Cat. No. W407-E1-07

SYSMAC CS/CJ Series

Loop Control Boards
CS1W-LCB01/LCB05
Process-control CPU Units
CS1D-CPU□□P
(CPU Unit: CS1D-CPU□□H, Loop Controller: LCB05D)
Loop-control CPU Units
CJ1G-CPU42P
(CPU Unit: CJ1G-CPU42H, Loop Controller: LCB01)
CJ1G-CPU43P/44P/45P
(CPU Unit: CJ1G-CPU43H/44H/45H, Loop Controller: LCB03)

FUNCTION BLOCK REFERENCE MANUAL

OMRON

Loop Control Boards
CS1W-LCB01/LCB05

Process-control CPU Units
CS1D-CPU□□P
(CPU Unit: CS1D-CPU□□H, Loop Controller: LCB05D)

Loop-control CPU Units
CJ1G-CPU42P
(CPU Unit: CJ1G-CPU42H, Loop Controller: LCB01)
CJ1G-CPU43P/44P/45P
(CPU Unit: CJ1G-CPU43H/44H/45H, Loop Controller: LCB03)

FUNCTION BLOCK REFERENCE MANUAL

Revised November 2007

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.
The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.
⚠WARNING	Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.
⚠Caution	Indicates an imminently hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The work "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.
The abbreviation "Ch" which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.
The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

©OMRON, 2000

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.

No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the user of the information contained in this publication.

About this Manual:

This manual describes the installation and operation of the CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units, and includes the sections described below.
The CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units help you build an instrumentation system comprising multiple loops. A Loop Control Board is installed as an Inner Board in the CPU Unit of a CS-series PLC (Programmable Controller).
The CS1W-LCB01 and CS1W-LCB05 Loop Control Boards must be installed in CS1-H CPU Units. They cannot be used in CS1 CPU Units.
Please read this manual and the other manuals related to the CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units carefully and be sure you understand the information provided before attempting to install and operate the products. The manuals used with the CS1W-LCB01, CS1W-LCB05 Loop Control Boards, CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units are listed in the following table. The suffixes have been omitted from the catalog numbers. Be sure you are using the most recent version for your area.

Name	Contents	Cat. No. (suffixes omitted)
SYSMAC CS/CJ Series CS1W-LCB01, CS1W-LCB05, CS1D-CPU□□P and CJ1G-CPU□□P Function Block Reference Manual	Provides detailed information on the function blocks.	W407
SYSMAC CS/CJ Series CS1W-LCB01, CS1W-LCB05, CS1D-CPU□□P and CJ1G-CPU□□P Operation Manual	Describes the basic running of the Loop Control Boards (excluding detailed descriptions of the function blocks).	W406
CXONE-AL□□C-E CX-One FA Integrated Tool Package Setup Manual	Describes the installation and operation of the CX-One FA Integrated Tool Package. Refer to this manual when installing support software from the CX-One Package.	W444-E1-01
SYSMAC CS/CJ Series CX-Process Tool Operation Manual	Describes operation of the CX-Process Tool.	W372
Faceplate Auto-Builder for NS Operation Manual	Describes operation of the software that generates NS-series PT projects from a SCADA CSV file output by the CX-Process Tool.	W418

When using CS1D Process-control CPU Units, in which CS1D-LCB05D Duplex Loop Control Boards are included, refer to the following manual for information on the CS1D CPU Unit.

Name	Contents	Cat. No. (suffixes omitted)
SYSMAC CS Series CS1D-CPU□□H CS1D-DPL01 CS1D-PA/PD□□□ CS1D Duplex System Operation Manual	Describes the setup and operation of CS1D Duplex systems.	W405

When using CJ Series Loop-control CPU Units, refer to the following manual for information on the CJ1-H CPU Unit elements.

Name	Contents	Cat. No. (suffixes omitted)
SYSMAC CJ Series Programmable Controllers	Provides an outlines of and describes the design, installation, maintenance, and	W393

Name	Contents	Cat. No. (suffixes omitted)
Operation Manual CJ1G/H-CPU□□H, CJ1G-CPU□□P, CJ1MCPU□□, CJ1G-CPU□□	other basic operations for the CJ-series PLCs.	
SYSMAC CS/CJ Series Programmable Controllers Programming Manual CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1DCPU□□H, CS1D-CPU□□S, CJ1G/H-CPU□□H, CJ1G-CPU□□P, CJ1MCPU□□, CJ1G-CPU□□	This manual describes programming and other methods to use the functions of the CS/CJ-series PLCs.	W394
SYSMAC CS/CJ Series Programmable Controllers Instructions Reference Manual CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1DCPU□□H, CS1D-CPU□□S, CJ1G/H-CPU□□H, CJ1G-CPU□□P, CJ1MCPU□□, CJ1G-CPU□□	This manual describes the ladder diagram programming instructions supported by CS/CJ-series PLCs.	W340

Section 1 describes the features and system configuration of CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units.

Section 2 describes the names and functions of parts, and provides other information required to install and operate CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units.

Section 3 provides information on the control mechanism, basic operation, exchanging data with other Units and software, and fail-safe countermeasures for CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units.

Section 4 describes a simple example of how to use CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units.

Section 5 describes basic examples of combining function blocks.

Section 6 provides information on how to use FINS commands.

Section 7 provides information on errors that may occur while running of CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units and guidelines for troubleshooting these errors.

Appendix 1 describes how to use the Step Ladder Program block on CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units and Appendix 2 describes how to use the Sequence Table block on CS1W-LCB01 and CS1W-LCB05, and CS1D-LCB05D.

⚠WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Loop Controllers

Loop Control Types, Functional Elements, and Versions

Loop Controller Types

There are two types of CS/CJ-series Loop Controller: Separate Loop Controllers and Loop Controllers Pre-installed in CPU Units

Loop Controller type	Type name	Product name	Model	PLC series and Unit type
Separate	Separate Loop Controller	Loop Control Unit	CS1W-LC001	CS-series CPU Bus Unit Loop Controller
		Loop Control Board	CS1W-LCB01/05	CS-series Inner Board Loop Controller
Pre-installed in CPU Unit	CPU Unit with Pre-installed Loop Controller	Process-control CPU Unit	CS1D-CPU□□P	A one-Unit Loop Controller consisting of an Inner Board pre-installed in a CS-series CS1D-H CPU Unit
		Loop-control CPU Unit	CJ1G-CPU□□P	A one-Unit Loop Controller consisting of an Inner Board pre-installed in a CJ-series CJ1-H CPU Unit

Loop Controller Functional Elements

- Separate Loop Controllers consist of only the Loop Controller functional element (i.e., the Loop Controller element).
- CPU Units with Pre-installed Loop Controller consists of a CPU Unit functional element (i.e., the CPU Unit element) and the Loop Controller functional element (i.e., the Loop Controller element).

Versions

The functional elements (i.e., the CPU Unit element and Loop Controller element) have versions.

Model Numbers and Functional Elements

The following table lists the Loop Controller product model numbers, the functional element names for the CPU Unit elements and Loop Controller elements, and the versions of the functional elements.

Product name	Product model number	Unit version of the product model (See note.)	Configuration			
			CPU Unit element		Loop Controller element	
			CPU Unit model with same functionality	Functional element Unit version	Functional element name	Functional element version
Loop Control Unit	CS1W-LC001	Pre-Ver. 2.0	-		LC001	Ver. 2.5
Loop Control Board	CS1W-LCB01	Ver. 2.0 to Ver. 3.5	-		LCB01	Ver. 2.0 to Ver. 3.5
	CS1W-LCB05				LCB05	
Process-control CPU Unit	CS1D-CPU65P	-	CS1D-CPU65H	Ver. 1.0 or later	LCB05D	Ver. 1.0
	CS1D-CPU67P		CS1D-CPU67H	Ver. 1.0 or later	LCB05D	
Loop-control CPU Unit	CJ1G-CPU42P	-	CJ1G-CPU42H	Ver. 3.0 or later	LCB01	Ver. 2.0 to Ver. 3.5
	CJ1G-CPU43P		CJ1G-CPU43H	Ver. 3.0 or later	LCB03	
	CJ1G-CPU44P		CJ1G-CPU44H	Ver. 3.0 or later	LCB03	
	CJ1G-CPU45P		CJ1G-CPU45H	Ver. 3.0 or later	LCB03	

Note: Only Separate Loop Controllers have a Unit version for the product model. CPU Units with Pre-installed Loop Controllers do not have a Unit version for the product model.

Notation in this Manual

This manual uses the following notation.

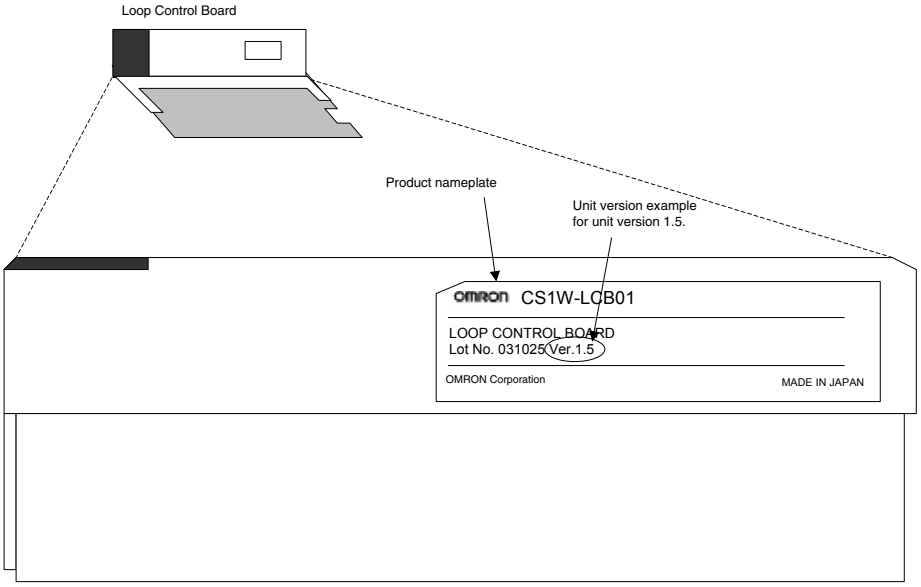
- "Loop Controller" is used as a generic term to refer to the Loop Controllers in general.
- "LCB□□" is used to refer to specific Loop Controller functional elements. For example, the Loop Controller function element in a CS1W-LCB05 Loop Control Board is the LCB05, so "LCB05" is used to refer to the Loop Controller functional element. The Loop Controller function element in a CJ1G-CPU44P Loop-control CPU Unit is the LCB03, so "LCB03" is used to refer to the Loop Controller functional element.
- Model numbers are used to refer to specific Loop Controller models.

In the *CX-Process Tool Operation Manual* for version 3.2 or lower, functional element names (LCB□□) are given as "Loop Control Board." In the *CX-Process Tool Operation Manual* for version 4.0 or higher, simply "LCB□□" is used.

Unit Version Notation on Products

Loop Control Boards

A "unit version" has been introduced to manage CPU Units, Special I/0 Units, and Inner Boards in the CS/CJ Series according to differences in functionality accompanying upgrades. This system applies to Units manufactured since October 1, 2003. The unit version code is provided on the nameplate of the product for which unit versions are being managed, as shown below for the Loop Control Board.



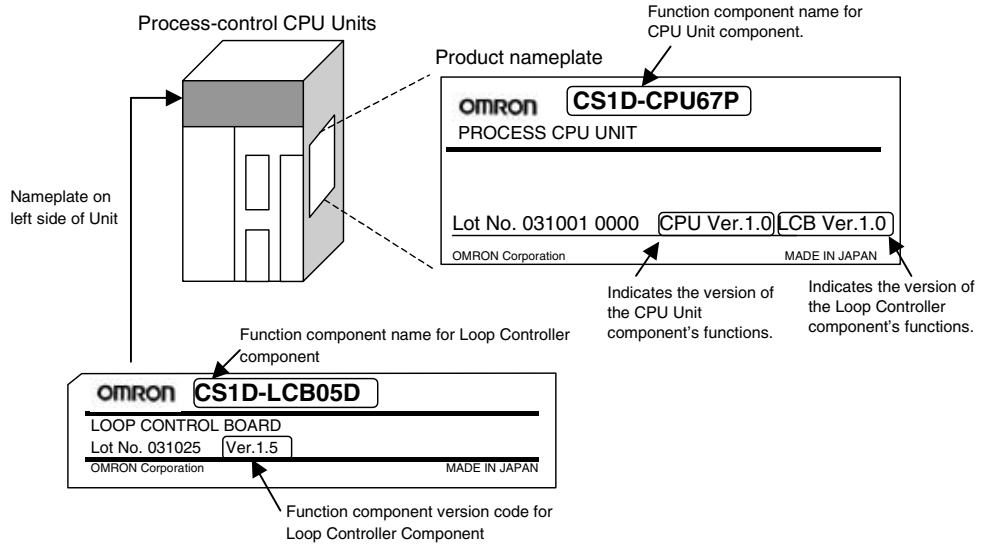
The CX-Process Tool can be used to confirm the unit versions of Loop Control Boards in the Monitor Run Status Window. After connecting the CX-Process Tool online, select Operation - Monitor Run Status from the Execute Menu.
Confirm the unit version in ITEM 099 (MPU/FROM version display) under from the System Common Block (Block Model 000) in the Monitor Run Status Window.

ITEM	Data Name	Data
099	MPU/FROM version display	V1.50

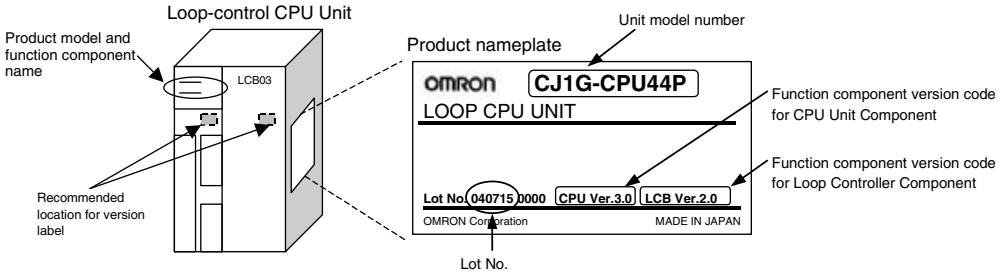
Version 1.50 and onward must be indicated.

Process-control CPU Units

Note: CPU Unit components for which no version code is provided are pre-Ver. 2.0 CPU Units.



Loop-control CPU Units



Confirming CPU Unit Component Versions with Support Software

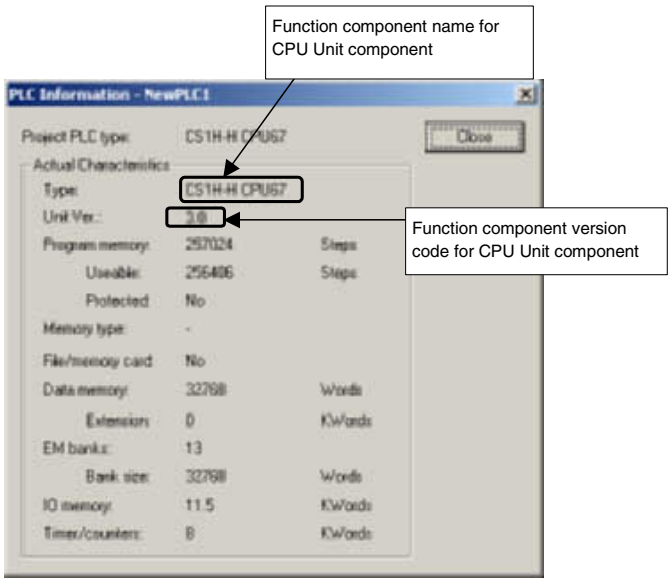
CX-Programmer version 4.0 can be used to confirm the unit version using either of the following two methods.

- Using the PLC Information
- Using the *Unit Manufacturing Information* (This method can also be used for Special I/0 Units and CPU Bus Units.)

Note: CX-Programmer version 3.3 or lower cannot be used to confirm unit versions.

PLC Information

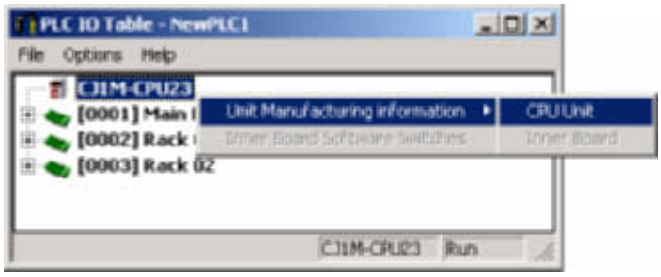
1. If you know the device type and CPU type, select them in the Change PLC dialog box, go online, and select ***PLC-Edit-Information*** from the menus.
   If you do not know the device type and CPU type, but are connected directly to the CPU Unit on a serial line, select ***PLC-Auto Online*** to go Online, and then select ***PLC- Edit- Information*** from the menus.
2. In either case, the following PLC Information Dialog Box will be displayed.



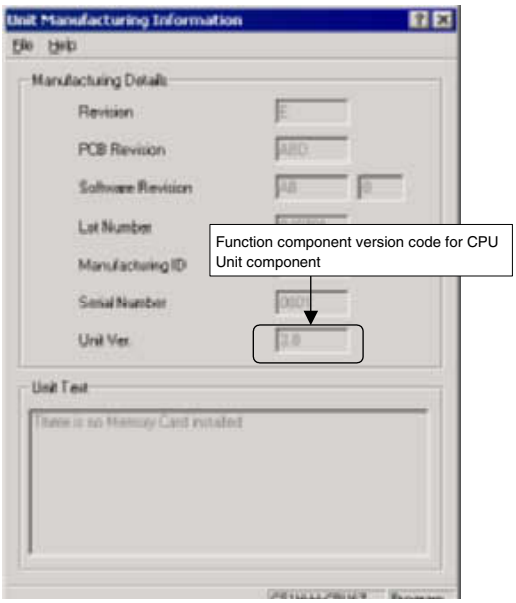
Use the above display to confirm the unit version of the CPU Unit that is connected online.

Unit Manufacturing Information

1. In the I/O Table Window, right-click and select ***Unit Manufacturing Information-CPU Unit.***



2 The Following Unit Manufacturing Information Dialog Box will be displayed.



Use the above display to confirm the unit version of the CPU Unit connected online.

Function Component Versions and Programming Devices

The Programming Device that supports the function component version code must be used to enable all the functions in the corresponding function component.
Note: Upgrading versions is not necessary if only the basic functions of the CPU Unit component are required.

CPU Unit Components

Loop Controller		Programming Device	
Function component name	**Function component version**	**CX-Process Tool**	**CX-Programmer (See note.)**
CS1G/H-CPU□□H	Pre-Ver. 2.0	-	-
	Ver. 2.0		Ver. 4.0 or higher
	Ver. 3.0		Ver. 5.0 or higher
	Ver. 4.0		Ver. 7.0 or higher
CS1D-CPU□□H	Vcr. 1.1		Ver. 4.0 or higher
CJ1G-CPU□□H	Ver. 3.0		Ver. 5.0 or higher
	Ver. 4.0		Ver. 7.0 or higher

Loop Controller Components

Loop Controller		Programming Device	
Function component name	**Function component version**	**CX-Process Tool**	**CX-Programmer (See note.)**
LCB01	Ver. 1.0	Not specific	-
	Ver. 1.5	Ver. 3.2 or higher	
	Ver. 2.0	Vcr. 4.0 or higher	
	Ver. 3.0	Ver. 5.0 or higher	
	Ver. 3.5	Ver. 5.2 or higher	
LCB03	Ver. 2.0	Ver. 4.0 or higher	
	Ver. 3.0	Ver. 5.0 or higher	
	Ver. 3.5	Ver. 5.2 or higher	
LCB05	Ver. 1.0	Not specific	
	Vcr. 1.5	Ver. 3.2 or higher	
	Ver. 2.0	Ver. 4.0 or higher	
	Ver. 3.0	Ver. 5.0 or higher	
	Ver. 3.5	Ver. 5.2 or higher	
LCB05D	Ver. 1.0	Ver. 3.2 or higher	

Precautions

This section provides general precautions for using the Programmable Controller (PLC) and related devices.

The information contained in this section is important for the safe and reliable application of the Programmable Controller. You must read this section and understand the information contained before attempting to set up or operate a PLC system.

1 Intended Audience xvi
2 General Precautions xvi
3 Safety Precautions xvii
4 Operating Environment Precautions xix
5 Application Precautions xx
6 EC Directives xxii
7 Other Applicable Directives xxii

1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent) and knowledge about instrumentation system.

- Personnel in charge of installing FA systems
- Personnel in charge of designing FA systems
- Personnel in charge of managing FA systems and facilities

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in this manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, petrochemical plants, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the system, machines and equipment with double safety mechanism.

This manual provides information for running CS1W-LCB01 and CS1W-LCB05 Loop Control Boards, and CS1D-CPU□□P Process-control CPU Units, and CJ1G-CPU□□P Loop-control CPU Units. Be sure to read this manual before attempting to use the Loop Control Boards and related software (CX-Process Tool) and keep this manual close at hand for reference during running.

⚠WARNING It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications.

3 Safety Precautions

⚠WARNING Do not attempt to take any Unit or Board apart while power is being supplied. Doing so may result in electric shock.

⚠WARNING Do not touch live terminals. Electric shock will result.

⚠WARNING Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- When using a CS1D-CPU□□P Process-control CPU Units, the CS1D Duplex System will stop operating and all outputs will be turned OFF in the following cases:
  - The self-diagnostic function detected errors at the same time in both the active side (CPU Unit or Loop Controller) and the standby side (CPU Unit or Loop Controller).
  - A SEVERE FAILURE ALARM (FALS) instruction is executed and generated fatal errors at the same time in both the active CPU Unit and the standby CPU Unit.
  - The self-diagnostic function detected an error while operating in simplex mode or performing duplex initialization in duplex mode.
  - A SEVERE FAILURE ALARM (FALS) instruction was executed and generated a fatal error while operating in simplex mode or performing duplex initialization in duplex mode.

  As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.
- When a CS1W-LCB01 or CS1W-LCB05 Loop Control Board is mounted in a CS1-H CPU Unit, the CPU Unit will stop operating and all outputs will be turned OFF if the self-diagnostic function detected an error or a SEVERE FAILURE ALARM (FALS) instruction was executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-V DC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

⚠WARNING Check the following items before starting to run the Loop Control Board:
- Do not allow the bank of the EM Area with the number specified for allocation to the HMI (human-machine interface) data to overlap with any other area used by the CPU Unit or other Units. The block allocated for the HMI is specified in ITEM 050 (EM Area Bank Allocated for HMI Memory = 0 to 12) of the System Common block (Block Model 000). If areas overlap, the system may operate in an unexpected manner, which may result in injury.
- Do not allow the area to which user link table data is written to overlap with any other area used by the CPU Unit or other Units. If areas overlap, the system may operate in an unexpected manner, which may result in injury.
- Analog Input/Output Units used in combination with the Loop Controller must be mounted correctly, and the unit number set on the front panel of the Analog Input/Output Unit must match the unit number set on the Field Terminal block. If the unit numbers do not match, input/output (read/write) is performed on the data of another Special I/O Unit (whose unit number is set on the Field Terminal block).
- The defaults of the System Common block on the Loop Control Board must be set correctly.
- Always stop the operation of the Loop Controller before converting any of the EM Area to file memory. If any part of the EM Area that is being used by the Loop Control Board for the HMI is converted to file memory during Board operation, the system may operate in an unexpected manner, which may result in injury.

⚠WARNING Do not use battery-free operation for the CS1-H CPU Unit or the CPU functional element of a Process-control CPU Unit or Loop-control CPU Unit. If battery-free operation is used for the CPU Unit or CPU function element, the contents of the EM Area will not be stable when the power supply is turned ON, possibly causing illegal values in the HMI data in the Loop Controller.

⚠WARNING Do not perform processing in such a way that the Loop Control Board and CPU Unit perform writing on identical I/O memory addresses allocated to an contact output or analog output to an external Unit. If writing is performed on identical addresses, the externally connected load may act unexpectedly and cause injury.

⚠WARNING When using the CS1D-CPU□□P Process-control CPU Units, both the CPU Unit's cycle time and the Loop Controller's operation cycle will be temporarily longer than normal during duplex initialization (in duplex mode). The extended cycle time and operation cycle may temporarily worsen the control characteristics, so verify the system's operation in test runs before actually running the system.

⚠WARNING
- When using LCB unit version 3.5 or later and transferring program pattern data from the Loop Controller to the memory of the CPU Unit, be sure that the part of memory where the program patter data is transferred is not being used by another Unit. If the same part of memory is used by more than one Unit, unexpected system operation may result.
- When using LCB unit version 3.5 or later and transferring program pattern data to the Loop Controller, make sure that the program pattern data is set correctly. If incorrect program pattern data is transferred to the Loop Controller, unexpected operation of the Loop Controller may result.

4 Operating Environment Precautions

4-1 CS1D-CPU□□P Process-control CPU Units Precautions

- Normal operation will be possible only if the CS1D-CPU□□P Process-control CPU Units is used in the combination in which they were shipped. Normal operation may not be possible if the CS1D-CPU□□P Process-control CPU Units is used in any other combination. Therefore, do not remove the Loop Controller component from the CPU Unit. Always replace the entire CS1D-CPU□□P Process-control CPU Units as one Unit even if only the Loop Controller or CPU Unit has failed.
- The CS1D CPU Unit's cycle time and the Loop Controller component's LCB load rate are different in duplex mode and simplex mode. Verify the system's operation in both modes in trial operation before actually running the system.
- When replacing a CS1D Process-control CPU Unit while power is supplied to the PLC, always switch the DPL Unit's CPU USE/NO USE switch to "NO USE." Removing the CS1D Process-control CPU Unit with the switch set to "USE" (power supplied) may damage the CPU Duplex Backplane, CS1D CPU Unit, DPL Unit, and Loop Controller component of the Process-control CPU Unit.

4-2 CS1W-LCB01/CS1W-LCB05 Loop Control Boards Precautions

- Do not use a CS1W-LCB01 or CS1W-LCB05 Loop Control Board in any CPU Unit other than the CS1-H.
- If a CS1W-LCB01 or CS1W-LCB05 Loop Control Board is used in a CS1 CPU Unit, a non-fatal INNER Board error will occur and the Loop Control Board will not operate. (The CPU Unit itself will be able to operate.)
- If a CS1W-LCB01 or CS1W-LCB05 Loop Control Board is used in a CS1D CPU Unit, a fatal INNER Board error will occur. (In this case, neither the Loop Control Board nor the CPU Unit will operate.)
- Loop Control Boards before version 1.5 cannot be used with CS1D-CPU□□S CS1D CPU Units for Single-CPU Systems.

4-3 Precautions for All Loop Control Boards, Process-control CPU Units, and Loop-control CPU Units

⚠Caution Do not operate the control system in the following places:
- Locations subject to direct sunlight
- Locations subject to temperature or humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to exposure to water, oil, or chemicals
- Locations subject to shock or vibration

⚠Caution Take appropriate and sufficient countermeasures when installing systems in the following locations:
- Locations subject to static electricity or other forms of noise
- Locations subject to strong electromagnetic fields
- Locations subject possible exposure to radioactivity
- Locations close to power supplies

⚠Caution The operating environment of the PLC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PLC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PLC.

⚠WARNING

Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always connect to a class-3 ground (to 100 Ω or less) when installing the Units. Not connecting to a class-3 ground may result in electric shock.
- Always turn OFF the power to the PLC before attempting any of the following. Not turning OFF the power may result in malfunction or electric shock.
- Mounting or dismounting I/O Units
- Assembling the Units
- Setting DIP switches or unit number setting switches
- Connecting or wiring the cables
- Connecting or disconnecting the connectors

⚠Caution

Failure to abide by the following precautions could lead to faulty operation of the PLC or the system, or could damage the PLC or PLC Units. Always heed these precautions.

- If the power supply is turned OFF while function block data is being backed up from RAM to flash memory, the backup will not be completed normally. If the power supply is turned back ON within 24 hours, however, the super capacitor will have held the RAM data. The backup operation will restart when power is turned ON and operation will start when the backup has been completed. If the power supply is turned OFF for more than 24 hours, however, RAM data will be lost and operation will be started with the data that was previously saved to flash memory. If this happens, the Cold Start Auto-execution Flag (A35807) will turn ON to show that the previous data has been used. Use this bit in programming to take whatever steps are necessary, such as downloading the most recent function block data.
- To hold analog outputs or contact outputs at specific values (for example, maximum value or minimum value) when the Loop Controller has stopped running, create a Step Ladder Program on the CPU Unit so that each of the allocated bits on the Analog Output Unit or Contact Output Unit are set to a specific value taking the N.C. condition of the Loop Control Board Running flag (A35801) as the input condition.
- When a fatal error occurs on the CPU Unit (including execution of the FALS instruction), the Loop Controller also stops running. To hold the analog output to the previous value before the stop occurred, and to set the analog output to either the minimum value or maximum value, use the output hold function of the Analog Output Unit or Analog Input/Output Unit.
- Before turning ON the power to the PLC, make sure that the facilities are safe.
- The analog output values and contact outputs from the Loop Controller are updated at the same time that the power to the PLC is turned ON regardless of the operation mode of the CPU Unit (including the PROGRAM mode). (Internally, the analog output values and contact outputs are sent via the CPU Unit to the Basic I/O Unit and Analog Output Unit.)
- The Loop Controller itself does not have a human-machine interface. So, an external interface such as SCADA software must be provided.
- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions or other causes.

- Before touching the PLC, be sure to first touch a grounded metallic object in order to discharge any static build-up. Otherwise, it might result in a malfunction or damage.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Do not attempt to disassemble, repair, or modify any Units or Boards.
- Leave the dust-protection label attached to the top Unit when wiring. Removing the label may result in malfunction.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Check the user program for proper execution before actually running it on the Unit or Board. Not checking the program may result in an unexpected operation.
- Double-check all the wiring before turning ON the power supply. Incorrect wiring may result in burning.
- Tighten the PLC Backplane mounting screws, terminal block screws, and cable (connector) screws to the torque specified in user manuals.
- Confirm that no adverse effect will occur in the system before attempting any of the following:
  - Changing the operating mode of the PLC (including the setting of the startup operating mode).
  - Force-setting/force-resetting of any contact in memory
  - Changing the present value or any set value in memory
- Do not connect pin 6 (+5 V power supply line) of the RS-232C port on the CPU Unit to any external device except the CJ1W-CIF11 RS-422A Adapter or NT-AL001 RS-232C/RS-422A Adapter. Doing so may damage the external device or CPU Unit.

6 EC Directives

CS-series products confirm to EC Directives. For the system to conform to EC Directives, however, the following precautions must be adhered to.

- CS-series Units must be installed within control panel.
- Use reinforced insulation of double insulation for the DC power supplies used for the I/O power supplies.
- CS-series products that meet EC Directives also meet the Common Emission Standard (EN61000-6-4). The measure necessary to ensure that standards, such as the radiated emission standard (10 m), are met, however, will vary depending on the overall configuration of the control panel, the other devices to the control panel, and wiring. You must therefore confirm that EC Directives are met for the overall machine or device.

7 Other Applicable Directives

Applicable Directives

- EMC Directive
- Low Voltage Directive

Concepts

EMC Directive

In order that OMRON products can be used with any machinery and in combination with other manufacturer's equipment, the products themselves are designed to comply with EMC standards (see Note), so that the assembled machinery or device can then also easily comply with EMC standards.

Even if machinery and equipment complies with EMC standards before assembly, this compliance may change depending on the device, the configuration of the control panel, and wiring, so OMRON cannot guarantee that a particular system complies with the directive. You must therefore confirm that EMC Directives are met for the overall machine or device.

Note EMC: One directive relating to Electro-Magnetic Compatibility
EMS: Electro-Magnetic Susceptibility standard EN6100-6-2
EMI: Electro-Magnetic Interference standard EN61000-6-4
Common Emission Standard EN61000-6-4, radiated emission standard (10 m)

Low Voltage Directive

The Low Voltage Directive provides that necessary safety standards are guaranteed for devices operating at voltages of 50 to 1,000 V AC or 75 to 1,500 V DC to comply with EN61131-2.

Version Upgrade Information

The following functions have been added to the LCB01 and LCB05 Loop Controllers with the upgrade from version 3.0 to version 3.5.

- Select the appropriate unit version when registering an LCB/LC001 in CX Process Tool (select ***Insert - Insert Node*** from the Settings Menu). If the unit version is incorrectly set to V1.0, V1.5, or V2.0, select ***Convert LCB Model*** from the Execution Menu, and update the unit version.

Item	Loop Controller version				
	Ver.1.0	**Ver.1.5**	**Ver.2.0**	**Ver.3.0**	**Ver.3.5**
Compatible CX-Process Tool version	**Ver. 3.2 or lower**	**Ver. 3.2 or higher**	**Ver. 4.0 or higher**	**Ver. 5.0 or higher**	**Ver. 5.2 or higher**
Segment Program 3 block (Block Model 158) added.	---	---	---	---	Supported
Data backup during Loop Controller operation added.	---	---	---	---	Supported
Simple backup file recovery using FINS command added.	---	---	---	---	Supported
Improved Segment Program 2 block (Block Model 157) functionality	---	---	---	---	Supported
Online editing of sequence tables	---	Supported	Supported	Supported	Supported
Displaying PVs and changing SVs of timers and counters in sequence tables	---	Supported	Supported	Supported	Supported
Bank Selector block (Block Model 168) for PID constants	---	Supported	Supported	Supported	Supported
Split Converter block (Block Model 169)	---	Supported	Supported	Supported	Supported
Disturbance overshooting suppression for Basic PID (Block Model 011) and Advanced PID (Block Model 012)	---	Supported	Supported	Supported	Supported
MV Limit Alarm Stop switch and MV Alarm Control Stop switch for general Control blocks	---	Supported	Supported	Supported	Supported
Easy backup of function block data from Loop Controller to Memory Card	---	---	Supported	Supported	Supported
Memory Card backup for tag settings, comments, and user link table connection information prepared using CX-Process Tool	---	---	Supported	Supported	Supported
First or second reference input match selection for Segment Program 2 (Block Model 157) start	---	---	Supported	Supported	Supported
Synchronization of Segment Program 2 (Block Model 157)	---	---	Supported	Supported	Supported
Hot start enabled time setting	---	---	Supported	Supported	Supported
Secondary loop anti-reset wind-up with cascade control	---	---	Supported	Supported	Supported
Added Split Converter block (Block Model 169) input range setting from 0.00 to 100.00%	---	---	Supported	Supported	Supported
Added field terminal blocks	---	---	AI 4-point Terminal (PTS51/52) AI 8-point Terminal (PTS55/56) AI 4-point Terminal (PDC55) AO 2-point Terminal (DA021) AI 4-point/AO 2-point Terminal (MAD42)	AI 2-point Terminal (PTS15/16, PDC15) AI 16-point Terminal (AD161)	In addition to the ones shown to the left, the following field terminal blocks were added: AI 4-point Terminal (PH41U) AI 4-point Terminal (AD04U) AI 4-point Terminal (ADG41)
Other added function blocks	---	---	---	Switch Instrument block (Block Model 225)	–
Wireless debugging function (Allows the user to enter pseudo inputs to a function block's PVs from the CX-Process Tool or HMI I/F.)	---	---	---	Supported	Supported

Item	Loop Controller version				
	Ver.1.0	Ver.1.5	Ver.2.0	Ver.3.0	Ver.3.5
MV tight shut function (An analog output terminal can be a tight shut output to the CPU Unit's I/O memory in the user link table.)	---	---	---	Supported	Supported
MV analog output invert function (A field terminal (analog output terminal) can be inverted to the CPU Unit's I/O memory in the user link table.)	---	---	---	Supported	Supported
RUN/STOP function (PID processing can be started or stopped in individual function blocks, such as the Basic PID (Block Model 011) or Advanced PID (Block Model 012).)	---	---	---	Supported	Supported
Switch control action direction function (Can switch the control action direction when operating the Basic PID block (Block Model 011) or Advanced PID (Block Model 012) in Auto mode.)	---	---	---	Supported	Supported
Reference sequence table function (Can reference another table's condition judgment in the Sequence Table block (Block Model 302).)	---	---	---	Supported	Supported
Added timer function (Can specify a TIM (timer) command in the Step Ladder block (Block Model 301).)	---	---	---	Supported	Supported
Pulse output function (Can generate a pulse output (ON for 1 refresh cycle) in the user link table.)	---	---	---	Supported	Supported
Expanded user link table EM specification (EM banks other than EM bank 0 (EM0) can be specified as data areas in the user link table.)	---	---	---	Supported. Banks EM1 to EMC can be specified.	Supported. Banks EM1 to EMC can be specified.
Number of data items that can be written increased from 8 to 16 for Constant ITEM Setting (Block Model 171)	---	---	---	Supported	Supported
Simple backup added for block diagram data, tags, comments, and annotation data, in addition to function block data.	---	---	---	Supported	Supported
The data backed up for the simple backup operation was changed from RAM to Flash memory.	---	---	---	Supported	Supported

Upgraded Functions for LCB01/05 and LCB03 Version 3.5

Segment Program 3 Block (Block Model 158) Added

- The maximum number of steps that can be used per program has been increased to 100, making it easier to create more complex temperature control programs.
- A built-in bank (e.g., PID) switching function makes it possible to change to the optimum PID parameters when moving between steps.
- Auto-tuning can be started from the Segment Program 3 block for a Basic PID block (Block Model 011) or an Advanced PID block (Block Model 012), making it easy to execute auto-tuning for each step.
- Program data and other data can be read from the LCB to the DM Area of the PLC, or written from the DM Area to the LCB, making it easy to quickly replace program data. The following data is output as time information during temperature control program execution: elapsed time since the run/stop command turned ON, program total time, step time output, step remaining time, program time output, and program remaining time.

Data Backup during Loop Controller Operation Added

By using an external backup specification in the System Common block (Block Model 000), function block data can be backed up to Flash memory during Loop Controller operation without using the CX-Process Tool.

Function Block Data Replacement (Direct Recovery) Added

The simple backup function supported by the LCB01, LCB03, and LCB05 has been further improved. Previously, a Memory Card was required both for backup (LCB to

Memory Card) and restoration (Memory Card to LCB). The improved function allows data to be restored using a communications command (FINS command) with no need for a Memory Card. Function blocks in the LCB can thus be overwritten by using communications from a host personal computer.

Improved Segment Program 2 Block (Block Model 157) Functionality

When the program is restarted using the X1 reference input function and there is more than one matching point for the X1 reference input, it is possible to specify the matching point from which the program is to be restarted.

Terminal Blocks Added

I/O field terminal blocks have been added for the Units listed in the following table.

Unit name	Model	Block model	Block name
CJ-series Isolated-type High-resolution Analog Input Unit with Fully Universal Inputs	CJ1W-PH41U	572	AI 4-point Terminal (PH41U)
CJ-series Isolated-type General-purpose Analog Input Unit with Fully Universal Inputs	CJ1W-AD04U	573	AI 4-point Terminal (AD04U)
CJ-series High-speed Analog Input Unit	CJ1W-ADG41	581	AI 4-point Terminal (ADG41)

Upgraded Functions for LCB01/05 and LCB03 Version 3.0

Wireless Debugging Function (Pseudo PV Input)

The user can enter a fixed pseudo input to the PV of a control block (Basic PID, Advanced PID, etc.) from the CX-Process Tool, SCADA software, or a PT while the Loop Controller is operating. Then enables easily confirming the operation of the entire function block for specific PV values without actually connecting an external sensor or other input device. Pseudo inputs can also be used to enable easily replacing sensors during operation.

Tight Shut Function

Tight shut outputs can be used to output values to I/O memory in the CPU Unit using a field terminal (analog output terminal) or a user link table. A specified lower limit (−20.00% min.) is output for values under 0% and a specified upper limit (+115.00% max.) is output for output values greater than 100%. This enables completely opening or closing values using only 0% or 100% outputs for MVs from control blocks.

Analog Output Invert Function

Values output from a field terminal (analog output terminal) or user link table can be inverted when outputting them to I/O memory in the CPU Unit. For example, 0.00% would be output for 100.00% and 100.00% would be output for 0.00%. This enables easily reversion analog outputs, e.g., when the opening and closing directions of valves delivered to the production site are backward.

RUN/STOP Function for Individual PID Blocks

PID processing can be started or stopped in individual function blocks using a contact input (run/stop switch) for the Basic PID (Block Model 011) or Advanced PID (Block Model 012). The MV when PID processing is speed can also be specified (MV at stop). Although previously, alarm processing and PV input processing was stopped when processing was stopped for individual function blocks, but now only PID processing can be stopped for user-set conditions, the MV can be held at the specified value, and processing can be restarted. Bumpless processing does not function for the MV output when changing from STOP to RUN, reducing the startup time for fast temperature rises.

Switching Control Action Direction in PID Blocks

The control action direction (direct/reverse) can be switched when executing a Basic PID block (Block Model 011) or Advanced PID (Block Model 012). PID processing will be automatically initialized when the direction is changed, and bumpless processing

will be used for the MV. This enables easily switching between heating and cooling control from SCADA software or a PT (i.e., an HMI interface) without greatly disturbing control.

Referencing Sequence Tables

Another table's condition judgments can be referenced from a sequence table. This enables placing common processing (like subroutines) in the table that is being referenced.

Timer Commands in Step Ladder Blocks

A timer can be used in the Step Ladder block (Block Model 301).

Pulse Output Function for User Link Tables

A one-shot pulse output (ON for 1 refresh cycle) can be generated in a user link table when a specified ITEM in the function block turns ON to write the status in the specified bit address of I/O memory in the CPU Unit. This enables easily outputting a trigger signal from the Loop Controller to the CPU Unit.

Expanded User Link Table EM Specifications

EM banks other than EM bank 0 (EM0) can be specified as data areas in the user link table. This enables using user link tables when EM bank 0 is being used for some other function in ladder programming or as file memory.

Field Terminal Blocks Added

Field terminal blocks have been added for the following Units.

Unit name	Model	Block model	Block name
CS-series Analog Input Unit	CS1W-AD161	582	AI 16-point Terminal (AD161)
CS-series Isolated-type Thermocouple Input Unit	CJ1W-PTS15	571	AI 2-point Terminal (PRS15/16,PDC15)
CJ-series Isolated-type Temperature-resistance Thermometer Input Unit	CJ1W-PTS16		
CJ-series Isolated-type Analog Input Unit	CJ1W-PDC15		

Switch Instrument Block Added

A Switch Instrument block (Block Model 225) has been added. This enables easily starting or stopping multiple motors or pumps, or easily monitoring and manipulating ON/OFF valve operation.

Saving Tag Settings, Comments, and Block Diagram Information Created with the CX-Process Tool in Flash Memory (CX-Process Tool Ver. 5.0)

If CX-Process Tool version 5.0 or higher is used, tag settings, comments, and block diagram information created with the CX-Process Tool can be saved in Flash memory built into the Loop Controller.

Unrestricted Layout of Function Blocks in Block Diagrams (CX-Process Tool Ver. 5.0)

If CX-Process Tool version 5.0 or higher is used, function blocks can be placed at any desired position on block diagrams.

TABLE OF CONTENTS

About this Manual: iii
Read and Understand this Manual v
Loop Controllers....ix
Unit Version Notation on Products....xi
Precautions xv

SECTION 1 List of Function Blocks.... 1
1-1 List of Function Blocks 2
1-2 How to Use Function Blocks for Specific Operations....8

SECTION 2 Description of Function Blocks 13
Conventions Used in Function Block Descriptions 17
System Common blocks
<000> System Common blocks 000 (fixed).... 18
Control blocks
<001> 2-position ON/OFF 001 to 500 31
<002> 3-position ON/OFF 001 to 500 38
<011> Basic PID 001 to 500.... 45
<012> Advanced PID 001 to 500.... 67
<013> Blended PID 001 to 500 82
<014> Batch Flowrate Capture 001 to 500.... 90
<016> Fuzzy Logic 001 to 100 96
<031> Indication and Setting 001 to 500.... 110
<032> Indication and Operation 001 to 500 114
<033> Ratio Setting 001 to 500.... 118
<034> Indicator 001 to 500.... 123
External Controller block
<045> ES100X Controller Terminal 601 to 632.... 126
Alarm/Signal restriction/Hold blocks
<111> High/Low Alarm 100 to 500 138
<112> Deviation Alarm 100 to 500 140
<113> Rate-of-change Operation and Alarm 100 to 500 142
<115> High/Low Limit 100 to 500.... 144
<116> Deviation Limit 100 to 500.... 146
<118> Analog Signal Hold 100 to 500.... 148

Arithmetic blocks
<121> Addition or Subtraction 100 to 500 ... 150
<122> Multiplication 100 to 500 ... 152
<123> Division 100 to 500 ... 154
<126> Arithmetic Operation 001 to 100 ... 156
<127> Range Conversion 001 to 500 ... 165
Function blocks
<131> Square Root 001 to 500 ... 169
<132> Absolute Value 001 to 500 ... 171
<133> Non-linear Gain (Dead Band) 001 to 500 ... 173
<134> Low-end Cutout 001 to 500 ... 175
<135> Segment Linearizer 100 to 349 ... 177
<136> Temperature and Pressure Correction 001 to 500 ... 180
Time Function blocks
<141> First-order Lag 001 to 500 ... 184
<143> Rate-of-change Limit 001 to 500 ... 186
<145> Moving Average 001 to 500 ... 188
<147> Lead/Delay 001 to 500 ... 190
<148> Dead Time 001 to 500 ... 192
<149> Dead Time Compensation 001 to 500 ... 194
<150> Accumulator for instantaneous value input 001 to 500 ... 196
<151> Run Time Accumulator 001 to 500 ... 200
<153> Time Sequence Data Statistics 001 to 100 ... 202
<155> Ramp Program 001 to 500 ... 207
<156> Segment Program 001 to 500 ... 216
<157> Segment Program 2 001 to 500 ... 220
<158> Segment Program 3 001 to 500 ... 246
<601> Step Data 001 to 500 ... 274
<602> Bank Data 001 to 500 ... 281
Signal Selection/Switching blocks
<161> Rank Selector 001 to 500 ... 288
<162> Input Selector 001 to 500 ... 291
<163> 3-input Selector 001 to 500 ... 294
<164> 3-output Selector 001 to 500 ... 297
<165> Constant Selector 001 to 500 ... 300
<166> Constant Generator 001 to 500 ... 303
<167> Ramped Switch 001 to 500 ... 308
<168> Bank Selector 001 to 500 ... 308
<169> Split Converter 001 to 500 ... 318
ITEM Setting blocks
<171> Constant ITEM Setting 001 to 500 ... 328
<172> Variable ITEM Setting 001 to 500 ... 333
<174> Batch Data Collector 001 to 500 ... 337

Pulse Train Operation blocks
<182> Accumulated Value Input Adder 001 to 500 ... 340
<183> Accumulated Value Analog Multiplier 001to 500 ... 343
<184> Accumulator for accumulated value input 001 to 500 ... 346
<185> Contact Input/ Accumulated Value Output 001 to 500 ... 350
<186> Accumulated Value Input/ Contact Output 001 to 500 ... 353
Other blocks
<192> Analog/Pulse Width Converter 001 to 500 ... 356
Sequential Operation blocks
<201> Contact Distributor 001 to 500 ... 359
<202> Constant Comparator 001 to 500 ... 361
<203> Variable Comparator 001 to 500 ... 365
<205> Timer 001 to 005 ... 369
<206> ON/OFF Timer 001 to 500 ... 371
<207> Clock Pulse 001 to 500 ... 373
<208> Counter 001 to 500 ... 375
<209> Internal Switch 001 to 500 ... 377
<210> Level Check 001 to 500 ... 379
Contact Type Control Target
<221> ON/OFF Valve Manipulator 001 to 500 ... 384
<222> Motor Manipulator 001 to 500 ... 388
<223> Reversible Motor Manipulator 001 to 500 ... 393
<224> Motor Opening Manipulator 001 to 500 ... 398
<225> Switch Instrument 001 to 500 ... 404
Sequential Control block
<301> Step Ladder Program 701 to 900 ... 423
<302> Sequence Table 701 to 900 ... 450
Field Terminal Block
<501> DI 8-point Terminal 901 to 980 ... 456
<502> DI 16-point Terminal 901 to 980 ... 457
<503> DI 32-point Terminal 901 to 980 ... 458
<504> DI 64-point Terminal 901 to 980 ... 459
<511> DO 5-point Terminal 901 to 980 ... 461
<512> DO 8-point Terminal 901 to 980 ... 462
<513> DO 12-point Terminal 901 to 980 ... 463
<514> DO 16-point Terminal 901 to 980 ... 464
<515> DO 32-point Terminal 901 to 980 ... 465
<516> DO 64-point Terminal 901 to 980 ... 466
<518> DI 16-point/DO 16-point Terminal 901 to 980 ... 467
<525> DI 96-point Terminal 901 to 980 ... 468
<537> DO 96-point Terminal 901 to 980 ... 469
<544> DI 48-point/DO 48-point Terminal 901 to 980 ... 470
<551> AI 8-point Terminal (AD003) 901 to 980 ... 471
<552> AO 8-point Terminal (DA003/4) 901 to 980 ... 473
<553> AI 2-point/AO 2-point Terminal (MAD01) 901 to 980 ... 475
<561> AI 4-point Terminal (PTS01/02/03, PDC01, PTW01) 901 to 980 ... 477

<562> PI 4-point Terminal (PPS01) 901 to 980 480
<563> AO 4-point Terminal (PMV01) 901 to 980 483
<564> AI 8-point Terminal (PTR01/02) 901 to 980 485
<565> AO 4-point Terminal (PMV02) 901 to 980 488
<566> AI 4-point Terminal (PTS51) 901 to 980 491
<567> AI 4-point Terminal (PTS52) 901 to 980 494
<568> AI 8-point Terminal (PTS55) 901 to 980 497
<569> AI 8-point Terminal (PTS56) 901 to 980 501
<570> AI 8-point Terminal (PDC55) 901 to 980 504
<571> AI 2-point Terminal (PTS15/16, PDC15) 507
<572> AI 4-point Terminal (PH41U) 901 to 980 510
<573> AI 4-point Terminal (AD04U) 901 to 980 513
<581> AI 4-point Terminal (ADG41) 901 to 980 516
<582> AI 16-point Terminal (AD161) 519
<583> AI 4-point/AO 4-point Terminal (MAD44) 901 to 980 523
<584> AI 8-point Terminal (AD081) 901 to 980 525
<585> AO 8-point Terminal (DA08V/C) 901 to 980 527
<586> AI 4-point Terminal (AD041) 901 to 980 529
<587> AO 4-point Terminal (DA041) 901 to 980 531
<588> AI 4-point Terminal (DRT1-AD04) 901 to 980 533
<589> AO 2-point Terminal (DRT1-DA02) 901 to 980 535
<591> AO 2-point Terminal (DA021) 901 to 980 537
<592> AI 4-point/AO 2-point Terminal (MAD42) 901 to 980 539

Appendix A Execution Error Code List 541
Appendix B ITEM Allocations for HMI 549
Appendix C Auxiliary Area Flags Relevant to the Loop Control Board 564

SECTION 1
List of Function Blocks

1-1 List of Function Blocks 2
1-2 How to Use Function Blocks for Specific Operations 8

1-1 List of Function Blocks

*1: the Function Blocks dealing with high-speed operation (operation cycle: 0.01, 0.02, and 0.05 seconds is possible) However, Not supported by the LCB05D.
*2: LCB01/05 Ver.1.5 or later only.
*3: LCB05/05D only.
*4: LCB01/05 Ver 2.0 or later and LCB03 only.
*5: CS-series only.
*6: CJ-series only.
*7: LCB01/03/05 Ver. 3.5 or later only

Category	Type	Block Model	Block Name	Function	Allocatable Block Address	Page
System Common Block		000	System Common	Makes settings common to all function blocks and outputs signals for the system.	000	**18**
Control Block	Controller	001*1	2-position ON/OFF	2-position type ON/OFF controller	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	**31**
		002*1	3-position ON/OFF	3-position type ON/OFF controller for heating/cooling ON/OFF control		**38**
		011*1	Basic PID	Performs basic PID control.		**45**
		012*1	Advanced PID	Performs PID with two degrees of freedom control for enabling deviation/MV compensation, MV tracking, etc.		**67**
		013	Blended PID	Performs PIF control on the cumulative value (cumulative deviation) between the accumulated value PV and accumulated value Remote Set Point.		**82**
		014	Batch Flowrate Capture	Functions to open the valve at a fixed opening until a fixed batch accumulated value is reached.		**90**
		016	Fuzzy Logic	Outputs up to two analog outputs based on fuzzy logic performed on up to 8 analog inputs.	LCB05/05D: 001 to 100 LCB03: 001 to 100 LCB01: 001 to 050	**96**
		031*1	Indication and Setting	Manual setter with PV indication and SP setting functions	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	**110**
		032*1	Indication and Operation	Manual setter with PV indication and MV setting functions		**114**
		033*1	Ratio Setting	Ratio and bias setter with PV indication and ratio setting function		**118**
		034*1	Indicator	PV indicator with PV alarm		**123**
External Controller Block	External Controller Block	045	ES100X Controller Terminal	Performs monitoring and setting for an ES100X Controller connected directly to the RS-232C port on the Loop Control Unit.	LCB01/05: 601 to 632 LCB05D, LCB03: Not supported.	**126**
Operation Block	Alarm/Signal restrictions/ Hold	111*1	High/Low Alarm	Provides the alarm contact outputs for the high and low limits of single analog signals.	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	**138**
		112*1	Deviation Alarm	Provides the alarm contact outputs for the deviation of two analog signals.		**140**

Category	Type	Block Model	Block Name	Function	Allocatable Block Address	Page
Operation Block (continued)		113*1	Rate-of-change Operation and Alarm	Provides the alarm contact outputs for the high and low limits of rate-of-change operation when the analog signal rate-of-change is output.		142
		115*1	High/Low Limit	Limits the high and low limits of single analog signals.		144
		116*1	Deviation Limit	Calculates the deviation between two analog signals, and limits the deviation within that range.		146
		118*1	Analog Signal Hold	Holds the maximum, minimum or instantaneous value of single analog signals.		148
	Arithmetic	121*1	Addition or Subtraction	Performs addition/subtraction with gain and bias on up to 4 analog signals.		150
		122*1	Multiplication	Performs multiplication with gain and bias on up to 2 analog signals.		152
		123*1	Division	Performs division with gain and bias on up to 2 analog signals.		154
		126*1	Arithmetic Operation	Performs various math operation (trigonometric. logarithmic, etc.) on floating-point decimal values converted (to industrial units) from up to 8 analog inputs.	LCB05/05D: 001 to 100 LCB03: 001 to 100 LCB01: 001 to 050	156
		127*1	Range Conversion	Easily converts up to 8 analog signals simply by inputting the 0% and 100% input values and 0% and 100% output values.	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	165
	Functions	131*1	Square Root	Performs square root extraction (with low-end cutout) on single analog signals.		169
		132*1	Absolute Value	Performs non-linear (3 gain values) operation on single analog signals. Analog signals can also set as a dead band (with different gap).		171
		133*1	Non-linear Gain (Dead Band)	Outputs the absolute value of single analog signals.		173
		134*1	Low-end Cutout	Sets output to zero close to the zero point of single analog signals.		175
		135*1	Segment Linearizer	Converts single analog signals to 15 segments before the signals is output.		177
		136*1	Temperature And Pressure Correction	Performs temperature and pressure correction.		180
	Time Function	141*1	First-order Lag	Performs first-order lag operation on single analog signals.	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	184
		143*1	Rate-of-change Limit	Performs rate-of-change restriction on single analog signals.		186
		145*1	Moving Average	Performs moving average operation on single analog signals.		188
		147*1	Lead/Delay	Performs lead/delay operation on single analog signals.		190
		148*1	Dead Time	Performs dead time and first-order lag operations on single analog signals.		192
		149*1	Dead Time Compensation	Used for Smith's dead time compensation PID control		194
		150	Accumulator for instantaneous value input	Accumulates analog signals, and outputs 8-digit accumulated value signals.		196
		151	Run Time Accumulator	Accumulates the operating time, and outputs the pulse signal per specified time.		200

Category	Type	Block Model	Block Name	Function	Allocatable Block Address	Page
Operation Block (continued)	Time Function (continued)	153*1	Time Sequence Data Statistics	Records time sequence data from analog signals and calculates statistics, such as averages and standard deviations.	LCB05/05D: 001 to 100 LCB03: 001 to 100 LCB01: 001 to 050	**202**
		155	Ramp Program	Ramp program setter for combining ramps for time and hold values.	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	**207**
		156	Segment Program	Segment program setter setting the output values with respect to time.		**216**
		157	Segment Program 2	Segment program setting with wait function for setting the output values with respect to time		**220**
		158	Segment Program 3	Segment program setting with wait function and bank (e.g., PID) switching function for setting output values with respect to time.		**246**
		601	Step Data	Expansion settings for Segment Program 3 block (Block Model 158). Sets step data, such as the time width and output value.		**274**
		602	Bank Data	Expansion settings for Segment Program 3 block (Block Model 158). Sets bank data, such as the PID constants.		**281**
	Signal Selection/ Switching	161*1	Rank Selector	Selects the rank of up to 8 analog signals.		**288**
		162*1	Input Selector	Selects the specified analog signals specified by the contact signal from up to 8 analog signals.		**291**
		163*1	3-input Selector	Selects and outputs one of three analog input signals.		**294**
		164*1	3-output Selector	Outputs one analog input signal in three switched direction.		**297**
		165*1	Constant Selector	Selects 8 preset constants by the contact signal.		**300**
		166*1	Constant Generator	Outputs 8 independent constants.		**303**
		167	Ramped Switch	Switches two analog inputs (or constants) with a ramp.		**308**
		168*2	Bank Selector	Records the PID parameters (SP, P, I, D, MH, ML) in up to 8 sets in advance, and switches the PID parameter for Basic/Advanced/Blended PID Blocks according to the analog input range (zone) or input bits.	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	**308**
		169*2	Split Converter	Inputs the MV from the Basic PID block or Advanced PID block, converts the MV into two analog outputs for V characteristics or parallel characteristics (e.g., MV for heating or cooling) and outputs them.		**318**
	ITEM Settings	171*1	Constant ITEM Setting	Writes the constant to the specified ITEM at the rising edge of the send command contact.		**328**
		172*1	Variable ITEM Setting	Writes the analog signal to the specified ITEM at the rising edge of the send command contact.		**333**
		174*1	Batch Data Collector	Stores each of max. 8 analog inputs to buffer by a certain timing within sequential processing.		**337**
	Pulse Train Operation	182	Accumulated Value Input Adder	Adds up to four accumulated value signals.		**340**

Category	Type	Block Model	Block Name	Function	Allocatable Block Address	Page
Operation Block (continued)	Pulse Train Operation (continued)	183	Accumulated Value Analog Multiplier	Multiplies analog signals by the accumulated value signals.	LCB05/05D: 001 to 500 LCB03: 001 to 300 LCB01: 001 to 050	**343**
		184	Accumulator for accumulated value input	Converts 4-digit accumulated value signals to 8 digits.		**346**
		185	Contact input/ Accumulated value output	Counts low-speed contact pulses, and outputs 8-digit accumulated signals.		**350**
		186	Accumulated Value Input/ Contact Output	Converts 4-digit accumulated value signals to low-speed contact pulses before they are output.		**353**
	Others	192*1	Analog/Pulse Width Converter	Changes the ON/OFF duration ratio in a constant cycle duration so that it is proportional to the analog signal.		**356**
	Sequence Operation	201*1	Contact Distributor	Connect contact signals between function blocks in a 1: 1 connection.		**359**
		202*1	Constant Comparator	Compares up to eight sets of analog signals and constants, and outputs the comparison results as contacts.		**361**
		203*1	Variable Comparator	Compares up to eight pairs of analog signals, and outputs the comparison results as contacts.		**365**
		205*1	Timer	2-stage output type addition timer for forecast values and reached values. Can also output the present value.		**369**
		206*1	ON/OFF Timer	Timer for performing ON-OFF operation at preset ON and OFF times.		**371**
		207*1	Clock Pulse	Manipulates and monitors ON/OFF valves with open/close limit switches.		**373**
	Sequence Operation (continued)	208*1	Counter	2-stage output type addition timer for forecast values and arrival values. Can also output the current value.		**375**
		209*1	Internal Switch	Temporary storage contact for accepting relays in the Step Ladder Program block. (Note: One internal switch is already allocated as "temporary storage" in CX-Process Tool.)		**377**
		210*1	Level Check	Checks an analog input for 8 levels and outputs a contact corresponding to the level. The level number is also output as an analog value.}		**379**
	Contact Type Control Target	221	ON/OFF Valve Manipulator	Manipulates and monitors ON/OFF valves with open/close limit switches.		**384**
		222	Motor Manipulator	Manipulates and monitors motor operation.		**388**
		223	Reversible Motor Manipulator	Manipulates and monitors reversible motor operation.		**393**
		224	Motor Opening Manipulator	Inputs a target opening, and manipulates an electric positional-proportional motor.		**398**
		225	Switch Instrument	Manipulates and monitors multiple devices (up to 8) such as ON/OFF valves, motors, and pumps.		**404**
Sequential Control		301*1	Step Ladder Program	Performs logic sequence and step progression control.	LCB01: 701 to 720 LCB03/05/05D: 701 to 900	**423**
		302*3	Sequence Table	Conditions and actions are listed in table format to perform logic sequence or step progression control. Note: CS1W-LCB05/05D only; not supported by the CS1W-LCB01.		**450**

Category	Type	Block Model	Block Name	Function	Allocatable Block Address	Page
Field Terminal	Contact I/O	501*1	DI 8-point Terminal	Inputs 8 contacts from 8-point Input Unit.	901 to 980	**456**
		502*1	DI 16-point Terminal	Inputs 16 contacts from 16-point Input Unit.		**457**
		503*1	DI 32-point Terminal	Inputs 32 contacts from 32-point Input Unit.		**458**
		504*1	DI 64-point Terminal	Inputs 64 contacts from 64-point Input Unit.		**459**
		511*1	DO 5-point Terminal	Outputs 5 contacts from 5-point Output Unit.		**461**
		512*1	DO 8-point Terminal	Outputs 8 contacts from 8-point Output Unit.		**462**
Field Terminal (continued)	Contact I/O (continued)	513*1	DO12-point Terminal	Outputs 12 contacts from 12-point Output Unit.		**463**
		514*1	DO16-point Terminal	Outputs 16 contacts from 16-point Output Unit.		**464**
		515*1	DO32-point Terminal	Outputs 32 contacts from 32-point Output Unit.		**465**
		516*1	DO64-point Terminal	Outputs 64 contacts from 64-point Output Unit.		**466**
		518*1	DI 16-point/ Do16-point Terminal	Inputs and outputs 16 contacts each from 16-point Input/16-point Output Units.		**467**
		525*1	DI 96-point Terminal	Inputs 96 contacts from 96-contact Input Units.		**468**
		537*1	DO 96-point Terminal	Outputs 96 contacts from 96-contact Output Units.	901 to 980	**469**
		544*1	DI 48-point/ DO 48-point Terminal	Inputs and outputs 48 contacts each from 48-point Input/48-point Output Units.		**470**
	Analog I/O	551*1	AI 8-point Terminal (AD003)	Inputs 8 analog signals from the C200H-AD003.		**471**
		552*1	AO 8-point Terminal (DA003/4)	Inputs 8 analog signals from the C200H-DA003/DA003.		**473**
		553*1	AI 2-point/ AO 2-point Terminal (MAD01)	Inputs and outputs 2 analog signals each from the C200H-MAD01.		**475**
		561*1 *5	AI 4-point Terminal (PTS01/02/03,PDC01, PTW01)	Inputs 4 analog signals from one of CS1W-PTS01 (Isolated-type Thermocouple Input Unit), CS1W-PTS02/03 (Isolated-type Temperature-resistance Thermometer Input Unit), CS1W-PDC01 (Isolated-type Analog Input Unit) or CS1W-PTW01 (2-lead Transmitter Input Unit).		**477**
		562*1 *5	PI 4-point Terminal (PPS01)	Inputs 4 instantaneous values and accumulated values each from CS1W-PPS01 (Isolated-type Pulse Input Unit).		**480**
		563*1 *5	AO 4-point Terminal (PMV01)	Outputs 4 analog signals from CS1W-PMV01 (Isolated-type Control Output Unit).		**483**
		564*1 *5	AI 8-point Terminal (PTR01/02)	Inputs 8 analog signals from CS1W-PTR01 (Power Transducer Input Unit) or CS1W-PTR02 (Analog Input Unit (100 mV)).		**485**
		565*1 *5	AO 4-point Terminal (PMV02)	Outputs 4 analog signals from CS1W-PMV02 (Isolated-type Control Output Unit).		**488**
		566*4	AI 4-point Terminal (PTS51)	Inputs 4 analog signals from CS1W-PTS51 or CJ1W-PTS51 (Isolated-type Thermocouple Input Unit).		**491**
		567*4	AI 4-point Terminal (PTS52)	Inputs 4 analog signals from CS1W-PTS52 or CJ1W-PTS52 (Isolated-type Thermocouple Input Unit).		**494**

Category	Type	Block Model	Block Name	Function	Allocatable Block Address	Page
Field Terminal (continued)	Analog I/O (continued)	568*4 *5	AI 8-point Terminal (PTS55)	Inputs 8 analog signals from CS1W-PTS55 (Isolated-type Thermocouple Input Unit).		**497**
		569*4 *5	AI 8-point Terminal (PTS56)	Inputs 8 analog signals from CS1W-PTS56 (Isolated-type Thermocouple Input Unit).		**501**
		570*4 *5	AI 8-point Terminal (PDC55)	Inputs 8 analog signals from CS1W-PDC55 (Direct current Input Unit).		**504**
		571	AI 2-point Terminal (PTS15/16, PDC15)	Inputs 2 analog signals from the CJ1W-PTS15, CJ1W-PTS16, or CJ1W-PDC15.		**507**
		572*6 *7	AI 4-point Terminal (PH41U)	Inputs 4 analog signals from CJ1W-PH42U (Isolated-type High-resolution Analog Input Unit with Fully Universal Inputs)		**510**
		573*6 *7	AI 4-point Terminal (AD04U)	Inputs 4 analog signals from CJ1W-AD04U Isolated-type General-purpose Input Unit with Fully Universal Inputs)		**513**
		581*6 *7	AI 4-point Terminal (ADG41)	Inputs 4 analog signals from CJ1W-ADG41 (High-speed Analog Input Unit)		**516**
		582	AI 16-point Terminal (AD161)	Inputs 16 analog signals from the CJ1W-AD16.		**519**
		583*1 *5	AI 4-point/AO 4-point Terminal (MAD44)	Inputs and outputs 4 analog signals each from the CS1W-MAD44.		**523**
		584*1	AI 8-point Terminal (AD081)	Inputs 8 analog signals from the CS1W-AD081(-V) or CJ1W-AD081(-V)		**525**
		585*1	AO 8-point Terminal (DA08V/C)	Outputs 8 analog signals from the CS1W-DA08V/DA08C or CJ1W-DA08V/DA08C	901 to 980	**527**
		586*1	AI 4-point Terminal (AD041)	Inputs 4 analog signals from the CS1W-AD041(-V1) or CJ1W-AD041(-V1)		**529**
		587*1	AO 4-point Terminal (DA041)	Outputs 4 analog signals from the CS1W-DA041 or CJ1W-DA041		**531**
		588*1	AI 4-point Terminal (DRT1-AD04)	Inputs four analog signals from a DRT1-AD04 DeviceNet Slave Analog Input Unit.		**533**
		589*1	AO 2-point Terminal (DRT1-DA02)	Outputs two analog signals from a DRT1-DA02 DeviceNet Slave Analog Output Unit.		**535**
		591*4 *6	AO 2-point Terminal (DA021)	Outputs 2 analog signals from the CJ1W-DA021.		**537**
		592*4 *6	AI 4-point/AO 2-point Terminal (MAD42)	Inputs 4 analog signals and outputs 2 analog signals each from the CJ1W-MAD42.		**539**

1-2 How to Use Function Blocks for Specific Operations

To Perform this Specific Operation		Perform the Following	Reference
Data Exchange	Direct exchange of large amounts of data between the CPU Unit and function blocks for data exchange with a PT (Programmable Terminal) for example	Use a user link table or the HMI function.	Loop Control Board Operation Manual
	Continuous data exchange with the CPU Unit	Use a user link table.	Loop Control Board Operation Manual
	Read/write of specified data (ITEMs) from a CPU Unit (including a CPU Unit on a networked PLC) whenever necessary	Execute the CMND (DELIVER COMMAND) instruction in the Step Ladder Program, and issue the FINS command (ITEM read/write command).	
	Reading/writing specific ITEMs for Control, Operation, and External Controller Blocks with SCADA software	Using the HMI to transfer Loop Control Board data using tags created with CX-Process Tool.	Loop Control Board Operation Manual
	Reading and writing I/O memory in the CPU Unit using SCADA software	Use user link tables and then use the CSV tags created on the CX-Process Tool to specify I/O memory addresses.	Loop Control Board Operation Manual
Run/Stop	Instruction of run start/stop of the Loop Control Board (all function blocks) from the CPU Unit whenever necessary	Execute the CMND (DELIVER COMMAND) instruction in the Step Ladder Program, and issue the FINS command (ITEM read/write command) to change ITEM 014 (run/stop command) of the System Common block. Or, use the ITEM setting commands (Block Models 171 and 172) to stop ITEM 014 (run/stop command) of the System Common block. (In this case, operation cannot be started.) Note: Operation can also be stopped or started on CX-Process Tool and CX-Process Monitor.	Loop Control Board Operation Manual
	Instruction of operation stop/stop cancellation on individual function blocks from the CPU Unit whenever necessary	Execute the CMND (DELIVER COMMAND) instruction in the Step Ladder Program, and issue the FINS command (ITEM read/write command) to change ITEM 000 (stop block operation command) of the relevant block. Note: Arithmetic operation stop/stop cancel on a relevant block can also be indicated by monitoring the run status on CX-Process Tool.	
	Execution of required processing on the CPU Unit according to run status (e.g. in RUN mode, execution error, function block data error) of the Loop Control Board	Use A35500 to A3505 as input conditions to perform the required processing in the CPU Unit.	Loop Control Board Operation Manual
	Execution of required processing on the Loop Control Board according to run status (e.g. operation mode, fatal error, Output OFF) of the CPU Unit	Execute the required processing on the Loop Control Board using the Sequence Table/Step Ladder Program block based upon the CPU Unit run status of ITEMs 007 to 011 and 013 in the System Common block.	
High-speed processing	High-speed processing of specific function blocks	Set the operation cycle of the relevant function block to a shorter value.	Loop Control Board Operation Manual
High-density monitor	High-density monitoring of analog signals	Monitor analog signals by the Field Terminal blocks (Block Models 501 to 587) and Send to Computer blocks (Block Models 401 to 404)	Loop Control Board Operation Manual
Monitoring/ Setting External Controllers	Monitoring and setting a stand-alone external controller.	Connect an ES100X Controller to the RS-232C port on the Loop Control Board and use the ES100X Controller Terminal (Block Model 045).	External Controller Block
Batch Data Collection	Data collection by a certain timing within sequence processing in a batch processing plant	Use the Batch Data Collector block (Block Model 174)	Batch Data Collector Block (Block Model 174)

To Perform this Specific Operation		Perform the Following	Reference
Analog control	ON/OFF control	Use the 2-position ON/OFF block (Block Model 001).	• 2-position ON/OFF block (Block Model 001)
	Heating/cooling ON/OFF control	Use the 3-position ON/OFF block (Block Model 002).	• 3-position ON/OFF block (Block Model 002)
	Time-proportional control	Use the Analog/Pulse Width Converter block (Block Model 192).	• Analog/Pulse Width Converter Block (Block Model 192) • Loop Control Board Operation Manual
	Application of input filter on PV	Use the First-order Lag block (Block Model 141).	First-order Lag Block (Block Model 141)
	Application of bias on PV	Use the Ratio Setting block (Block Model 033) or the Addition/Subtraction block (Block Model 121).	• Ratio Setting Block (Block Model 033) • Addition/Subtraction Block (Block Model 121)
	Application of ratio on Set Point and PV		
	Input of error between multiple PVs	Use the Addition/Subtraction block (Block Model 121).	Addition/Subtraction block (Block Model 121)
	Entry of differential pressure transmitter to calculate flowrate	Use the Square Root block (Block Model 131) (with low-end cutout function).	Square Root block (Block Model 131)
	Entry of pulse output flowmeter for accumulation of flowrate	Use the Pulse Input Unit, and enter to the Accumulator for accumulated value input block (Block Model 184) for continuous accumulation.	• Accumulator for Accumulated Value Input Block (Block Model 184) • Loop Control Board Operation Manual
	Temperature and pressure correction	Use the Temperature and Pressure Correction block (Block Model 136).	Temperature and Pressure Correction Block (Block Model 136)
	Setting of the PID constant values for multiple words	Use the Constant Item Setting block (Block Model 171).	• Constant Item Setting Block (Block Model 171) • Loop Control Board Operation Manual
	Switching of multiple Set Point values	Use the Constant Selector block (Block Model 165) or the Constant Item Setting block (Block Model 171).	• Constant Selector block (Block Model 165) • Constant Item Setting block (Block Model 171) • Loop Control Board Operation Manual
	Switching of multiple PID sets	Use the Constant Item Setting block (Block Model 171).	• Constant Item Setting Block (Block Model 171) • Loop Control Board Operation Manual
	Ramp control of Set Point values (program control)	Use the Ramp Program block (Block Model 155), the Segment Program block (Block Model 156), the Segment Program 2 block (Block Model 157), or the Segment Program 3 block (Block Model 158).	• Ramp Program Block (Block Model 155) • Segment Program Block (Block Model 156) • Segment Program 2 Block (Block Model 157) • Segment Program 3 Block (Block Model 158) • Loop Control Board Operation Manual
	Cascade control	Use a serial connection for the Basic PID block (Block Model 011) or Advanced PID block (Block Model 012).	• Basic PID Block (Block Model 011) • Advanced PID Block (Block Model 012) • Loop Control Board Operation Manual

To Perform this Specific Operation		Perform the Following	Reference
	Dead time compensation control	Use the Dead Time Compensation block (Block Model 149) or the Advanced PID block (Block Model 012).	• Dead Time Compensation block (Block Model 149) • Advanced PID Block (Block Model 012) • Loop Control Board Operation Manual
	Feedforward control Non-interfering control	Use the Advanced PID block (Block Model 012) or the Lead/Delay block (Block Model 147).	• Advanced PID Block (Block Model 012) • Lead/Delay Block (Block Model 147) • Loop Control Board Operation Manual
	Sample PI control	Use the ON/OFF Timer block (Block Model 206).	• ON/OFF Timer Block (Block Model 206) • Loop Control Board Operation Manual
	PID control with differential gap	Use the Constant Item Setting block (Block Model 171).	Constant Item Setting Block (Block Model 171)
	Selective control	Use the Rank Selector block (Block Model 161).	Rank Selector Block (Block Model 161)
	Using fuzzy control based on knowledge from ambiguous expressions	Use the Fuzzy Logic block (Block Model 016).	Fuzzy Logic Block (Block Model 016)
Special math operations	Performing calculation is engineering units rather than percentages Performing special calculations, such as trigonometric or logarithmic operation	Use the Arithmetic Operation block (Block Model 126) or Time Sequence Data Statistics BLOCK (Block Model 153).	• Arithmetic Operation block (Block Model 126) • Time Sequence Data Statistics Block (Block Model 153)
	Calculating statistics (e.g., average, standard deviation, etc.) for time sequence data	Use the Time Sequence Data Statistics block (Block Model 153).	
Accumulation processing	Accumulation (accumulator) of instantaneous analog signals such as flowrate signals on the Loop Control Board	Use the Accumulator for instantaneous value input block (Block Model 150).	• Accumulator for Instantaneous Value Input Block (Block Model 150) • Loop Control Board Operation Manual
	Continuous accumulation of 4-digit accumulated value signals (repeat signals 0000 to 9999) and conversion to 8-digit signals	Use the Accumulator for accumulated value input block (Block Model 184).	• Accumulator for Accumulated Value Input Block (Block Model 184)
	Input and accumulation of low-speed pulse signals such as the power signal	Use the Contact input/Accumulated value output block (Block Model 185).	Contact Input/Accumulated Value Output Block (Block Model 185)
	Notification of accumulated values on a field mechanical counter for contact inputs	Use the Accumulated Value Input/Contact Output block (Block Model 186).	Accumulated Value Input/Contact Output Block (Block Model 186)
	Batch flowrate capture	Use the Batch Flowrate Capture block (Block Model 014).	Batch Flowrate Capture Block (Block Model 014)
	Ratio control of accumulated values	Use the Batch Flowrate Capture block (Block Model 014) and the Blended PID block (Block Model 013).	• Blended PID Block (Block Model 013) • Batch Flowrate Capture Block (Block Model 014)
	Addition of accumulated values	Use the Accumulated Value Input Adder block (Block Model 182).	Accumulated Value Input Adder Block (Block Model 182)
	Multiplication of analog signals with accumulated values	Use the Accumulated Value Analog Multiplier block (Block Model 183).	Accumulated Value Analog Multiplier Block (Block Model 183)

To Perform this Specific Operation		Perform the Following	Reference
Sequence control	AND, OR and other logical operations on the Loop Control Board	Use the Sequence table (Block Model 302) or the Step Ladder Program block (Block Model 301). Use the Internal Switch block (Block Model 209).	• Internal Switch Block (Block Model 209) • Sequence Table Block (Block Model 302) • Loop Control Board Operation Manual • Step Ladder Program Block (Block Model 301)
	One-shot contact output of the ON input state when the contact state changes from OFF to ON and vice versa only in 1-operation cycles (system common operation cycle)		
	Constantly ON contacts and other system contacts		
	Step progression control and other control on the Loop Control Board		
	Acceptance of relays in the Step Ladder Program		
	Execution of special processing at each fixed cycle longer than operation cycle in Step Ladder Program	Generate a fixed cycle timing signal by the Clock Pulse block (Block Model 207).	Clock Pulse block (Block Model 207)
	Execution of timers/counters on the Loop Control Board	Use the Timer block (Block Model 205) and the Counter block (Block Model 208).	• Timer block (Block Model 205) • Counter block (Block Model 208)
Constant setting/selection	Constant transmission of constants as analog signals	Use the Constant Generator block (Block Model 166).	Constant Generator Block (Block Model 166)
	Setting of constants to specified ITEMs under certain conditions	Use the Constant ITEM Setting block (Block Model 171).	Constant ITEM Setting Block (Block Model 171)
	Selection of one of multiple constants and transmission of that constant as an analog signal	Use the Constant Selector block (Block Model 165).	Constant Selector Block (Block Model 165)
Constant setting/selection (continued)	Changing PID constants and other parameters in stages according to a process value (e.g., temperature).	Use the Level Check block (Block Model 210) and the Constant ITEM Setting block (Block Model 171) together to change parameters for other blocks according to the level.	• Constant ITEM Setting Block (Block Model 171) • Level Check Block (Block Model 210)
Analog signal setting/ selection	Setting of analog signals to specified ITEMs under certain conditions	Use the Variable ITEM Setting block (Block Model 171).	Variable ITEM Setting Block (Block Model 171)
	Selection of one of multiple analog signals and transmission of that analog signal as an analog signal	Use the Input Selector block (Block Model 162).	Input Selector Block (Block Model 162)
	Selection of the maximum value from multiple analog signals and transmission of that maximum value as an analog signal	Use the Rank Selector block (Block Model 161).	Rank Selector Block (Block Model 161)
	Selection of the minimum value from multiple analog signals and transmission of that minimum value as an analog signal		
	Selection of the nth largest value from multiple analog signals and transmission of the signal as an analog signal		
	Switching of sensors on a different measuring system or measurement target	Use the 3-input Selector block (Block Model 163).	3-input Selector Block (Block Model 163)
	Switching of operation nodes on a different measuring system or measurement target	Use the 3-output Selector block (Block Model 164).	3-output Selector Block (Block Model 164)
	Changing two settings with a ramp (e.g., opening and closing valves	Use the Ramped Switch block (Model Block 167).	Ramped Switch Block (Model Block 167)

To Perform this Specific Operation		Perform the Following	Reference
	Converting ranges of analog signals merely by setting values for 0% and 100% inputs and 0% and 100% outputs	Use the Range Conversion block (Block Model 127).	Range Conversion Block (Block Model 127)
	Continuous proportional control for heating/cooling.	Use with the Basic/Advanced PID block and Split Converter block (Block Model 169). (Supported only by Loop Control Board Ver.1.5)	
Analog signal/ constant comparison	Comparison of constant and analog signals	Use the Constant Comparator block (Block Model 202).	Constant Comparator Block (Block Model 202)
	Comparison of two analog signals	Use the Variable Comparator block (Block Model 203).	Variable Comparator Block (Block Model 203)
Manipulation/ monitor/ control of special external control target	Manipulation and monitoring of ON/OFF valve with open/close limit switches	Use the ON/OFF Valve Manipulator block (Block Model 221).	ON/OFF Valve Manipulator Block (Block Model 221) Switch Instrument Block (Block Model 225)
	Manipulation and monitoring of motors	Use the Motor Manipulator block (Block Model 222).	Motor Manipulator Block (Block Model 222) Switch Instrument Block (Block Model 225)
	Manipulation and monitoring of reversible motors	Use the Reversible Motor Manipulator block (Block Model 223).	Reversible Motor Manipulator Block (Block Model 223) Switch Instrument Block (Block Model 225)
	Manipulation of a electric positional-proportional motor as the control target	Use the Basic PID (Block Model 011)/Advanced PID block (Block Model 012) and Motor Opening Manipulator block (Block Model 224).	• Basic PID Block (Block Model 011) • Advanced PID Block (Block Model 012) • Motor Opening Manipulator Block (Block Model 224) • Switch Instrument Block (Block Model 225)

SECTION 2
Description of Function Blocks

Conventions Used in Function Block Descriptions 17

System Common blocks

<000> System Common blocks 000 (fixed)..... 18

Control blocks

<001> 2-position ON/OFF 001 to 500 31
<002> 3-position ON/OFF 001 to 500 38
<011> Basic PID 001 to 500..... 45
<012> Advanced PID 001 to 500..... 67
<013> Blended PID 001 to 500 82
<014> Batch Flowrate Capture 001 to 500..... 90
<016> Fuzzy Logic 001 to 100 96
<031> Indication and Setting 001 to 500..... 110
<032> Indication and Operation 001 to 500 114
<033> Ratio Setting 001 to 500..... 118
<034> Indicator 001 to 500..... 123

External Controller block

<045> ES100X Controller Terminal 601 to 632..... 126

Alarm/Signal restriction/Hold blocks

<111> High/Low Alarm 100 to 500 138
<112> Deviation Alarm 100 to 500 140
<113> Rate-of-change Operation and Alarm 100 to 500 142
<115> High/Low Limit 100 to 500..... 144
<116> Deviation Limit 100 to 500..... 146
<118> Analog Signal Hold 100 to 500..... 148

Arithmetic blocks

<121> Addition or Subtraction 100 to 500 150
<122> Multiplication 100 to 500..... 152
<123> Division 100 to 500..... 154
<126> Arithmetic Operation 001 to 100..... 156
<127> Range Conversion 001 to 500..... 165

Function blocks

<131> Square Root 001 to 500 169
<132> Absolute Value 001 to 500 171
<133> Non-linear Gain (Dead Band) 001 to 500..... 173
<134> Low-end Cutout 001 to 500 175
<135> Segment Linearizer 100 to 349 177
<136> Temperature and Pressure Correction 001 to 500..... 180

Time Function blocks
<141> First-order Lag 001 to 500 ... 184
<143> Rate-of-change Limit 001 to 500 ... 186
<145> Moving Average 001 to 500 ... 188
<147> Lead/Delay 001 to 500 ... 190
<148> Dead Time 001 to 500 ... 192
<149> Dead Time Compensation 001 to 500 ... 194
<150> Accumulator for instantaneous value input 001 to 500 ... 196
<151> Run Time Accumulator 001 to 500 ... 200
<153> Time Sequence Data Statistics 001 to 100 ... 202
<155> Ramp Program 001 to 500 ... 207
<156> Segment Program 001 to 500 ... 216
<157> Segment Program 2 001 to 500 ... 220
<158> Segment Program 3 001 to 500 ... 246
Signal Selection/Switching blocks
<161> Rank Selector 001 to 500 ... 288
<162> Input Selector 001 to 500 ... 291
<163> 3-input Selector 001 to 500 ... 294
<164> 3-output Selector 001 to 500 ... 297
<165> Constant Selector 001 to 500 ... 300
<166> Constant Generator 001 to 500 ... 303
<167> Ramped Switch 001 to 500 ... 308
<168> Bank Selector 001 to 500 ... 308
<169> Split Converter 001 to 500 ... 318
ITEM Setting blocks
<171> Constant ITEM Setting 001 to 500 ... 328
<172> Variable ITEM Setting 001 to 500 ... 333
<174> Batch Data Collector 001 to 500 ... 337
Pulse Train Operation blocks
<182> Accumulated Value Input Adder 001 to 500 ... 340
<183> Accumulated Value Analog Multiplier 001to 500 ... 343
<184> Accumulator for accumulated value input 001 to 500 ... 346
<185> Contact Input/ Accumulated Value Output 001 to 500 ... 350
<186> Accumulated Value Input/ Contact Output 001 to 500 ... 353
Other blocks
<192> Analog/Pulse Width Converter 001 to 500 ... 356
Sequential Operation blocks
<201> Contact Distributor 001 to 500 ... 359
<202> Constant Comparator 001 to 500 ... 361
<203> Variable Comparator 001 to 500 ... 365
<205> Timer 001 to 005 ... 369
<206> ON/OFF Timer 001 to 500 ... 371
<207> Clock Pulse 001 to 500 ... 373
<208> Counter 001 to 500 ... 375
<209> Internal Switch 001 to 500 ... 377
<210> Level Check 001 to 500 ... 379

Contact Type Control Target
<221> ON/OFF Valve Manipulator 001 to 500 384
<222> Motor Manipulator 001 to 500 388
<223> Reversible Motor Manipulator 001 to 500 393
<224> Motor Opening Manipulator 001 to 500 398
<225> Switch Instrument 001 to 500 404
Sequential Control block
<301> Step Ladder Program 701 to 900 423
<302> Sequence Table 701 to 900 450
Field Terminal Block
<501> DI 8-point Terminal 901 to 980 456
<502> DI 16-point Terminal 901 to 980 457
<503> DI 32-point Terminal 901 to 980 458
<504> DI 64-point Terminal 901 to 980 459
<511> DO 5-point Terminal 901 to 980 461
<512> DO 8-point Terminal 901 to 980 462
<513> DO 12-point Terminal 901 to 980 463
<514> DO 16-point Terminal 901 to 980 464
<515> DO 32-point Terminal 901 to 980 465
<516> DO 64-point Terminal 901 to 980 466
<518> DI 16-point/DO 16-point Terminal 901 to 980 467
<525> DI 96-point Terminal 901 to 980 468
<537> DO 96-point Terminal 901 to 980 469
<544> DI 48-point/DO 48-point Terminal 901 to 980 470
<551> AI 8-point Terminal (AD003) 901 to 980 471
<552> AO 8-point Terminal (DA003/4) 901 to 980 473
<553> AI 2-point/AO 2-point Terminal (MAD01) 901 to 980 475
<561> AI 4-point Terminal (PTS01/02/03, PDC01, PTW01) 901 to 980 477
<562> PI 4-point Terminal (PPS01) 901 to 980 480
<563> AO 4-point Terminal (PMV01) 901 to 980 483
<564> AI 8-point Terminal (PTR01/02) 901 to 980 485
<565> AO 4-point Terminal (PMV02) 901 to 980 488
<566> AI 4-point Terminal (PTS51) 901 to 980 491
<567> AI 4-point Terminal (PTS52) 901 to 980 494
<568> AI 8-point Terminal (PTS55) 901 to 980 497
<569> AI 8-point Terminal (PTS56) 901 to 980 501
<570> AI 8-point Terminal (PDC55) 901 to 980 504
<571> AI 2-point Terminal (PTS15/16, PDC15) 901 to 980 507
<572> AI 4-point Terminal (PH41U) 901 to 980 510
<573> AI 4-point Terminal (AD04U) 901 to 980 513
<581> AI 4-point Terminal (ADG41) 901 to 980 516
<582> AI 16-point Terminal (AD161) 901 to 980 519
<583> AI 4-point/AO 4-point Terminal (MAD44) 901 to 980 523
<584> AI 8-point Terminal (AD081) 901 to 980 525
<585> AO 8-point Terminal (DA08V/C) 901 to 980 527
<586> AI 4-point Terminal (AD041) 901 to 980 529

<587> AO 4-point Terminal (DA041) 901 to 980 531
<588> AI 4-point Terminal (DRT1-AD04) 901 to 980 533
<589> AO 2-point Terminal (DRT1-DA02) 901 to 980 535
<591> AO 2-point Terminal (DA021) 901 to 980 537
<592> AI 4-point/AO 2-point Terminal (MAD42) 901 to 980 539
<601>Step Data 001 to 500 274
<602> Bank Data 001 to 500 281

Conventions Used in Function Block Descriptions

Each of the function blocks is described using the following conventions.

Outline

Describes an outline of the functions of the function block.

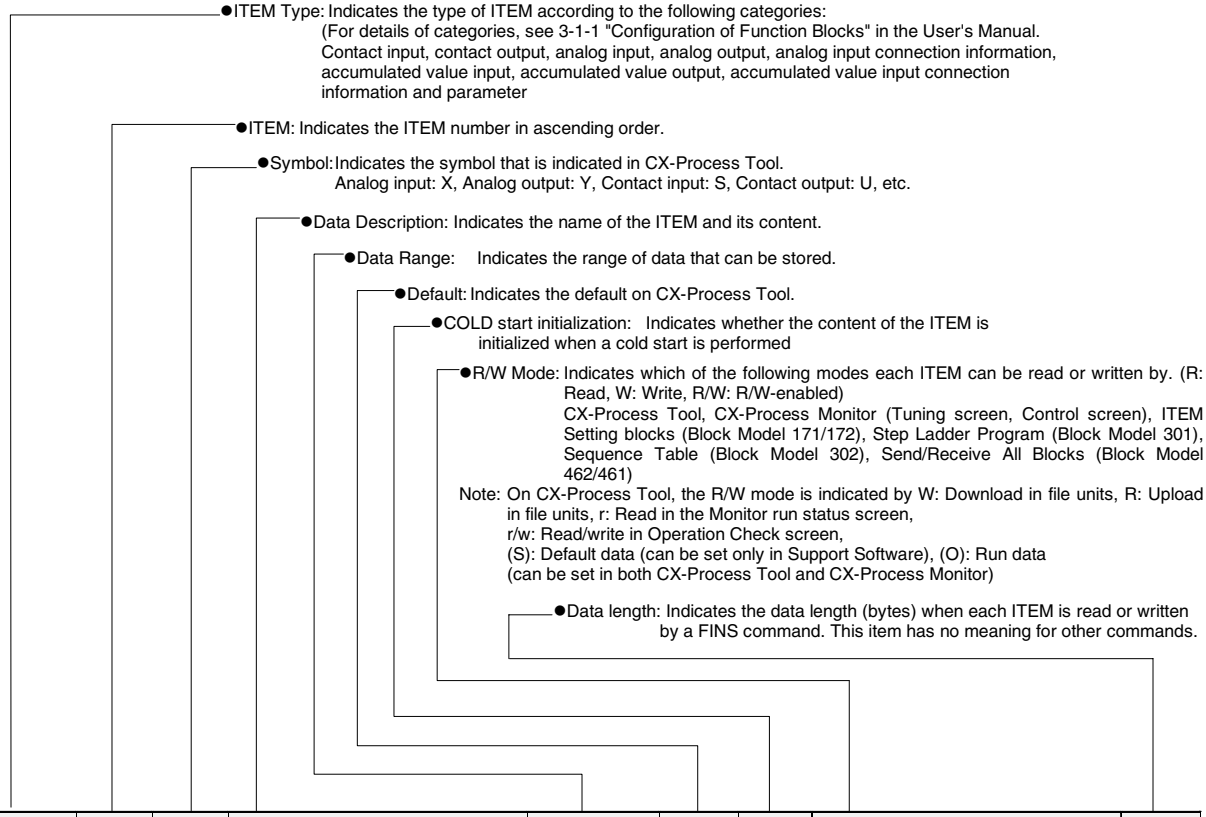
Function block applications

Gives examples of typical applications that the function block can be used in.

Block diagram

Shows the input ITEMs and output ITEMs of the function block, and internal processes specific to the function block.

ITEM list



ITEM Type	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0		–	–	–	S, R	1
Parameter	001		Comment	23 characters	Block name		R/W(S)	–	–	–	24
	002		Block Model: Basic PID	011	011		R/W(S)	–	–	–	2

Block Model	Block Name	Block Address
<000>	System Common blocks	000 (fixed)

Outline

This function block sets the functions that are used in common to all function blocks, and outputs various signals for system use and the CPU Unit run status.

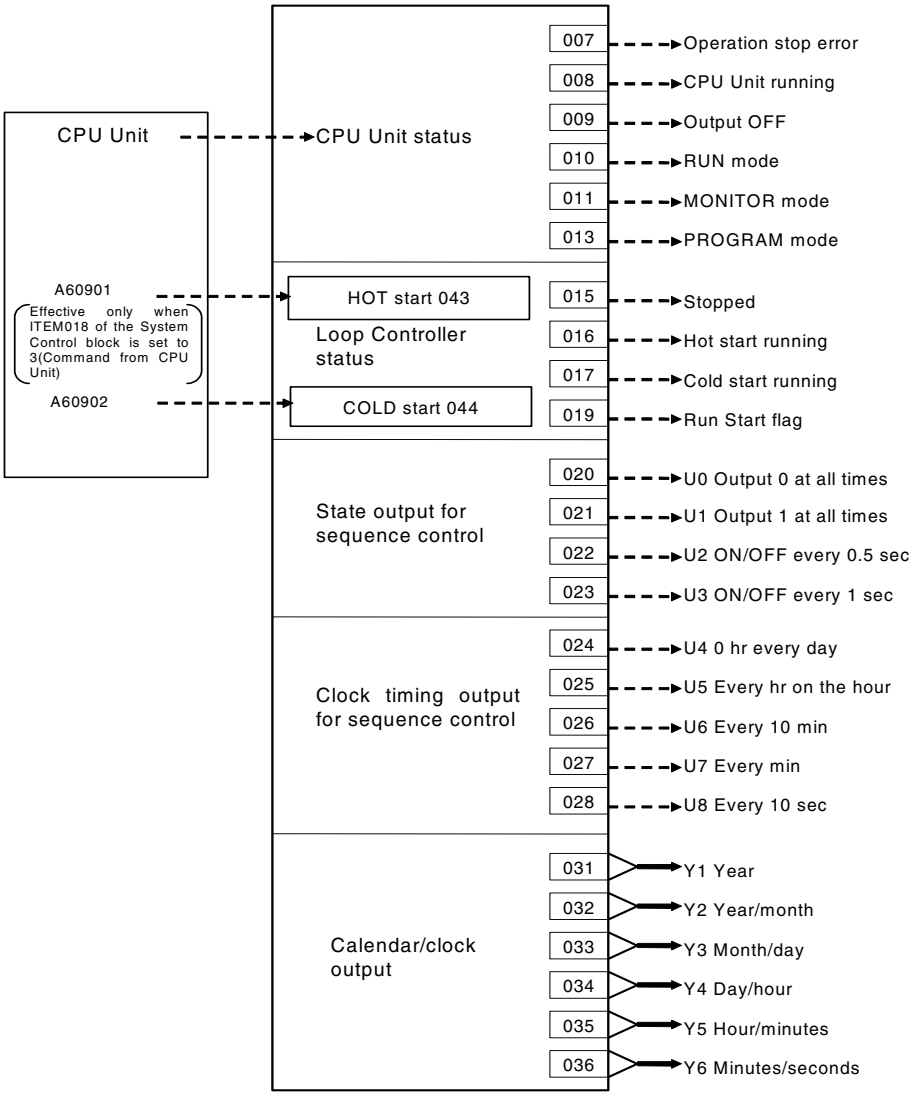
Setting of functions common to all function blocks
•Setting of the system common operation cycle
•Run/stop command and run indication
•Indication of the load rate for each operation cycle group
•System indication and setting for node terminals
•Error indication
•Memory processing

Output of CPU Board run status
•Operating mode, fatal error, output OFF, function block change

Output of Loop Control Board run/stop command and status
•Output of states for sequence control

Output of various signals for system use
•Output of states for sequence control
•Clock timing output signals
•Calendar and clock output

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	(000)		Be sure to set this ITEM to 0. Note: If set to 1, processing for all function blocks stops, and data exchange between the Loop Control Board and the CPU Unit stops.	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: System Common	000	000	–	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error(See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	2
Parameter	004		System common operation cycle (sec) 1: 01.s, 2: 0.2s, 3: 0.5s, 4: 1s, 5: 2s Note: Before changing the operation cycle, first stop the Loop Control Board.	1 to 5	4 (:1s)	–	R/W(S)	–	–	2

CPU Unit run status

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact output	007		Fatal error 0: A fatal error has not occurred on the CPU Unit. 1: A fatal error has occurred on the CPU Unit. (Fatal error was detected by system self–diagnostics or the FALS command was executed.)	0, 1	0	Yes	r	–	R	1
	008		CPU Unit running 0: CPU Unit has stopped. (PROGRAM mode or fatal error) 1: CPU Unit is running. (RUN mode or MONITOR mode)	0, 1	0	Yes	r	–	R	1
	009		Output OFF 0: CPU Unit output is not OFF. 1: CPU Unit output is OFF. (Auxiliary Area A50015 ON)	0, 1	0	Yes	r	–	R	1
	010		RUN mode 0: CPU Unit not in RUN mode 1: CPU Unit in RUN mode	0, 1	0	Yes	r	–	R	1
	011		MONITOR mode 0: CPU Unit not in MONITOR mode 1: CPU Unit in MONITOR mode	0, 1	0	Yes	r	–	R	1
	013		PROGRAM mode 0: CPU Unit not in PROGRAM mode 1: CPU Unit in PROGRAM mode	0, 1	0	Yes	r	–	R	1

Loop Control Board run/stop command and status (for HMI I/F display)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	014		Run/stop command 0: Stop, 1: Hot start, 2: Cold start Note 1: Loop Control Board already running. Change to 1 or 2 invalid Note 2: Only setting of 0 (stop) can be performed in the ITEM Setting blocks. (For details, see “3-2 Description of Operation” in the User’s Manual.)	0 to 2	0	Yes	r/w	W (Note 2)	–	2
	015		Run/stop Status 1: Stop 0: Running	0, 1	0	Yes	r	–	R	2
	016		Hot start 1: Hot start in operation 0: Other	0, 1	0	Yes	r	–	R	2
	017		Cold start 1: Cold start in operation, 0: Other	0, 1	1	Yes	r	–	R	2
	018		START mode at power ON 0: Hot start within specified time (supported for LCB01/05 Ver.2.0 or later and LCB03). 1: Hot start, 2: Cold start 3: CPU Unit specification (A60901 ON: Hot start, A60902 ON: Cold start) *1 Note1: If setting 3 is selected and both A60901 and A60902 are OFF, operation will not start. If both are ON, a hot start will be used.) Note2: The setting 3 is not supported for the LCB05D. Note3: If setting 0 is selected, Hot start are performed within the specified in ITEM 037 (Hot start enable time). Note4: For details on ITEM 018 (START mode at power ON), refer to the Loop Control Boards/Process-control CPU Units/Loop-control CPU Units Operation Manual (W406). *1: Not supported for the LCB05D	1, 2	CJ1G-CPU4*P:0 others:1	–	R/W(S)	–	–	2
	019		Run Start flag 1: Running is started (hot or cold start) 0: 0 is set by the user. Note: The Run Start flag is latched to 1 when the Loop Controller starts running, and remains at 1 as long as the flag is not reset to 0. (This flag differs from constantly ON flags in that it can be set to 0 by the user.)	0, 1	1	Yes	r	–	R/W	1

Status output for sequence control

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact output	020	U0	Output 0 0 is output at all times at power ON.	0	0	Yes	r	–	R	1
	021	U1	Output 1 1 is output at all times at power ON.	1	1	Yes	r	–	R	1
	022	U2	ON/OFF every 0.5 sec	0, 1	0	Yes	r	–	R	1
	023	U3	ON/OFF every 1 sec	0, 1	0	Yes	r	–	R	1
	024	U4	Differential output at 0 hr every day	0, 1	0	Yes	r	–	R	1
	025	U5	Differential output at every hour on the hour	0, 1	0	Yes	r	–	R	1
	026	U6	Differential output every 10 min	0, 1	0	Yes	r	–	R	1
	027	U7	Differential output every min	0, 1	0	Yes	r	–	R	1
	028	U8	Differential output every 10 sec	0, 1	0	Yes	r	–	R	1

Calendar and clock output

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	031	Y1	Year	YYYY		Yes	–	–	–	2
	032	Y2	Year/month (year: lower 2 digits of year)	YYMM		Yes	–	–	–	2
	033	Y3	Year/day	MMDD		Yes	–	–	–	2
	034	Y4	Day/hours	DDhh		Yes	–	–	–	2
	035	Y5	Hour/minutes	hhmm		Yes	–	–	–	2
	036	Y6	Minutes/seconds	mmss		Yes	–	–	–	2

Note: This calendar data is based upon the calendar data of the CPU Unit.

Hot start enabled time (LCB01/05 Ver.2.0 or later and LCB03 only)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	037	HOT_TIM	Hot start enabled time (Unit: sec) This setting is available in ITEM 018 (START mode at power ON). Hot start are performed within the time specified in the value of this setting. Note: The time of the power off is measured by the PLC clock data, so the cold start will automatically perform if the PLC clock is incorrect.	0 to 3600	2	–	R/W(S)	–	–	2

Download indication for individual function blocks

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	039	BT	Function Block Changed flag 1: Function blocks have been downloaded from the CX-Process Tool software in units of function blocks. 0: Function blocks have not been downloaded from the CX-Process Tool software in units of function blocks, or a hot or cold start was made after a download.	0, 1	0	Yes	–	–	–	1

Specifying the Start Mode in the CPU Unit (Not supported by the LCB05D)

If ITEM 018 (start mode at power ON) is set to 3, mode specified in the CPU Unit will be used.

Note: The Loop Controller will not start operation until either A60901 is turned ON to specify a hot start from the CPU Unit or until A60902 is turned ON to specify a cold start from the CPU Unit.

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	043	EH_START	Status of A60901 (hot start specification from CPU Unit) 1: ON, 0: OFF	0, 1	0	Yes	r	–	–	1
	044	EC_START	Status of A60902 (cold start specification from CPU Unit) 1: ON, 0: OFF	0, 1	0	Yes	r	–	–	1

The state of Hot Start Disable(LCB05D, LCB01/05 Ver.1.5 or later, and LCB03 Only)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	045	DH_START	The status of A35807(The state of HOT Start Disable) 1: A cold start was executed automatically even though a hot start was specified. 0: A hot start not executed.	0, 1	0	–	r	–	–	1

Operation indications

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	047	LOAD	LCB load factor	0 to 100%		Yes	r	–	–	2
	048	L_LOAD	LCB maximum load factor (Input 0 to reset.)	0 to 100%		Yes	r/w	–	–	2

HMI function

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050	EN_BANK	EM Area bank allocated for HMI function	0 to C (16 Hex)	0	–	R/W(S)	–	–	2
	051		Operation cycle for HMI function (s) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 Note: Always stop operation before changing the setting.	1 to 5	4(1 s)	–	R/W(S)	–	–	2
Contact input	056	RD_STOP	Reception stopped switch 0: Normal, 1: Reception stopped	0, 1	0	Yes	R/W(O)	–	–	1
	057	SD_STOP	Transmission stopped switch 0: Normal, 1: Transmission stopped	0, 1	0	Yes	R/W(O)	–	–	1
Parameter	059		HMI function disable switch 0: Enabled 1: Disabled	0, 1	0	Yes	R/W(S)	–	–	2
	060		Data update check code (for HMI indication)	0 to FFFF Hex	0	Yes	r	–	–	2

Duplex status(LCB05D Only)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	061	DPL_RUN	Duplex operation 0: Not duplex system or operation in Simplex Mode 1: Operation in Duplex Mode	0, 1	0	Yes	R	–	–	1
	062	ACT_FLG	Left-side CPU Unit status (active/standby) 0: Left-side 1: Right-side	0, 1	0	Yes	R	–	–	1
	064	ERR_POS	The location of the INNER board which caused a fatal Inner Board error. 0: No error 1: Right-side 2: Left-side 3: Both sides	0 to 3	0	Yes	R	–	–	2

Alarm generation (for HMI indication)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	081		Smallest block address that has reached the MV low limit (MLA)	0 to 500	0	Yes	r	–	–	1
	082		Smallest block address that has reached the MV high limit (MHA)	0 to 500	0	Yes	r	–	–	1
	083		Smallest block address with deviation alarm (DVA)	0 to 500	0	Yes	r	–	–	1
	084		Smallest block address with a low low limit alarm (LL)	0 to 500	0	Yes	r	–	–	1
	085		Smallest block address with a low limit alarm (L)	0 to 500	0	Yes	r	–	–	1
	086		Smallest block address with a high limit alarm (H)	0 to 500	0	Yes	r	–	–	1
	087		Smallest block address with a high high limit alarm (H)	0 to 500	0	Yes	r	–	–	1

Error indication

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	091		Smallest block address where PV error input is ON*1 (000: Normal)	000 to 032	000	Yes	r	–	–	2
	092		Smallest block address where MV error input is ON*2 (000: Normal)	000 to 032	000	Yes	r	–	–	2
	093		Smallest block address where execution error (other than error code 0) occurs ON*3	000 to	000	Yes	r	–	–	2
	094		Smallest block address where function block database error occurs ON*4	000 to	000	Yes	r	–	–	2
	095		User link table error *5	000 to 2400	000	Yes	r	–	–	2

*1: Specify this when PV error contact input is ON (set source designation at ITEM 018 and error indication at ITEM 019) in the Basic PID or Advanced PID blocks.

*2: Specify this when MV error contact input is ON (set source designation at ITEM 090 and error indication at ITEM 091) in the Basic PID or Advanced PID blocks.

*3: The smallest block number of the function block where the error occurred is stored when the error code to be stored to ITEM 003 of each function block is other than 0 (normal). For details on error codes, see Appendix "Execution Error Code List."

*4: The function blocks in which the database error is occurring are cyclically checked, and the block address is overwritten and displayed each time that an error is detected. FFFF indicates that the database error is occurring on all function blocks.

*5: The user link table ID number is stored when a user link is executed but the destination ITEM does not exist or is not appropriate. When two or more errors occur in the user link tables, the display will show the ID number of the first user link table downloaded with the Rd (to LCB) command.

Memory processing

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	099		MPU/FROM version display (V*. **V*. **)			Yes	r	–	–	16
	100		All clear			Yes	w	–	–	2
	101		Backup start command (RAM to flash memory) Note: With Ver. 1.5 and earlier Loop Controllers, the Loop Controller will stop after the data has been backed up. Either execute a cold or hot start from the CX-Process Tool or turn the power supply OFF and ON.	0, 1	0	Yes	r/w	–	–	2
	102		Recovery start command (flash memory to RAM) Note: The Loop Control Board will be in a stopped state after data has been restored. Either execute a cold or hot start from the CX-Process Tool or turn the power supply OFF and ON.	0, 1	0	Yes	r/w	–	–	2
	103		Backup error display 1: Error, 0: Normal	0, 1	0	Yes	r	–	–	2
	104		Flash memory write counter The number of times data is written to flash memory is given in this ITEM. If the count exceeds 32,767, the value will remain at 32,767 without counting up any further. In addition, when ITEM126 is set to 1, 0 will always be stored in this ITEM.	0 to 32767	0	–	r	–	–	2
	106		Flash memory write counter (value divided by 10) In this ITEM, only 1/10 of the actual write count is given. When “1” is displayed, it means that the actual write count is 10. If the count exceeds 32,767, the value will remain at 32,767 without counting up any further.	0 to 32767	0	–	r	–	–	2
	107		Backup year and month ITEM 032 (year and month) is stored when a backup is started.	YYMM	FFFF Hex	Yes	r	–	–	2
	108		Backup year and month ITEM 034 (day and hours) is stored when a backup is started.	DDhh	FFFF Hex	Yes	r	–	–	2
	109		Backup year and month ITEM 036 (minutes and seconds) is stored when a backup is started.	mmss	FFFF Hex	Yes	r	–	–	2
	110		CX-Process Tool software version (Indicates the version of the CX-Process Tool used to create the function block data. For example, "250" is given for version 2.50.) Note: This value cannot be set by the user. It is set by the CX-Process Tool.	0 to 32767	400	Yes	R (S)	–	–	2
	120		Backup status while running 0: Not backing up 1: Backing up	0, 1	0	Yes	–	–	–	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
	125	BACKUP	Backup start command while running Executes backup command while running when set to 1. Not automatically cleared to 0 when backup is completed, so clear to 0 when performing backup again. Backup will not be interrupted if 0 is written while backup is being performed. 0: ITEM 125 disabled.	0, 1	0	Yes	R/W(O)	–	R/W	1
	126	BCNT_EN	Flash memory write counter (ITEM104) disable 0: ITEM 104 enabled. The backup count will be stored in ITEM 104. 1: ITEM 104 disabled. Zero will always be stored in ITEM 104.	0, 1	0	–	R/W(O)	–	R/W	1

Note: “Backup start command while running” (ITEM 125) is disabled while LCB operation is stopped. Backup is not performed even if ITEM 125 is set to 1.

Note
- Before changing ITEM 004 (system common operation cycle) of the System Common block (Block Model 000), be sure to stop running of the Loop Control Board. Start running of the Loop Control Board by a cold start after changing ITEM 004. Otherwise, the Loop Control Board will not run correctly.
- Be sure to set 0 to ITEM 000 of the System Common block (Block Model 000). If this ITEM is set to 1, running of the Loop Control Board stops, and data exchange with the CPU Unit stops.

Note The internal data on the CS1 CPU Unit and not the data on the Loop Controller is output as the calendar and clock output data of ITEM 031 to ITEM 036 of the System Common block (Block Model 000).

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

Allocated EM Area address (□ = bank number)	ITEM	Tag ITEM	Data Name	Send/ Receive
EM□_00000	–			Send
EM□_00001	047	LOAD	LCB load rate	Send
EM□_00002	–			Send
EM□_00003	048	M_LOAD	LCB maximum load rate	Send
EM□_00004	–			Send
EM□_00005	–			Send
EM□_00006	–			Send
EM□_00007	059	K_CODE	Data update check code	Send
EM□_00008	104	BUP_CNT	Flash memory write counter	Send
EM□_00009	120	BUP_ST	Backup start command while running	Send
EM□_00010	106	BUP_CNTD	Flash memory write counter (value divided by 10)	Send
EM□_00011	–			Send
EM□_00012	–			Send
EM□_00013	–			Send
EM□_00014	–			Send
EM□_00015	003	ERR	Execution error	Send
EM□_00016	–			Send
EM□_00017, bit 00	–			Send
EM□_00017, bit 01	–	PVE_ST	PV error contact input (corresponds to A35501) 0: Normal, 1: Error	Send
EM□_00017, bit 02	–	MVE_ST	MV error contact input (corresponds to A35502) 0: Normal, 1: Error	Send
EM□_00017, bit 03	093	ERR_ST	Execution error (corresponds to A35503) 0: Normal, 1: Error	Send
EM□_00017, bit 04	094	BLKDB_ST	Function block database error (corresponds to A35504) 0: Normal, 1: Error	Send
EM□_00017, bit 07	045	DH_START	The state of Hot Start Disable	Send
EM□_00017, bit 08	061	DPL_RUN	Duplex operation	Send
EM□_00017, bit 09	062	ACT_FLG	Left-side CPU Unit status (ac-tive/standby)	Send
EM□_00017, bit 13	–			Send
EM□_00017, bit 15	039	BT_FLG	Function block change (corresponds to A35515) 0: No, 1: Yes	Send
EM□_00018, bit 00	081	T_MLA	MV low limit reached (MLA) (corresponds to A35600)	Send
EM□_00018, bit 01	082	T_MHA	MV high limit reached (MHA) (corresponds to A35601)	Send
EM□_00018, bit 02	083	T_DVA	Deviation alarm (DVA) (corresponds to A35602)	Send
EM□_00018, bit 03	084	T_LL	Low low limit alarm (LL) (corresponds to A35603)	Send
EM□_00018, bit 04	085	T_PL	Low limit alarm (L) (corresponds to A35604)	Send
EM□_00018, bit 05	086	T_PH	High limit alarm (H) (corresponds to A35605)	Send
EM□_00018, bit 06	087	T_HH	High high limit alarm (HH) (corresponds to A35606)	Send
EM□_00018, bit 13	126	BCNT_EN	Flash memory write counter (ITEM104) disable	Send and receive
EM□_00018, bit 14	125	BACKUP	Backup start command while running	Send and receive
EM□_00019, bit 00	007	FAIL	Fatal CPU Unit error	Send
EM□_00019, bit 01	008	RUN	CPU Unit operating	Send
EM□_00019, bit 02	009	L_STOP	CPU Unit loads OFF	Send
EM□_00019, bit 03	010	RUN_MD	CPU Unit in RUN mode	Send
EM□_00019, bit 04	011	MON_MD	CPU Unit in MONITOR mode	Send
EM□_00019, bit 06	013	PRG_MD	CPU Unit in PROGRAM mode	Send

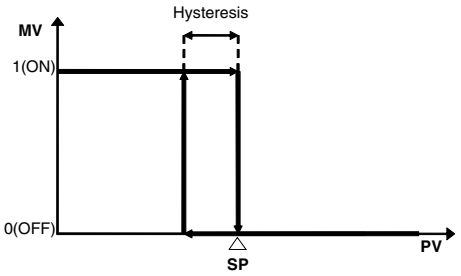
Block Model	Block Name	Block Address
<001>	2-position ON/OFF	001 to 500

Outline

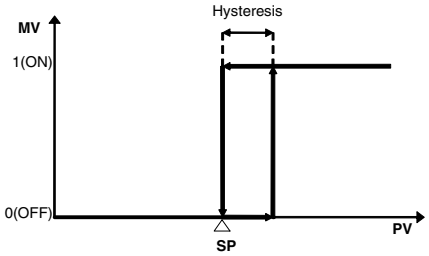
This function block is a 2-position type ON/OFF controller.

- Remote/Local switching is possible.
- This function block is provided with four PV alarm outputs and a deviation alarm output.

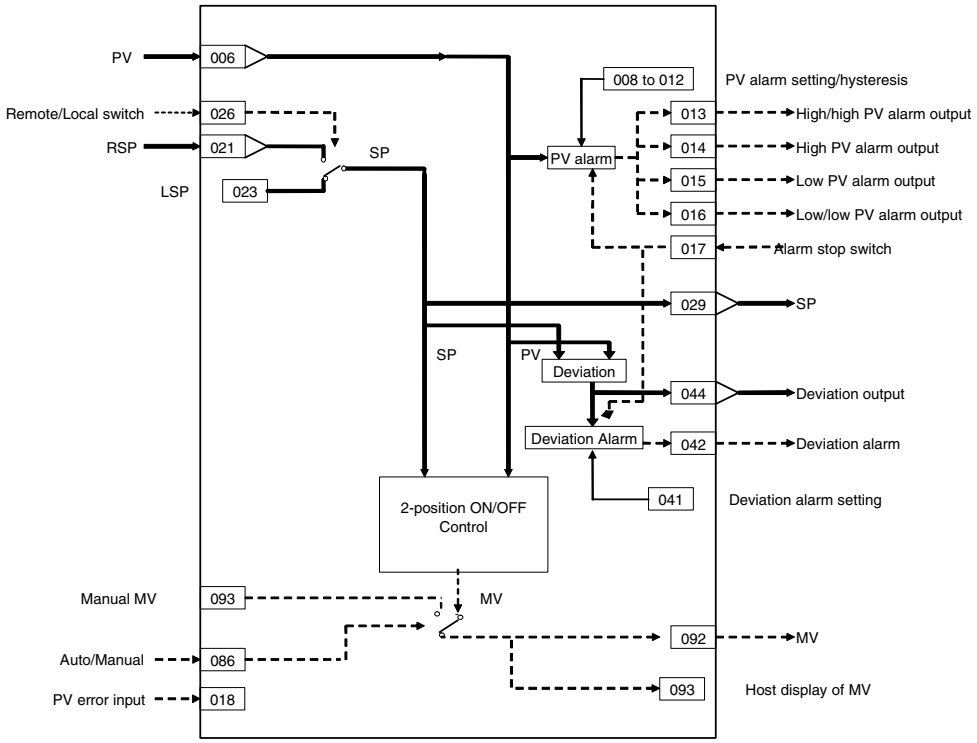
•During reverse action



•During forward action



Block diagram



ITEM list

Note The values of ITEMs that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Control Board was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Control Board was stopped are also cleared. When a hot start is performed, these values are held.

Contact input

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: 2-position ON/OFF	001	001	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

PV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	006		PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	PV input	-15.00 to +115.00%	0.00	Yes	–	–	–	S	2
Parameter	008		High/high alarm setting	-15.00 to +115.00%	115.00	–	R/W (O)	W	–	S/R	2
	009		High alarm setting	-15.00 to +115.00%	100.00	–	R/W (O)	W	–	S/R	2
	010		Low alarm setting	-15.00 to +115.00%	0.00	–	R/W (O)	W	–	S/R	2
	011		Low/low alarm setting	-15.00 to +115.00%	-115.00	–	R/W (O)	W	–	S/R	2
	012		Hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	013	HH	High/high alarm output	0, 1	0	Yes	–	–	R	S	1
	014	H	High alarm output	0, 1	0	Yes	–	–	R	S	1
	015	L	Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
	016	LL	Low alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input	017	S1	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	Yes	R/W (O)	–	R/W	S/R	1
Connection terminal contact input	018		PV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	019	PVE	PV error indication 0: Normal 1: Error → MANUAL mode	0, 1	0	Yes	–	–	R	S	1
Parameter	020		Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1

*1: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.

Setting Value Set Point

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	021		Remote Set Point source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	022	RSP	Remote Set Point input	-15.00 to +115.00%	0.00	Yes	–	–	–	–	2
Parameter	023		Local Set Point setting	-15.00 to +115.00%	0.00	–	R/W (O)	W	–	R	2
	024		Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM 026.	0, 1	0	–	R/W(S)	–	–	S/R	1
Contact input/ parameter	026	R/L	Remote/Local switch 0: Local 1: Remote Note: Valid only when ITEM 024 is 1	0, 1	0	Yes	R/W (O)	–	R/W	S/R	1
Analog output	029	SP	Current Set Point output	-15.00 to +115.00%	0.00	Yes	r/w	–	–	S	2

Deviation

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	041		Deviation alarm setting (Hysteresis is set at ITEM 012.)	0 to 115.00%	115.00	–	R/W (O)	W	–	S/R	2
Contact output	042	DA	Deviation alarm output	0, 1	0	Yes	–	–	R	S	1
Parameter	043		Deviation alarm standby sequence 0: Not used 1: Used Note: Restart in standby sequence by cold start	0, 1	0	–	R/W(S)	–	–	–	1
Analog output	044	Y1	Deviation output (deviation = PV – SP)	±115.00%	0.00	Yes	r/w	–	–	S	2

Control

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	052		Control action 0: Reverse (MV=1 by PV < SP) 1: Direct (MV=1 by PV > SP)	0, 1	0	–	R/W(S)	–	–	–	1
	055		Control hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
	062		MV Output Retrace Time for PV Error*1 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2

*1: Based on the value specified in ITEM 062, the MV will be restored to the output value at the times specified below when a PV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 062 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 062 x 2 s

MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input/ parameter	086	A/M	Auto/Manual switch 0: Manual, 1: Auto	0, 1	0	Yes	R/W (O)	–	R/W	S/R	1
Contact output	092	MV	Output	0, 1	0	Yes	–	–	R	–	1
Parameter	093		Host display of MV (Auto/Manual switch: Auto, Manual) or Manual MV (Auto/Manual switch: Manual)	0, 1	0	Yes	R/W (O)	–	R/W	S/R	1

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

Note To send data of the 2-position ON/OFF block to CX-Process Monitor by the Block Send Terminal to Computer blocks (Block Models 403 and 404), set the operation cycle of the Send to Computer blocks to the same or longer than that of the 2-position ON/OFF block at ITEM 004. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
008	High/high alarm setting	HH_SP
009	High alarm setting	H_SP
010	Low alarm setting	L_SP
011	Low/low alarm setting	LL_SP
013	High/high alarm output	HH
014	High alarm output	H
015	Low alarm output	L
016	Low/low alarm output	LL
017	Alarm stop switch	AOF
019	PV error indication	PV_ABN
023	Local Set Point setting	SP
024	Set Point setting mode (default)	CAS_SET
026	Remote/Local switch	R/L_SW
029	Current Set Point output	SP
041	Deviation alarm setting	DVA_SP
042	Deviation alarm output	DVA
044	Deviation output	Y1
086	Auto/Manual switch	A/M_SW
093	Host display of MV (Auto/Manual switch: Auto, Manual) or Manual operation value (Auto/Manual switch: Manual)	MV
099	Label	OP_MK

Block Model	Block Name	Block Address
<002>	3-position ON/OFF	001 to 500

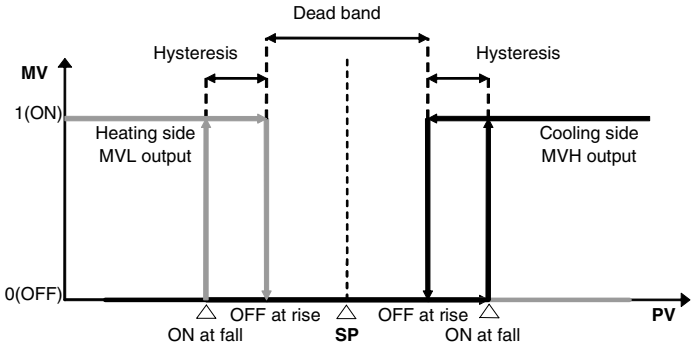
Outline

This function block is a 3-position type ON/OFF controller for heating/cooling ON/OFF control.

•Two outputs are provided for heating and cooling.
•Dead band and hysteresis can be set.
•Remote/Local switching is possible.

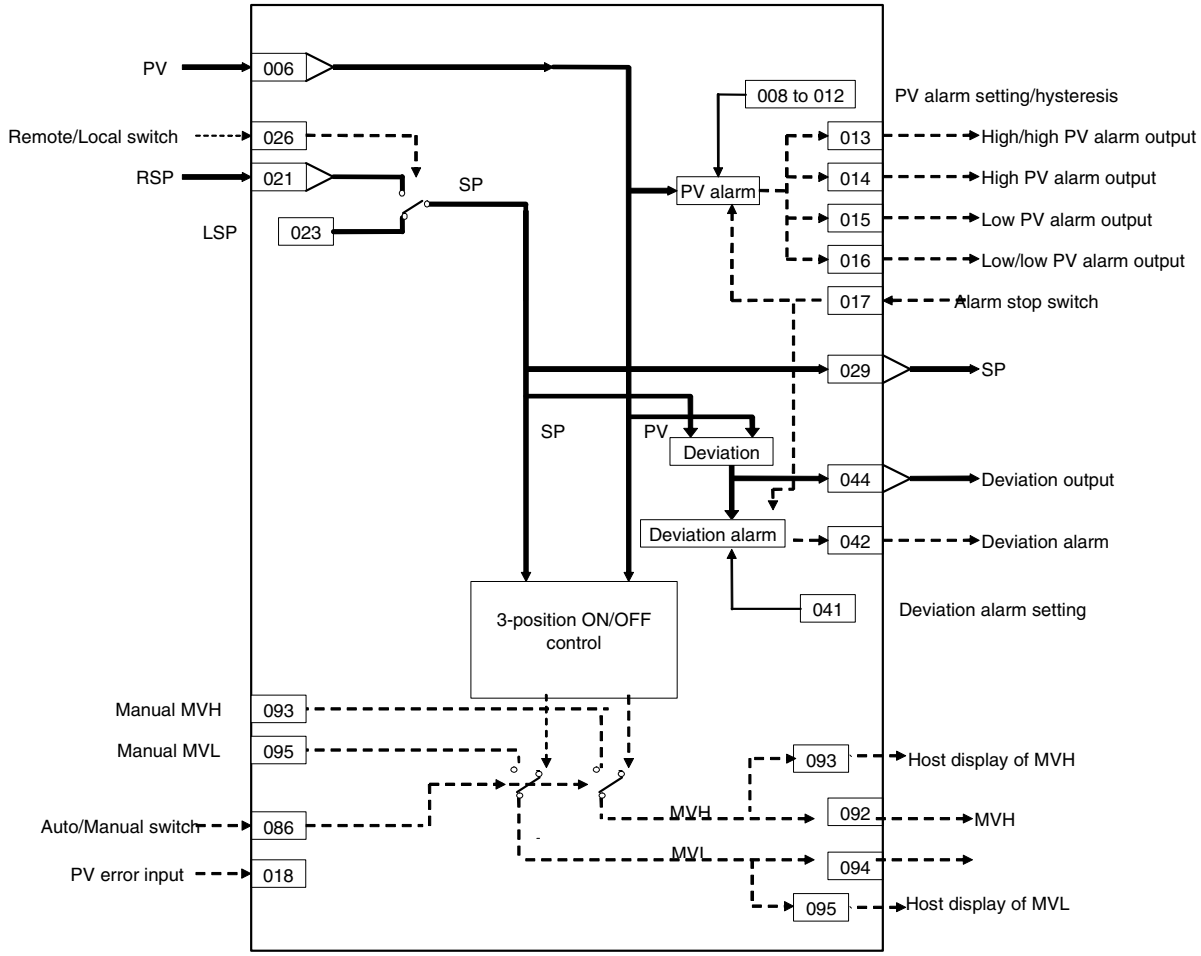
3-position ON/OFF action

MVH output turns ON during MV rise by "Set Point + dead band ÷ 2 + MVH side hysteresis," and turns OFF during MV fall by "Set Point + dead band ÷ 2".
MVL output turns ON during MV fall by "Set Point - dead band ÷ 2 - MVH side hysteresis," and turns OFF during MV rise by "Set Point - dead band ÷ 2".



Note: To reverse action, use the Step Ladder Program block (Block Model 301) to invert output.

Block diagram



ITEM list

Note: The values of ITEMs that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Control Board was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Control Board was stopped are also cleared. When a hot start is performed, these values are held.

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: 3-position ON/OFF	002	002	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

PV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	006		PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	PV input	-15.00 to +115.00%	0.00	Yes	–	–	–	S	2
Parameter	008		High/high alarm setting	-15.00 to +115.00%	115.00	–	R/W (O)	W	–	S/R	2
	009		High alarm setting	-15.00 to +115.00%	100.00	–	R/W (O)	W	–	S/R	2
	010		Low/low alarm setting	-15.00 to +115.00%	0.00	–	R/W (O)	W	–	S/R	2
	011		Low/low alarm setting	-15.00 to +115.00%	-115.00	–	R/W (O)	W	–	S/R	2
	012		Hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	013	HH	High/high alarm output	0, 1	0	Yes	–	–	R	S	1
	014	H	High alarm output	0, 1	0	Yes	–	–	R	S	1
	015	L	Low alarm output	0, 1	0	Yes	–	–	R	S	1
	016	LL	Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input	017	S1	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	–	R/W (O)	–	R/W	S/R	1
Connection terminal contact input	018		PV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	019	PVE	PV error indication 0: Normal, 1: Error → MANUAL mode	0, 1	0	Yes	–	–	R	S	1
Parameter	020		Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1

*1: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.

Setting Value Set Point

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	021		Remote Set Point source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	022	RSP	Remote Set Point input	-15.00 to +115.00%	0.00	Yes	–	–	–	–	2
Parameter	023		Local Set Point setting	-15.00 to +115.00%	0.00	–	R/W (O)	W	–	R	2
	024		Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM 026.	0, 1	0	–	R/W(S)	–	–	S/R	1
Contact input/ parameter	026	R/L	Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM 024 is 1	0, 1	0	Yes	R/W (O)	–	R/W	S/R	1
Analog output	029	SP	Current Set Point output	-15.00 to +115.00%	0.00	Yes	r/w	–	–	S	2

Deviation

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	041		Deviation alarm setting (hysteresis is set in ITEM 012)	0 to 115.00%	115.00	–	R/W (O)	W	–	S/R	2
Contact output	042	DA	Deviation alarm output	0, 1	0	Yes	–	–	R	S	1
Parameter	043		Deviation alarm standby sequence 0: Not used, 1: Used Note: Restart in standby sequence by cold start	0, 1	1	–	R/W(S)	–	–	–	1
Analog output	044	Y1	Deviation output (deviation = PV – SP)	±115.00%	0.00	Yes	r/w	–	–	S	2

Control

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	054		Deadband setting	0 to 115.00%	1.00	–	R/W(O)	W	–	–	2
	055		Control hysteresis setting (MVH)	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
	056		Control hysteresis setting (MVL)	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
	062		MV Output Retrace Time for PV Error*1 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2

*1: Based on the value specified in ITEM 062, the MV will be restored to the output value at the times specified below when a PV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 062 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 062 x 2 s

MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input/ parameter	086	A/M	Auto/Manual switch 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	092	MVH	MVH output	0, 1	0	Yes	–	–	R	–	1
Parameter	093		Host display of MVH (Auto/Manual switch: Auto, Manual) or Manual MVH (Auto/Manual switch: Manual)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
Contact output	094	MVL	MVL output	0, 1	0	Yes	–	–	R	–	1
Parameter	095		Host display of MVL(Auto/Manual switch: Auto, Manual) or Manual MVL (Auto/Manual switch: Manual)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
008	High/high alarm setting	HH_SP
009	High alarm setting	H_SP
010	Low alarm setting	L_SP
011	Low/low alarm setting	LL_SP
013	High/high alarm output	HH
014	High alarm output	H
015	Low alarm output	L
016	Low/low alarm output	LL
017	Alarm stop switch	AOF
019	PV error indication	PV_ABN
023	Local Set Point setting	SP
024	Set Point setting mode (default)	CAS_SET
026	Remote/Local switch	R/L_SW
029	Current Set Point output	SP
041	Deviation alarm setting	DVA_SP
042	Deviation alarm output	DVA
044	Deviation output	Y1
086	Auto/Manual switch	A/M_SW
093	Host display of MVH(Auto/Manual switch: Auto, Manual) or MVH manual operation value (Auto/Manual switch: Manual)	MVH
095	Host display of MVL (Auto/Manual switch: Auto, Manual) or MVL manual operation value (Auto/Manual switch: Manual)	MVL
099	Label	OP_MK

Block Model	Block Name	Block Address
<011>	Basic PID	001 to 500

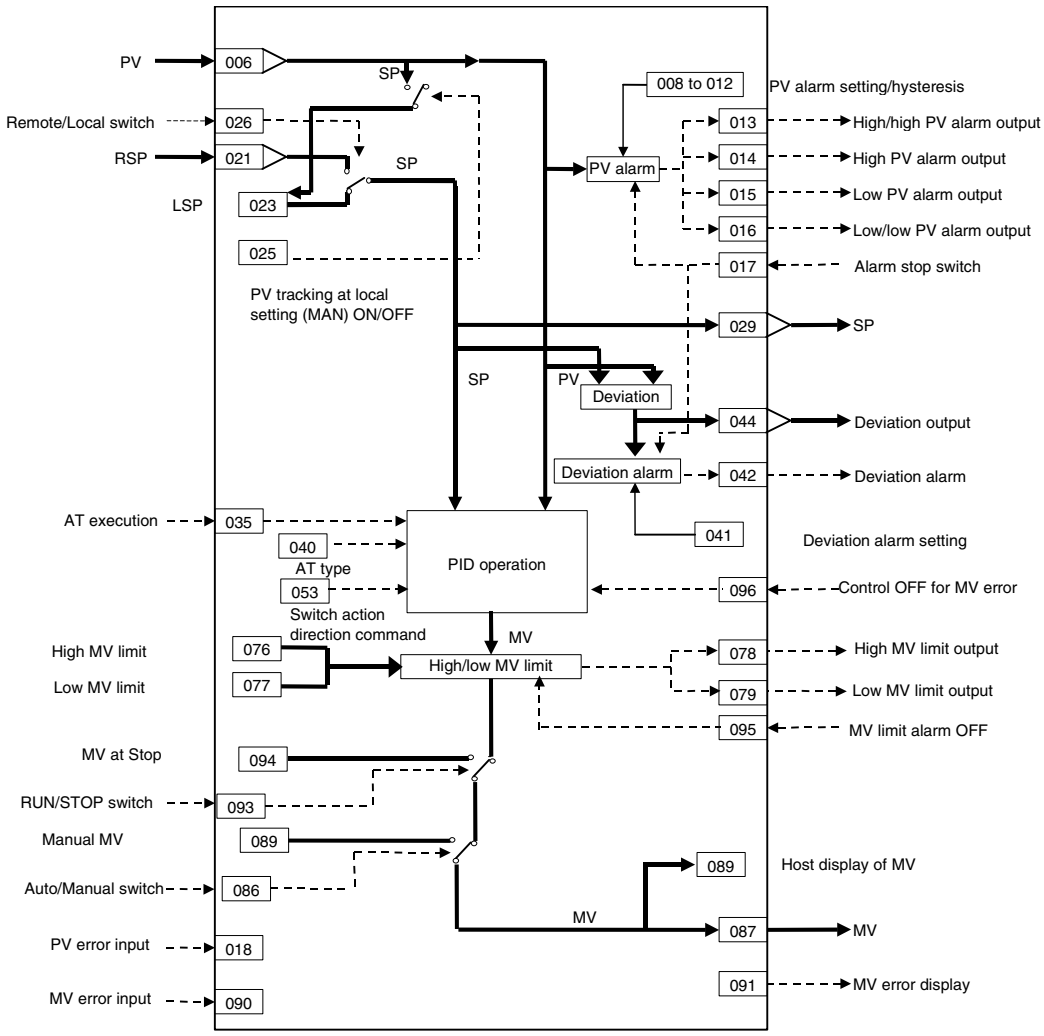
Outline

This function block is a controller whose PID functions have been narrowed down to the basic functions for fixed value control and cascade control.

- This function block is provided with four PV alarm outputs and a deviation alarm output, allowing standby sequences.
- The Set Point can always be made to track PV during the manual mode in fixed value control. Also when using cascade control, the secondary loop Set Point can always be made to track PV while the primary loop is in the manual mode. To use these functions, set the “PV tracking at local setting (Manual)” (ITEM 025) setting to “1: Used.”
- Bumpless output of primary side MV (without tracking) can be performed when the MV is used on the secondary loop side in cascade control.
- Auto-tuning of PID constants can be executed according to the limit cycle mode. (For details, see "About PID Constant AT (auto-tuning) Function" on page 57)
- The disturbance overshoot adjustment function can be used to adjust the control waveform when it is subjected to external noise. (For details, see "Disturbance Overshoot Adjustment Function" on page 65)
- When using cascade control on the LCB01/05 Ver. 2.0 or later or the LCB03, the primary side MV can be held to when the secondary loop (i.e., slave) PID block reaches the MV upper or lower limit. To use this function, set the “MV hold switch when secondary loop MV upper/lower limit is reached (self node is secondary side)” (ITEM 033) setting to “1: Used.

- With Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers, the PID action direction can be reversed in Auto mode.
  To use this function, set ITEM 053 (switch action direction command) to 1. The MV will operate with in the opposite direction of the action direction set in ITEM 052 (control action). When the direction is switched, bumpless processing will executed on the MV output value. With this processing, it is easy to switch between heating/cooling control from a HMI interface (such as SCADA software or a PT) without excessively disturbing control.
- With Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers, a contact input (ITEM 093, the RUN/STOP switch) can be used to start (RUN) or stop (STOP) PID processing in individual PID function blocks. It is also possible to specify the MV when PID processing stops (MV at Stop).
  Bumpless processing will not operate when ITEM 093 is switched from 1 (STOP) to 0 (RUN).
- When an execution error occurs, the error can be cleared by setting ITEM 003 (execution error display) to 0 (clear error).

Block diagram



ITEM list

Note The values of ITEMs that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Controller was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Controller was stopped are also cleared. When a hot start is performed, these values are held.

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Basic PID	011	011	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”) When the setting is not 0, writing 0 will clear the execution error. (See note *1.)		0000	Yes	R/W(O)	W	–	S/R	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *2, 7: 0.02 *2, 8: 0.05 *2 *2: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

*1: LCB01/03/05 version 3.5 or later only.
When an execution error occurs, it can be cleared by writing 0 (clear error) to ITEM 003. If the error occurs again in the next operation cycle, however, an execution error will again be recorded. Therefore determine the conditions that caused the error before writing 0 to ITEM 003.

*2: Operation cycles of 0.01 s or less cannot be used with the CS1D-LCB05D.

PV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	006	PV_AD	PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	PV input	-15.00 to +115.00%	0.00	Yes	–	–	–	S	2
Parameter	008	HH_SP	High/high alarm setting	-15.00 to +115.00%	115.00	–	R/W (O)	W	–	S/R	2
	009	H_SP	High alarm setting	-15.00 to +115.00%	100.00	–	R/W (O)	W	–	S/R	2
	010	L_SP	Low alarm setting	-15.00 to +115.00%	0.00	–	R/W (O)	W	–	S/R	2
	011	LL_SP	Low/low alarm setting	-15.00 to +115.00%	-15.00	–	R/W (O)	W	–	S/R	2
	012	HS_SP	Hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	013	HH	High/high alarm output	0, 1	0	Yes	–	–	R	S	1
	014	H	High alarm output	0, 1	0	Yes	–	–	R	S	1
	015	L	Low alarm output	0, 1	0	Yes	–	–	R	S	1
	016	LL	Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input	017	S1	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	Yes	R/W (O)	–	R/W	S/R	1
Connection terminal contact input	018	PVE_AD	PV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	019	PVE	PV execution error indication 0: Normal 1: Error → MANUAL mode	0, 1	0	Yes	–	–	R	S	1
Parameter	020	ALM_LIM	Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1

*1: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.
- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

Setting Value Set Point

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	021	RSP_AD	Remote Set Point source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	022	RSP	Remote Set Point input	-15.00 to +115.00%	0.00	Yes	–	–	–	–	2
Parameter	023	SP_W	Local Set Point setting	-15.00 to +115.00%	0.00	–	R/W (O)	W	–	R	2
	024	CAS_SET	Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM 026.	0, 1	0	–	R/W(S)	–	–	S/R	1
	025	PVTRK_SW	PV tracking at local setting (Manual) 0: Not used, 1: Used	0, 1	0	–	R/W(S)	–	–	–	1
Contact input/ parameter	026	R/L	Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM 024 is 1	0, 1	0	–	R/W (O)	–	R/W	S/R	1
Analog output	029	SP	Current Set Point output	-15.00 to +115.00%	0.00	—	r/w	–	–	S	2
Parameter	032	MVTRK_SW	Bumpless output between primary/secondary loops (self node is secondary side) 0: Not used, 1: Used	0, 1	0	Yes	R/W(S)	–	–	–	1
	033	MVHOLD_SW	MV hold switch when secondary loop MV upper/lower limit is reached (self node is secondary side) 0: Not used,1: Used	0, 1	0	–	R/W(S)	–	–	–	1
Contact output	034	CAS_CLP	Primary loop MV held when secondary loop MV upper/lower limit is reached 1:MV held, 0:MV not held	0, 1	0	Yes	–	–	–	S	1

AT (auto-tuning)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	035	AT	AT command/AT Executing 0: Cancel AT 1: Execute AT as AT command AT Executing flag remains at 1 during AT execution. Flag returns to 0 automatically after AT execution ends normally.	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	036	CYCL_OUT	Limit cycle MV amplitude Note: Set as ±%.	5.00 to 50.00	20.00	–	R/W(O)	–	–	–	2
	037	CYCL_HS	Limit cycle hysteresis	0 to 10.00%	0.20	–	R/W(O)	–	–	–	2
	038	ST_GIN	AT calculation gain	0.10 to 10.00	1.00	–	R/W(O)	–	–	–	2
	039	AT_DEV	Judgment deviation for provisional AT execution	0 to 100.00%	10.00	–	R/W(O)	–	–	–	2
	040	AT_TYP	AT type (0: Standard, 1: Short)	0, 1	0	–	R/W(O)	–	–	–	1

Deviation

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	041	DV_SP	Deviation alarm setting (hysteresis is set in ITEM 012)	0 to 115.00%	115.00	–	R/W(O)	W	–	S/R	2
Contact output	042	DA	Deviation alarm output	0, 1	0	Yes	–	–	R	S	1
Parameter	043	DV_SQ	Deviation alarm standby sequence 0: Not used, 1: Used Note: Restart in standby sequence by cold start	0, 1	1	–	R/W(S)	–	–	–	1
Analog output	044	Y1	Deviation output (deviation = PV - SP)	±115.00%	0.00	Yes	r/w	–	–	S	2

Control

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	051	PID_RATE	Processing cycle of PID control (0: cycle specified at ITEM 004) Note: When operation cycle is set to value other than "0", the setting value of ITEM 004 is automatically changed to "4".	(0), 1, 2, 4, 8, 16, 32, 64, 128s	0	–	R/W(S)	–	–	–	2
	052	DIR_REV	Control action 0: Reverse (MV decreases by PV increase.), 1: Direct (MV increases by PV increase.)	0, 1	0	–	R/W(S)	–	–	–	1
	053	DIR_CHG	Switch action direction command *3	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	054	P	Proportional band	0.1 to 999.9%	100.0	–	R/W(O)	W	–	S/R	2
	055	I	Integral time (0: No integral action)	0 to 9999s *2	0	–	R/W(O)	W	–	S/R	2
	056	D	Differential time (0: No differential action)	0 to 9999s *2	0	–	R/W(O)	W	–	S/R	2
Contact input wiring information	061	MIE_AD	Out-of-range processing at MV output destination block (BBB: Destination block address, III: ITEM No., 000000: Processing OFF) Note: When contact turns ON, accumulator in PID control is stopped.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	062*1	MV_RTM	MV Output Retrace Time for PV Error*2 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2
	065	ALFA	PID with 2 degrees of freedom parameter α	0.00 to 1.00	0.65	–	R/W(S)	–	–	–	2
	066	BETA	PID with 2 degrees of freedom parameter β	0.00 to 1.00	1.00	–	R/W(S)	–	–	–	2

*1: Based on the value specified in ITEM 062, the MV will be restored to the output value at the times specified below when a PV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 062 x 1 s.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 062 x 2 s.

*2: If the operation cycle (ITEM 004) is 0.01 to 0.05 s, the integral time and derivative time will be in units of 0.01 s.
When the operation cycle is changed to 0.01 s or 0.05 s, change the settings for I and D (the integral time and differential time) by dividing the previous value by 100.

*3: This setting is supported only by Ver. 3.0 and higher versions of the LCB01, LCB03, and LCB05 Loop Controllers.
When ITEM 053 goes from 0 to 1 (rising edge of the signal), the control action direction will be the opposite of the direction set in ITEM 052. When ITEM 053 goes from 1 to 0 (falling edge of the signal), the control action direction will return to be the direction set in ITEM 052.

MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	076	MH	High MV limit	±320.00%	100.00 *1	–	R/W(O)	W	–	S/R	2
	077	ML	Low MV limit	±320.00%	0.00*1	–	R/W(O)	W	–	S/R	2
Contact output	078*3	U1	High MV limit arrival output 1: High limit or higher Valid for AUTO mode only; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
	079*3	U2	Low MV limit arrival output 1: Low limit or lower Valid for AUTO mode only; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
Contact input/ parameter	086	A/M	Auto/Manual switch 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	087	MV	MV output	±320.00%	0.00	Yes	r/w	–	–	–	2
Parameter	088	MV_REV	Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%.	0, 1	0	–	R/W(S)	–	–	–	1
	089	MV	Host display of MV (Auto/Manual switch: Auto, Manual) or Manual MV (Auto/Manual switch: Manual)	±320.00%	0.00	Yes	R/W(O)	W	–	S/R	2
Connection terminal contact input	090	MVE_AD	MV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	091	MVE	MV error display 0: Normal, 1: Error (MANUAL mode when ITEM 096=1(Enable).)	0, 1	0	Yes	–	–	R	S	1
Contact input	093	R/S	RUN/STOP switch 0: RUN 1: STOP *2	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	094	STP_MV	MV at Stop *2	±320.00%	0.00	–	R/W(O)	W	–	–	2
	095 *3	MVA_OFF	MV limit alarm OFF 0: Alarm 1: OFF	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	096 *3	MVE_CNT	Control OFF for MV error 0: OFF 1: ON	0, 1	0	–	R/W(S)	–	–	–	1
	097 *3	MVE_RTM	MV output retrace time for MV error *3 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2

*1: For LCB 01/03/05 Ver.2.0 or later, the defaults for the high MV limit and low MV limit are 105.00% and −5.00%, respectively.

*2: These items are supported by the Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers only.

- ITEM 093 is enabled in Auto mode only.
- When ITEM 093 is set to 1 (STOP), PID processing is stopped.
- As long as ITEM 093 is set to 1 (STOP), the MV output value (ITEM 087) will be the value set in ITEM 094.
- The MV upper/lower limit settings are not applied to ITEM 094.
- AT (auto-tuning) cannot be executed while ITEM 093 is set to 1 (STOP). If ITEM 093 is set to 1:

Stop during auto-tuning, auto-tuning will be canceled.

- If ITEM 093 is set to 0 (RUN), PID processing will restart. Bumpless processing will not operate when ITEM 093 is switched from 1(STOP) to 0 (RUN) unless ITEM 086 is switched from 0 (MAN) to 1 (AUTO) at the same time.

*3: LCB 01/05 Ver.1.5 or later, and LCB03 only
Based on the value specified in ITEM 097, the MV will be restored to the previous output value at the time specified below when a MV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 097 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 097 x 2 s

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	098	MV_IDX	MV index position	-15.00 to +115.00%	0.00	Yes	R/W(O)	W	–	S/R	2
	099	OP_MX	Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

Note Bumpless output of MV functions when PID constants are changed in the Basic PID block (Block Model 011).For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172).
If this happens, use the Sequence table (Block Model 302) or the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

Disturbance Overshoot Adjustment (LCB 01/05 Ver.1.5 or later, and LCB03 only)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD Start Initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Parameter	100	IPS_USE	Disturbance overshoot adjustment enable	0, 1	0	–	R/W(O)	W	R/W	–	1
	101	IPS_GAIN	Disturbance gain	-1.00 to 1.00	0.65	–	R/W(O)	W	–	–	2
	102	IPS_CONST	Disturbance time constant	0.01 to 100.00	1.00	–	R/W(O)	W	–	–	2
	103	IPS_SET	Disturbance stabilization band	0.00 to 10.00%	0.00	–	R/W(O)	W	–	–	2
	104	IPS_JUDG	Disturbance judgement width	-100.00 to 100.00%	0.00	–	R/W(O)	W	–	–	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
008	High/high alarm setting	HH_SP
009	High alarm setting	H_SP
010	Low alarm setting	L_SP
011	Low/low alarm setting	LL_SP
013	High/high alarm output	HH
014	High alarm output	H
015	Low alarm output	L
016	Low/low alarm output	LL
017	Alarm stop switch	AOF
019	PV error indication	PV_ABN
023	Local Set Point setting	SP
024	Set Point setting mode (default)	CAS_SET
026	Remote/Local switch	R/L_SW
029	Current Set Point output	SP
034	Primary loop MV held when secondary loop MV upper/lower limit is reached (LCB01/05 Ver.2.0 and LCB03 only)	CAS_CLP
035	AT command/AT Executing	AT
041	Deviation alarm setting	DVA_SP
042	Deviation alarm output	DVA
044	Deviation output	DV
053*2	Switch action direction command	DIR_CHG
054	Proportional band	P
055	Integral time (0: No integral action)	I
056	Differential time (0: No differential action)	D
076	High MV limit	MH_LMT
077	Low MV limit	ML_LMT
078	High MV limit output	MLA
079	Low MV limit output	MLA
086	Auto/Manual switch	A/M_SW
089	Host display of MV (Auto/Manual switch: Auto, Manual) or Manual MV (Auto/Manual switch: Manual)	MV
091	MV error indication	MV_ABN
093*2	RUN/STOP switch	R/S
095 *1	MV limit alarm OFF	MVA_OFF
098	MV index position	MV_IDX
099	Label	OP_MK

*1: LCB 01/05 Ver.1.5 or later, and LCB03 only.

*2: LCB 01/03/05 Ver.3.0 or later only.

Description of functions

Item		Description	
PV (Process Variable) Input	Number of points	1	
	Input range	-15.00 to +115.00%	
	Operation function	None (Calculation of square root, first-order lag, bias, etc. Is required by external blocks)	
	Sampling cycle	According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds or 1 to 128 seconds) Note, however, that the external input refresh cycle of the entire instrumentation system differs from this operation cycle. (See 3-2 Description of Operation in the User's Manual.)	
	PV error input	When the PV error contact turns ON, the Loop Controller is forced to enter the Manual mode, and the MV value active at that moment is held. At the same time, the PV error is transferred to the CX-Process Monitor. The disconnected line detection output ITEM of analog input (AI) function blocks is specified as the source designation for use. This enables forced switching to the Manual mode when a disconnected line is detected on the Analog Input Unit, and transfer of the PV error to CX-Process Monitor at the same time.	
	PV compensation	None	
SP (Set Point)	Number of points	1	
	Setting range	-15 to +115.00%	
	Remote/Local switching	Possible	
	Bumpless output of MV when Local Set Point changes	The Local Set Point is made to match the Remote Set Point value to ensure bumpless (without sudden changes) switching of MV when the Remote Set Point is switched to the Local Set Point.	
	SP rate-of-change limit	None	
	PV tracking at manual setting of the Local Set Point	The Local Set Point can be made to track PV when the mode is switched to the Manual mode. When the mode is returned to the Auto mode, control is started with PV equaling the Set Point. Sudden changes in the MV caused at switching back to the Auto mode do not occur.	
	Bumpless processing between primary/secondary loops	When the self node is performing cascade control as the secondary controller, processing is performed on the MV of the primary controller to be input as follows: • When the Set Point of the self node is Local (LSP): The primary controller is switched to the Manual mode, and the Local Set Point of the self node is overwritten on the MV of the primary controller. • When the Set Point of the self node is Remote (RSP): The primary controller is switched to the Auto mode, and the MV of the primary controller is input as the Remote Set Point as per normal.	
PID Control	Control method	Advanced PID Various PID methods (proportional priority type, PV differential priority type, deviation differential type, etc.) can be selected according to the settings of parameters α and β.)	
	RUN/STOP	This contact input (RUN/STOP switch) can be used to start or stop PID processing in individual function blocks. (Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers only)	
	Control action	Direct/reverse action can be switched. Note: The control action direction can be switched during operation (Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers only).	
	PID constant	1 set AT (auto-tuning) can be automatically set according to limit cycle mode. (For details, see page 39 "About PID Constant AT Functions.")	
		Proportional band	0.1 to 999.9% (0.1% increments)
		Integral time	0 to 9999 sec. (1 second increments) 0: No accumulator Stepping of accumulation can be indicated from external contacts.
		Differential time	0 to 9999 sec. (1 second increments) 0: No differentiation
	Manual reset	None	

Item		Description
MV (Manipulated Variable)	Number of points	1
	Output range	-320.00 to +320.00%
	Output refresh cycle	According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds)
	Auto/manual switching	Possible (according to CX-Process Monitor, CX-Process Tool or correct signal from Step Ladder Program block/Contact Distributor block)
	High/low MV limit	High limit: -320.00 to +320.00%, low limit: -320.00 to +320.00% Note: The default low limit is -5.00% and default high limit is 105.00% to ensure that the valve becomes fully open or fully closed. If output less than 0.00% or more than 100% is meaningless, for example, in the case of time-proportional ON/OFF control for a heater, set these limits to 0.00% and 100.00, respectively, to prevent overshoot.
	MV high rate-of-change limit	None
	Preset MV switching	None
	MV hold	None
	MV tracking	None
	MV compensation	None
	Out-of-range processing at MV output destination block	PID integral action is stopped when the range is exceeded on the function block to which MV is connected, and unnecessary fluctuation of MV is prevented.
	MV error input	MV error is transferred to CX-Process Monitor when the MV error contact turns ON.
Alarm	PV alarm	4 (high/high limit, high limit, low limit, low/low limit), setting range: -15.00 to +115.00% Hysteresis: 0 to +115.00%
	Deviation alarm	1 (ON outside deviation) Standby sequence can be provided: standby started at power ON (alarm OFF even outside deviation range), alarm ON outside deviation range after entering deviation
State Output		1 current Set Point output (-15.00 to +115.00%), deviation output provided, no output for MV compensation

Note When any of the following operations is executed, bumpless processing is automatically used to prevent bumps in the MV.

- When switching from Manual Mode to Auto Mode (i.e., when the Auto/Manual switch, ITEM 086, is changed from 0 to 1).
- When a PID parameter (ITEM 054, ITEM 055, or ITEM 056) is changed.
- When parameter α or β for PID with two degrees of freedom (ITEM 065 or ITEM 066) is changed.
- When the high MV limit (ITEM 076) is changed in the high direction.
- When the low MV limit (ITEM 077) is changed in the low direction.
- When the PV compensation ON/OFF switch (ITEM 046) is switched.
- When the MV compensation ON/OFF switch (ITEM 073) is switched.
- When the preset MV is cleared (i.e., when the preset MV switch, ITEM 080, is changed from 1 to 0).
- When MV hold is cleared (i.e., when the MV hold switch, ITEM 082, is changed from 1 to 0).
- When MV tracking is cleared (i.e., when the MV tracking switch, ITEM 085, is changed from 1 to 0).
- When stop operation is cleared (i.e., when stop block operation command, ITEM 000, is changed from 1 to 0).

Bumpless processing functions, however, only for PID control or PI control (i.e., when integral operation is enabled). It does not function for P control or PD control.
Also, when bumpless control is in effect, the MV is held for one operation cycle. For example, when switching from Manual Mode to Auto Mode, the highest MV in Manual Mode will be held for the first MV after the switch. (The MV will be changed from the second time onwards.)

About PID Constant AT (auto-tuning) Function

The following description is applicable to both the Basic PID block (Block Model 011) and Advanced PID block (Block Model 012).

What is the "AT (auto-tuning) function?"

The AT function forcibly changes the manipulated variable (MV) according to the limit cycle mode to observe the characteristics of the control target, and automatically calculates the PID constants based upon the observation results.
This AT function is supported on the Loop Controller in the both the Basic PID block (Block Model 011) and Advanced PID block (Block Model 012).
Two types of AT function modes are available: standard AT and short AT.

AT Type	Description	
Standard AT	•When AT is started with PV outside of the "judgment deviation for provisional AT execution" range.	Before the Set Point is reached, provisional AT is executed temporarily so that provisional PID constants bring PV closer to the Set Point. The limit cycle is then generated by the specified limit cycle MV amplitude, and the PID constants are automatically calculated and stored.
	•When AT is started with PV inside of the "judgment deviation for provisional AT execution" range.	After PID control brings the PV closer to the Set Point without executing provisional AT, the limit cycle is then generated by the specified limit cycle MV amplitude, and the PID constants are automatically calculated and stored.
Short AT	•The limit cycle is generated directly by the MV amplitude of the MV high and low limit function without executing provisional AT, and the PID constants are automatically calculated and stored.	

Note: By setting the AT calculation gain (ITEM 038), the user can adjust the extent that automatically stored values are influenced by new PID constants calculated by auto-tuning in either of the available AT types.

Description of AT-related ITEMs

Item	Description	Method use
AT type	Standard: Provisional AT (when the PV at the start of auto-tuning is outside of the judgment deviation for provisional AT execution) is executed, and the limit cycle is generated by the limit cycle MV amplitude. Short: Provisional AT is not executed. MV is amplified by the high and low values of the MV limit function to generate the limit cycle. Default is standard auto-tuning.	To shorten the time required for auto-tuning, select short auto-tuning. Note, however, that in this case distortion of the PV caused by the limit cycle increases as MV is amplified by the high and low values of the MV limit function. If the resulting values obtained by reducing the MV limit function high and low values to limit the amplitude are inappropriate, the limit cycle may not be generated.
AT command/AT Executing	This doubles as the AT command and the AT Executing flag. •AT command: Instructs execution of standard auto-tuning. When execution is instructed, the limit cycle is generated on the Set Point, and the PID constants are automatically calculated and stored. •AT Executing flag: This flag remains at 1 during execution of auto-tuning. When execution ends, the flag automatically returns to 0.	Execution is instructed after AT execution conditions are set to enabled. Execution of PID control using the AT result is first started when this flag is set to 0 after execution is instructed. For the duration that this flag is 0, apply interlocks to other controls as required using the Step Ladder Program. Note 1 If AT execution is instructed when the remote Set Point or SP rate-of-change limit is valid, execute auto-tuning with the current Set Point held. After AT execution, cancel the current Set Point hold. Note 2 When AT cancel is instructed during auto-tuning, PID control is started in a bumpless manner from MV at that moment in time.
Limit cycle MV amplitude	With standard auto-tuning, set the amplitude of MV for the Set Point when the limit cycle is generated. With short auto-tuning, limit cycle MV amplitude is invalid. Default is an MV amplitude of ±20% (total 40%).	To disable changes to MV of ±20% (total 40%) (for generating the limit cycle), decrease the MV amplitude value. To prevent generation of the limit cycle at changes of MV of ±20% (total 40%), increase the MV amplitude value.
Limit cycle hysteresis	Set the hysteresis for the Set Point when generating the limit cycle. In the case of reverse action, MV is turned ON by a hysteresis of SP-0.20%. (default)	If an unstable PV prevents a normal limit cycle from being generated, increase the limit cycle hysteresis value. Note, however, that setting the hysteresis value larger than necessary, impairs AT accuracy.
AT calculation gain	Set the gain for calculating the PID constants by AT. Default is 1.00.	Decrease gain to give priority to response. Increase gain to give priority to stability.
Judgment deviation for provisional AT execution	With standard auto-tuning, provisional AT is started when PV is within the range "SP - judgment deviation for provisional AT execution." With short auto-tuning, judgment deviation for provisional AT execution is invalid. Default is 10.00%.	If it takes too long to arrive at the Set Point as provisional AT is not executed, and overshooting caused by execution of provisional AT is not a problem, decrease the deviation setting. Alternatively, if overshooting caused by execution of provisional AT is a problem, increase the deviation.

AT non-executable states (conditions)

The table below shows the states in which AT cannot be executed. AT execution is canceled when these states are reached during AT execution.

Note: AT is also canceled when AT-related ITEMs have been changed.

AT can be executed in all states other than those in the following table.

AT non-executable states (conditions)	•Manual mode •PV compensation in progress (Advanced PID block only) •PV tracking in progress (Advanced PID blocks only.) •PV error generated •MV compensation in progress •MV rate-of-change limit function in use •Preset MV in progress •MV hold in progress •MV tracking in progress •MV error generated •Integral action stopped (according to integral action stop switch) (Advanced PID block only) •When bumpless output between primary/secondary loops is enabled on the secondary side, and the secondary loop side is set as the Local Set Point, auto-tuning cannot be executed on the primary loop itself.
AT cancel conditions	•Auto-tuning is canceled when a cold start is performed. •When an auto-tuning error occurs (error is canceled when a cold start is performed or when AT execution is instructed again)

Limitations in writing ITEMs during AT

ITEMs other than stop block operation command (ITEM 000), AT command/AT executing (ITEM 035), and auto/manual switch (ITEM 086) cannot be written during autotuning.

About AT errors

AT errors are stored as execution error code 15 to ITEM 003 of Basic PID block (Block Model 011) and Advanced PID block (Block Model 012) if either of the following execution errors occurs:

- The limit cycle cannot be generated.
- The appropriate PID constants cannot be calculated even if the limit cycle is generated.
- Unit Version 3.0 or Earlier:
  - Auto-tuning is started with standard auto-tuning operation and the PV is outside of the judgement deviation for provisional auto-tuning execution:
    - The limit cycle half-wave time interval is two or more times the provisional PID constant integral time.
  - Auto-tuning is started with standard auto-tuning operation and the PV is within the judgement deviation for provisional AT execution:
    - The limit cycle half-wave time interval is two or more times the manual PID integral time.
  - Short AT Operation
    - The limit cycle half-wave time interval is greater than 9.999 s.
- Unit Version 3.5 or Later
  - The limit cycle half-wave time interval is greater than 9.999 s.

If an auto-tuning error occurs, consider either manually setting the PID constants or changing the control loop (e.g., changing the sensor position or changing the cascade control).

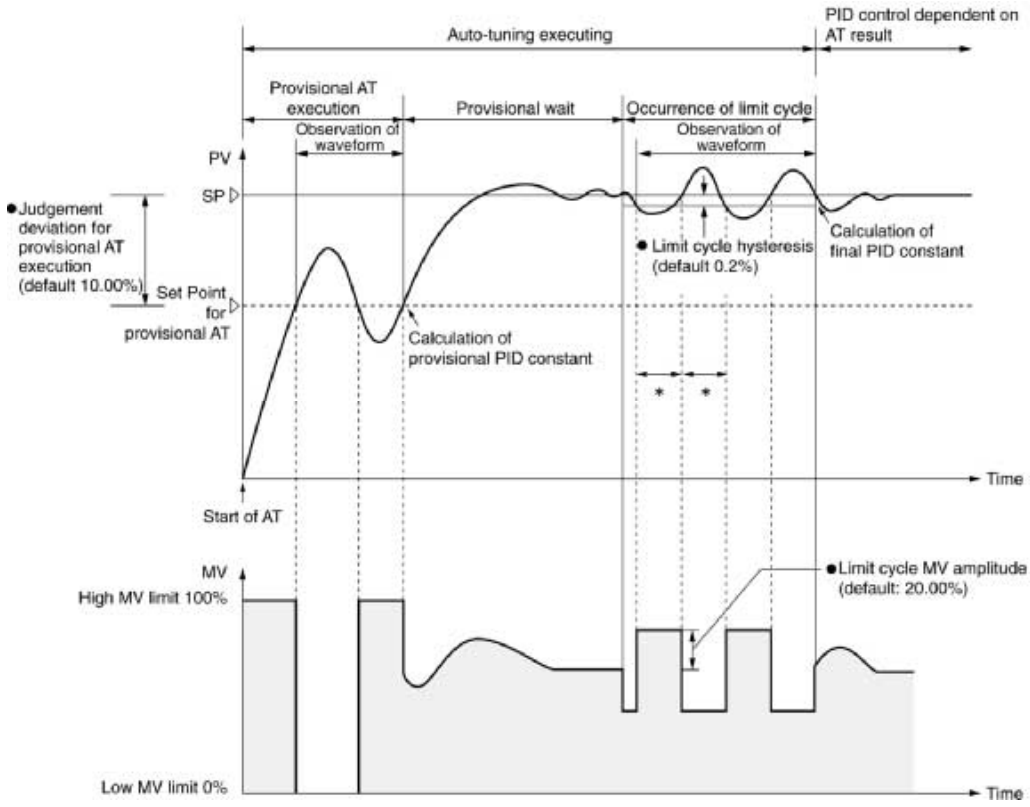
Clearing AT Errors

When an execution error occurs, the error can be cleared by writing 0 (clear error) to ITEM 003 (execution error display).

Example of waveforms produced during AT execution

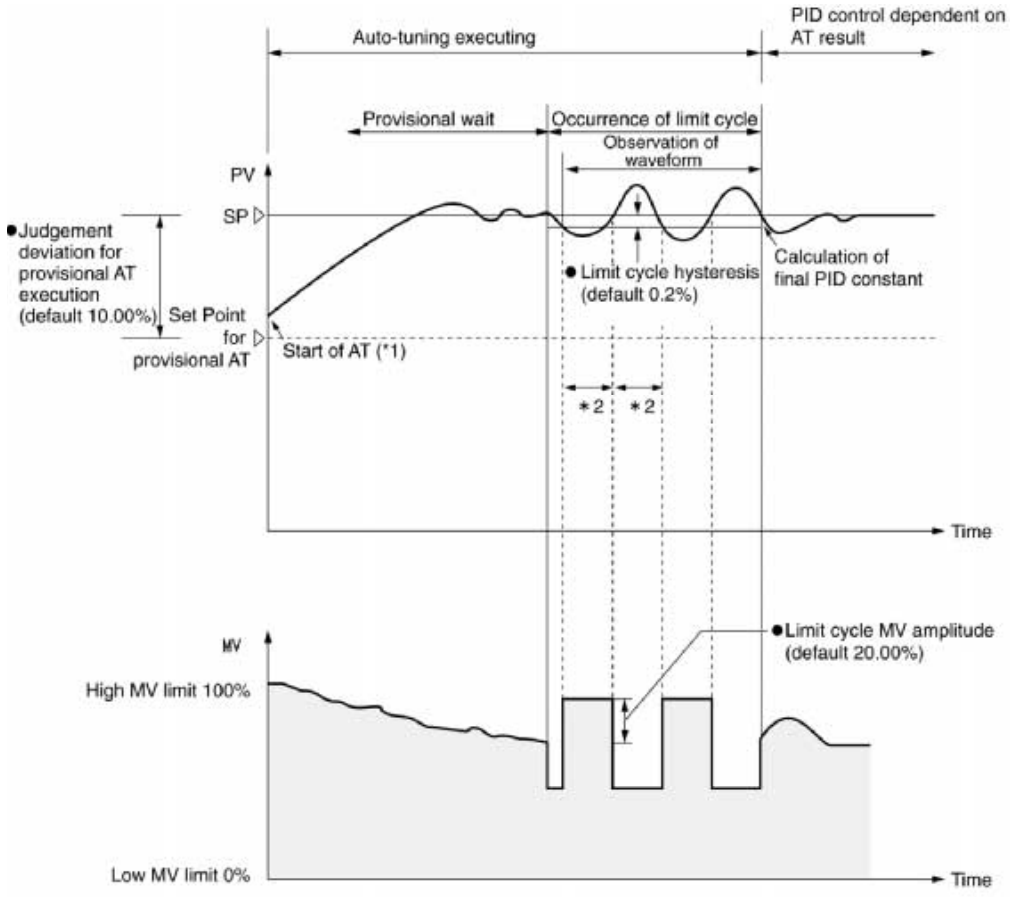
Operation by standard AT

a)When AT is started with PV outside the "judgment deviation for provisional AT execution" range:



*: For unit version 3.5 or later, the timeout time is 9,999 s max. For unit version 3.0 or earlier, it is two times the provisional PID constant integral time. If the timeout time is exceeded, an auto-tuning error will occur and the optimum PID constants cannot be calculated.

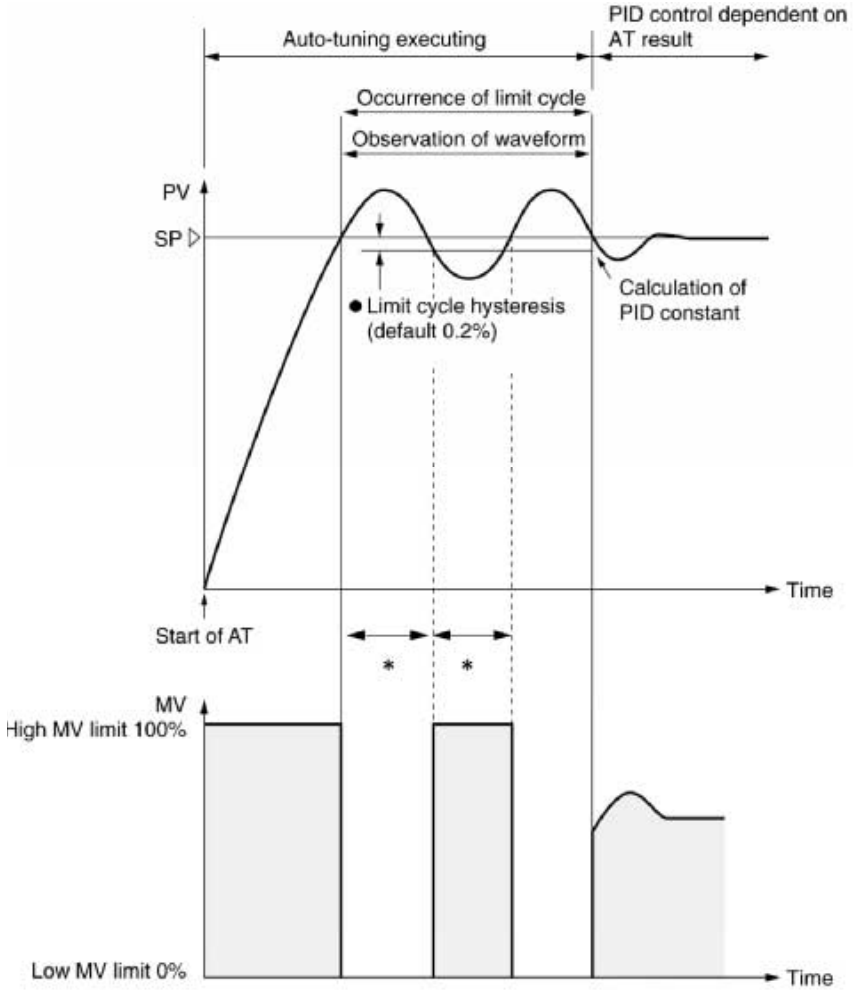
b)When AT is started with PV inside the "judgment deviation for provisional AT execution" range:



*1: •When the PID constants are at their default settings (P=100%, I=0 s, D=0 s) with PV within the judgment deviation for provisional AT execution range, it takes some time for PV to arrive at the Set Point and for limit cycle to start.
•When integral time I is 0 s with PV within the judgment deviation for provisional AT execution range, the Loop Controller converts the integral time to 240 s for execution of PID constants to bring the PV closer to the Set Point excluding offsets.

*2: For unit version 3.5 or later, the timeout time is 9,999 s max. For unit version 3.0 or earlier, it is two times the provisional PID constant integral time. If the timeout time is exceeded, an auto-tuning error will occur and the optimum PID constants cannot be calculated.

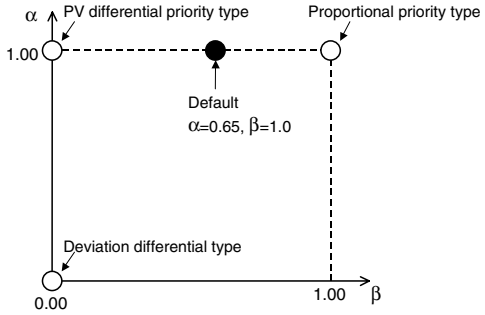
Operation by short AT



*: The timeout time is 9,999 s max. If 9,999 s is exceeded (for either unit version 3.0 or earlier or for unit version 3.5 or later), an auto-tuning error will occur and the optimum PID constants cannot be calculated.

About 2 Degrees of Freedom PID Parameters α and β

2 degrees of freedom PID can be achieved based on the PID constants set automatically (by AT) or manually in Basic PID block (Block Model 011) and Advanced PID block (Block Model 012).
"2 degrees of freedom PID" is PID that adapts to the two characteristics of disturbance response and trackability to changes in the Set Point. This type of PID is used as the PID on the Loop Controller.
The various types of PID control shown in the figure below can be selected by the user setting the two parameters α and β as desired. Selection in this way enables tracking to changes in the Set Point without changing the disturbance response.
The setting values are:
α = 0.65
β = 1.0

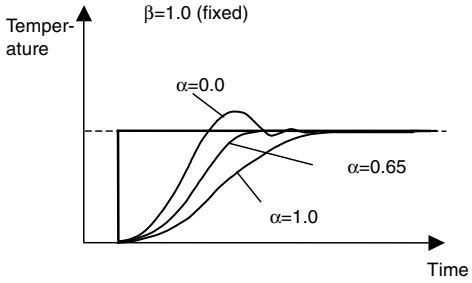


•Proportional priority type (I-PD):
Proportional and differential operations function on PV, and accumulation is performed on the deviation. Tracking to changes in the Set Point is slower than the PV differential priority type and deviation differential type. Bumps (sudden changes) do not occur in MV even if the Set Point changes. This control type is effective when overshooting is not allowed in the control.
•PV differential priority type:
Disturbance response is high as differential operation functions on the PV. Trackability to changes in the Set Point is slower than the device differential type.
•Deviation differential type:
Trackability to changes in the Set Point is high as differential operation functions on the deviation. This control type is effective when control is used for PID on the secondary side in cascade control.

The default values of both parameters α and β enable satisfactory control in almost all applications. However, adjustment is effective in the following instances.

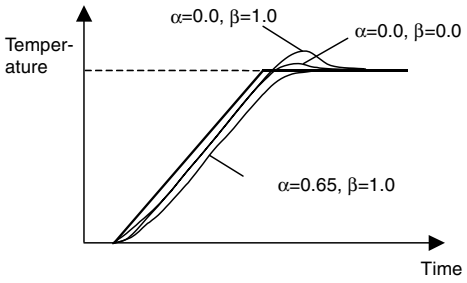
• If the tracking delay in the ramp is large, or if the control waveform is flat and settling is slow when moving from a ramp to a soak in program control, set parameter α to a smaller value. To minimize overshooting that may occur in this adjustment, set parameter β to a smaller value.
•If tracking to changes in the Set Point is poor in Remote Set Point control, set parameter α to a smaller value.
If this adjustment is not sufficient, set parameter β to a smaller value.

Response Image for SP Changes in Steps.



When α is lowered, tracking is improved but overshooting occurs. (There is no effect on step-shaped SP changes even if β is lowered.)

Response Image for SP Changes in Ramps.



When α is lowered, tracking is improved but overshooting occurs. Overshooting can be reduced for ramp-shaped SP changes by lowering β.

Disturbance Overshoot Adjustment Function

The disturbance overshoot adjustment function is used to adjust the control waveform when it is subjected to external noise.

Function Blocks

Basic PID (Block Model 011) and Advanced PID (Block Model 012)

Enabling/Disabling Disturbance Overshoot Adjustment

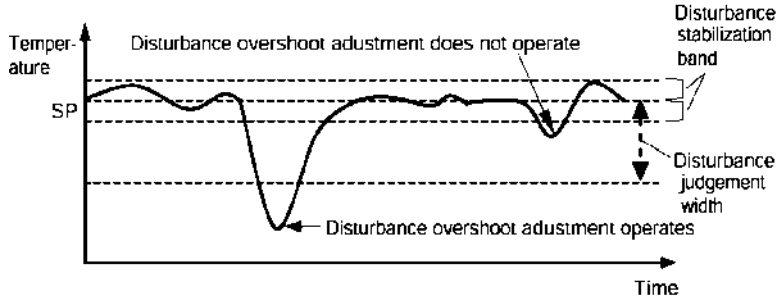
Set ITEM 100 (disturbance overshoot adjustment enable) in the Basic PID (Block Model 011) or Advanced PID (Block Model 012) block to 1 to enable disturbance overshoot adjustment.

ITEM	Setting	Setting range	Default
100	Disturbance overshoot adjustment 0: Disabled 1: Enabled	0, 1	0

Disturbance Overshoot Adjustment Start Conditions

ITEM	Setting	Setting range	Default
103	Disturbance stabilization band (%FS)	0.00 to 10.00%	0.00
104	Disturbance judgement width (%FS)	–100.00 to 100.00%	0.00

- If the deviation is greater than the disturbance judgement width after the PV stabilizes to within the disturbance stabilization band, the disturbance overshoot adjustment function will be activated.
- When the disturbance judgement width is a positive value, disturbance overshoot adjustment will be activated when disturbance makes the PV fall. When the disturbance judgement width is a negative value, disturbance overshoot adjustment will be activated when disturbance makes the PV rise.



- Disturbance overshoot adjustment will not operate under the following conditions.
  - When the disturbance stabilization band or disturbance judgement width is 0.
  - While changing the target value (target value change exceeding the disturbance stabilization band).
  - During autotuning
  - During ON/OFF control (P=0.00)
  - During PD control (I=0.0)
  - The setting unit for the disturbance stabilization band and disturbance judgement width is the percentage of full-scale for the PV/SP (%FS).

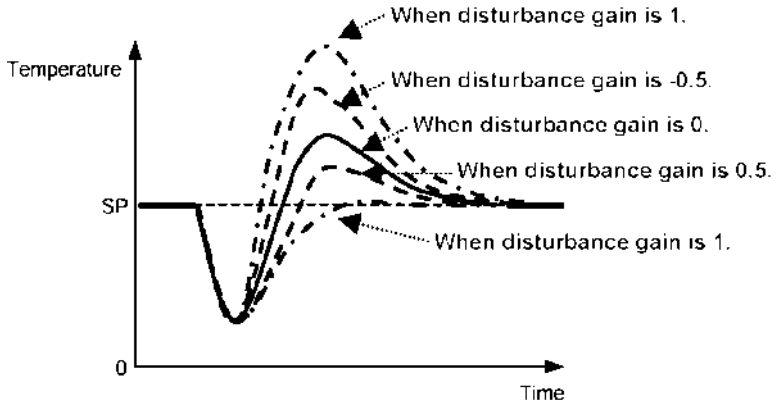
Disturbance Response Waveform Adjustment

The disturbance response waveform can be adjusted using the settings for the disturbance gain (ITEM 101) and the disturbance time constant (ITEM 102).

ITEM	Setting	Setting range	Default
101	Disturbance gain	–1.00 to 1.00	0.65
102	Disturbance time constant	0.01 to 100.00	1.00

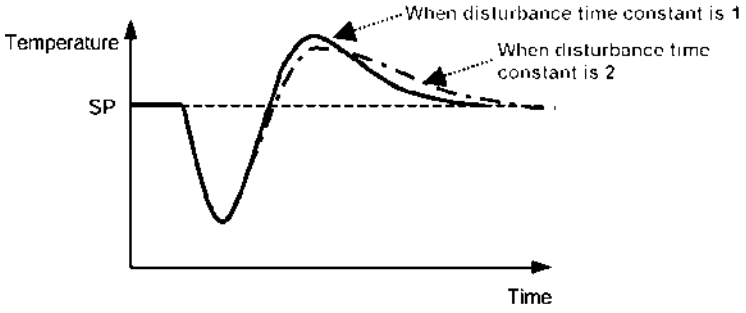
Disturbance Gain (ITEM 101)

- The disturbance gain setting can be increased to reduce overshooting when disturbance occurs.
- The disturbance gain setting can be decreased to increase overshooting when disturbance occurs.
- When the disturbance gain is set to 0, the disturbance overshoot adjustment function will not operate.



Disturbance Time Constant (ITEM 102)

- The reset time after disturbance can be lengthened by increasing the disturbance time constant. (The default value of 1 is normally used for the disturbance time constant. If adjusting the disturbance gain alone is not sufficient, this value can be adjusted for fine-tuning.)
- The waveform may vary from that in the diagram depending on differences in the control target and differences in PID constants.



Block Model	Block Name	Block Address
<012>	Advanced PID	001 to 500

Outline

This function block is provided with the functions required for achieving advanced PID.

•This function block has all of the functions provided in the Basic PID block.
•It is also provided with the following functions:

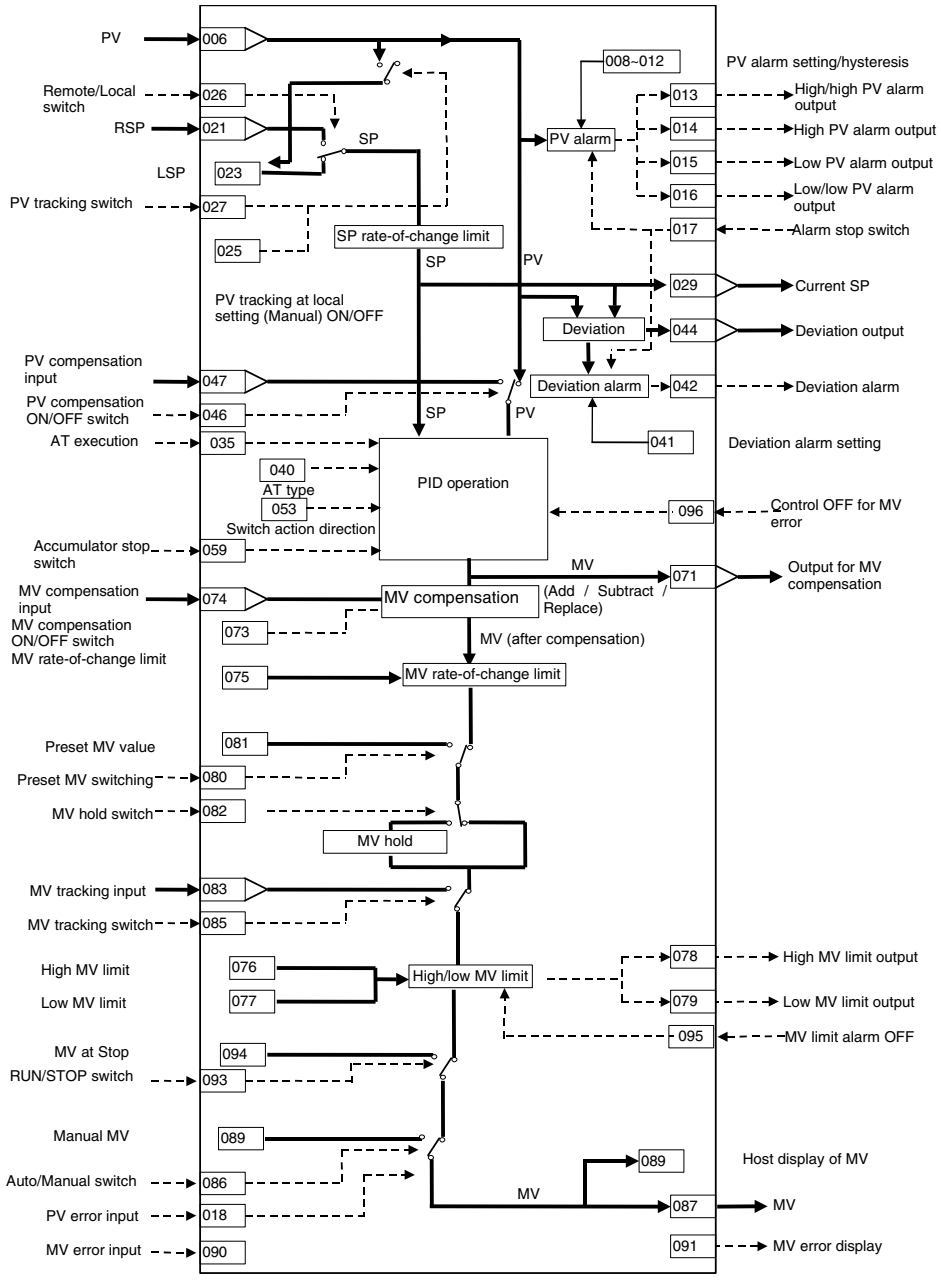
SP rate-of-change limit, PV compensation, manual reset/integration OFF, MV compensation, MV rate-of-change limit, MV high/low limit, preset MV, MV hold, MV tracking

•Auto-tuning of PID constants can be executed according to the limit cycle mode. (For details, see "About PID Constant AT (auto-tuning) Function" on page 57.)
• The disturbance overshoot adjustment function can be used to adjust the control waveform when it is subjected to external noise. (For details, see "Disturbance Overshoot Adjustment Function" on page 65.)
• When using cascade control on the LCB01/05 Ver. 2.0 or later or the LCB03, the primary side MV can be held when the secondary loop (i.e., slave) PID block reaches the MV upper or lower limit. To use this function, set the “MV hold switch when secondary loop MV upper/lower limit is reached (self node is secondary side)” (ITEM 033) setting to “1: Used.
• With Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers, the PID action direction can be reversed in Auto mode.
To use this function, set ITEM 053 (switch action direction command) to 1. The MV will operate with in the opposite direction of the action direction set in ITEM 052 (control action). When the direction is switched, bumpless processing will executed on the MV output value. With this processing, it is easy to switch between heating/cooling control from a HMI interface (such as SCADA software or a PT) without excessively disturbing control.
• With Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers, a contact input (ITEM 093, the RUN/STOP switch) can be used to start (RUN) or stop (STOP) PID processing in individual PID function blocks. It is also possible to specify the MV when PID processing stops (MV at Stop).
Bumpless processing will not operate when ITEM 093 is switched from 1 (STOP) to 0 (RUN).
• When an execution error occurs, the error can be cleared by writing 0 (clear error) to ITEM 003 (execution error display).

Function block applications

Cascade control with tracking function, override control, dead time compensation, sample PI control, feedforward control

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Advanced PID	012	012	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”) When the setting is not 0, writing 0 will clear the execution error. (See note *1.)		0000	Yes	R/W(O)	W	–	S/R	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *2, 7: 0.02 *2, 8: 0.05 *2 *2: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	—	2

*1: LCB01/03/05 version 3.5 or later only.
When an execution error occurs, it can be cleared by writing 0 (clear error) to ITEM 003. If the error occurs again in the next operation cycle, however, an execution error will again result. Therefore determine the conditions that caused the error before writing 0 to ITEM 003.

*2: Operation cycles of 0.01 s or less cannot be used with the CS1D-LCB05D.

PV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	006	PV_AD	PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	PV input	-15.00 to +115.00%	0.00	Yes	r	–	–	S	2
Parameter	008	HH_SP	High/high alarm setting	-15.00 to +115.00%	115.00	–	R/W(O)	W	–	S/R	2
	009	H_SP	High alarm setting	-15.00 to +115.00%	100.00	–	R/W(O)	W	–	S/R	2
	010	L_SP	Low alarm setting	-15.00 to +115.00%	0.00	–	R/W(O)	W	–	S/R	2
	011	LL_SP	Low/low alarm setting	-15.00 to +115.00%	-15.00	–	R/W(O)	W	–	S/R	2
	012	HS_SP	Hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	013	HH	High/high alarm output	0, 1	0	Yes	–	–	R	S	1
	014	H	High alarm output	0, 1	0	Yes	–	–	R	S	1
	015	L	Low alarm output	0, 1	0	Yes	–	–	R	S	1
	016	LL	Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input	017	S1	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	–	R/W(O)	–	R/W	S/R	1
Connection terminal contact input	018	PVE_AD	PV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	019	PVE	PV execution error indication 0: Normal, 1: Error → MANUAL mode	0, 1	0	Yes	–	–	R	S	1
Parameter	020	ALM_LIM	Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1

*1: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.
- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

Setting Value Set Point

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	021	RSP_AD	Remote Set Point source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	022	RSP	Remote Set Point input	-15.00 to +115.00%	0.00	Yes	–	–	–	–	2
Parameter	023	SP_W	Local Set Point setting	-15.00 to +115.00%	0.00	–	R/W(O)	W	–	R	2
	024	CAS_SET	Set Point setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM 026.	0, 1	0	–	R/W(S)	–	–	S/R	1
	025	PVTRK_SW	PV tracking at local setting (Manual) 0: Not used, 1: Used	0, 1	0	–	R/W(S)	–	–	–	1
Contact input/ parameter	026	R/L	Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM 024 is 1	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact input	027	S2	PV tracking switch 0: Not used, 1: Used (valid only in Local mode)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	028	SPV_LIM	SP rate-of-change limit (0: No restriction) Note: The time unit is set in ITEM 030.	0 to 115.00%/Time unit	0.00	–	R/W(S)	W	–	–	2
Analog output	029	SP	Current SP output	-15.00 to +115.00%	0.00	Yes	r/w	–	–	S	2
Parameter	030	TMU	SP rate-of-change limit time unit 0: s, 1: min, 2: hr	0 to 2	0	–	R/W (S)	–	–	–	1
	032	MV_TRV	Bumpless output between primary/secondary loops (self node is secondary side) 0: Not used, 1: Used	0, 1	0	–	R/W(S)	–	–	–	1
	033	MVHOLD_SW	Primary loop MV held when secondary loop MV upper/lower limit is reached (self node is secondary side) 0:Not Used, 1:Used	0, 1	0	–	R/W(S)	–	–	–	1
Contact output	034	CAS_CLP	Primary loop MV held when secondary loop MV upper/lower limit is reached 1:MV held, 0:MV not held	0, 1	0	Yes	–	–	–	S	1

AT (auto-tuning)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	035	AT	AT command/AT Executing 0: Cancel AT, 1: Execute AT as AT command •AT Executing flag remains at 1 during AT execution. Flag returns to 0 automatically after AT execution ends normally.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	036	CYCL_OUT	Limit cycle MV amplitude Note: Set as ±%.	5.00 to 50.00	20.00	–	R/W(O)	–	–	–	2
	037	CYCL_HS	Limit cycle hysteresis	0 to 10.00%	0.20	–	R/W(O)	–	–	–	2
	038	ST_GIN	At calculation gain	0.10 to 10.00	1.00	–	R/W(O)	–	–	–	2
	039	AT_DEV	Judgment deviation for provisional AT execution	0 to 100.00%	10.00	–	R/W(O)	–	–	–	2
	040	AT_TYP	AT type (0: Standard type, 1: Reduced time type)	0, 1	0	–	R/W(O)	–	–	–	1

Deviation

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	041	DV_SP	Deviation alarm setting (hysteresis is set at ITEM 012)	0 to 115.00%	115.00	–	R/W(O)	W	–	S/R	2
Contact output	042	DA	Deviation alarm output	0, 1	0	Yes	–	–	R	S	1
Parameter	043	DV_SQ	Deviation alarm standby sequence 0: Not used, 1: Used Note: Restart in standby sequence by cold start	0, 1	1	–	R/W(S)	–	–	–	1
Analog output	044	Y1	Deviation output (deviation = PV - SP)	±115.00%	0.00	Yes	r/w	–	–	S	2
Parameter	045	PVCMP	PV compensation mode 0: Not used, 1: Addition, 2: Subtraction, 3: Substitution	0 to 3	0	–	R/W(S)	–	–	–	1
Contact input	046	S3	PV compensation ON/OFF switch 0: OFF, 1: ON	0, 1	0	–	R/W(O)	–	R/W	S/R	1
Analog input wiring information	047	X1	PV compensation source designation	BBB or III	000000	–	R/W(S)	–	–	–	4

Control

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	051	PID_RATE	Processing cycle of PID control (0: cycle set at ITEM 004) Note: When operation cycle is set to value other than "0", the setting value of ITEM 004 is automatically changed to "4".	(0), 1, 2, 4, 8, 16, 32, 64, 128s	0	–	R/W(S)	–	–	–	2
	052	DIR_REV	Control action 0: Reverse (MV decreases by PV increase.), 1: Direct (MV increases by PV increase.)	0, 1	0	–	R/W(S)	–	–	–	1
	053	DIR_CHG	Switch action direction command *3	0,1	0	Yes	R/W(O)	–	R/W	S/R	1
	054	P	Proportional band	0.1 to 999.9%	100.0	–	R/W(O)	W	–	S/R	2
	055	I	Integral time (0: No integral action)	0 to 9999 s *1	0	–	R/W(O)	W	–	S/R	2
	056	D	Differential time (0: No differential action)	0 to 9999 s *1	0	–	R/W(O)	W	–	S/R	2
	057	MRT	Manual reset (enabled when accumulator is OFF)	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
Contact input	059	S4	Input of accumulator stop switch 0: Not used, 1: Stop accumulation	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact input wiring information	061	MIE_AD	Out-of-range processing at the MV output destination block (BBB: Destination block address, III: ITEM No., 000000: Processing OFF) Note: When contact turns ON, accumulator in PID control is stopped.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	062*2	MV_RTM	MV Output Retrace Time for PV Error *2 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2
	065	ALFA	Advanced PID parameter α	0.00 to 1.00	0.65	–	R/W(S)	–	–	–	2
	066	BETA	Advanced PID parameter β	0.00 to 1.00	1.00	–	R/W(S)	–	–	–	2

*1: If the operation cycle (ITEM 004) is 0.01 to 0.05 s, the integral time and derivative time will be in units of 0.01 s.

*2: Based on the value specified in ITEM 062, the MV will be restored to the output value at the times specified below when a PV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 062 x 1 s. If the operation cycle is 2 s, the value specified in ITEM 062 x 2 s

*3: This setting is supported only by Ver. 3.0 and higher versions of the LCB01, LCB03, and LCB05 Loop Controllers.
When ITEM 053 goes from 0 to 1 (rising edge of the signal), the control action direction will be the opposite of the direction set in ITEM 052. When ITEM 053 goes from 1 to 0 (falling edge of the signal), the control action direction will return to be the direction set in ITEM 052.

MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog output	071	Y2	Output for MV compensation	±320.00%	0.00	Yes	r/w	–	–	–	2
Parameter	072	MVCMP_TP	MV compensation mode 0: Not used, 1: Addition, 2: Subtraction, 3: Substitution	0 to 3	0	–	R/W(S)	–	–	–	1
	073	S5	MV compensation ON/OFF switch 0: OFF, 1: ON	0, 1	0	–	R/W(O)	–	R/W	S/R	1
Analog input wiring information	074	X2	MV compensation source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	075	MVV_SP	MV rate-of-change limit (0: No restriction)	0 to 115.00%/s	0.00	–	R/W(O)	W	–	–	2
	076	MH	High MV limit	±320.00%	100.00 *1	–	R/W(O)	W	–	S/R	2
	077	ML	Low MV limit	±320.00%	0.00*1	–	R/W(O)	W	–	S/R	2
Contact output	078	U1	High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
	079	U2	Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
Contact input	080	S6	Preset MV switch 1: Select preset MV	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	081	PRSET_SW	Preset MV value	±320.00%	0.00	–	R/W(O)	W	–	–	2
Contact input	082	S7	MV hold switch 0: Not used, 1: Hold MV	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog input wiring information	083	X3	MV tracking source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	084	X3	MV tracking input	±320.00%	0.00	Yes	–	–	–	–	2
Contact input	085	S8	MV tracking switch 0: Not used, 1: Used	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact input/ parameter	086	A/M	Auto/Manual switch 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	087	MV_C	MV output	±320.00%	0.00	Yes	r/w	–	–	–	2
Parameter	088		Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%.	0, 1	0	–	R/W(S)	–	–	–	1
	089		Host display of MV (Auto/Manual switch: Auto, Manual) or Manual MV (Auto/Manual switch: Manual)	±320.00%	0.00	Yes	R/W(O)	W	–	S/R	2
Connection terminal contact input	090		MV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	091	MVE	MV error display 0: Normal, 1: Error (Manual mode When ITEM 096 = 1 (enabled))	0, 1	0	Yes	–	–	R	S	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	093	R/S	RUN/STOP switch 0: RUN 1: STOP *2	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	094	STP_MV	MV at Stop *2	±320.00%	0.00	–	R/W(O)	W	–	–	2
	095 *3	MVA_OFF	MV limit alarm OFF 0: Alarm 1: OFF	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	096 *3	MVE_CNT	Control OFF for MV error 0: OFF 1: ON	0, 1	0	–	R/W(S)	–	–	–	1
	097 *3	MVE_RTM	MV output retrace time for MV error *3 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2

*1: For LCB 01/03/05 Ver.2.0 or later, the defaults for the high MV limit and low MV limit are 105.00% and –5.00%, respectively.

*2: These items are supported by the Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers only.

- ITEM 093 is enabled in Auto mode only.
- When ITEM 093 is set to 1 (STOP), PID processing is stopped.
- As long as ITEM 093 is set to 1 (STOP), the MV output value (ITEM 087) will be the value set in ITEM 094.
- The MV upper/lower limit settings are not applied to ITEM 094.
- AT (auto-tuning) cannot be executed while ITEM 093 is set to 1 (STOP). If ITEM 093 is set to 1: Stop during auto-tuning, auto-tuning will be canceled.
- If ITEM 093 is set to 0 (RUN), PID processing will restart. Bumpless processing will not operate when ITEM 093 is switched from 1(STOP) to 0 (RUN) unless ITEM 086 is switched from 0 (MAN) to 1 (AUTO) at the same time.

*3: LCB 01/05 Ver.1.5 or later, and LCB03 only
Based on the value specified in ITEM 097, the MV will be restored to the previous output value at the time specified below when a MV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 097 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 097 x 2 s

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	098		MV index position	-15.00 to +115.00%	0.00	Yes	R/W(O)	W	–	S/R	2
	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

Note1 The values of ITEMs that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the PV tracking switch, PV compensation ON/OFF switch and alarm stop switch that were active before the instantaneous power interruption or running of the Loop Controller was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Controller was stopped are also cleared. When a hot start is performed, these values are held.

Note2 Bumpless output of MV functions when PID constants are changed in the Basic PID block (Block Model 011).For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172).
If this happens, use the Sequence table (Block Model 302) or the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

Disturbance Overshoot Adjustment (LCB 01/05 Ver.1.5 or later, and LCB03 only)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD Start Initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Parameter	100	IPS_USE	Disturbance overshoot adjustment enable	0, 1	0	–	R/W(O)	W	R/W	–	1
	101	IPS_GAIN	Disturbance gain	-1.00 to 1.00	0.65	–	R/W(O)	W	–	–	2
	102	IPS_CONST	Disturbance time constant	0.01 to 100.00	1.00	–	R/W(O)	W	–	–	2
	103	IPS_SET	Disturbance stabilization band	0.00 to 10.00%	0.00	–	R/W(O)	W	–	–	2
	104	IPS_JUDG	Disturbance judgement width	-100.00 to 100.00%	0.00	–	R/W(O)	W	–	–	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
008	High/high alarm setting	HH_SP
009	High alarm setting	H_SP
010	Low alarm setting	L_SP
011	Low/low alarm setting	LL_SP
013	High/high alarm output	HH
014	High alarm output	H
015	Low alarm output	L
016	Low/low alarm output	LL
017	Alarm stop switch	AOF
019	PV error indication	PV_ABN
023	Local Set Point setting	SP
024	Set Point setting mode (default)	CAS_SET
026	Remote/Local switch	R/L_SW
027	PV tracking switch	S2
029	Current Set Point output	SP
034	Primary loop MV held when secondary loop MV upper/lower limit is reached (LCB01/05 Ver.2.0 and LCB03 only)	CAS_CLP
035	AT command/AT Executing	AT
041	Deviation alarm setting	DVA_SP
042	Deviation alarm output	DVA
044	Deviation output	DV
046	PV compensation ON/OFF switch	S3
053*2	Switch action direction command	DIR_CHG
054	Proportional band	P
055	Integral time	I
056	Differential time	D
057	Manual reset	MRT
059	Input of accumulator stop switch	S4
073	MV compensation ON/OFF switch	S5
076	High MV limit	MH_LMT
077	Low MV limit	ML_LMT
078	MV high limit output	MHA
079	MV low limit output	MLA
080	Preset MV switch	S6
082	MV hold switch	S7
085	MV tracking switch	S8
086	Auto/Manual switch	A/M_SW
089	Host display of MV (Auto/Manual switch: Auto, Manual) or Manual MV (Auto/Manual switch: Manual)	MV
091	MV error display	MV_ABN
093*2	RUN/STOP switch	R/S
095*1	MV limit alarm OFF	MVA_OFF
098	MV index position	MV_IDX
099	Label	OP_MK

*1: LCB 01/05 Ver.1.5 or later, and LCB03 only.

*2: LCB 01/03/05 Ver.3.0 or later only.

Description of functions

Item		Description
PV (Process Variable) Input	Number of points	1
	Input range	-15.00 to +115.00%
	Operation function	None (Calculation of square root, first-order-lag, bias, etc. Is required by external blocks.)
	Sampling cycle	According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds) Note, however, that the external input refresh cycle of the entire instrumentation system differs from this operation cycle. (See 3-2 Description of Operation in the User's Manual.)
	PV error input	When the PV error contact turns ON, the Loop Controller is forced to enter the Manual mode, and the MV value active at that moment is held. At the same time, the PV error is transferred to the CX-Process Monitor. The disconnected line detection output ITEM of analog input (AI) function blocks is specified as the source designation for use. This enables forced switching to the Manual mode when a disconnected line is detected on the Analog Input Unit, and transfer of the PV error to CX-Process Monitor at the same time.
	PV compensation	When the PV compensation input switch is set to 1 (ON), arithmetic operation is performed on the PV signal that is input to PID control. PV compensation is enabled only in the Auto mode. One of the following three operations is possible: •Addition: The external PV compensation input value is added to the PV signal, and the result is assigned to PID control. •Subtraction: The external PV compensation input value is subtracted from the PV signal, and the result is assigned to PID control. •Substitution: The PV signal is substituted with the external PV compensation input value, and the result is assigned to PID control. When the PV compensation input switch is OFF, the PV signal is returned to. Example: This operation is used for dead time compensation control (additive).
SP (Set Point)	Number of points	1
	Setting range	-15.00 to +115.00%
	Remote/Local switching	Possible
	SP rate-of-change limit	Possible (0 to 115.00%/s)
	PV tracking at manual setting of the Local Set Point	The Local Set Point can be made to track PV when the mode is switched to the Manual mode. When the mode is returned to the Auto mode, control is started with PV equaling the Set Point. Sudden changes in the MV caused at switching back to the Auto mode do not occur.
	PV tacking	Matches the SP (Set Point) to the PV (Process Variable) when the PV tracking switch is set to 1 (ON), and hold SP and PV in this matched relationship. When the PV tracking switch is OFF, the Loop Controller can be run in a bumpless manner from the PV value.
	Bumpless processing between primary/secondary loops	When the self node is performing cascade control as the secondary controller, processing is performed on the MV of the primary controller to be input as follows: •When the Set Point of the self node is Local (LSP): The primary controller is switched to the Manual mode, and the Local Set Point of the self node is overwritten on the MV of the primary controller. •When the Set Point of the self node is Remote (RSP): The primary controller is switched to the Auto mode, and the MV of the primary controller is input as the Remote Set Point as per normal.

Item		Description	
PID Control	Control method	Advanced PID Various PID methods (proportional priority type, PV differential priority type, deviation differential type, etc.) can be selected according to the settings of parameters α and β.) (For details, refer to the description for the Basic PID block.)	
	RUN/STOP	This contact input (RUN/STOP switch) can be used to start or stop PID processing in individual function blocks. (Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers only)	
	Control action	Direct/reverse action can be switched. Note: The control action direction can be switched during operation (Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers only).	
	PID Constant	1 set AT (auto-tuning) can automatically set according to limit cycle mode. (For details, see page 39 "About PID Constant AT Functions.")	
		Proportional band	0.1 to 999.9% (0.1% increments)
		Integral time	0 to 9999 sec. (1 second increments) 0: No accumulator Integral stop can be indicated from external contacts.
		Differential time	0 to 9999 sec. (1 second increments) 0: No differentiation
	Manual reset	-320.00 to +320.00% (0.00% increments) Bumpless output at manual reset	
MV (Manipulated Variable)	Number of points	1	
	Output range	-320.00 to +320.00%	
	Output refresh cycle	According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds)	
	Auto/manual switching	Possible (according to CX-Process Monitor, CX-Process Tool or correct signal from Step Ladder Program block/Contact Distributor block)	
	High/low MV limit	High limit: -320.00 to +320.00%, low limit: -320.00 to +320.00% Note: The default low limit is -5.00% and default high limit is 105.00% to ensure that the valve becomes fully open or fully closed. If output less than 0.00% or more than 100% is meaningless, for example, in the case of time-proportional ON/OFF control for a heater, set these limits to 0.00% and 100.00, respectively, to prevent overshoot.	
	MV rate-of-change limit	0 to 115.00%/s	
	Preset MV switching	Possible (according to contacts from other function blocks) When the preset MV switch is set to ON, the MV switches to the preset MV (fixed value) and control is continued at this value. When the PV tracking switch is OFF, the Loop Controller can be run in a bumpless manner from the preset MV value. Preset MV switching is enabled only in the Auto mode.	
	MV hold	Possible (according to contacts from other function blocks) The MV (Manipulated Variable) is held at the current value when the MV hold switch is set to 1 (ON). When the MV hold switch is OFF, the MV is returned to from in a bumpless manner from the MV hold value. (MV hold is enabled only in the Auto mode.)	
	MV tracking	Possible (according to contacts from other function blocks) The MV is switched (tracks) to the input value from other function blocks. When the MV tracking switch is set to 1 (ON), the MV is made to match the value of the external MV tracking input, and the MV and MV tracking input are held in this matched relationship. When the switch is OFF, MV is returned to on a bumpless manner from the value of the MV tracking input. MV tracking is enabled only in the Auto mode. MV output is also bumpless when switching between the Auto and Manual modes.	
	MV compensation	Possible (according to contacts from other function blocks) When the MV compensation input switch is set to 1 (ON), arithmetic operation is performed on the MV signal that is input to PID control. MV compensation is enabled only in the Auto mode. One of the following three operations is possible: •Addition: The external MV compensation input value is added to the MV signal. •Subtraction: The external MV compensation input value is subtracted from the MV signal. •Substitution: The MV signal is substituted with the external MV compensation input value. When the MV compensation input switch is OFF, the MV signal from the PID control is returned to. MV at this time changes in a bumpless manner.	

Item		Description
MV (Manipulated Variable)	Out-of-range processing MV output destination block	PID integral action is stopped when the range is exceeded on the function block to which MV is connected, and unnecessary fluctuation of MV is prevented.
	MV error input	MV error is transferred to CX-Process Monitor when the MV error contact turns ON. The disconnected line detection output ITEM of analog output (AO) function blocks is specified as the source designation for use. This enables transfer of the MV error to CX-Process Monitor when a disconnected line is detected on the Analog Output Unit.
Alarm	PV alarm	4 (high/high limit, high limit, low limit, low/low limit), setting range: -15.00 to +115.00% Hysteresis: 0 to +115.00%
	Deviation alarm	1 (ON outside deviation) Standby sequence can be provided: standby started at power ON (alarm OFF even outside deviation range), alarm ON outside deviation range after entering deviation
State Output		1 deviation output (-115.00 to +115.00%) 1 output for MV compensation (-320.00 to +320.00%)

Note When any of the following operations is executed, bumpless processing is automatically used to prevent bumps in the MV.

- When switching from Manual Mode to Auto Mode (i.e., when Auto/Manual switch, ITEM 086, is changed from 0 to 1).
- When a PID parameter (ITEM 054, ITEM 055, or ITEM 056) is changed.
- When parameter α or β for PID with two degrees of freedom (ITEM 065 or ITEM 066) is changed.
- When the high MV limit (ITEM 076) is changed in the high direction.
- When the low MV limit (ITEM 077) is changed in the low direction.

Bumpless processing functions, however, only for PID control or PI control (i.e., when integral operation is enabled). It does not function for P control or PD control.
Also, when bumpless control is in effect, the MV is held for one operation cycle. For example, when switching from Manual Mode to Auto Mode, the highest MV in Manual Mode will be held for the first MV after the switch. (The MV will be changed from the second time onwards.)

About PID Constant AT (auto-tuning) Function

For details on this function, see the item of the same description in the Basic PID block (Block Model 011).

About 2 Degrees of Freedom PID Parameters α and β

Refer to *About 2 Degrees of Freedom Parameters α and β* for Advanced PID blocks (Block Model 011).

Block Model	Block Name	Block Address
<013>	Blended PID	001 to 500

Outline

This function block performs PID control on the cumulative value (cumulative deviation) between the accumulated value PV and accumulated value Remote Set Point. Ratio control of flowrate accumulated values is possible as this function block is provided with a ratio to accumulated Remote Set Point function.

- This function block is provided with cumulative deviation alarm output.
- It is also provided with an accumulation counter for converting PV four digits to eight digits.
- It is also provided with PV and Remote Set Point instantaneous value output.

Note: As this function block is a Remote Set Point input type function block, it is generally used as the slave for a Batch Flowrate Capture block (Block Model 014) as the master.

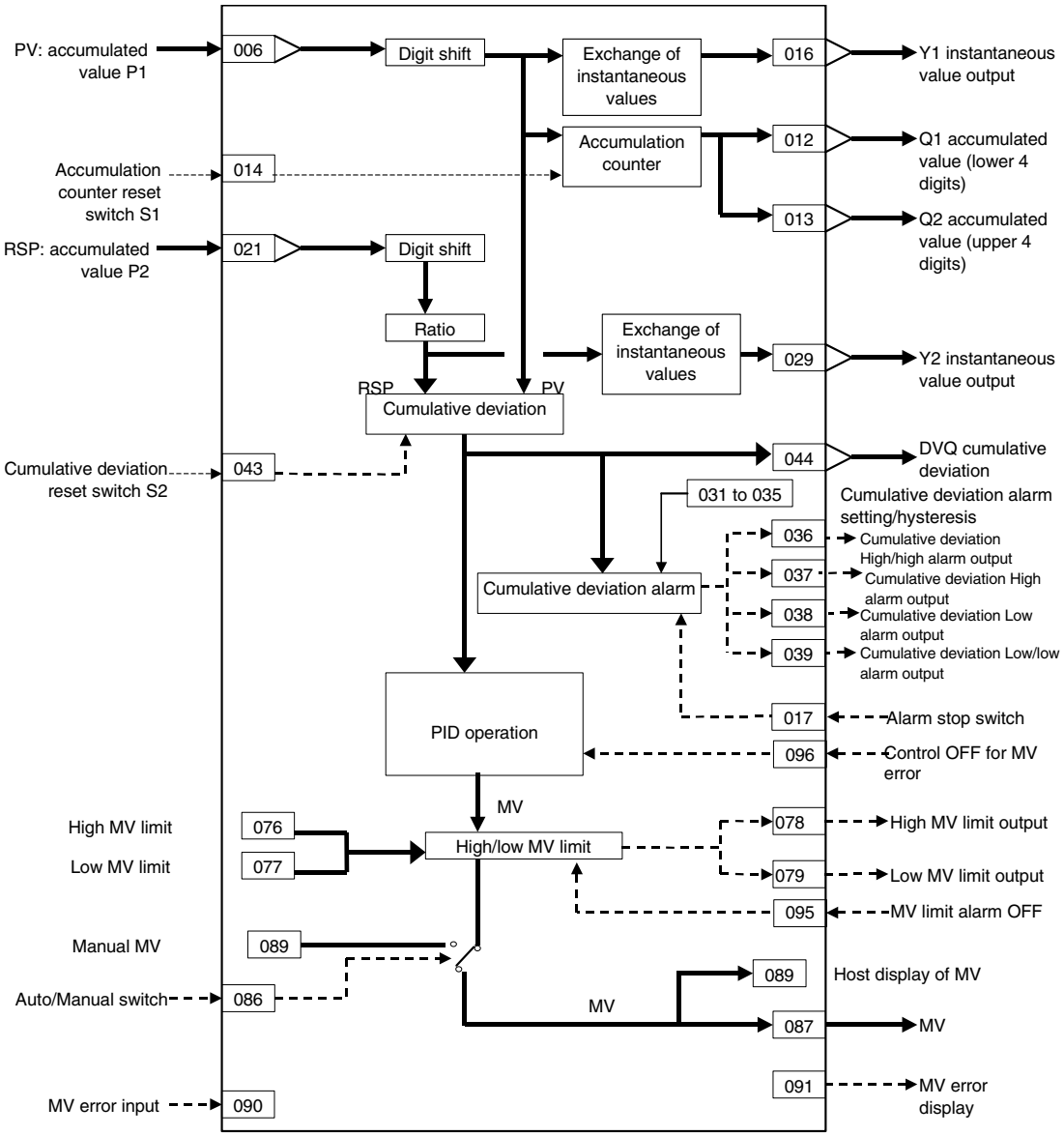
Function block applications

The PV is input in series as the Remote Set Point with the Batch Flowrate Capture block (Block Model 014) set as the master. Accumulated values (0 to 9999) from a container type flowmeter (e.g. oval type) are input as the PV to perform ratio control between multiple function blocks.

Note: The value obtained by accumulating the pulse input from a Pulse Input Unit (CS1W-PPS01) by the PI 4-point Terminal block (Block Model 562) is input as the accumulated value PV.

Example Control while maintaining the ratio between batch capture amounts of liquids B and C at a constant ratio in response to the batch capture amount of liquid A.

Block diagram



ITEM list

Note The values of ITEMs that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Controller was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Controller was stopped are also cleared. When a hot start is performed, these values are held.

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	R/W	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Blended PID	013	013	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004	CNT_TMEX	Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

PV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Accumulated value input wiring information	006	P1_AD	PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Accumulated value input	007	P1	Input	0 to 9999	0	Yes	r	–	–	S	2
Parameter	009	PV_SFT	Digit shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10)*1	-3 to +1	0	–	R/W(S)	–	–	–	1
	010	PV_K	PV instantaneous value conversion coefficient (number of pulses per second at instantaneous value output 100% is set)	0 to 99999.9999	100.0000	–	R/W(S)	–	–	–	4
	011	PV_N	Number of moving average data at PV instantaneous value conversion	1 to 16	16	–	R/W(S)	–	–	–	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Accumulated value output	012	Q1	Accumulated value (lower 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
	013	Q2	Accumulated value (upper 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
Contact input	014	S1	Accumulation counter reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	015	PR	Pulse rate (for host display: scale unit/pulse)	0 to 10.000	1.000	–	R/W(S)	–	–	–	2
Analog output	016	Y1	Instantaneous value output	0 to 320.00%	0.00	Yes	r/w	–	–	S	2
Contact input	017	ALM_OFF	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	020	ALM_LIM	Alarm limit*2 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1

*1: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

*2: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

Setting Value Set Point

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Accumulated value input wiring information	021	P2_AD	P2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Accumulated value input	022	P2	Input	0 to 9999	0	Yes	r	–	–	–	2
Parameter	024	SP_SFT	Digit shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) Note 1	-3 to +1	0	–	R/W(S)	–	–	–	1
	025	SP_K	SP instantaneous value conversion coefficient (number of pulses per second at instantaneous value output 100% is set)	0 to 99999.9999	100.0000	–	R/W(S)	–	–	–	4
	026	SP_N	Number of moving average data at SP instantaneous value conversion	1 to 16	16	–	R/W(S)	–	–	–	1
	027	K1	Ratio	0 to 3.2000	1.0000	–	R/W(O)	W	–	S/R	2
Analog output	029	Y2	Current SP instantaneous value output	0 to 320.00%	0.00	Yes	r/w	–	–	S	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	031	DHH_SP	Cumulative deviation High/high alarm setting	±32000	32000	–	R/W(O)	W	–	–	2
	032	DH_SP	Cumulative deviation High alarm setting	±32000	32000	–	R/W(O)	W	–	–	2
r	033	DL_SP	Cumulative deviation Low alarm setting	±32000	-32000	–	R/W(O)	W	–	–	2
	034	DLL_SP	Cumulative deviation Low/low alarm setting	±32000	-32000	–	R/W(O)	W	–	–	2
	035	DHS_SP	Hysteresis setting	0 to 32000	0	–	R/W(S)	W	–	–	2

Deviation

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact output	036	DHH	Cumulative deviation High/high alarm output	0, 1	0	Yes	–	–	R	S	1
	037	DH	Cumulative deviation High alarm output	0, 1	0	Yes	–	–	R	S	1
	038	DL	Cumulative deviation Low alarm output	0, 1	0	Yes	–	–	R	S	1
	039	DLL	Cumulative deviation Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
Parameter	040	DEV_QK	Cumulative deviation value normalization constant	1 to 32000	10000	–	R/W(S)	W	–	–	2
	041	S3	Operation mode at cumulative deviation High/High and Low/Low alarm 0: Normal, 1: Stop cumulative deviation counter at alarm	0, 1	0	–	R/W(S)	–	–	–	1
	042	S4	Cumulative deviation operation mode at Auto start 0: Normal, 1: Reset	0, 1	0	–	R/W(S)	–	–	–	1
Contact input	043	S2	Cumulative deviation reset switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	044	DVQ	Cumulative deviation output	±32000	0	Yes	r/w	–	–	S	2

Control

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	052	DIR_REV	Control action 0: Reverse (MV decreases by PV increase.), 1: Direct (MV increases by PV increase.)	0, 1	0	–	R/W(S)	–	–	–	1
	054	P	Proportional band	0.1 to 999.9%	100.0	–	R/W(O)	W	–	S/R	2
	055	I	Integral time (0: No integral action)	0 to 9999s	0	–	R/W(O)	W	–	S/R	2
	056	D	Differential time (0: No differential action)	0 to 9999s	0	–	R/W(O)	W	–	S/R	2

MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	076	MH_LMT	High MV limit	±320.00%	100.00*1	–	R/W(O)	W	–	S/R	2
	077	ML_LMT	Low MV limit	±320.00%	0.00*1	–	R/W(O)	W	–	S/R	2
Contact output	078	U1	High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
	079	U2	Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
Contact input/ parameter	086	A/M	Auto/Manual switch 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	087	MV_C	MV output	±320.00%	0.00	Yes	r/w	–	–	–	2
Parameter	088	MV_REV	Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%.	0, 1	0	–	R/W(S)	–	–	–	1
	089	MV	Host display of MV (Auto/Manual switch: Auto, Manual) or Manual MV (Auto/Manual switch: Manual)	±320.00%	0.00	Yes	R/W(O)	W	–	S/R	2
Connection terminal contact input	090	MVE_AD	MV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	091	MVE	MV error display 0: Normal, 1: Error	0, 1	0	Yes	–	–	R	S	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	095 *2	MVA_OFF	MV limit alarm OFF 0: Alarm 1: OFF	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	096 *2	MVE_CNT	Control OFF for MV error 0: OFF 1: ON	0, 1	0	–	R/W(S)	–	–	–	1
	097 *2	MVE_RTM	MV output retrace time for MV error *2 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2

*1: For LCB 01/03/05 Ver.2.0 or later, the defaults for the high MV limit and low MV limit are 105.00% and –5.00%, respectively.

*2: LCB 01/05 Ver.1.5 or later, and LCB03 only
Based on the value specified in ITEM 097, the MV will be restored to the previous output value at the time specified below when a MV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 097 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 097 x 2 s

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	098		MV index position	-15.00 to +115.00%	0.00	Yes	R/W(O)	W	–	S/R	2
	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

Note Bumpless output of MV functions when PID constants are changed in the Basic PID block (Block Model 011).For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172).
If this happens, use the Sequence table (Block Model 302) or the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
012	Accumulated value Q1	Q1
013	Accumulated value Q2	Q2
014	Accumulation counter reset switch	S1
015	Pulse rate	None
016	Instantaneous value output	Y1
017	Alarm stop switch	AOF
027	Ratio	K1
029	Current SP instantaneous value output	Y2
036	Cumulative deviation High/high alarm output	DHH
037	Cumulative deviation High alarm output	DH
038	Cumulative deviation Low alarm output	DL
039	Cumulative deviation Low/low alarm output	DLL
043	Cumulative deviation reset switch	S2
044	Cumulative deviation output	DEV_Q
054	Proportional band	P
055	Integral time (0: No integral action)	I
056	Differential times (0: No differential action)	D
076	High MV limit	MH_LMT
077	Low MV limit	ML_LMT
078	High MV limit output	MHA
079	Low MV limit output	MLA
086	Auto/Manual switch	A/M_SW
089	Host display of MV (Auto/Manual switch: Auto, Manual) or Manual MV (Auto/Manual switch: Manual)	MV
091	MV error display	MV_ABN
095	MV limit alarm OFF	MVA_OFF
098	MV index position	MV_IDX
099	Label	OP_MK

Block Model	Block Name	Block Address
<014>	Batch Flowrate Capture	001 to 500

Outline

This function block functions to open the valve at a fixed opening until a fixed batch accumulated value is reached in batch capture processing to a tank, for example. 4-digit accumulated value signals (batch accumulated values) are input as the PV, and the analog signal (MV value) to the valve controlling the capture volume is gradually increased proportionately to the accumulated value to maintain MV at a fixed value (regular setting). When the fixed value reaches the fixed capture volume (that is, when the accumulated value signals reach the "regular setting - pre-batch setting"), the analog signals (MV value) to the valve controlling the capture volume are gradually decreased to 0% so that the batch accumulated value finally matches the fixed value.

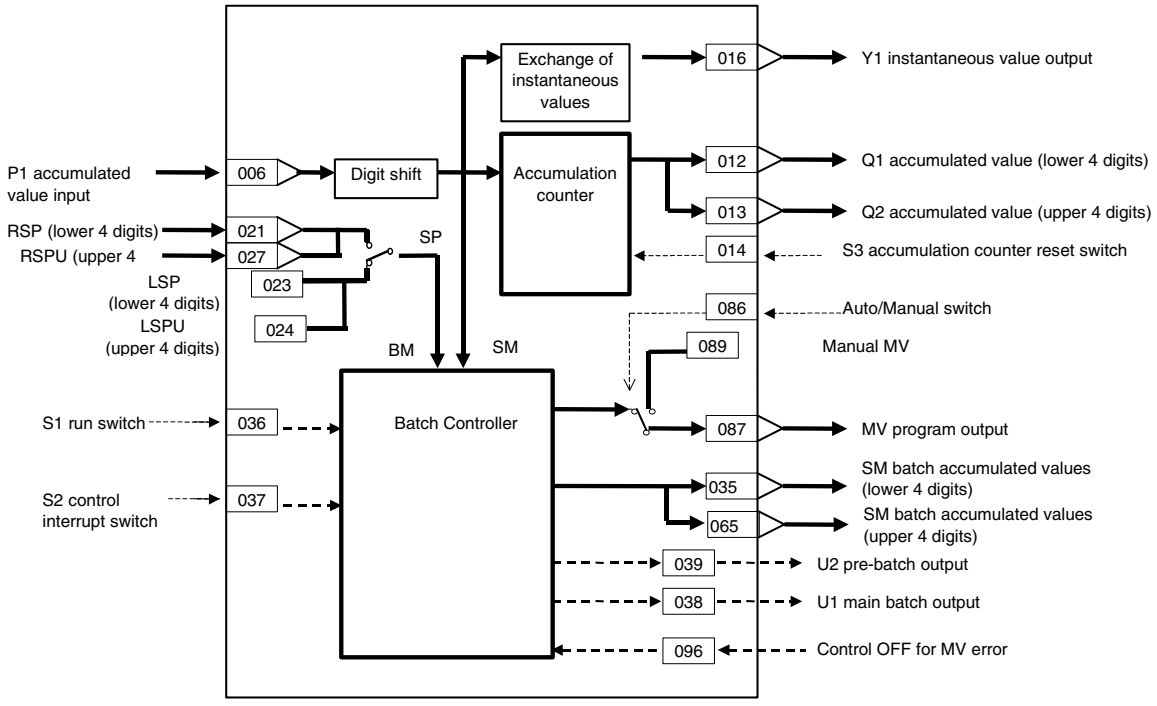
- This function block is provided with a pre-batch function.
- It is also provided with a program MV output function exclusively for batch capture processing.
- It is also provided with a contact output for action timing notification.
- The local SP and remote SP can be set to a fixed preset value (BM).
- The local SP, remote SP, preset value (BM), and batch accumulated value can be set to 8 digits.

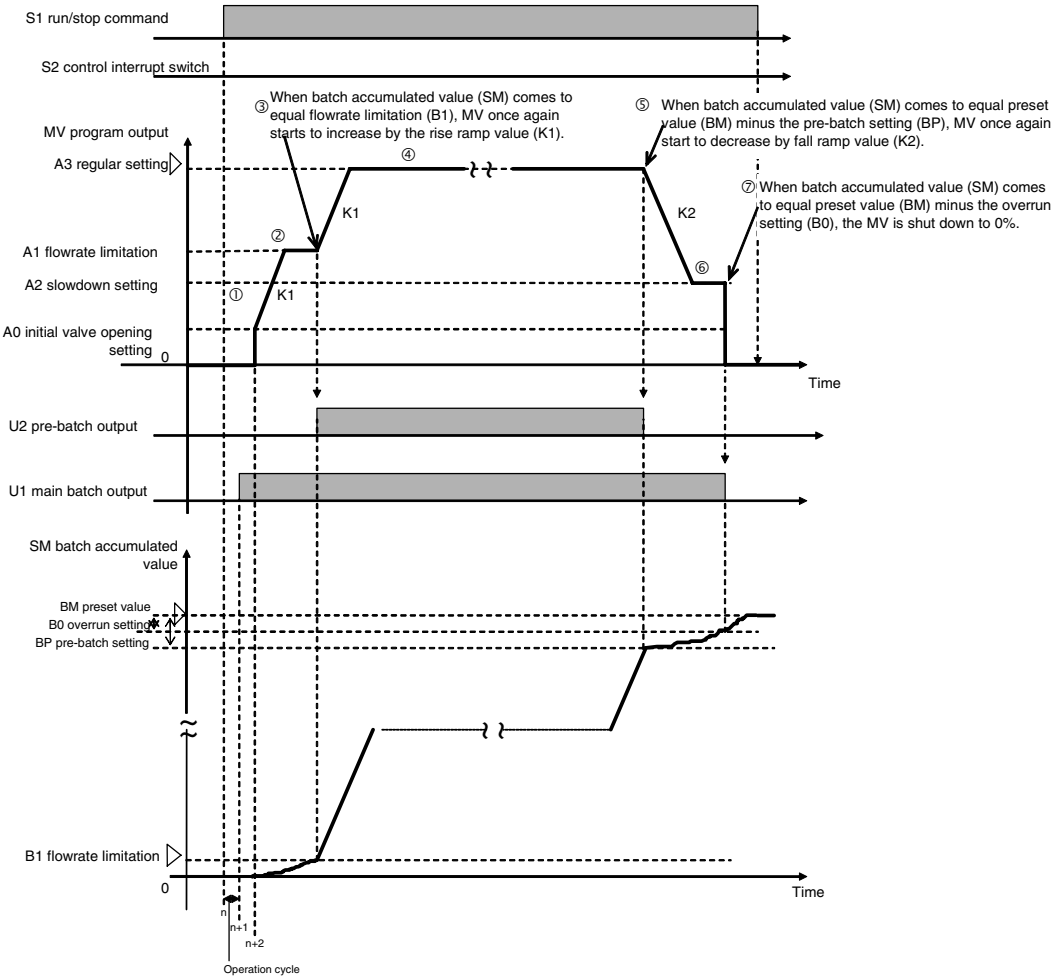
Note: When a cold start is performed, the accumulated values of operation results that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Valve operation in batch capture processing in a tank

Block diagram





1. When S1 run/stop command is set to 1 (ON), capture operation is started. At next operation cycle, U1 contact (main batch output) is set to 1 (ON). At the following operation cycle, the MV value is made to increase from A0 (initial valve opening setting) to K1 (rise rate).
2. When MV value reaches A1 (flowrate limitation setting), MV is maintained at that value (opening).
3. When SM (batch accumulated value) reaches BI (flowrate limitation setting), U2 contact (pre-batch output) is set to 1 (ON), and the MV value is made to increase by K1 (rise ramp rate) again.
4. When the MV value reaches A3 (regular setting), MV is maintained at that value (opening), and accumulation (capture) operation is performed.
5. When SM (batch accumulated value) reaches "BM (regular setting) - BP (pre-batch setting)", the MV value is made to decrease at K2 (fall ramp rate). At this time, the setting of U2 contact (pre-batch output) changes from 1 (ON) to 0 (OFF).
6. When the MV value reaches A2 (slowdown setting), MV is maintained at that value (opening).
7. When SM (batch accumulated value) reaches "BM (regular setting) - B0 (overrun setting)", MV is set to 0%. At this time, the setting of U1 contact (main batch output) changes from 1 (ON) to 0 (OFF).

Note: When S2 control interrupt switch is set to 1 (ON) during accumulation (capture) operation, the MV value decreases by K2 (fall ramp rate) until A0 (initial valve setting) until it reaches 0%. At this time, U1 contact (main batch output) and U2 contact (pre-batch output) are set to 0 (OFF). When S2 control interrupt switch is reset to 0 (OFF), the MV value is made to increase from A0 (initial valve setting) by K1 (rise ramp rate), and the state that was active before the interruption is returned to when the MV value reaches A3 (regular setting). At this time, the settings of U1 contact (main batch output) and U2 contact (pre-batch output) return to 1 (ON).

ITEM list

Note When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Batch Flowrate Capture	014	014	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004	CNT_TMEX	Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

Accumulated value input P1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Accumulated value input connection information	006	P1_AD	P1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Accumulated value input	007	P1	Input	0 to 9999	0	Yes	–	–	–	S	2
Parameter	009	PV_SFT	Digit shift (10 x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) (Note 1)	-3 to +1	0	–	R/W(S)	–	–	–	1
	010	PV_K	Instantaneous value conversion coefficient (number of pulses per second at instantaneous value output 100% is set)	0 to 99999.9999	1.0000	–	R/W(S)	–	–	–	4
	011	PV_N	Number of moving average data at instantaneous value conversion	1 to 16	16	–	R/W(S)	–	–	–	1
Accumulated value output	012	Q1	Accumulated value (lower 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
	013	Q2	Accumulated value (upper 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
Contact input	014	S3	Accumulation counter reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	016	Y1	Instantaneous value output	0 to 320.00%	0.00	Yes	r/w	–	–	S	2
Parameter	017	PR	Pulse rate (for host display: scale unit/pulse)	0 to 10.000	1.000	–	R/W(S)	–	–	S/R	2

Setting Value Set Point

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input connection information	021	RSP_AD	Remote SP source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	022	RSP	Remote SP input (lower 4 digits)	0 to 9999	0	Yes	–	–	–	–	2
Parameter	023	SP_W	Local SP setting (lower 4 digits)	0 to 9999	0	–	R/W(O)	W	–	R	2
	024	SPU_W	Local SP setting (upper 4 digits)	0 to 9999	0	–	R/W (O)	W	–	R	2
Contact input/ parameter	026	R/L	Remote/Local switching 0: Local, 1: Remote	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog input connection information	027	RSPU_AD	Remote SP source designation BBB: Block address, III: ITEM No.	BBB or III	00000	–	R/W (S)	–	–	–	4
Analog input	028	RSPU	Remote SP input (upper 4 digits)	0 to 9999	0	Yes	–	–	–	–	2
Accumulated value output	029	CSP	Current SP output (lower 4 digits)	0 to 9999	0	Yes	r/w	–	–	S	2
Parameter	030	CSPU	Current SP output (upper 4 digits)	0 to 9999	0	Yes	r/w	–	–	S	2

Batch controller (lower 4 digits)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	031	BM	Preset value (lower 4 digits, current SP is entered)	0 to 9999	9999	Yes	R/w	–	–	S	2
	032	B0	Overrun setting (value subtracted from BM)	0 to 9999	0	–	R/W(O)	W	–	S/R	2
	033	BP	Pre-batch setting (value subtracted from BM)	0 to 9999	0	–	R/W(O)	W	–	S/R	2
	034	BI	Flowrate limitation	0 to 9999	0	–	R/W(O)	W	–	S/R	2
Analog output	035	SM	Batch accumulated value (lower 4 digits)	0000 to 9999	0	Yes	r/w	W	–	S	2
Contact input	036	S1	Run/stop command (0: Reset, 1: Run)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	037	S2	Control interrupt switch (1: Interrupt)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	038	U1	Main batch output	0, 1	0	Yes	–	–	R	S	1
	039	U2	Pre-batch output	0, 1	0	Yes	–	–	R	S	1

Program output

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	041	A0	Initial valve opening setting	0 to 320.00 %	0.00	–	R/W(O)	–	–	–	2
	042	A1	Flowrate limitation setting	0 to 320.00 %	10.00	–	R/W(O)	–	–	–	2
	043	A2	Slowdown setting	0 to 320.00 %	10.00	–	R/W(O)	–	–	–	2
	044	A3	Regular setting	0 to 320.00 %	30.00	–	R/W(O)	–	–	–	2
	045	K1	Rise ramp value	0 to 320.00 %/s	1.00	–	R/W(O)	–	–	–	2
	046	K2	Fall ramp value	0 to 320.00 %/s	1.00	–	R/W(S)	–	–	–	2

Batch controller (upper 4 digits)

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	061	BMU	Preset value (upper 4 digits, current SP is entered)	0 to 9999	0	Yes	R	–	–	S	2
Analog output	065	SMU	Batch accumulated value (upper 4 digits)	0 to 9999	0	Yes	r/w	W	–	S	2
Contact input/ parameter	086	A/M	Auto/Manual switch 0:Manual, 1:Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	087	MV_C	Program output	±320.00 %	0	Yes	r/w	–	–	–	2
Parameter	088	MV_REV	Inversion of host display of MV 0: Not used, 1: Used Note: “Inversion” changes 0 to 100% range to 100 to 0%.	0, 1	0	–	R/W(S)	–	–	–	1
	089	MV	Host display of MV	±320.00 %	0.00	Yes	R/W(O)	–	–	S/R	2
Source designation contact input	090	MVE_AD	MV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	091	MVE	MV Error Display 0: Normal, 1: Error (Manual mode When ITEM 096 = 1 (enabled))	0, 1	0	Yes	–	–	R	S	1
Parameter	096 *1	MVE_CNT	Control OFF for MV error 0: OFF 1: ON	0, 1	0	–	R/W(S)	–	–	–	1
	097 *1	MVE_RTM	MV output retrace time for MV error *1 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2

*1: LCB 01/05 Ver.1.5 or later, and LCB03 only
Based on the value specified in ITEM 097, the MV will be restored to the previous output value at the time specified below when a MV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 097 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 097 x 2 s

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	098		MV index position	-15.00 to 115.00 %	0.00	Yes	R/W(O)	–	–	S/R	2
	099		Label	0 to 15	0	Yes	R/W(O)	–	–	S/R	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Input	P1
012	Accumulated value (lower 4 digits)	Q1
013	Accumulated value (upper 4 digits)	Q2
014	Accumulation counter reset switch	S3
016	Instantaneous value output	Y1
017	Pulse rate (for host display: scale unit/pulse)	PR
023	Local Set Point setting (lower 4 digits)	SP
024	Local Set Point setting (upper 4 digits)	SPU_W
026	Remote/Local switch	R/L_SW
029	Current Set Point output (lower 4 digits)	SP
030	Current Set Point output (upper 4 digits)	SPU
031	Preset value (lower 4 digits)	BM
032	Overrun setting (value subtracted from BM)	B0
033	Pre-batch setting (value subtracted from BM)	BP
034	Flowrate limitation	B1
035	Batch accumulated value (lower 4 digits)	SM
036	Run/stop command	S1
037	Control interrupt switch	S2
038	Main batch output	U1
039	Pre-batch output	U2
061	Preset value (upper 4 digits)	BMU
065	Batch accumulated value (upper 4 digits)	SMU
086	Auto/Manual switch	A/M_SW
089	Host display of MV	MV
091	MV error display	MV_ABN
098	MV index position	MV_IDX
099	Label	OP_MK

Note Note that this function block cannot be sent by the 4-Block Send Terminal to Computer block (Block Model 404).

Block Model	Block Name	Block Address
<016>	Fuzzy Logic	001 to 100

Outline

This function block outputs up to two analog outputs based on fuzzy logic performed on up to 8 analog inputs, X1 to X8.
Using fuzzy logic enables applying the Loop Controller to control applications using the knowledge of experienced workers expressed as ambiguous expressions, such as "a little" or "quite a lot."
The membership functions of a Fuzzy Logic block can be displayed as graphs on version 2.50 or later of the CX-Process Tool.

The specifications of the Fuzzy Logic block are as follows:
•I/O: 8 inputs and 2 outputs
•Rule format: 8 conditions and 2 conclusions
•Number of rules: 64 max.
•Five labels (NL, NS, ZR, PS, and PL)
•Inference method: Max.-Min. logical ANDs
•Deterministic output calculations: Center of gravity
•Output when rules not fulfilled: Constant or previous value (selectable)

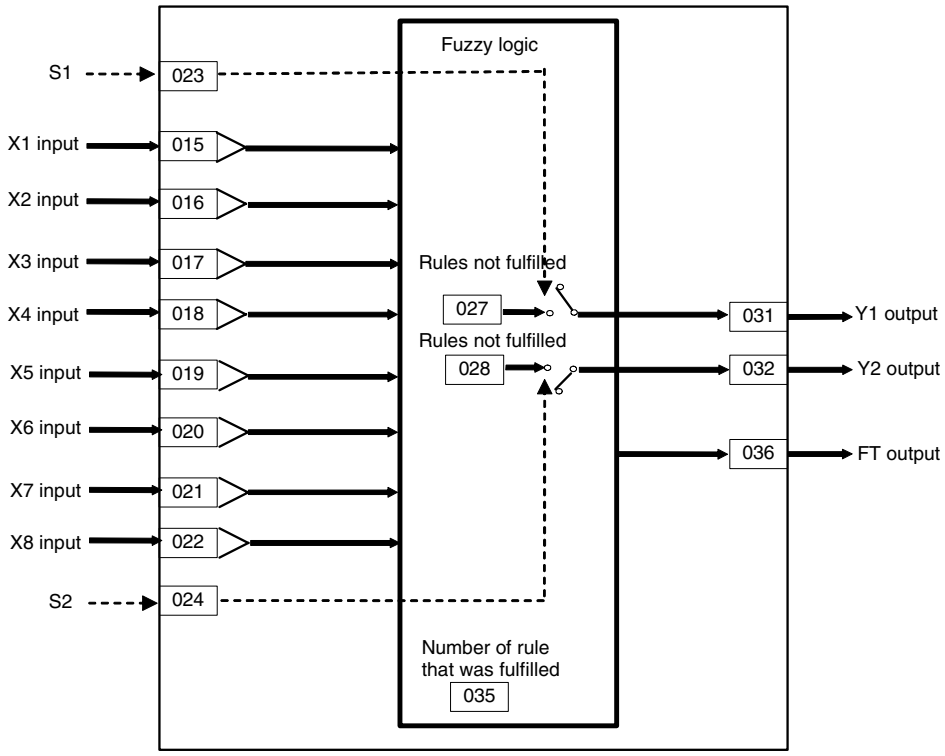
The specifications of the membership functions are as follows:
Conditions
•Resolution: 64, 000 max.
•Continuous functions: 4 inflection points max. (S, Z, Λ, and Π)
•Height: 0 or 10, 000

Conclusions
•Resolution: 64, 000 max.
•Height: Always 10, 000

Function block applications

•Controlling systems with excessive external interference.
•Replacing an OMRON C200H-FZ001 Fuzzy Logic Unit.

Block Diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W (S)	–	–	–	24
	002		Block Model: Fuzzy Logic	016	016	–	R/W (S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W (S)	–	–	–	2
Special	006		Operation error details Indicates the ITEM number when execution error 19 occurs.	41 to 90 101 to 164	0	–	–	–	–	–	2

Measured PVs

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
	008		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
	009		X3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
	010		X4 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
	011		X5 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
	012		X6 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
	013		X7 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
	014		X8 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W (S)	–	–	–	4
Analog inputs	015	X1	X1 input value	±32000	0	Yes	r	–	–	S	2
	016	X2	X2 input value	±32000	0	Yes	r	–	–	S	2
	017	X3	X3 input value	±32000	0	Yes	r	–	–	S	2
	018	X4	X4 input value	±32000	0	Yes	r	–	–	S	2
	019	X5	X5 input value	±32000	0	Yes	r	–	–	S	2
	020	X6	X6 input value	±32000	0	Yes	r	–	–	S	2
	021	X7	X7 input value	±32000	0	Yes	r	–	–	S	2
	022	X8	X8 input value	±32000	0	Yes	r	–	–	S	2

Outputs when rules are not fulfilled

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input parameter	023	S1	Output value selection switch for output 1 when rules are not fulfilled 0: Maintain previous, 1: Fixed value	0, 1	0	–	R/W (O)	W	R/W	S/R	1
	024	S2	Output value selection switch for output 2 when rules are not fulfilled 0: Maintain previous, 1: Fixed value	0, 1	0	–	R/W (O)	W	R/W	S/R	1
Parameter	027	A1	Fixed value for output 1 when rules are not fulfilled	±32000	0	–	R/W (O)	W	–	S/R	2
	028	A2	Fixed value for output 2 when rules are not fulfilled	±32000	0	–	R/W (O)	W	–	S/R	2

Output values: MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog outputs	031	Y1	Y1 output value	±32000	0	Yes	r	W	–	S	2
	032	Y2	Y2 output value	±32000	0	Yes	r	W	–	S	2
Parameter	035	FN	Read rule numbers for fulfilled rules	1 to 64	1	–	R/W (O)	W	–	S/R	2
Analog outputs	036	FT	Applicability for each rule Applicability for rules specified in ITEM 035	0 to 10000	0	Yes	–	W	–	S	2

Condition membership functions

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameters	Input 1, Separate horizontal coordinates with colon to specify.										
	041		Input 1 NL	20 characters max.		–	R/W (O)	–	–	–	21
	042		Input 1 NS	27 characters max.		–	R/W (O)	–	–	–	28
	043		Input 1 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	044		Input 1 PS	27 characters max.		–	R/W (O)	–	–	–	28
	045		Input 1 PL	20 characters max.		–	R/W (O)	–	–	–	21
	Input 2, Separate horizontal coordinates with colon to specify.										
	046		Input 2 NL	20 characters max.		–	R/W (O)	–	–	–	21
	047		Input 2 NS	27 characters max.		–	R/W (O)	–	–	–	28
	048		Input 2 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	049		Input 2 PS	27 characters max.		–	R/W (O)	–	–	–	28
	050		Input 2 PL	20 characters max.		–	R/W (O)	–	–	–	21
	Input 3, Separate horizontal coordinates with colon to specify.										
	051		Input 3 NL	20 characters max.		–	R/W (O)	–	–	–	21
	052		Input 3 NS	27 characters max.		–	R/W (O)	–	–	–	28
	053		Input 3 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	054		Input 3 PS	27 characters max.		–	R/W (O)	–	–	–	28
	055		Input 3 PL	20 characters max.		–	R/W (O)	–	–	–	21
	Input 4, Separate horizontal coordinates with colon to specify.										
	056		Input 4 NL	20 characters max.		–	R/W (O)	–	–	–	21
	057		Input 4 NS	27 characters max.		–	R/W (O)	–	–	–	28
	058		Input 4 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	059		Input 4 PS	27 characters max.		–	R/W (O)	–	–	–	28
	060		Input 4 PL	20 characters max.		–	R/W (O)	–	–	–	21
	Input 5, Separate horizontal coordinates with colon to specify.										

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	061		Output 5 NL	20 characters max.		–	R/W (O)	–	–	–	21
Parameters	062		Output 5 NS	27 characters max.		–	R/W (O)	–	–	–	28
	063		Output 5 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	064		Output 5 PS	27 characters max.		–	R/W (O)	–	–	–	28
	065		Output 5 PL	20 characters max.		–	R/W (O)	–	–	–	21
	Input 6, Separate horizontal coordinates with colon to specify.										
	066		Output 6 NL	20 characters max.		–	R/W (O)	–	–	–	21
	067		Output 6 NS	27 characters max.		–	R/W (O)	–	–	–	28
	068		Output 6 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	069		Output 6 PS	27 characters max.		–	R/W (O)	–	–	–	28
	070		Output 6 PL	20 characters max.		–	R/W (O)	–	–	–	21
	Input 7, Separate horizontal coordinates with colon to specify.										
	071		Output 7 NL	20 characters max.		–	R/W (O)	–	–	–	21
	072		Output 7 NS	27 characters max.		–	R/W (O)	–	–	–	28
	073		Output 7 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	074		Output 7 PS	27 characters max.		–	R/W (O)	–	–	–	28
	075		Output 7 PL	20 characters max.		–	R/W (O)	–	–	–	21
	Input 8, Separate horizontal coordinates with colon to specify.										
	076		Output 8 NL	20 characters max.		–	R/W (O)	–	–	–	21
	077		Output 8 NS	27 characters max.		–	R/W (O)	–	–	–	28
	078		Output 8 ZR	27 characters max.		–	R/W (O)	–	–	–	28
	079		Output 8 PS	27 characters max.		–	R/W (O)	–	–	–	28
	080		Output 8 PL	20 characters max.		–	R/W (O)	–	–	–	21

Conclusion membership functions

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, –: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S) : Initial setting data, (O) : Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameters	Output 1, Specify horizontal axis.										
	081		Output 1 NL	6 characters max.	–		R/W (O)	–	–	–	7
	082		Output 1 NS	6 characters max.	–		R/W (O)	–	–	–	7
	083		Output 1 ZR	6 characters max.	–		R/W (O)	–	–	–	7
	084		Output 1 PS	6 characters max.	–		R/W (O)	–	–	–	7
	085		Output 1 PL	6 characters max.	–		R/W (O)	–	–	–	7
	Output 2, Specify horizontal axis.										
	086		Output 2 NL	6 characters max.	–		R/W (O)	–	–	–	7
	087		Output 2 NS	6 characters max.	–		R/W (O)	–	–	–	7
	088		Output 2 ZR	6 characters max.	–		R/W (O)	–	–	–	7
	089		Output 2 PS	6 characters max.	–		R/W (O)	–	–	–	7
	090		Output 2 PL	6 characters max.	–		R/W (O)	–	–	–	7

Rules:

IF Input 1=**: Input 2=**: Input 3=**: Input 4=**: Input 5=**: Input 6=**: Input 7=**: Input 8=** THEN Output 1=**: Output 2=**

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameters	101		Rule 1	29 characters max.		–	R/W (O)	–	–	–	30
	102		Rule 2	29 characters max.		–	R/W (O)	–	–	–	30
	to		to			–					
	164		Rule 64	29 characters max.		–	R/W (O)	–	–	–	30

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
015	X1 input value	X1
016	X2 input value	X2
017	X3 input value	X3
018	X4 input value	X4
019	X5 input value	X5
020	X6 input value	X6
021	X7 input value	X7
022	X8 input value	X8
023	Output value selection switch for output 1 when rules are not fulfilled	S1
024	Output value selection switch for output 2 when rules are not fulfilled	S2
027	Fixed value for output 1 when rules are not fulfilled	A1
028	Fixed value for output 2 when rules are not fulfilled	A2
031	Y1Output value	Y1
032	Y2Output value	Y2
035	Read rule numbers for fulfilled rules	FN
036	Applicability for each rule	FT

Setting fuzzy logic parameters

Rules

Rules express experience and know-how in IF-THEN statements. For example, IF (you're close to the car in front of you) & (you're going very fast) THEN (you have to step on the brake very hard).
Up to 8 conditions can be set for inputs X1 to X8, and up to two conclusions can be set for outputs Y1 and Y2.
Rules 1 to 64 can be set for ITEM 101 to ITEM 164. The following elements are specified for each rule.

1. Conditions

The labels that will be used for inputs X1 to X8 are listed in order separated by colons. For example, if label NS is used for input X1 and labels ZR, PL, PL, NS, ZR, PL, and PL are likewise used for inputs X2, X3, X4, X5, X6, X7, and X8, then NS:ZR:PL:PL:NS:ZR:PL:PL is specified.

Note: Labels are used to express conditions for the above rules for some applications, for example "close, " "very fast, " and "very hard" in the above example. The following 5 labels can be used in a Fuzzy Logic block.
NL: Negative Large
NS: Negative Small
ZR: Approximately Zero
PS: Positive Small
PL: Positive Large

2. Conclusions

The labels that will be used for outputs Y1 and Y2 are listed in order separated by colons. For example, if ZR is used for output Y1 and PL is used for output Y2, then ZR:PL is specified

•A slash is placed between the conditions and conclusions. For example, the above rule would be specified as follows:
NS:ZR:PL:PL:NS:ZR:PL:PL/ZR:PL
Set a hyphen for inputs or outputs for which labels are not set. For example, to set ZR for input X2, ZR and input X4, and PL for output Y2, then the rule "IF (Input X1 is NL and Input X2 is PL), THEN (Output Y1 is ZR)" would be specified as follows for ITEM 101:
NL:PL:-:-:-:-:-:-/ZR:-
Execution error 19 will occur if this standard is not followed.

Membership functions

Membership function must be set for each rule that is being used. Membership functions determine the applicability of a status to the labels set for inputs and outputs. There are membership functions for both conditions and for conclusions.
There are four typical membership functions for conditions: S, Z, Λ, and Π. These are specified by the inflection points for the labels.

Membership functions are set as follows:

1. Membership functions for conditions

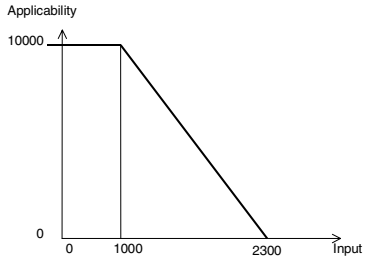
Condition membership functions can be set for up to 5 labels for inputs X1 to X8.
The inflection points for each input, X1 to X8, for the labels NL, NS, ZR, PS, and PL are set in ITEM 041 to ITEM 080 as values along the X axis. (Up to 40 settings are possible, i.e., 8 inputs x 5 labels.)

Note1: There can be two or three inflection points for the membership functions for labels NL and PL. For labels NS, ZR, and PS, there can be three or four inflection points. Execution error 19 will occur if more than two values are the same.

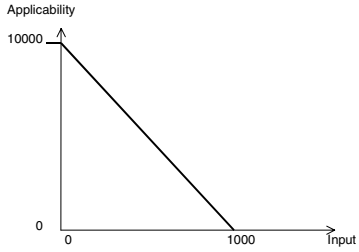
Note 2: Values along the X axis have 1 sign character and up to 5 numeric characters. (Execution error 19 will occur is a + sign is attached.) Leading zeros may be entered or omitted (e.g., either 50 or 050 is acceptable.) Values are separated by colons.

NL

Three X coordinates
Example) 0:1000:2300

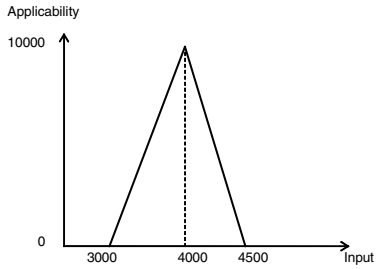


Two X coordinates
Example) 0:1000

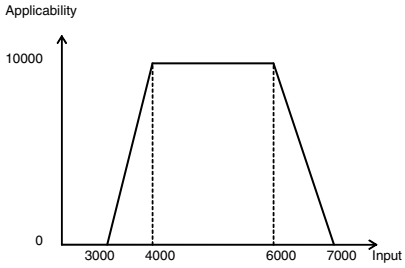


NS, ZR, and PS

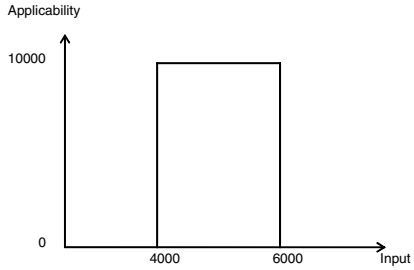
Three X coordinates
Example) 3000:4000:4500



Four X coordinates
Example) 3000:4000:6000:7000

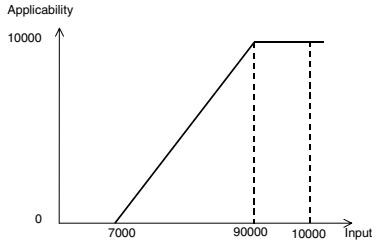


Example) 4000:4000:6000:6000

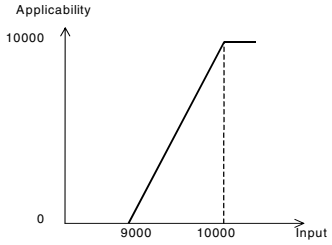


PL

Three X coordinates
Example) (X1:X2:X3) = (7000:9000:10000)

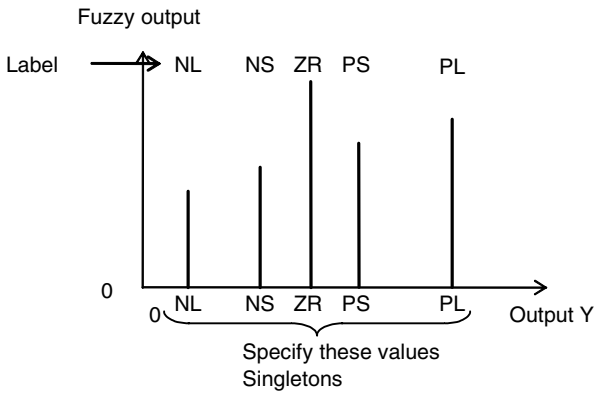


Two X coordinates
Example) 9000:10000



2. Membership functions for conclusions

Conclusion membership functions can be set for up to 5 labels for outputs Y1 and Y2. Singletons for labels NL, NS, ZR, PS, and PL are set in ITEM 081 to ITEM 090 as values along the Y axis. (Up to 10 settings are possible, i.e., 2 outputs x 5 labels.)



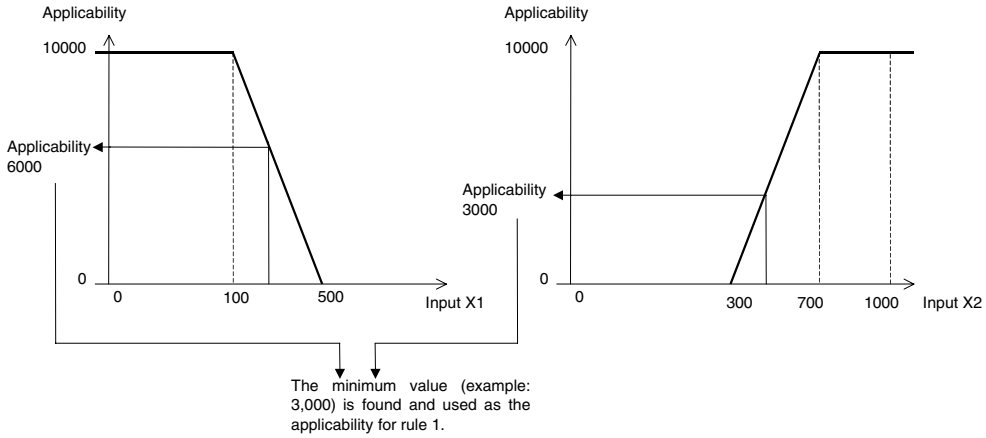
Outline of fuzzy logic processing

Inferences are processes as follows: 1) Conditions, 2) Conclusions, 3) Deterministic output calculations.

1. Conditions

Inputs X1 to X8 and the condition membership functions are used to find the applicability for each label for each input. Although there are from 1 to 8 conditions for inputs X1 to X8, the minimum applicability for all conditions for each is found and used as the applicability for the rule.

Example)
Condition membership functions:
Setting NL for input X1) 0:100:500 is specified for ITEM 041.
Setting PL for input X2) 300:700:1000 is specified for ITEM 050.

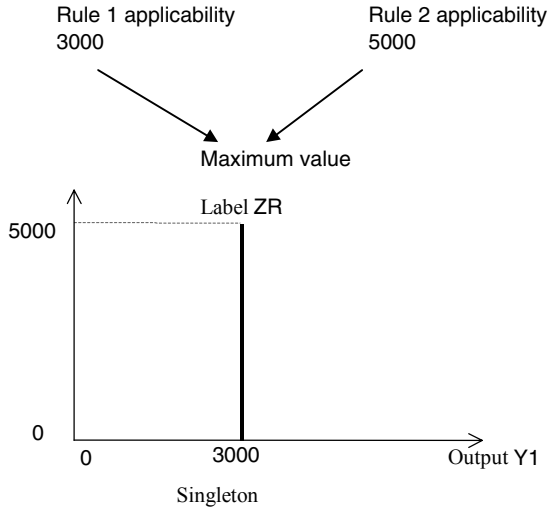


The applicability is thus found for all rules for use in the conclusions.

2. Conclusions

The applicability found for each rule in the conditions is compared to the labels for the conclusions, and the maximum value is found for each label. The maximum value is used as the fuzzy output for that label.
For these, the horizontal singletons for outputs Y1 and Y2 are specified on the horizontal axis as values Y1 and Y2 as specified by the conclusion membership functions. The results are shown for the following conclusion membership functions.

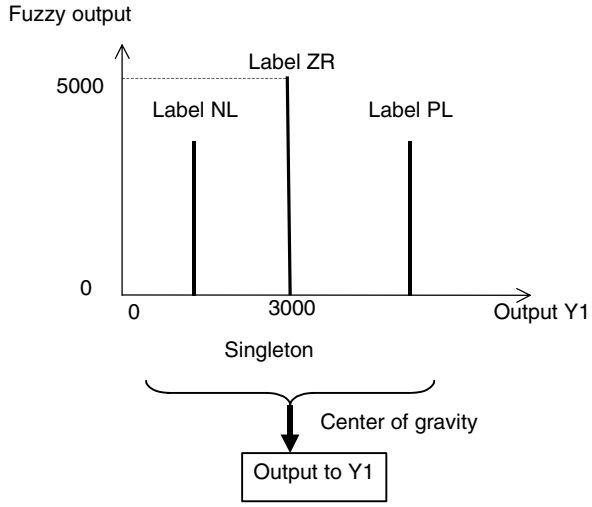
ZR singleton for output Y1 is set to 3000 by setting ITEM 083 to 3, 000.
If label ZR is used in the conclusions for other rules, the maximum value is used as the fuzzy output value for ZR. Here, the singleton for ZR is 3, 000.



3. Deterministic output calculations

The centers of gravity of up two five labels is found for outputs 1 and 2 and these are output as analog values Y1 and Y2.

Example) As shown below, the maximum value is found for other conclusion membership functions, the center of gravity of the fuzzy outputs for a maximum of five labels is found, and it is output to Y1 as the deterministic output value.



Note: The center of gravity method adds the coordinates for the labels for each membership function weighted by the applicability of each and then divides the total by the total sum of the applicabilities to find the deterministic output. The results corresponds to the center of gravity when the membership functions are thought of as graphic figures, using this center of gravity as the final output.

Execution error codes

When an execution error occurs, outputs 1 and 2 will be controlled by the setting of ITEM 023 and ITEM 024 (Output value selection switch for output 1/2 when rules are not fulfilled).

Code	Meaning	Description	Operation when error occurs	Countermeasure
1	Source/ destination not specified	Connection is not possible as specified.	Execution of Fuzzy Logic block will stop.	Check the block address or ITEM number of sources.
19	Inappropriate operation	There is a syntax error in a Fuzzy Logic block (Block Model 016) that prevents operation. 1) There is not one sign character and 5 numeric characters maximum (e.g., a + sign is specified). 2) Values are not separated by colons. 3) The values that are set are not sufficient. 4) More than two inflection points in membership functions are the same. 5) Inflection points in membership functions do not increase to the right. 6) A membership function used in a rule has not been defined.		Check the membership functions and rules. The number of the ITEM causing the problem will be provided in ITEM 006 (operation error details).

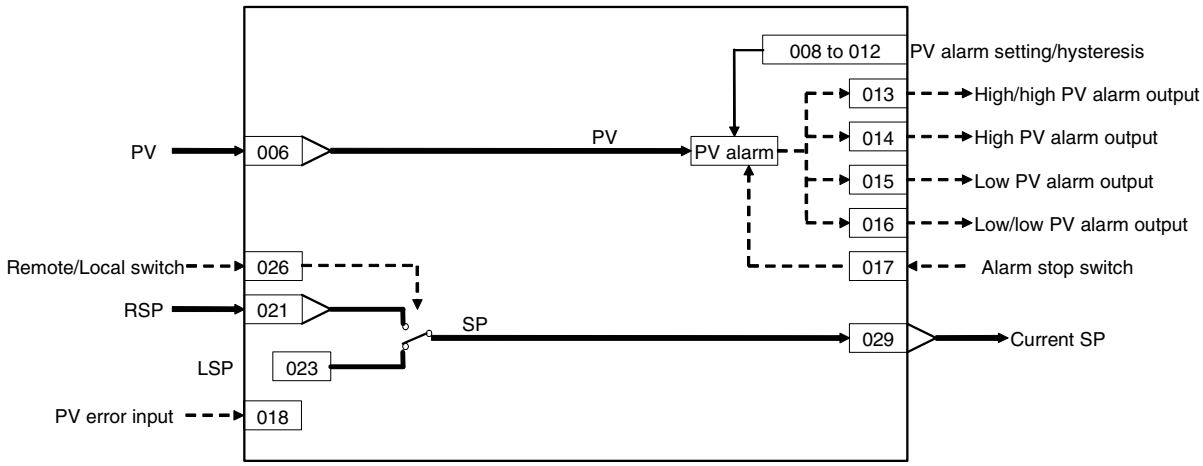
Block Model	Block Name	Block Address
<031>	Indication and Setting	001 to 500

Outline

This function block is the manual setter with PV indication and Set Point setting functions.

•This function block is provided with four PV alarms (high/high, high, low and low/low).
•It is also provided with a remote setting function that allows Remote/Local switching.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Indication and Setting	031	031	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	006		PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	PV input	-15.00 to +115.00%	0.00	Yes	r	–	–	S	2
Parameter	008		High/high alarm setting	-15.00 to +115.00%	115.00	–	R/W(O)	W	–	S/R	2
	009		High alarm setting	-15.00 to +115.00%	100.00	–	R/W(O)	W	–	S/R	2
	010		Low alarm setting	-15.00 to +115.00%	0.00	–	R/W(O)	W	–	S/R	2
	011		Low/low alarm setting	-15.00 to +115.00%	-15.00	–	R/W(O)	W	–	S/R	2
	012		Hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	013	HH	High/high alarm output	0, 1	0	Yes	–	–	R	S	1
	014	H	High alarm output	0, 1	0	Yes	–	–	R	S	1
	015	L	Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
	016	LL	Low alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input	017	S1	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Connection terminal contact input	018		PV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	019	PVE	PV error indication 0: Normal, 1: Error → MANUAL mode	0, 1	0	Yes	–	–	R	S	1
Parameter	020		Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1

*1: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 00.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.

Setting Value Set Point

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input connection information	021		Remote Set Point source designation	BBB or III	000000		R/W(S)	–	–	–	4
Analog input	022	RSP	Remote Set Point input	-15.00 to +115.00%	0.00		r	–	–	–	2
Parameter	023		Local Set Point setting	-15.00 to +115.00%	0.00		R/W(O)	W	–	R	2
	024		SP setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM 026.	0, 1	0		R/W(S)	–	–	S/R	1
Contact input/ parameter	026	R/L	Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM 024 is 1	0, 1	0		R/W(O)	–	R/W	S/R	1
Analog output	029	CSP	Current SP setting	-15.00 to +115.00%	0.00		r/w	–	–	S	2

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	099		Label	0 to 15	0		R/W(O)	W	–	S/R	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
008	High/high alarm setting	HH_SP
009	High alarm setting	H_SP
010	Low alarm setting	L_SP
011	Low/low alarm setting	LL_SP
013	High/high alarm output	HH
014	High alarm output	H
015	Low alarm output	L
016	Low/low alarm output	LL
017	Alarm stop switch	AOF
019	PV error display	PV_ABN
023	Local Set Point setting	SP
024	Set Point setting mode (default)	CAS_SET
026	Remote/Local switch	R/L_SW
029	Current Set Point output	SP
099	Label	OP_MK

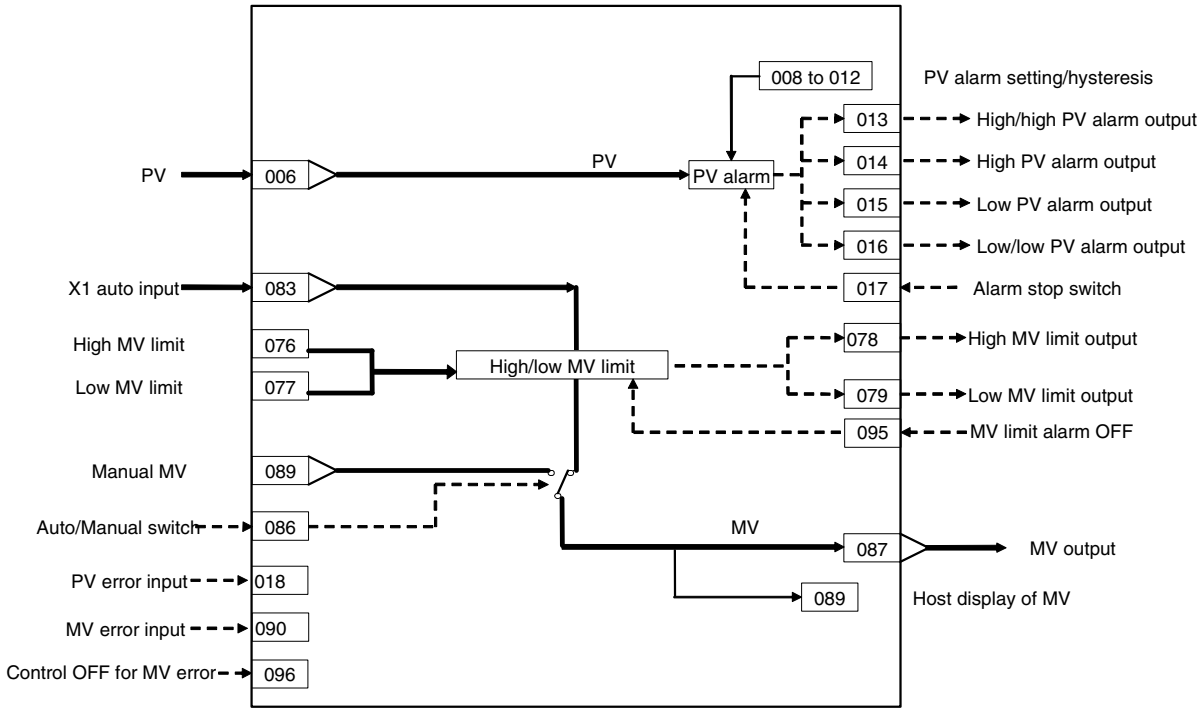
Block Model	Block Name	Block Address
<032>	Indication and Operation	001 to 500

Outline

This function block is the manual setter with PV indication and MV operation functions.

- This function block is provided with four PV alarm outputs (high/high, high, low and low/low).
- It is also provided with a remote setting function that allows Remote/Local switching.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Indication and Operation	032	032	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	006	PV_AD	PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	PV input	-15.00 to +115.00%	0.00	Yes	r	–	–	S	2
Parameter	008	HH_SP	High/high alarm setting	-15.00 to +115.00%	115.00	–	R/W(O)	W	–	S/R	2
	009	H_SP	High alarm setting	-15.00 to +115.00%	100.00	–	R/W(O)	W	–	S/R	2
	010	L_SP	Low alarm setting	-15.00 to +115.00%	0.00	–	R/W(O)	W	–	S/R	2
	011	LL_SP	Low/low alarm setting	-15.00 to +115.00%	-15.00	–	R/W(O)	W	–	S/R	2
	012	HS_SP	Hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	013	HH	High/high alarm output	0, 1	0	Yes	–	–	R	S	1
	014	H	High alarm output	0, 1	0	Yes	–	–	R	S	1
	015	L	Low alarm output	0, 1	0	Yes	–	–	R	S	1
	016	LL	Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input	017	S1	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Connection terminal contact input	018	PVE_AD	PV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	019	PVE	PV error indication 0: Normal, 1: Error → MANUAL mode	0, 1	0	Yes	–	–	R	S	1
Parameter	020	ALM_LIM	Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1

*1: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	076	MH_LMT	High MV limit	±320.00%	100.00 *1	–	R/W(O)	W	–	S/R	2
	077	ML_LMT	Low MV limit	±320.00%	0.00*1	–	R/W(O)	W	–	S/R	2
Contact output	078	U1	High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
	079	U2	Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
Analog input connection information	083	X1_AD	Auto input source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	084	X1	Auto input	±320.00%	0.00	Yes	r	–	–	S	2
Contact input/ parameter	086	A/M	Auto/Manual switch 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	087	MV_C	MV output	±320.00%	0.00	Yes	r/w	–	–	–	2

*1: For LCB 01/03/05 Ver.2.0 or later, the defaults for the high MV limit and low MV limit are 105.00% and –5.00%, respectively.

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	088	MV_REV	Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%.	0, 1	0	–	R/W(S)	–	–	–	1
	089	MV	Host display of MV	±320.00%	0.00	Yes	R/W(O)	W	–	S/R	2
Connection terminal contact input	090	MVE_AD	MV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	091	MVE	MV error display 0: Normal, 1: Error (Manual mode When ITEM 096 = 1 (enabled))	0, 1	0	–	–	–	R	S	1
Parameter	095 *1	MVA_OFF	MV limit alarm OFF 0: Alarm 1: OFF	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	096 *1	MVE_CNT	Control OFF for MV error 0: OFF 1: ON	0, 1	0	–	R/W(S)	–	–	–	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	097 *1	MVE_RTM	MV output retrace time for MV error *1 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2
Parameter	098	MV_IDX	MV index position	-15.00 to +115.00%	0.00	Yes	R/W(O)	W	–	S/R	2
	099	OP_MK	Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

*1: LCB 01/05 Ver.1.5 or later, and LCB03 only
Based on the value specified in ITEM 097, the MV will be restored to the previous output value at the time specified below when a MV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 097 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 097 x 2 s

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
008	High/high alarm setting	HH_SP
009	High alarm setting	H_SP
010	Low alarm setting	L_SP
011	Low/low alarm setting	LL_SP
013	High/high alarm output	HH
014	High alarm output	H
015	Low alarm output	L
016	Low/low alarm output	LL
017	Alarm stop switch	AOF
019	PV error display	PV_ABN
076	High MV limit	MH_LMT
077	Low MV limit	ML_LMT
078	High MV limit output	MHA
079	Low MV limit output	MLA
084	Auto input	X1
086	Auto/Manual switch	A/M_SW
089	Data for host display	MV
091	MV error display	MV_ABN
095	MV limit alarm OFF	MVA_OFF
098	MV index position	MV_IDX
099	Label	OP_MK

Block Model	Block Name	Block Address
<033>	Ratio Setting	001 to 500

Outline

This function block is the ratio and bias setter with PV indication and ratio setting function.

- Ratio can be set externally.
- Input bias and output bias can be set.
- This function block is provided with engineering unit setting data for ratio and engineering unit setting data for PV for display on the host.

Ratio calculation formula

where

$$MV = K1\frac{SP}{100}(PV - A1) - B1$$

MV: Output (-320.00 to +320.00%)
SP: Ratio setting (-15 to +115.00%)
PV: Reference input (%)
K1: Ratio gain (±10.000) .... Set the ratio to SP=100%.
Example) Set "3.000" when the ratio range is 0 to 3 times.
A1: Input bias (±320.00%)
B1: Output bias (±320.00%)

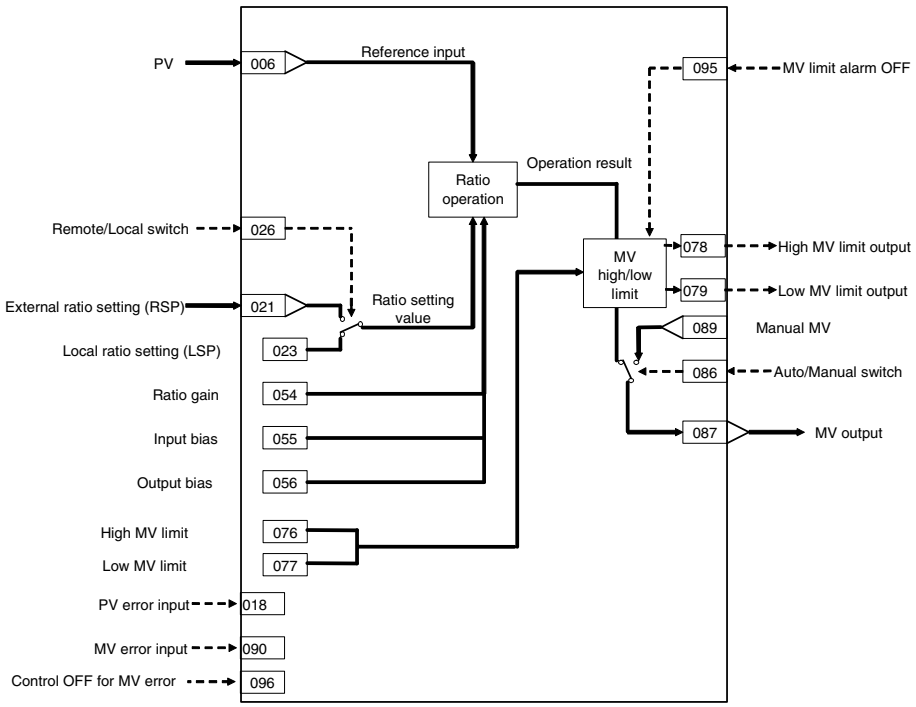
External setting of ratio

Use external ratio setting source designation (ITEM 021).

Actual graduation of ratio

To set the Set Point scale displayed on the host to the actual scale, set the range corresponding to SP in the above ratio calculation formula on the host computer.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Ratio Setting	033	033	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	006		Reference input source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	Reference input	-15.00 to +115.00%	0.00	Yes	r	–	–	S	2
Connection terminal contact input	018*2		PV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	019*2	PVE	PV error indication 0: Normal, 1: Error → MANUAL mode	0, 1	0	Yes	–	–	R	S	1
Parameter	020		Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	–	R/W (S)	–	–	–	1
Analog input connection information	021		External ratio setting source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	022	RSP	External ratio setting	-15.00 to +115.00%	0.00	Yes	r	–	–	–	2
Parameter	023	LSP	Local ratio setting	-15.00 to +115.00%	0.00	–	R/W(O)	W	–	R	2
	024		Ratio setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM 026.	0, 1	0	–	R/W(S)	–	–	S/R	1
Contact input/ parameter	026	R/L	Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM 024 is 1	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	029	SP	Current SP output	-15.00 to +15.00%	0.00	Yes	r/w	–	–	S	2

*1: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

Ratio operation

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	054	K1	Ratio range (sets signal ratio range corresponding to SP=100%)	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	055	A1	Input bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	056	B1	Output bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2

MV

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	076	MH	High MV limit	±320.00%	100.00 *1	–	R/W(O)	W	–	S/R	2
	077	ML	Low MV limit	±320.00%	0.00*1	–	R/W(O)	W	–	S/R	2
Contact output	078	U1	High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
	079	U2	Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode.	0, 1	0	Yes	–	–	R	S	1
Contact input/ parameter	086	A/M	Auto/Manual switch 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	087	MV	Output	±320.00%	0.00	Yes	r/w	–	–	–	2

*1: For LCB 01/03/05 Ver.2.0 or later, the defaults for the high MV limit and low MV limit are 105.00% and –5.00%, respectively.

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	088		Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%.	0, 1	0	–	R/W(S)	–	–	–	1
	089		Host display of MV	±320.00%	0.00	Yes	R/W(O)	W	–	S/R	2
Connection terminal contact input	090		MV error contact source designation	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact output	091	MVE	MV error display 0: Normal, 1: Error (Manual mode When ITEM 096 = 1 (enabled))	0, 1	0	Yes	–	–	R	S	1
Parameter	095 *1	MVA_OFF	MV limit alarm OFF 0: Alarm 1: OFF	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	096 *1	MVE_CNT	Control OFF for MV error 0: OFF 1: ON	0, 1	0	–	R/W(S)	–	–	–	1
	097 *1	MVE_RTM	MV output retrace time for MV error *1 0: Disabled	0 to 10	0	–	R/W(S)	–	–	–	2
Parameter	098		MV index position	-15.00 to +115.00%	0.00	Yes	R/W(O)	W	–	S/R	2
	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

*1: LCB 01/05 Ver.1.5 or later, and LCB03 only
Based on the value specified in ITEM 097, the MV will be restored to the previous output value at the time specified below when a MV error is detected.
If the operation cycle (ITEM 004) is 1 s, the value specified in ITEM 097 x 1 s
If the operation cycle is 2 s, the value specified in ITEM 097 x 2 s

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Reference input	PV
019	PV error display	PV_ABN
023	Local ratio setting	SP
024	Ratio setting mode (default)	CAS_SET
026	Remote/Local switch	R/L_SW
029	Current SP output	SP
054	Ratio range	K1
055	Input bias	A1
056	Output bias	B1
076	High MV limit	MH_LMT
077	Low MV limit	ML_LMT
078	High MV limit output	MHA
079	Low MV limit output	MLA
086	Auto/Manual switch	A/M_SW
089	Data for host display	MV
091	MV error display	MV_ABN
095 *1	MV limit alarm OFF	MVA_OFF
098	MV index position	MV_IDX
099	Label	OP_MK

*1: LCB 01/05 Ver.1.5 or later, and LCB03 only.

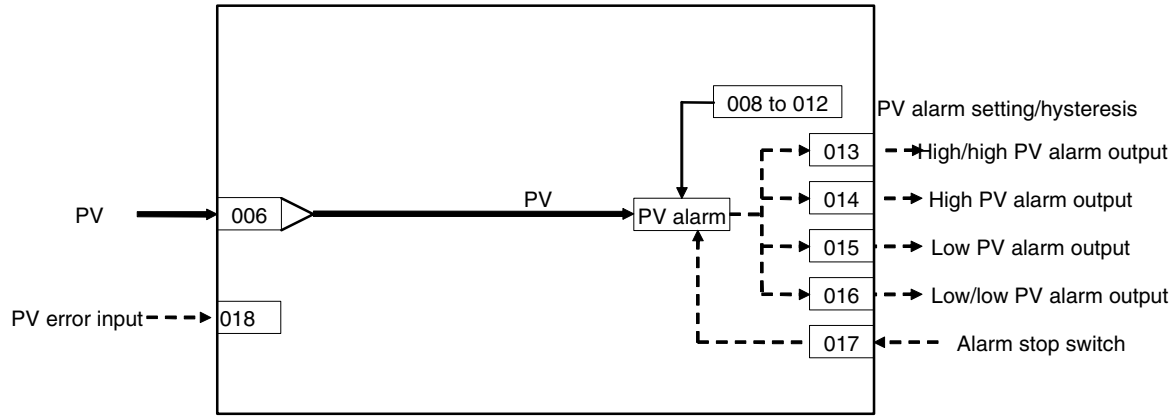
Block Model	Block Name	Block Address
<034>	Indicator	001 to 500

Outline

This function block is the PV indicator.

•This function block is provided with four PV alarm outputs (high/high, high, low and low/low).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Indicator	034	034	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	006		PV source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	PV	PV input	-15.00 to +115.00%	0.00	–	r	–	–	S	2
Parameter	008		High/high alarm setting	-15.00 to +115.00%	115.00	Yes	R/W(O)	W	–	S/R	2
	009		High alarm setting	-15.00 to +115.00%	100.00	–	R/W(O)	W	–	S/R	2
	010		Low alarm setting	-15.00 to +115.00%	0.00	–	R/W(O)	W	–	S/R	2
	011		Low/low alarm setting	-15.00 to +115.00%	-15.00	–	R/W(O)	W	–	S/R	2
	012		Hysteresis setting	0 to 115.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	013	HH	High/high alarm output	0, 1	0	–	–	–	R	S	1
	014	H	High alarm output	0, 1	0	Yes	–	–	R	S	1
	015	L	Low/low alarm output	0, 1	0	Yes	–	–	R	S	1
	016	LL	Low alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input parameter	017	S1	Alarm stop switch 0: Alarm, 1: Stop	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Connection terminal contact input	018		PV error contact source designation	BBB or III	000000	Yes	R/W(S)	–	–	–	4
Contact output	019	PVE	PV error indication 0: Normal, 1: Error → MANUAL mode	0, 1	0	–	–	–	R	S	1
Parameter	020		Alarm limit*1 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%.	0, 1	0	Yes	R/W (S)	–	–	–	1

*1: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows:

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	099		Label	0 to 15	0		R/W(O)	W	–	S/R	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

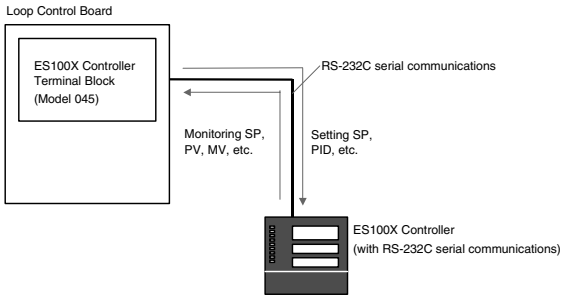
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	PV input	PV
008	High/high alarm setting	HH_SP
009	High alarm setting	H_SP
010	Low alarm setting	L_SP
011	Low/low alarm setting	LL_SP
013	High/high alarm output	HH
014	High alarm output	H
015	Low alarm output	L
016	Low/low alarm output	LL
017	Alarm stop switch	AOF
019	PV error display	PV_ABN
099	Label	OP_MK

Block Model	Block Name	Block Address
<045>	ES100X Controller Terminal	601 to 632

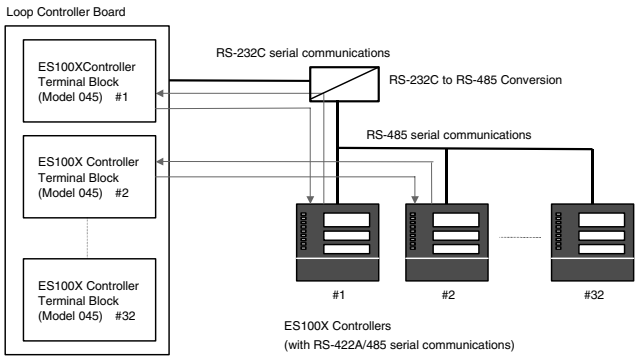
Outline

This function block is used to monitor values such as the SP, PV, and MV and set values such as the SP and PID constants for an ES100X Controller (a digital set-value controller) connected to the Loop Control Board via serial communications.
Note: This function block is not supported by the CS1W-LCB05D.

One ES100X Controller



More than One ES100X Controller



Applicable Controllers

The following digital set-value controllers are supported: ES100X-□□□01□ (RS-232C serial communications) and ES100X-□□□04□(RS-422A/485 serial communications).

Number of ES100X Controllers per Function Block

Each ES100X Controller Terminal Block can monitor or set one ES100X Controller.

Number of ES100X Controllers per Loop Control Board

- With ES100X Controllers supporting RS-232C connections, only one ES100X Controller can be connected to each Loop Control Board.
- With ES100X Controllers supporting RS-422A/485 connections, each Loop Control Board can be connected to up to 32 ES100X Controller. The ES100X unit number set in ITEM 006 is used to differentiate the ES100X Controller with which to communicate.

Connecting the Loop Control Board to ES100X Controllers

The RS-232C port on the Loop Control Board is connected to the RS-232C terminals or RS-422A/485 terminals on the ES100X Controllers.

Data Transfer Contents

Operating the Controller (Function Block to ES100X)

Switching between RUN and STOP, switching between automatic and manual operation, executing autotuning, and switch ES100X parameter setting modes.

Setting the Controller (Function Block to ES100X)

Setting the local SP, PID constants, MV (manipulated variable) upper/lower limits, manual mode MV, and inputting a remote SP within this function block to output to the ES100X.

Monitoring the Controller (ES100X to Function Block)

Monitoring the PV, current SP, MV, RUN/STOP status, automatic/manual status, remote/local parameter setting mode (serial communications/front panel keys), autotuning status, scaling settings (upper/lower limits and decimal point location). You can also create outputs from within the function block, such as alarm outputs based on the PV (deviation, HH, H, L, and LL) or based on the MV upper/lower limits.

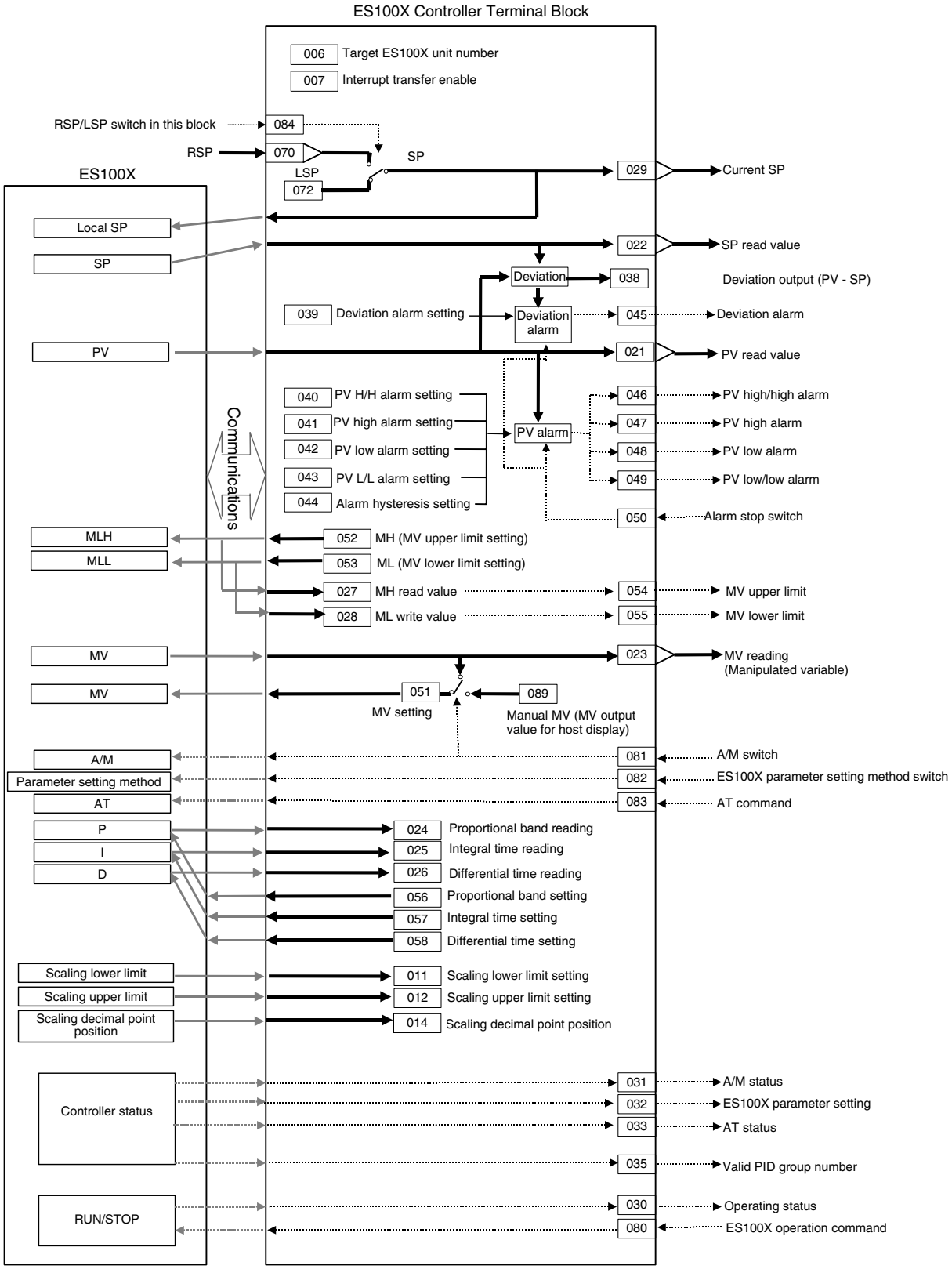
Data Update Cycle for Setting and Monitoring

Data will be updated every second for each ES100X Controller when the execution cycle of the function block is 0.1 second.
When more than one ES100X Controller Terminal Block is used, multiply 1 second by the number of ES100X Controllers connected.
It is possible, however, to use an interrupt transfer function to write to an ES100X Controller even when a different ES100X Controller Terminal Block is being executed.

ES100X Requirements

- •Normal control must be set (set specifications setting mode C033 to 0).
  Note: Cascade control can be set as long as primary loop PID is set for communications.
- •The local SP mode must be set (set operation mode P008 in the ES100X to 0 for a local SP).
  Note 1:Even if the ES100X is set for a remote SP (RSP), the ES100X will be force-set to a local SP (LSP) by this function block the first time it is executed.
  Note 2:If a remote SP is set, the remote SP can be read.
- •Remote parameter setting mode must be set (enabling setting parameters via serial communications).
  (Set operation mode P007 to 1 for remote setting.)
  Note 1: The ES100X must be set to the remote parameter setting mode (in P007) to change the following parameters:
  Set point (ITEM 029), MV output for host display (ITEM 089), MV upper limit (ITEM 052), MV lower limit (ITEM 053), proportional band (ITEM 056), integral time (ITEM 057), and differential time (ITEM 058).
  Note 2: The following specifications can be changed regardless of the ES100X parameter setting mode: ES100X operation command (ITEM 080), A/M switch (ITEM 081), EX100 parameter setting method switch (ITEM 082) and AT command (ITEM 083).
- •The bank number must be 0 (set operation mode P006 in the ES100X to 0).
  Note: Data in bank 0 will be read and written even if a different bank number is specified.
- •The PID group number must be 1 (set the PID group number in bank number 0 in the ES100X to 1).
  Note: If the PID group number is not 1, the following cannot be set: P, I, D, and MV limits.
- •Communications must be set to a data length of 7 bits, even parity, and two stop bits.
  Note: Communications will not be possible unless the above communications settings are made.
- •Communications with the ES100X will be stopped when downloading the initial setting data from the CX-Process Tool (i.e., when the ITEM list read/write method is set to R/W(S) data from the CX-Process Tool). (Cold starts are automatically used for other function blocks.) Execute a hot or cold start to start the communications.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command 0: Cancel stop, 1: Stop	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: ES100X Controller Terminal	045	045	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (seconds) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	1	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

Communications between Controllers

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	006		Target ES100X unit number (0 to 99, connection possible to 32 Controllers)	0 to 99	0	–	R/W(S)	–	–	–	2
	007		Interrupt transfer enable 0: Disable, 1: Enable	0, 1	0	–	R/W(S)	–	–	–	1
	008		Baud rate (kbits/s) (0: 1.2, 1:2.4, 2: 4.8, 3: 9.6, 4: 19.2)	0 to 4	3	–	R/W(S)	–	–	–	2
Special	009		Controller error level display	0 to 3	See note.	–	–	–	–	S	2
	010		Response code (response code for commands addressed to ES100X)	0000 to 2714 Hex	See note.	–	–	–	–	S	2

Data

ITEM TYPE	ITEM	Symbol	Data Description		Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, –: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
								According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	011		Scaling lower limit	Read value from the ES100X	-1999 to 9998	See note.	Yes	–	–	–	–	2
	012		Scaling upper limit		-1998 to 9999	See note.	Yes	–	–	–	–	2
	014		Scaling decimal point position		0 to 3	See note.	Yes	–	–	–	–	2
	021	PV	Process variable		-10.00% to 110.00%	See note.	Yes	r	–	–	S	2
	022	SP	Set point		0.00% to 100.00%	See note.	Yes	r	–	–	–	2
	023	MV	Manipulated variable		-5.00%to 105.00%	See note.	Yes	r	–	–	–	2
	024		Proportional band		0.0% to 999.9%	See note.	Yes	–	–	–	S	2
	025		Integral (reset) time		0 to 9999 s	See note.	Yes	–	–	–	S	2
	026		Differential (rate) time		0 to 9999 s	See note.	Yes	–	–	–	S	2
	027		MV upper limit		-4.90% to 105.00%	See note.	Yes	–	–	–	S	2
	028		MV lower limit		-5.00% to 104.90%	See note.	Yes	–	–	–	S	2
	029	CSP	Current SP setting	LSP or RSP in this block	0.00% to 100.00%	See note.	Yes	r	–	–	S	2
Contact output	030	RUN	Operating status display 0: STOP, 1: RUN	Value read from ES100X	0, 1	See note.	Yes	–	–	R	S	1
	031	A/M	Auto/manual status display 0: Manual, 1: Auto		0, 1	See note.	Yes	–	–	R	S	1
	032	RMT	EX100 parameter setting method 0: Local (front panel keys), 1: Remote (serial communications)		0, 1	See note.	Yes	–	–	R	S	1
	033	AT	AT status 0: AT not being executed (including normal end) 1: AT being executed		0, 1	See note.	Yes	–	–	R	S	1
Parameter	035		Valid PID group number		1 to 8	See note.	Yes	–	–	–	–	2
	038		Deviation output (deviation = PV - SP)	Result calculated in this block	±110.00%	0.00	Yes	–	–	–	–	2
	039		Deviation alarm setting	Value set in this block	0% to 110.00%	110.00	–	R/W(O)	W	–	S/R	2
	040		PV high/high alarm setting		-10.00% to 110.00%	110.00	–	R/W(O)	W	–	S/R	2
	041		PV high alarm setting		-10.00% to 110.00%	100.00	–	R/W(O)	W	–	S/R	2
	042		PV low alarm setting		-10.00% to 110.00%	0.00	–	R/W(O)	W	–	S/R	2
	043		PV low/low alarm setting		-10.00% to 110.00%	-10.00	–	R/W(O)	W	–	S/R	2
	044		Hysteresis setting		0.00% to 110.00%	1.00	–	R/W(S)	W	–	–	2
Contact output	045	DVA	Deviation alarm value	Result calculated in this block	0, 1	0	Yes	–	–	R	S	1
	046	HH	PV high/high alarm value		0, 1	0	Yes	–	–	R	S	1
	047	H	PV high alarm value		0, 1	0	Yes	–	–	R	S	1
	048	L	PV low alarm value		0, 1	0	Yes	–	–	R	S	1
	049	LL	PV low/low alarm value		0, 1	0	Yes	–	–	R	S	1
Contact input	050	AS	Alarm stop switch 0: Alarm, 1: Stop	Value written to	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

ITEM TYPE	ITEM	Symbol	Data Description		Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, –: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
								According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog output	051		MV setting	ES100X	-5.00% to 105.00%	See note.	Yes	r/w	–	–	–	2
Parameter	052		MV upper limit setting		-4.90% to 105.00%	See note.	Yes	R/W(O)	W	–	R	2
	053		MV lower limit setting		-5.00% to 104.90%	See note.	Yes	R/W(O)	W	–	R	2
Contact output	054	MHA	MV upper limit output 1: Above upper limit Valid only for auto mode (always 0 for manual mode).	Results calculated in this block	0, 1	0	Yes	–	–	R	S	1
	055	MLA	MV lower limit output 1: Below lower limit Valid only for auto mode (always 0 for manual mode).		0, 1	0	Yes	–	–	R	S	1
Parameter	056		P (proportional band) setting	Value written to ES100X	0.0% to 999.9%	See note.	Yes	R/W(O)	W	–	R	2
	057		I (integral time) setting 0: No integral control		0 to 9999 s	See note.	Yes	R/W(O)	W	–	R	2
	058		D (differential time) setting 0: No differential control		0 to 9999 s	See note.	Yes	R/W(O)	W	–	R	2
Analog input connection information	070		Remote SP source designation	Value set in this block	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	071		Remote SP input value	Value written to ES100X	0.00% to 100.00%	0.00	Yes	–	–	–	–	2
Parameter	072		Local SP setting		0.00% to 100.00%	See note.	Yes	R/W(O)	W	–	R	2
Contact input	080	RUN	ES100X operation command 0: Stop, 1: Run		0, 1	See note.	Yes	R/W(O)	–	R/W	R	1
	081	A/M	A/M switch 0: Manual, 1: Auto		0, 1	See note.	Yes	R/W(O)	–	R/W	R	1
	082	RMT	EX100 parameter setting method switch 0: Local (front panel keys), 1: Remote (serial communications)		0, 1	See note.	Yes	R/W(O)	–	R/W	R	1
	083	AT	AT command 0: Stop AT, 1: Execute AT		0, 1	See note.	Yes	R/W(O)	–	R/W	R	1
Contact input parameter	084	R/L	RSP/LSP switch in this block 0: Local SP, 1: Remote SP Note: Valid only when ITEM 085 is 1 (RSP/LSP switching enabled).	In this block	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	085		SP setting method (default) 0: LSP only, 1: RSP/LSP switching enabled (ITEM 084 will be disabled if “LSP only” is set.)	In this block	0, 1	0	–	R/W(S)	–	–	S/R	1
	088		Inverted MV display at host 0: No, 1: Yes Note: Inversion means to take 0% to 100% and convert it to 100% to 0%.		0, 1	0	–	R/W(S)	–	–	–	1
	089	MV	MV output for host display		-5.00% to 105.00%	See note.	Yes	R/W(O)	W	–	S/R	2
	098		MV manual pointer position		-5.00% to 105.00%	0.00	Yes	R/W(O)	W	–	S/R	2
	099		Label		0 to 15	0	Yes	R/W(O)	W	–	S/R	2

Note:

•If more than one ES100X Controller is used, only the baud rate (ITEM 008) set in the block with the lowest block address is used. If the baud rate is changed, the new setting will become effective the next time the Loop Controller Unit is restarted.

•When reading the PV or SP from the ES100X, the scaling lower limit (ITEM 011) and scaling upper limit (ITEM 012) will be used to convert the data to between 0.00% and 100.00% in the Loop Control Board.

When writing data to the ES100X, the scaling lower limit (ITEM 011) and scaling upper limit (ITEM 012) will be used to convert the data from between 0.00% and 100.00% before writing to the ES100X.

When the Loop Controller Unit is started (hot or cold), data is read from the ES100X and used for the initial ITEM settings in the function block instead of using the ITEM settings originally in the function block. This is done for safety. The ITEMs to which this applies are listed as "See note." in the default column in the ITEM table given above.

•ES100X Data Read/Write Timing

Only one ES100X Controller Terminal Block is executed each cycle.

If there are n ES100X Controller Terminal Blocks, each block will be executed only once every n cycles. (The External Controller Blocks will be executed in ascending order of block addresses.)

1)Reading Data from the ES100X to the Loop Control Board

Data is read when the ES100X Controller Terminal Block is executed.

2)Writing Data from the Loop Control Board to the ES100X

•When Interrupt Transfer Enable (ITEM 007) is OFF

Data is written when the ES100X Controller Terminal Block is executed.

•When Interrupt Transfer Enable (ITEM 007) is ON

The ES100X Controller Terminal Block with interrupt transfer enabled will be executed even if another ES100X Controller Terminal Block is scheduled to be executed that cycle. For remote SP setting (with ITEM 084 and ITEM 085 both set to 1), the SP is written to the ES100X only when the ES100X Controller Terminal Block is executed.

•ES100X Data Update Cycle

The ES100X Controller Terminal Block must be executed more than once to read and write all the data for the ES100X.

Approximately one second will be required to update the data for one ES100X Controller when the execution cycle of the function block is 0.1 second. If the execution cycle increases, the update cycle will increase as a multiple of the execution cycle.

If n ES100X Controllers are connected, the time required for each Controller will be approximately n seconds.

•Response Code (ITEM 010)

If communications with the ES100X are normal, a communications command will be sent to the ES100X and the response code that is returned will be indicated.

Refer to the ES100X user's manual for communications for details.

•Controller Error Level Display (Levels 0 to 3, ITEM 009)

The error level of the ES100X classifies errors groups into error levels 0 to 3 for errors read by sending the variable read command to the ES100X.

0: No error

1: Group 0 or 1 (calibration data error, internal voltage error, etc.)

2: Groups 2 and 3 (PV errors, etc.)

3: Group 9 (motor calibration setting error, etc.)

Refer to the ES100X user's communications manual for details.

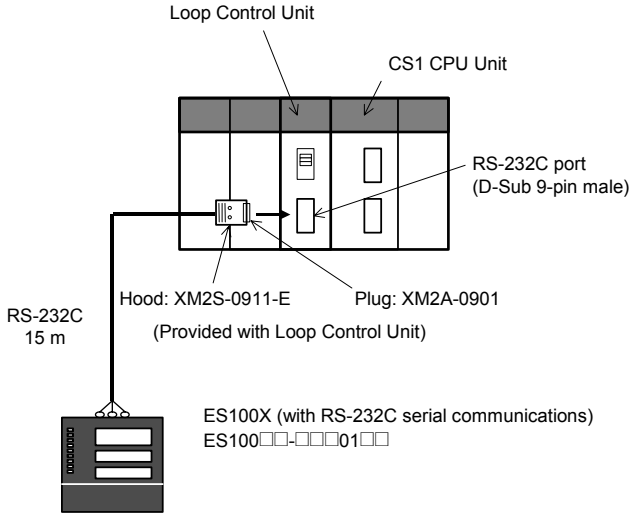
Execution Error Table

Code	Name	Description	Action when error occurs	Measure to be taken
29	External device reception error	A communications frame error has occurred in the data received from the ES100X for the ES100X Controller Terminal Block. (Either an FCS check error or frame error occurred three times in a row.)	Communications with the ES100X stopped and communications with another ES100X attempted.	Check the communications path. Check the communications settings: Data length of 7 bits, even parity, and two stop bits.
30	Response timeout	A response is not returned for data sent to the Controller for an ES100X Controller Terminal Block. (A response was not received for 5 seconds three times.)	Communications with the ES100X stopped and communications with another ES100X attempted.	Check the communications path. Check the communications settings: Data length of 7 bits, even parity, and two stop bits. Check the restrictions for the ES100X (e.g., parameter setting mode).
31	Controller unit number duplication	The unit number (ITEM 006) of the Controller to communicate with in the ES100X Controller Terminal Block is the same as the unit number in another ES100X Controller Terminal Block. A timeout error (30) will occur if the specified unit number is not set for any ES100X Controller.	Communications with the ES100X are stopped.	Set the unit numbers (ITEM 006) so that each number is set for only one ES100X Controller.

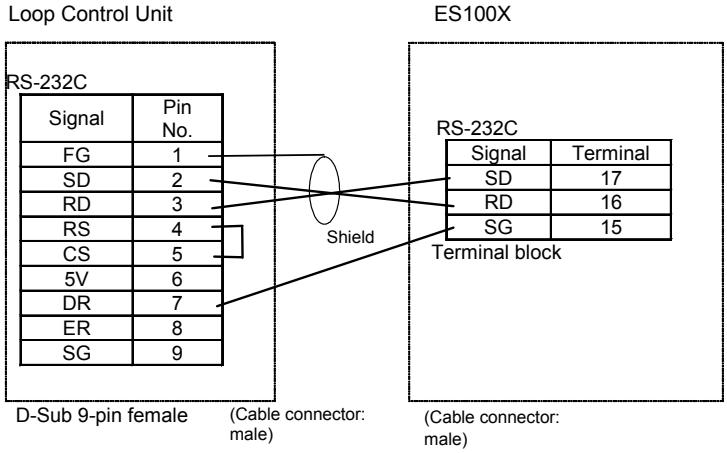
Hardware Connections to ES100X Controllers

1:1 Connections between Loop Control Board and ES100X via RS-232C

System Configuration



Wiring



Recommended RS-232C Cables

UL2464 AWG28 x 5P IFS-RVV-SB (UL-conforming product) (Fujikura)
AWG28x5P IFVV-SB (not UL-conforming product)
UL2464-SB(MA)5Px28AWG(7/0.127) (UL-conforming product) (Hitachi)
CO-MA-VV-SB 5Px28AWG(7/0.127) (not UL-conforming product)

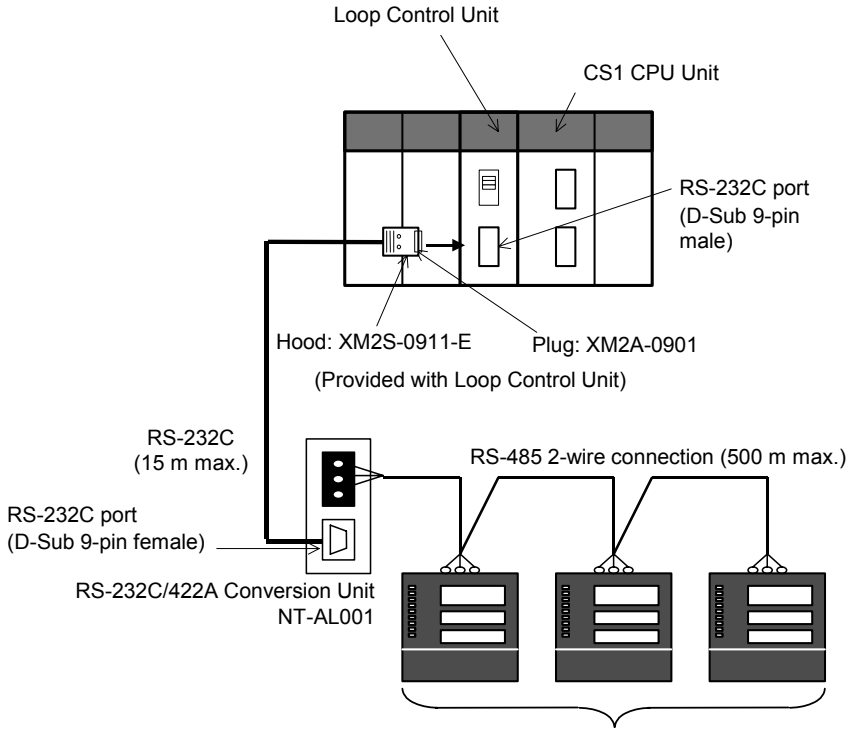
Applicable Connectors

RS-232C 9-pin Connector for Loop Control Board

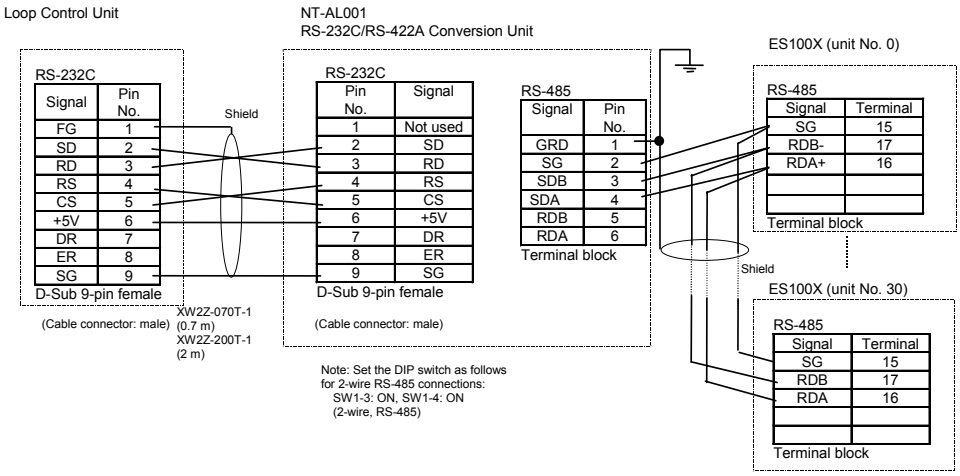
Name	Model number	Specifications	
Plug	XM2A-0901	9-pin, male	Used together. (One connector included with Loop Control Board)
Hood	XM2S-0911-E	For 9-pin connector, mini screws	

1:N Connections between Loop Control Board and ES100X Controllers via RS-232C/RS-485 Conversion (N = 1 to 31)

System Configuration



Wiring



Note:

Do not connect pin 6 (+5 V) on the RS-232C port on the Loop Control Board to any device other than the NT-AL001. The external device or the Loop Control Board may be damaged.
Set the 2-wire/4-wire setting on the NT-AL001 to a 2-wire connection (RS-485).
Set the DIP switch as shown below.
SW1-3: ON, SW1-4: ON (2-wire, RS-485)

Recommended RS-232C Cables between Loop Control Board and NT-AL001

Name	Model number	Length
NT-AL001 Connecting Cables	XW2Z-070T-1	0.7 m
	XW2Z-200T-1	2.0 m

Applicable Connector

The RS-232C 9-pin Connector on the Loop Control and the NT-AL001 is listed in the following table.

Name	Model number	Specifications	
Plug	XM2A-0901	9-pin, male	Used together. (One connector included with Loop Control Board)
Hood	XM2S-0911-E	For 9-pin connector, mini screws	

Recommended RS-485 Cable

CO-HC-ESV-3Px7/0.2(Hirakawa-Huddic)

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (Fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
009	Controller error level display	ERR1
010	Response code	RES
021	PV measured value	PV
024	P (proportional band)	P
025	I (integral time)	I
026	D (differential time)	D
027	MV upper limit	MH
028	MV lower limit	ML
029	SP (setting)	SP
030	Operating status display	RUN
031	A/M status display	A/M_SW
032	ES100X parameter setting mode	RMT
033	AT status	AT
039	Deviation alarm setting	DVA_SP
040	PV high/high alarm setting	HH_SP
041	PV high alarm setting	H_SP
042	PV high alarm setting	L_SP
043	PV low/low alarm setting	LL_SP
045	Deviation alarm setting	DVA
046	PV high/high alarm value	HH
047	PV high alarm value	H
048	PV low alarm value	L
049	PV low/low alarm value	LL
050	Alarm stop switch	AOF
052	MV upper limit	MH
053	MV lower limit	ML
054	MV upper limit output	MHA
055	MV lower limit output	MLA
056	P (proportional band)	P
057	I (integral time)	I
058	D (differential time)	D
072	SP (setting)	SP
080	ES100X operation command	RUN
081	A/M switch	A/M_SW
082	ES100X parameter setting mode	RMT
083	AT command	AT
084	RSP/LSP switch in this block	R/L_SW
085	SP setting method	CAS_SET
089	Manipulated output value	MV
098	MV manual pointer position	MV_IDX
099	Label	OP_MK

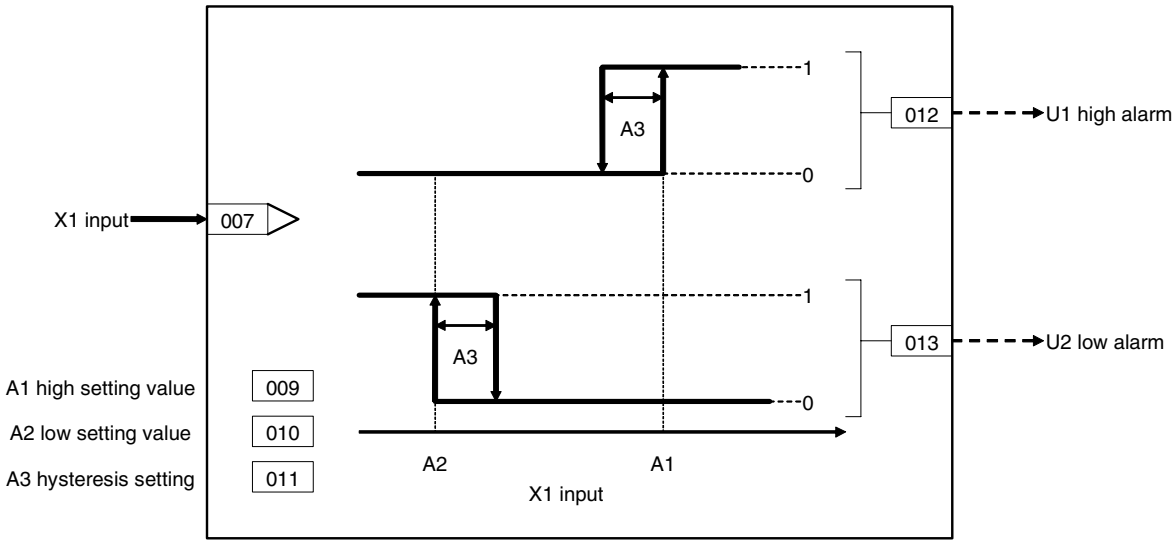
Block Model	Block Name	Block Address
<111>	High/Low Alarm	100 to 500

Outline

This function block provides the alarm contact outputs for the high and low limits of single analog outputs.

•High and low limits have hysteresis.
•The high limit can be set to a value lower than the low limit.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: High/Low alarm	111	111	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%		Yes	r	–	–	S	2
Parameter	009	A1	High setting	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	010	A2	Low setting	±320.00%	-320.00	–	R/W(O)	W	–	S/R	2
	011	A3	Hysteresis setting	0 to 320.00%	1.00	–	R/W(S)	W	–	S/R	2
Contact output	012	U1	High alarm output	0, 1	0	Yes	–	–	R	S	1
	013	U2	Low alarm output	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	PV
009	High setting	H_SP
010	Low setting	L_SP
011	Hysteresis setting	A3
012	High alarm output	H
013	Low alarm output	L

Note This function block cannot be sent using 1-Block Send Terminal to Computer (Block Model 403).

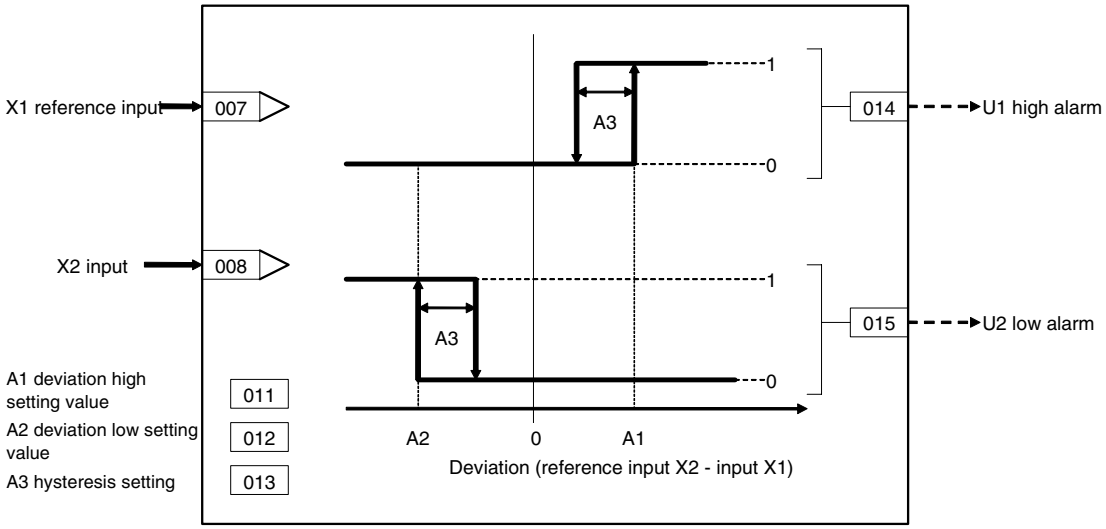
Block Model	Block Name	Block Address
<112>	Deviation Alarm	100 to 500

Outline

This function block provides the alarm contact outputs for the deviation of two analog signals.
The deviation high alarm output changes to 1 (turns ON) when "X2 input - X1 reference input" is at or higher than the deviation high setting. The deviation low alarm output changes to 1 (turns ON) when "X1 input - X2 reference input" is at or lower than the deviation low setting.

•The deviation high and low limits have hysteresis.
•The deviation high limit can be set to a value lower than the deviation low limit.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Deviation Alarm	112	112	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	009	X1	Reference input	±320.00%	0.00	Yes	r	–	–	S	2
	010	X2	Input	±320.00%	0.00	Yes	r	W	–	S	2
Parameter	011	A1	Deviation high setting	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	012	A2	Deviation low setting	±320.00%	-320.00	–	R/W(O)	W	–	S/R	2
	013	A3	Hysteresis setting	0 to 320.00%	1.00	–	R/W(S)	W	–	S/R	2
Contact output	014	U1	Deviation high alarm output	0, 1	0	Yes	–	–	R	S	1
	015	U2	Deviation low alarm output	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

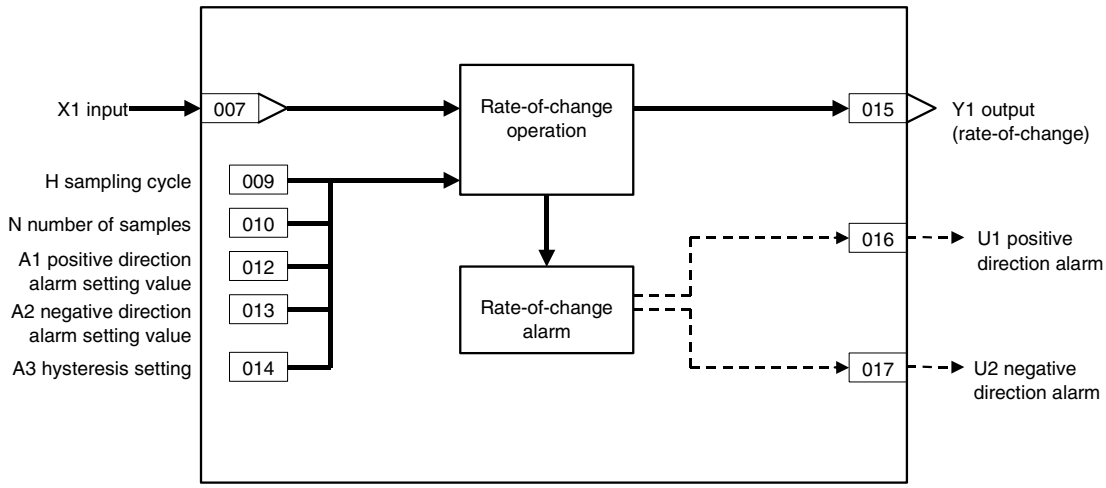
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
009	Reference input	X1
010	Input	X2
011	Deviation high setting	A1
012	Deviation low setting	A2
013	Hysteresis setting	A3
014	Deviation high alarm output	U1
015	Deviation low alarm output	U2

Block Model	Block Name	Block Address
<113>	Rate-of-change Operation and Alarm	100 to 500

Outline

This function block provides the alarm contact outputs for the high and low limits of rate-of-change operation when the analog signal rate-of-change is output.
By how many percent (%) X1 input changes per second, minute or hour is output as the rate-of-change. Judgment of the change in alarm signal is performed by comparing the value of X1 input with the data of H x N seconds previous currently held in memory.
U1 output changes to 1 (turns ON) if X1 is greater than A1 positive direction alarm setting.
U2 output changes to 1 (turns ON) if X1 is greater than A2 negative direction alarm setting.
Each of the alarm settings has A3 hysteresis.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1		Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Rate-of-change Operation and Alarm	113	113	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	1 to 4 6 to 8	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	–	r	–	–	S	2
Parameter	009	H	Sampling cycle (0: Operation cycle)	0 to 320s	0	Yes	R/W(S)	W	–	S/R	2
	010	N	Number of samples	1 to 8	8	–	R/W(S)	W	–	S/R	1
	011		Unit (0:%/s, 1:%/min, 2:%/h)	0 to 2	0	–	R/W(S)	–	–	S/R	1
	012	A1	Positive direction alarm setting	0 to 320.00	320.00	–	R/W(O)	W	–	S/R	2
	013	A2	Negative direction alarm setting	0 to 320.00	320.00	–	R/W(O)	W	–	S/R	2
	014	A3	Hysteresis setting	0 to 320.00	1.00	–	R/W(S)	W	–	S/R	2
Analog output	015	Y1	Output rate-of-change	±320.00%	0.00	–	r/w	–	–	S	2
Contact output	016	U1	Positive direction alarm output	0, 1	0	Yes	–	–	R	S	1
	017	U2	Negative direction alarm output	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

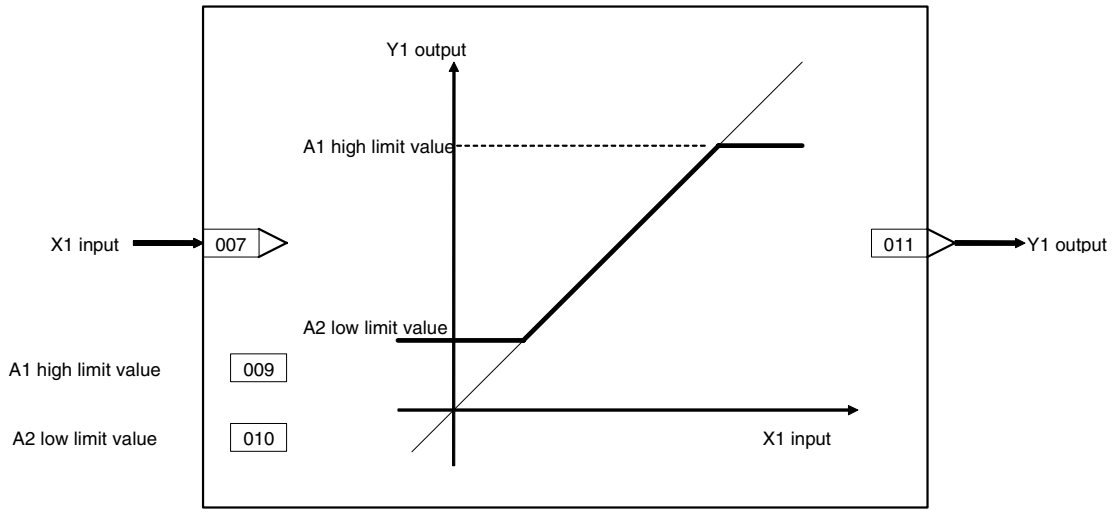
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Sampling cycle	H
010	Number of samples	N
011	Unit	TM
012	Positive direction alarm setting	A1
013	Negative direction alarm setting	A2
014	Hysteresis setting	A3
015	Output rate-of-change	Y1
016	Positive direction alarm output	U1
017	Negative direction alarm output	U2

Block Model	Block Name	Block Address
<115>	High/Low Limit	100 to 500

Outline

This function block limits the high and low limits of single analog signals.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Model name: High/Low Limit	115	115	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	–	r	–	–	S	2
Parameter	009	A1	High limit	±320.00%	320.00	Yes	R/W(O)	W	–	S/R	2
	010	A2	Low limit	±320.00%	-320.00	–	R/W(O)	W	–	S/R	2
Analog output	011	Y1	Output	±320.00%	0.00	–	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

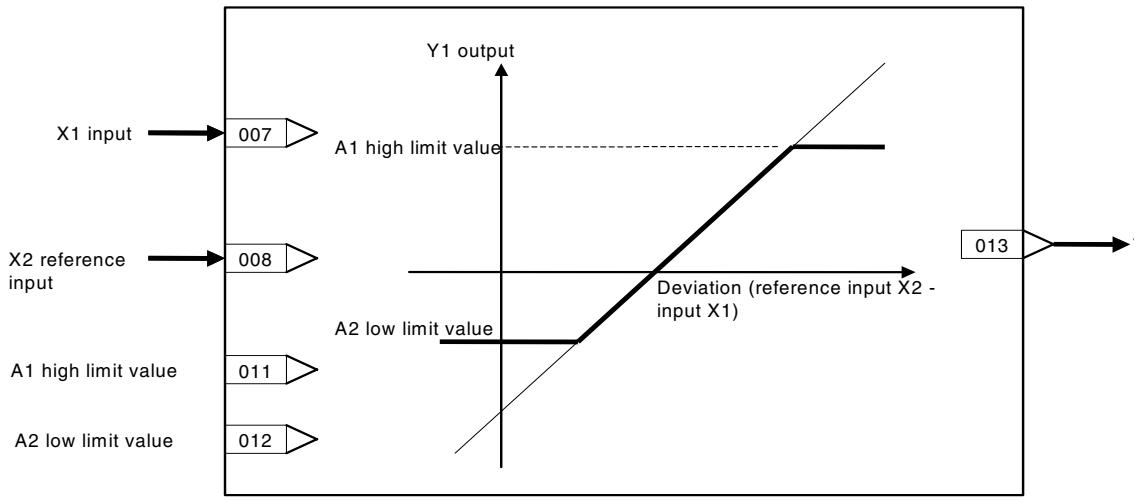
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	High limit	A1
010	Low limit	A2
011	Output	Y1

Block Model	Block Name	Block Address
<116>	Deviation Limit	100 to 500

Outline

This function block calculates the deviation (X2 - X1) between two analog signals, limits the deviation within than range, and outputs that value.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Deviation Limit	116	116	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	009	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	010	X2	Reference input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	011	A1	High deviation limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	012	A2	Low deviation limit	±320.00%	-320.00	–	R/W(O)	W	–	S/R	2
Analog output	013	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (Fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
009	Input	X1
010	Reference input	X2
011	High deviation limit	A1
012	Low deviation limit	A2
013	Output	Y1

Block Model	Block Name	Block Address
<118>	Analog Signal Hold	100 to 500

Outline

This function block holds the maximum, minimum or instantaneous value of single analog signals, and outputs that value.

•The maximum value is held and output.
•The minimum value is held and output.
•The instantaneous value is held and output.
•This function block has a reset switch for resetting held values.

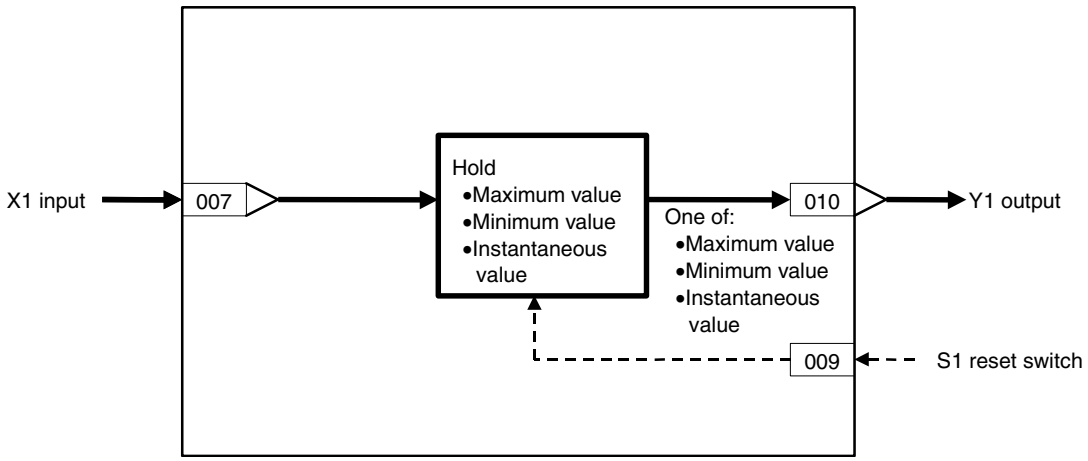
When the hold mode is set to instantaneous value, the instantaneous value when S1 reset switch changes from 1 (ON) to 0 (OFF) is held and output to Y1.
When the hold mode is set to either maximum value or minimum value, the maximum value or minimum value is held and output to Y1 when S1 reset switch is 0 (OFF).
When S1 is set to 1 (ON), the value is not held.
When S1 reset switch is set to 1 (ON), X1 input equals Y1 output.

Note: When a cold start is performed, the values that were held before CPU Unit output OFF or before running of the Loop Controller was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Peak hold or hold at fall of contact state

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Analog Signal Hold	118	118	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
	006		Hold mode (1: Maximum value, 2: Instantaneous value, 3: Minimum value)	1 to 3	2	–	R/W(S)	–	–	S/R	1
Analog input connection information	007		X1 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Contact input/ parameter	009	S1	Reset switch Contact inputs and parameters are reset when set to 1. When the switch setting changes to 0 from 1 when ITEM 006 is set to 2, inputs and parameters are held. When ITEM 006 is set to either 1 or 3, contacts and parameters are held when the switch setting is 0 and are not held when the switch setting is 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	010	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
006	Hold mode	KN
008	Input	X1
009	Reset switch	S1
010	Output	Y1

Block Model	Block Name	Block Address
<121>	Addition or Subtraction	100 to 500

Outline

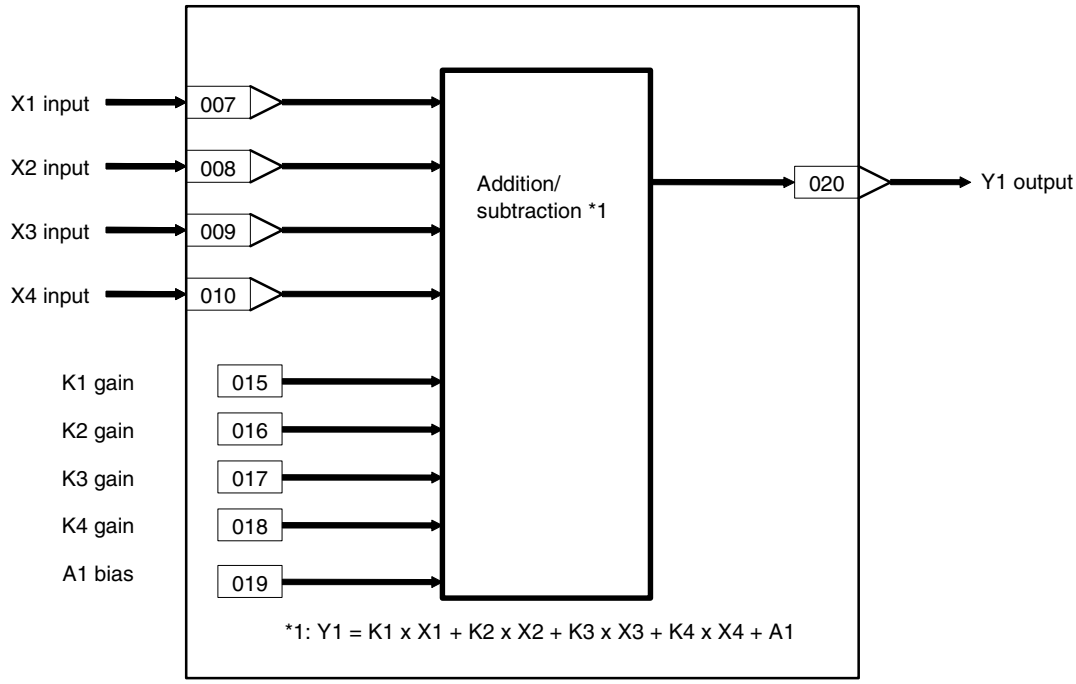
This function block performs addition/subtraction with gain and bias on up to four analog signals.

Y1 = K1 x X1 + K2 x X2 + K3 x X3 + K4 x X4 + A1

•Internal operation is executed at double precision (32 bits).

Note: Calculate 100% in the calculation formula as 1.0.
Example: If X1 = 20%, X2 = -10%, X3 = 70%, X4 = -30%, K1 = 1.0, K2 = 5.0, K3 = 0.5, K4 = -0.5, and A1 = -40%,
Y1 = {1.0 x 0.2 + 5.0 x (-0.1) + 0.5 x 0.7 + (-0.5) x (-0.3) - 0.4} x 100%
= {0.2 - 0.5 + 0.35 + 0.15 - 0.4} x 100%
= -20%

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Addition or Subtraction	121	121	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	009		X3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	010		X4 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	011	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	012	X2	Input	±320.00%	0.00	Yes	r	–	–	S	2
	013	X3	Input	±320.00%	0.00	Yes	r	–	–	S	2
	014	X4	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	015	K1	K1 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	016	K2	K2 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	017	K3	K3 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	018	K4	K4 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	019	A1	A1 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
Analog output	020	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
011	X1 Input	X1
012	X2 Input	X2
013	X3 Input	X3
014	X4 Input	X4
015	K1 gain	K1
016	K2 gain	K2
017	K3 gain	K3
018	K4 gain	K4
019	A1 bias	A1
020	Output	Y1

Block Model	Block Name	Block Address
<122>	Multiplication	100 to 500

Outline

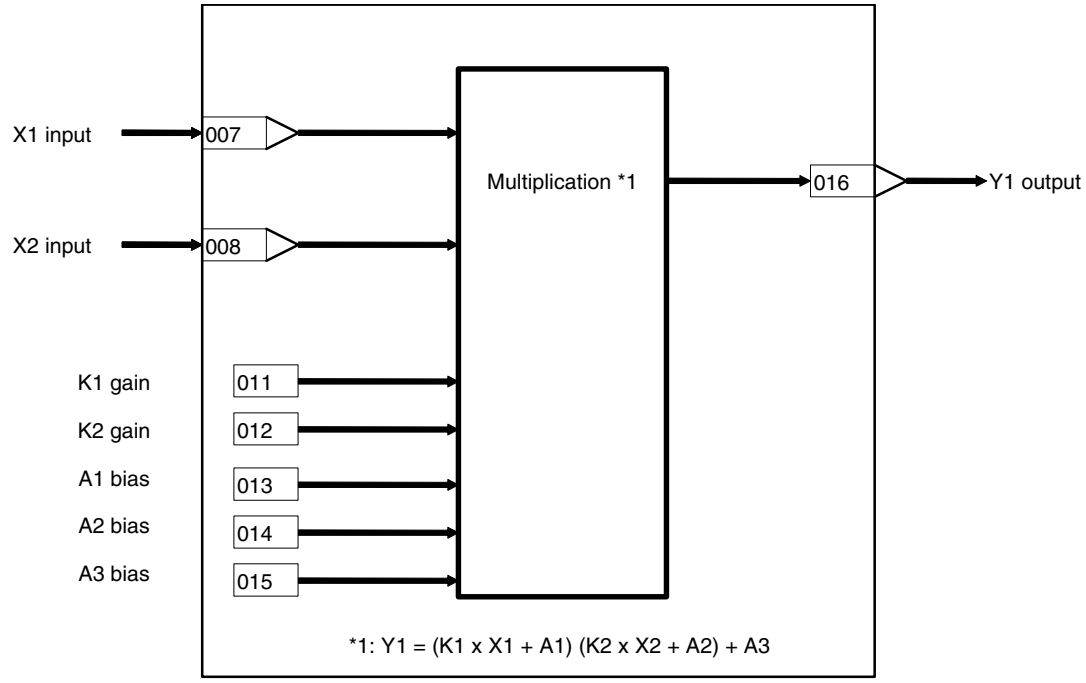
This function block performs multiplication with gain and bias on up to two analog signals.

Y1 = (K1 x X1 + A1) (K2 x X2 + A2) + A3

•Internal operation is executed at double precision (32 bits).

Note: Calculate 100% in the calculation formula as 1.0. When there is no X2 input, take A2 to be 100.00%.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Multiplication	122	122	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	009	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	010	X2	Input	±320.00%	0.00	Yes	r	–		S	2
Parameter	011	K1	K1 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	012	K2	K2 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	013	A1	A1 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	014	A2	A2 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	015	A3	A3 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
Analog output	016	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
009	X1 Input	X1
010	X2 Input	X2
011	K1 gain	K1
012	K2 gain	K2
013	A1 bias	A1
014	A2 bias	A2
015	A3 bias	A3
016	Output	Y1

Block Model	Block Name	Block Address
<123>	Division	100 to 500

Outline

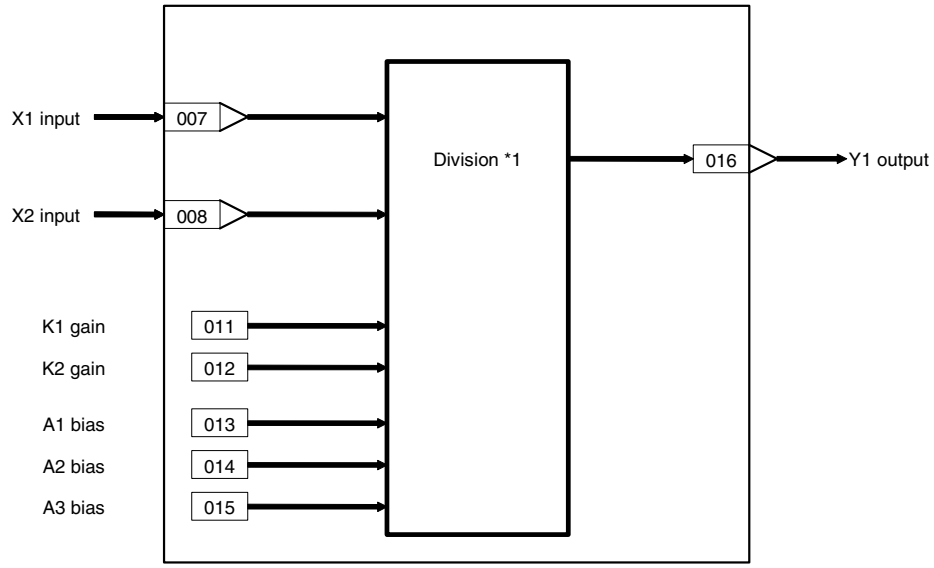
This function block performs division with gain and bias on up to two analog signals.

$$Y1 = \frac{K1 \times X1 + A1}{K2 \times X2 + A2} + A3$$

•Internal operation is executed at double precision (32 bits).

Note: Calculate 100% in the calculation formula as 1.0. When there is no X2 input, take A2 to be 100.00%.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Division	123	123	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	009	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	010	X2	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	011	K1	K1 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	012	K2	K2 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	013	A1	A1 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	014	A2	A2 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	015	A3	A3 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
Analog output	016	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
009	X1 Input	X1
010	X2 Input	X2
011	K1 gain	K1
012	K2 gain	K2
013	A1 bias	A1
014	A2 bias	A2
015	A3 bias	A3
016	Output	Y1

Block Model	Block Name	Block Address
<126>	Arithmetic Operation	001 to 100

Outline

This function performs various math operations using industrial units. Not only basic arithmetic, but also special math, such as trigonometric functions, exponent functions, and logarithmic operations, is possible.

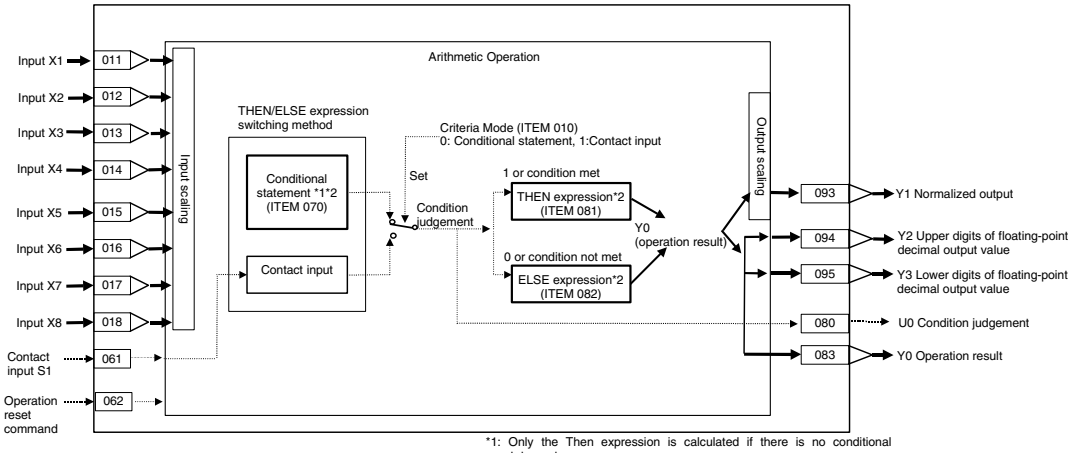
Note: The arithmetic functions blocks (Addition or Subtraction, Multiplication, and Division) operated on percentage units from 0% to 100%. The Arithmetic Operation block first scales input values X1 to X8 to real numbers and operates on industrial units.

The result of a conditional statement or the status of a contact input (S1) can be used to switch between two expressions (THEN/ELSE expressions) to calculate and output the operation results Y0.
It is also possible to set just one expression (the THEN expression) and use it unconditionally.

- Up to eight analog input values, X1 to X8, can be scaled to floating-point numbers and then used in the conditional statement or calculation expressions.
- The operators (arithmetic, trigonometric, etc.), floating-point values A1 to A8, and the B1 to B4 intermediate buffers can be used in the conditional statement or calculation expressions. The conditional statement and calculation expressions must each be 32 characters or less.
- A comparison operator (<, >, etc.) must be used in the conditional statement.
- The specified calculation results can also be stored in the B1 to B4 intermediate buffers.
- The source data for inputs X1 to X8 is automatically detected inside the Loop Controller as normalized data or floating point data. (If floating point data is detected, scaling is disabled.) This enables specification of floating point data as the source data.
  If floating point data is detected for inputs X1 to X8, X1 to X8 input values (ITEM 021 to ITEM 028) will always be 0.

Note: The operation result Y0 is output in both normalized form as Y1 for use in the Loop Controller (0.00% to 100.00% fixed decimal point data) and as floating-point data (Y2 and Y3).

Block diagram



*1: Only the Then expression is calculated if there is no conditional statement.
*2: Inputs X1 to X8, constants A1 to A8, intermediate buffers B1 to B4, and operators can be used. A comparison operator is required in the conditional statement.

Description

The criteria mode set in ITEM 010 is used to designate the method for switching between the THEN and ELSE expressions.

1) Criteria Mode Set to Conditional Statement

The THEN expression is used when the conditional statement is satisfied (i.e., the judgement is 1).
The ELSE expression is used when the conditional statement is not satisfied (i.e., the judgement is 0).
The conditional statement is an expression using a comparison operator. It must consist of 32 characters max.
The left side of the THEN expression must consist of 32 characters max. (i.e., not including the operation results Y0=).
The left side of the ELSE expression must consist of 32 characters max. (i.e., not including the operation results Y0=).

Note: The THEN expression will be used if there is no conditional statement or there is no comparison operator in the conditional expression.

2) Criteria Mode set to Contact Input S1

The THEN expression is used when contact input S1 is 1 (i.e., the judgement is 1).
The ELSE expression is used when contact input S1 is 0 (i.e., the judgement is 0).
The left side of the THEN expression must consist of 32 characters max. (i.e., not including the operation results Y0=).
The left side of the ELSE expression must consist of 32 characters max. (i.e., not including the operation results Y0=).

The comparison operators that can be used in the conditional statement are as follows:
=, >, <, <>, >=, <=

Note: Using Equals (=) in the Conditional Statement
Internal calculations are performed using signal precision floating-point decimal. Floating-point error will result from division for scaling, division, numeric functions, etc. The possibility of error must be considered when using the equals operator (=). A <= or >= operator should be used whenever the size relationship can be expressed in the conditional statement.

The operators that can be used in the conditional statement and calculation expressions are as follows:

Symbol	Operator
+	Addition
-	Subtraction
*	Multiplication

Symbol	Operator
EXP(x)	Exponent
LN(x)	Natural log
LOG(x)	Common log (log10)

/	Division
ABS(x)	Absolute value
ACOS(x)	Arccosine
ASIN(x)	Arcsine
ATAN(x)	Arctangent
COS(x)	Cosine
SIN(x)	Sine
TAN(x)	Tangent

P10(x)	Exponent of 10
SQRT(x)	Square root

Note: The analog input signals (X1 to X8), constants (A1 to A8), intermediate buffers (B1 to B4), and operation results (Y0) can be used for the argument (x).

Setting Examples

ITEM	Name	Data
010	Criteria mode	0 (conditional expression)
070	Conditional statement	(X1+X2+X3+X4+A5+A6+A7+A8)/A1>=A2
071	Intermediate buffer B1=	LN(X1)+EXP(X2)
072	Intermediate buffer B2=	B2+SQRT(Y0)
073	Intermediate buffer B3=	B2+X1*(-1.2345E-9)
074	Intermediate buffer B4=	SQRT(A8*(X1+X2)+A7)
081	THEN expression Y0=	X1+B3+B4
082	ELSE expression Y0=	X2+B3-B4

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command 0: Cancel stop, 1: Stop	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Arithmetic Operation	126	126	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Contact input	010		Criteria mode 0: Conditional statement (If ITEM 070 is blank, a THEN statement will be executed.) 1: Contact input (ITEM 061)	0, 1	0	–	R/W(S)	–	–	S/R	1
Analog input connection information	011		X1 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		X2 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		X3 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		X4 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		X5 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		X6 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		X7 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		X8 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	021	X1	X1 input value	±320.00%	0.00	Yes	r	–	–	S	2
	022	X2	X2 input value	±320.00%	0.00	Yes	r	–	–	S	2
	023	X3	X3 input value	±320.00%	0.00	Yes	r	–	–	S	2
	024	X4	X4 input value	±320.00%	0.00	Yes	r	–	–	S	2
Analog input	025	X5	X5 input value	±320.00%	0.00	Yes	r	–	–	S	2
	026	X6	X6 input value	±320.00%	0.00	Yes	r	–	–	S	2
	027	X7	X7 input value	±320.00%	0.00	Yes	r	–	–	S	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	028	X8	X8 input value	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	031		X1 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	032		X1 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	033		X2 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	034		X2 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	035		X3 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	036		X3 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
Parameter	037		X4 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	038		X4 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	039		X5 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	040		X5 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	041		X6 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	042		X6 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	043		X7 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	044		X7 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	045		X8 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	046		X8 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	051		A1 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	052		A2 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12
	053		A3 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12
	054		A4 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12
	055		A5 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12
	056		A6 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12
	057		A7 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12
	058		A8 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(O)	–	–	–	12
Contact input	061	S1	Contact input	0, 1		Yes	–	–	R/W	S/R	1
	062	S2	Operation reset command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	070		Conditional statement	32 characters max.		–	R/W(S)	–	–	–	34
	071		B1 intermediate buffer	32 characters max.		–	R/W(S)	–	–	–	34
	072		B2 intermediate buffer	32 characters max.		–	R/W(S)	–	–	–	34
	073		B3 intermediate buffer	32 characters max.		–	R/W(S)	–	–	–	34
	074		B4 intermediate buffer	32 characters max.		–	R/W(S)	–	–	–	34
Contact output	080	U0	Condition judgement 0: Criteria not met or contact input OFF, 1: Criteria met or contact input ON	0, 1		Yes	–	–	R	S	1
Parameter	081		THEN expression	32 characters max.		–	R/W(S)	–	–	–	34
	082		ELSE expression	32 characters max.		–	R/W(S)	–	–	–	34
Analog output	083	Y0	Operation result (result of THEN expression or result of ELSE expression) *1	Floating-point value		Yes	r	–	–	–	4
Parameter	091		Output reverse scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
	092		Output reverse scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 2 numeric digit	10 characters max.		–	R/W(S)	–	–	–	12
Analog output	093	Y1	Normalized output value (value after reverse scaling for Y0)	±320.00%	0.00	Yes	r	–	–	S	2
	094	Y2	Floating-point decimal output value (upper digits of Y0)	0 to 65535	0	Yes	r	–	–	S	2
	095	Y3	Floating-point decimal output value (lower digits of Y0)	0 to 65535	0	Yes	r	–	–	S	2

Note:

•The normalized output (Y1, ITEM 093) is the operation result (Y0, ITEM 083) scaled back to between 0% and 100% (fixed floating-point value) using the output reverse scaling upper and lower limits (ITEM 091 and ITEM 092). Y1 is rounded to two decimal places.

•The upper and lower digits of the floating-point decimal output value (Y2 and Y3, ITEM 094 and ITEM 095) use the IEEE754 format (bits 00 to 22: mantissa, bits 23 to 30: exponent, bit 31: sign). This enables outputting the results to I/O memory in the CPU Unit using an AO Terminal to CPU Unit Block for application in floating-point data conversion and math instructions in the CPU Unit ladder program. It also enables monitoring the data as floating-point decimal data on the CX-Programmer's I/O memory editing window.

•Turning ON the operation reset command (S2, ITEM 062) will clear the operation result (Y0), normalized output value (Y1), and the floating-point output value (Y2 and Y3) to zero before processing calculations. (From version 2.50 of the Loop Controller, the operation result Y0 will be 0 as long as the operation reset command S2 is 1 (ON).)
For example, this can be used to reset a total when inputting Y0 in accumulative calculations for the THEN or ELSE expression.

•Floating-point decimal data must be within the following ranges as well as within the range specified for each ITEM.
This applies to the scaling upper and lower limits for X1 to X8, constants A1 to A8, the conditional statement, intermediate buffers B1 to B4, the THEN expression, the ELSE expression, and the output reverse scaling upper and lower limits.
Range: -3.402823×10^{38} to $-1.401298 \times 10^{-45}$, $+1.401298 \times 10^{-45}$ to $+3.402823 \times 10^{38}$

•Floating-point decimal data can be given in any of the following formats (x = 0 to 9):
xxx, x.x, xxxxx.xxxxx, +x.xxxxEx, x.xxxxE+x, +x.xxxxExx, x.xxxxE+xx, x.xxxxE-x, x.xxxxE-xx, -x.xxxxE-x, -x.xxxxE-xx
In all of these formats, the mantissa is to the left of E and the exponent is to the right of E.
Example: +1.2345E7 would be 1.2345×10^{7}

•The order of calculations of the ITEMs is as follows:
B1, B2, B3, B4, conditional statement, THEN expression, ELSE expression.

•When the Loop Controller is cold-started, B1 to B4, the condition judgement (U0), and the operation result (Y0) are cleared to 0. If an intermediate buffer is used as the denominator in a division operation without placing a suitable value in the buffer, a division by 0 error (execution error 10) will occur.

*1: ITEM 083 cannot be connected to a user link table. It is used for connecting to the Xn input of an Arithmetic Operation block.

• When the source data for input Xn is the Loop Controller's internal data (0.00% to 100.00%: fixed decimal point), always set the Xn scaling value (ITEM 031 to 046) to lower limit 0.00 and upper limit 100.00.
If the Xn scaling value is blank, operations will be performed using the lower limit 0 and upper limit 10,000. Therefore, if the Xn scaling value is left blank, Xn = 30.00% will be arithmetically converted to 3,000.0. If the source data for input Xn is a cumulative value or other integer, however, and using the lower limit 0 and upper limit 10,000 are not a problem, the Xn scaling value can be left blank. For example, Xn = 3,000 will be treated arithmetically as 3,000.

•Execution Errors
If an execution error occurs, execution of the Arithmetic Operation block will be stopped. If this occurs, check all operators, arguments, and the operation result and correct the conditional statement or calculation expressions as necessary. The execution errors that can occur for this block are described below.
Execution error 3 will occur if constants A1 to A8 or the intermediate buffers (B1 to B4) are used in the conditional statement or calculation expressions but not defined. (Definition is not required for ITEMs that are not used.)

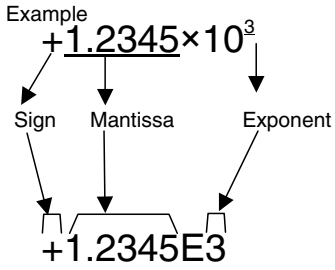
•Execution error 19 (unsuitable operation) will occur if there is a syntax error in the conditional statement or a calculation expression or if the THEN expression, ELSE expression, or output reverse scaling upper/lower limits are not defined.
The execution errors that can occur for this operators are listed in the following table.

Symbol	Operator	Execution error
+	Addition	None
-	Subtraction	None
*	Multiplication	None

Symbol	Operator	Execution error
/	Division	Execution error 10 (division by 0) will occur if an attempt is made to divide by 0.
ABS(x)	Absolute value	Execution error 11 (operation exceeded) will occur if x is negative and the result exceeded the range of numbers for single-precision floating-point.
ACOS(x)	Arccosine	Execution error 12 (augment beyond definition) will occur if the aurgment is not between -1.0 and 1.0.
ASIN(x)	Arcsine	Execution error 12 (augment beyond definition) will occur if the aurgment is not between -1.0 and 1.0.
ATAN(x)	Arctangent	None
COS(x)	Cosine	None
SIN(x)	Sine	None
TAN(x)	Tangent	None
EXP(x)	Exponent	Execution error 11 (operation exceeded) will occur the result exceeded the range of numbers for single-precision floating-point.
LN(x)	Natural log	Execution error 11 (operation exceeded) will occur if x is 0.0. Execution error 12 (augment beyond definition) will occur if x is negative.
LOG(x)	Common log (log10)	Execution error 11 (operation exceeded) will occur if x is 0.0. Execution error 12 (augment beyond definition) will occur if x is negative.
P10(x)	Exponent of 10	None
SQRT(x)	Square root	Execution error 12 (augment beyond definition) will occur if x is negative.

Representation of Floating-point Data (for Reference)

Simply stated, floating-point data are numbers expressed in exponential form.
A real number can be expressed by the sign, the mantissa, and the exponent, as shown below. (The mantissa contains the digit values in order and the exponent indicates the decimal point position.)



Mantissa: The mantissa is the effective numeric value, which has been normalized so that the integer portion is one digit. (The data is called “floating-point” data because the decimal point moves.)

Conditions of Floating-point Data in Function Blocks

- The exponential base is base 10.
- The mantissa can be up to 5 digits long.
- The exponent can be up to 2 digits long.

Examples of Scaled Values

Format (Mantissa left of E, Exponent right of E)	Scaled value		
	Example 1	Example 2	Example 3
	500.00 (after normalization) $\rightarrow 5.0000\times10^{2}$	-2000.0 (after normalization) $\rightarrow -2.0000\times10^{3}$	-0.0300 (after normalization) $\rightarrow -3.00\times10^{-2}$
	These numbers can be expressed in the following formats.		
xxx x.x xxxxx.xxxxx	500.00	-2000.0	-0.0300
+x.xxxxEx -x.xxxxEx	+5.0000E2	-2.000E3	Cannot be expressed.
x.xxxxE+x	5.0000E+2	Cannot be expressed.	
+x.xxxxExx -x.xxxxExx	+5.0000E02	-2.000E03	
x.xxxxE+xx	5.0000E+02	Cannot be expressed.	
x.xxxxE-x	Cannot be expressed.	Cannot be expressed.	
x.xxxxE-xx			
-x.xxxxE-x			-3.00E-2
-x.xxxxE-xx			-3.00E-02

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (Fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
010	Criteria mode	S0
021	Input	X1
022	Input	X2
023	Input	X3
024	Input	X4
025	Input	X5
026	Input	X6
027	Input	X7
028	Input	X8
061	Contact input	S1
062	Operation reset command	S2
080	Judgement	U0
093	Normalized output value	Y1
094	Floating-point decimal output value (upper digits of Y0)	Y2
095	Floating-point decimal output value (lower digits of Y0)	Y3

Block Model	Block Name	Block Address
<127>	Range Conversion	001 to 500

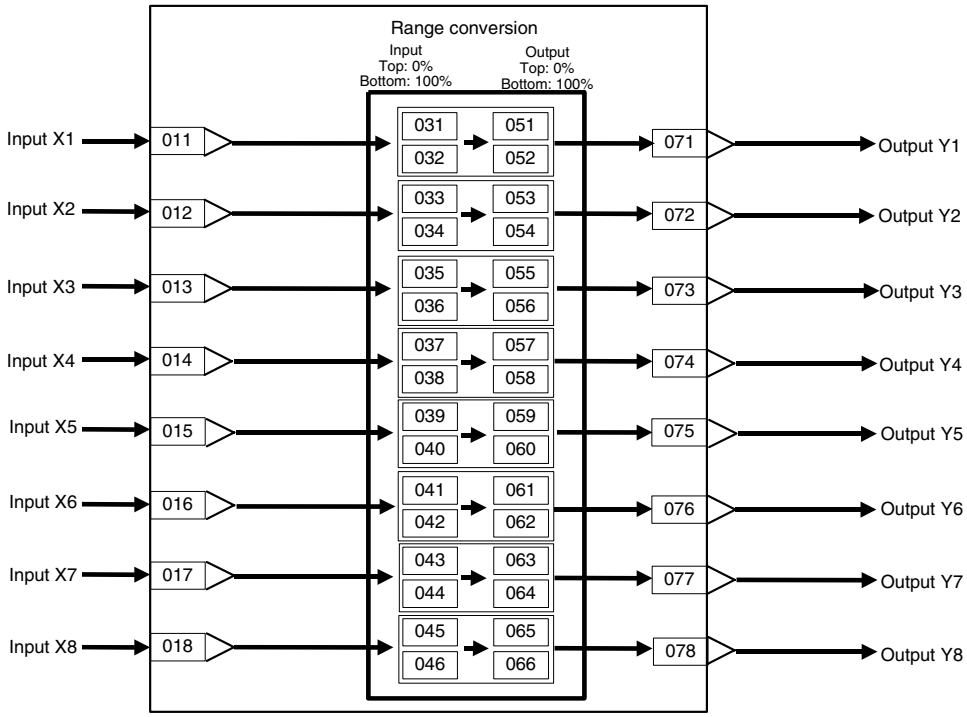
Outline

This function block converts ranges for analog signals simply by setting the values for 0% and 100% inputs and 0% and 100% outputs. Range conversions are possible for up to eight analog inputs.

Applications

Used between function blocks. Using a range conversion eliminates the need to calculate coefficients and biases.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Range Conversion	127	127	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	011		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		X3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		X4 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		X5 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		X6 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		X7 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		X8 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog inputs	021	X1	Input value	±320.00%	0.00	Yes	r	–	–	S	2
	022	X2	Input value	±320.00%	0.00	Yes	r	–	–	S	2
	023	X3	Input value	±320.00%	0.00	Yes	r	–	–	S	2
	024	X4	Input value	±320.00%	0.00	Yes	r	–	–	S	2
	025	X5	Input value	±320.00%	0.00	Yes	r	–	–	S	2
	026	X6	Input value	±320.00%	0.00	Yes	r	–	–	S	2
	027	X7	Input value	±320.00%	0.00	Yes	r	–	–	S	2
	028	X8	Input value	±320.00%	0.00	Yes	r	–	–	S	2
Parameters	031		Input range 0% (Input value X1)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	032		Input range 100% (Input value X1)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	033		Input range 0% (Input value X2)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	034		Input range 100% (Input value X2)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	035		Input range 0% (Input value X3)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	036		Input range 100% (Input value X3)	±320.00%	100.00	–	R/W(S)	–	–	–	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameters (continued)	037		Input range 0% (Input value X4)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	038		Input range 100% (Input value X4)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	039		Input range 0% (Input value X5)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	040		Input range 100% (Input value X5)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	041		Input range 0% (Input value X6)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	042		Input range 100% (Input value X6)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	043		Input range 0% (Input value X7)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	044		Input range 100% (Input value X7)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	045		Input range 0% (Input value X8)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	046		Input range 100% (Input value X8)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	051		Output range 0% (Output valueY1)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	052		Output range 100% (Output value Y1)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	053		Output range 0% (Output value Y2)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	054		Output range 100% (Output value Y2)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	055		Output range 0% (Output value Y3)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	056		Output range 100% (Output value Y3)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	057		Output range 0% (Output value Y4)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	058		Output range 100% (Output value Y4)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	059		Output range 0% (Output value Y5)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	060		Output range 100% (Output value Y5)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	061		Output range 0% (Output value Y6)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	062		Output range 100% (Output value Y6)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	063		Output range 0% (Output value Y7)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	064		Output range 100% (Output value Y7)	±320.00%	100.00	–	R/W(S)	–	–	–	2
	065		Output range 0% (Output value Y8)	±320.00%	0.00	–	R/W(S)	–	–	–	2
	066		Output range 100% (Output value Y8)	±320.00%	100.00	–	R/W(S)	–	–	–	2
Analog outputs	071	Y1	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2
	072	Y2	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2
	073	Y3	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2
	074	Y4	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2
	075	Y5	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2
	076	Y6	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2
	077	Y7	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2
	078	Y8	Output value	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on CX-Process Monitor or SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block execution command	MT_ST
003	Execution error display	ERR
021	Input value	X1
022	Input value	X2
023	Input value	X3
024	Input value	X4
025	Input value	X5
026	Input value	X6
027	Input value	X7
028	Input value	X8
071	Output value	Y1
072	Output value	Y2
073	Output value	Y3
074	Output value	Y4
075	Output value	Y5
076	Output value	Y6
077	Output value	Y7
078	Output value	Y8

Block Model	Block Name	Block Address
<131>	Square Root	001 to 500

Outline

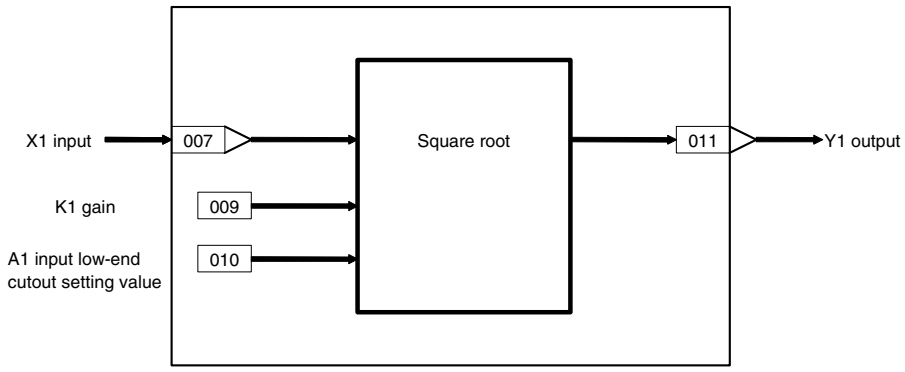
This function block performs square root extraction (with low-end cutout) on single analog signals.

$Y1=K1\sqrt{X1}$

Y1 = K1 x X1 when X1 is at the input low-end cutout setting or a minus value.
•Provided with input dropout function
•Method of use: To extract the square root signal from a differential pressure flowmeter, set K1 to equal 1. To change the span, change the value of K1.

Note: Calculate 100% in the calculation formula as 1.0.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Square Root	131	131	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	K1	Gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	010	A1	Input low-end cutout setting	0 to 320.00%	0.00	–	R/W(O)	W	–	S/R	2
Analog output	011	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	X1 Input	X1
009	Gain	K1
010	Input low-end cutout setting	A1
011	Output	Y1

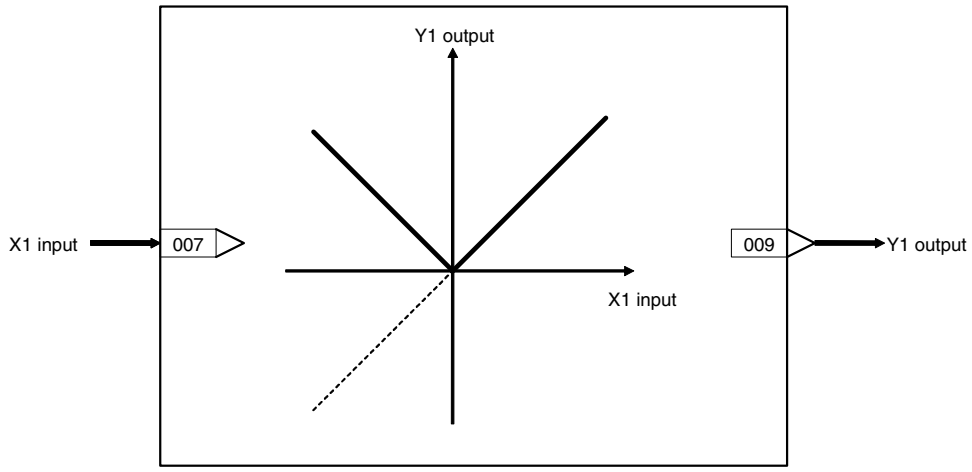
Block Model	Block Name	Block Address
<132>	Absolute Value	001 to 500

Outline

This function block outputs the absolute value of single analog signals.

Y1 = |X1|

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Absolute Value	132	132	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Analog output	009	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	X1 input	X1
009	Output	Y1

Block Model	Block Name	Block Address
<133>	Non-linear Gain (Dead Band)	001 to 500

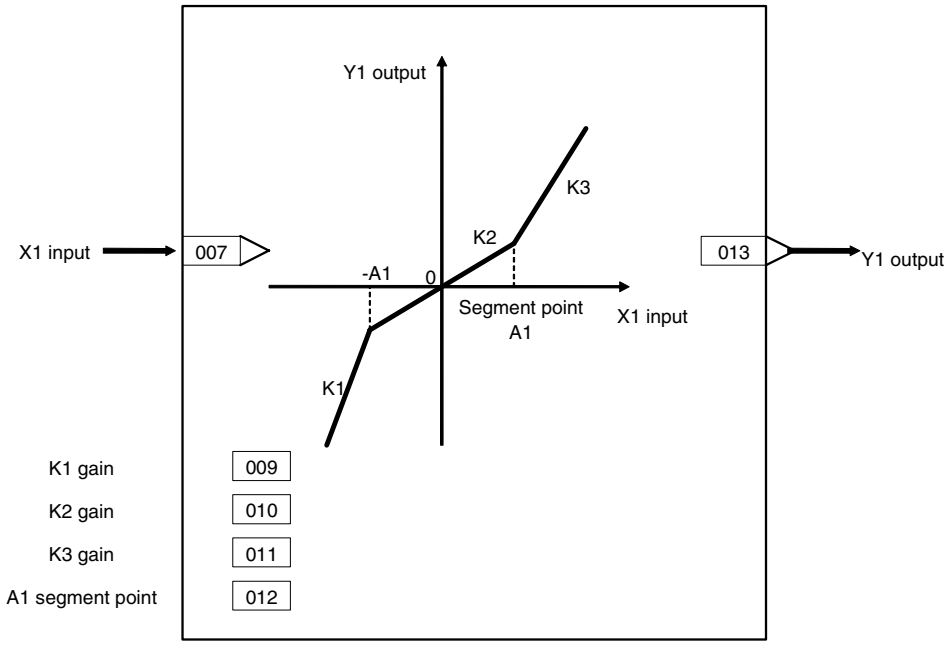
Outline

This function block performs non-linear (three gain values K1, K2, K3) operation on single analog signals. Analog signals can also be set as a dead band (with differential gap) by setting K2 to equal 0.

Function block applications

Non-linear control.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0		–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name		R/W(S)	–	–	–	24
	002		Model name: Non-linear Gain (Dead Band)	133	133		R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000		r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0		R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000		R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00		r	–	–	S	2
Parameter	009	K1	K1 gain	±10.000	1.000		R/W(O)	W	–	S/R	2
	010	K2	K2 gain	±10.000	1.000		R/W(O)	W	–	S/R	2
	011	K3	K3 gain	±10.000	1.000		R/W(O)	W	–	S/R	2
	012	A1	Segment point	0 to 320.00%	0.00		R/W(O)	W	–	S/R	2
Analog output	013	Y1	Output	±320.00%	0.00		r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

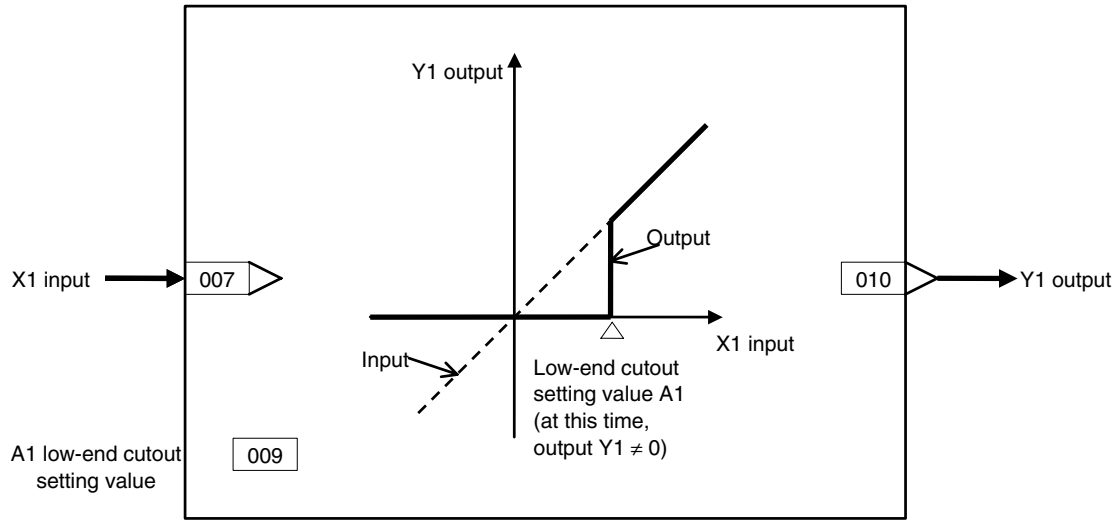
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	X1 input	X1
009	K1 gain	K1
010	K2 gain	K2
011	K3 gain	K3
012	Segment point	A1
013	Output	Y1

Block Model	Block Name	Block Address
<134>	Low-end Cutout	001 to 500

Outline

This function block sets output to zero close to the zero point of single analog signals.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Low-end Cutout	134	134	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	R	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	A1	Low-end cutout setting	0 to 320.00%	0.00	–	R/W(O)	W	–	S/R	2
Analog output	010	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	X1 input	X1
009	Low-end cutout setting	A1
010	Output	Y1

Block Model	Block Name	Block Address
<135>	Segment Linearizer	100 to 500

Outline

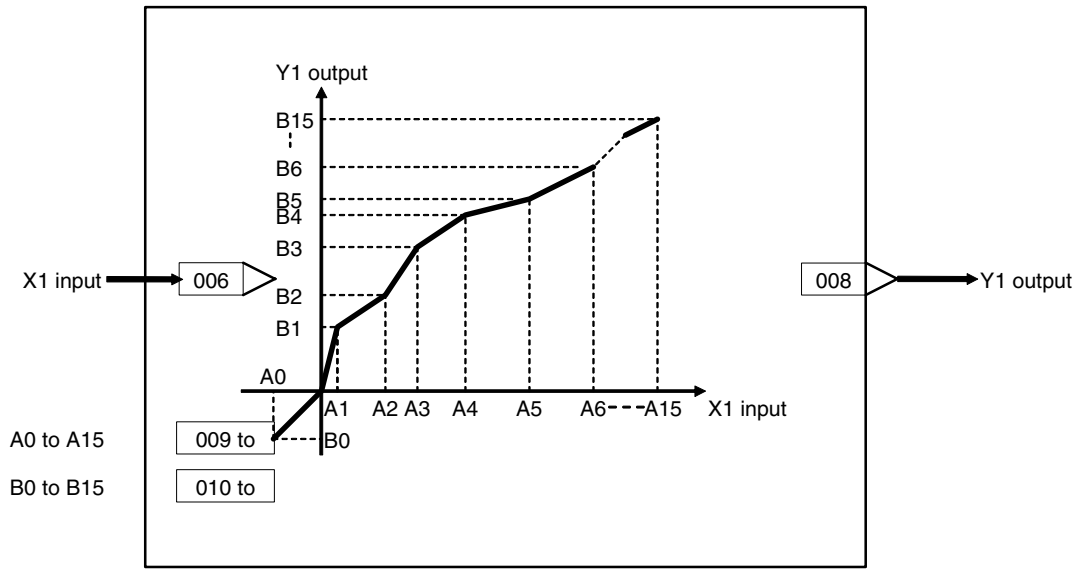
This function block converts single analog signals to 15 segments before the signal is output.

- 15 segments (16 segment points) are possible.
- When the input signal value is out of the setting range, Y1 output becomes the value of B0 or final Bn, and can be used jointly with the high/low limit function.
- Set so that the following input condition is satisfied:
  A1<A2<A3< ... <An
  For example, if input is set as follows:
  A1<A2<A3>A4 ... > An
  Then, input A4 onwards up to An becomes a fixed output value.
- Set the block so that An – An-1 is 320.00 (%) or less. An error will occur and an execution cellar (error code 71) will occur when the range is entered if this limit is exceeded.

Function block applications

- Control of control targets having non-linear static characteristics (e.g. variable gain control)
- Compensation of control targets having non-linear characteristics

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Segment Linearizer	135	135	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	006		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Analog output	008	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2
Parameter	009	A0	A0 input	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	010	B0	B0	±320.00%	0.00	–	R/W(O)	W	–	–	2
	011	A1	A1 input	±320.00%	-280.00	–	R/W(O)	W	–	–	2
	012	B1	B1 output	±320.00%	80.00	–	R/W(O)	W	–	–	2
	013	A2	A2 input	±320.00%	-240.00	–	R/W(O)	W	–	–	2
	014	B2	B2 output	±320.00%	0.00	–	R/W(O)	W	–	–	2
	015	A3	A3 input	±320.00%	-200.00	–	R/W(O)	W	–	–	2
	016	B3	B3 output	±320.00%	80.00	–	R/W(O)	W	–	–	2
	017	A4	A4 input	±320.00%	-160.00	–	R/W(O)	W	–	–	2
	018	B4	B4 output	±320.00%	0.00	–	R/W(O)	W	–	–	2
	019	A5	A5 input	±320.00%	-120.00	–	R/W(O)	W	–	–	2
	020	B5	B5 output	±320.00%	80.00	–	R/W(O)	W	–	–	2
	021	A6	A6 input	±320.00%	-80.00	–	R/W(O)	W	–	–	2
	022	B6	B6 output	±320.00%	0.00	–	R/W(O)	W	–	–	2
	023	A7	A7 input	±320.00%	-40.00	–	R/W(O)	W	–	–	2
	024	B7	B7 output	±320.00%	80.00	–	R/W(O)	W	–	–	2
	025	A8	A8 input	±320.00%	40.00	–	R/W(O)	W	–	–	2
	026	B8	B8 output	±320.00%	0.00	–	R/W(O)	W	–	–	2
	027	A9	A9 input	±320.00%	80.00	–	R/W(O)	W	–	–	2
	028	B9	B9 output	±320.00%	80.00	–	R/W(O)	W	–	–	2
	029	A10	A10 input	±320.00%	120.00	–	R/W(O)	W	–	–	2
	030	B10	B10 output	±320.00%	0.00	–	R/W(O)	W	–	–	2
	031	A11	A11 input	±320.00%	160.00	–	R/W(O)	W	–	–	2
	032	B11	B11 output	±320.00%	80.00	–	R/W(O)	W	–	–	2
	033	A12	A12 input	±320.00%	200.00	–	R/W(O)	W	–	–	2
	034	B12	B12 output	±320.00%	0.00	–	R/W(O)	W	–	–	2
	035	A13	A13 input	±320.00%	240.00	–	R/W(O)	W	–	–	2
	036	B13	B13 output	±320.00%	80.00	–	R/W(O)	W	–	–	2
	037	A14	A14 input	±320.00%	280.00	–	R/W(O)	W	–	–	2
	038	B14	B14 output	±320.00%	0.00	–	R/W(O)	W	–	–	2
	039	A15	A15 input	±320.00%	320.00	–	R/W(O)	W	–	–	2
	040	B15	B15 output	±320.00%	80.00	–	R/W(O)	W	–	–	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	X1 input	X1
008	Output	Y1

Block Model	Block Name	Block Address
<136>	Temperature and Pressure Correction	001 to 500

Outline

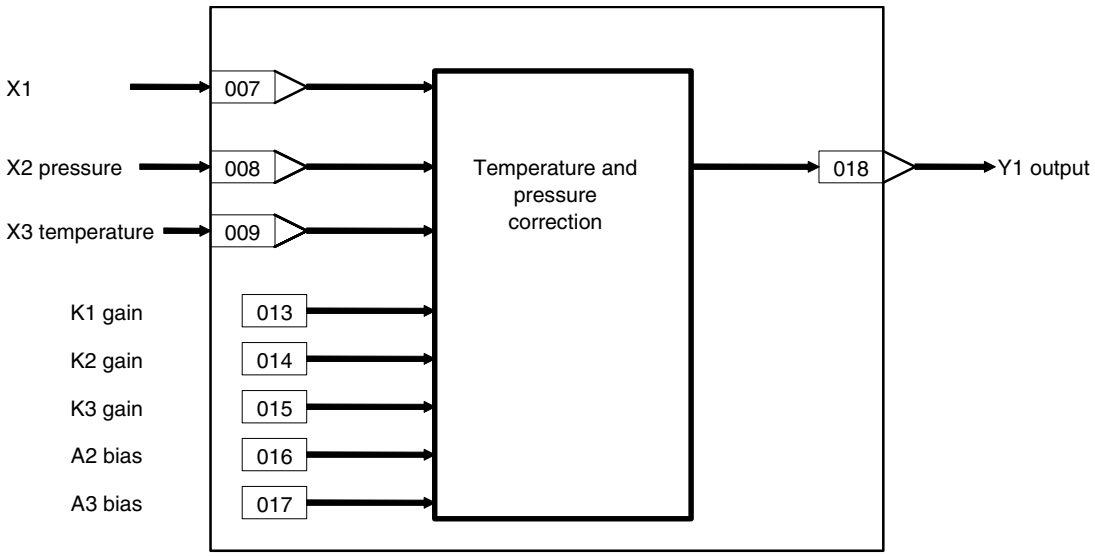
This function block corrects for the influence of temperature and pressure differences in measuring a gaseous flow by a differential pressure flowmeter.

$$Y1 = K1 \times X1 \sqrt{\frac{K2 \times X2 + A2}{K3 \times X3 + A3}}$$

- Internal operation is executed at double precision (32 bits).
- Temperature or pressure can also be corrected individually.
- X1 flow signal must be converted to a linear signal by extracting the square root before input.

Note: Calculate 100% in the calculation formula as 1.0. Output becomes 0 when the result in the root becomes a minus number.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Temperature and Pressure Correction	136	136	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	009		X3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	010	X1	Flow input	±320.00%	0.00	Yes	r	–	–	S	2
	011	X2	Pressure input	±320.00%	0.00	Yes	r	–	–	S	2
	012	X3	Temperature input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	013	K1	K1 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	014	K2	K2 gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	015	K3	K3 gain	±10.000	1.000	–	R/W(O)	W		S/R	2
	016	A2	A2 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	017	A3	A3 bias	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
Analog output	018	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

Explanation of the Equation

• General Expression

When a gas flows under pressure and temperature conditions different from the design specifications, the following compensation must be made in order to measure the gas' true flow rate.

$$\text{Adjusted flow rate} = \sqrt{\frac{\text{Design density}}{\text{Actual density}}} \times \sqrt{\frac{\text{Actual pressure} \times \text{Design temp.}}{\text{Design pressure} \times \text{Actual temp.}}} \times \text{Measured flow rate}$$

• Function Block's Equation

The function block's equation is the compensation equation (shown above) converted to the following format.

$$\text{Adjusted flow rate Y1} = K1 \times \sqrt{\frac{K2 \times \text{Actual pressure X2} + A2}{K3 \times \text{Actual temp. X3} + A3}} \times \text{Measured flow rate X1}$$

$$K1 = \sqrt{\frac{\text{Design temp.}}{\text{Actual density}}} \qquad K2 = \frac{\text{Pressure range span}}{\text{Design pressure (absolute)}} \qquad A2 = \frac{\text{Pressure range min. (absolute)}}{\text{Design pressure (absolute)}}$$

$$K3 = \frac{\text{Temp. range span}}{\text{Design temp. (absolute)}} \qquad A3 = \frac{\text{Temp. range min. (absolute)}}{\text{Design temp. (absolute)}}$$

Note: The measured flow rate X1, Actual pressure X2, and actual temperature X3 are calculated as normalized data in the equation.

Example:

Design density = Actual density = 1.2928 kg/Nm^3

Pressure range = -50 to 500 kPa → Pressure range span = 550 kPa (abs)

→ Pressure range min. (absolute) = -50+101.3 = 51.3 kPa (abs)

Design pressure = 400 kPa → Design pressure (absolute) = 400+101.3 = 501.3 kPa (abs)

Temperature range = -50 to 250°C → Pressure range span = 300°C (K)

→ Temp. range min. (absolute) = -50+273.2 = 223.2 K

Design temperature = 200°C → Design temp. (absolute) = 200+273.2 = 473.2 K

$$K1 = \sqrt{\frac{1.2928\text{kg/Nm}^3}{1.2928\text{kg/Nm}^3}} = 1 \qquad K2 = \frac{550\text{kPa (abs)}}{501.3\text{kPa (abs)}} = 1.097 \qquad A2 = \frac{51.3\text{kPa (abs)}}{501.3\text{kPa (abs)}} = 0.102$$

$$K3 = \frac{300\text{K}}{473.2\text{K}} = 0.634 \qquad A3 = \frac{223.2\text{K}}{473.2.\text{K}} = 0.471$$

Consequently, the compensation equation is as follows:

$$\text{Adjusted flow rate Y1} = 1 \times \sqrt{\frac{1.097 \times \text{Actual pressure X2} + 0.102}{0.634 \times \text{Actual temp. X3} + 0.471}} \times \text{Measured flow rate X1}$$

For an actual pressure X2 of 30% (0.3) and actual pressure X3 of 40% (0.4):

$$\text{Adjusted flow rate Y1} = 1 \times \sqrt{\frac{1.097 \times 0.3 + 0.102}{0.634 \times 0.4 + 0.471}} \times \text{Measured flow rate X1}$$

Adjusted flow rate Y1 = 0.77 × Measured flow rate X1

For a measured flow rate X1 of 0.5, the adjusted flow rate Y1 = 0.386.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
010	X1 flow input	X1
011	X2 pressure input	X2
012	X3 temperature input	X3
013	K1 gain	K1
014	K2 gain	K2
015	K3 gain	K3
016	A2 bias	A2
017	A3 bias	A3
018	Output	Y1

Block Model	Block Name	Block Address
<141>	First-order Lag	001 to 500

Outline

This function block performs first-order lag operation on single analog signals that is required for reducing pulsation in the input signal.
•When S1 reset switch is set to 1 (ON), the output equals input.

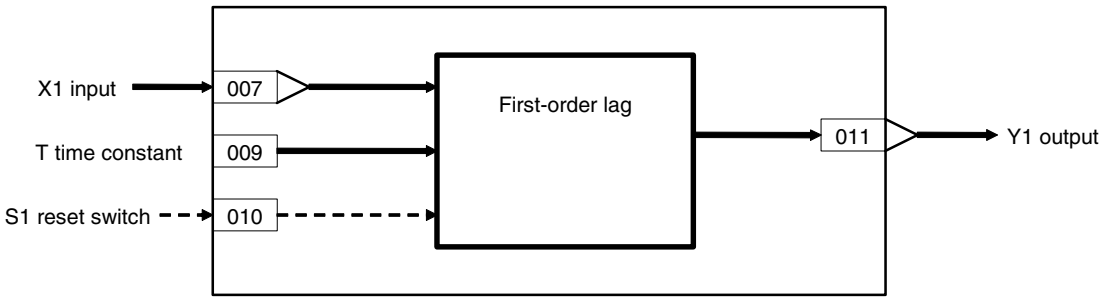
$$Y1(s) = \frac{X1(s)}{1 + T \cdot s}$$

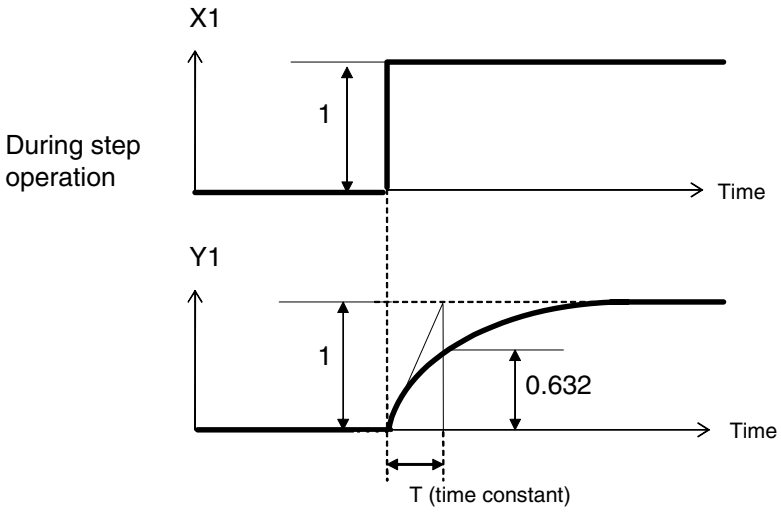
Note: Calculate 100% in the calculation formula as 1.0.
Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Filtering of PV input (elimination of noise or pulsation)

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: First-order Lag	141	141	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	T	Time constant (0: No delay)	0 to 999.9s	0.0	–	R/W(O)	W	–	S/R	2
Contact input	010	S1	Reset switch (1: Y1=X1)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	011	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Time constant	T
010	Reset switch	S1
011	Output	Y1

Block Model	Block Name	Block Address
<143>	Rate-of-change Limit	001 to 500

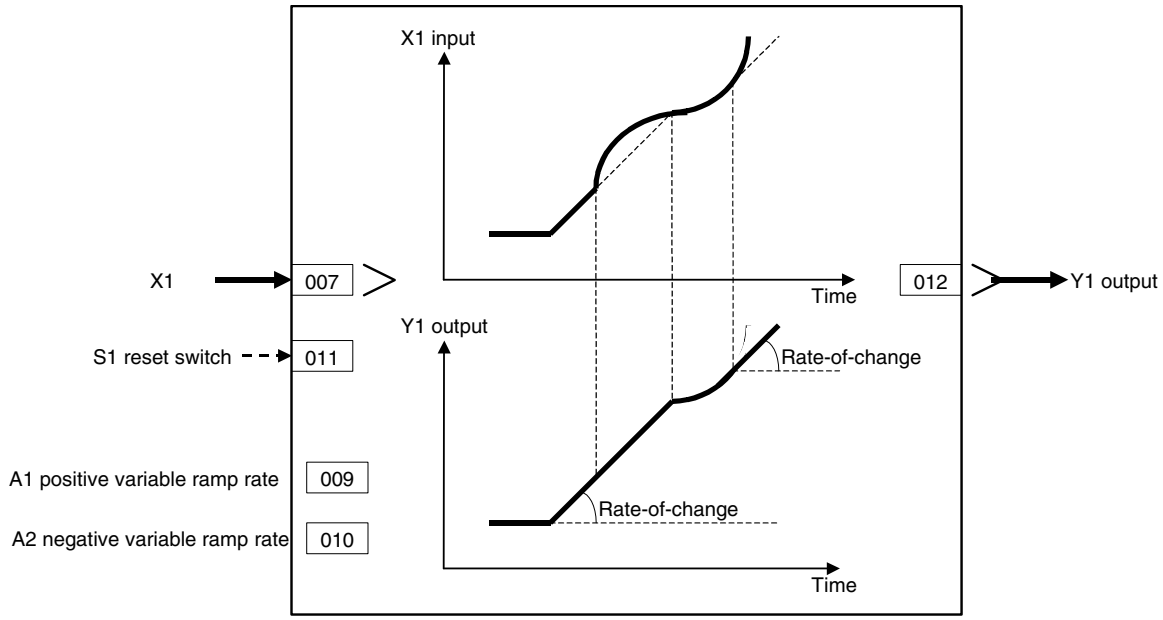
Outline

This function block performs rate-of-change limiting on single analog signals to reduce pulsation in the input signal.

When S1 reset switch is set to 1 (ON), the output equals input.
The time unit for the rate-of-change setting can be set to seconds, minutes, or hours.

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Rate-of-change Limit	143	143	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	A1	Positive ramp rate Note: Time unit set in ITEM 013. (Rate-of-change limit OFF when 0.00)	0.00 to 320.00%/time unit	320.00	–	R/W(O)	W	–	S/R	2
	010	A2	Negative ramp rate Note: Time unit set in ITEM 013. (Rate-of-change limit OFF when 0.00)	0.00 to 320.00%/time unit	320. 00	–	R/W(O)	W	–	S/R	2
Contact input/ parameter	011	S1	Reset Switch (1: Y1=X1)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	012	Y1	Output	±320.00%	0.00	Yes	–	–	–	S	2
Parameter	013	TMU	Time unit 0: sec, 1: min, 2: hr	0 to 2	0	–	R/W (S)	–	–	S/R	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Positive ramp rate	A1
010	Negative ramp rate	A2
011	Reset Switch	S1
012	Output	Y1
013	Time unit	TMU

Block Model	Block Name	Block Address
<145>	Moving Average	001 to 500

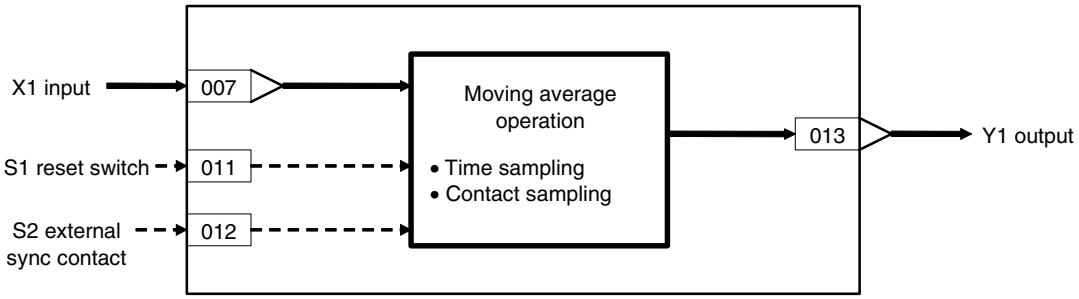
Outline

This function block performs moving average operation on single analog signals.

•There are two data sampling modes: sampling at fixed time intervals, and sampling of individual data items each time that an external contact turns ON. Selective use of these modes allows you to easily execute moving average operation on signals outputs from a batch type analyzer, for example.

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram



Supplementary note

By the moving average operation, the average value of n number of samples is taken and output with the oldest item of data discarded when a new item of data is added.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Moving Average	145	145	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	1 to 4 6 to 8	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
	006	M	Sampling mode 0: Time, 1: Sync with external contact S2	0, 1	0	–	R/W(S)	–	–	–	1
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	H	Sampling cycle 0: Sample on operation cycle, 1 to 9999: Sample every 1 to 9999 s Note: This setting is ignored if the sampling mode is set to 1 (sync with external contact S2)	0, 1 to 9999s	0	–	R/W(S)	W	–	S/R	2
	010	N	Number of samples	1 to 20	16	–	W(S)	–	–	S/R	1
Contact input	011	S1	Reset switch (1: Y1=X1)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	012	S2	External sync contact (DIFU/DIFD commands used)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	013	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Sampling cycle	H
010	Number of samples	N
011	Reset switch	S1
012	External sync contact	S2
013	Output	Y1

Block Model	Block Name	Block Address
<147>	Lead/Delay	001 to 500

Outline

This function block performs lead/delay operation of control signals on single analog signals.

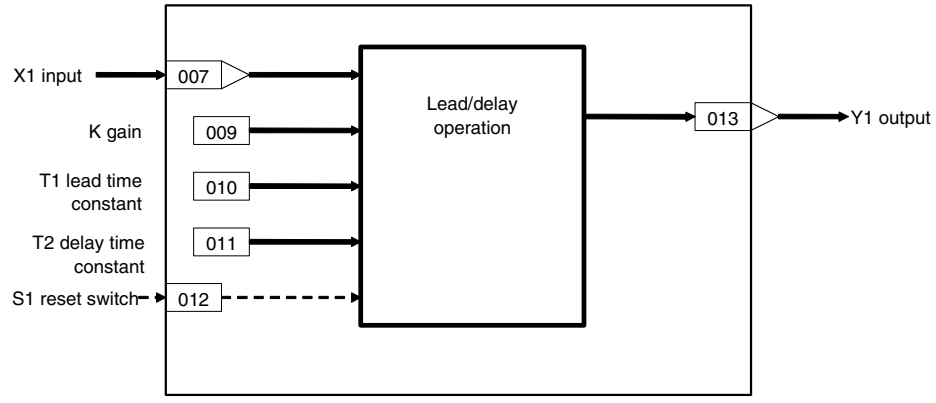
$$Y1(s) = K\frac{1 + T1 \cdot s}{1 + T2 \cdot s} \times 1(s)$$

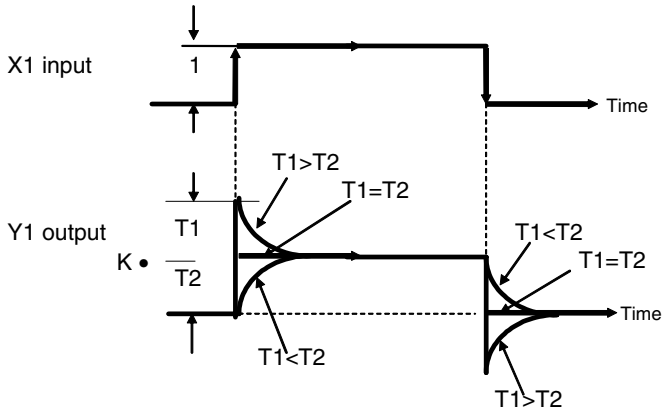
Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Feedforward control, non-interacting control (e.g. used when counteracting the influence of disturbance)

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Lead/Delay	147	147	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7:0.02 *1, 8:0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	K	Gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	0010	T1	Time constant (0: No Lead)	0 to 999.9s	1.0	–	R/W(O)	W	–	S/R	2
	0011	T2	Time constant (0: No delay)	0 to 999.9s	10.0	–	R/W(O)	W	–	S/R	2
Contact input	012	S1	Reset switch (1:Y1=X1)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	013	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Gain	K
010	Time constant (No Lead)	T1
011	Time constant (No delay)	T2
012	Reset switch	S1
013	Output	Y1

Block Model	Block Name	Block Address
<148>	Dead Time	001 to 500

Outline

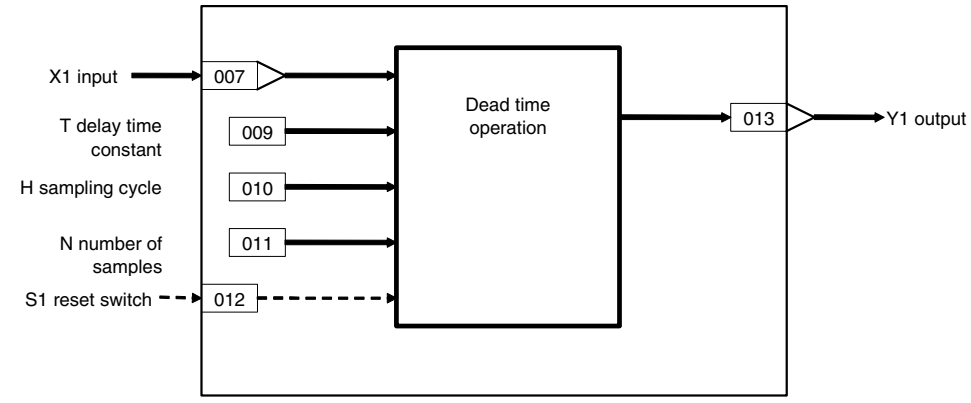
This function block performs dead time and first-order lag operations on single analog signals.

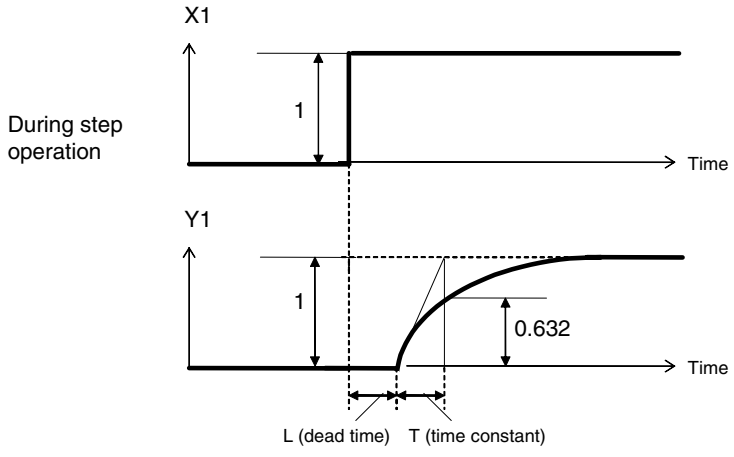
$$Y1(s) = \frac{e^{-Ls}}{1 + T \cdot s} X1(s)$$

- New data is sampled at each sampling cycle H (seconds) for number of samples (N) on the data to be held. The data previous to dead time L seconds (= H x N seconds) is output as the output signal. In other words, the output is delayed by L seconds after the input.
- When the lag time constant is set, the first-order lag operation is performed after time L (dead time) has elapsed.

Note: •The sampling cycle (ITEM 010) takes priority over operation cycle (ITEM 004).
•When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Dead Time	148	148	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	T	Time constant (0: No delay)	0 to 999.9s	0.0	–	R/W(O)	W	–	S/R	2
	010	H	Sampling cycle (0: Operation cycle)	0 to 9999s	0	–	R/W(S)	W	–	S/R	2
	011	N	Number of samples (0: No dead time)	0 to 20	20	–	R/W(S)	–	–	S/R	1
Contact input	012	S1	Reset switch (1:Y1=X1)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	013	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Time constant (0: No delay)	T
010	Sampling cycle	H
011	Number of samples	N
012	Reset switch	S1
013	Output	Y1

Block Model	Block Name	Block Address
<149>	Dead Time Compensation	001 to 500

Outline

This function block performs PID control using the Smith predictor.

$$Y1(s) = K\frac{1 - e^{-Ls}}{1 + T \cdot S}X1(s)$$

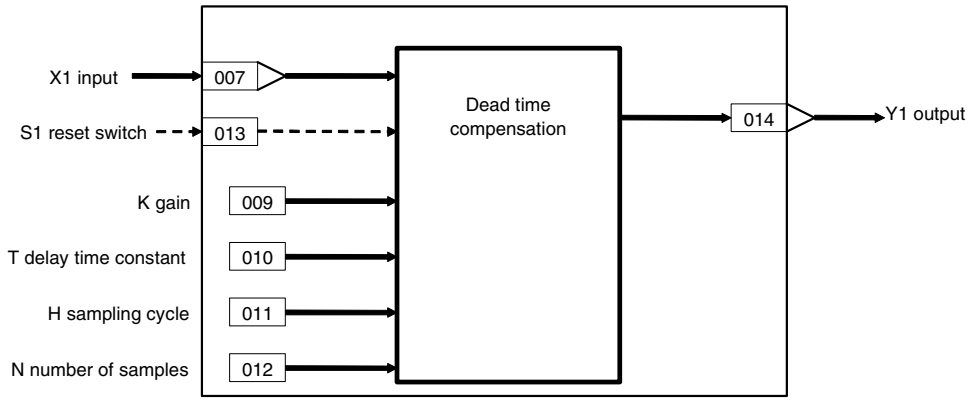
- This function block is applied to processes with long dead time and processes whose dead time does not change much.
- Set dead time (L) and time constant (T) to the same values as the dead time and time constant of the process (control target).

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Control using the Smith predictor

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Dead Time Compensation	149	149	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	K	Gain	±10.000	1.000	–	R/W(O)	W	–	S/R	2
	010	T	Time constant (0: No delay)	0 to 999.9s	0.0	–	R/W(O)	W	–	S/R	2
	011	H	Sampling cycle (0: Operation cycle)	0 to 9999s	0	–	R/W(S)	W	–	S/R	2
	012	N	Number of samples (0: No dead time)	0 to 20	20	–	R/W(S)	W	–	S/R	1
Contact input	013	S1	Reset switch (1:Y1=X1)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	014	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Gain	K
010	Time constant	T
011	Sampling cycle	H
012	Number of samples	N
013	Reset switch	S1
014	Output	Y1

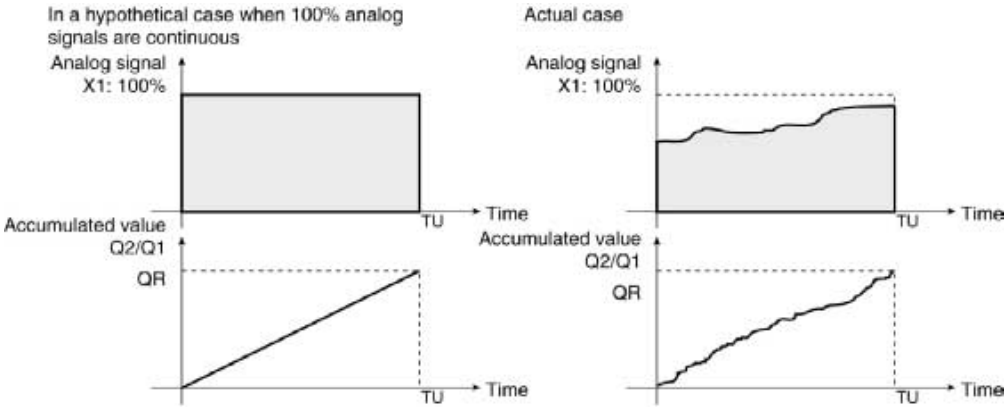
Block Model	Block Name	Block Address
<150>	Accumulator for instantaneous value input	001 to 500

Outline

This function block accumulates (totalizes) instantaneous analog signals (e.g. flowrate signals) and outputs 8-digit accumulated value signals within the range 00000000 to 99999999. This function block can also be used for batch control.

•Q2 and Q1 accumulated values become QR preset value (counter rate) assuming that 100% values are continuous as analog signal inputs for the preset time unit (TU: one of seconds, minutes, hours or days).

By accumulation (totalization), analog signals are totalized according to the 0 to 100% range of the actual analog signal input, and accumulated values Q2 and Q1 proportional to these inputs are output at all times.



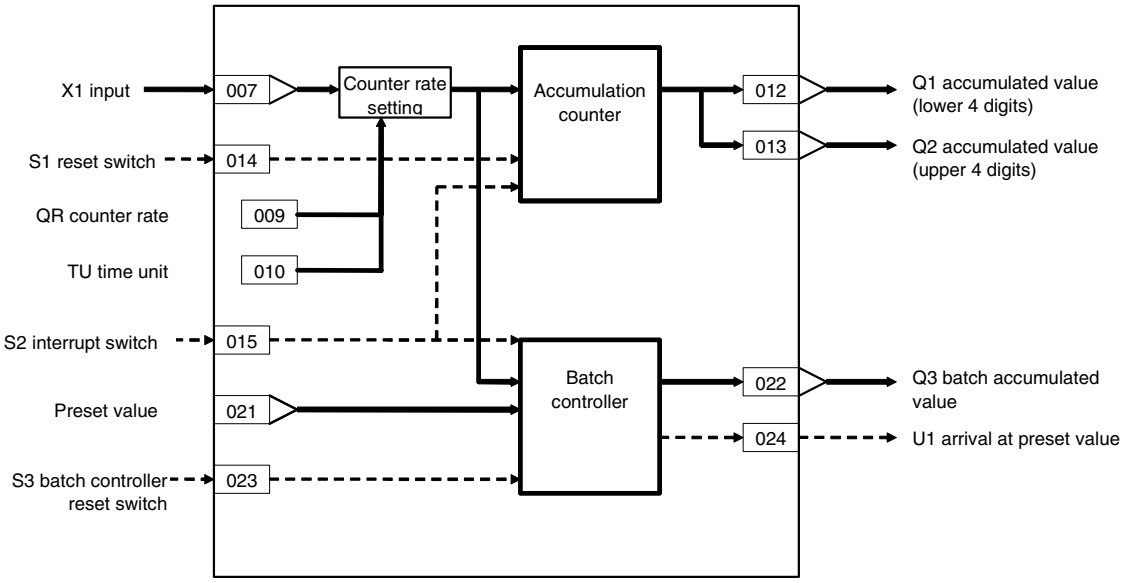
•Accumulated values are divided into upper four digits and lower four digits before they are output. If necessary, join these two sets of digits together for display on a host computer.
•When Qn accumulated value output is used as analog input for other function blocks, the count 9999 is processed as 99.99%.
•When S1 reset switch is set to 1 (ON), the accumulated values Q1 and Q2 are returned to count 0.
•When S3 batch controller reset switch is input, Q3 batch accumulated value becomes count 0, and U1 arrival at preset value is reset to 0 (OFF).
•S2 interrupt switch stops all count operations.
•Minus inputs are regarded as 0% input.

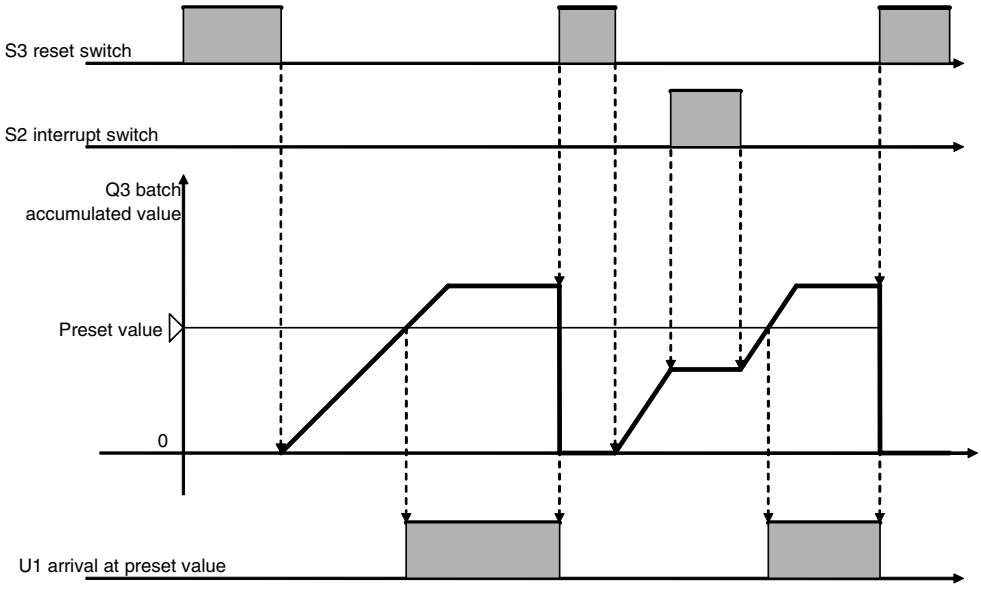
Note: Internally held accumulated values are cleared when a cold start is performed, and are held when a hot start is performed.

Function block applications

Accumulation (totalization) of instantaneous flowrate signals that have been converted to analog values

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Accumulator for instantaneous value input	150	150	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

Instantaneous value input X1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	009	QR	Counter rate Assuming that input is 100% for time unit setting TU, set the accumulated value to be displayed. Example) Set TU: 2 and QR: 1500 for 0 to 1500 m^3.	0 to 10000.00	100.00	–	R/W(O)	W	–	–	4
	010	TU	Time unit (0:S, 1:min, 2:hr, 3:day)	0 to 3	0	–	R/W(S)	–	–	S/R	1
Accumulated value output	012	Q1	Accumulated value (lower 4 digits)	0 to 9999	0	Yes	r/w	–	–	S	2
	013	Q2	Accumulated value (upper 4 digits)	0 to 9999	0	Yes	r/w	–	–	S	2
Contact input	014	S1	Reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	015	S2	Interrupt switch (1: Interrupt)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

Batch controller

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	021		Preset value	0000 to 9999	9999	–	R/W(O)	W	–	S/R	2
Accumulated value output	022	Q3	Batch accumulated value	0000 to 9999	0	Yes	r/w	–	–	S	2
Contact input	023	S3	Batch controller reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	024	U1	Arrival at preset value	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
010	Time unit	TU
012	Accumulated value	Q1
013	Accumulated value	Q2
014	Reset switch	S1
015	Interrupt switch	S2
021	Preset value	BM
022	Batch accumulated value	Q3
023	Batch controller reset switch	S3
024	Arrival at preset value	U1

Block Model	Block Name	Block Address
<151>	Run Time Accumulator	001 to 500

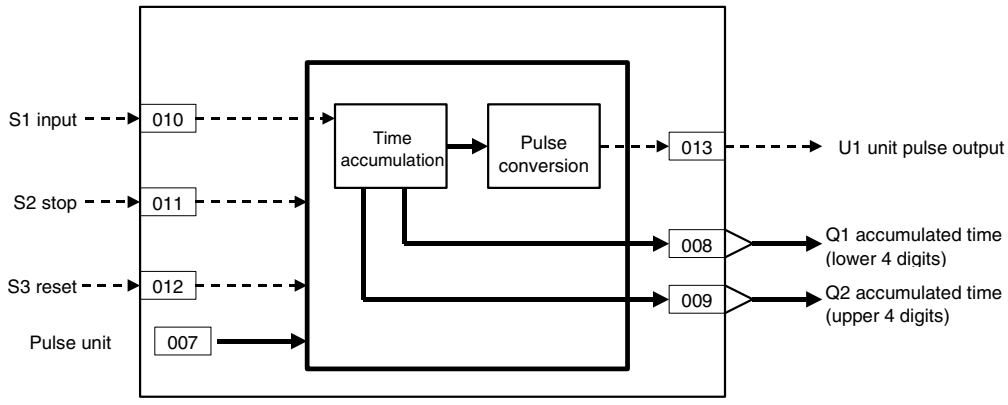
Outline

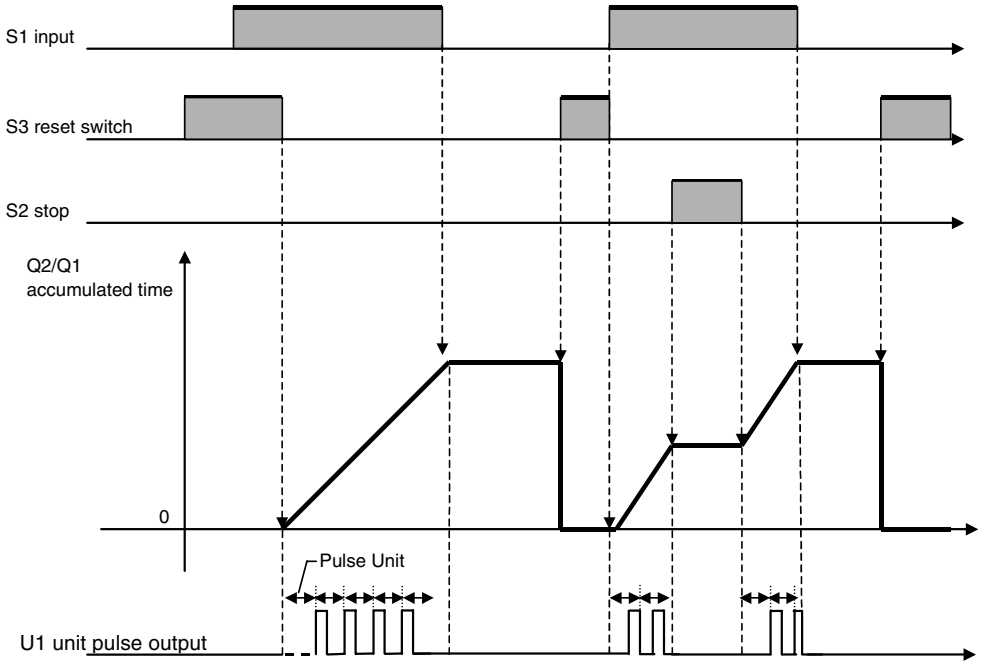
This function block accumulates the running time of machinery such as pumps, and outputs the accumulated running time as a number of pulses.

•The accumulated running time is expressed as number of pulses per unit time.
•Counting of time accumulated values is performed each pulse unit when S1 input is set to 1 (ON). Counting is not dependent on the operation cycle.

Note: •Set the operation cycle of ITEM 004 to a value shorter than the pulse unit of ITEM 007.
•Internally held accumulated values are cleared when a cold start is performed, and are held when a hot start is performed.

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Run time accumulator	151	151	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
	007		Pulse unit (0: s, 1: 10 s, 2: min, 3: 10min, 4: h)	0 to 4	0	–	R/W(S)	–	–	S/R	1
Accumulated value output	008	Q1	Accumulated time (lower 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
	009	Q2	Accumulated time (upper 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
Contact input	010	S1	Input	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	011	S2	Stop	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	012	S3	Reset	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	013	U1	Unit pulse output (1: ON during operation cycle)	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Pulse unit	PT
008	Accumulated time (lower 4 digits)	Q1
009	Accumulated time (upper 4 digits)	Q2
010	Input	S1
011	Stop	S2
012	Reset	S3
013	Unit pulse output	U1

Block Model	Block Name	Block Address
<153>	Time Sequence Data Statistics	001 to 100

Outline

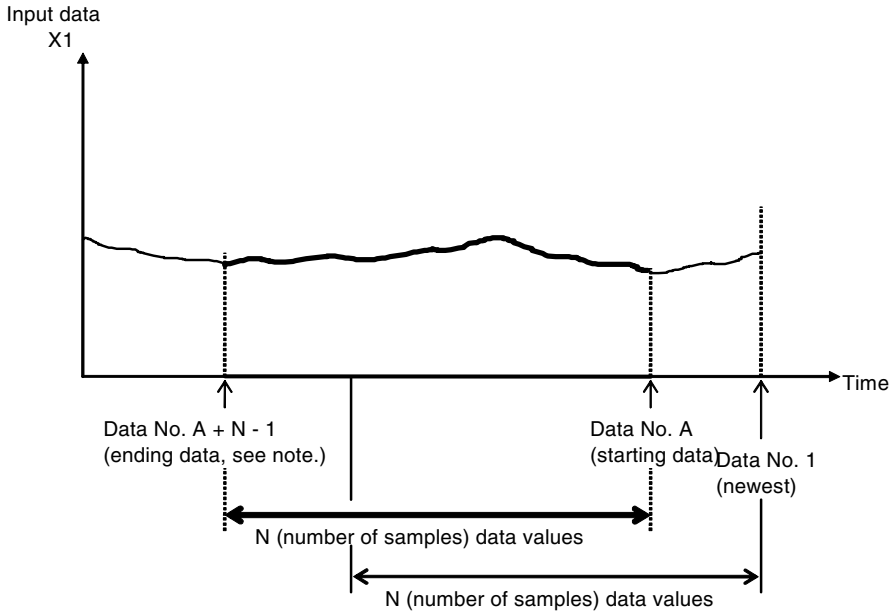
This function block records up to 400 time sequence values from analog signals and calculates statistics, such as the average and standard deviation.

Supported Statistical Calculations

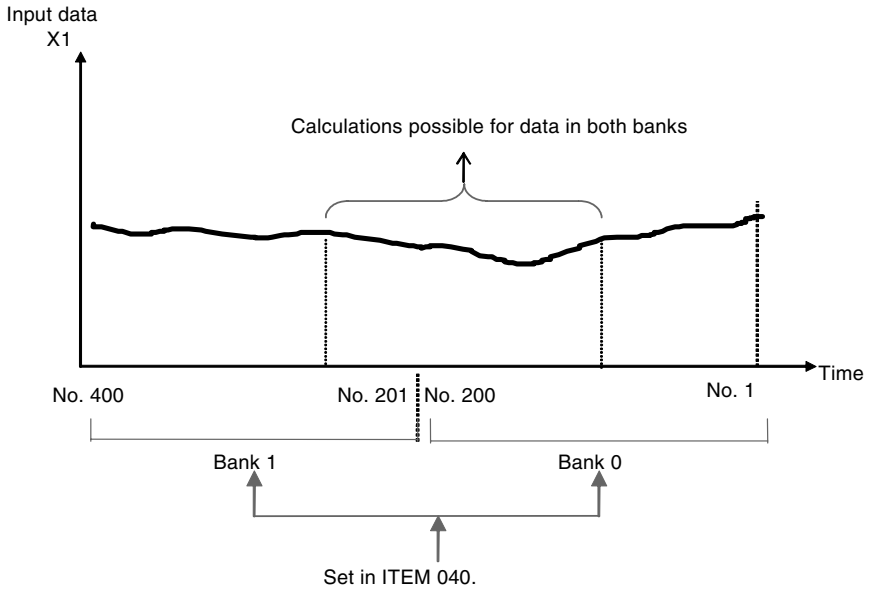
Average value	Y1 = X1(k)/N
Smallest value	Smallest value of Y2 = X1(k)
Largest value	Largest value of Y3 = X1(k)
Range	Y5 (upper), Y4 (lower) = Y3 - Y2
Standard deviation	Y9 = Square root of Y8 (upper), Y7 (lower)
Average deviation	Y6 = |Y1 - X1(k)| / N
Distribution	Y8 (upper), Y7 (lower) = {Y1 - X1(k)}2 / N

Note: X1(k) denotes the time sequence values input for statistical calculations.
k = A to A+N-1 (A: Number of first data in range, N: Number of samples)

The number of samples, N, is specified between 1 and 400 in ITEM 011. When N samples have been collected, the oldest sample is discarded each time a new sample is taken before making statistical calculations.
It is also possible to use previous data as the starting point for statistical calculations rather than the most recent data. The starting data number is specified in ITEM 010.



The function block internally stores data samples 1 to 400 as shown above.
When monitoring data samples using ITEM 041 to ITEM 240 or when inputting data number 1 to 400 directly into the buffers, the bank must be set. Switching between bank 0 and 1 can be executed using FINS commands or by using the Expanded AI Terminal from CPU Unit block to change ITEM 040. Calculations can also be performed on data in both banks, as shown below.



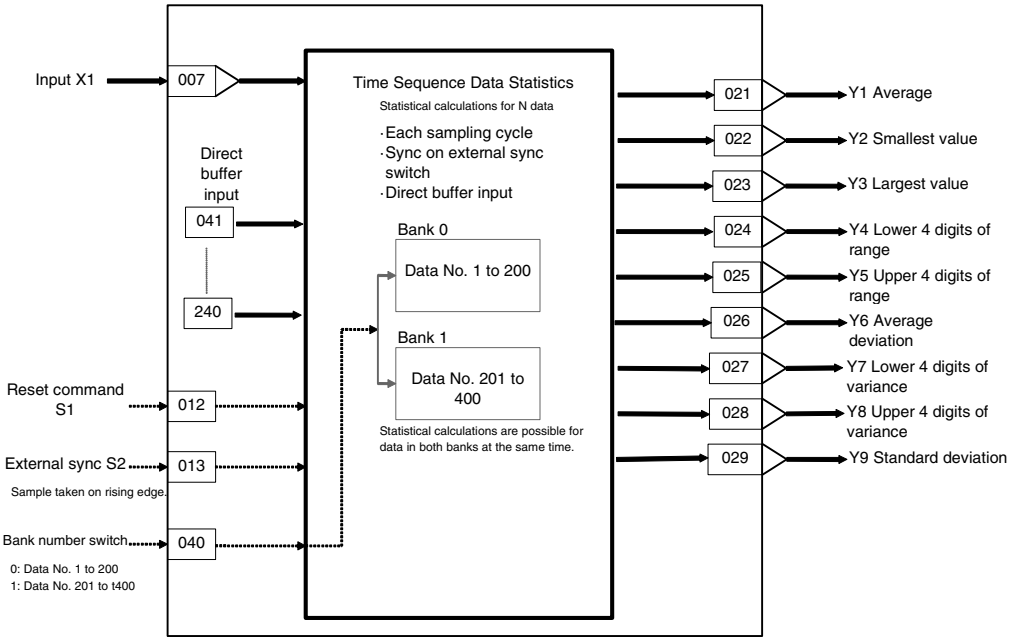
Note: A = Number of first data in range, N = Number of samples. A + N - 1 must be less than or equal to 400. If A + N -1 is greater than 400, a parameter error (execution error code 71) will occur.

Any of the following three methods can be used to sample data. The sampling method is set in ITEM 006.
Each cycle (1 to 9,999 s) (set ITEM 006 to 0).
Sync on external sync contact (sample on OFF to ON transition) (set ITEM 006 to 1).
Direct buffer input using values set in ITEMs 041 to 240 as sampling data (set ITEM 006 to 2).

Function block applications

Analyzing inconsistency in a process value that should be constant, such as a temperature or flow rate.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command 0: Cancel stop, 1: Stop	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Time Sequence Data Statistics	153	153	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (seconds) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	1 to 4 6 to 8	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
	006		Sampling method 0: Each sampling cycle 1: Sync on external sync switch (Sample when ITEM 013 goes from 0 to 1.) 2: Direct buffer input (Use values set in ITEMs 041 to 240 as sampling data.)	0 to 2	0	–	R/W(S)			–	1
Analog input connection information	007		X1 source designation (BBB: Block address, III: ITEM number)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	009		Sampling cycle 0: Sampling on operation cycle 1 to 9999: Sample every 1 to 9, 999 s. Note: This setting is ignored if ITEM 006 (sampling method) is set to 1 (sync on external sync contact) or 2 (direct buffer input).	0 or 1 to 9999 s	0	–	R/W(S)			S/R	2
	010		First data number in range	1 to 400	1	–	R/W(S)	–	–	S/R	2
	011		Number of samples	1 to 400	100	–	R/W(S)	–	–	S/R	2
Contact input	012	S1	Reset command 1: Set all ITEMs from 041 to 240 to X1 value.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	013	S2	External sync switch 0 to 1: Take sample (Valid only when ITEM 006 is set to 1.)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	021	Y1	Average	±320.00%	0.00	Yes	r	–	–	S	2
	022	Y2	Smallest value	±320.00%	0.00	Yes	r	–	–	S	2
	023	Y3	Largest value	±320.00%	0.00	Yes	r	–	–	S	2
	024	Y4	Lower 4 digits of range (= Largest value - smallest value)	0% to 99.99%	0.00	Yes	r	–	–	S	2
	025	Y5	Upper 4 digits of range (= Largest value - smallest value)	0% to 9999%	0	Yes	r	–	–	S	2
	026	Y6	Average deviation	0% to 320.00%	0.00	Yes	r	–	–	S	2
	027		Lower 4 digits of variance	0% to 99.99%	0.00	Yes	–	–	–	S	2
	028		Upper 4 digits of variance	0% to 9999%	0	Yes	–	–	–	S	2
	029	Y9	Standard deviation	0% to 320.00%	0.00	Yes	r	–	–	S	2
	040		Bank number 0: Data number 1 to 200 1: Data number 201 to 400	0, 1	0	Yes	R/W(O)	–	–	–	2
	041		Newest data Bank SW = 0: Number 1 Bank SW = 1: Number 201	±320.00%	0.00	Yes	–	R/W	–	–	2
	to		to			–					
	240		Oldest data Bank SW = 0: Number 200 Bank SW = 1: Number 400	±320.00%	0.00	–	–	R/W	–	–	2

Note: The contents of buffers for ITEMs 041 to 210 will not be initialized when the sampling method (ITEM 006) is changed from direct buffer input to a sampling cycle or external switch sync, and sampling will be started with the data currently in the buffers. To initialize the buffers, turn ON the reset command in ITEM 012.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (Fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Input	X1
009	Sampling cycle	H
010	First data number in range	A
011	Number of samples	N
012	Reset command	S1
013	External sync switch	S2
021	Average value	Y1
022	Smallest value	Y2
023	Largest value	Y3
024	Lower 4 digits of range	Y4
025	Upper 4 digits of range	Y5
026	Average deviation	Y6
027	Lower 4 digits of variance	Y7
028	Upper 4 digits of variance	Y8
029	Standard deviation	Y9

Block Model	Block Name	Block Address
<155>	Ramp Program	001 to 500

Outline

This function block is a ramp program setter for combining ramp and soak values.

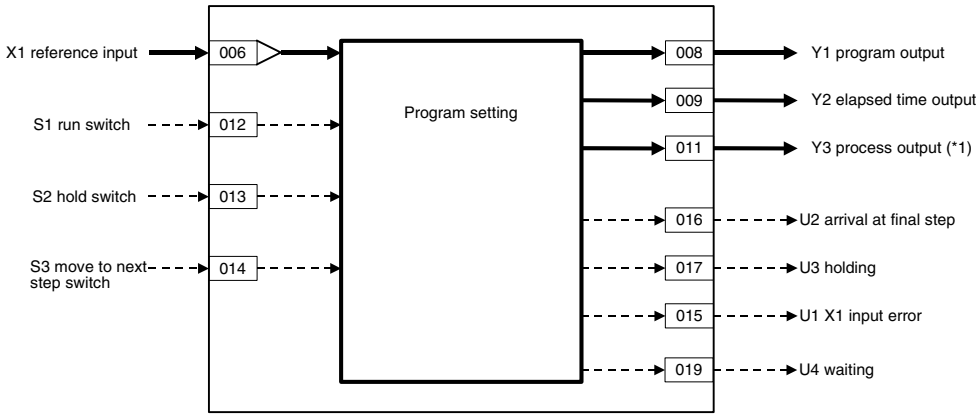
Provided with a wait function

When X1 reference input has not arrived at A soak value±wait width value, measurement of the soak time is stopped regardless of Y1 output having moved to the soak process from the ramp process. At the same time, the value of Y1 output is held at A soak value. When X1 reference input is in Y1 output±wait width, program execution moves to the soak process, and measurement of the soak time is started. When X1 reference input does not fall within Y1 output±wait width even though the maximum wait time has elapsed, program execution moves to the soak process and measurement of the soak time is started.
When the state of S3 move to next step command changes from 0 (OFF) to 1 (ON) during a wait, the wait operation is canceled, program execution moves to the soak process, and measurement of the soak time is started.

- The wait width and maximum wait time can be set common to all steps in the ramp program.
- Provided with a function for matching the setting value to X1 reference input at the start of the ramp program
- Provided with process output ("Process output" here refers to state that makes a distinction between ramp and soak.)
- Provided with elapsed time output for the entire program
- The desired process can be moved to when data is set by ITEM Setting blocks to process output (ITEM 011). (Setting by ITEM Setting blocks is valid only when S1 run/stop command is 1 (ON).)
  The ramp program can also be returned to a process smaller than the current process. (Note, however, that when the ramp program is started from the reference input, the ramp program cannot return to a point before the point where the ramp program is started by the reference input.)

When S1 run/stop command is 0 (OFF), Y1 output equals 0. When the setting of S1 run/stop command changes from 0 (OFF) to 1 (ON), the ramp program starts with the value of Y1 output at A0 default. (When X1 reference input is designated as the source, and there is a point where X1 reference input matches the rise ramp rate or soak value, the program starts from that point.) The ramp program outputs up to 15 steps, each step comprising a ramp and soak value, to Y1 output for the duration that the S1 run/stop command is 1 (ON).

Block diagram

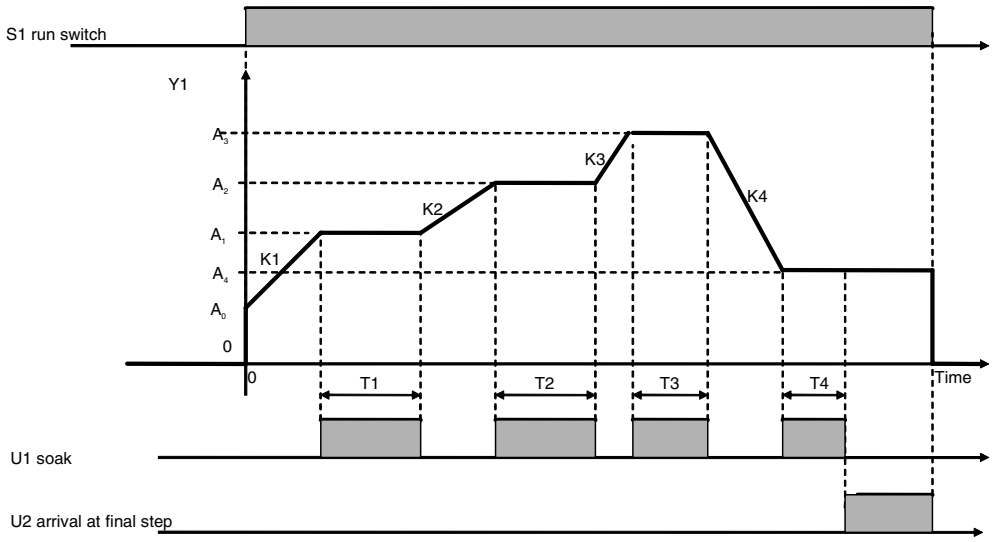


*1: Value of Y3 process output ("Process" here refers to state that makes a distinction between ramp and soak.)

Process	Y3
Stop	0
K1	1
T1	2
K2	3
T2	4
K3	5
T3	6
K4	7
T4	8

Process	Y3
K5	9
T5	10
K6	11
T6	12
K7	13
T7	14
K8	15
T8	16
to	to
K15	29
T15	30

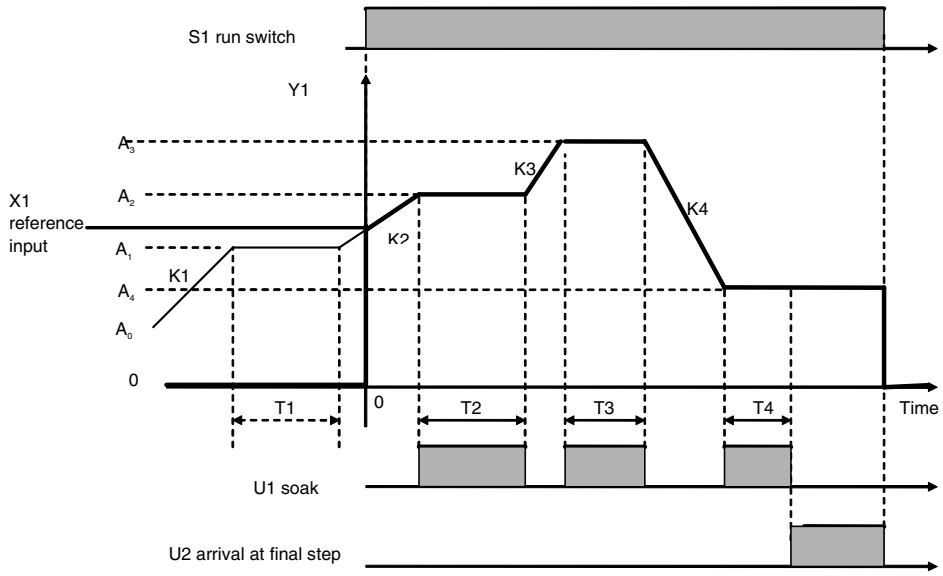
When the ramp program is started from A0 default:



When the ramp program is started from X1 reference input:

The ramp program is started from a point where X1 reference input and rise ramp match.

Note: The condition for start of the ramp program from X1 reference input is as follows: X1 reference input must match the first rise ramp (before ramp falls) or soak value. However, a ramp that has risen after a fall is not accepted in this condition. In this case, Y1 output remains at 0 (OFF).



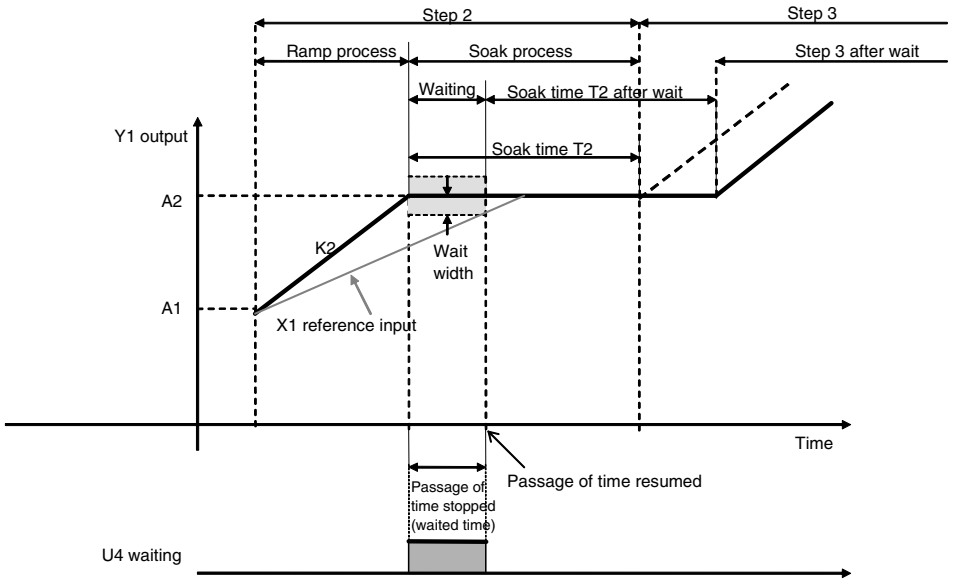
When wait operation is performed based on X1 reference input

When X1 reference input has not arrived at Y1 output±wait width value, program execution does not move to the soak process and measurement of the soak time is stopped regardless of Y1 output having moved to the soak process from the ramp process. When X1 reference input arrives at Y1 output±wait width value, program execution moves to the soak process and measurement of the soak width is started. To cancel a wait operation midway, change the state of S3 move to next step command from 0 (OFF) to 1 (ON).

Note 1:Setting the wait width to 0.00% disables the wait operation. So, the wait width is actually set within the range 0.01 to 320.00%.

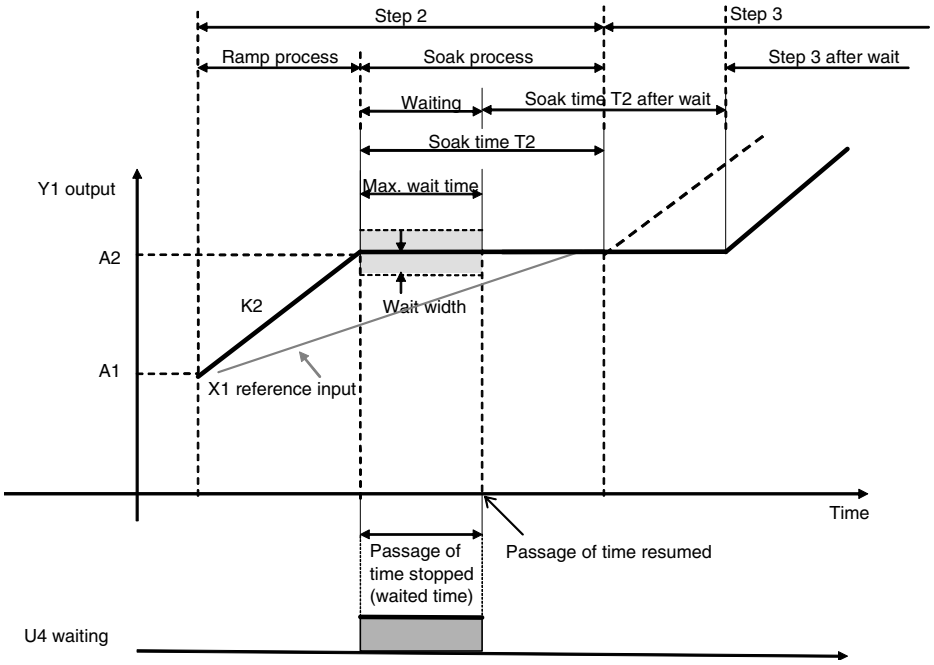
Note 2:Even during a wait, Y2 elapsed time output continues and increases. Y2 stops only when S2 hold switch is 1 (ON).

Y1 output does not move to the soak process and time measurement stops until X1 reference input falls in Y1±wait width. After the wait, T2 soak time in step 2 is secured.



When X1 reference input does not fall within Y1±wait width even if the maximum wait time is exceeded

When X1 reference input does not fall within Y1±wait width even if the maximum wait time is exceeded, the wait operation is forcibly stopped, program execution moves to the soak process, and time measurement starts.



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block model: Ramp Program	155	155	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1	1 to 4	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog contact information	006		X1 source designation (BBB: Block address, III: ITEM No.) X1 equals Y1 at start when X1 is connected.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	X1	Reference input (input for external setting of start point)	±320.00%	0.00	Yes	r	–	–	S	2
Analog output	008	Y1	Program output	±320.00%	0.00	Yes	r/w	–	–	S	2
	009	Y2	Elapsed time output	0 to 3200.0	0.0	Yes	r/w	–	–	S	2
Parameter	010		Elapsed time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(S)	–	–	S/R	1
Analog output	011	Y3	Process output (Process distinguishes between ramp and soak.)	0 to 30	0	Yes	r/w	W	–	S/R	2
Contact input	012	S1	Run/stop command (0: Reset, 1: Run)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	013	S2	Hold switch (1: Hold)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	014	S3	Move to next step command (When the command state changes from 0 to 1, program execution jumps to the start of the ramp process of the next step. This command is automatically reset by the system after the jump ends.) Note: When the command state changes from 0 to 1 during a wait, wait is canceled, and program execution moves to the soak process.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	015	U1	X1 input error (1: Error. Output is 0 when reference input X1 does not match the ramp rate and soak value of the rise ramp.)	0, 1	0	Yes	–	–	R	S	1
	016	U2	Arrival at final step	0, 1	0	Yes	–	–	R	S	1
	017	U3	Holding	0, 1	0	Yes	–	–	R	S	1
	019	U4	Waiting (0: Not waiting, 1: Waiting)	0, 1	0	Yes	–	–	R	S	1
Start step											
Parameter	020	A0	Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.)	±320.00%	0.00	–	R/W(O)	–	–	–	1
No.1 step											
Parameter	021	K1	Ramp rate	±115.00%/H1	1.00	–	R/W(O)	W	–	–	2
	022	H1	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	023	A1	Soak value	±320.00%	100.00	–	R/W(O)	W	–	–	2
	024	T1	Soak time	0 to 3200.0	100.0	–	R/W(O)	W	–	–	2
	025	J1	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.2 step											
Parameter	026	K2	Ramp rate	±115.00%/H2	1.00	–	R/W(O)	W	–	–	2
	027	H2	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	028	A2	Soak value	±320.00%	200.00	–	R/W(O)	W	–	–	2
	029	T2	Soak time	0 to 3200.0	100.0	–	R/W(O)	W	–	–	2
	030	J2	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.3 step											

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	031	K3	Ramp rate	±115.00%/H3	1.00	–	R/W(O)	W	–	–	2
	032	H3	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	033	A3	Soak value	±320.00%	300.00	–	R/W(O)	W	–	–	2
	034	T3	Soak time	0 to 3200.0	100.0	–	R/W(O)	W	–	–	2
	035	J3	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.4 step											
Parameter	036	K4	Ramp rate	±115.00%/H4	-1.00	–	R/W(O)	W	–	–	2
	037	H4	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	038	A4	Soak value	±320.00%	150.00	–	R/W(O)	W	–	–	2
	039	T4	Soak time	0 to 3200.0	100.0	–	R/W(O)	W	–	–	2
	040	J4	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.5 step											
Parameter	041	K5	Ramp rate	±115.00%/H5	-1.00	–	R/W(O)	W	–	–	2
	042	H5	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	043	A5	Soak value	±320.00%	0.00	–	R/W(O)	W	–	–	2
	044	T5	Soak time	0 to 3200.0	10.0	–	R/W(O)	W	–	–	2
	045	J5	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.6 step											
Parameter	046	K6	Ramp rate	±115.00%/H6	-1.00	–	R/W(O)	W	–	–	2
	047	H6	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	048	A6	Soak value	±320.00%	-150.00	–	R/W(O)	W	–	–	2
	049	T6	Soak time	0 to 3200.0	10.0	–	R/W(O)	W	–	–	2
	050	J6	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.7 step											
Parameter	051	K7	Ramp rate	±115.00%/H7	-1.00	–	R/W(O)	W	–	–	2
	052	H7	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	053	A7	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	054	T7	Soak time	0 to 3200.0	10.0	–	R/W(O)	W	–	–	2
	055	J7	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.8 step											
Parameter	056	K8	Ramp rate	±115.00%/H8	0	–	R/W(O)	W	–	–	2
	057	H8	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	058	A8	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	059	T8	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	060	J8	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.9 step											
Parameter	061	K9	Ramp rate	±115.00%/H9	0	–	R/W(O)	W	–	–	2
	062	H9	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	063	A9	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	064	T9	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	065	J9	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.10 step											
Parameter	066	K10	Ramp rate	±115.00%/H10	0	–	R/W(O)	W	–	–	2
	067	H10	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	068	A10	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	069	T10	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	070	J10	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.11 step											
Parameter	071	K11	Ramp rate	±115.00%/H11	0	–	R/W(O)	W	–	–	2
	072	H11	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	073	A11	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	074	T11	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	075	J11	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.12 step											
Parameter	076	K12	Ramp rate	±115.00%/H12	0	–	R/W(O)	W	–	–	2
	077	H12	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	078	A12	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	079	T12	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	080	J12	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.13 step											
Parameter	081	K13	Ramp rate	±115.00%/H13	0	–	R/W(O)	W	–	–	2
	082	H13	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	083	A13	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	084	T13	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	085	J13	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.14 step											
Parameter	086	K14	Ramp rate	±115.00%/H14	0	–	R/W(O)	W	–	–	2
	087	H14	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	088	A14	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	089	T14	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	090	J14	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
No.15 step											
Parameter	091	K15	Ramp rate	±115.00%/H15	0	–	R/W(O)	W	–	–	2
	092	H15	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
	093	A15	Soak value	±320.00%	-300.00	–	R/W(O)	W	–	–	2
	094	T15	Soak time	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	095	J15	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	–	–	–	1
Wait setting											
Parameter	096		Wait width (0: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	S/R	2
	097		Max. wait time (0.0: Unlimited) Note: The time unit of this setting is the same as that of the ramp in each step.	0 to 3200.0	0.0	–	R/W(O)	W	–	S/R	2

Note 1

- The S3 move to next step command is enabled only during the soak process, and is invalid during ramp processes.
  When the S3 move to next step command changes state from 0 to 1 during the soak process, program execution moves to the start of the ramp process of the next step.
  Even if the S3 move to next step command changes state from 0 to 1 during the ramp process, program execution does not move to the next step. Program execution moves to the next step when execution arrives at the final value of that ramp process.
- When "+" (plus number) data and not "-" (minus number) data is set to Kx (any ramp rate) regardless of a fall ramp (soak value lower than previous value), U2 arrival at final step becomes 1 (ON) at that step. The same also applies to rise ramps.
- To stop execution of the ramp program, set Kn final ramp rate to 0.00%/Hn.
- When a hot start is performed, the ramp program starts midway through the process immediately before the instantaneous power interruption occurred or immediately before the program was stopped according to the elapsed time.

Note 2:ITEMs ITEM 020 to ITEM 097 can be changed while the ramp program is running (for the duration that S1 run/stop command is 1). Any changes made are immediately reflected in program execution.

A0 initial value, K□ ramp rate for each step, H□ ramp time unit for each step, A□ soak value for each step, T□ soak time for each step, J□ soak time unit for each step, wait width common to all steps and maximum wait time common to all steps

Note 3: Do not change the following ITEMs while the ramp program is running (for the duration that S1 run/stop command is 1).
ITEM 004 (operation cycle), ITEM 010 (elapsed time unit)
Before you change the values of these ITEMs, temporarily set S1 run/stop command to 0 (OFF). After you have changed the values, set S1 run/stop command to 1 (ON) and restart the program.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Reference input	X1
008	Program output	Y1
009	Elapsed time output	Y2
010	Elapsed time unit	H0
011	Process output	Y3
012	Run/stop command	S1
013	Hold switch	S2
014	Move to next step command	S3
015	X1 input error	U1
016	Arrival at final step	U2
017	Holding	U3
019	Waiting	U4
020	Default	A0
096	Wait width	WB
097	Max. wait time	WT

Block Model	Block Name	Block Address
<156>	Segment Program	001 to 500

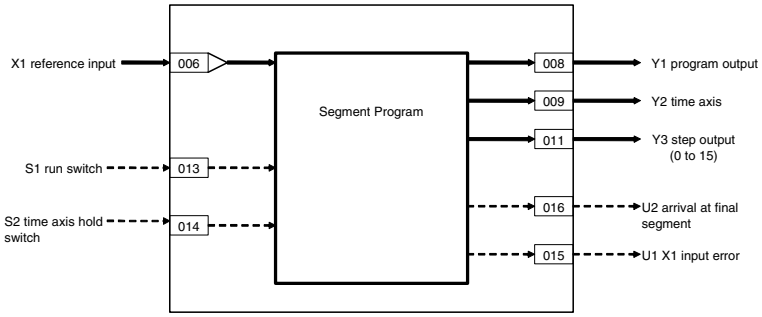
Outline

This function block is the segment program setter for setting time and output as segments.

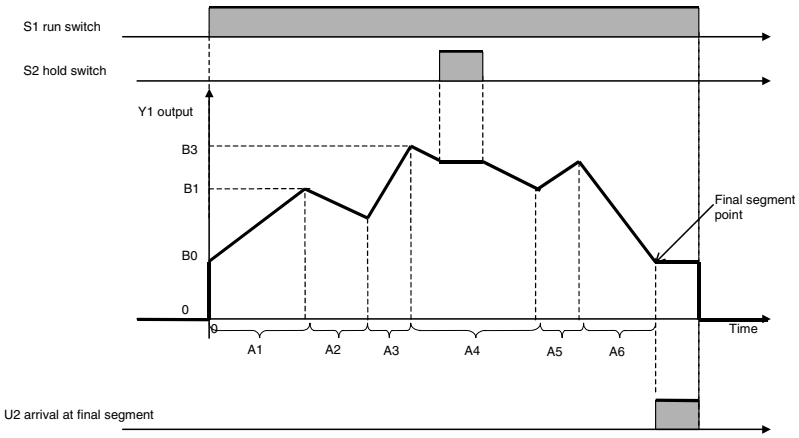
- Provided with a function for matching the setting value to X1 reference input at the start of the segment program
- Provided with step output
- Provided with time axis output for the entire program
- The desired step (segment point) or point on the time axis can be moved when data is set by ITEM Setting blocks to step output (ITEM 011) or time axis output (ITEM 009). (Setting by ITEM Setting blocks is valid only when S1 run/stop command is 1 (ON).) The segment program can also be returned to a step smaller than the current step. (Note, however, that when the segment program is started from the reference input, the segment program cannot return to a point before the point where the segment program is started by the reference input.)

When S1 run/stop command is 0 (OFF), Y1 output equals 0. When the setting of S1 run/stop command changes from 0 (OFF) to 1 (ON), the segment program starts with the value of Y1 output at B0 default.
When the X1 reference input is specified as the source, and if there is a point where the X1 reference input matches the first up or down ramp, the program starts from that point.

Block diagram

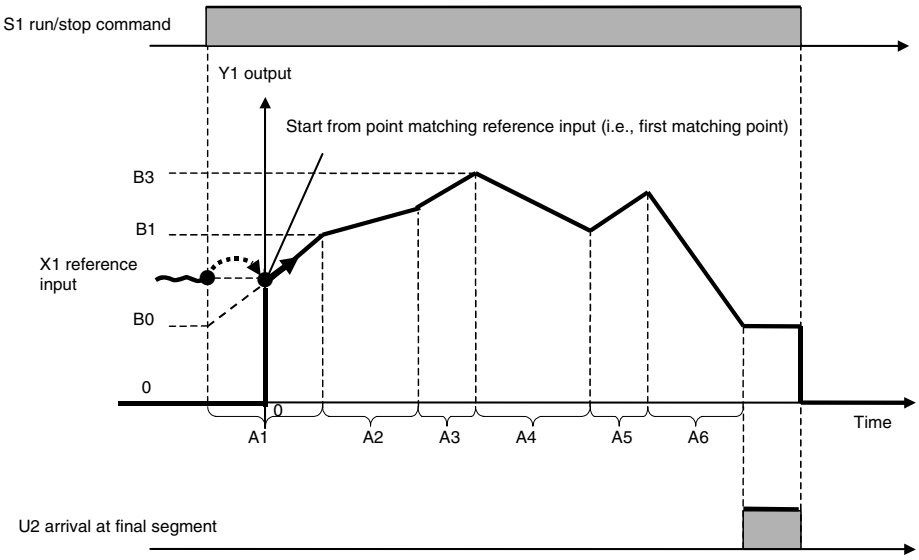


When the segment program is started from B0 default:



When the segment program is started from X1 reference input:

The program starts from a point where the X1 reference input and the first up ramp (B0 to B3) match. If there is no match between B0 and B3, then no match will be detected even if the X1 reference input matches a segment from B3 onwards. If no match is detected, then the output Y1 value will remain at 0 (OFF).



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Segment Program	156	156	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1	1 to 4	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog contact information	006		X1 source designation (BBB: Block address, III: ITEM No.) X1 equals Y1 at start when X1 is connected.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	X1	Reference input (input for external setting of start point)	±320.00%	0	Yes	r	–	–	S	2
Analog output	008	Y1	Program output	±320.00%	0	Yes	r/w	–	–	S	2
	009	Y2	Time axis output	0 to 3200.0	0.0	Yes	r/w	–	–	S/R	2
Analog output	011	Y3	Step output (0: Display only at end.)	0 to 15	0	Yes	r/w	W	–	S/R	2
Parameter	012	H1	Time axis unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(S)	–	–	S/R	1
Contact input	013	S1	Run/stop command (0: Reset, 1: Run)	0, 1	0	Yes	R/W(O)	–	–	S/R	1
	014	S2	Hold switch (1: Stop)	0, 1	0	Yes	R/W(O)	–	–	S/R	1
Contact output	015	U1	X1 input (1: Error. Output is 0 when reference input X1 is not matching between No.1 segment B0 and B1.)	0, 1	0	Yes	–	–	R	S	1
	016	U2	Arrival at final segment (final arrival of entered segments)	0, 1	0	Yes	–	–	R	S	1
Parameter	022	B0	Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.)	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	023	A1	A1 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	024	B1	B1 output	±320.00%	320.00	–	R/W(O)	W	–	–	2
	025	A2	A2 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	026	B2	B2 output	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	027	A3	A3 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	028	B3	B3 output	±320.00%	320.00	–	R/W(O)	W	–	–	2
	029	A4	A4 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	030	B4	B4 output	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	031	A5	A5 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	032	B5	B5 output	±320.00%	320.00	–	R/W(O)	W	–	–	2
	033	A6	A6 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	034	B6	B6 output	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	035	A7	A7 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	036	B7	B7 output	±320.00%	320.00	–	R/W(O)	W	–	–	2
	037	A8	A8 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	038	B8	B8 output	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	039	A9	A9 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	040	B9	B9 output	±320.00%	320.00	–	R/W(O)	W	–	–	2
	041	A10	A10 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	042	B10	B10 output	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	043	A11	A11 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	044	B11	B11 output	±320.00%	320.00	–	R/W(O)	W	–	–	2
	045	A12	A12 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	046	B12	B12 output	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	047	A13	A13 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	048	B13	B13 output	±320.00%	320.00	–	R/W(O)	W	–	–	2
	049	A14	A14 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	050	B14	B14 output	±320.00%	-320.00	–	R/W(O)	W	–	–	2
	051	A15	A15 time	0 to 320.0	200.0	–	R/W(O)	W	–	–	2
	052	B15	B15 output	±320.00%	320.00	–	R/W(O)	W	–	–	2

Note: •To stop execution of the segment program, set An final time to "0". (U2 arrival at final segment (ITEM 016) turns ON.)
Execution ends when Y2 time axis output (ITEM 009) reaches 3200.0.
•When a hot start is performed, the segment program starts midway through the segment immediately before the instantaneous power interruption occurred or immediately before the program was stopped according to the elapsed time.

Note Do not change the following ITEMs while the segment program is running (for the duration that S1 run/stop command is 1).
ITEM 004 (operation cycle), ITEM 012 (time axis unit), ITEM 022 to ITEM 052 (segment pattern setting values, and values of currently executing or previous steps in segment program)
Before you change the values of these ITEMs, temporarily set S1 run/stop command to 0 (OFF). After you have changed the values, set S1 run/stop command to 1 (ON) and restart the program.
Note that in the case of ITEM 022 to ITEM 052 (segment pattern setting values), the setting values of steps ahead of the currently executing step can be changed while the segment program is running (for the duration that S1 run/stop command is 1).

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Reference input	X1
008	Program output	Y1
009	Time axis output	H1
011	Step output	Y3
012	Time axis unit	H1
013	Run/stop command	S1
014	Hold switch	S2
015	X1 input	U1
016	Arrival at final segment	U2

Block Model	Block Name	Block Address
<157>	Segment Program 2	001 to 500

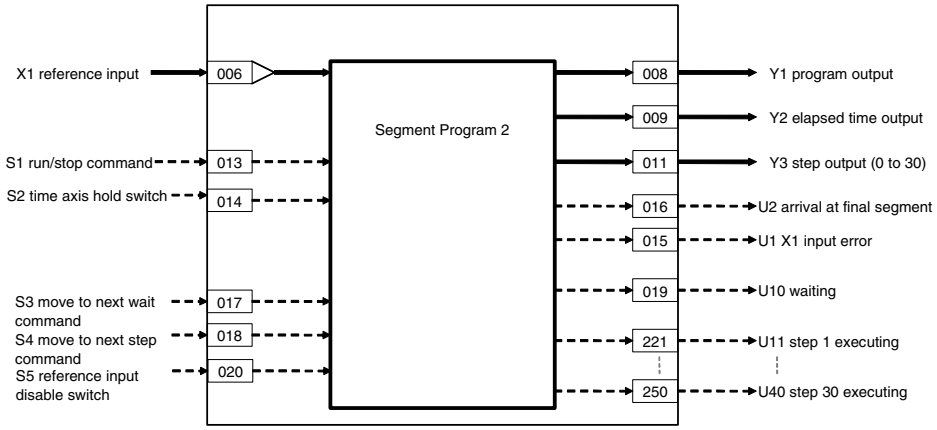
Outline

This function block is segment program setting with wait function for setting the output values with respect to time.

•Provided with a wait function
  •In the case of wait operation ON steps, program execution does not move to the next if X1 reference input has not arrived at Y1 output±wait width (of current step) value. At the same time, the value of Y1 output is held at the final value of the current step. When X1 reference input is in Y1 output±wait width, program execution moves to the next step, and time measurement and changing of the Y1 output segment are started. When X1 reference input is not in Y1 output±wait width even though the maximum wait time has elapsed, time measurement and changing of the Y1 output segment are started.
  •When the state of S4 move to next step command changes from 0 (OFF) to 1 (ON) during a wait, the wait operation is canceled, program execution moves to the next step, and time measurement is started.
  •When the state of S3 move to next wait changes from 0 (OFF) to 1 (ON) during execution of a certain step, program execution jumps to the final value of the current step. If the current step is a wait operation ON step, program execution enters wait operation.
•The wait width and maximum wait time can be set common to all steps in the ramp program.
•The time width can be set to each step.
•The time unit (seconds, minutes, hours) can be specified to all steps in the ramp program.
•Provided with a function for matching the setting value to X1 reference input at the start of the segment program
•Provided with step output
•Provided with elapsed time output for the entire program
•The desired step can be moved to when data is set by ITEM Setting block to step output (ITEM 011). (Setting by ITEM Setting blocks is valid only when S1 run/stop command is 1 (ON).)
 The segment program can also be returned to a step smaller than the current step. (Note, however, that when the segment program is started from the reference input, the segment program cannot return to a point before the point where the segment program is started by the reference input.)
•Even if reference input X1 is specified as the source, the program can be started from the default B0 instead of X1 by setting the reference input disable switch.
•The soak value can be changed even after completing a step. If the soak value is changed before the first step for reference input X1, however, it will be ignored.
•The step executing flag can be used in the ladder program.

1) When the Run/stop command (S1) is 0 (OFF), output Y1 will be 0.
2) The following will take place then the Run/stop command (S1) is changed from 0 to 1 (OFF to ON).
  •If reference input X1 is not specified as the source, output Y1 will start from B0.
  •If reference input X1 is specified as the source but the reference input disable switch is 1 (ON), output Y1 will start from B0.
  •If reference input X1 is specified as the source, the reference input disable switch is 0 (OFF), and reference input X1 coincides with the up or down ramp step, output Y1 will start from reference input X1.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Segment Program 2	157	157	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004	CNT_TM	Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1	1 to 4	4	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog contact information	006	X1_AD	X1 source designation (BBB: Block address, III: ITEM No.) X1 equals Y1 at start when X1 is connected.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	X1	Reference input (input for external setting of start point)	±320.00%	0	Yes	r	–	–	S	2
Analog output	008	Y1	Program output	±320.00%	0	Yes	r/w	–	–	S	2
	009	Y2	Elapsed time output	0 to 3200.0	0.0	Yes	r/w	–	–	S	2
Analog output	011	Y3	Step output (0: Display only at end.)	0 to 30	0	Yes	r/w	W	–	S/R	2
Parameter	012	H1	Elapsed time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(S)	–	–	S/R	1
Contact input	013	S1	Run/stop command (0: Reset, 1: Run)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	014	S2	Hold switch (1: Stop)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	015	U1	X1 input error (1: Error. Output is 0 when X1 reference input does not match the first up ramp.)	0, 1	0	Yes	–	–	R	S	1
	016	U2	Arrival at final segment (final arrival of entered segments)	0, 1	0	Yes	–	–	R	S	1
Contact input	017	S3	Move to next wait command (When the command state changes from 0 to 1, output jumps to the final output value of the current step. S3 is automatically reset after the jump ends.) **Note:** This command is invalid during a wait operation. (This command, however, will accept the wait command in the following step after a wait ends if it is always set to 1 using the ladder program.)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	018	S4	Move to next step command (When the command state changes from 0 to 1, program execution jumps to the start of the next step. This command is automatically reset by the system after the jump ends.) **Note:** When the command state changes from 0 to 1 during a wait, wait is canceled, and program execution moves to the next step.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	019	U10	Waiting (0: Not waiting, 1: Waiting)	0, 1	0	Yes	–	–	R	S	1
	020*1	S5	Reference input disable switch (0: Enabled, 1: Disabled)	0, 1	0	Yes	R/W (O)	–	R/W	S/R	1
Parameter	022	B0	Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	023	A1	Step 1 A1 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	024	B1	Step 1 B1 output value	±320.00%	10.00	–	R/W(O)	W	–	–	2
	025	J1	Step 1 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	026	A2	Step 2 A2 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	027	B2	Step 2 B2 output value	±320.00%	20.00	–	R/W(O)	W	–	–	2
	028	J2	Step 2 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	029	A3	Step 3 A3 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	030	B3	Step 3 B3 output value	±320.00%	30.00	–	R/W(O)	W	–	–	2
	031	J3	Step 3 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	032	A4	Step 4 A4 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	033	B4	Step 4 B4 output value	±320.00%	40.00	–	R/W(O)	W	–	–	2
	034	J4	Step 4 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	035	A5	Step 5 A5 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	036	B5	Step 5 B5 output value	±320.00%	50.00	–	R/W(O)	W	–	–	2
	037	J5	Step 5 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	038	A6	Step 6 A6 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	039	B6	Step 6 B6 output value	±320.00%	60.00	–	R/W(O)	W	–	–	2
	040	J6	Step 6 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	041	A7	Step 7 A7 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	042	B7	Step 7 B7 output value	±320.00%	70.00	–	R/W(O)	W	–	–	2
	043	J7	Step 7 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	044	A8	Step 8 A8 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	045	B8	Step 8 B8 output value	±320.00%	80.00	–	R/W(O)	W	–	–	2
	046	J8	Step 8 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	047	A9	Step 9 A9 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	048	B9	Step 9 B9 output value	±320.00%	90.00	–	R/W(O)	W	–	–	2
	049	J9	Step 9 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	050	A10	Step 10 A10 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	051	B10	Step 10 B10 output value	±320.00%	100.00	–	R/W(O)	W	–	–	2
	052	J10	Step 10 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	053	A11	Step 11 A11 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	054	B11	Step 11 B11 output value	±320.00%	90.00	–	R/W(O)	W	–	–	2
	055	J11	Step 11 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	056	A12	Step 12 A12 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	057	B12	Step 12 B12 output value	±320.00%	80.00	–	R/W(O)	W	–	–	2
	058	J12	Step 12 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	059	A13	Step 13 A13 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	060	B13	Step 13 B13 output value	±320.00%	70.00	–	R/W(O)	W	–	–	2
	061	J13	Step 13 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	062	A14	Step 14 A14 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	063	B14	Step 14 B14 output value	±320.00%	60.00	–	R/W(O)	W	–	–	2
	064	J14	Step 14 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	065	A15	Step 15 A15 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	066	B15	Step 15 B15 output value	±320.00%	50.00	–	R/W(O)	W	–	–	2
	067	J15	Step 15 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	068	A16	Step 16 A16 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	069	B16	Step 16 B16 output value	±320.00%	40.00	–	R/W(O)	W	–	–	2
	070	J16	Step 16 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	071	A17	Step 17 A17 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	072	B17	Step 17 B17 output value	±320.00%	30.00	–	R/W(O)	W	–	–	2
	073	J17	Step 17 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	074	A18	Step 18 A18 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	075	B18	Step 18 B18 output value	±320.00%	20.00	–	R/W(O)	W	–	–	2
	076	J18	Step 18 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	077	A19	Step 19 A19 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	078	B19	Step 19 B19 output value	±320.00%	10.00	–	R/W(O)	W	–	–	2
	079	J19	Step 19 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	080	A20	Step 20 A20 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	081	B20	Step 20 B20 output value	±320.00%	0.00	–	R/W(O)	W	–	–	2
	082	J20	Step 20 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	083	A21	Step 21 A21 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	084	B21	Step 21 B21 output value	±320.00%	10.00	–	R/W(O)	W	–	–	2
	085	J21	Step 21 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	086	A22	Step 22 A22 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	087	B22	Step 22 B22 output value	±320.00%	20.00	–	R/W(O)	W	–	–	2
	088	J22	Step 22 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	089	A23	Step 23 A23 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	090	B23	Step 23 B23 output value	±320.00%	30.00	–	R/W(O)	W		–	2
	091	J23	Step 23 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	092	A24	Step 24 A24 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	093	B24	Step 24 B24 output value	±320.00%	40.00	–	R/W(O)	W	–	–	2
	094	J24	Step 24 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	095	A25	Step 25 A25 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	096	B25	Step 25 B25 output value	±320.00%	50.00	–	R/W(O)	W	–	–	2
	097	J25	Step 25 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	098	A26	Step 26 A26 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	099	B26	Step 26 B26 output value	±320.00%	60.00	–	R/W(O)	W	–	–	2
	100	J26	Step 26 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	101	A27	Step 27 A27 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	102	B27	Step 27 B27 output value	±320.00%	70.00	–	R/W(O)	W	–	–	2
	103	J27	Step 27 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	104	A28	Step 28 A28 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	105	B28	Step 28 B28 output value	±320.00%	80.00	–	R/W(O)	W	–	–	2
	106	J28	Step 28 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	107	A29	Step 29 A29 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	108	B29	Step 29 B29 output value	±320.00%	90.00	–	R/W(O)	W	–	–	2
	109	J29	Step 29 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1
	110	A30	Step 30 A30 time width, 0.0: End	0 to 3200.0	200.0	–	R/W(O)	W	–	–	2
	111	B30	Step 30 B30 output value	±320.00%	100.00	–	R/W(O)	W	–	–	2
	112	J30	Step 30 Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(O)	W	–	–	1

Wait setting

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	121	WT_SP01	Step 1 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	122	WT_TM01	Step 1 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	123	WT_SP02	Step 2 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	124	WT_TM02	Step 2 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	125	WT_SP03	Step 3 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	126	WT_TM03	Step 3 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	127	WT_SP04	Step 4 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	128	WT_TM04	Step 4 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	129	WT_SP05	Step 5 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	130	WT_TM05	Step 5 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	131	WT_SP06	Step 6 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	132	WT_TM06	Step 6 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	133	WT_SP07	Step 7 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	134	WT_TM07	Step 7 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	135	WT_SP08	Step 8 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	136	WT_TM08	Step 8 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	137	WT_SP09	Step 9 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	138	WT_TM09	Step 9 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	139	WT_SP10	Step 10 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	140	WT_TM10	Step 10 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	141	WT_SP11	Step 11 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	142	WT_TM11	Step 11 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	143	WT_SP12	Step 12 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	144	WT_TM12	Step 12 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	145	WT_SP13	Step 13 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	146	WT_TM13	Step 13 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	147	WT_SP14	Step 14 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	148	WT_TM14	Step 14 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	149	WT_SP15	Step 15 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	150	WT_TM15	Step 15 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	151	WT_SP16	Step 16 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	152	WT_TM16	Step 16 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	153	WT_SP17	Step 17 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	154	WT_TM17	Step 17 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	155	WT_SP18	Step 18 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	156	WT_TM18	Step 18 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	157	WT_SP19	Step 19 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	158	WT_TM19	Step 19 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–		2
	159	WT_SP20	Step 20 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–		2
	160	WT_TM20	Step 20 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–		2
	161	WT_SP21	Step 21 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–		2
	162	WT_TM21	Step 21 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–		2
	163	WT_SP22	Step 22 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	164	WT_TM22	Step 22 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	165	WT_SP23	Step 23 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	166	WT_TM23	Step 23 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	167	WT_SP24	Step 24 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	168	WT_TM24	Step 24 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	169	WT_SP25	Step 25 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	170	WT_TM25	Step 25 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	171	WT_SP26	Step 26 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	172	WT_TM26	Step 26 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	173	WT_SP27	Step 27 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	174	WT_TM27	Step 27 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	175	WT_SP28	Step 28 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	176	WT_TM28	Step 28 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	177	WT_SP29	Step 29 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	178	WT_TM29	Step 29 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	179	WT_SP30	Step 30 Wait width (0.00: No wait operation)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	180	WT_TM30	Step 30 Max. wait time (0.0: Unlimited)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2

Up Ramp/Down Ramp Area Start Designations (LCB01/05 Ver. 2.0 or later, or LCB03 Only)

Search Area Number Designation (Ver. 3.5 or Later)

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact output	189	SRCH WAIT	Search area designation wait	0, 1	0	Yes	r	–	R	S	1
Parameter	190	REF_ SET	Reference input search method (valid for ITEM 020=0) 0: Searches for the point matching the reference input value until the ramp direction changes (Same as LCB01/05 Ver. 1.5 or earlier) 1: Search in specified direction, first/second half Searches in the first half or second half when ITEM 192 or ITEM 193 is set to 1. 2: Search for specified section	0, 1	0	–	R/W(S)	W	–	–	2
	191	REF_ FSET	Processing method for when reference input search fails (valid for ITEM 020=0) Specify the operation when a matching point is not found. 0: Execution error when there is no matching point 1: Initial value start when there is no matching value	0, 1	0	–	R/W(S)	W	–	–	2
	192	REF_F	Reference input search area designation: First half 0 to 1: Specifies the first half as the search area for reference input matches. (Cleared to 0 after designation.)	0, 1	0	–	R/W(O)	–	R/W	S/R	1
	193	REF_L	Reference input search area designation: Second half 0 to 1: Specifies the second half as the search area for reference input matches. (Cleared to 0 after designation.)	0, 1	0	–	R/W(O)	–	R/W	S/R	1
Parameter	194	SRCH SECT	Search area number -1: B0 start 0 to 30: Search area number	-1, 0 to 30	0	Yes	R/W(O)	–	–	S/R	2

Time Axis Synchronous Operation Designations (LCB01/05 Ver. 2.0 or later, or LCB03 Only)

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	195	SYN_SET	Synchronous operation reference parameter designation 0: Master designation Not 0: Slave designation, designate the master block address	0 to 500	0	–	R/W(S)	–	–	–	2
Analog output	196	ST_TM	Time axis within step	0 to 3200.0	0.0	Yes	–	–	–	–	2

Note: • ITEM 190: Reference Input Search Method

ITEM 190 = 0

A search is performed for the point matching the reference input value until the ramp direction changes. If there is no matching point, operation will be performed according to the “Processing method for when reference input search fails” (ITEM 191).

ITEM 190 = 1 or 2

The program will not start until “Reference input search area designation: First half” (ITEM 192), “Reference input search area designation: Second half” (ITEM 193) or “Search area number” (ITEM 194) is designated. (An execution error will not occur.) If a matching point for the reference input is not found in the specified search area, execution error 02 (initial value error) will occur.

Step Executing Flags

ITEM TYPE	ITEM	Sym bol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact output	221	U11	Step 1 Executing flag Turns ON when the corresponding step is being executed. The ON status is held when waiting or when the time axis is stopped.	0, 1	0	–	–	–	R	–	1
	222	U12	Step 2 Executing flag	0, 1	0	–	–	–	R	–	1
Contact output	223	U13	Step 3 Executing flag	0, 1	0	–	–	–	R	–	1
	224	U14	Step 4 Executing flag	0, 1	0	–	–	–	R	–	1
	225	U15	Step 5 Executing flag	0, 1	0	–	–	–	R	–	1
	226	U16	Step 6 Executing flag	0, 1	0	–	–	–	R	–	1
	227	U17	Step 7 Executing flag	0, 1	0	–	–	–	R	–	1
	228	U18	Step 8 Executing flag	0, 1	0	–	–	–	R	–	1
	229	U19	Step 9 Executing flag	0, 1	0	–	–	–	R	–	1
	230	U20	Step 10 Executing flag	0, 1	0	–	–	–	R	–	1
	231	U21	Step 11 Executing flag	0, 1	0	–	–	–	R	–	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	232	U22	Step 12 Executing flag	0, 1	0	–	–	–	R	–	1
	233	U23	Step 13 Executing flag	0, 1	0	–	–	–	R	–	1
	234	U24	Step 14 Executing flag	0, 1	0	–	–	–	R	–	1
	235	U25	Step 15 Executing flag	0, 1	0	–	–	–	R	–	1
	236	U26	Step 16 Executing flag	0, 1	0	–	–	–	R	–	1
	237	U27	Step 17 Executing flag	0, 1	0	–	–	–	R	–	1
	238	U28	Step 18 Executing flag	0, 1	0	–	–	–	R	–	1
	239	U29	Step 19 Executing flag	0, 1	0	–	–	–	R	–	1
	240	U30	Step 20 Executing flag	0, 1	0	–	–	–	R	–	1
	241	U31	Step 21 Executing flag	0, 1	0	–	–	–	R	–	1
	242	U32	Step 22 Executing flag	0, 1	0	–	–	–	R	–	1
	243	U33	Step 23 Executing flag	0, 1	0	–	–	–	R	–	1
	244	U34	Step 24 Executing flag	0, 1	0	–	–	–	R	–	1
	245	U35	Step 25 Executing flag	0, 1	0	–	–	–	R	–	1
	246	U36	Step 26 Executing flag	0, 1	0	–	–	–	R	–	1
	247	U37	Step 27 Executing flag	0, 1	0	–	–	–	R	–	1
	248	U38	Step 28 Executing flag	0, 1	0	–	–	–	R	–	1
	249	U39	Step 29 Executing flag	0, 1	0	–	–	–	R	–	1
	250	U40	Step 30 Executing flag	0, 1	0	–	–	–	R	–	1

Note: •To stop execution of the segment program, set An time width to "0". (U2 arrival at final segment (ITEM 016) turns to ON.)
When Y2 elapsed time output (ITEM 009) reaches 3200.0, ITEM 009 is not refreshed. The value of 3200.0 is maintained, but control continues.
•When a hot start is performed, the segment program starts midway through the segment immediately before the instantaneous power interruption occurred or immediately before the program was stopped according to the elapsed time.
For the LCB01/05 Ver. 2.00 or later, or for the LCB03, operation will be as described above if the “Reference input search method” (ITEM 190) is set to 0. If it is set to 1, a search will be performed in the specified first half/second half direction.
•The setting of the “Elapsed time output” (ITEM 009) will not affect program settings even if it is changed. The output will be the time from when the run/stop command was turned ON. (The lapsed time output will stop when the Hold Switch is ON.) Timing will continue during Waiting (ITEM 019).
If the “Reference input search method” (ITEM 190) is set to “1: Search in specified direction, first/second half” on the LCB01/05 Ver. 2.00 or later, or for the LCB03, and a power interruption or a HOT start occurs, the elapsed time output is held until the first/second half designation is made. Timing is restarted when the first/second half designation is made.
When a master block address is specified in the “Synchronous operation reference block designation (ITEM 195) (i.e., a value other than 0), operation is based on the master block. Thus, if the run/stop command is ON for both the slave block and the master block, the slave block outputs the elapsed time from the master block. If the hold switch is ON in the master block, the elapsed time value will stop in the slave block as well. The elapsed time can, however, be stopped in just the slave block.
•Reset the run/stop command (S1: ITEM 012) whenever the operation cycle has been changed.
•If the “Move to next wait command” is turned ON, the program output will ignore the remaining time, the set value will be output, and the wait operation will be started. The next step will be moved to when the wait operation has been finished.
The “Move to next wait step command” is automatically reset after the command is detected. It is, however, disabled while waiting.
•When the “Move to next step command” is turned ON, the next step is always moved to.

The “Move to next step command” is automatically reset after the command is detected. If the “Move to next step command” is turned ON while waiting, the wait operation will be ended and the next step will be executed.
•The elapsed time cannot be changed. It is an indication only.
•If a step time setting (A1 to A30) is changed to 0.0, the program will end on that step and the following steps will not be executed.
•Any of the parameters related to steps can be changed at any time.
•At start, the value set for ITEM 007 (i.e., ITEM 007) is compared to the program set value and execution is started at the step where the values match. The range of the signals that are compared is the range to the inflection point of the program set value. If the value is not in the program set value range when starting, an input error signal will be output.

Note The following ITEMs ITEM 022 to ITEM 180 can be changed while the segment program is running (for the duration that S1 run/stop command is 1). Any changes made are immediately reflected in program execution.
B0 initial value, A□ time width for each step, B□ final output for each step, J□ time unit for each step, wait width for each step, and maximum wait time for each step.

Note Do not change ITEM 004 (operation cycle), ITEM 012 (elapsed time unit) while the segment program is running (for the duration that S1 run/stop command is 1). Otherwise, ITEM 008 (program output) and ITEM 009 (elapsed time output) will not be calculated correctly.
Before changing the values of these ITEMs, temporarily set S1 run/stop command to 0 (OFF). After changing the values, set S1 run/stop command to 1 (ON) and restart the program.

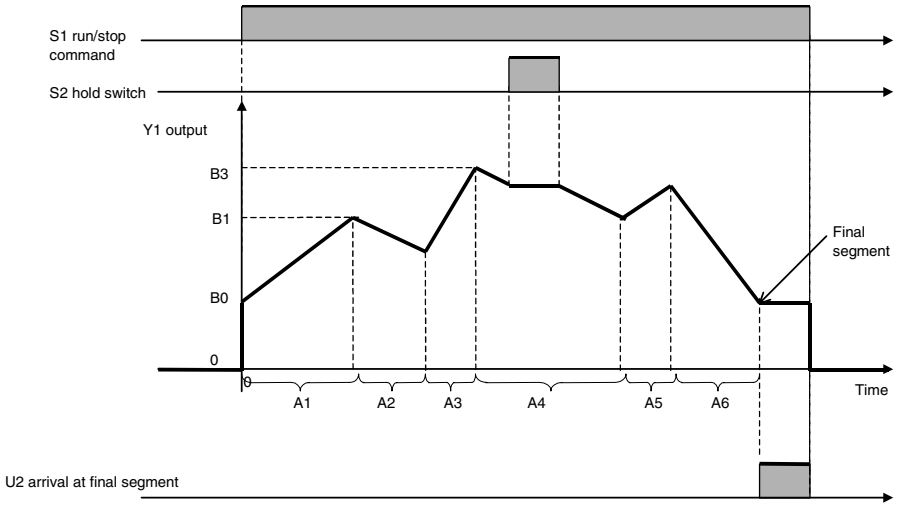
List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Reference input	X1
008	Program output	Y1
009	Elapsed time output	Y2
011	Step output	Y3
012	Elapsed time unit	H1
013	Run/stop command	S1
014	Hold switch	S2
015	X1 input error	U1
016	Arrival at final segment	U2
017	Move to next wait command	S3
018	Move to next step command	S4
019	Waiting	U10
020	Reference input disable switch	S5
192	Reference input search area designation: First half (LCB01/05 Ver. 2.0 or later, or LCB03 Only)	REF_F
193	Reference input search area designation: Second half (LCB01/05 Ver. 2.0 or later, or LCB03 Only)	REF_L
194	Search area number	SRCHSECT

Description

When the segment program is started from B0 default:



When the segment program is started from X1 reference input:

If a cold start is performed when the reference input is enabled (i.e., ITEM 020 = 0), the area can be designated and the segment program will start from the point matching the X1 reference input.

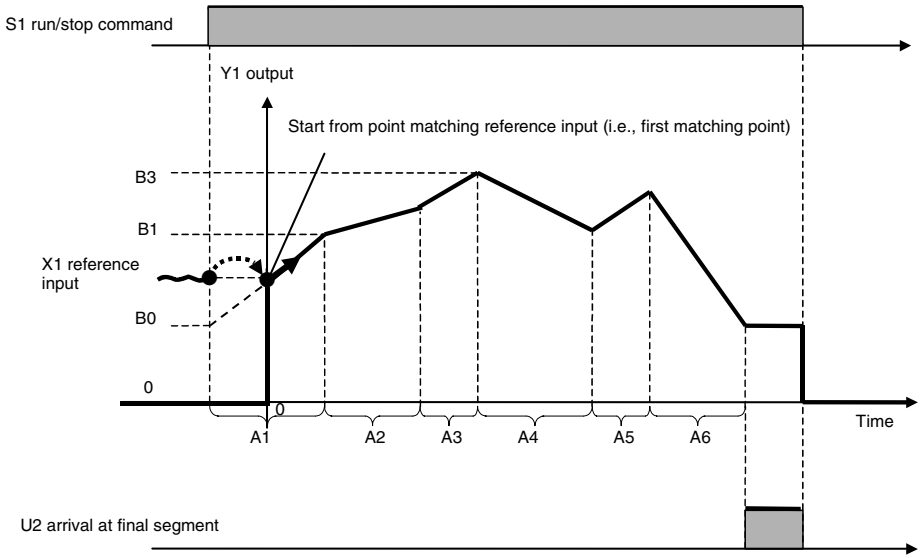
The operation depends on the unit version of the Loop Controller and the “reference input search method” (ITEM 190), as explained next.

Note 1: The program starts from B0 when the “reference input disable switch” (ITEM 020) is set to “1: Disabled.”

2: When a hot start is performed, operation will continue from the value used before power was turned OFF. To restart from the X1 reference input when using a hot start, set ITEM 018 (START mode at power ON) in the System Common block (Block Model 000) to 0 (Hot start with specified time) and set ITEM 037 (Hot start enabled time) in the System Common block (Block Model 000) to a time longer than the power OFF time.

LCB01/05 Ver.1.5 or Earlier

A search is made for points matching the X1 reference input value until the direction of the ramp changes from the direction in the first step. When the point matching the X1 reference input is found, the program is started from this point (i.e., the first matching point).



If no matching point is found, an execution error (2: initial value error) will occur and Y1 output will remain set to 0 (OFF).

LCB01/05 Ver.2.0 or Later, and LCB03 Ver.2.0 or Later

There are two start point search functions that can be used.

"Reference Input Search Method" (ITEM 190) = 1 "Search in Specified Direction, First/Second Half"

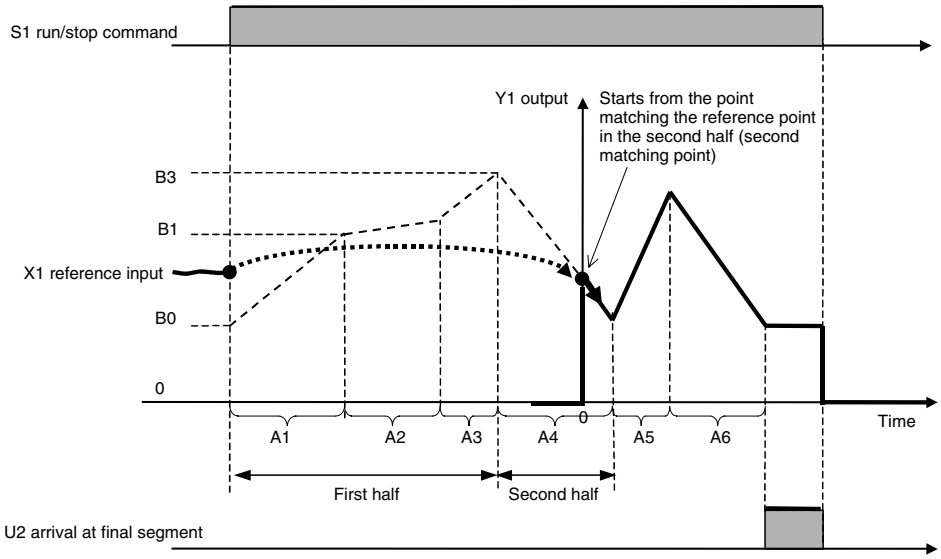
When "Reference input search area designation: First half" (ITEM 192) or "Reference input search area designation: Second half" (ITEM 193) is set to 1 (ON), the search for the reference input matching point will be performed in the specified first half (ITEM 192 = 1) or second half (ITEM 193 = 1) direction.
The program will not start until either ITEM 192 or ITEM 193 is set to 1.

Note: If the "reference input search method" (ITEM 190) is set to 1, ITEM 192 and ITEM 193 will be automatically cleared to 0. Reset ITEM 192 and ITEM 193 after they are cleared to 0.

"Reference input search area designation: First half" (ITEM 192) = 1:
The program will start from the point matching the X1 reference input found within the first half (time until the direction changes from the direction in the first step). This point is the first matching point. (After the program starts, ITEM 192 is automatically cleared to 0.)

"Reference input search area designation: Second half" (ITEM 193) = 1:
The program will start from the point matching the X1 reference input found within the second half. This point is the second matching point. (After the program starts, ITEM 193 is automatically cleared to 0.)

The following diagram is an example for when ITEM 193 is set to 1 for the second half search area.



"Reference Input Search Method" (ITEM 190) = 0 (Searches for the point matching the reference input X1 value until the ramp direction changes)

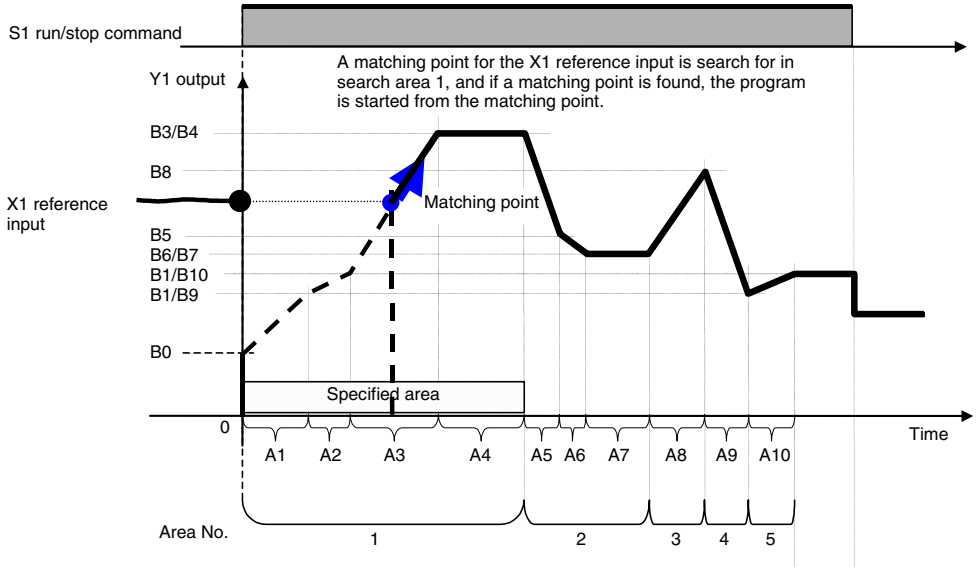
Operation is the same as for LCB01/05 Ver.1.5 or earlier. Therefore, the point matching the X1 reference input value is searched until the direction changes from the ramp direction in the first step. The program starts from the point matching the X1 reference input (first matching point).

LCB01/03/05 Ver. 3.5 or Later

There are three start point search functions that can be used.

Reference Input Search Method (ITEM 190) = 2 (Search in Designated Search Area)

The area number is specified in ITEM 194 (Search area number) as the area in which to search for a point matching the reference input. The program will not start until a search area number is specified in ITEM 194. The following example shows searching in a specified search area (ITEM 190 = 2) for the start point search function.



Search Areas
Search area 1 extends from B0 as the starting point until the first ramp ends (i.e., the area from A0 to A4, including the soaking step) and search area 2 extends until the next ramp ends (i.e., the area from A5 to A7). Search area 3 is A8, search area 4 is A9, and search area 5 is A10.
Search Method
A point matching the X1 reference input is searched for in the specified search area. If a matching point is found, the program will start from the matching point.

Reference Input Search Method (ITEM 190) = 1 (Search in Specified Direction, First/Second Half)
By setting either ITEM 192 (Reference input search area designation: First half) or ITEM 193 (Reference input search area designation: Second half) to 1, a point matching the reference input is searched for in either the first half or the second half. This is the same operation as for LCB01/03/05 Ver. 3.0 or earlier.

Reference Input Search Method (ITEM 190) = 0 (Search for the Point Matching the Reference Input Value until the Ramp Direction Changes)
This is the same operation as for LCB01/05 Ver. 1.5 or earlier. That is, a matching point for the X1 reference input is searched for until the ramp direction changes in comparison to the ramp direction of the first step. The program will start from the point matching the X1 reference input (i.e., from the first matching point). This is the same operation as for LCB01/03/05 Ver. 3.0 or earlier.

ITEM 191: Processing Method for When Reference Input Search Fails

When no point matching the X1 reference input is found, execution will be according to the value set for “processing method for when reference input search fails” (ITEM 191).

ITEM 191 = 0 (Execution Error When There Is No Matching Point)

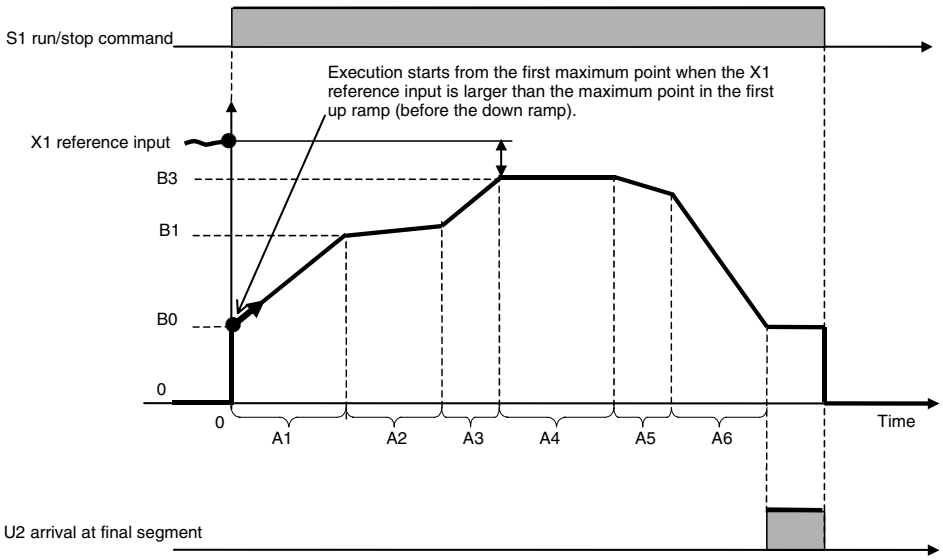
When no match is found, an execution error (2: initial value error) occurs and the program output (ITEM 008) value remains set to 0.

ITEM 191 = 1 (Initial Value Start When There Is No Matching Value)

1) ITEM 190 = 0 (Searches for the point matching the reference input X1 value until the ramp direction changes)

If there is no point matching the reference input before the ramp direction changes, the program will start from the B0 point.

In the following example, no point matching the reference input is found in the first ramp area, so the program started from the B0 point.



2) ITEM 190 = 1 “Search in Specified Direction, First/Second Half”

2-1) First half is an up ramp:

2-1-1) Reference input value is larger than maximum point in the specified half (first half or second half)

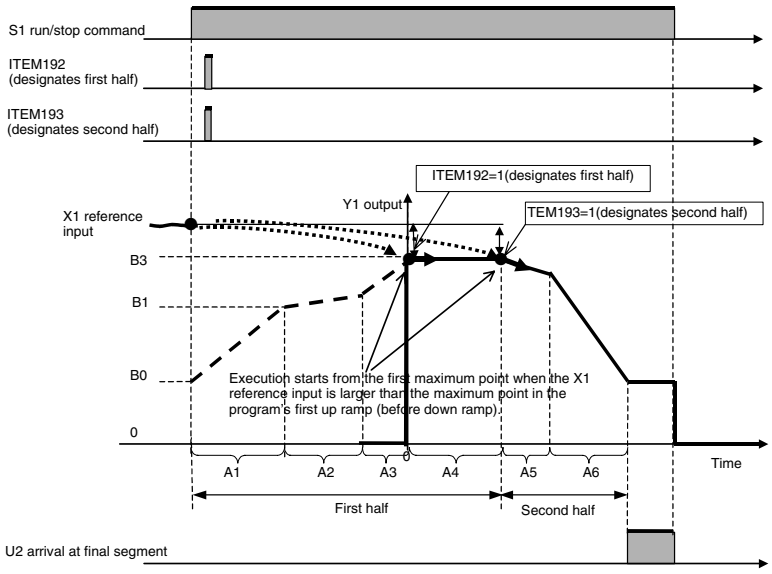
Maximum point is not in a soaking step:

Reference input is larger than the maximum point in either the designated first half or second half. The program will start from the first maximum point when either ITEM 192 is set to 1 (designates first half) or ITEM 193 is set to 1 (designates second half).

Maximum point is in a soaking step:

When ITEM 192 is set to 1 (first half), execution will start from the beginning of the soaking step (last step of the first half).

When ITEM 193 is set to 1 (second half), execution will start from the beginning of the first step in the second half (next down ramp step after the soaking step).



2-1-2) Reference input value is smaller than the minimum point in the designated half (first half or second half):

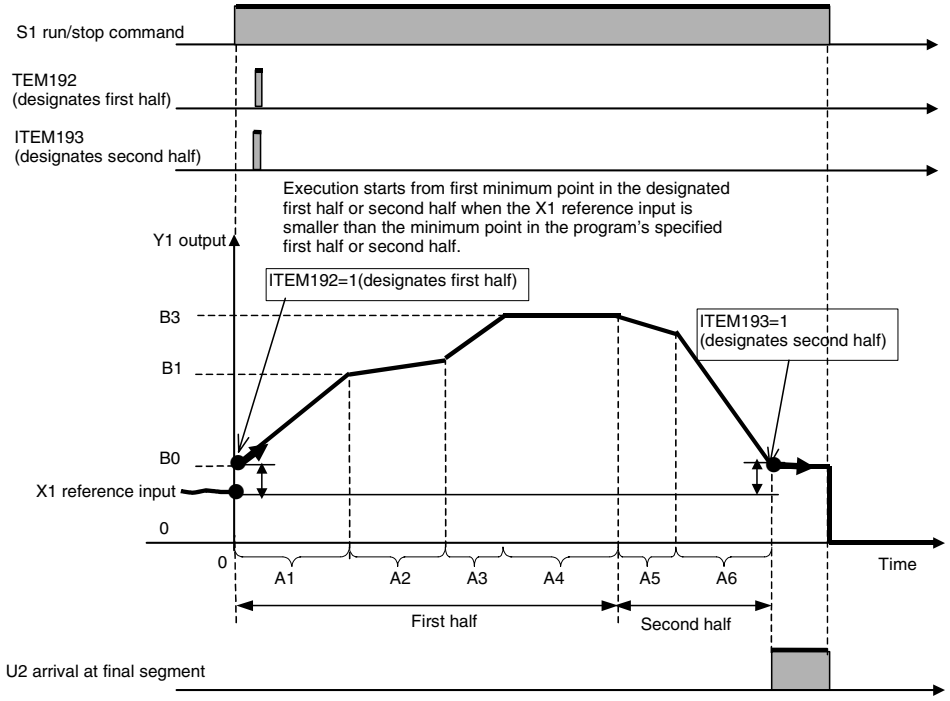
Minimum point is not in a soaking step:

Execution will start from the B0 point when either ITEM 192 (designates first half) or ITEM 193 (designates second half) is set to 1.

Minimum point is in a soaking step:

Execution will start from the beginning of the soaking step (last step in first half) when ITEM 192 is set to 1 (designates first half).

Execution will start from the first step in the second half (the up step following the soaking step) when ITEM 193 is set to 1 (designates second half).



2-2) First step is a down ramp:

2-2-1) Reference input value is smaller than the minimum point in either the designated first half or second half.

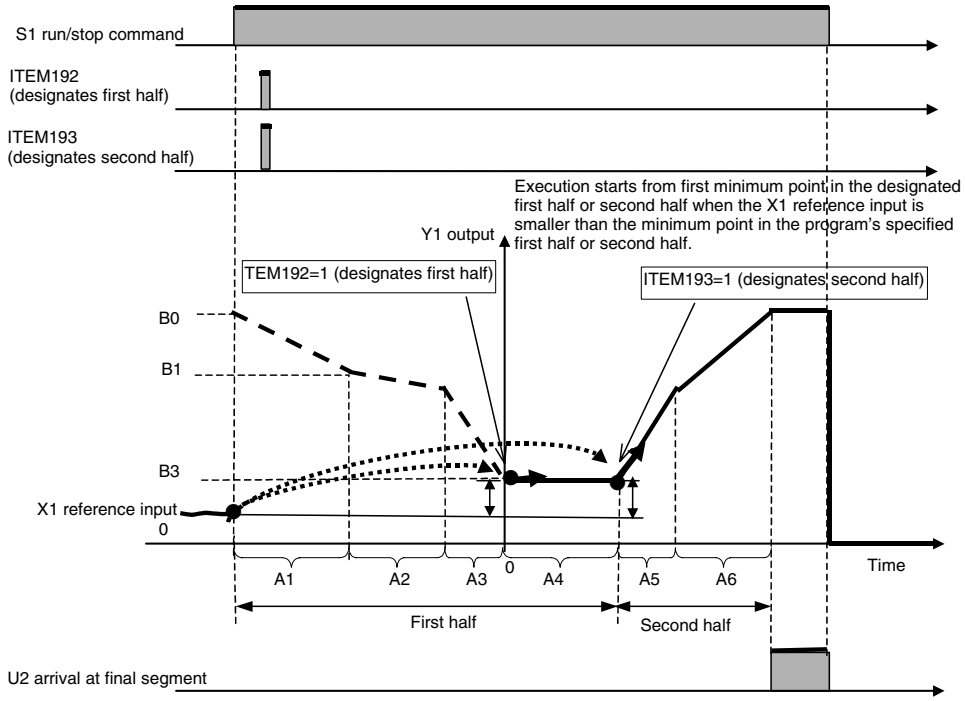
Minimum point is in a soaking step:

When ITEM 192 is set to 1 (designates first half), execution will start from the beginning of the soaking step (last step of the first half).

When ITEM 193 is set to 1 (designates second half), execution will start from the beginning of the first step in the second half (next up ramp step after the soaking step).

Minimum point is not in a soaking step:

Execution will start from the first minimum point when either ITEM 192 is set to 1 (designates first half) or ITEM 193 is set to 1 (designates second half) is set to 1.



2-2-2) Reference input value is larger than the maximum point in either the designated first half or second half.

Maximum point is not in a soaking step:

Execution will start from the maximum point in the first half (B0) when ITEM 192 is set to 1 (designates first half).

Execution will start from the maximum point in the second half when ITEM 193 is set to 1 (designates second half).

Maximum point is in a soaking step:

Execution will start from the beginning of the soaking step when ITEM 192 is set to 1 (designates first half).

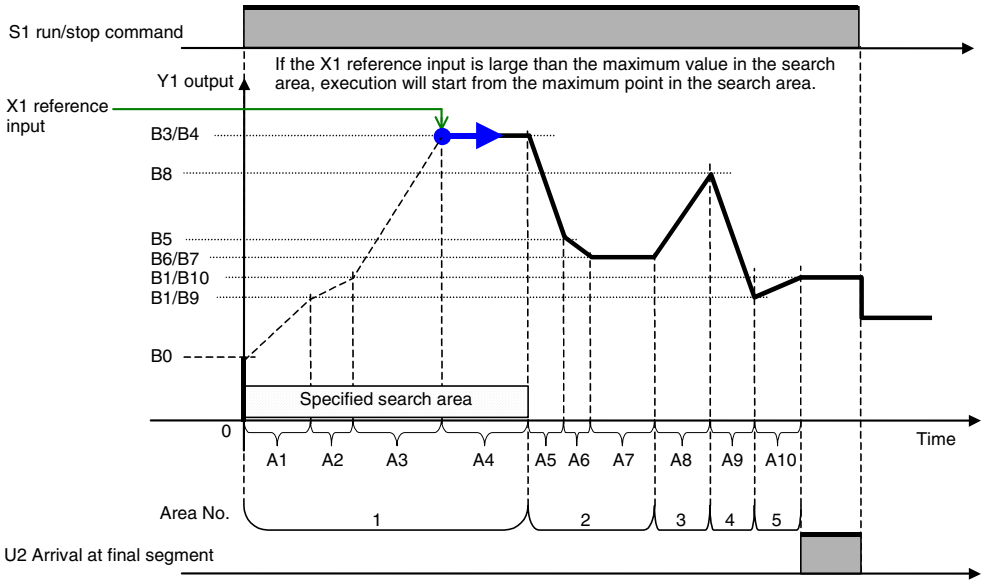
Execution will start from beginning of the maximum point in the second half (the soaking step) when ITEM 193 is set to 1 (designates second half).

3) ITEM 190 = 2 (Searching in Specified Search Area)

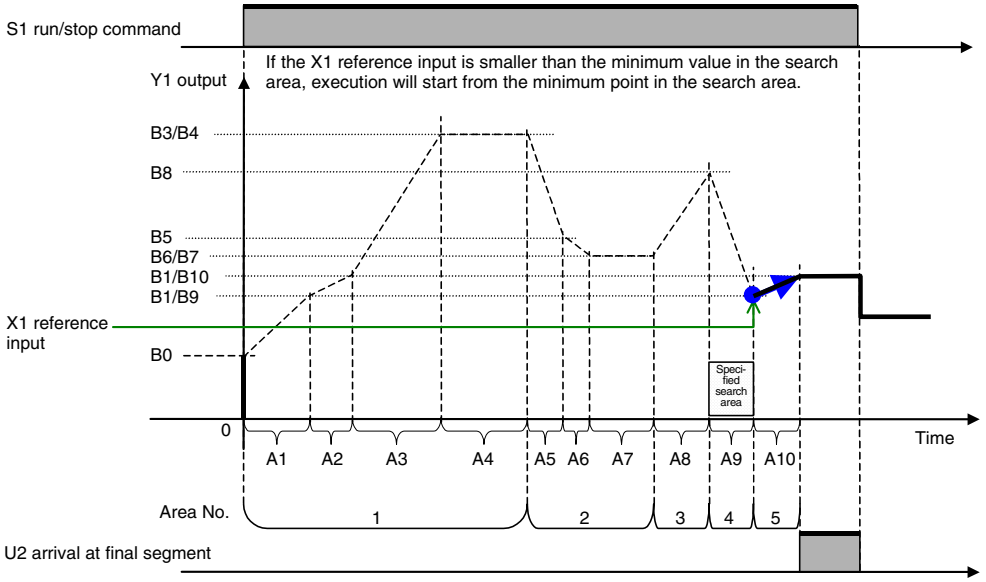
If there is not a point that matches the reference input value in the specified search area, the start point will be determined by whether the reference input value is larger or smaller than the searched values.

When X1 Reference Input Is Larger Than the Maximum Value in the Search Area:

Execution will start from the maximum point in the search area (from the beginning of the soaking step in the following figure).



When X1 Reference Input Is Smaller Than the Minimum Value in the Search Area: Execution will start from the minimum point in the search area (from the end point in the search area in the following figure).



When a wait operation is performed based on X1 reference input

When X1 reference input has not arrived Y1 output±wait width (of current step) value at the final point of each step, program execution does not move to the next step, and Y1 output is held. Program execution moves to the next step when X1 reference input arrives at Y1 output±wait width (of current step) value.
To cancel a wait operation midway, change the state of S4 move to next step command from 0 (OFF) to 1 (ON).

Note 1: The wait operation functions to hold output at the final value of the current step if wait operation is set to ON for that step. For this reason, to enable wait operation when moving from a ramp step to a soaking step, wait operation is set not to the soaking step but to the ramp step.

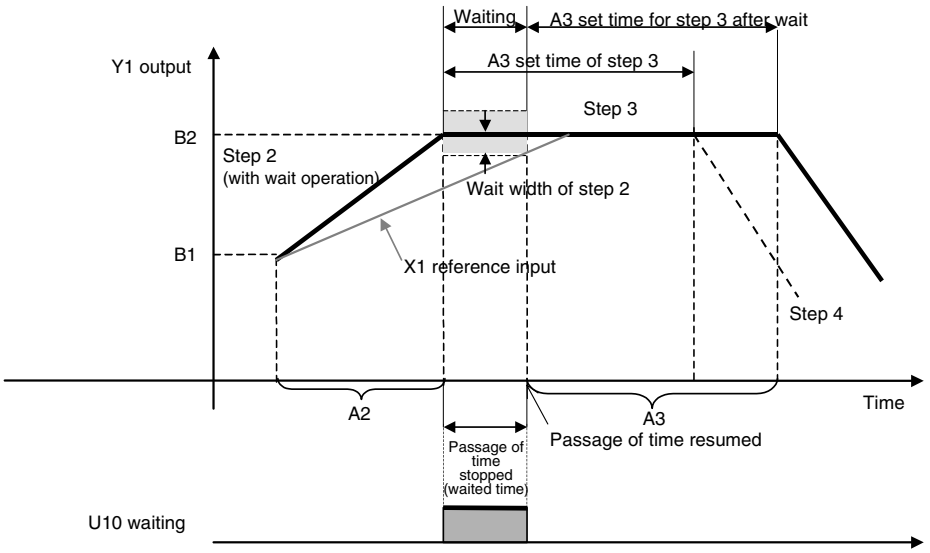
2: Setting the wait width to 0.00% disables the wait operation. So, the wait width is actually set within the range 0.01 to 320.00%.

3: Wait operation is canceled when the S4 move to next step command changes state from 0 (OFF) to 1 (ON).

4: Even during a wait, Y2 elapsed time output continues and increases. Y2 stops only when S2 hold switch is 1 (ON).

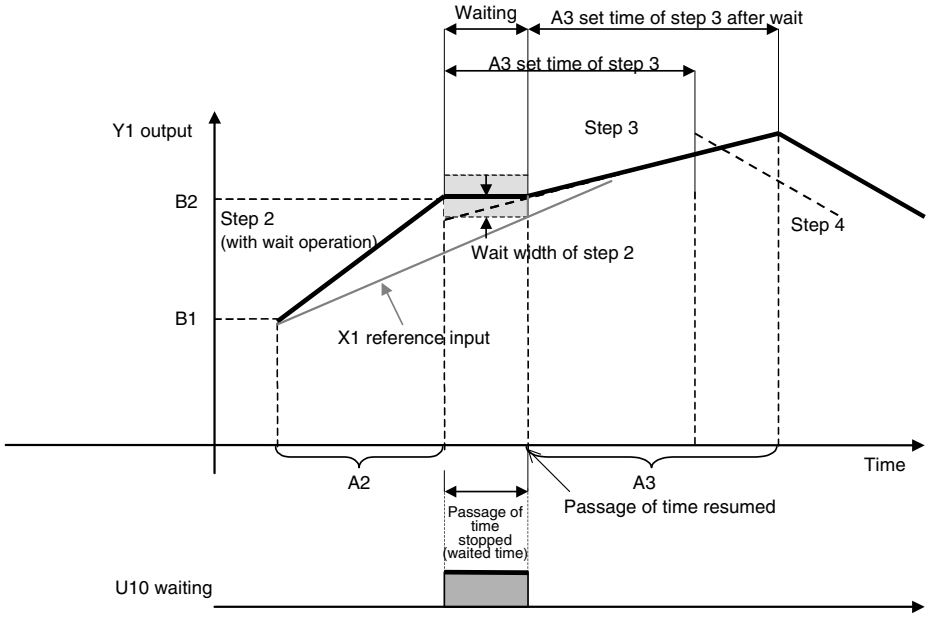
When program execution moves from the ramp step (wait operation ON) to the soaking step

Y1 output does not move to step 3 and the program execution waits at the final value of step 2 until X1 reference input falls in Y1±wait width. After the wait, A3 set time of step 3 is secured.



When program execution moves from the ramp step (wait operation ON) to another ramp step

Y1 output does not move to step 3 and program execution waits (value is held) at the final value of step 2 until X1 reference input X1 falls in Y1± wait width (of step 2). After the wait, the ramp of step 3 is started, and A3 set time is secured. Subsequent program operation shifts by the time that wait operation was performed.



When program execution jumps to wait operation in the current step by S3 move to next wait command

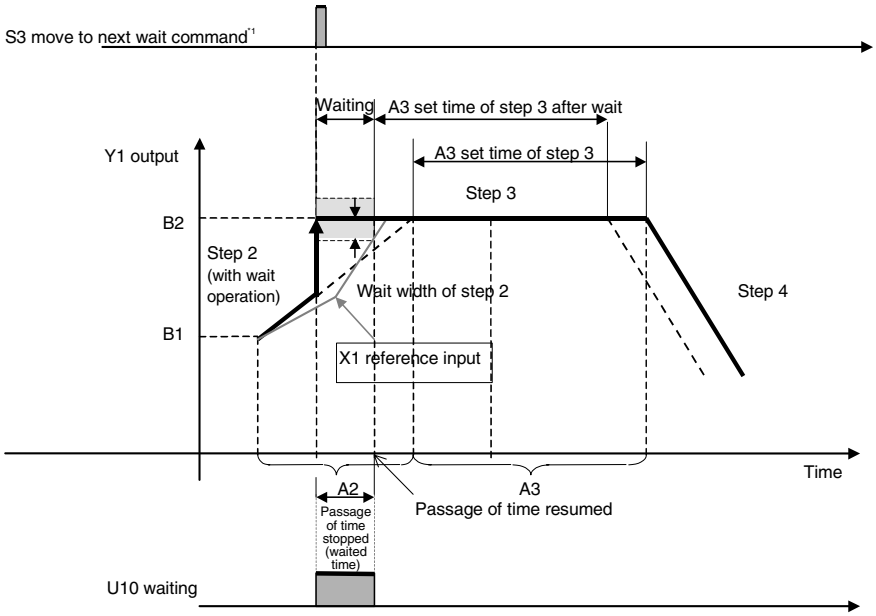
To disable waiting for the set time of the step until wait operation is entered though the wait width must be entered, change the state of the S3 move to next wait command from 0 (OFF) to (ON). When the state of the S3 move to next wait command changes from 0 (OFF) to 1 (ON), program execution jumps to the final value of the current step. (This brings X1 reference input closer to the wait width more quickly.) Wait operation is started from the current step if wait operation is set to ON for that step.

Note: The S3 move to next wait command functions to cause program execution to jump to the final value of the current step. For this reason, if wait operation is set to OFF for the current step, program execution moves to the next step as it is.

If S3 move to next wait command turns 0 (OFF) during execution of step 2, the program jumps to B2 the final value of that step.

(1) If wait operation is set to ON at step 2, B2 remains at it is, and program execution waits for X1 reference input to approach. When X1 reference input is in Y1±wait width, program execution moves to step 3.

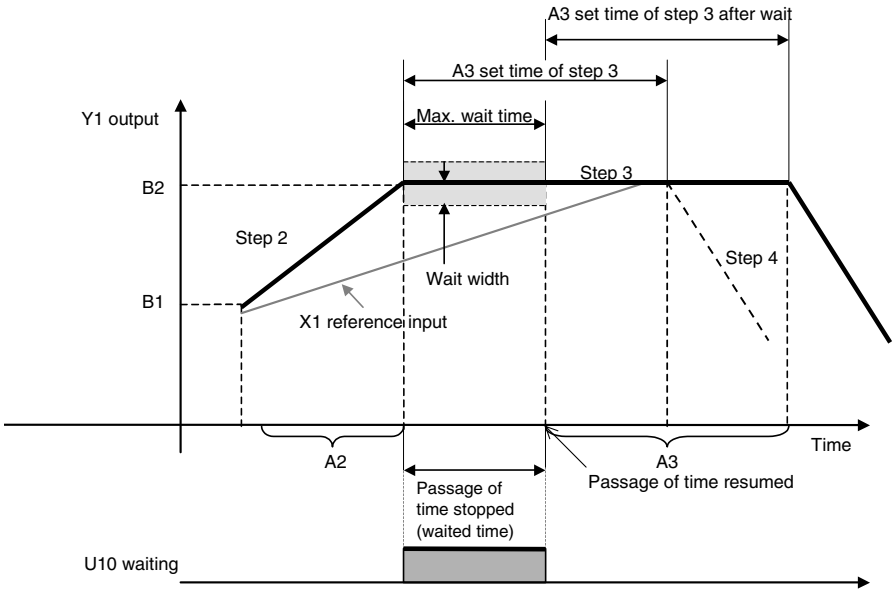
(2) If wait operation is set to OFF at step 2, program execution moves to step 3 as it is.



*1: When S3 move to next wait command changes to 1 (ON), program execution jumps to the final value of the current step, and the system automatically turns S3 to 0 (OFF) immediately after the jump.

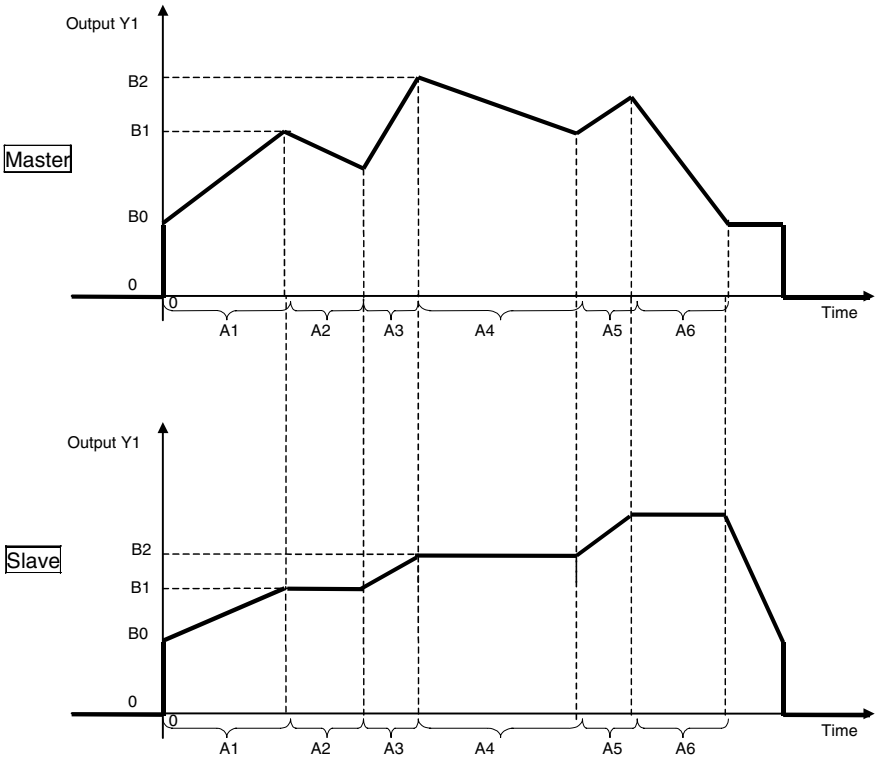
When X1 reference input is not in Y1 output±wait width even though the maximum wait time has elapsed

When X1 reference input is not in Y1 output±wait width even though the maximum wait time has elapsed, the wait operation is forcibly quit, program execution moves to the next step, and time measurement is started.



Synchronizing Time Axes for Multiple Segment Program 2 Blocks (LCB01/05 Ver. 2.0 or later, or LCB03 Only)

The time axes can be synchronized for multiple segment program 2 blocks. As shown in the following diagram, the slave is synchronized to the time widths of the master. To synchronize the time axes, the block address of the segment program 2 block to function as the master must be input for the “Synchronous operation reference block designation” (ITEM 195). The segment program 2 block specified as the master block will operate as it normally would independent from the status of the slave block. The segment program 2 block specified as the slave block will operate based on the “Elapsed time output” (ITEM 009), “Step output” (ITEM 011), and “Elapsed time unit” (ITEM 012) of the master block. If the “Run/stop command” (ITEM 013) turns ON in the master block, the command will also turn ON in the slave block.
More than one slave block can specify the same block as the master block and a slave block can be specified as the master block for another slave block (i.e., the slave of a slave).



Details

- Behavior when Operating Status Differs between Master and Slave Blocks
  The run/stop command in the slave block can be turned OFF, in which case the outputs will go to 0. If the master block is already operating when the run/stop command in the slave block turns ON, the slave block will operate using the same step position as the master block. If the master block is not operating, the slave block will not operate until the master block starts operating.
- Hold Switch (ITEM 014)
  If the “Hold switch” (ITEM 014) turns ON in the master block, it will also turn ON in the slave block and the time axes will stop (outputs will be held).
  If the “Hold switch” (ITEM 014) turns ON in the slave block, the master block will not be affected and the slave block time axis will stop (outputs will be held).
- Move to Next Wait Command (ITEM 017) and Move to Next Step Command (ITEM 018)
  These will not be effective (held to ON) even if turned ON in the slave block. Use the master block to turn them ON.
- Execution Error (ITEM 003) in Master Block
  If an execution error occurs in the slave block, error code 40 (master block execution error) will be occur and the program will stop.
- Operation Cycle (ITEM 004)
  Set the slave block to the same operation cycle as the master block. If the slave block’s operation cycle is not the same as that of the master block, an execution error (71: inappropriate parameter) will occur.
- Deletion of Master Block during Operation
  If the master block is deleted during operation, an execution error (70: illegal Combination of function blocks) will occur in the slave block and output values will be held. To stop operation of the slave block, turn OFF the run/stop command.
- If the master block is changed during operation, the slave will continue operation based on the new master block.
- Time Axis within Step (ITEM 196)
  This ITEM is output by the master block and referenced by the slave block.
- Turning OFF Synchronization

Use the following procedure to turn OFF synchronization.

1) Reset the master block.
   Set ITEM 013 (run/stop command) for the master block to 0.
2) Turn OFF the master designation.
   Set ITEM 195 (synchronous operation reference block) for the slave block to 0.

Execution Errors

1 Source/Destination Designation Not Defined
This error occurs when a block address or ITEM number specified for a source does not exist. If this occurs, ITEM 015 (X1 input error) will turn ON.

2 Initial Value Error
- This error occurs when the reference input is not in an up ramp region when the run/stop command turns ON. If this occurs, ITEM 015 (X1 input error) will turn ON.
- This error occurs when there are only up ramps or only down ramps when the "Reference search input method" (ITEM 190) is set to "Search in specified direction, first/second half." (This is checked when ITEM 192 or ITEM 193 is turned ON.) (LCB01/05 Ver. 2.0 or later, or LCB03 Only)
- This error occurs when the specified area does not exist when the "Reference search input method" (ITEM 190) is set to 2 ("Searching in Specified Search Area"). (Ver. 3.5 or later)

19 Inappropriate Operation (LCB01/05 Ver 2.0 or later, and LCB only)
- This error occurs when "synchronous operation reference block" (ITEM 195) is set to 0 during operation of the slave block.

40 Master Block Error (LCB01/05 Ver 2.0 or later, and LCB only)
- This error occurs when an execution error occurs in the master.

70 Illegal Combination of function blocks (LCB01/05 Ver 2.0 or later, and LCB only)
- This error occurs when the segment program 2 block is not specified as the master block (the function block for the block address registered in ITEM 195 is not specified as Block Model 157: Segment Program 2)
- This error occurs when segment program 2 specified as the master is deleted during operation.
- This error occurs when the same block address as the local block is set in the "synchronous operation reference block" (ITEM 195).

71 Inappropriate Parameter (LCB01/05 Ver. 2.0 or later, or LCB03 only)
- This error occurs when the operation cycle (ITEM 004) of the slave block is not the same as the operation cycle of the master block.

Block Model	Block Name	Block Address
<158>	Segment Program 3	001 to 500

Outline

This function block is a segment program setting with a bank (e.g., PID) change function and wait function for setting times and outputs in segments.

The following are the main Segment Program 3 block functions.

- Bank (e.g., PID) Change Function
  When moving between steps, the bank set for each step (parameter groups containing PID constants, MV upper limit, MV lower limit, etc.) can be written to a PID block, either a Basic PID block (Block Model 011) or an Advanced PID block (Block Model 012).

- Batch Reading and Writing of Program Pattern Data from and to the CPU unit
  Program pattern data (step data and bank data) can be batch read from I/O memory in the CPU Unit. This enables batch changing step data and bank data using the ladder program in the CPU Unit. The data can also be read to I/O memory, making it possible to save program pattern data.

- Time Display
  The following items can be displayed: Program total time, elapsed time output, program time output, program remaining time, time axis within step, and step remaining time.

- Output Mode Specification When Run/Stop Command Turns OFF
  Either of the following two methods can be selected for when Segment Program 3 S1 run/stop command turns OFF:
  - Continue the output value from before the command turned OFF.
  - Output the preset value when resetting.

- AT Commands to PID Blocks
  AT can be executed from the Segment Program 3 block (Block Model 158) for the Basic PID (Block Model 011) or Advanced PID (Block Model 012) blocks.

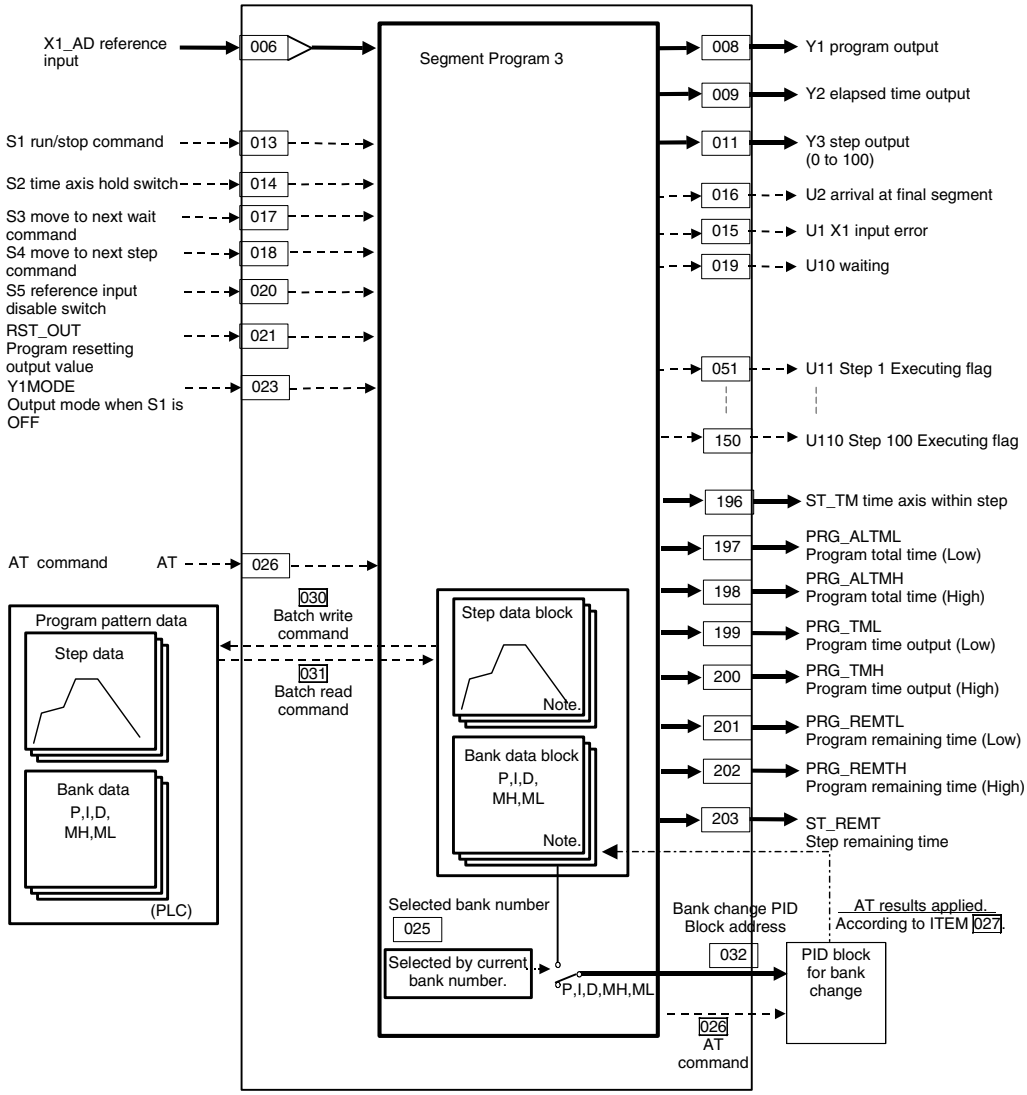
- Operation Start Position Specification
  Operation can be started from the point where the initial ramp (until the ramp changes) matches the reference input value.

The following table shows the differences between Segment Program 2 and Segment Program 3.

Differences with Segment Program 2 (Block Model 157)

		Segment Program 3 (Block Model 158)	Segment Program 2 (Block Model 157)
Number of steps		100	30
Wait function		Yes	Yes
Bank (e.g. PID) change function		Yes	–
Batch reading and writing of program pattern data from and to the CPU Unit		Yes	–
Time display	**Elapsed time**	Yes	Yes
	Program total time	Yes	–
	Program time output	Yes	–
	Program remaining time	Yes	–
	Time axis within step	Yes	Yes
	Step remaining time	Yes	–
Output mode specification when S1 run/stop command turns OFF		Yes	–
AT Commands to PID Blocks		Yes	–
Operation start position specification	**X1 reference input start (first ramp)**	Yes	Yes
	Up/down area start specification (second ramp)	–	Yes
	Search area number specification (third ramp)	–	Yes
Time axis synchronization		–	Yes

Block Diagram



Note:

- Step data is stored in Step Data blocks (Block Model 601).
- Bank data is stored in Bank Data blocks (Block Model 602).

Note Step Data Blocks (Block Model 601) and Bank Data Blocks (Block Model 602)

- The Step Data block (Block Model 601) and Bank Data block (Block Model 602) serve as function blocks for Segment Program 3 (Block Model 158) expansion settings.
- When Segment Program 3 (Block Model 158) is registered using the CX-Process Tool, the Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) are registered automatically. The required number of blocks for the maximum number of steps used (ITEM 038) and the maximum number of banks used (ITEM 043) are created automatically. (See note.)

Note: When the block addresses for the Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) are created automatically, the largest block addresses from 500 down will be allocated.

The Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) cannot be edited individually as function blocks using the CX-Process Tool. They can

be edited by right-clicking on the ITEM list for the Segment Program 3 block (Block Model 158) and selecting ***Extension*** from the pop-up menu.

Note
- The Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) cannot be downloaded individually. They are downloaded together with the Segment Program 3 block (Block Model 158).
- The Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) cannot be deleted individually. They are deleted by reducing the maximum numbers of banks and steps for the Segment Program 3 block (Block Model 158) and then again downloading the Segment Program 3 (Block Model 158) block to the LCB.

- The required number of Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) are created automatically, as shown in the following tables, depending on the settings for the maximum number of steps and banks.

Relation between Maximum Number of Steps Used (ITEM 038) and Number of Step Data Blocks (Block Model 601)

Maximum number of steps used (ITEM 038)	Number of Step Data blocks (Block Model 601) created automatically
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4

Relation between Maximum Number of Banks Used (ITEM 043) and Number of Bank Data Blocks (Block Model 602)

Maximum number of banks used (ITEM 043)	Number of Bank Data blocks (Block Model 602) created automatically
1 to 15	1
16 to 30	2
31 to 45	3
46 to 60	4
61 to 75	5
76 to 90	6
91 to 100	7

When changing the number of Step Data blocks (Block Model 601) by increasing or decreasing the maximum number of steps used or when changing the number of Bank Data blocks (Block Model 602) by increasing or decreasing the maximum number of banks used, the Segment Program 3 block (Block Model 158) must again be downloaded to the LCB. (The function blocks must be downloaded.) The Segment Program 3 block (Block Model 158) operation will stop at this time.

Note
- If the number of Step Data blocks (Block Model 601) and the number of Bank Data blocks (Block Model 602) are not increased or decreased, operation will not be stopped and steps or banks can be inserted or deleted. In that case it is not necessary to download the function blocks. Data can be transferred by downloading only the ITEMs.
- When inserting or deleting steps or banks without stopping operation, check the capacity in advance and confirm the maximum number of steps or banks that can be used.
- To change the settings for the maximum number of steps used (ITEM 038) or the maximum number of banks used (ITEM 043), operation must be stopped and the function block unit must be downloaded.

ITEM List

ITEM type	ITEM	Sym-bol	Data description	Data range	Default	COLD start initializa-ion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data length (bytes)
							Ac-cording to CX-Process Tool	Ac-cording to ITEM Setting block	Ac-cording to Sequen-tial Control Block	Ac-cording to HMI I/F	
Contact input	000	MT_ ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	—	—	—	S/R	1
Parameter	001	COM MEN T	Comment	23 characters	Block name	—	R/W(S)	—	—	—	24
Parameter	002	MOD EL	Block Model: Segment Program 3	158		—	R/W(S)	—	—	—	2
Special	003	ERR	Execution error display/clear Execution error display 0: Normal, Other: Error (See *Appendix Execution Error Code List*.) Execution error clear specification 0: Execution error clear	Execution error display 0 or higher Execution error clear specification 0	0000	Yes	R/W(O)	W	—	S/R	2
Parameter	004	CNT _TM	Operation cycle (sec)1: 0.1, 2: 0.2, 3: 0.5, 4: 1	1 to 4	4	—	R/W(S)	—	—	—	2
Parameter	005	SCA N_N O	Execution order	1 to 2000	2000	—	R/W(S)	—	—	—	2
Analog contact information	006	X1_ AD	X1 source designation (BBB: Block address, III: ITEM No.) X1 equals Y1 at start when X1 is connected.	BBBIII	000000	—	R/W(S)	—	—	—	4
Analog input	007	X1	Reference input (input for external setting of start point)	±320.00%	0	Yes	r	—	—	S	2
Analog output	008	Y1	Program output	±320.00%	0	Yes	r/w	—	—	S	2
Analog output	009	Y2L	Elapsed time output (lower digits)	0 to 429496729. 5	0	Yes	r/w	—	—	S	2
	010	Y2H	Elapsed time output (upper digits)		0	Yes	r/w	—	—	S	2
Analog output	011	Y3	Step output (0: Display only at end.)	0 to 100	0	Yes	r	W	—	S/R	2
Parameter	012	H1	Elapsed time unit (0: sec, 1: min, 2: hr)	0 to 2	0	—	R/W (S)	—	—	S/R	1
Contact input	013	S1	Run/stop command (0: Reset, 1: Run)	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1
	014	S2	Hold switch (1: Stop)	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1
Contact output	015	U1	X1 input error (1: Error. Output is 0 when X1 reference input does not match the first up ramp.) (Cleared when resetting.)	0, 1	0	Yes	—	—	R	S	1
	016	U2	Arrival at final segment (final arrival of entered segments)	0、1	0	O	—	—	R	S	1

ITEM type	ITEM	Sym-bol	Data description	Data range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data length (bytes)
							Ac-cording to CX-Process Tool	Ac-cording to ITEM Setting block	Ac-cording to Sequen-tial Control Block	Ac-cording to HMI I/F	
Contact input	017	S3	Move to next wait command (When the command state changes from 0 to 1, output jumps to the final output value of the current step. S3 is automatically reset after the jump ends.) **Note:** This command is disabled during a wait operation. (This command, however, will accept the wait command in the following step after a wait ends if it is always set to 1 using the ladder program.)	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1
	018	S4	Move to next step command (When the command state changes from 0 to 1, program execution jumps to the start of the next step. This command is automatically reset by the system after the jump ends.) **Note:** When the command state changes from 0 to 1 during a wait, wait is canceled, and program execution moves to the next step	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1
	019	U10	Waiting (0: Not waiting, 1: Waiting)	0, 1	0	Yes	—	—	R	S	1
	020	S5	Reference input disable switch (0: Enabled, 1: Disabled)	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1
Parameter	021	RST_OUT	Program resetting output value Set the output for when the run/stop command OFF output mode (ITEM 023) is set to 0 (Setting output at reset).	±320.00%	0	—	R/W (O)	W	—	—	2
	022	B0	Default (Note, however, that the X1 reference input is given priority and this value is invalid when the source of X1 is specified.)	±320.00%	0	—	R/W (O)	W	—	—	2

ITEM type	ITEM	Symbol	Data description	Data range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	023	Y1MODE	Output mode when S1 is OFF Specify the output mode for when the run/stop command turns OFF. 0: Setting output at reset Output the reset output that was set in advance. 1: Continue Hold the output from the operation cycle before the reset.	0, 1	0	—	R/W (O)	W	—	—	2
Analog output	024	ERR_OFST	Error detection address Note: An address in the area type specified by ITEM 024 is output.	0 to 32767	0	Yes	r	—	—	—	2
Analog output	025	C_BNK	Selecting bank No.	0 to 100	0	Yes	r	—	—	S	2
Contact input	026	AT	AT command/AT executing	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1
Parameter	027	AT_PIDNo	AT result reflection bank number	0 to 100 0: Current bank number	0	Yes	R/W (O)	W	—	S/R	2
Parameter	028	PTN_ADS1	Program pattern first address kind	0: CIO Area, 1: W (Work Area) 2: H (Hold Area) 3: D (DM Area) 4: E0 5: E1 6: E2 7: E3 8: E4 9: E5 10: E6 11: E7 12: E8 13: E9 14: EA 15: EB 16: EC	3	—	R/W (O)	—	—	—	2
	029	PTN_ADS2	Program pattern first address	0 to 32767	32767	—	R/W (O)	—	—	—	2
Contact input	030	PTN_UL	Program pattern transfer order (LCB to CPU Unit)	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1
	031	PTN_DL	Program pattern transfer order (CPU Unit to LCB)	0, 1	0	Yes	R/W (O)	—	R/W	S/R	1

Step Data Block and Bank Data Block Settings

ITEM type	ITEM	Sym-bol	Data description	Data range	Default	COLD start initializa-ion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data length (bytes)
							Ac-cording to CX-Process Tool	Ac-cording to ITEM Setting block	Ac-cording to Sequen-tial Control Block	Ac-cording to HMI I/F	
Parameter	032	CHG_PID	Target PID block's address	0 to 500	0	—	R/W (S)	—	—	—	2
Analog output contact information	033	E1_AD	E1 destination (BBBIII)	BBBIII	000000	—	R/W (S)	—	—	—	4
	034	E2_AD	E2 destination (BBBIII)	BBBIII	000000	—	R/W (S)	—	—	—	4
	035	E3_AD	E3 destination (BBBIII)	BBBIII	000000	—	R/W (S)	—	—	—	4
	036	E4_AD	E4 destination (BBBIII)	BBBIII	000000	—	R/W (S)	—	—	—	4
	037	E5_AD	E5 destination (BBBIII)	BBBIII	000000	—	R/W (S)	—	—	—	4
Parameter	038	MAX_STEP	Max. No. of steps	1 to 100	10	—	R/W (S)	—	—	—	2
	039	STP_DAT1	Step data 1 block's address (steps 1 to 25)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	040	STP_DAT2	Step data 2 block's address (steps 26 to 50)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	041	STP_DAT3	Step data 3 block's address (steps 51 to 75)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	042	STP_DAT4	Step data 4 block's address (steps 76 to 100)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	043	MAX_BANK	Max. No. of banks	0 to 100 0: Not used.	0	—	R/W (S)	—	—	—	2
	044	BNK_DAT1	Bank data 1 block's address (banks 1 to 15)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	045	BNK_DAT2	Bank data 2 block's address (banks 16 to 30)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	046	BNK_DAT3	Bank data 3 block's address (banks 31 to 45)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	047	BNK_DAT4	Bank data 4 block's address (banks 46 to 40)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	048	BNK_DAT5	Bank data 5 block's address (banks 61 to 75)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	049	BNK_DAT6	Bank data 6 block's address (banks 76 to 90)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2
	050	BNK_DAT7	Bank data 7 block's address (banks 91 to 100)	0 to 500 0: Not used.	0	—	R/W (S)	—	—	—	2

Step Executing Flags

ITEM type	ITEM	Sym-bol	Data description	Data range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data length (bytes)
							Ac-cording to CX-Process Tool	Ac-cording to ITEM Setting block	Ac-cording to Sequen-tial Control Block	Ac-cording to HMI I/F	
Contact output	051	U11	Step 1 Executing flag Turns ON when applicable step is being executed. The ON status is held during a wait or while the time axis is stopped.	0, 1	0	—	—	—	R	—	1
	052	U12	Step 2 Executing flag	0, 1	0	—	—	—	R	—	1
	053	U13	Step 3 Executing flag	0, 1	0	—	—	—	R	—	1
	054	U14	Step 4 Executing flag	0, 1	0	—	—	—	R	—	1
	055	U15	Step 5 Executing flag	0, 1	0	—	—	—	R	—	1
	056	U16	Step 6 Executing flag	0, 1	0	—	—	—	R	—	1
	057	U17	Step 7 Executing flag	0, 1	0	—	—	—	R	—	1
	058	U18	Step 8 Executing flag	0, 1	0	—	—	—	R	—	1
	059	U19	Step 9 Executing flag	0, 1	0	—	—	—	R	—	1
	060	U20	Step 10 Executing flag	0, 1	0	—	—	—	R	—	1
	061	U21	Step 11 Executing flag	0, 1	0	—	—	—	R	—	1
	062	U22	Step 12 Executing flag	0, 1	0	—	—	—	R	—	1
	063	U23	Step 13 Executing flag	0, 1	0	—	—	—	R	—	1
	064	U24	Step 14 Executing flag	0, 1	0	—	—	—	R	—	1
	065	U25	Step 15 Executing flag	0, 1	0	—	—	—	R	—	1
	066	U26	Step 16 Executing flag	0, 1	0	—	—	—	R	—	1
	067	U27	Step 17 Executing flag	0, 1	0	—	—	—	R	—	1
	068	U28	Step 18 Executing flag	0, 1	0	—	—	—	R	—	1
	069	U29	Step 19 Executing flag	0, 1	0	—	—	—	R	—	1
	070	U30	Step 20 Executing flag	0, 1	0	—	—	—	R	—	1
	071	U31	Step 21 Executing flag	0, 1	0	—	—	—	R	—	1
	072	U32	Step 22 Executing flag	0, 1	0	—	—	—	R	—	1
	073	U33	Step 23 Executing flag	0, 1	0	—	—	—	R	—	1
	074	U34	Step 24 Executing flag	0, 1	0	—	—	—	R	—	1
	075	U35	Step 25 Executing flag	0, 1	0	—	—	—	R	—	1
	076	U36	Step 26 Executing flag	0, 1	0	—	—	—	R	—	1
	077	U37	Step 27 Executing flag	0, 1	0	—	—	—	R	—	1
	078	U38	Step 28 Executing flag	0, 1	0	—	—	—	R	—	1
	079	U39	Step 29 Executing flag	0, 1	0	—	—	—	R	—	1
	080	U40	Step 30 Executing flag	0, 1	0	—	—	—	R	—	1
	081	U41	Step 31 Executing flag	0, 1	0	—	—	—	R	—	1
	082	U42	Step 32 Executing flag	0, 1	0	—	—	—	R	—	1
	083	U43	Step 33 Executing flag	0, 1	0	—	—	—	R	—	1
	084	U44	Step 34 Executing flag	0, 1	0	—	—	—	R	—	1
	085	U45	Step 35 Executing flag	0, 1	0	—	—	—	R	—	1
	086	U46	Step 36 Executing flag	0, 1	0	—	—	—	R	—	1
	087	U47	Step 37 Executing flag	0, 1	0	—	—	—	R	—	1
	088	U48	Step 38 Executing flag	0, 1	0	—	—	—	R	—	1
	089	U49	Step 39 Executing flag	0, 1	0	—	—	—	R	—	1
	090	U50	Step 40 Executing flag	0, 1	0	—	—	—	R	—	1
	091	U51	Step 41 Executing flag	0, 1	0	—	—	—	R	—	1
	092	U52	Step 42 Executing flag	0, 1	0	—	—	—	R	—	1
	093	U53	Step 43 Executing flag	0, 1	0	—	—	—	R	—	1
	094	U54	Step 44 Executing flag	0, 1	0	—	—	—	R	—	1
	095	U55	Step 45 Executing flag	0, 1	0	—	—	—	R	—	1
	096	U56	Step 46 Executing flag	0, 1	0	—	—	—	R	—	1
	097	U57	Step 47 Executing flag	0, 1	0	—	—	—	R	—	1
	098	U58	Step 48 Executing flag	0, 1	0	—	—	—	R	—	1
	099	U59	Step 49 Executing flag	0, 1	0	—	—	—	R	—	1
	100	U60	Step 50 Executing flag	0, 1	0	—	—	—	R	—	1
	101	U61	Step 51 Executing flag	0, 1	0	—	—	—	R	—	1
	102	U62	Step 52 Executing flag	0, 1	0	—	—	—	R	—	1
	103	U63	Step 53 Executing flag	0, 1	0	—	—	—	R	—	1

ITEM type	ITEM	Sym-bol	Data description	Data range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data length (bytes)
							Ac-cording to CX-Process Tool	Ac-cording to ITEM Setting block	Ac-cording to Sequen-tial Control Block	Ac-cording to HMI I/F	
	104	U64	Step 54 Executing flag	0, 1	0	–	–	–	R	–	1
	105	U65	Step 55 Executing flag	0, 1	0	–	–	–	R	–	1
	106	U66	Step 56 Executing flag	0, 1	0	–	–	–	R	–	1
	107	U67	Step 57 Executing flag	0, 1	0	–	–	–	R	–	1
	108	U68	Step 58 Executing flag	0, 1	0	–	–	–	R	–	1
	109	U69	Step 59 Executing flag	0, 1	0	–	–	–	R	–	1
	110	U70	Step 60 Executing flag	0, 1	0	–	–	–	R	–	1
	111	U71	Step 61 Executing flag	0, 1	0	–	–	–	R	–	1
	112	U72	Step 62 Executing flag	0, 1	0	–	–	–	R	–	1
	113	U73	Step 63 Executing flag	0, 1	0	–	–	–	R	–	1
	114	U74	Step 64 Executing flag	0, 1	0	–	–	–	R	–	1
	115	U75	Step 65 Executing flag	0, 1	0	–	–	–	R	–	1
	116	U76	Step 66 Executing flag	0, 1	0	–	–	–	R	–	1
	117	U77	Step 67 Executing flag	0, 1	0	–	–	–	R	–	1
	118	U78	Step 68 Executing flag	0, 1	0	–	–	–	R	–	1
	119	U79	Step 69 Executing flag	0, 1	0	–	–	–	R	–	1
	120	U80	Step 70 Executing flag	0, 1	0	–	–	–	R	–	1
	121	U81	Step 71 Executing flag	0, 1	0	–	–	–	R	–	1
	122	U82	Step 72 Executing flag	0, 1	0	–	–	–	R	–	1
	123	U83	Step 73 Executing flag	0, 1	0	–	–	–	R	–	1
	124	U84	Step 74 Executing flag	0, 1	0	–	–	–	R	–	1
	125	U85	Step 75 Executing flag	0, 1	0	–	–	–	R	–	1
	126	U86	Step 76 Executing flag	0, 1	0	–	–	–	R	–	1
	127	U87	Step 77 Executing flag	0, 1	0	–	–	–	R	–	1
	128	U88	Step 78 Executing flag	0, 1	0	–	–	–	R	–	1
	129	U89	Step 79 Executing flag	0, 1	0	–	–	–	R	–	1
	130	U90	Step 80 Executing flag	0, 1	0	–	–	–	R	–	1
	131	U91	Step 81 Executing flag	0, 1	0	–	–	–	R	–	1
	132	U92	Step 82 Executing flag	0, 1	0	–	–	–	R	–	1
	133	U93	Step 83 Executing flag	0, 1	0	–	–	–	R	–	1
	134	U94	Step 84 Executing flag	0, 1	0	–	–	–	R	–	1
	135	U95	Step 85 Executing flag	0, 1	0	–	–	–	R	–	1
	136	U96	Step 86 Executing flag	0, 1	0	–	–	–	R	–	1
	137	U97	Step 87 Executing flag	0, 1	0	–	–	–	R	–	1
	138	U98	Step 88 Executing flag	0, 1	0	–	–	–	R	–	1
	139	U99	Step 89 Executing flag	0, 1	0	–	–	–	R	–	1
	140	U100	Step 90 Executing flag	0, 1	0	–	–	–	R	–	1
	141	U101	Step 91 Executing flag	0, 1	0	–	–	–	R	–	1
	142	U102	Step 92 Executing flag	0, 1	0	–	–	–	R	–	1
	143	U103	Step 93 Executing flag	0, 1	0	–	–	–	R	–	1
	144	U104	Step 94 Executing flag	0, 1	0	–	–	–	R	–	1
	145	U105	Step 95 Executing flag	0, 1	0	–	–	–	R	–	1
	146	U106	Step 96 Executing flag	0, 1	0	–	–	–	R	–	1
	147	U107	Step 97 Executing flag	0, 1	0	–	–	–	R	–	1
	148	U108	Step 98 Executing flag	0, 1	0	–	–	–	R	–	1
	149	U109	Step 99 Executing flag	0, 1	0	–	–	–	R	–	1
	150	U110	Step 100 Executing flag	0, 1	0	–	–	–	R	–	1

Time Information Outputs

ITEM type	ITEM	Sym-bol	Data description	Data range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data length (bytes)
							Ac-cording to CX-Process Tool	Ac-cording to ITEM Setting block	Ac-cording to Sequen-tial Control Block	Ac-cording to HMI I/F	
Analog output	196	ST_TM	Time axis within step Indicates, in the time unit, not the elapsed time but how far execution has advanced in each step (excluding wait times and hold times)	0 to 3200.0	0	—	r	—	—	—	2
	197	PG_ALTML	Program total time (Low) This is the total time width for each step. The time unit is set using the elapsed time unit setting.	0 to 429496729.5	0	Yes	r	—	—	S	2
	198	PG_ALTMH	Program total time (High)		0	Yes	r	—	—	S	2
	199	PG_TML	Program time output (Low) Indicates, in the time unit, not the elapsed time but how far execution has advanced in the program total time (excluding wait times and hold times). The time unit is set using to the elapsed time unit setting.	0 to 429496729.5	0	Yes	r	—	—	S	2
	200	PG_TMH	Program time output (High)		0	○	r	—	—	S	2
	201	PG_REMTL	Program remaining time (Low) This is the time remaining when the time axis in the program is subtracted from the program total time (excluding wait times and hold times). The time unit is set using to the elapsed time unit setting.	0 to 429496729.5	0	○	r	—	—	S	2
	202	PG_REMTH	Program remaining time (High)		0	Yes	r	—	—	S	2
	203	ST_REMT	Step remaining time This is the time remaining when the time axis in the step is subtracted from the step time width (excluding wait times and hold times).	0 to 3200.0	0	○	r	—	—	—	2

List of Tag ITEMs on SCADA Software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending or receiving data to or from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data name	CSV tags in SCADA software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Reference input	X1
008	Program output	Y1
009	Elapsed time output (lower digits)	Y2L
010	Elapsed time output (upper digits)	Y2H
011	Step output	Y3
012	Elapsed time unit	H1
013	Run/stop command	S1
014	Hold switch	S2
015	X1 input error	U1
016	Arrival at final segment	U2
017	Move to next wait command	S3
018	Move to next step command	S4
019	Waiting	U10
020	Reference input disable switch	S5
025	Selecting bank number	C_BNK
026	AT command/AT executing	AT
030	Program pattern transfer order (LCB to CPU Unit)	PTN_UL
031	Program pattern transfer order (CPU Unit to LCB)	PTN_DL
197	Program total time (Low)	PG_ALTML
198	Program total time (High)	PG_ALTMH
199	Program time output (Low)	PG_TML
200	Program time output (High)	PG_TMH
201	Program remaining time (Low)	PG_REMTL
202	Program remaining time (High)	PG_REMTH

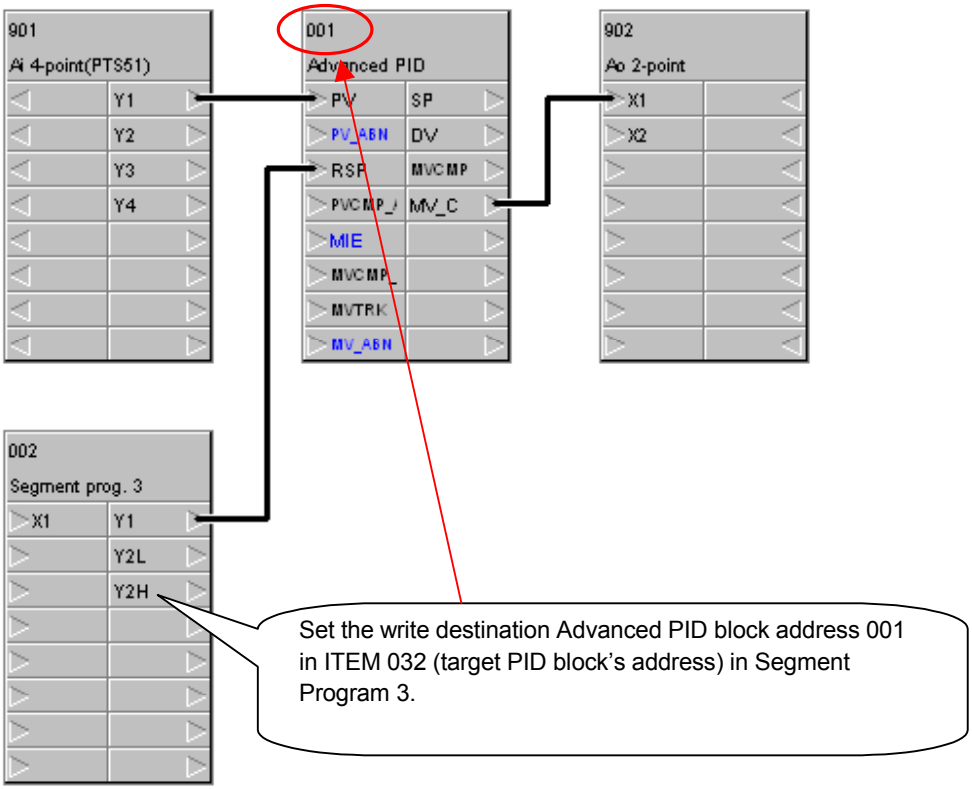
Description

Bank (e.g., PID) Change Function

With the Segment Program 3 block, a bank number is set for each step data item. When moving between steps, the bank data set for each step (P, I, D, MH_LMT, and ML_LMT) is written to the PID block specified by the target PID block's address (ITEM 032).

Program Example

The following diagram shows a program example in which the Y1 program output of Segment Program 3 is connected to the RSP for an Advanced PID block (Block Address 001). To change the PID parameters for the Advanced PID block (Block Address 001) when moving between steps, set the write destination Advanced PID block address (001 in this example) in ITEM 032 (target PID block's address) in the Segment Program 3 block.



Note Bank numbers can be changed in this way only when moving between steps. To make a change at any other time, use the Bank Change block (Block Model 168).

Step Data

- The set values for each step (i.e., time width, output value, wait width, wait time limit, and time unit) and a bank number can be set in the step data.

	Step No.						
	1	2	3	•••••	98	99	100
Time width	10.0	20.0	10.0				
Output value							
Wait width							
Wait time limit							
Time unit	sec	sec	sec				
Bank No.	0	0	1				

- When moving to the applicable step, Segment Program 3 writes to the Bank Change PID Block the bank data specified by the bank number.

Note 1: The bank number can be set from 0 to 100. When a number from 1 to 100 is specified, the bank data is written to that bank number. When 0 is specified, bank data is not written when moving between steps. Set the bank number to 0 when not changing banks.

2: Different bank data can be used for each step by setting a different bank number for each step. It is also possible to use the same bank data for all steps by using the name bank number.

3: Execution error 71 will occur if the bank number is set to a number greater than the maximum number of banks used (ITEM 043).

Editing Step Data

Use the following procedure to edit step data.

1. Right-click on the ITEM list for Segment Program 3 and select ***Extension*** from the pop-up menu.
2. The Segment Program Screen 3 Edit Screen will be displayed for editing the step data. For details, refer to the *CX-Process Tool Operation Manual* (Cat. No. W372).

Bank Data

In addition to P, I, D, MH_LMT, and ML_LMT, values 1 to 5 can be set for the bank data. It is possible to write to any function block ITEM specified by Segment Program 3 ITEM 033 to ITEM 037.

Bank No.		P	I	D	MH_ LMT	ML_ LMT	Extra data 1	Extra data 2	Extra data 3	Extra data 4	Extra data 5
	1										
	2										
	:										
	99										
	100										

- To write to an ITEM in the specified block, specify the destination with the destination specification (ITEM 033 to ITEM 037) for extra data 1 to 5, and set a value from 1 to 5 for the Bank Data block (Block Model 602).

Note 1: Data will not be written if 000.000 is set for the destination specification.

2: If a non-existent block address or ITEM is specified with the destination specification (ITEM 033 to ITEM 037) for extra data 1 to 5 or if ITEM 002 is specified with the destination specification (ITEM 033 to ITEM 037) for extra data 1 to 5, execution error 1 will occur and Segment Program 3 operation will stop.

3: If a value outside of the write destination ITEM range is written, execution error 71 will occur and Segment Program 3 operation will stop.

Editing Bank Data

Use the following procedure to edit bank data.

1. Right-click on the ITEM list for Segment Program 3 and select ***Extension*** from the pop-up menu.
2. Click the **Bank Setting** Button in the Segment Program 3 Edit Screen. The Bank Data Edit Screen will be displayed for editing the bank data. For details, refer to the *CX-Process Tool Operation Manual* (Cat. No. W372).

Step Data and Bank Data Settings

Step data is stored in a separate Step Data block for each 25 steps. The following table shows the relationship between the Step Data blocks and the step numbers.

Relationship between Step Data Blocks and Step Numbers

Step data block	Step numbers
Step data block specified in ITEM 039	The step data for steps 1 to 25 can be set.
Step data block specified in ITEM 040	The step data for steps 26 to 50 can be set.
Step data block specified in ITEM 038	The step data for steps 51 to 75 can be set.
Step data block specified in ITEM 042	The step data for steps 76 to 100 can be set.

Bank data is stored in a separate Bank Data block for each 15 steps. The following table shows the relationship between the Bank Data blocks and the bank numbers.

Relationship between Bank Data Blocks and Bank Numbers

Max. number of banks used (ITEM 043)	Number of Bank Data blocks (Block Model 602) created automatically
Bank data block specified in ITEM 044	The bank data for steps 1 to 15 can be set.
Bank data block specified in ITEM 045	The bank data for steps 16 to 30 can be set.
Bank data block specified in ITEM 046	The bank data for steps 31 to 45 can be set.
Bank data block specified in ITEM 047	The bank data for steps 46 to 60 can be set.
Bank data block specified in ITEM 048	The bank data for steps 61 to 75 can be set.
Bank data block specified in ITEM 049	The bank data for steps 76 to 90 can be set.
Bank data block specified in ITEM 050	The bank data for steps 91 to 100 can be set.

Step data settings can be made in the Segment Program 3 Settings window of the CX-Process Tool. For details, refer to the *CX-Process Tool Operation Manual* (Cat. No. W372).

Batch Reading and Writing of Program Pattern Data from and to the CPU Unit

Program pattern data stored in CPU Unit I/O Memory can be batch transferred to the LCB. Likewise, step data and bank data downloaded to the LCB can be transferred as program pattern data to specified part of I/O memory in the CPU Unit.

Transferring Program Pattern Data in the LCB to I/O Memory in the CPU Unit: Program Pattern Data Transfer (LCB to CPU Unit)

⚠Caution When transferring data from the Loop Controller to the Programmable Controller with LCB unit version 3.5 or later, be sure to confirm that the destination words are not already being used by another Unit. If the destination words are already in use, transferring the data could result in unexpected system operation.

- If the Program Pattern Transfer Order (LCB to CPU Unit) is turned ON when the area type for the memory area where the program pattern data is transferred is set in ITEM 028 and the first address is set in ITEM 029, then the program pattern data will be output in the format specified for the specified memory area (see below).
- The Program Pattern Transfer Order (LCB to CPU Unit) can be executed while Segment Program 3 is running.
- The LCB operation cycle is temporarily extended when the Program Pattern Transfer Order (LCB to CPU Unit) is executed. (Guideline: Approx. 1.3 ms)

Program Pattern Data Format in CPU Unit I/O Memory

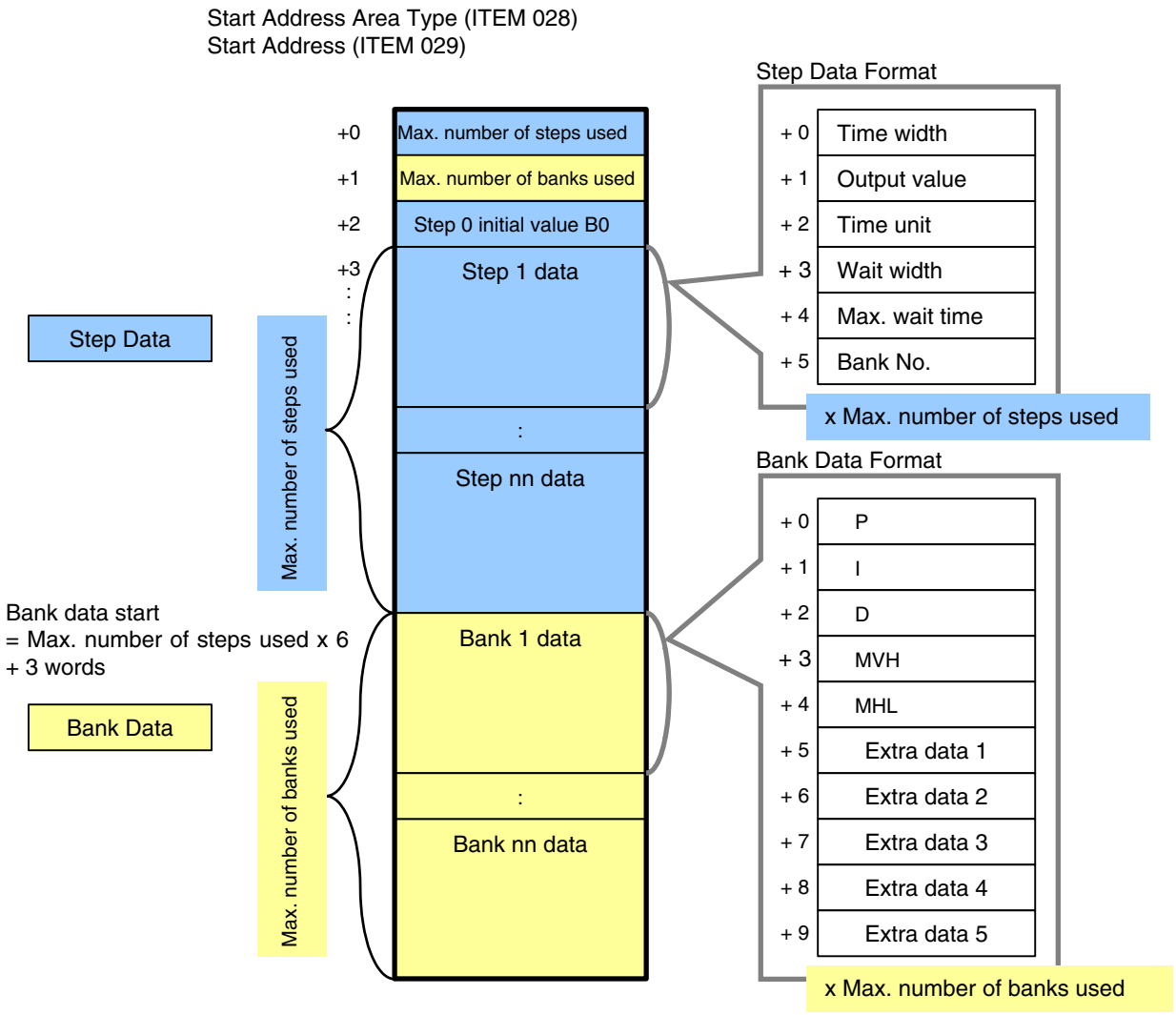


Fig. 1 Program Pattern Data Format

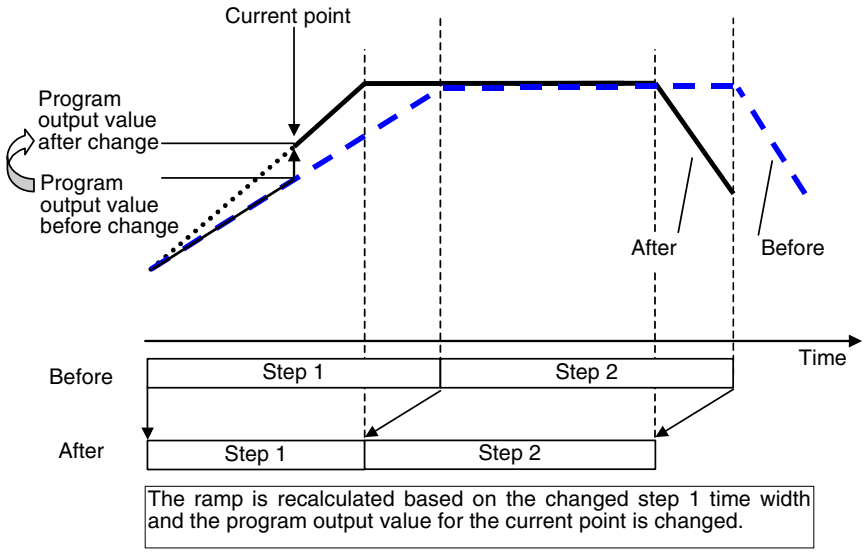
Transferring Program Pattern Data in the I/O Memory of the CPU Unit to the LCB: Program Pattern Data Transfer (CPU Unit to LCB)

⚠Caution When transferring program pattern data to the Loop Controller with LCB unit version 3.5 or later, make sure that the program pattern data settings are correct. If incorrect program pattern data is transferred to the Loop Controller, unexpected Loop Controller operation may result.

- Stop Segment Program 3 operation (i.e., turn the run/stop command OFF). While Segment Program 3 is operating (i.e., when the run/stop command is ON), the data will not be transferred even if the Program Pattern Transfer Order (LCB to CPU Unit) (ITEM 031) is turned ON. The command will be automatically turned OFF if it is turned ON during Segment Program 3 operation.
- While the area type for the memory area where the program pattern data is stored is set in ITEM 028 and with the start address set in ITEM 029, turn ON the Program Pattern Transfer Order (LCB to CPU Unit)(ITEM 031).
- At this time, the program pattern data must be written in I/O memory in the specified format. (Refer to Fig. 1 Program Pattern Data Format.)
  If the program pattern data format is incorrect, execution error 72 or 74 will occur and Segment Program 3 operation cannot be started.
- The LCB operation cycle is temporarily extended when the Program Pattern Transfer Order (CPU Unit to LCB) is executed. (Guideline: Approx. 3 ms)

Partially Changing Program Pattern Data during Operation

- Program pattern data cannot be changed during operation (i.e., while the run/stop command is ON) by using the program pattern data batch read/write function.
- To change the program pattern data during operation, either download the ITEMs from the CX-Process Tool or use an ITEM Write block or user link table.
- If the time width or SP is changed, recalculate the time display ITEM and the ramps.



Example: When the Step 1 Time Width Is Changed

- If the change was made during operation of the step before the one currently being executed, and the ITEMs are downloaded with the step time width set to 0.0, execution error 74 will occur and Segment Program 3 operation will be stopped.

Time Display

Time Display ITEMs for Segment Program 3

Time display ITEM	Time unit	Description
Elapsed time output (Data length: 4 bytes)	Elapsed time unit (ITEM 012)	This is the elapsed time, including the wait time, with the run/stop command as the starting point.
Time axis within step (Data length: 2 bytes)	Step time unit for applicable step in Step Data block	Indicates, in the time unit, not the elapsed time but how far execution has advanced in each step. It is calculated in each operation cycle (when the function block is executed).
Step remaining time (Data length: 2 bytes)	Step time unit for applicable step in Step Data block	This is the time remaining when the time axis in the step is subtracted from the step time width. It is calculated in each operation cycle (when the function block is executed). Wait and hold times are not included.
Program total time (Data length: 4 bytes)	Elapsed time unit (ITEM 012)	This time is the total of the time widths of all steps. It is recalculated when a cold start, hot start, program pattern data batch read/write, or ITEM (step time width) write is executed.
Program time output (Data length: 4 bytes)	Elapsed time unit (ITEM 012)	Indicates not the elapsed time but how far operation has advanced in the above program total time. It is calculated in each operation cycle (when the function block is executed). Wait and hold times are not included.
Program remaining time (Data length: 4 bytes)	Elapsed time unit (ITEM 012)	This is the time remaining when the time axis in the program is subtracted from the program total time. It is calculated in each operation cycle (when the function block is executed). Wait and hold times are not included.

Note: For details on the time status of individual ITEMs, refer to *Timing Status of Time-related ITEMs* below.

Operation when the Maximum Value Is Exceeded for a Time Display ITEM

- If the value for the elapsed time output or the program time output exceeds the maximum value of 429496729.5 (0xFFFFFFFF) that can be expressed in four bytes, the time will be held at the maximum value.
- If the value for the program total time or the program remaining time exceeds the maximum value of 429496729.5 (0xFFFFFFFF) that can be expressed in four bytes, the time will be held at the maximum value.
- The data range for the step remaining time and the time axis within the step is 0 to 3200.0, so it does not exceed the maximum value for two bytes.

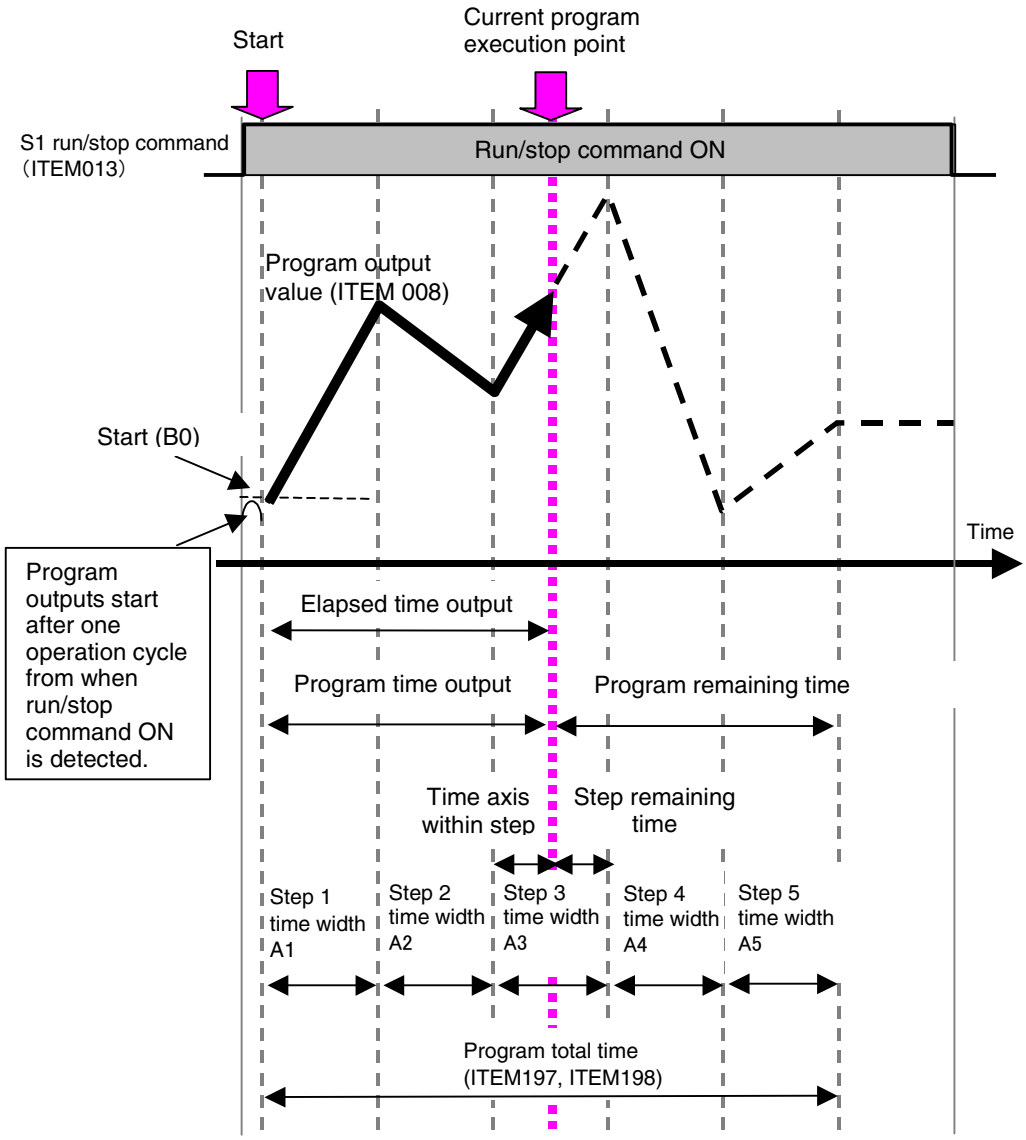
Timing Status of Time-related ITEMs

After the program has been executed, the time-related ITEMs are timed as shown below.

B0 Start (Wait Not Used)

The program is started from the initial value of B0 and there is no wait, so the value is the same for the elapsed time output and the time axis in the program.

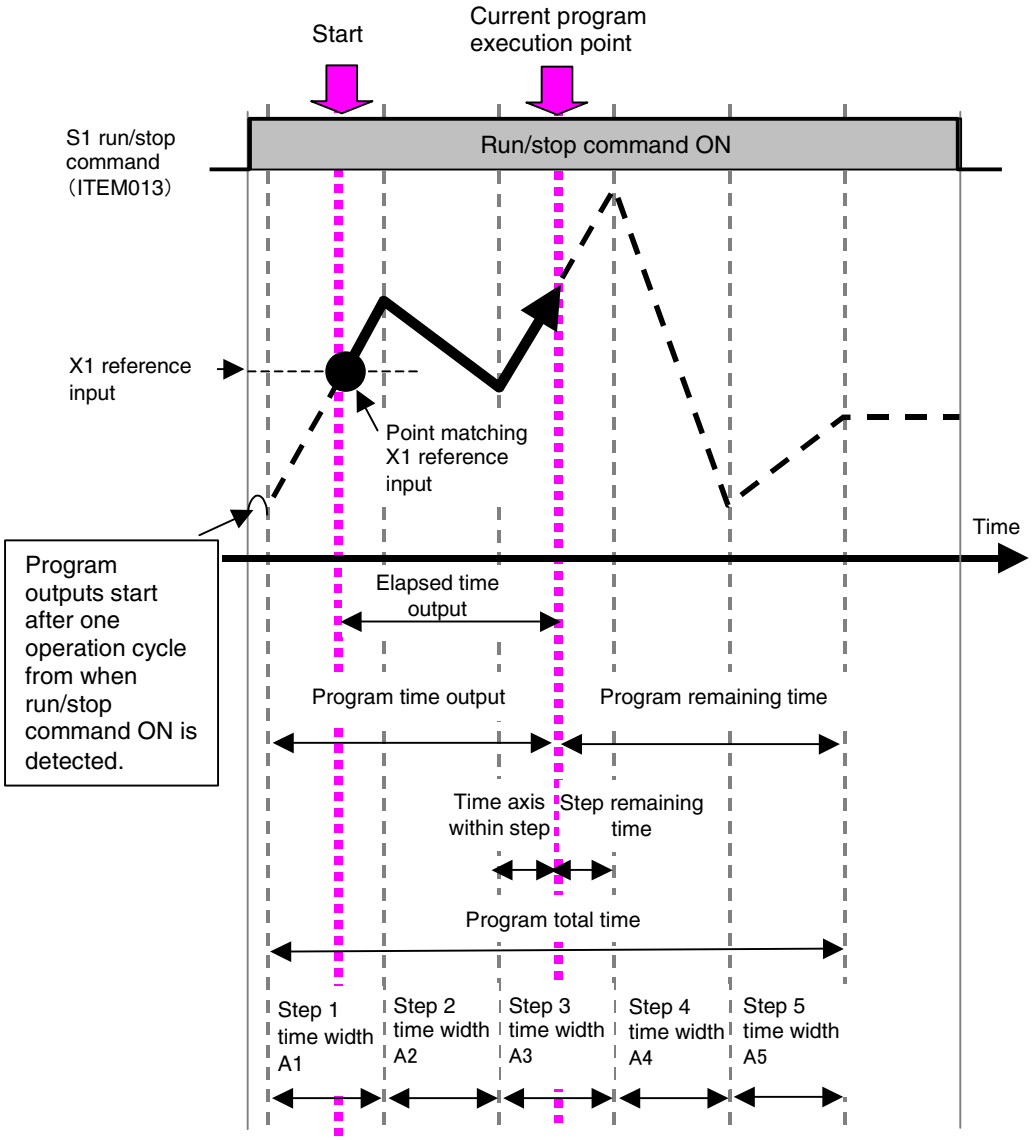
Time display ITEM	Description
Elapsed time output	Indicates the time elapsed from the program starting point (B0) until the current execution point.
Program time output	The sum of the A1 to A2 step time widths plus the step time axis in A3.
Program remaining time	The difference derived from subtracting the program time output from the program total time (the sum of the A1 to A5 time widths).



Timing of Time-related ITEMs with X1 Reference Input Start

With a X1 reference input start, operation starts from the middle of the program (the point where X1 reference input and the program output value match), so the program starting point becomes the measurement starting point for the elapsed time. The following table shows the timing status for time-related ITEMs.

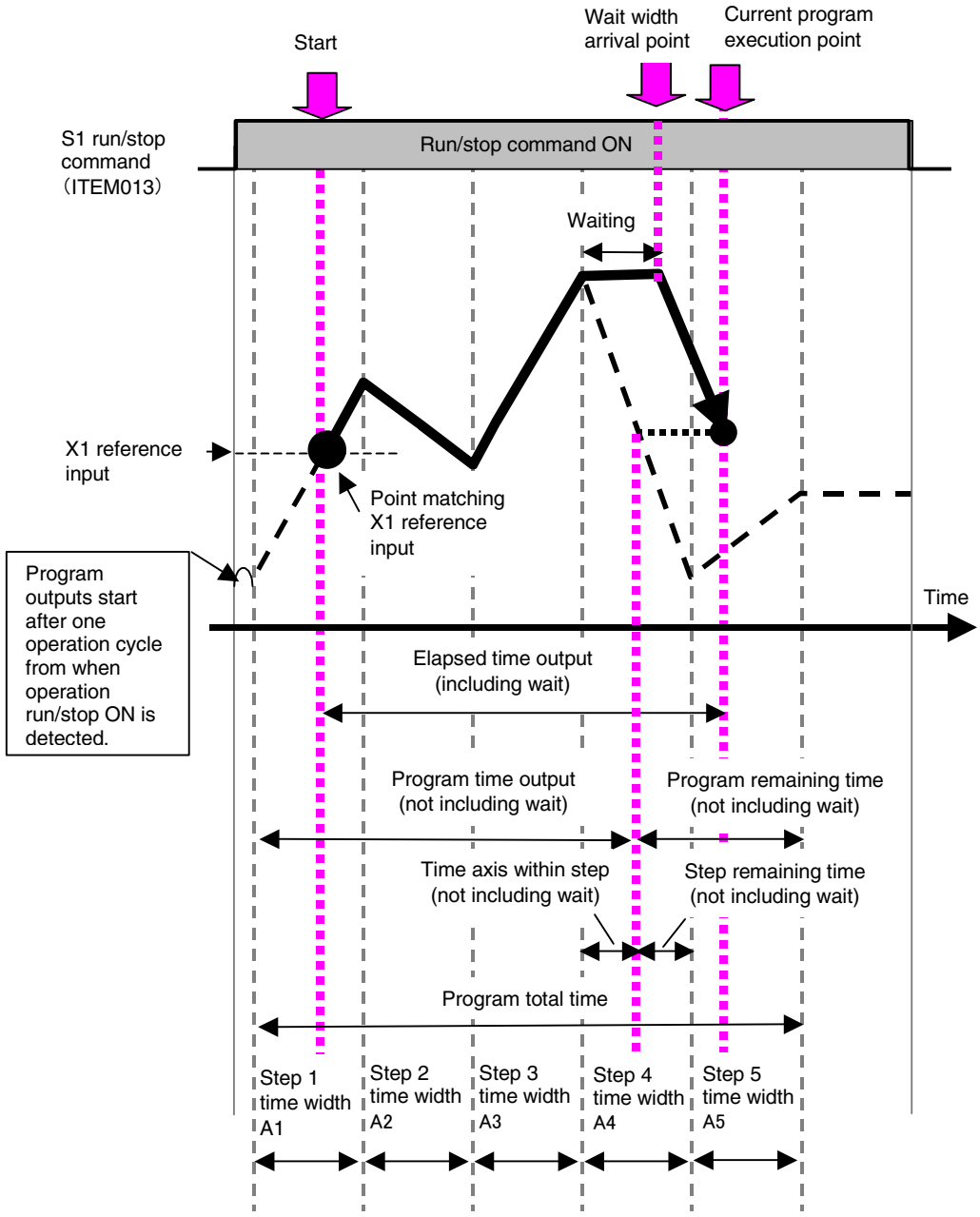
Time display ITEM	Description
Elapsed time output	Indicates the time elapsed from the program starting point (the Point matching X1 reference input) until the current execution point.
Program time output	The sum of the A1 to A2 step time widths plus the step time axis in A3.
Program remaining time	The difference derived from subtracting the program time output from the program total time (the sum of the A1 to A5 step time widths).



Timing of Time-related ITEMs with Wait

If X1 reference input does not reach the Y1 output ± wait width range at the final point for each step, the wait function holds outputs without moving to the next step. During the wait, outputs are held and the program does not advance, The following table shows the timing status of the time-related ITEMs.

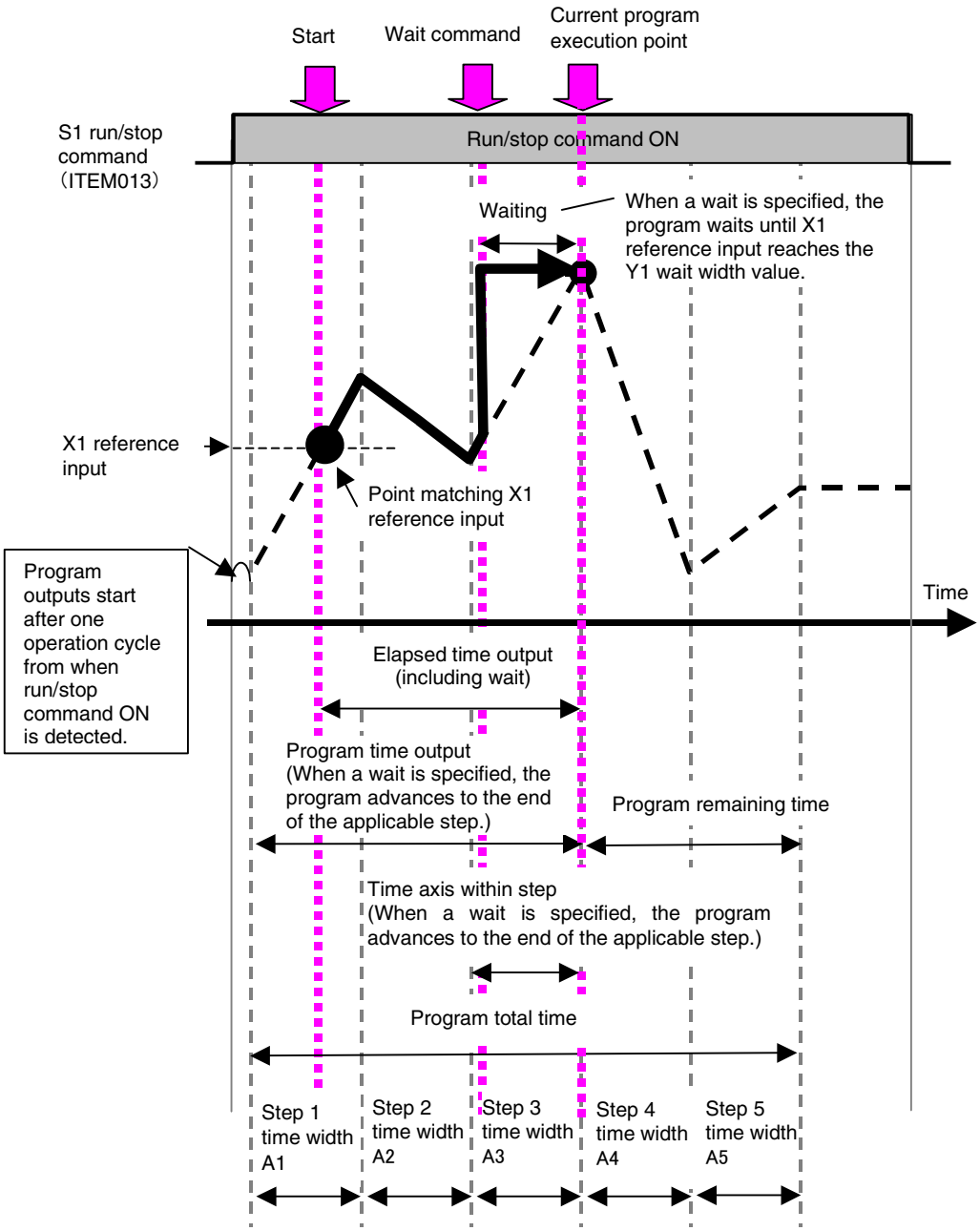
Time display ITEM	Description
Elapsed time output	Indicates the time elapsed from the program starting point (the Point matching X1 reference input) until the current execution point, including the wait time.
Program time output	The sum of the A1 to A3 step time widths plus the step time axis in A4.
Program remaining time	The difference derived from subtracting the program time output from the program total time (the sum of the A1 to A5 step time widths).



Timing of Time-related ITEMs with Wait Command

When a wait command is executed, the program jumps to the final point in the current step and then waits until X1 reference input reaches the Y1 output ± wait width range. At the point where the wait command is executed, the time axis in the program and the time axis in the step advance to the final point in the step. The following table shows the timing status of the time-related ITEMs.

Time display ITEM	Description
Elapsed time output	Indicates the time elapsed from the program starting point (the point matching X1 reference input) until the current execution point, including the wait time.
Program time output	Depending on the wait specification, the program advances to the A3 step, so this becomes the sum of the A1 to A3 step time widths.
Program remaining time	The difference derived from subtracting the program time output from the program total time (the sum of the A1 to A5 step time widths).



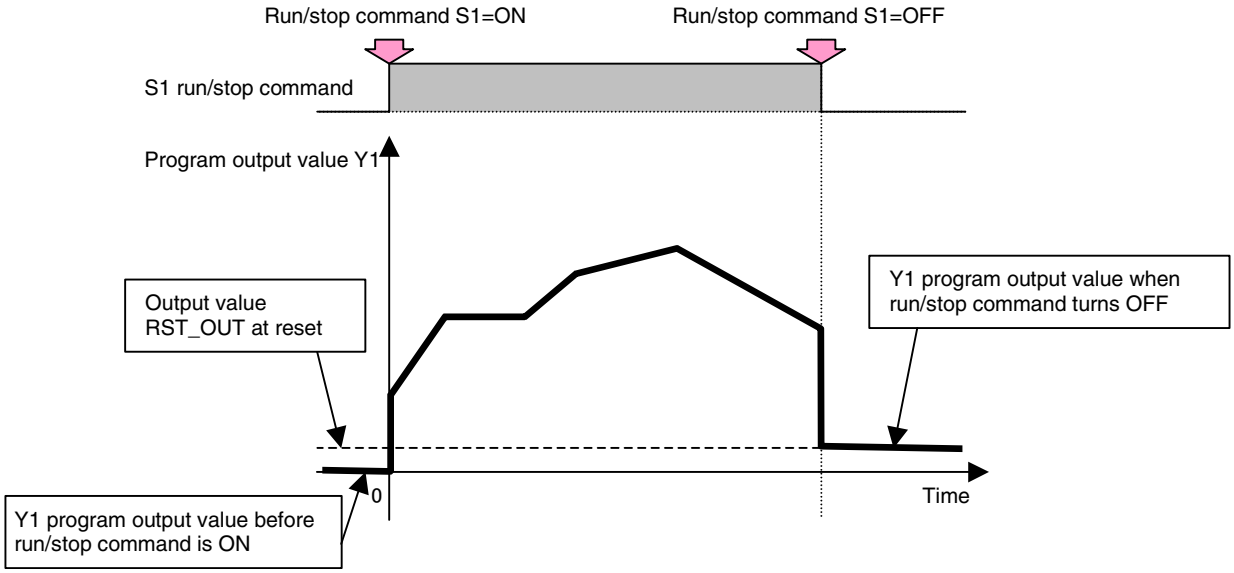
Output Mode Specification When Run/Stop Command Is OFF

The output mode when S1 run/stop command (ITEM 013) is OFF can be set in ITEM 023.

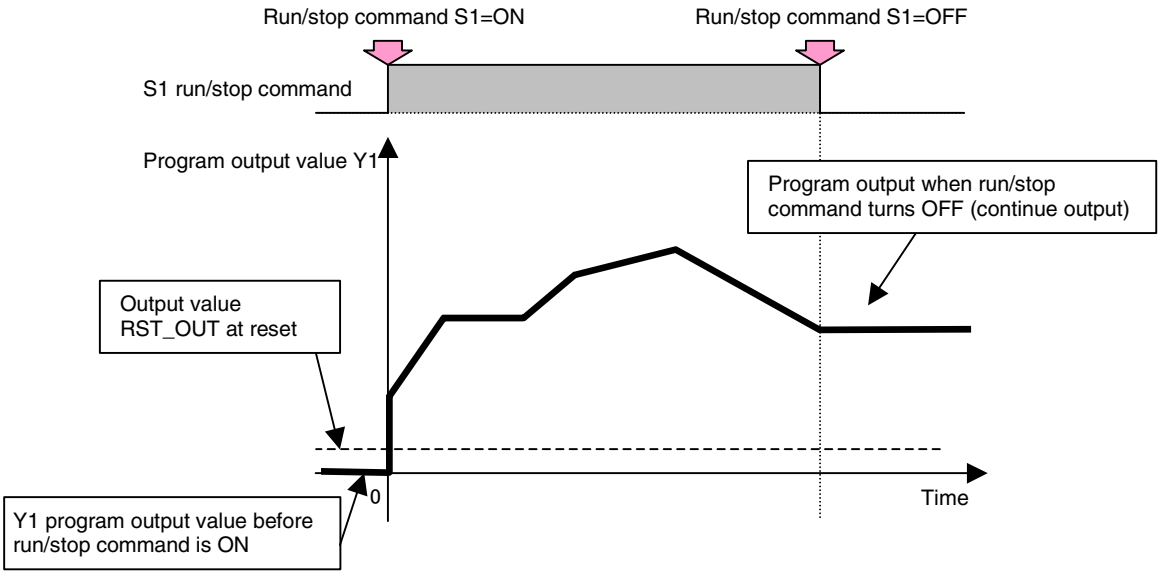
- ITEM 023 = 0: Setting Output at Reset
  Outputs the reset output that has been set in advance. The reset output value can be set in ITEM 021. The program output value at reset is enabled when S1 run/stop command (ITEM 013) turns OFF.

- ITEM 023 = 1: Continue Output
  The output from the operation cycle before S1 run/stop command turned from ON to OFF (reset) is held. Continue output is enabled when S1 run/stop command (ITEM 013) turns OFF.

- When S1 run/stop command (ITEM 013) turns OFF after a cold start, the program output value becomes 0.



Outputs When Run/Stop Command Is OFF (Example: Setting Output at Reset)



Outputs When Run/Stop Command Is OFF (Example: Continue Output)

AT Commands to PID Blocks

- When the AT result reflection bank number (ITEM 027) is specified and the AT command is turned ON, AT will be executed for the Basic PID block (Block Model 011) or Advanced PID block (Block Model 012) set for the target PID block's address (ITEM 032).
- When the AT command (ITEM 27) turns ON, execution of the Segment Program 3 block (Block Model 158) is held, i.e., the hold switch (ITEM 014) turns ON.
- After AT is completed, execution of the Segment Program 3 block (Block Model 158) is not restarted automatically. It is restarted by turning OFF the hold switch (ITEM 014).
- When AT is completed, the PID parameters will be saved in the bank number specified for the AT result reflection bank number (ITEM 027).
- If 0 is specified for the AT result reflection bank number (ITEM 027), the parameters will be saved in the bank number set for the step number currently being executed, i.e., the selecting bank number (ITEM 025).
- When AT is executed, execution error 72 (parameter inconsistency) will occur if the AT result reflection bank number (ITEM 027) is greater than the maximum number of banks used (ITEM 043). AT will also not be executed for the connected PID block.
- To clear the execution error, change the AT result reflection bank number (ITEM 027) so that it falls within the maximum number of banks used (ITEM 043), and then either again turn ON the AT command or set the execution error display/clear (ITEM 003) of the Segment Program 3 block (Block Model 158) to 0.
- If an AT error occurs for the connected PID during AT execution, execution error 15 (AT error) will also occur for the Segment Program 3 block (Block Model 158). The PID parameters will not be reflected in the bank number specified for the AT result reflection bank number (ITEM 027).
- To clear the execution error, either again turn ON the AT command or set the execution error display/clear (ITEM 003) of the Segment Program 3 block (Block Model 158) to 0.

Execution Errors

If there is an inconsistency in the ITEM settings when the function block S1 run/stop command is turned ON, an execution error will occur and the error code will be registered in ITEM 003. The following table lists the execution errors that occur for these function blocks, along with their descriptions and suggested countermeasures. For details on other errors, refer to *Appendix A Execution Error Code List*.

Code	Error	Description	Operation at error	Countermeasure
01	Source or destination not defined	Either the X1 source block address or the ITEM number does not exist.	Operation of the applicable function block is stopped or the applicable functions do not operate normally. ITEM 015 (X1 input error) will turn ON.	Check the source and destination block address and ITEM numbers, and download again.
		Either the destination block address for extra data 1 to 5 or the ITEM number does not exist. ITEM 002 was specified for the destination for extra data 1 to 5.	The run/stop command (ITEM 013) turns OFF. The program output value (ITEM 008) is set according to the output mode when S1 is OFF (ITEM 023).	
02	Default error	When the run/stop command turned ON, the reference input was outside the initial ramp range.	The program will not start. ITEM 015 (X1 input error) will turn ON.	Check the reference input connection and the program settings.
15	AT error	An AT error occurred at the connected PID block.	The PID parameters are not reflected in the bank.	Clear the error by either executing AT again or by setting the execution error display/clear (ITEM 003) for Segment Program 3 (Block Model 158) to 0.
70	Improper combination of function blocks	In the target PID block's address (ITEM 032), the function block with the set block address is not a Basic PID or Advanced PID block or 000 (not specified).	Program outputs do not operate at the default settings.	Check the settings for the target PID block's address (ITEM 032).
71	Inappropriate parameter	The bank number set for a step is greater than the maximum number of banks used.	Program outputs do not operate at the default value.	Change the bank number so that it is within the maximum number of banks used, and then again turn ON the run/stop command.
		When writing to an ITEM set using a extra data 1 to 5, an attempt was made to set a value out of range.	The run/stop command (ITEM 013) turns OFF. The program output value (ITEM 008) is set according to the output mode when S1 is OFF (ITEM 023).	Set the correct value and then download again.

Code	Error	Description	Operation at error	Countermeasure
72	Parameter inconsistency	The block addresses of the maximum number of steps used (ITEM 038) and the step data block do not match.	Program outputs do not operate at the default value.	Correct the block address settings for the maximum number of steps used (ITEM 038) and the step data block, and then again turn ON the run/stop command.
		The block addresses of the maximum number of banks used (ITEM 043) and the bank data block do not match.	Program outputs do not operate at the default value.	Correct the block address settings for the maximum number of banks used (ITEM 043) and the bank data block, and then again turn ON the run/stop command.
		The AT result reflection bank number (ITEM 027) is greater than the maximum number of banks used (ITEM 043). (There is no bank reflecting the AT results.)	The AT command (ITEM 026) turns OFF and the AT command is not output at the connected PID block.	Change the AT result reflection bank number (ITEM 027) so that it is no more than the maximum number of banks used (ITEM 043), and then either again turn ON the AT command or clear the error by setting the execution error display/clear (ITEM 003) of Segment Program 3 (Block Model 158) to 0.
73	Parameter address error	The maximum number of steps used and the maximum number of banks used from the specified start address cannot be obtained. (The end address exceeds 32,767.)	Program pattern data is not transferred (LCB to CPU Unit).	Turn OFF the program pattern transfer order (LCB to CPU Unit), set the correct start address, and again turn ON the program pattern transfer order (LCB to CPU Unit).
74	Transfer source parameter error	The maximum numbers of steps and banks used in the program pattern data on the CPU Unit do not match the Segment Program 3 (Block Model 158) maximum number of steps used (ITEM 038) and the maximum number of banks used (ITEM 043).	Program pattern data is not transferred (CPU Unit to LCB). In ITEM 024 (error detection address), the offset address where the CPU Unit to LCB transfer failed is indicated (only when an execution error occurs).	Turn OFF the program pattern transfer order (CPU Unit to LCB) (ITEM 031), match the maximum numbers of steps and banks used in the program pattern data on the CPU Unit to the numbers for Segment Program 3, and again turn ON the program pattern transfer order (CPU Unit to LCB).
		Some program pattern data at the CPU Unit is set out of range.	Program pattern data is not transferred (CPU Unit to LCB). In ITEM 024 (error detection address), the offset address where the CPU Unit to LCB transfer failed is indicated (only when an execution error occurs).	Turn OFF the program pattern transfer order (CPU Unit to LCB) (ITEM 031), correct all values so they are within range, and again turn ON the program pattern transfer order (CPU Unit to LCB).

Code	Error	Description	Operation at error	Countermeasure
		When program pattern data was changed, the time width for the step before the one being executed was changed to 0.0	The run/stop command (ITEM 013) turns OFF. The program output (ITEM 008) is set according to the output mode when S1 is OFF (ITEM 023).	Turn ON the run/stop command. The program will start again.
75	Program pattern data transfer (CPU Unit to LCB) interrupt error	Power was interrupted or LCB operation was stopped during a program pattern data transfer (CPU Unit to LCB).	The transfer stops. The program pattern transfer order (CPU Unit to LCB) (ITEM 031) stays ON.	Either turn the program pattern transfer order (CPU Unit to LCB) (ITEM 031) OFF and then back ON, or clear the error by setting the execution error display/clear (ITEM 003) of Segment Program 3 (Block Model 158) to 0.
76	Upload transfer interrupt detected error	Power was interrupted or LCB operation was stopped during a program pattern data transfer (LCB to CPU Unit).	The transfer stops. The program pattern transfer order (LCB to CPU Unit) (ITEM 030) stays ON.	Either turn the program pattern transfer order (LCB to CPU Unit) (ITEM 030) OFF and then back ON, or clear the error by setting the execution error display/clear (ITEM 003) of Segment Program 3 (Block Model 158) to 0.
77	Inappropriate parameter (The total time for the time width setting exceeds the maximum value.)	The total time for the time width setting exceeds the maximum value. Note: The maximum total time is 429,496,729.5 s ≅ 13.61 years.	The run/stop command is turned OFF.	Set the time width again so that the total time does not exceed the maximum value.
99	Database error	There was a database error in the Step Data blocks (Block Model 601), Bank Data blocks (Block Model 602), and Segment Program 3 block (Block Model 158) when the Segment Program 3 block was executed.	Execution of the Segment Program 3 block stops.	Executed the Clear all, Download, or Recovery operation from the CX-Process Tool, or reset the Segment Program 3 block.

Block Model	Block Name	Block Address
<601>	Step Data **Segment Program 3 (Block Model 158) Expansion Data Block**	001 to 500

Outline

This function block is used as expansion data blocks for the Segment Program 3 block (Block Model 158). When the Segment Program 3 block (Block Model 158) time width or other step data is set, the required number of blocks will automatically be registered, and the block addresses will be automatically allocated to addresses 500 and lower. These block ITEMs cannot be changed directly. In addition, the block ITEMs will be displayed for viewing-only in the CX-Process Tool navigation tree. They cannot be included in the block diagram.

One block can store up to 25 steps of data. When using the maximum 100 steps of data with a Segment Program 3 block, four blocks must be used.

Note
- The Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) cannot be downloaded individually. They are downloaded together with the Segment Program 3 block (Block Model 158).
- The Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) cannot be deleted individually. They are deleted by reducing the maximum numbers of banks and steps for the Segment Program 3 block (Block Model 158) and then again downloading the Segment Program 3 (Block Model 158) block to the LCB.

ITEM list

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Contact input	000	MT_ ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COM MEN T	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MOD EL	Block Model: Segment Program 3 Step Data	601		–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display		0000	Yes	r	–	–	S	2
Parameter	004	CNT _TM	Operation cycle (s) 1: 0.1, 2: 0.2, 3: 0.5, 4:1	1 to 4	4	–	R/W(S)	–	–	–	2
	005	SCA N_N O	Execution order	1 to 2000		–	R/W(S)	–	–	–	2
Parameter	011	A1	Step 1 A1 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	012	B1	Step 1 B1 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	1
	013	J1	Step 1 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	2
	014	WT_ SP01	Step 1 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	015	WT_ TM01	Step 1 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	016	BAN K1	Step 1 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	017	A2	Step 2 A2 time width (0.00: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	018	B2	Step 2 B2 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	019	J2	Step 2 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	020	WT_ SP02	Step 2 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	021	WT_ TM02	Step 2 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	022	BAN K2	Step 2 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	023	A3	Step 3 A3 time width (0.00: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	024	B3	Step 3 B3 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	025	J3	Step 3 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	026	WT_ SP03	Step 3 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	027	WT_ TM03	Step 3 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	028	BAN K3	Step 3 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	029	A4	Step 4 A4 time width (0.00: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequen-tial Control Block	According to HMI I/F	
Parameter	030	B4	Step 4 B4 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	031	J4	Step 4 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	032	WT_ SP04	Step 4 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	033	WT_ TM04	Step 4 Max. wait time band (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	034	BAN K4	Step 4 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	035	A5	Step 5 A5 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	036	B5	Step 5 B5 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	037	J5	Step 5 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	038	WT_ SP05	Step 5 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	039	WT_ TM05	Step 5 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	040	BAN K5	Step 5 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	041	A6	Step 6 A6 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	042	B6	Step 6 B6 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	043	J6	Step 6 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	044	WT_ SP06	Step 6 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	045	WT_ TM06	Step 6 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	046	BAN K6	Step 6 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	047	A7	Step 7 A7 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	048	B7	Step 7 B7 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	049	J7	Step 7 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	050	WT_ SP07	Step 7 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	051	WT_ TM07	Step 7 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	052	BAN K7	Step 7 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	053	A8	Step 8 A8 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	054	B8	Step 8 B8 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	055	J8	Step 8 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	056	WT_ SP08	Step 8 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	057	WT_ TM08	Step 8 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	058	BAN K8	Step 8 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	059	A9	Step 9 A9 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	060	B9	Step 9 B9 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	061	J9	Step 9 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	062	WT_ SP09	Step 9 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	063	WT_ TM09	Step 9 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	064	BAN K9	Step 9 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	065	A10	Step 10 A10 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	066	B10	Step 10 B10 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	067	J10	Step 10 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	068	WT_ SP10	Step 10 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	069	WT_ TM10	Step 10 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	070	BAN K10	Step 10 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	071	A11	Step 11 A11 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	072	B11	Step 11 B11 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	073	J11	Step 11 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	074	WT_ SP11	Step 11 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	075	WT_ TM11	Step 11 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	076	BAN K11	Step 11 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	077	A12	Step 12 A12 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	078	B12	Step 12 B12 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	079	J12	Step 12 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	080	WT_ SP12	Step 12 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	081	WT_ TM12	Step 12 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	082	BAN K12	Step 12 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	083	A13	Step 13 A13 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	084	B13	Step 13 B13 output value (See note 1.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	085	J13	Step 13 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	086	WT_ SP13	Step 13 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	087	WT_ TM13	Step 13 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	088	BAN K13	Step 13 Bank No. (0: No bank selected) ((See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	089	A14	Step 14 A14 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	090	B14	Step 14 B14 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	091	J14	Step 14 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	092	WT_ SP14	Step 14 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	093	WT_ TM14	Step 14 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	094	BAN K14	Step 14 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	095	A15	Step 15 A15 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	096	B15	Step 15 B15 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	097	J15	Step 15 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	098	WT_ SP15	Step 15 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	099	WT_ TM15	Step 15 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	100	BAN K15	Step 15 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	101	A16	Step 16 A16 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	102	B16	Step 16 B16 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	103	J16	Step 16 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	104	WT_ SP16	Step 16 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	105	WT_ TM16	Step 16 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	106	BAN K16	Step 16 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	107	A17	Step 17 A17 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	108	B17	Step 17 B17 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	109	J17	Step 17 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	110	WT_ SP17	Step 17 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	111	WT_ TM17	Step 17 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	112	BAN K17	Step 17 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	113	A18	Step 18 A18 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	114	B18	Step 18 B18 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	115	J18	Step 18 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	116	WT_ SP18	Step 18 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	117	WT_ TM18	Step 18 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	118	BAN K18	Step 18 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	119	A19	Step 19 A19 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	120	B19	Step 19 B19 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	121	J19	Step 19 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	122	WT_ SP19	Step 19 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	123	WT_ TM19	Step 19 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	124	BAN K19	Step 19 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	125	A20	Step 20 A20 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	126	B20	Step 20 B20 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	127	J20	Step 20 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	128	WT_ SP20	Step 20 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	129	WT_ TM20	Step 20 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	130	BAN K20	Step 20 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	131	A21	Step 21 A21 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	132	B21	Step 21 B21 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	133	J21	Step 21 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	134	WT_ SP21	Step 21 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	135	WT_ TM21	Step 21 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	136	BAN K21	Step 21 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	137	A22	Step 22 A22 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	138	B22	Step 22 B22 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	139	J22	Step 22 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	140	WT_ SP22	Step 22 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	141	WT_ TM22	Step 22 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	142	BAN K22	Step 22 Bank No. (0: No bank selected) (See note 1.)	1 to 100	0	–	R/W(O)	W	–	–	2
	143	A23	Step 23 A23 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	144	B23	Step 23 B23 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	145	J23	Step 23 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	146	WT_ SP23	Step 23 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	147	WT_ TM23	Step 23 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	148	BAN K23	Step 23 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	149	A24	Step 24 A24 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	150	B24	Step 24 B24 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	151	J24	Step 24 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	152	WT_ SP24	Step 24 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	153	WT_ TM24	Step 24 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	154	BAN K24	Step 24 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2
	155	A25	Step 25 A25 time width (0.0: end) (See note.)	0.0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	156	B25	Step 25 B25 output value (See note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	157	J25	Step 25 Time unit (See note.)	0 to 2	0	–	R/W(O)	W	–	–	1
	158	WT_ SP25	Step 25 Wait width (0.00: No wait operation) (See note.)	0 to 320.00%	0.00	–	R/W(O)	W	–	–	2
	159	WT_ TM25	Step 25 Max. wait time (See note.)	0 to 3200.0	0.0	–	R/W(O)	W	–	–	2
	160	BAN K25	Step 25 Bank No. (0: No bank selected) (See note.)	1 to 100	0	–	R/W(O)	W	–	–	2

Note: Step numbers 1 to 25 for this function block will change depending on the step data number assigned for the Segment Program 3 block (Block Model 158).

When using Step Data blocks specified by ITEM 039 to ITEM 042 in the Segment Program 3 block, the step number is assigned as shown in the following table.

Segment Program 3 Step Data Blocks (039 to 042)	Step Number
ITEM 039 (Step Data No. 1)	1 to 25
ITEM 040 (Step Data No. 2)	26 to 50
ITEM 041 (Step Data No. 3)	51 to 75
ITEM 042 (Step Data No. 4)	76 to 100

Block Model	Block Name	Block Address
<602>	Bank Data **Segment Program 3 (Block Model 158) Expansion Data Block**	001 to 500

Outline

This function block is used as expansion data blocks for the Segment Program 3 block (Block Model 158). When the Segment Program 3 block (Block Model 158) PID parameters are set, the required number of blocks will automatically be registered, and the block addresses will be automatically allocated to addresses 500 and lower. These block ITEMs cannot be changed directly. In addition, the block ITEMs will be displayed for viewing-only in the CX-Process Tool navigation tree. They cannot be included in the block diagram.

One block can store up to 15 banks of data. When using the maximum 100 banks of data with a Segment Program 3 block, seven blocks must be used.

Note
- The Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) cannot be downloaded individually. They are downloaded together with the Segment Program 3 block (Block Model 158).
- The Step Data blocks (Block Model 601) and Bank Data blocks (Block Model 602) cannot be deleted individually. They are deleted by reducing the maximum numbers of banks and steps for the Segment Program 3 block (Block Model 158) and then again downloading the Segment Program 3 (Block Model 158) block to the LCB.

ITEM list

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Contact input	000	MT_ ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COM MEN T	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MOD EL	Block Model: Segment prog. 3 Bank Data	602		–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display		0000	Yes	r	–	–	S	2
Parameter	004	CNT _TM	Operation cycle (s) 1: 0.1, 2: 0.2, 3: 0.5, 4:1	1 to 4	4	–	R/W(S)	–	–	–	2
	005	SCA N_N O	Operation order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	011	BNK 1_P	Bank 1 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	012	BNK 1_I	Bank 1 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	013	BNK 1_D	Bank 1 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	014	BNK 1_M H	Bank 1 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	015	BNK 1_ML	Bank 1 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	016	BNK 1_E1	Bank 1 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	017	BNK 1_E2	Bank 1 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	018	BNK 1_E3	Bank 1 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	019	BNK 1_E4	Bank 1 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	020	BNK 1_E5	Bank 1 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	021	BNK 2_P	Bank 2 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	022	BNK 2_I	Bank 2 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	023	BNK 2_D	Bank 2 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	024	BNK 2_M H	Bank 2 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	025	BNK 2_ML	Bank 2 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	026	BNK 2_E1	Bank 2 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	027	BNK 2_E2	Bank 2 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	028	BNK 2_E3	Bank 2 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	029	BNK 2_E4	Bank 2 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	030	BNK 2_E5	Bank 2 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	031	BNK 3_P	Bank 3 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	032	BNK 3_I	Bank 3 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	033	BNK 3_D	Bank 3 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	034	BNK 3_MH	Bank 3 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	035	BNK 3_ML	Bank 3 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	036	BNK 3_E1	Bank 3 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	037	BNK 3_E2	Bank 3 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	038	BNK 3_E3	Bank 3 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	039	BNK 3_E4	Bank 3 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	040	BNK 3_E5	Bank 3 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	041	BNK 4_P	Bank 4 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	042	BNK 4_I	Bank 4 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	043	BNK 4_D	Bank 4 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	044	BNK 4_MH	Bank 4 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	045	BNK 4_ML	Bank 4 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	046	BNK 4_E1	Bank 4 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	047	BNK 4_E2	Bank 4 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	048	BNK 4_E3	Bank 4 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	049	BNK 4_E4	Bank 4 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	050	BNK 4_E5	Bank 4 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	051	BNK 5_P	Bank 5 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	052	BNK 5_I	Bank 5 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	053	BNK 5_D	Bank 5 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	054	BNK 5_MH	Bank 5 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	055	BNK 5_ML	Bank 5 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	056	BNK 5_E1	Bank 5 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	057	BNK 5_E2	Bank 5 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	058	BNK 5_E3	Bank 5 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	059	BNK 5_E4	Bank 5 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	060	BNK 5_E5	Bank 5 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	061	BNK 6_P	Bank 6 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	062	BNK 6_I	Bank 6 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	063	BNK 6_D	Bank 6 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	064	BNK 6_MH	Bank 6 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	065	BNK 6_ML	Bank 6 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	066	BNK 6_E1	Bank 6 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	067	BNK 6_E2	Bank 6 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	068	BNK 6_E3	Bank 6 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	069	BNK 6_E4	Bank 6 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	070	BNK 6_E5	Bank 6 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	071	BNK 7_P	Bank 7 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	072	BNK 7_I	Bank 7 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	073	BNK 7_D	Bank 7 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	074	BNK 7_MH	Bank 7 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	075	BNK 7_ML	Bank 7 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	076	BNK 7_E1	Bank 7 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	077	BNK 7_E2	Bank 7 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	078	BNK 7_E3	Bank 7 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	079	BNK 7_E4	Bank 7 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	080	BNK 7_E5	Bank 7 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	081	BNK 8_P	Bank 8 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	082	BNK 8_I	Bank 8 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	083	BNK 8_D	Bank 8 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	084	BNK 8_MH	Bank 8 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	085	BNK 8_ML	Bank 8 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	086	BNK 8_E1	Bank 8 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	087	BNK 8_E2	Bank 8 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	088	BNK 8_E3	Bank 8 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	089	BNK 8_E4	Bank 8 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	090	BNK 8_E5	Bank 8 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	091	BNK 9_P	Bank 9 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	092	BNK 9_I	Bank 9 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	093	BNK 9_D	Bank 9 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	094	BNK 9_MH	Bank 9 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	095	BNK 9_ML	Bank 9 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	096	BNK 9_E1	Bank 9 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	097	BNK 9_E2	Bank 9 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	098	BNK 9_E3	Bank 9 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	099	BNK 9_E4	Bank 9 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	100	BNK 9_E5	Bank 9 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	101	BNK 10_P	Bank 10 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	102	BNK 10_I	Bank 10 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	103	BNK 10_D	Bank 10 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	104	BNK 10_MH	Bank 10 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	105	BNK 10_ML	Bank 10 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	106	BNK 10_E1	Bank 10 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	107	BNK 10_E2	Bank 10 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	108	BNK 10_E3	Bank 10 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	109	BNK 10_E4	Bank 10 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	110	BNK 10_E5	Bank 10 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	111	BNK 11_P	Bank 11 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	112	BNK 11_I	Bank 11 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	113	BNK 11_D	Bank 11 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	114	BNK 11_MH	Bank 11 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	115	BNK 11_ML	Bank 11 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	116	BNK 11_E1	Bank 11 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	117	BNK 11_E2	Bank 11 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	118	BNK 11_E3	Bank 11 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	119	BNK 11_E4	Bank 11 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	120	BNK 11_E5	Bank 11 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	121	BNK 12_P	Bank 12 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	122	BNK 12_I	Bank 12 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	123	BNK 12_D	Bank 12 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	124	BNK 12_MH	Bank 12 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	125	BNK 12_ML	Bank 12 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	126	BNK 12_E 1	Bank 12 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	127	BNK 12_E 2	Bank 12 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	128	BNK 12_E 3	Bank 12 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	129	BNK 12_E 4	Bank 12 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	130	BNK 12_E 5	Bank 12 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	131	BNK 13_P	Bank 13 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	132	BNK 13_I	Bank 13 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	133	BNK 13_D	Bank 13 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	134	BNK 13_M H	Bank 13 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	135	BNK 13_M L	Bank 13 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	136	BNK 13_E 1	Bank 13 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	137	BNK 13_E 2	Bank 13 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	138	BNK 13_E 3	Bank 13 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	139	BNK 13_E 4	Bank 13 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	140	BNK 13_E 5	Bank 13 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	141	BNK 14_P	Bank 14 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	142	BNK 14_I	Bank 14 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	143	BNK 14_D	Bank 14 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	144	BNK 14_M H	Bank 14 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	145	BNK 14_M L	Bank 14 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	146	BNK 14_E 1	Bank 14 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	147	BNK 14_E 2	Bank 14 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	148	BNK 14_E 3	Bank 14 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	149	BNK 14_E 4	Bank 14 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	150	BNK 14_E 5	Bank 14 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	Accord-ing to HMI I/F	
Parameter	151	BNK 15_P	Bank 15 proportional band (see note.)	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	152	BNK 15_I	Bank 15 integral time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	153	BNK 15_D	Bank 15 differential time (see note.)	0 to 9999 s	0	–	R/W(O)	W	–	–	2
	154	BNK 15_MH	Bank 15 high MV limit (see note.)	±320.00%	105.00	–	R/W(O)	W	–	–	2
	155	BNK 15_ML	Bank 15 low MV limit (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	156	BNK 15_E1	Bank 15 setting 1 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	157	BNK 15_E2	Bank 15 setting 2 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	158	BNK 15_E3	Bank 15 setting 3 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	159	BNK 15_E4	Bank 15 setting 4 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2
	160	BNK 15_E5	Bank 15 setting 5 (see note.)	±320.00%	0.00	–	R/W(O)	W	–	–	2

Note: Bank numbers 1 to 15 for this function block will change depending on the bank data number assigned for the Segment Program 3 block (Block Model 158).

When using Bank Data blocks specified by ITEM 044 to ITEM 050 in the Segment Program 3 block, the bank number is assigned as shown in the following table.

Segment Program 3 Bank Data Blocks (044 to 050)	Bank Number
ITEM 044 (Bank Data No. 1)	1 to 15
ITEM 045 (Bank Data No. 2)	16 to 30
ITEM 046 (Bank Data No. 3)	31 to 45
ITEM 047 (Bank Data No. 4)	46 to 60
ITEM 048 (Bank Data No. 5)	61 to 75
ITEM 049 (Bank Data No. 6)	76 to 90
ITEM 050 (Bank Data No. 7)	91 to 100

Block Model	Block Name	Block Address
<161>	Rank Selector	001 to 500

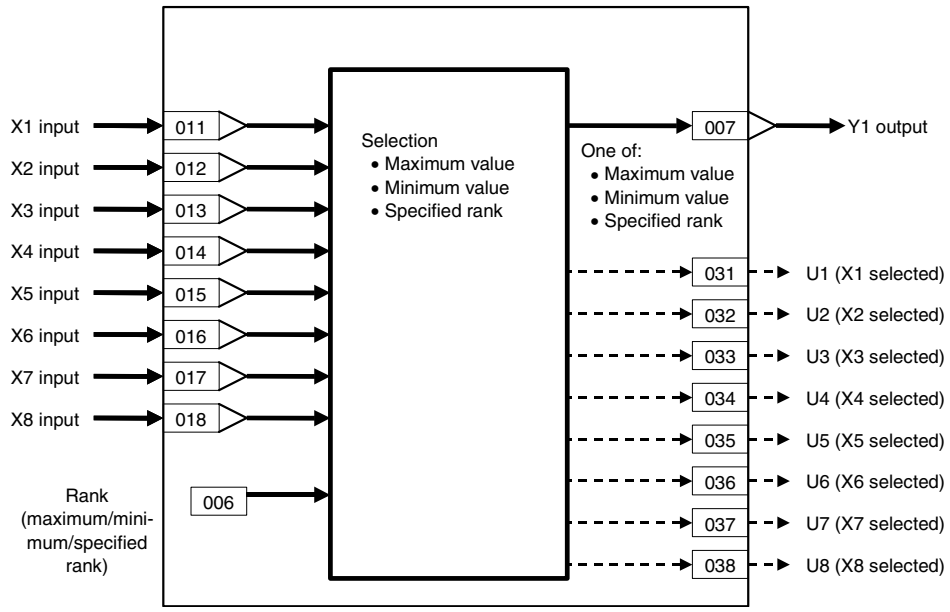
Outline

This function block specifies the rank of up to eight analog signals, and selects the data of the specified rank.
The rank within analog signals having the same value is not specified.

Function block applications

High selector, low selector, specific rank selector control

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Rank Selector	161	161	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
	006		X rank (1: Maximum value, 8: Minimum value, 2 to 7: Specified rank [in order of highest rank])	1 to 8	8	–	R/W(O)	W	–	–	1
Analog output	007	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2
Analog input connection information	011		X1 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		X2 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		X3 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		X4 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		X5 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		X6 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		X7 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		X8 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	021	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	022	X2	Input	±320.00%	0.00	Yes	r	–	–	S	2
	023	X3	Input	±320.00%	0.00	Yes	r	–	–	S	2
	024	X4	Input	±320.00%	0.00	Yes	r	–	–	S	2
	025	X5	Input	±320.00%	0.00	Yes	r	–	–	S	2
	026	X6	Input	±320.00%	0.00	Yes	r	–	–	S	2
	027	X7	Input	±320.00%	0.00	Yes	r	–	–	S	2
	028	X8	Input	±320.00%	0.00	Yes	r	–	–	S	2
Contact output	031	U1	X1 selected	0, 1	0	Yes	–	–	R	S	1
	032	U2	X2 selected	0, 1	0	Yes	–	–	R	S	1
	033	U3	X3 selected	0, 1	0	Yes	–	–	R	S	1
	034	U4	X4 selected	0, 1	0	Yes	–	–	R	S	1
	035	U5	X5 selected	0, 1	0	Yes	–	–	R	S	1
	036	U6	X6 selected	0, 1	0	Yes	–	–	R	S	1
	037	U7	X7 selected	0, 1	0	Yes	–	–	R	S	1
	038	U8	X8 selected	0, 1	0	Yes	–	–	R	S	1

Note: Connection of ITEM 011 and ITEM 012 are mandatory. ITEM 013 to ITEM 106 need not be connected. (In this case, the input value becomes -320.00%.)

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Output	Y1
021	X1 input	X1
022	X2 input	X2
023	X3 input	X3
024	X4 input	X4
025	X5 input	X5
026	X6 input	X6
027	X7 input	X7
028	X8 input	X8
031	X1 selected	U1
032	X2 selected	U2
033	X3 selected	U3
034	X4 selected	U4
035	X5 selected	U5
036	X6 selected	U6
037	X7 selected	U7
038	X8 selected	U8

Block Model	Block Name	Block Address
<162>	Input Selector	001 to 500

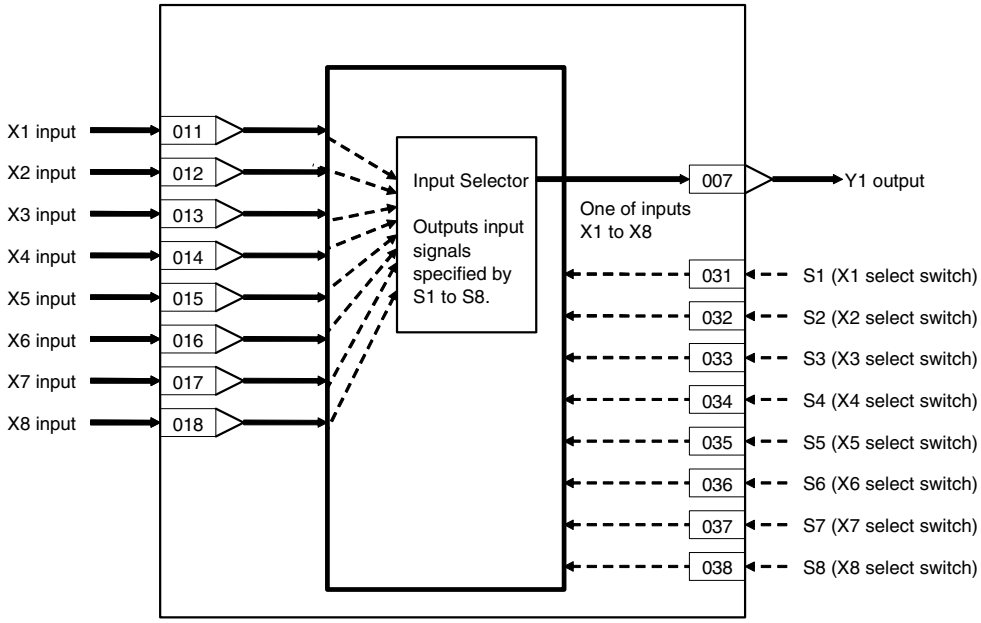
Outline

This function block selects a single analog signal specified by the contact signal from up to eight analog signals.
This function block differs from the Constant Selector block (Block Model 165) in that selection is made from analog values to be converted and not from fixed values.

Function block applications

Multiplexer

Block diagram



The analog signal is selected by the select switch changing to 1 (ON). When multiple select switches are 1 (ON), the switch having the smallest number among S1 to S8 is valid.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Input Selector	162	162	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog output	007	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2
Analog input connection information	011		X1 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		X2 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		X3 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		X4 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		X5 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		X6 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		X7 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		X8 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	021	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	022	X2	Input	±320.00%	0.00	Yes	r	–	–	S	2
	023	X3	Input	±320.00%	0.00	Yes	r	–	–	S	2
	024	X4	Input	±320.00%	0.00	Yes	r	–	–	S	2
	025	X5	Input	±320.00%	0.00	Yes	r	–	–	S	2
	026	X6	Input	±320.00%	0.00	Yes	r	–	–	S	2
	027	X7	Input	±320.00%	0.00	Yes	r	–	–	S	2
	028	X8	Input	±320.00%	0.00	Yes	r	–	–	S	2
Contact input	031	S1	X1 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	032	S 2	X2 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	033	S 3	X3 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	034	S 4	X4 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	035	S 5	X5 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	036	S 6	X6 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	037	S 7	X7 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	038	S 8	X8 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

Note1: Connection of ITEM 011 and ITEM 012 are mandatory. ITEM 013 to ITEM 106 need not be connected. (In this case, the input value becomes -320.00%.)

Note2: Inputs are selected by X1 to X8 select switches changing to 1 (ON) and not when operation is started. When multiple select switches are 1 (ON), the select switch for the ITEM having the smallest ITEM number is valid.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Output	Y1
021	X1 input	X1
022	X2 input	X2
023	X3 input	X3
024	X4 input	X4
025	X5 input	X5
026	X6 input	X6
027	X7 input	X7
028	X8 input	X8
031	X1 select switch	S1
032	X2 select switch	S2
033	X3 select switch	S3
034	X4 select switch	S4
035	X5 select switch	S5
036	X6 select switch	S6
037	X7 select switch	S7
038	X8 select switch	S8

Block Model	Block Name	Block Address
<163>	3-input Selector	001 to 500

Outline

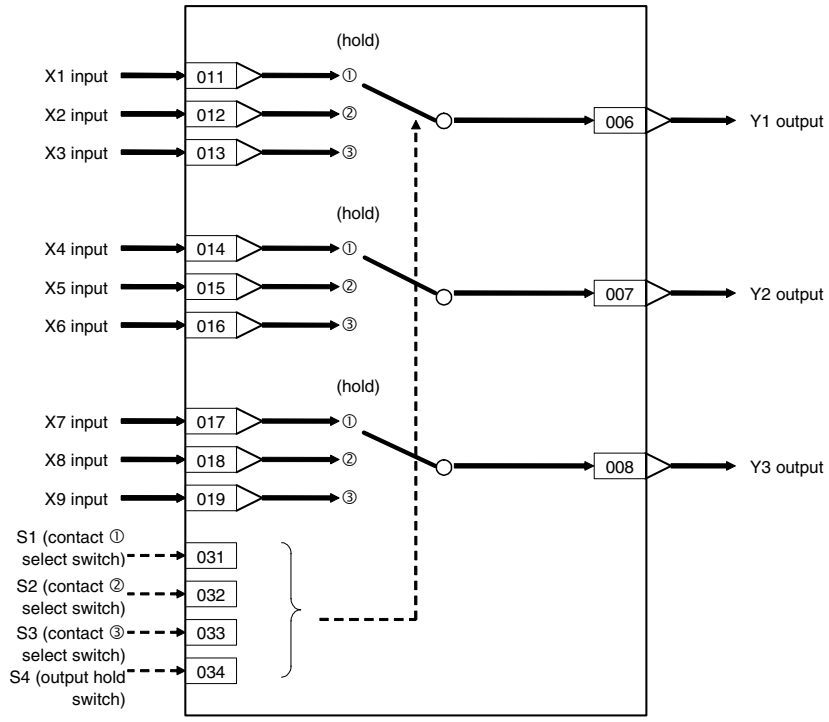
This function block selects and outputs one of three analog input signals. Three sets of analog input signals are held by this function.

•In addition to switching of three analog input signals, the previous value can also be held.

Function block applications

Switching of measuring systems or sensors having different measurement targets

Block diagram



When S1 contact select switch is 1 (ON), X1, X4 and X7 are selected, and are output to Y1, Y2 and Y3, respectively.
When S2 contact select switch is 1 (ON), X2, X5 and X8 are selected, and are output to Y1, Y2 and Y3, respectively.
When S3 contact select switch is 1 (ON), X3, X6 and X9 are selected, and are output to Y1, Y2 and Y3, respectively.
When S4 output hold switch is 1 (ON), X1 to X9 inputs are not selected. The previous output values are held for Y1, Y2 and Y3 outputs in this case.

Note: •Use the OUT command or SET command in the Step Ladder Program block (Block Model 301) for manipulating the S1 to S4 contact select switches.
•An error (execution error code 19: inappropriate operation) occurs when two or more S1 to S3 contact select switches are specified at the same time. If an error occurs, the output value that was active before the error occurs is held.
•When S4 contact switch is set to 1 (ON) at the same time as S1 to S3, the setting of S4 (output hold switch) is given priority.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: 3-input Selector	163	163	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog output	006	Y1	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	007	Y2	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	008	Y3	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
Analog input connection information	011		X1 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		X2 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		X3 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		X4 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		X5 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		X6 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		X7 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		X8 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	019		X9 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	021	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	022	X2	Input	±320.00%	0.00	Yes	r	–	–	S	2
	023	X3	Input	±320.00%	0.00	Yes	r	–	–	S	2
	024	X4	Input	±320.00%	0.00	Yes	r	–	–	S	2
	025	X5	Input	±320.00%	0.00	Yes	r	–	–	S	2
	026	X6	Input	±320.00%	0.00	Yes	r	–	–	S	2
	027	X7	Input	±320.00%	0.00	Yes	r	–	–	S	2
	028	X8	Input	±320.00%	0.00	Yes	r	–	–	S	2
	029	X9	Input	±320.00%	0.00	Yes	r	–	–	S	2
Contact input	031	S1	S1 select switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	032	S2	S2 select switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	033	S3	S3 select switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	034	S4	Output hold switch – Output is held when set to ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
006	Y1 output	Y1
007	Y2 output	Y2
008	Y3 output	Y3
021	X1 input	X1
022	X2 input	X2
023	X3 input	X3
024	X4 input	X4
025	X5 input	X5
026	X6 input	X6
027	X7 input	X7
028	X8 input	X8
029	X9 input	X9
031	S1 select switch	S1
032	S2 select switch	S2
033	S3 select switch	S3
034	Output hold switch	S4

Block Model	Block Name	Block Address
<164>	3-output Selector	001 to 500

Outline

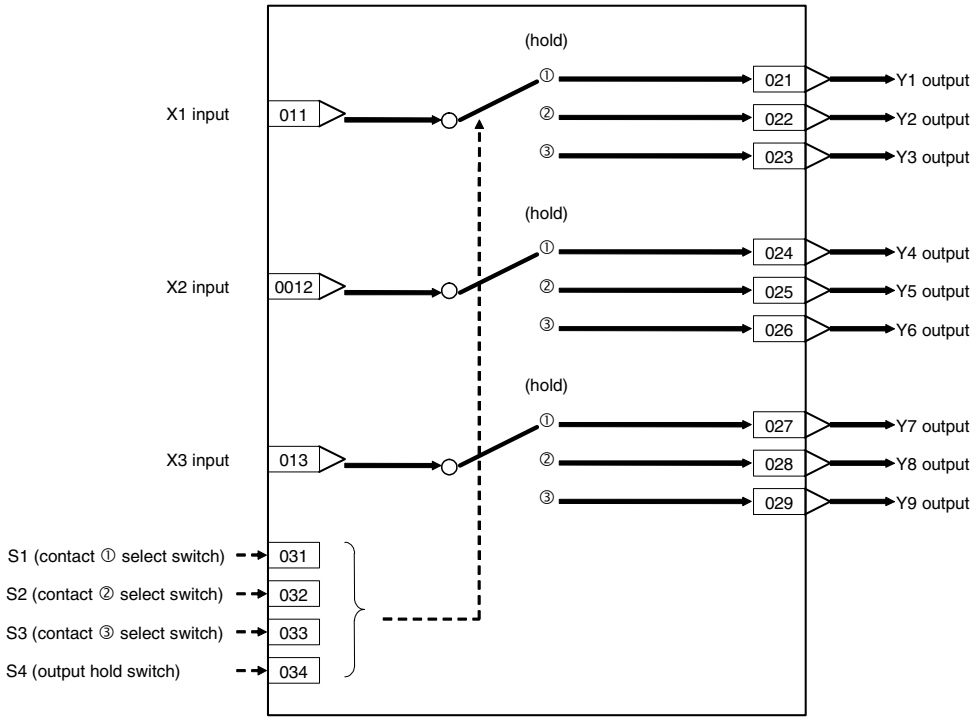
This function block selects and outputs one analog input signal to one of three switched outputs.
Three sets of analog input signal and switched output are held by this function block.

•In addition to switching to one of three switched outputs, the previous value can also be held.

Function block applications

Selection of control panels or control targets having different targets to be manipulated

Block diagram



When S1 contact select switch is 1 (ON), X1, X2 and X3 inputs are output to Y1, Y4 and Y7, respectively.
When S2 contact select switch is 1 (ON), X1, X2 and X3 inputs are output to Y2, Y5 and Y8, respectively.
When S3 contact select switch is 1 (ON), X1, X2 and X3 inputs are output to Y3, Y6 and Y9, respectively.
When S4 output hold switch is 1 (ON), X1 to X3 inputs are not output. The previous output values are held for Y1 through Y9 outputs in this case.

Note: •Use the OUT command or SET command in the Step Ladder Program block (Block Model 301) for manipulating the S1 to S4 switches.
•An error (execution error code 19: inappropriate operation) occurs when two or more S1 to S3 contact select switches are specified at the same time. If an error occurs, the output value that was active before the error occurs is held.
•When S4 output hold switch is set to 1 (ON) at the same time as S1 to S3, the setting of S4 is given priority.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	R/W	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: 3-output Selector	164	164	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input wiring information	011		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		X3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	014	X1	X1 input	±320.00%	0.00	Yes	r	–	–	S	2
	015	X2	X2 input	±320.00%	0.00	Yes	r	–	–	S	2
	016	X3	X3 input	±320.00%	0.00	Yes	r	–	–	S	2
Analog output	021	Y1	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	022	Y2	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	023	Y3	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	024	Y4	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	025	Y5	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	026	Y6	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	027	Y7	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	028	Y8	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
	029	Y9	Output	±320.00%	0.00	Yes	R/W(O)	–	–	S	2
Contact input	031	S1	S1 select switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	032	S2	S2 select switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	033	S3	S3 select switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	034	S4	Output hold switch – Output is held when set to ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
014	X1 input	X1
015	X2 input	X2
016	X3 input	X3
021	Y1 output	Y1
022	Y2 output	Y2
023	Y3 output	Y3
024	Y4 output	Y4
025	Y5 output	Y5
026	Y6 output	Y6
027	Y7 output	Y7
028	Y8 output	Y8
029	Y9 output	Y9
031	S1 select switch	S1
032	S2 select switch	S2
033	S3 select switch	S3
034	Output hold switch	S4

Block Model	Block Name	Block Address
<165>	Constant Selector	001 to 500

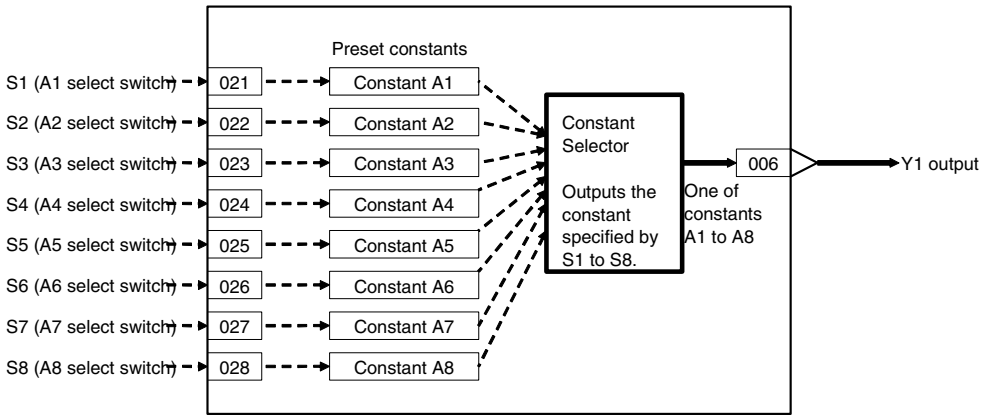
Outline

This function block selects eight preset constants (fixed values) by the contact signal, and outputs the selected constant as an analog signal.
This function block differs from the Input Selector block (Block Model 162) in that the constants are selected from fixed values and not from analog values that change.

Function block applications

Switching of multiple parameters (e.g. Set Point values)

Block diagram



The analog signal is selected by the select switch changing to 1 (ON). When multiple select switches are 1 (ON), the switch having the smallest number among S1 to S8 is valid.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Constant Selector	165	165	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog output	006	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	S	2
Parameter	011	A1	A1 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	012	A2	A2 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	013	A3	A3 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	014	A4	A4 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	015	A5	A5 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	016	A6	A6 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	017	A7	A7 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	018	A8	A8 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
Contact input	021	S1	A1 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	022	S2	A2 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	023	S3	A3 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	024	S4	A4 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	025	S5	A5 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	026	S6	A6 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	027	S7	A7 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	028	S8	A8 select switch – Selected by "1"	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

Note: Inputs are selected by A1 to A8 select switches changing to 1 (ON) and not when operation is started. When multiple select switches are 1 (ON), the select switch for the ITEM having the smallest ITEM number is valid.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
006	Output	Y1
011	A1 constant	A1
012	A2 constant	A2
013	A3 constant	A3
014	A4 constant	A4
015	A5 constant	A5
016	A6 constant	A6
017	A7 constant	A7
018	A8 constant	A8
021	A1 select switch	S1
022	A2 select switch	S2
023	A3 select switch	S3
024	A4 select switch	S4
025	A5 select switch	S5
026	A6 select switch	S6
027	A7 select switch	S7
028	A8 select switch	S8

Block Model	Block Name	Block Address
<166>	Constant Generator	001 to 500

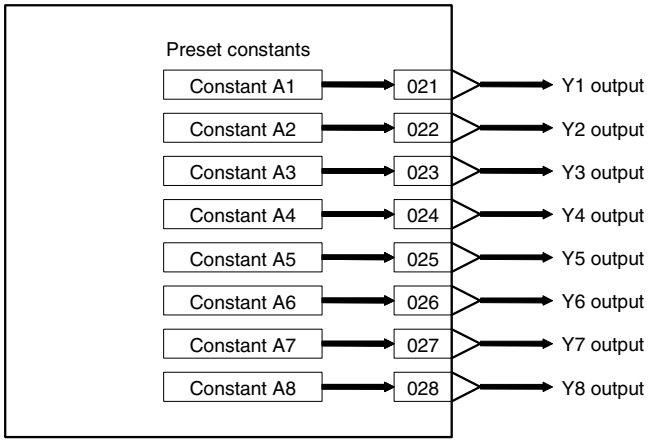
Outline

This function block outputs eight preset constants (fixed values) in batch manner as analog signals.
All A1 to A8 constants are output to Y1 to Y8 analog outputs at all times.

Function block applications

Use of certain fixed values as input values (e.g. to make one of the values in an addition operation a fixed value)

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Constant Generator	166	166	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	011	A1	A1 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	012	A2	A2 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	013	A3	A3 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	014	A4	A4 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	015	A5	A5 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	016	A6	A6 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	017	A7	A7 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	018	A8	A8 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
Analog output	021	Y1	Output	±320.00%	0.00	Yes	r/w	–	–	–	2
	022	Y2	Output	±320.00%	0.00	Yes	r/w	–	–	–	2
	023	Y3	Output	±320.00%	0.00	Yes	r/w	–	–	–	2
	024	Y4	Output	±320.00%	0.00	Yes	r/w	–	–	–	2
	025	Y5	Output	±320.00%	0.00	Yes	r/w	–	–	–	2
	026	Y6	Output	±320.00%	0.00	Yes	r/w	–	–	–	2
	027	Y7	Output	±320.00%	0.00	Yes	r/w	–	–	–	2
	028	Y8	Output	±320.00%	0.00	Yes	r/w	–	–	–	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
011	A1 constant	A1
012	A2 constant	A2
013	A3 constant	A3
014	A4 constant	A4
015	A5 constant	A5
016	A6 constant	A6
017	A7 constant	A7
018	A8 constant	A8

Block Model	Block Name	Block Address
<167>	Ramped Switch	001 to 500

Outline

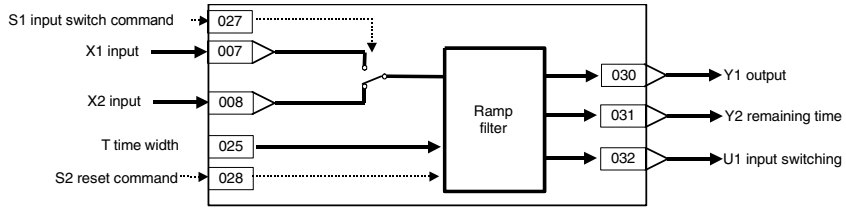
The function block creates a ramped switch that switches between two analog inputs, X1 and X2, or constants.
When the status of the Input Switch Command, S1, is changed, output Y1 is changed at a constant rate to equal the value of analog input X1 or analog input X2 at the end of the specified time.
Ramped Switch blocks can be used when it is necessary to change a process value gradually over a set period of time.

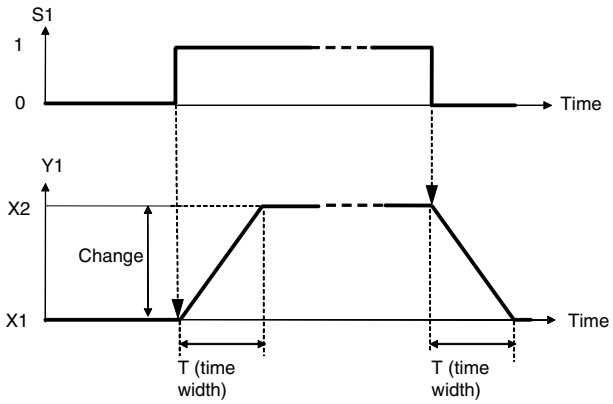
Note: Internal values resulting from calculations from just prior to power interruptions or stopping operation are cleared for cold starts. They are maintained for hot starts.

Function block applications

Changing a process value over time for opening/closing valves, ramping temperature increases for heat processing, etc.

Block diagram





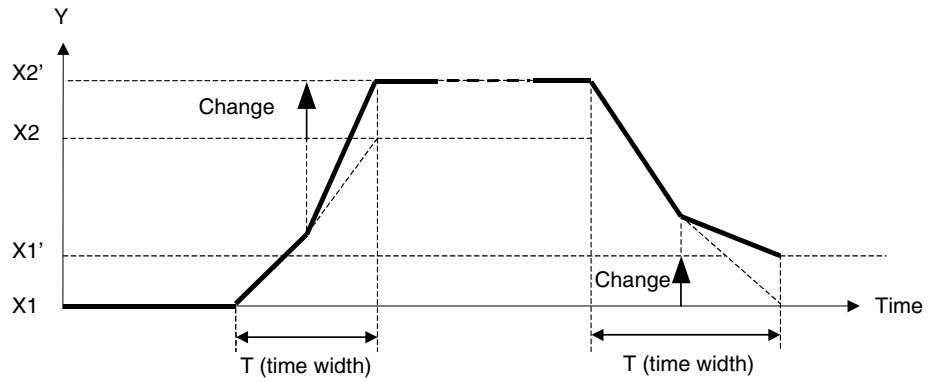
When Input Switch Command S1 changes to 1 (ON), the value of Y1 changes from X1 to X2 over time width T. When Input Switch Command S1 changes to 0 (OFF), the value of Y1 changes from X2 to X1 over time width T. When time width T has lapsed, the value of the selected input is output.
The ramp filter is operating only while input switching U1 is ON.
(The above figure explains the relationship when X2>X1. The relationship when X2<X1 is also possible.)

Note 1: When Reset Command S2 is set to 1 (ON), the value of Y1 will be reset to X2 if Input Switch Command S1 is set to 1 (ON), and to X2 if Input Switch Command S1 is set to 0 (OFF).

Note 2: If the Input Switch Command is changed while Output Y1 is changing, the value being output will change to X1 or X2 over time width T.

Note 3: If you have changed the time unit (Item 026) while Output Y1 is changing, change Reset Command S2 from 1 (ON) to 0 (OFF).

If the X2 input is changed when the S1 Input Switch Command is ON (Y1 = X2 ← X1) during input switching (i.e., while the ramp filter is operating), the slope will be automatically calculated within the remaining portion of the set T (time width) and Y1 will be output at the slope required to reach the new value of X2, i.e., X2'. Similarly, if the X1 input is changed when the S1 Input Switch Command is OFF (Y1 = X1 ← X2) during input switching (i.e., while the ramp filter is operating), the slope will be automatically calculated within the remaining portion of the set T (time width) and Y1 will be output at the slope required to reach the new value of X1, i.e., X1'.



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Ramped Switch	167	167	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix “Execution Error Code List.”)		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	1 to 4 5 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	007		X1 source destination BBB: Block address, III: ITEM No. Note: If 000000 is set, the value of ITEM 015 is used as a constant for X1 (fixed value).	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		X2 source destination BBB: Block address, III: ITEM No. Note: If 000000 is set, the value of ITEM 016 is used as a constant for X2 (fixed value).	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	015	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	016	X2	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	025	T	Time width (0: No delay)	0 to 3200.0	0.0	–	R/W(O)	W	–	S/R	2
	026	TU	Time unit (0: sec, 1: min, 2: hr)	0 to 2	0	–	R/W(S)	W	–	S/R	1
Contact input	027	S1	Input Switch Command (1: Y1= X2 to X1, 0: Y1= X1 to X2)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	028	S2	Reset Command When set to 1, if S1 (ITEM 027) =0 Y1 is reset to X1. If S1(ITEM 027) =1, Y1 is reset to X2.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	030	Y1	Output	±320.00%	0.00	Yes	R/W	–	–	S	2
	031	Y2	Remaining Time (Time set to 0)	0 to 3200.0	0.0	Yes	r	W	–	S	2
Contact output	032	U1	Input switching (ramp filter operating: 1)	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMS on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
015	X1 input	X1
016	X2 input	X2
025	Time width	T
026	Time unit	TU
027	Input switch command	S1
028	Reset command	S2
030	Y1 output	Y1
031	Remaining time	Y2
032 *1	Input switching	U1

*1: Supported by LCB05D,LCB01/05 Ver.1.12 later.

Block Model	Block Name	Block Address
<168>	Bank Selector	001 to 500

Outline

Only the LCB01/05 Ver.1.5 or later and LCB03 can support this function block.

Up to 8 sets of parameters (banks 0 to 7) can be recorded with different settings for the local SP and PID parameters (P, I, D, MH, and ML). The bank number can be switched to match the operating conditions, so that the existing local SP and/or PID parameter values in the target PID block (Basic or Advanced) are overwritten with the values that were preset in that bank.

Applicable PID Blocks:

A Basic PID block (Block Model 011) or Advanced PID block (Block Model 012) can be specified in ITEM 011.

Bank Selection Conditions:

Any of the following conditions can be used.

- Selection by bit
- Selection by bank number
- When PID parameters are selected automatically, the PID parameters (P, I, D, MH, and ML) can be switched automatically based on the zone in which an analog input value is located.

Note 1: When a cold start is performed, the internally stored values are cleared after power is interrupted or operation of the Loop Controller is stopped. When a hot start is performed, the internally stored values are retained.

Note 2: When PID parameters are being switched automatically and the upper limit of range 7 is exceeded, the function will switch to the range 0 PID parameters.

Auto-tuning PID Parameters for the Bank Selector Block:
Use the following procedure to auto-tune the target PID block's PID parameters and save those auto-tuning results in this function block's PID parameters.

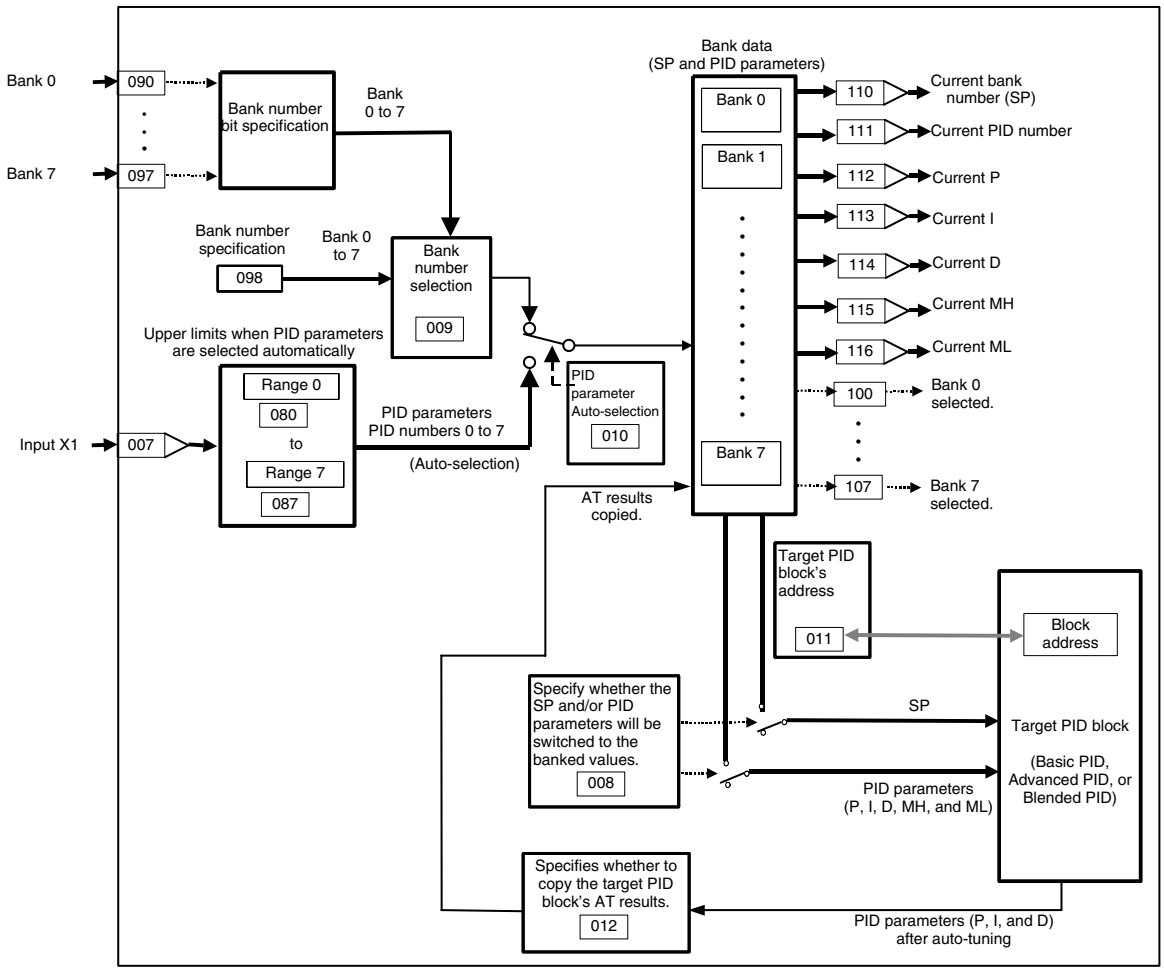
1. Disable PID Parameter Auto-selection by setting ITEM 010 to 0, so that the PID parameter bank is not selected automatically by input X1.
2. Specify the bank number in this function block that will store the tuned PID parameters. (The bank number can be specified by bit specification or direct bank number specification.)
3. Perform PID parameter tuning in the target PID block.
4. Turn this function block's PID block parameters copy Bit (ITEM 014) from OFF to ON to copy the target PID block's PID parameters to this function block's current bank.
5. Repeat steps 2 through 4 for each PID parameter bank.
6. When the PID parameters have been tuned for all of the required banks, return the PID parameter auto-selection setting (ITEM 010) to its original setting and verify operation.

Note: When the PID parameter auto-selection setting (ITEM 010) is set to 1 (Enabled), the PID parameter bank will be selected automatically according to input X1. If the PID block parameters copy bit (ITEM 014) or PID block AT results copy bit (ITEM 012) is being used, always disable the PID parameter auto-selection function by setting ITEM 010 to 0.

Function block applications

- Store several banks of settings and switch to the appropriate settings (SP and/or PID parameters) for the current model or application.
- Select the appropriate SP value for standby operation (maintaining temperature) or main operation (heating).
- When the startup characteristics of the controlled system are different from the characteristics during normal operation, the PID constants can be switched automatically to suit the different zones.
- When the settings change with time, the PID constants can be switched in different zones. For example, this function block can be used in combination with the Segment Program blocks (Block Models 156 and 157).

Block diagram



Differences between ITEM 110 and ITEM 111

The output destination ITEM differs depending on the selection method for the current bank number.

- ITEM 110 (current bank number): This is the bank number selected with the bank selection method (ITEM 009) and the bank number select bits (ITEM 090 to ITEM 097) or the bank number (ITEM 098)
- ITEM 111 (current PID number): This is the bank number selected by the X1 input when the PID parameter auto-selection (ITEM 010) is set to 1 (enabled). When this setting is 0 (disabled), the number is not updated. When the PID parameter auto-selection (ITEM 010) is set to 1, the value set for ITEM 111 is used. When set to 0, the bank number of the value set for ITEM 110 is used.

Timing of Data Writes to the Target PID Block

Bank data is written to the target PID block at the following times:

a) When the bank number has changed (written even if each parameter hasn't changed)
b) When the current bank's parameters (SP, P, I, D, MH, or ML) have been changed
c) When a cold start occurs

Copying AT Results

When the PID Block AT Results Copy Bit (ITEM 012) is set to 1 (Copy), the results of auto-tuning (P, I, and D parameter values) can be copied to the Bank Selector function's current bank after auto-tuning is performed on the target PID block.
The results are copied when the PID Block's AT Status Flag goes from 1 to 0.
When auto-tuning is being performed, the bank cannot be switched and PID parameters cannot be written.

Execution Errors

Error code 1: (Connection terminal/output terminal connection not defined)
The source designation's block address or ITEM number does not exist.

Error code 71: (Inappropriate parameter)
The target PID block's block address is not registered or it is not registered to a PID block.
The upper limits are not entered in ascending order (ITEM 080 ≤ ITEM 081 …).

ITEM list

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Bank Selector	168	168	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal Other: Error (See Appendix "Execution Error Code List.)		0000	Yes	r	–	–	S	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01, 7: 0.02, 8: 0.05	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

Input Settings

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Analog input connection information	006	X1_AD	X1 source designation Analog input source designation when using PID parameter auto-selection BBB: Block address III: Item number Note: When this item is set to 000000, the value set in ITEM 007 becomes the X1 input value.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	X1	Input value for PID parameter auto-selection	-320.00 to 320.00%	0.00	Yes	r	–	–	S	2

Selection Items

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Analog input connection information	008	CHG_PARA	Parameters to change 0: Both SP and PID parameters 1: SP only 2: PID parameters only (P, I, D, MH, and ML)	0 to 2	0	–	R/W(S)	W	–	–	–
Analog input	009	CHG_BNK	Bank selection method 0: Bit specification 1: Bank number specification	0, 1	0	–	R/W(S)	–	–	–	–
Parameter	010	SEL_PID	PID parameter auto-selection 0: Disable 1: Enable When set to 1, the PID parameters (P, I, D, MH, and ML) are automatically selected based on the value of X1.	0, 1	0	–	R/W(O)	–	–	–	–
	011	CHG_PID	Target PID block's address 0: Not specified	0 to 500	0	–	R/W(S)	W	–	–	–
Contact input	012	AT_REF	PID block AT results copy bit Turn ON to reflect (copy) the results of the PID block's auto-tuning (the tuned P, I, and D values) to the current bank. 0: Do not copy 1: Copy	0, 1	0	–	R/W(S)	W	–	–	–
Contact output	013	HLD_BNK	Turn ON to temporarily disabled bank switching. When this item is set to 0, the effective bank will be the specified current bank number (ITEM 110). 0: Enable switching 1: Disable switching	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	014	UP_PID	PID block parameters copy bit Turn from OFF to ON to upload the target PID block's PID parameters (P, I, D, MH, and ML) to the current bank. 0 → 1: Copy the target PID block's PID parameters to the current bank. This bit is automatically reset to 0 after the parameters are copied.	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1

Bank Parameter Settings

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Parameter	020	SP0	SP of bank 0	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	021	SP1	SP of bank 1	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	022	SP2	SP of bank 2	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	023	SP3	SP of bank 3	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	024	SP4	SP of bank 4	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	025	SP5	SP of bank 5	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	026	SP6	SP of bank 6	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	027	SP7	SP of bank 7	-15.00 to 15.00%	0.00	–	R/W(O)	W	–	–	2
	031	P0	P of bank 0	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	032	I0	I of bank 0	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	033	D0	D of bank 0	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	034	MH0	MH of bank 0	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	–	2
	035	ML0	ML of bank 0	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2
	036	P1	P of bank 1	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	037	I1	I of bank 1	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	038	D1	D of bank 1	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	039	MH1	MH of bank 1	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	–	2
	040	ML1	ML of bank 1	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2
	041	P2	P of bank 2	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	042	I2	I of bank 2	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	043	D2	D of bank 2	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	044	MH2	MH of bank 2	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	–	2
	045	ML2	ML of bank 2	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2
	046	P3	P of bank 3	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	047	I3	I of bank 3	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	048	D3	D of bank 3	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	049	MH3	MH of bank 3	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	–	2
	050	ML3	ML of bank 3	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2
	051	P4	P of bank 4	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	052	I4	I of bank 4	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	053	D4	D of bank 4	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	054	MH4	MH of bank 4	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	–	2
	055	ML4	ML of bank 4	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2
	056	P5	P of bank 5	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	057	I5	I of bank 5	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	058	D5	D of bank 5	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	059	MH5	MH of bank 5	-320.00 to 320.00%	105.00	–	R/W(O)	W	–-	–	2
	060	ML5	ML of bank 5	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2
	061	P6	P of bank 6	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	062	I6	I of bank 6	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	063	D6	D of bank 6	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	064	MH6	MH of bank 6	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	–	2
	065	ML6	ML of bank 6	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2
	066	P7	P of bank 7	0.1 to 999.9%	100.0	–	R/W(O)	W	–	–	2
	067	I7	I of bank 7	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	068	D7	D of bank 7	0 to 9,999 s	0	–	R/W(O)	W	–	–	2
	069	MH7	MH of bank 7	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	–	2
	070	ML7	ML of bank 7	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	–	2

Note 1: PID number n (n = 0 to 7) is selected automatically when:
Upper limit n-1 < Analog input (X1) ≤ Upper limit n

Note 2: Set the upper limits in ascending order in ITEM 080 to ITEM 087, i.e., upper limit 0 ≤ upper limit 1 ≤ … ≤ upper limit 7. If two or more upper limit values are equal, the lowest bank number will be used.

Specifying Ranges for PID Parameter Auto-selection

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Parameter	080	H_LMT0	Upper limit of range 0 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	081	H_LMT1	Upper limit of range 1 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	082	H_LMT2	Upper limit of range 2 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	083	H_LMT3	Upper limit of range 3 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	084	H_LMT4	Upper limit of range 4 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	085	H_LMT5	Upper limit of range 5 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	086	H_LMT6	Upper limit of range 6 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	087	H_LMT7	Upper limit of range 7 for PID parameter auto-selection	-320.00 to 320.00%	320.00%	–	R/W(O)	W	–	–	2
	088	HS_SP	Hysteresis for auto-selection	-320.00 to 320.00%	1.00%	–	R/W(O)	W	–	–	2

Bank Selection

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Setting input	090	SEL_BNK0	Bank 0 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	091	SEL_BNK1	Bank 1 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	092	SEL_BNK2	Bank 2 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	093	SEL_BNK3	Bank 3 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	094	SEL_BNK4	Bank 4 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	095	SEL_BNK5	Bank 5 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	096	SEL_BNK6	Bank 6 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
	097	SEL_BNK7	Bank 7 select bit 0: Not selected 1: Selected (see note)	0, 1	0	Yes	R/W(O)	W	R/W	S/R	1
Parameter	098	SET_BNK	Bank number specification	0 to 7	0	Yes	R/W(O)	W	–	S/R	2

Note: When two or more banks are selected, the lowest bank number will be used.

Status

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Contact output	100	SET_BNK0	Bank 0 Selected Flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
	101	SET_BNK1	Bank 1 Selected Flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
	102	SET_BNK2	Bank 2 Selected Flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
	103	SET_BNK3	Bank 3 Selected Flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
	104	SET_BNK4	Bank 4 Selected Flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
	105	SET_BNK5	Bank 5 selected flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
	106	SET_BNK6	Bank 6 selected flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
	107	SET_BNK7	Bank 7 selected flag 1: Selected	0, 1	0	Yes	–	–	R	S	1
Analog output	110	C_BNK	Current bank number (SP)	0 to 7	0	Yes	r	–	–	S	2
	111	C_PID	Current bank number (P, I, D, MH, and ML)	0 to 7	0	Yes	r	–	–	S	2
	112	C_SP	Current SP	-15.00 to 115.00%	0.00	Yes	r	–	–	S	2
	113	C_P	Current P	0.1 to 999.9%	0.0	Yes	r	–	–	S	2
	114	C_I	Current I (see note)	0 to 9,999s	0	Yes	r	–	–	S	2
	115	C_D	Current D (see note)	0 to 9,999s	0	Yes	r	–	–	S	2
	116	C_MH	Current MH	-320.00 to 320.00%	0.00	Yes	r	–	–	S	2
	117	C_ML	Current ML	-320.00 to 320.00%	0.00	Yes	r	–	–	S	2

Note: When the target PID block's operation cycle (ITEM 004) is set between 0.01 and 0.05 seconds, the integral time and differential time units are indicated in 0.01-second units, not 1-second units.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
007	Input value for PID parameter auto-selection	X1
098	Bank number specification	SET_BAK
110	Current bank number (SP)	C_BNK
111	Current bank number (P, I, D, MH, and ML)	C_PID
112	Current SP	C_SP
113	Current P	C_P
114	Current I	C_I
115	Current D	C_D
116	Current MH	C_MH
117	Current ML	C_ML
003	Execution error display	ERR
090	Bank 0 select bit	SEL_BNK0
091	Bank 1 select bit	SEL_BNK1
092	Bank 2 select bit	SEL_BNK2
093	Bank 3 select bit	SEL_BNK3
094	Bank 4 select bit	SEL_BNK4
095	Bank 5 select bit	SEL_BNK5
096	Bank 6 select bit	SEL_BNK6
097	Bank 7 select bit	SEL_BNK7
013	Bank switching disable bit	HLD_BNK
014	PID block parameters (P, I, D, MH, and ML) copy bit (Copies parameters from PID block to bank selector block.)	UP_PID
000	Stop block operation command	MT_ST
100	Bank 0 selected flag	SET_BNK0
101	Bank 1 selected flag	SET_BNK1
102	Bank 2 selected flag	SET_BNK2
103	Bank 3 selected flag	SET_BNK3
104	Bank 4 selected flag	SET_BNK4
105	Bank 5 selected flag	SET_BNK5
106	Bank 6 selected flag	SET_BNK6
107	Bank 7 selected flag	SET_BNK7

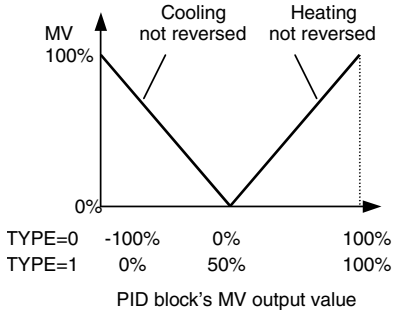
Block Model	Block Name	Block Address
<169>	Split Converter	001 to 500

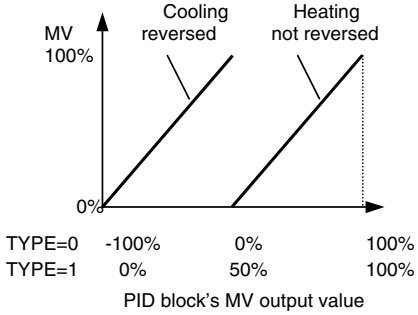
Outline

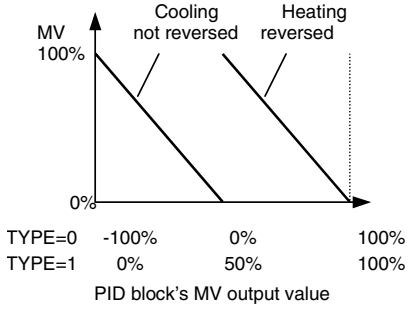
Only the LCB01/05 Ver.1.5 or later and LCB03 can support this function block.

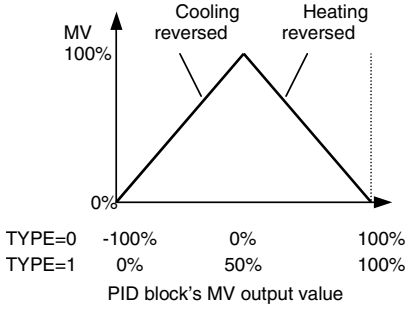
This function block is used in combination with a Basic PID block (Block Model 011) or Advanced PID block (Block Model 012) and converts the MV output from the PID block to two analog output values. For example, the Split Converter block can convert a single MV output to a heating MV and a cooling MV.

- The output can be converted to any of the following patterns to suit the characteristics of the control terminal.









- There are separate heating PID parameters and cooling PID parameters. The PID block's PID parameters can be changed to this function block's heating PID parameters when the MV output value is being converted to the heating MV and the cooling PID parameters when the MV output value is being converted to the cooling MV.
- Conversely, the PID blocks auto-tuning (AT) results can be copied to this function block's heating PID parameters or cooling PID parameters.
- A high and low limit function is provided for the heating MV and cooling MV.
- Using LCB01/05 Ver.2.0 or later, and LCB03, -100% to 100% (TYPE=0) or 0% to 100% (TYPE=1) can be selected for the input range (ITEM 008).
- Using LCB01/05 Ver.2.0 or later, and LCB03, the switching point of the heating and cooling side can be changed (ITEM 009).

Note 1. Set the control action (ITEM 052) of the associated PID block to 0 (Reverse: MV decreases as PV increases) to perform operation as shown in the above graphs.

Note 2. When reverse action is being used for the heating MV or cooling MV, set the high and MV low limits after setting reverse action.

Note 3. Set the same operation cycle that is set in the source PID block. Control may be unstable if the operation cycles are not the same.

Note 4. When TYPE=0 (X1 input range 0: -100% to 100%) is selected, set the MV high and low limits of the PID block used in combination with this function block to also enable output of negative values (e.g., ±100%).

Auto-tuning PID Parameters for the Split Converter Block

Use the following procedure to auto-tune the PID block's PID parameters and save those auto-tuning results in this function block's PID parameters.

1. Set the PID block PID parameters write bit (ITEM 040) to 0: Do not write, so that the source PID block's P, I, and D parameters will not be overwritten.
2. Perform PID parameter tuning in the source PID block.
3. Copy the results of the auto-tuning to the desired PID parameters of this function block
4. Repeat steps 2 and 3 for each PID parameter bank.
5. When the PID parameters have been tuned for all of the required banks, return the PID block PID parameters write bit (ITEM 040) to its original setting and verify operation.

The following procedure can be used to perform auto-tuning (AT) without manual tuning and fine-tuning.

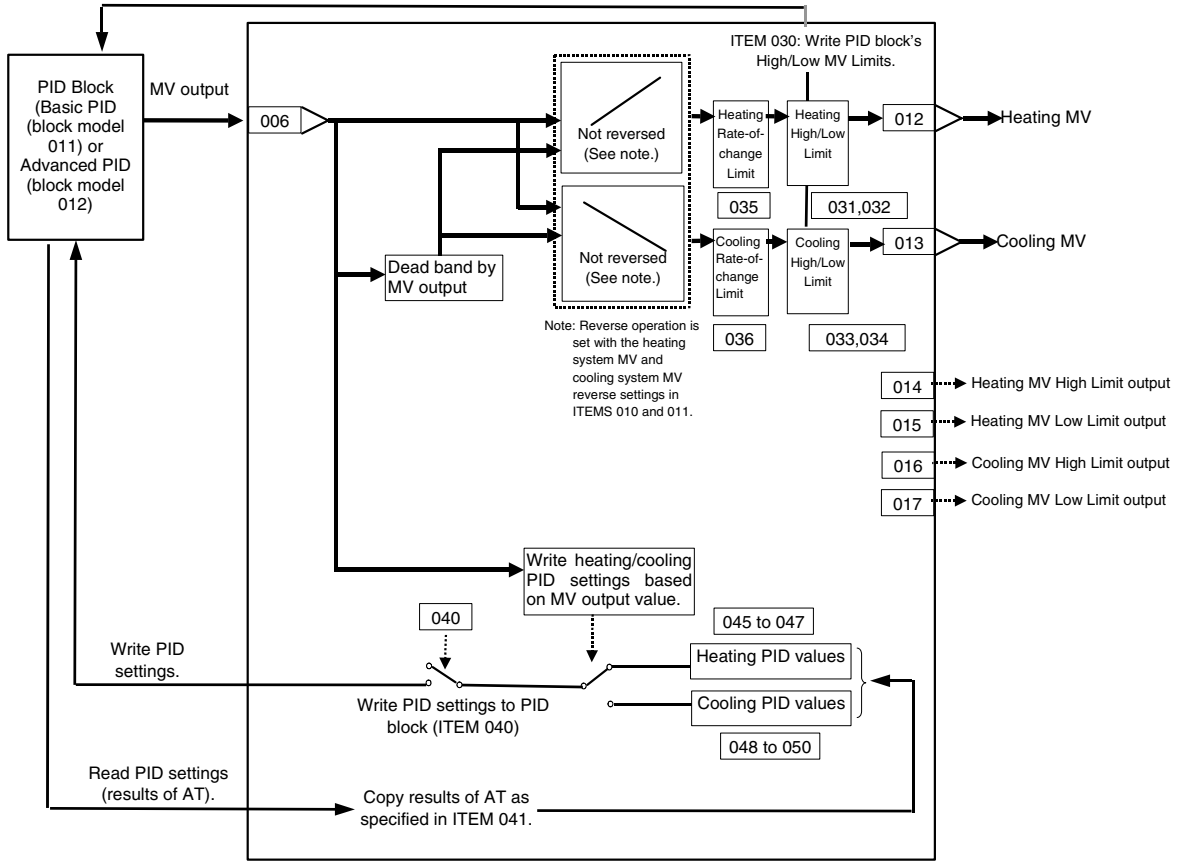
1. Set the PID block PID parameters write bit (ITEM 040) to 0 so that the destination PID block's P, I, and D parameters will not be overwritten.
2. Select the PID parameters to be auto-tuned in this function block using the AT results copy bit (ITEM 041).
3. Perform auto-tuning in the source PID block. When auto-tuning is completed, the PID parameters will automatically reflect the PID parameters selected in step 2 in this function block.
4. Repeat steps 2 and 3 for heating and cooling.
5. When the PID parameters have been tuned for all of the required banks, return the PID block PID parameters write bit (ITEM 040) to its original setting and verify operation.

Note: When the PID block PID parameters write bit (ITEM 040) is set to 1, the PID parameter bank will be automatically switched by input X1. Therefore, set the PID block PID parameters write bit (ITEM 040) to 0 before using the AT results copy bit (ITEM 041).

Function block applications

Use this function block when a single PID block controls two ranges of an application with two units, such as a heating control terminal and a cooling control terminal.
In addition to heating and cooling, the Split Converter function block can be used to control many applications that are split into two parts. Other common applications include controlling PH with liquid-mixing systems that add acid and alkaline, controlling pressure with compression and decompression units, and controlling humidity with humidification and dehumidification units. When using the Split Converter function block to control another application, substitute the appropriate control systems for "heating" and "cooling" in the examples.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Contact input	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002	MODEL	Block Model: Split Converter	169	169	–	R/W(S)	–	–	–	2
Special	003	ERR	Execution error display 0: Normal Other: Error (See Appendix "Execution Error Code List.)		0000	Yes	r	–	–	S	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01, 7: 0.02, 8: 0.05	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

X1 Settings

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Analog input connection information	006	X1_AD	X1 source designation of PID block's MV output BBB: Block address III: Item number	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	X1	PID block's MV output value	-320.00 to 320.00%	0.00	Yes	r	–	–	S	2
	008 *1	TYPE	X1 input range	0, 1	0	–	R/W(S)	–	–	–	1
	009 *1	CENTER	Center value offset	-100.00 to 100.00%	0.00	–	R/W(S)	–	–	–	2

*1: LCB01/05 Ver.2.0 or later, and LCB03 only.

MV

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Contact input	010	REV_CH	Reverse heating MV 0: Do not reverse. 1: Reverse	0, 1	0	–	R/W(S)	W	–	–	1
	011	REV_CC	Reverse cooling MV 0: Do not reverse. 1: Reverse	0, 1	0	–	R/W(S)	W	–	–	1
Analog output	012	MV_CH	Heating MV	-320.00 to 320.00%	0.00	Yes	r	–	–	S	2
	013	MV_CC	Cooling MV	-320.00 to 320.00%	0.00	Yes	r	–	–	S	2
Contact output	014	MHA_H	Heating MV high limit output	0, 1	0	Yes	–	–	R	S	1
	015	MLA_H	Heating MV low limit output	0, 1	0	Yes	–	–	R	S	1
	016	MHA_C	Cooling MV high limit output	0, 1	0	Yes	–	–	R	S	1
	017	MLA_C	Cooling MV low limit output	0, 1	0	Yes	–	–	R	S	1

Dead Band Settings

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Contact input, parameter	022	DB	Dead band (DB)	-200.00 to 200.00%	0.00	–	R/W(O)	–	–	S/R	2

MV Limit Settings

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Parameter	030	MHL_REF	Write PID block MV high/low limits bit (Split Converter Block to PID Block) 0: Do not write. 1: Write.	0, 1	0	–	R/W(S)	W	–	–	1
	031	MHA_H_SP	Heating MV high limit	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	S/R	2
	032	MLA_H_SP	Heating MV low limit	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	S/R	2

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
	033	MHA_C_SP	Cooling MV high limit	-320.00 to 320.00%	105.00	–	R/W(O)	W	–	S/R	2
	034	MLA_C_SP	Cooling MV low limit	-320.00 to 320.00%	-5.00	–	R/W(O)	W	–	S/R	2
	035	MHV_SP	Heating MV Rate-of-change limit (See note.)	0 to 320.00%/s (0: Not limited)	0.00	–	R/W(O)	W	–	S/R	2
	036	MCV_SP	Cooling MV Rate-of-change limit (See note.)	0 to 320.00%/s (0: Not limited)	0.00	–	R/W(O)	W	–	S/R	2

Note: Depending on the control characteristics, overshooting and undershooting are more likely to occur when heating and cooling rate-of-change limits have been set in ITEMs 035 and 036. Check the control characteristics before setting these rate-of-change limits.

PID Parameter Settings

ITEM TYPE	ITEM	Symbol	Data description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequence Control Block	According to HMI I/F	
Parameter	040	PID_REF	PID block PID parameters write bit (Split Converter Block to PID Block) 0: Do not write. 1: Write.	0, 1	0	–	R/W(S)	W	–	–	1
	041	AT_REF	AT results copy bit (PID Block to Split Converter Block) 0: Do not copy. 1: Copy both heating and cooling parameters. 2: Copy heating parameters only. 3: Copy cooling parameters only.	0 to 3	0	–	R/W(S)	W	R/W	–	2
	042	HS_SP	PID parameter switching hysteresis value	0 to 320.00%	5.00	–	R/W(S)	W	–	–	2
	045	P_H	Heating system P	0.1 to 999.9	100.0	–	R/W(O)	W	–	S/R	2
	046	I_H	Heating system I	0 to 9,999 (See note.)	0	–	R/W(O)	W	–	S/R	2
	047	D_H	Heating system D	0 to 9,999 (See note.)	0	–	R/W(O)	W	–	S/R	2
	048	P_C	Cooling system P	0.1 to 999.9	100.0	–	R/W(O)	W	–	S/R	2
	049	I_C	Cooling system I	0 to 9,999 (See note.)	0	–	R/W(O)	W	–	S/R	2
	050	D_C	Cooling system D	0 to 9,999 (See note.)	0	–	R/W(O)	W	–	S/R	2

Note: When the source PID block's operation cycle (ITEM 004) is set between 0.01 and 0.05 seconds, the integral time and differential time units are indicated in 0.01-second units, not 1-second units.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data between this function block and the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

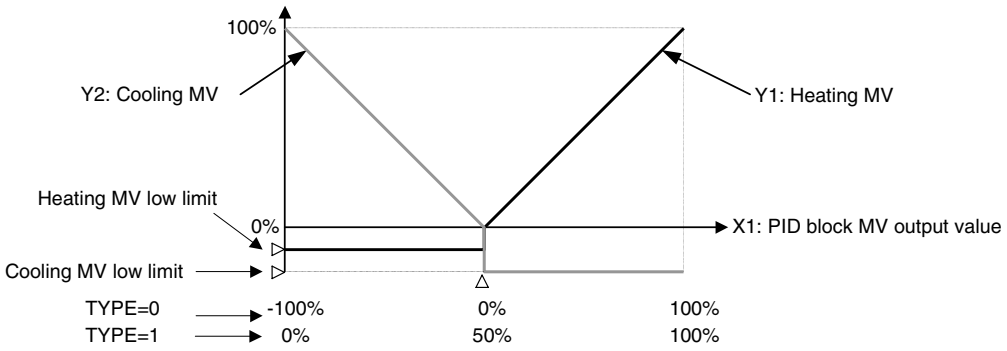
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
007	PID block's MV output value	X1
012	Heating MV	MV_CH
013	Cooling MV	MV_CC
022	Dead band	DB
031	Heating MV high limit	MHA_H_SP
032	Heating MV low limit	MLA_H_SP
033	Cooling MV high limit	MHA_C_SP
034	Cooling MV low limit	MLA_C_SP
045	Heating system P	P_H
046	Heating system I	I_H
047	Heating system D	D_H
048	Cooling system P	P_C
049	Cooling system I	I_C
050	Cooling system D	D_C
003	Execution error display	ERR
000	Stop block operation command	MT_ST
014	Heating MV high limit output	MHA_H
015	Heating MV low limit output	MLA_H
016	Cooling MV high limit output	MHA_C
017	Cooling MV low limit output	MLA_C

Description

Description of Dead Band Operation

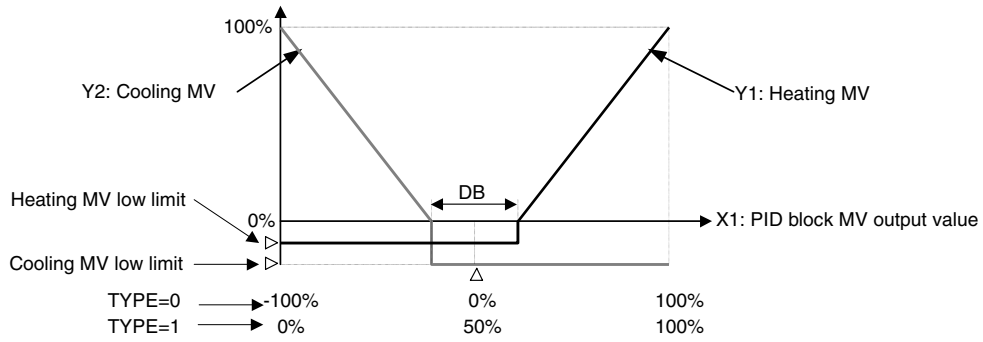
1. No Dead Band Setting (DB (ITEM 022) = 0)

When the PID block's MV output value (X1) is 0% (TYPE=0) or 50% (TYPE=1), the heating MV and cooling MV will be at their low limits.



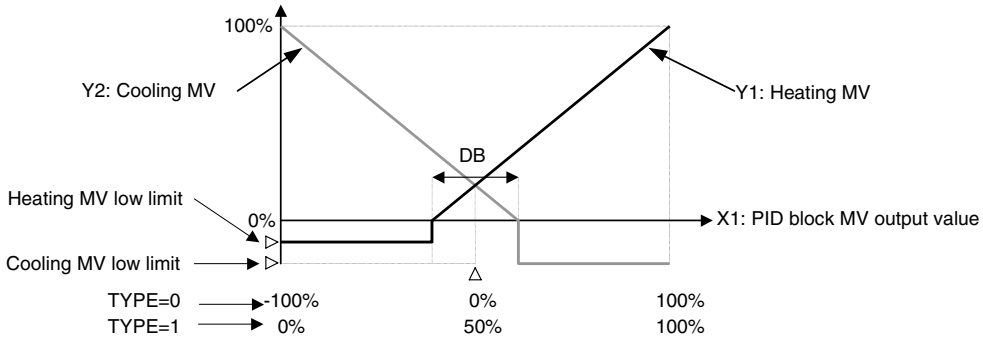
2. Positive Dead Band Setting (DB (ITEM 022) > 0)

The heating MV and cooling MV will be at their low limits in a range of width DB, centered at the PID block's MV output value (X1) of 0% (TYPE=0) or 50% (TYPE=1), i.e., from the point 0% - 1/2(DB) to the point 0% + 1/2(DB).



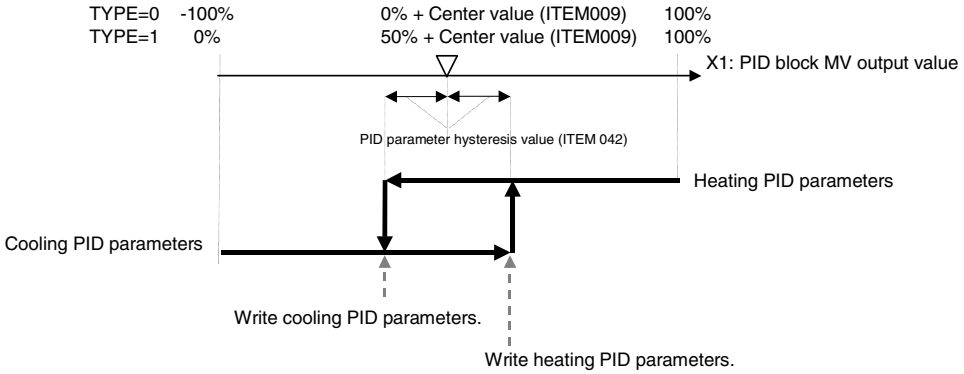
3. Negative Dead Band Setting (DB (ITEM 022) < 0)

The heating MV will be at its low limit up to the point 0% (TYPE=0) - ½DB or 50% - ½DB (TYPE=1) and the cooling MV will be at its low limit starting at the point 0% (TYPE=0) + ½DB or 50% + ½DB (TYPE=1).



Switching PID Parameters

If the Write PID settings to PID block bit (ITEM 040) is set to 1, the heating PID parameters and cooling PID parameters will be written to the PID block when the PID block's MV output value reaches the specified value. The following diagram shows how the PID parameter switching hysteresis value (ITEM 042) determines when the heating PID parameters and cooling PID parameters are written to the PID block.



The switching point of the heating and cooling side can be changed by setting the center value (ITEM 009) for an MV of 0% (TYPE = 0) or 50% (TYPE = 1).
If the selected PID parameters within this function block are changed, the changed PID parameter values are automatically reflected in the PID block.

Note: After a cold start, the hysteresis setting is ignored the first time that PID parameters are written. The heating PID parameters are written to the PID block if MV≥0 (TYPE = 0) or MV≥50 (TYPE = 1) and the cooling parameters are written to the PID block if MV < 0 (TYPE = 0) or MV < 50 (TYPE = 1). When the selected heating or cooling PID parameters are changed, those changes will be reflected in the PID block.

Writing MV High/Low Limits

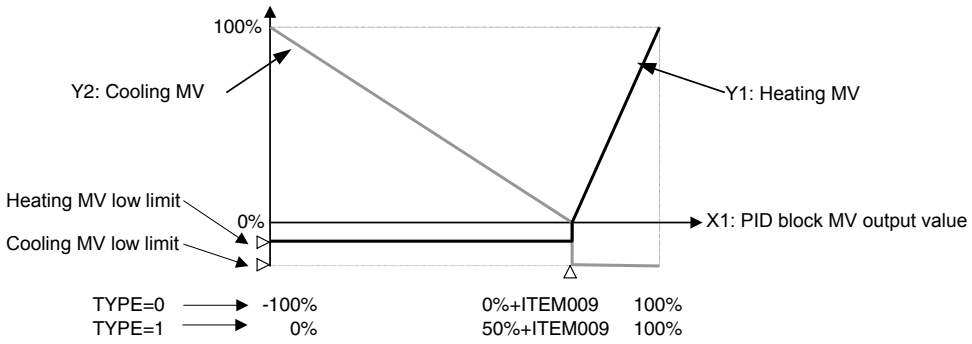
When the Write PID block MV high/low limits bit (ITEM 030) is set to 1, the MH (MV high limit) and ML (MV low limit) in the Split Converter block are adjusted for the dead band and written to the destination PID block.
The PID block's MH value is set with the heating MV high limit (ITEM 031) from the Split Converter block adjusted for the MV range of the PID block unless the heating action is reversed. If the action is reversed, the PID block's MH value is set with the adjusted heating MV low limit (ITEM 032) adjusted for the MV range of the PID block.
The PID block's ML value is set with the cooling MV high limit (ITEM 033) from the Split Converter block adjusted for the MV range of the PID block unless the cooling action is reversed. If the action is reversed, the PID block's ML value is set with the cooling MV low limit (ITEM 034) adjusted for the MV range of the PID block.

Copying AT Results

When the AT results copy bit (ITEM 041) is set to 1, the PID block's tuned P, I, and D values will be copied to the Split Converter's heating PID and cooling PID after auto-tuning is performed. The results are copied when the PID Block's AT Status Flag goes from 1 to 0.

Asymmetrical MV (LCB Ver.2.0 or Later, and LCB03)

Heating MV and cooling MV are centered at 0% when TYPE=0 and 50% when TYPE = 1, ITEM 009 (center value) can be used to change the right/left ramp and enable asymmetrical output. (This function is supported for LCB Ver.2.0 or later, and LCB03 only.)



Execution Errors

Error code 1: (Connection terminal/output terminal connection not defined)
The source designation's block address or ITEM number does not exist.

Error code 70: (Illegal combination of function blocks)
The source designation's PID block MV output value is not the MV output from a Basic PID block or Advanced PID block.

Error code 71: (Inappropriate parameter)

1. The heating MV high limit (ITEM 031) is less than the heating MV low limit (ITEM 032).
   The cooling MV high limit (ITEM 033) is less than the cooling MV low limit (ITEM 034).
2. The X1 input value at the minimum MV point will be 100% or higher under the following conditions.
   TYPE=0 (-100 to 100%): The minimum MV point (Dead band/2 + Center value) ≥ 100%
   TYPE=1 (0 to 100%): The minimum MV point (Dead band/2 + Center value + 50.00%) ≥ 100%
3. The X1 input value at the maximum MV point will be as shown below under the following conditions.
   TYPE=0 (-100 to 100%): The maximum MV point (Center value - Dead band/2) ≤ -100%
   TYPE=1 (0 to 100%): The maximum MV point (Center value - Dead band/2 + 50.00%) ≤ 0%

Block Model	Block Name	Block Address
<171>	Constant ITEM Setting	001 to 500

Outline

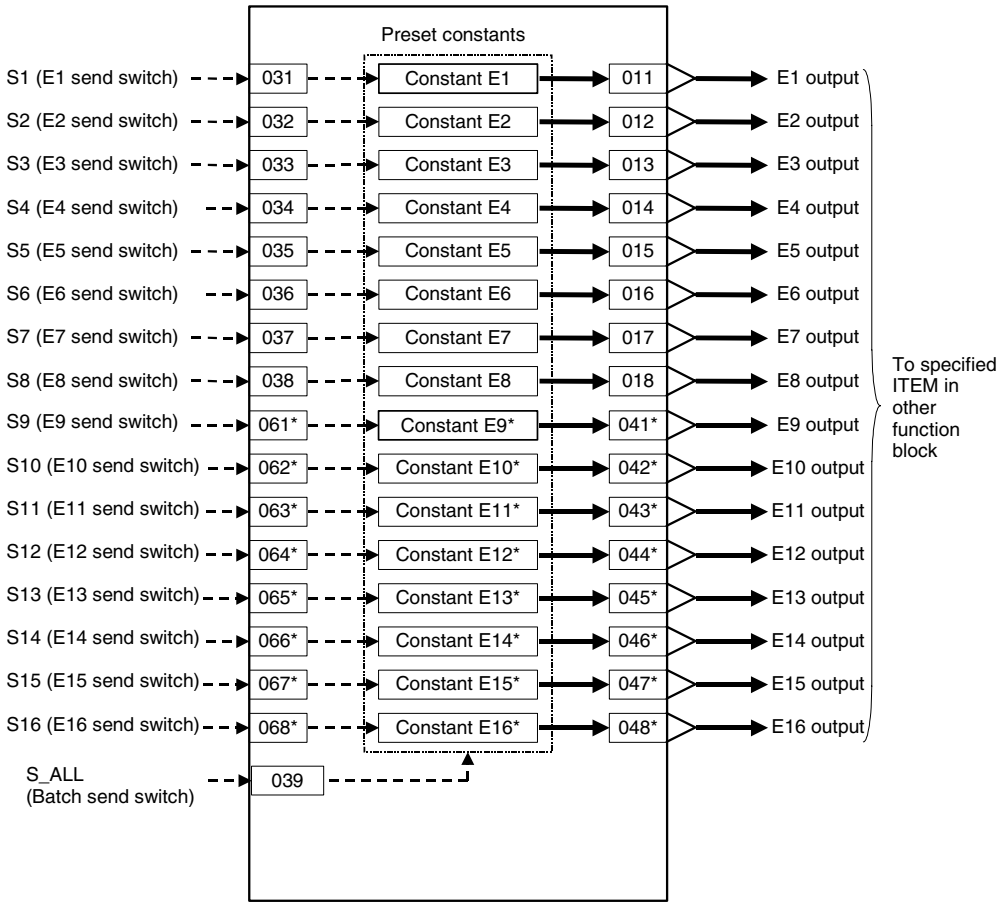
This function block writes the constant data (fixed values) to the specified parameter ITEM in specified function blocks. Constants are written to parameter ITEMs when E1 to E16 send switches or the batch send switch are ON.
Constant data is written within the range -32000 to +32000, and all numbers are expressed as values without any digits past the decimal point. (For example, 100 becomes 1.00 when it is written to an ITEM that is expressed with two digits past the decimal point.)

- ITEM 002 (Block Model) of the write destination function block cannot be changed.
- Writing is executed for the duration that a send switch is 1 (ON). Send switches are automatically set to 0 (OFF) after writing is completed. For this reason, to execute writing only once, use the differentiated output command (DIFU) of the Step Ladder Program block (Block Model 301) to manipulate the send switches. To repeat execution of writing, use the OUT or SET command to manipulate the send switch.
- If an out-of-range value is set in the destination ITEM, the data won't be written to the destination ITEM and execution error 71 will occur when the send switch goes ON. The write will be executed normally when the value is corrected and the send switch is turned ON again.
- If an unregistered block address or non-existent ITEM number is specified as the destination, execution error 1 will occur when the send switch goes ON. The write will be executed normally when the destination is corrected and the send switch is turned ON again.

Note: In function block ITEM lists, constant data can be written to ITEMs defined as settable (W) by ITEM Setting blocks. Constant data cannot be written to ITEMs defined as non-settable (-).

ITEM		R/W method			Data Length (bytes)
		According to CX-Process Monitor	According to ITEM Setting block	According to Step Ladder Program	
		W	W	–	1

Block diagram



*Note: These outputs are supported only by Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Constant ITEM Setting	171	171	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog output connection information	011		E1 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		E2 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		E3 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		E4 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		E5 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		E6 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		E7 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		E8 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	021	E1	E1 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	022	E2	E2 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	023	E3	E3 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	024	E4	E4 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	025	E5	E5 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	026	E6	E6 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	027	E7	E7 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	028	E8	E8 setting	±32000	0	–	R/W(O)	W	–	S/R	2
Contact input	031	S1	E1 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	032	S2	E2 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	033	S3	E3 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	034	S4	E4 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	035	S5	E5 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	036	S6	E6 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	037	S7	E7 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	038	S8	E8 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	039	S_ALL	Batch send switch – Send all when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output connection information (extended)	041*		E9 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	042*		E10 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	043*		E11 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	044*		E12 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	045*		E13 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	046*		E14 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog output connection information (extended)	047*		E15 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	048*		E16 destination (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter (extended)	051*	E9	E9 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	052*	E10	E10 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	053*	E11	E11 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	054*	E12	E12 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	055*	E13	E13 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	056*	E14	E14 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	057*	E15	E15 setting	±32000	0	–	R/W(O)	W	–	S/R	2
	058*	E16	E16 setting	±32000	0	–	R/W(O)	W	–	S/R	2
Contact input (extended)	061*	S9	E9 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	062*	S10	E10 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	063*	S11	E11 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	064*	S12	E12 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	065*	S13	E13 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	066*	S14	E14 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	067*	S15	E15 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	068*	S16	E16 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

*Note: These outputs are supported only by Ver. 3.0 and higher versions of the LCB01/03/05 Loop Controllers.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
021	E1 setting	E1
022	E2 setting	E2
023	E3 setting	E3
024	E4 setting	E4
025	E5 setting	E5
026	E6 setting	E6
027	E7 setting	E7
028	E8 setting	E8
031	E1 send switch	S1
032	E2 send switch	S2
033	E3 send switch	S3
034	E4 send switch	S4
035	E5 send switch	S5
036	E6 send switch	S6
037	E7 send switch	S7
038	E8 send switch	S8
039	Batch send switch	S_ALL
051	E9 setting	E9
052	E10 setting	E10
053	E11 setting	E11
054	E12 setting	E12
055	E13 setting	E13
056	E14 setting	E14
057	E15 setting	E15
058	E16 setting	E16
061	E9 send switch	S9
062	E10 send switch	S 10
063	E11 send switch	S 11
064	E12 send switch	S 12
065	E13 send switch	S 13
066	E14 send switch	S 14
067	E15 send switch	S 15
068	E16 send switch	S 16

Block Model	Block Name	Block Address
<172>	Variable ITEM Setting	001 to 500

Outline

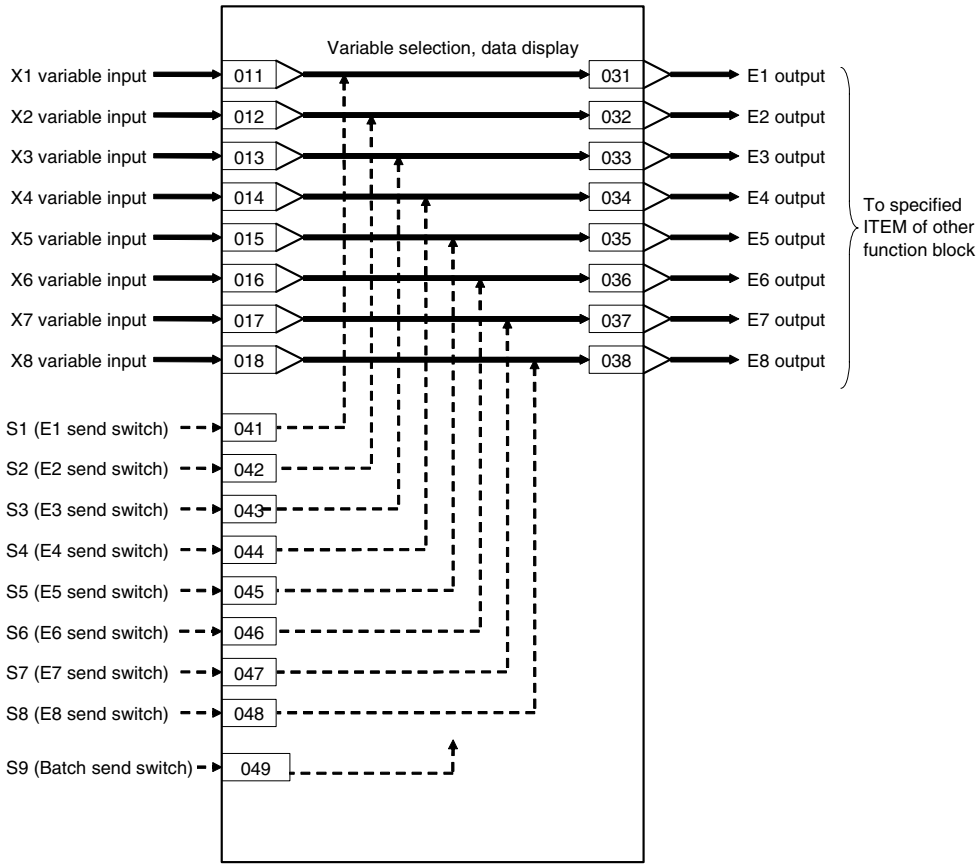
This function block input analog signals (variables), and writes that variable data (values that change) to the specified parameter ITEM in specified function blocks. Variables are written to parameter ITEMs when E1 to E8 send switches or the batch send switch are ON.
Variable data corresponding to variable data range -3200.00 to +3200.00% is written within the range -32000 to +32000, and all numbers are expressed as values without any digits past the decimal point. (For example, 100 becomes 1.00 when it is written to an ITEM that is expressed with two digits past the decimal point.)

•In function block ITEM lists, analog input (variable) data can be written to ITEMs defined as settable (W) by ITEM Setting blocks. Variable data cannot be written to ITEMs defined as non-settable (-).

ITEM		R/W method			Data Length (bytes)
		According to CX-Process Monitor	According to ITEM Setting block	According to Step Ladder Program	
		W	W	–	1

•ITEM 002 (Block Model) of the write destination function block cannot be changed.
•Writing is executed for the duration that a send switch is 1 (ON). Send switches are automatically set to 0 (OFF) after writing is completed. For this reason, to execute writing only once, use the differentiated output command (DIFU) of the Step Ladder Program block (Block Model 301) to manipulate the send switches. To repeat execution of writing, use the OUT or SET command to manipulate the send switches.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Variable ITEM Setting	172	172	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input connection information	011		X1 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		X2 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		X3 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		X4 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		X5 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		X6 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		X7 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		X8 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	021	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
	022	X2	Input	±320.00%	0.00	Yes	r	–	–	S	2
	023	X3	Input	±320.00%	0.00	Yes	r	–	–	S	2
	024	X4	Input	±320.00%	0.00	Yes	r	–	–	S	2
	025	X5	Input	±320.00%	0.00	Yes	r	–	–	S	2
	026	X6	Input	±320.00%	0.00	Yes	r	–	–	S	2
	027	X7	Input	±320.00%	0.00	Yes	r	–	–	S	2
	028	X8	Input	±320.00%	0.00	Yes	r	–	–	S	2
Analog output connection information	031		E1 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	032		E2 destination designation (BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	033		E3 destination designation (BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	034		E4 destination designation (BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	035		E5 destination designation (BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	036		E6 destination designation (BBB: Block address, III: ITEM No.(no connection allowed)	BBB or III	000000	–	R/W(S)	–	–	–	4
	037		E7 destination designation (BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	038		E8 destination designation (BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Contact input	041	S1	E1 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	042	S2	E2 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	043	S3	E3 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	044	S4	E4 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	045	S5	E5 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	046	S6	E6 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	047	S7	E7 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	048	S8	E8 send switch – Send when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	049	S9	Batch send switch – Send all when ON.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

Note Bumpless output of MV functions when PID constants are changed in the Basic PID block (Block Model 011) and Advanced PID block (Block Model 012).
For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172).
If this happens, use the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
021	X1 input	X1
022	X2 input	X2
023	X3 input	X3
024	X4 input	X4
025	X5 input	X5
026	X6 input	X6
027	X7 input	X7
028	X8 input	X8
041	E1 send switch	S1
042	E2 send switch	S2
043	E3 send switch	S3
044	E4 send switch	S4
045	E5 send switch	S5
046	E6 send switch	S6
047	E7 send switch	S7
048	E8 send switch	S8
049	Batch send switch	S9

Block Model	Block Name	Block Address
<174>	Batch Data Collector	001 to 500

Outline

This function block holds up to eight analog inputs in buffer according to a certain timing within sequence processing.
After batch processing ends, the data held in buffer ITEMs are read by the CPU Unit or CX-Process Monitor for use.

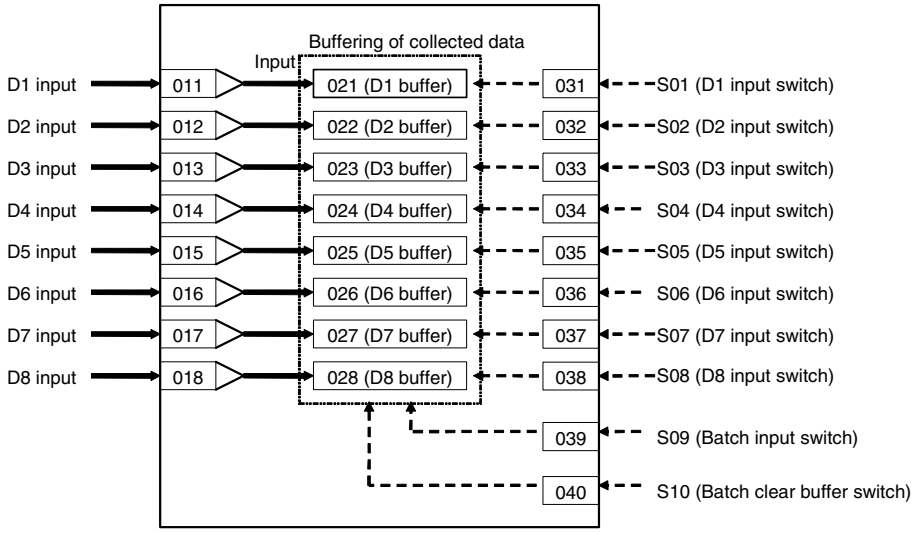
Note: To read the data on CX-Process Monitor, use the AO Terminal to Expanded CPU Unit block (Block Model 458) to temporarily store the data held in buffer ITEMs to the CPU Unit I/O Memory and then read the data.

Function block applications

Collection of data at the timing of sequence processing to create a ledger at a batch processing plant

Example Collect temperature data and level data to create a batch report after raw materials have been poured into a tank.

Block diagram



When the state of S1 to S8 input switches changes from 0 to 1, each of D1 to D8 inputs are held in ITEM 021 to ITEM 028 (hold data in buffer). After data has been loaded, S1 to S8 input switches are automatically reset to 0.
When the state of S9 batch input switch changes from 0 to 1, all of D1 to D8 inputs are held in ITEM 021 to ITEM 028 (hold data in buffer). After data has been loaded, S1 to S8 input switches are automatically reset to 0.
When the state of S10 batch clear buffer switch changes from 0 to 1, all of the data held in ITEM 021 to ITEM 028 (hold data in buffer) is cleared. After all buffers are cleared, S10 batch clear buffer switch is automatically reset to 0.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Batch Data Collector	174	174	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input wiring information	011		D1 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		D2 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		D3 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	014		D4 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	015		D5 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		D6 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		D7 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
	018		D8 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	021	D1	D1 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
	022	D2	D2 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
	023	D3	D3 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
	024	D4	D4 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
	025	D5	D5 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
	026	D6	D6 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
	027	D7	D7 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
	028	D8	D8 input (hold data in buffer)	±320.00%	0.00	Yes	r	–	–	S	2
Contact input	031	S01	D1 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	032	S02	D2 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	033	S03	D3 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	034	S04	D4 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	035	S05	D5 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	036	S06	D6 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	037	S07	D7 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	038	S08	D8 input switch – Data input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	039	S09	Batch input switch – Data of D1 to D8 is batch-input when setting changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	040	S10	Batch clear buffer switch – Contents (held values) of D1 to D8 buffers area batch-cleared when switch state changes from 0 to 1.	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
021	D1 input	D1
022	D2 input	D2
023	D3 input	D3
024	D4 input	D4
025	D5 input	D5
026	D6 input	D6
027	D7 input	D7
028	D8 input	D8
031	D1 input switch	S01
032	D2 input switch	S02
033	D3 input switch	S03
034	D4 input switch	S04
035	D5 input switch	S05
036	D6 input switch	S06
037	D7 input switch	S07
038	D8 input switch	S08
039	Batch input switch	S09
040	Batch clear buffer switch	S10

Block Model	Block Name	Block Address
<182>	Accumulated Value Input Adder	001 to 500

Outline

This function block adds up to four accumulated value signals (0000 to 9999 repeat signals).

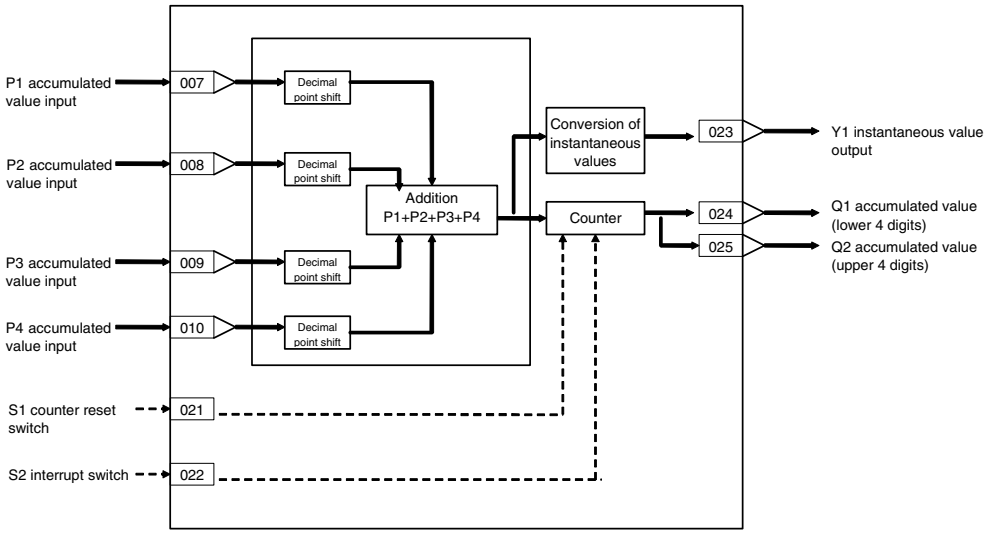
•Digit shift can be set to each of the accumulated value inputs.
•The results of addition are output as accumulated values (eight digits) and instantaneous values.
•When S1 counter reset switch is set to 1 (ON), the accumulated value count is returned to 0 (zero).
•All count operations are stopped by the S2 interrupt switch.

Note: When a cold start is performed, the accumulated values of the operation results that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Calculation of the total flowrate accumulated values of various fluids

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Accumulated Value Input Adder	182	182	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	1 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Accumulated value input connection information	007		P1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		P2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	009		P3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	010		P4 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Accumulated value input	011	P1	Input	0 to 9999	0	Yes	r	–	–	S	2
	012	P2	Input	0 to 9999	0	Yes	r	–	–	S	2
	013	P3	Input	0 to 9999	0	Yes	r	–	–	S	2
	014	P4	Input	0 to 9999	0	Yes	r	–	–	S	2
Parameter	015		P1 decimal point shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) Note 1	-3 to +1	0	–	R/W(S)	–	–	–	1
	016		P2 decimal point shift (same as above)	-3 to +1	0	–	R/W(S)	–	–	–	1
	017		P3 decimal point shift (same as above)	-3 to +1	0	–	R/W(S)	–	–	–	1
	018		P4 decimal point shift (same as above)	-3 to +1	0	–	R/W(S)	–	–	–	1
	019		Instantaneous value conversion parameter (The number of pulses per second at instantaneous value output 100% is set.)	0 to 99999.9999	1000.0000	–	R/W(S)	–	–	–	4
	020		Sample number for moving average in instantaneous value conversion	1 to 16	16	–	R/W(S)	–	–	S/R	1
Contact input	021	S1	Counter reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	022	S2	Interrupt switch (1: Interrupt)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	023	Y1	Instantaneous value output	0 to 320.00%	0.00	Yes	r/w	–	–	S	2
Accumulated value output	024	Q1	Accumulated value (lower 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
	025	Q2	Accumulated value (upper 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2

Note: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
011	P1 input	P1
012	P2 input	P2
013	P3 input	P3
014	P4 input	P4
020	Sample number for moving average in instantaneous value conversion	N
021	Counter reset switch	S1
022	Interrupt switch	S2
023	Instantaneous value output	Y1
024	Accumulated value (lower 4 digits)	Q1
025	Accumulated value (upper 4 digits)	Q2

Block Model	Block Name	Block Address
<183>	Accumulated Value Analog Multiplier	001 to 500

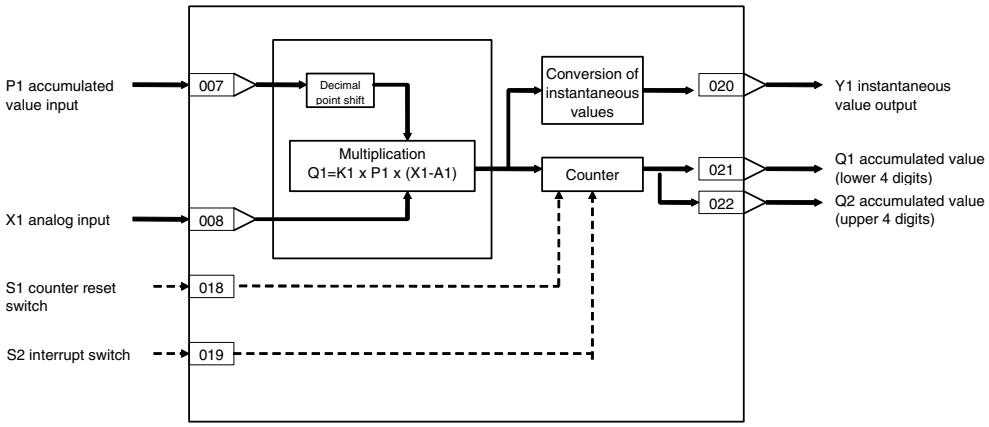
Outline

This function block multiplies analog signals by one set of accumulated value signals (0000 to 9999 repeat signals).

•Digit shift can be set to each of the accumulated value inputs.
•The results of multiplication are output as accumulated values (eight digits) and instantaneous values.
•When S1 counter reset switch is set to 1 (ON). the accumulated value count is returned to 0 (zero).
•All count operations are stopped by the S2 interrupt switch.

Note: When a cold start is performed, the accumulated values of the operation results that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Accumulated Value Analog Multiplier	183	183	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Accumulated value input connection information	007		P1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input connection information	008		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Accumulated value input	011	P1	Input	0 to 9999	0	Yes	r	–	–	S	2
Analog input	012	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	013		Decimal point shift (10x, –3: x0.001, –2: x0.01, –1: x0.1, 0: x1, 1: x10) Note 1	–3 to +1	0	–	R/W(S)	–	–	–	1
	014	K1	Gain	±10.000	1.000	–	R/W(O)	–	–	S/R	2
	015	A1	Bias	±320.00%	0.00	–	R/W(O)	–	–	S/R	2
	016		Instantaneous value conversion parameter (The number of pulses per second at instantaneous value output 100% is set.)	0 to 99999.9999	1000.0000	–	R/W(S)	–	–	–	4
	017		Sample number for moving average in instantaneous value conversion	1 to 16	16	–	R/W(S)	–	–	S/R	1
Contact input	018	S1	Counter reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	019	S2	Interrupt switch (1: Interrupt)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	020	Y1	Instantaneous value output	0 to 320.00%	0.00	Yes	r/w	–	–	S	2
Accumulated value output	021	Q1	Accumulated value (lower 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2
	022	Q2	Accumulated value (upper 4 digits)	0000 to 9999	0	Yes	r/w	–	–	S	2

Note 1: The multiplication formula is Q1=K1xP1x(X1-A1). Each of the values of Q1, K1 and P1 are the ranges indicated in the ITEM List above. Note, however, that X1 and A1 are calculated with 100%=1.0, and the data ranges for each are -3.2 to +3.2.

Note 2: If the result of multiplication is a minus value, the result is taken to be 0 (zero).

Note 3: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
011	P1 input	P1
012	X1 input	X1
014	Gain	K1
015	Bias	A1
017	Sample number for moving average in instantaneous value conversion	N
018	Counter reset switch	S1
019	Interrupt switch	S2
020	Instantaneous value output	Y1
021	Accumulated value (lower 4 digits)	Q1
022	Accumulated value (upper 4 digits)	Q2

Block Model	Block Name	Block Address
<184>	Accumulator for accumulated value input	001 to 500

Outline

This function block continuously accumulates 4-digit accumulated value signals (repeated signals within 0000 to 9999 range), and converts them to eight digits. This function block can also be used for batch control.

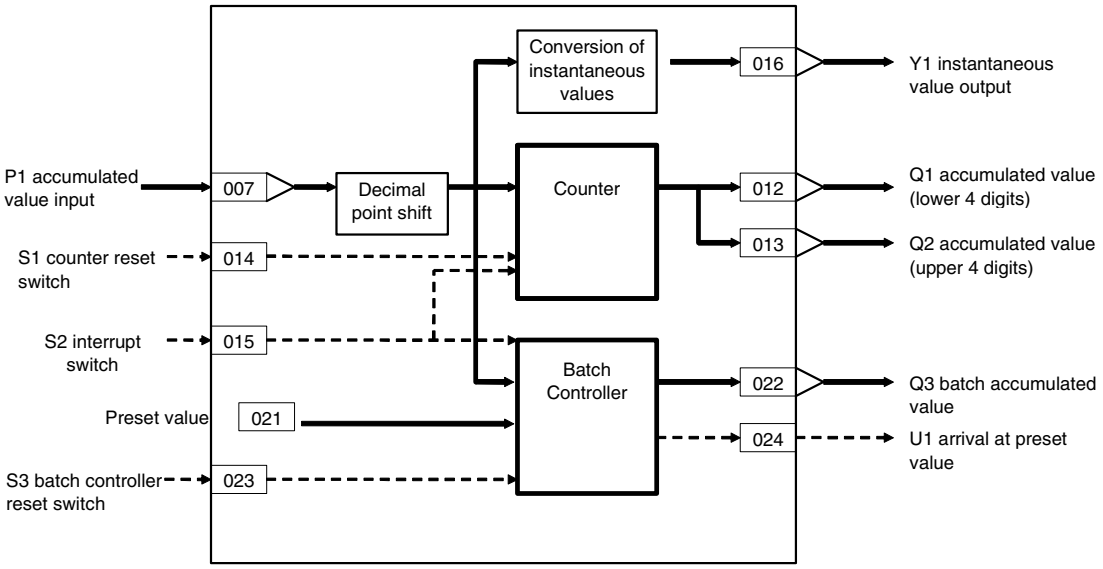
- Accumulated values are divided into upper four digits and lower four digits before they are output. If necessary, join these two sets of digits together for display on a host computer.
- When Qn accumulated value output is used as analog input for other function blocks, the count 9999 is processed as 99.99%.
- When S1 reset switch is set to 1 (ON), the accumulated values are returned to count 0.
- When S3 batch controller reset switch is input, Q3 batch accumulated value becomes count 0, and U1 arrival at preset value is reset to 0 (OFF).
- S2 interrupt switch stops all count operations.
- Minus inputs are regarded as 0% input.

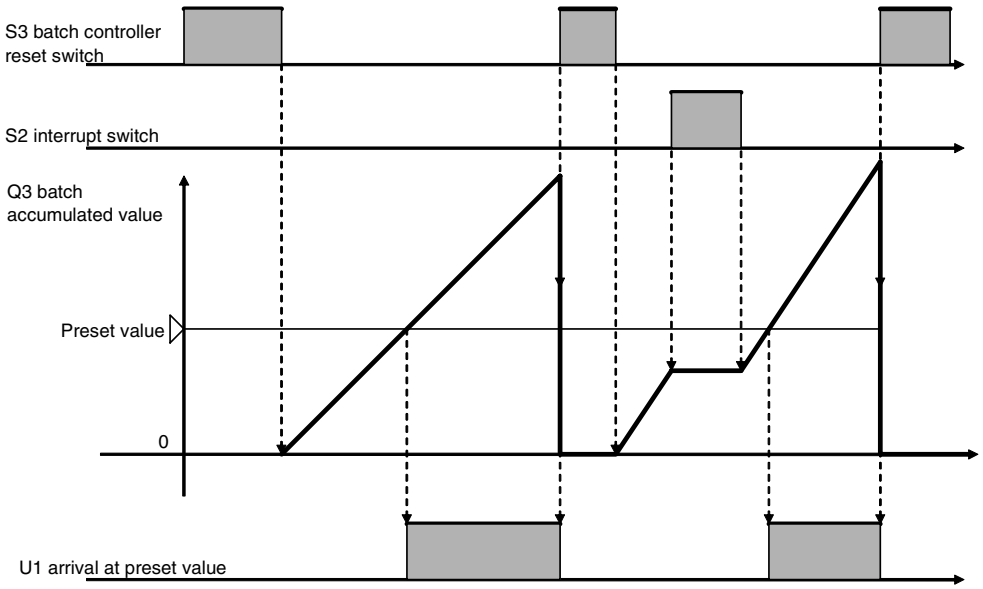
Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

- Input of accumulated values 0000 to 9999 from Pulse Input Unit (CS1W-PPS01: Block Model 562) as P1 accumulated value input
- Input of accumulated values 0000 to 9999 from Contact input/Accumulated value output block (Block Model 185) as P1 accumulated value input

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Accumulator for accumulated value input	184	184	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

Accumulated value input P1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Accumulated value input connection information	007		P1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Accumulated value input	008	P1	Input	0 to 9999	0	Yes	r	–	–	S	2
Parameter	009		Decimal point shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) Note 1	-3 to +1	0	–	R/W(S)	–	–	–	1
	010		Instantaneous value conversion parameter (The number of pulses per second at instantaneous value output 100% is set.)	0 to 99999.9999	1000.0000	–	R/W(S)	–	–	–	4
	011		Sample number for moving average in instantaneous value conversion	1 to 16	16	–	R/W(S)	–	–	–	1
Accumulated value output	012	Q1	Accumulated value (lower 4 digits)	0000 to 9999	0	Yes	r/w	W	–	S	2
	013	Q2	Accumulated value (upper 4 digits)	0000 to 9999	0	Yes	r/w	W	–	S	2
Contact input	014	S1	Counter reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	015	S2	Interrupt switch (1: Interrupt)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog output	016	Y1	Instantaneous value output	0 to 320.00%	0.00	Yes	r/w	–	–	S	2

Batch controller

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	021		Preset value	0000 to 9999	9999	–	R/W(O)	W	–	S/R	2
Accumulated value output	022	Q3	Batch accumulated value	0000 to 9999	0	Yes	r/w	W	–	S	2
Contact input	023	S3	Batch controller reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	024	U1	Arrival at preset value	0, 1	0	Yes	–	–	R	S	1

Note: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	P1 input	P1
012	Accumulated value (lower 4 digits)	Q1
013	Accumulated value (upper 4 digits)	Q2
014	Counter reset switch	S1
015	Interrupt switch	S2
016	Instantaneous value output	Y1
021	Preset value	BM
022	Batch accumulated value	Q3
023	Batch controller reset switch	S3
024	Arrival at preset value	U1

Block Model	Block Name	Block Address
<185>	Contact Input/Accumulated Value Output	001 to 500

Outline

This function block counts the rising edges of contact inputs (low-speed pulses) to output accumulated value signals.

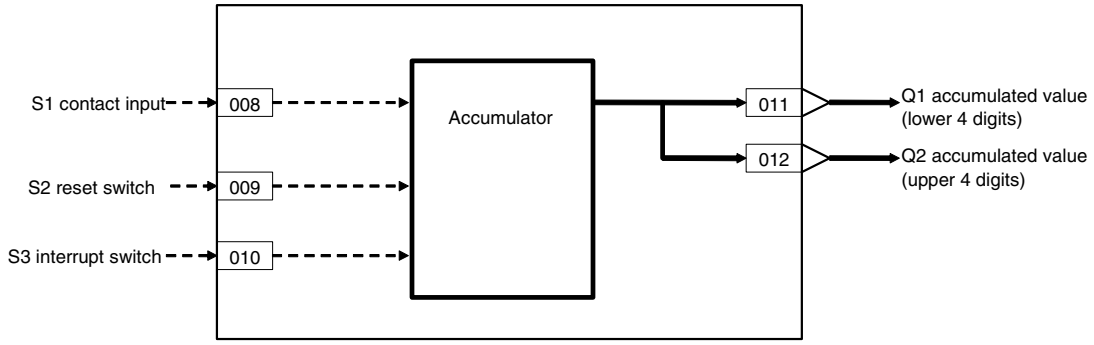
- This function block is used when the Contact Input Unit is used instead of the Pulse Input Unit to accumulate low-speed pulse train signals.
- Assign contact inputs in the Contact Distributor block (Block Model 201) or Step Ladder Program block (Block Model 301).
- Counting is not performed after the contact input signal is set to 1 (ON) unless it is temporarily set to 0 (OFF). For this reason, thoroughly check the relationship between operation cycle and pulse rate before use.

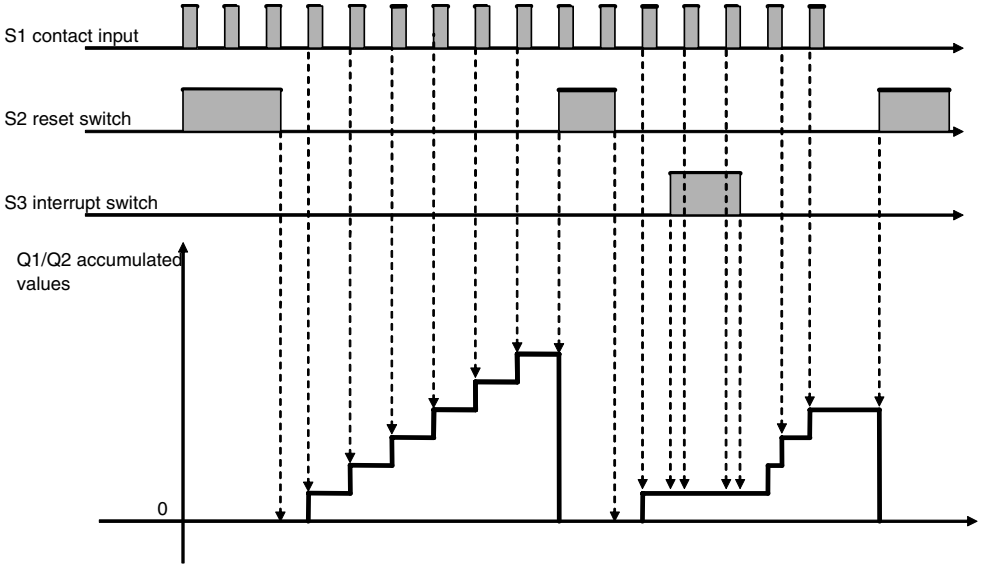
Note 1: When the contact signals input from the Basic Input Unit are taken as the input, the operation cycle of DI Terminal blocks can be used only when accumulating low-speed pulse inputs as the cycle is 0.1 to 2 seconds. The operation cycle of DI Terminal blocks cannot be used for accumulating high-speed pulses from flowrate meters, for example.
Note 2: Set the operation cycle of ITEM 004 to a value shorter than the contact input.
Note 3: When a cold start is performed, the values that were held before CPU Unit output turned OFF or before running of the Loop Controller was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Input and accumulation of low-speed pulses such as power
Output of accumulated values to the Accumulator for accumulated value input block (Block Model 184) for conversion to eight digits when accumulated values must be expressed up to eight digits

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Contact Input/Accumulated Value Output	185	185	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Contact input	008	S1	Contact input	0, 1	0	Yes	–	–	R/W	S/R	1
	009	S2	Reset switch (1: Reset)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	010	S3	Interrupt switch (1: Interrupt)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Accumulated value output	011	Q1	Accumulated value (lower 4 digits)	0000 to 9999	0	Yes	–	W	–	S	2
	012	Q2	Accumulated value (upper 4 digits)	0000 to 9999	0	Yes	–	W	–	S	2

Note Set the operation cycle of ITEM 004 to a value the same or shorter than the pulse cycle of the contact input.
Contacts inputs cannot be counted correctly if the operation cycle is set to a value that is longer than the pulse cycle of the contact input.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	Contact input	S1
009	Reset switch	S2
010	Interrupt switch	S3
011	Accumulated value (lower 4 digits)	Q1
012	Accumulated value (upper 4 digits)	Q2

Block Model	Block Name	Block Address
<186>	Accumulated Value Input/Contact Output	001 to 500

Outline

This function block converts accumulated values inputs to contact outputs (low-speed pulses).

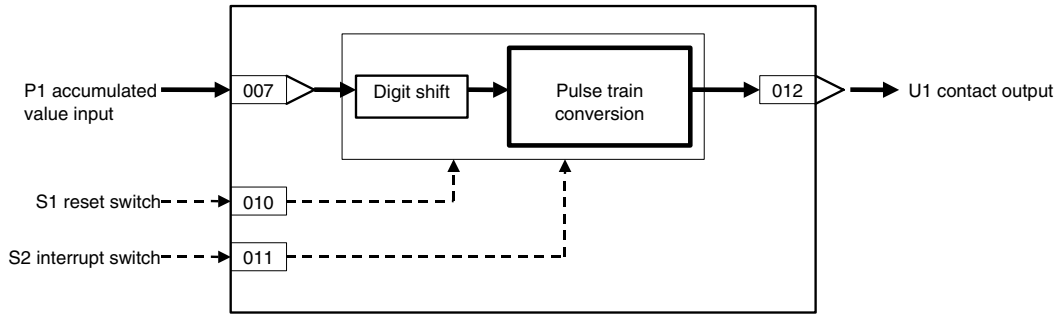
- This function block is used when the Contact Output Unit is used instead of the Pulse Output Unit to output low-speed pulse train signals.
- Connect contact outputs in the Contact Distributor block (Block Model 201) or Step Ladder Program block (Block Model 301).
- The next operation cycle is set to 0 (OFF) after the contact output signal has turned 1 (ON) for one operation cycle.
- Input values are accumulated internally when the output pulse rate is twice or more than the operation cycle and the output speed cannot keep pace with conversion.
- If internal accumulation continues, change the decimal point shift setting to set a slower pulse rate.

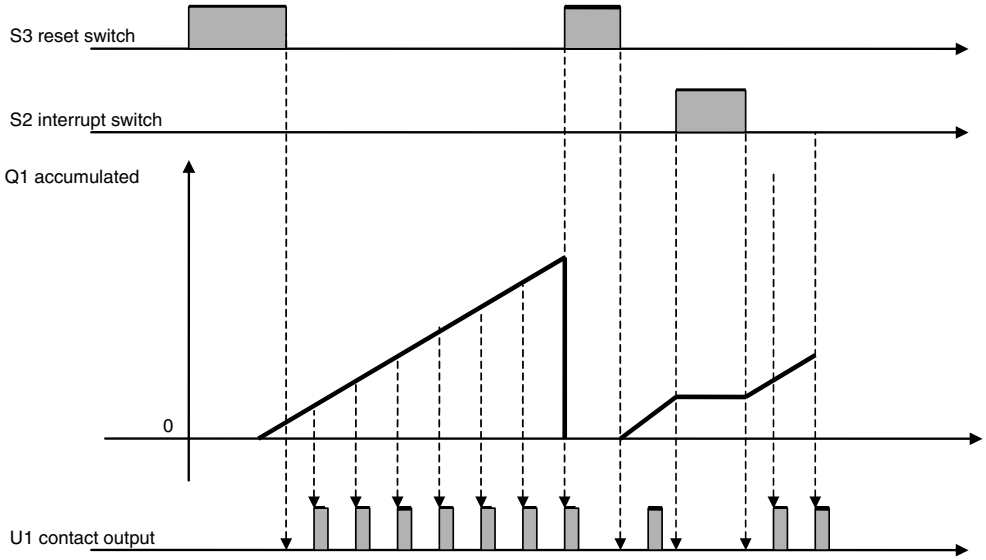
Note: •The maximum value of the internal counter is 99999999.
•When a cold start is performed, the accumulated values that were held before CPU Unit output turned OFF or before running of the Loop Controller was stopped are cleared from memory. These accumulated values are held when a hot start is performed.

Function block applications

Input of accumulated values from the Accumulator for instantaneous value input block (Block Model 150) as P1 accumulated value input
Notification of accumulated values by an on-site contact input mechanical counter

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0		–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name		R/W(S)	–	–	–	24
	002		Block Model: Accumulated Value Input/Contact Output	186	186		R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000		r	–	–	S	2
Parameter	004		Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0		R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Accumulated value input connection information	007		P1 source designation (BBB: Block address, III: ITEM No., Connection mandatory)	BBB or III	000000		R/W(S)	–	–	–	4
Accumulated value input	008	P1	Input	0 to 9999	0		r	–	–	S	2
Parameter	009		Decimal point shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10)	-3 to +1	0		R/W(S)	–	–	–	1
Contact input	010	S1	Counter reset switch (1: Reset)	0, 1	0		R/W(O)	–	R/W	S/R	1
	011	S2	Interrupt switch (1: Interrupt)	0, 1	0		R/W(O)	–	R/W	S/R	1
Contact output	012	U1	Contact output	0, 1	0		–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	P1 input	P1
010	Counter reset switch	S1
011	Interrupt switch	S2
012	Contact output	U1

Block Model	Block Name	Block Address
<192>	Analog/Pulse Width Converter	001 to 500

Outline

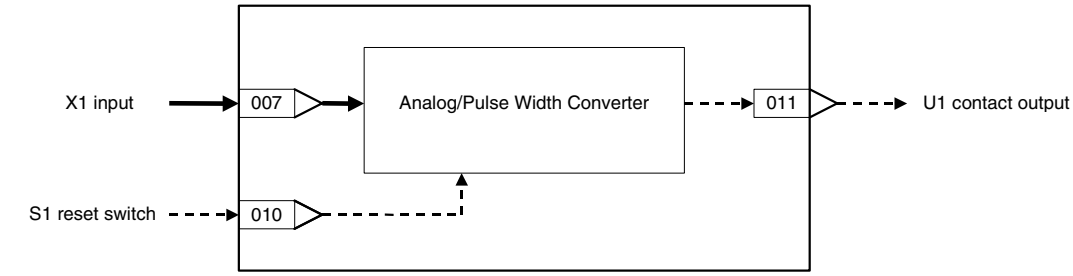
This function block changes the ON/OFF duration ratio in a constant cycle so that it is proportional to the analog input signal. (The ON duration ratio is changed within the range 0 to 100% corresponding to analog input range 0 to 100%.)

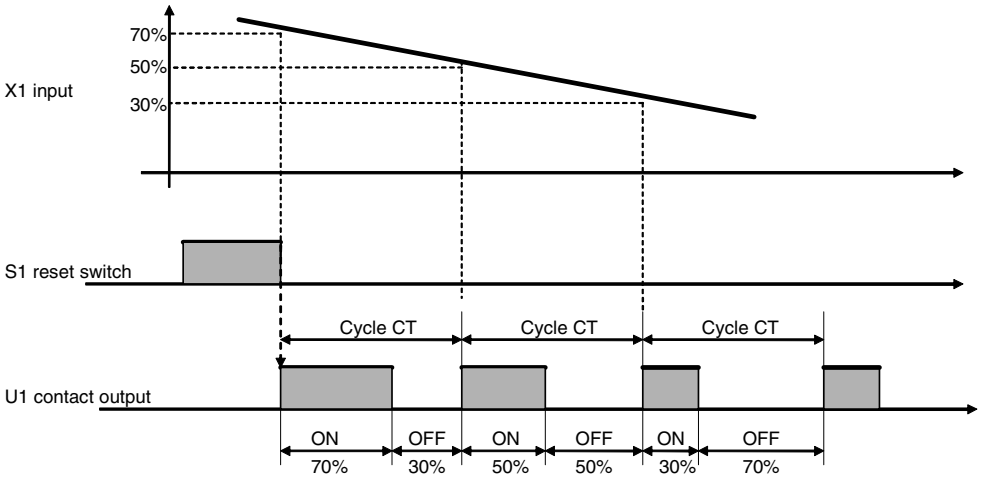
- The ON elapsed time and analog input value (that is, the ON time setting value) are compared at each operation cycle. When the analog input becomes OFF, the OFF state continues until CT pulse cycle time is completed.
- This function block is used, for example, to manipulate an ON/OFF control heater by output from a PID controller (time-proportional control).
- U1 contact output is set to 0 (OFF) for the entire cycle when input is 0% or less, and 1 (ON) for the entire cycle when input is 100% or more.
- The minimum time resolution is 0.1 seconds. However, time cannot be shorter than the operation cycle.
- U1 contact output is reset when S1 reset switch is set to 1 (ON), and set to 0 (OFF) for the entire cycle. When S1 reset switch is set to 0 (OFF), the ON time of U1 contact output is output proportionately to X1 analog input.

Function block applications

Time-proportional control (proportional control by which the time ratio between ON and OFF is changed proportionately)

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Analog/Pulse Width Converter	192	192	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
	006		Number of standby operation cycles at start of control	0 to 1000	0	–	R/W(S)	–	–	–	4
Analog input connection information	007		X1 source designation BBB: Block address, III: ITEM No., (Connection mandatory)	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	008	X1	Input	±320.00%	0.00	–	r	–	–	S	2
Parameter	009	CT	Pulse cycle time	1 to 1000.0s	1.0	Yes	R/W(S)	–	–	S/R	2
Contact input	010	S1	Reset switch (1: Reset)	0, 1	0	–	R/W(O)	–	R/W	S/R	1
Contact output	011	U1	Contact output	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV tags in SCADA software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	X1 input	X1
009	Pulse cycle time	CT
010	Reset switch	S1
011	Contact output	U1

Block Model	Block Name	Block Address
<201>	Contact Distributor	001 to 500

Outline

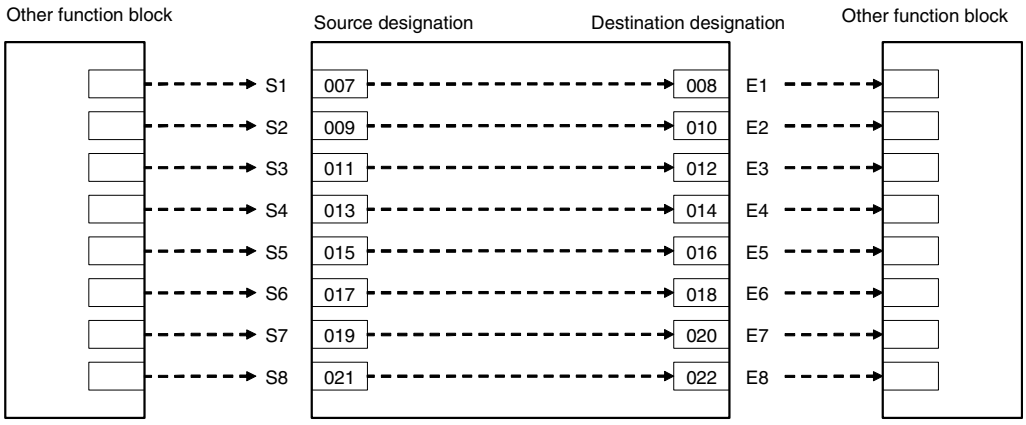
This function block connects contact signals between function blocks in a 1:1 connection without the need to use the Step Ladder Program block (Block Model 301).

- Eight pairs can be connected per Contact Distributor block.
- To connect a contact signal, specify the block number and ITEM number of the source and destination function blocks.
- The ITEMs that can be specified are the same as those in the Step Ladder Program block (Block Model 301). That is, "contact output" or "contact input" ITEMs can be specified as the source, and "contact input" ITEMs can be specified as the destination. For details, refer to ITEM type or R/W Mode "According to Step Ladder Program" in function block ITEM lists.

ITEM type		R/W method			Data Length (bytes)
		According to CX-Process Monitor	According to ITEM Setting block	According to Step Ladder Program	
Contact input		–	–	R/W	1

- Constant output or single output can be selected. (Loop Control Unit with unit Ver. 2.50 or later) For constant output, the contact input is connected to constant contact output. For single output, the contact input is connected to contact output only when 0 changes to 1, or 1 changes to 0.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: Contact Distributor	201	201	–	R/W(S)	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	2
Parameters	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	2
	006		Output type 0: Constant output, 1: Single output Note: For single output, the connection to contact output E□ is made only when contact input S□ changes.	0, 1	0	–	R/W(S)	–	–	1
Contact input connection information	007		S1 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	008		E1 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact input connection information	009		S2 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	010		E2 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact input connection information	011		S3 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	012		E3 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact input connection information	013		S4 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	014		E4 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact input connection information	015		S5 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	016		E5 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact input connection information	017		S6 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	018		E6 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact input connection information	019		S7 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	020		E7 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact input connection information	021		S8 source designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–	–	4
Contact output connection information	022		E8 destination designation (BBB: Block address, III: ITEM No.)	BBB or III	000000	–	R/W(S)	–		4

Block Model	Block Name	Block Address
<202>	Constant Comparator	001 to 500

Outline

This function block compares (one of >, = or < comparison mode) analog input signals and constants, and outputs the comparison results as contacts.

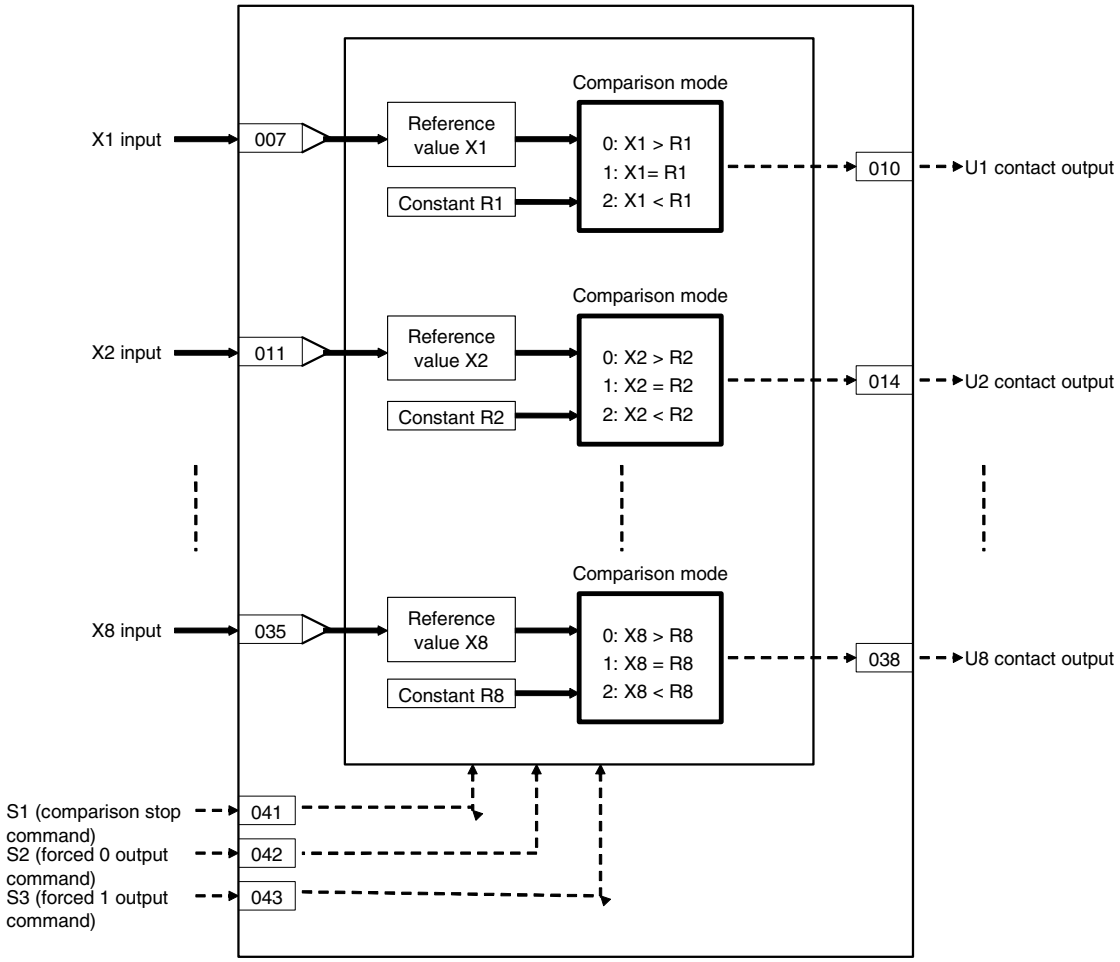
•Comparison can be performed on up to eight sets of signals and constants.
•All outputs for the comparison results can be forcibly turned ON or OFF.
•All comparison operations can be stopped.

Note: When the comparison mode is set to either > or <, comparison contacts do not have hysteresis.

Function block applications

Switching of control conditions (PID constants, heat/cool control, etc.) when the input is a certain value or higher (matching a certain value or a certain value or lower)

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Constant Comparator	202	202	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input wiring information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	008		R1 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	009		C1 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	010	U1	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	011		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	012		R2 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	013		C2 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	014	U2	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	015		X3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	016		R3 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	017		C3 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	018	U3	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	019		X4 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	020		R4 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	021		C4 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	022	U4	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	023		X5 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	024		R5 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	025		C5 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	026	U5	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	027		X6 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	028		R6 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	029		C6 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	030	U6	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	031		X7 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	032		R7 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	033		C7 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	034	U7	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	035		X8 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Parameter	036		R8 constant	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	037		C8 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	038	U8	Comparison result	0, 1	0	Yes	–	–	R	S	1
Contact input	041	S1	Comparison stop command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	042	S2	Forced 0 output command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	043	S3	Forced 1 output command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog input	051	X1	X1 input	±320.00%	0.00	Yes	r	–	–	S	2
	052	X2	X2 input	±320.00%	0.00	Yes	r	–	–	S	2
	053	X3	X3 input	±320.00%	0.00	Yes	r	–	–	S	2
	054	X4	X4 input	±320.00%	0.00	Yes	r	–	–	S	2
	055	X5	X5 input	±320.00%	0.00	Yes	r	–	–	S	2
	056	X6	X6 input	±320.00%	0.00	Yes	r	–	–	S	2
	057	X7	X7 input	±320.00%	0.00	Yes	r	–	–	S	2
	058	X8	X8 input	±320.00%	0.00	Yes	r	–	–	S	2

Note: •When S1 comparison stop command turns 1 (ON), all comparison processing on inputs X1 to X8 is stopped. All comparison result outputs at that time are held at the output values that were current when S1 turned 1 (ON).
•When S2 forced 0 output command turns 1 (ON), all contact outputs U1 to U8 turn 0 (OFF) regardless of the comparison results.
•When S3 forced 1 output command turns 1 (ON), all contact outputs U1 to U8 turn 1 (ON) regardless of the comparison results.
•The S2 forced 0 output command and S3 forced 1 output command are given priority over the S1 comparison stop command.
•If both the S2 forced 0 output command and S3 forced 1 output command turn 1 (ON), an execution error (error code 19: illegal operation) occurs.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
008	R1 constant	R1
010	U1 comparison result	U1
012	R2 constant	R2
014	U2 comparison result	U2
016	R3 constant	R3
018	U3 comparison result	U3
020	R4 constant	R4
022	U4 comparison result	U4
024	R5 constant	R5
026	U5 comparison result	U5
028	R6 constant	R6
030	U6 comparison result	U6
032	R7 constant	R7
034	U7 comparison result	U7
036	R8 constant	R8
038	U8 comparison result	U8
041	Comparison stop command	S1
042	Forced 0 output command	S2
043	Forced 1 output command	S3
051	X1 input	X1
052	X2 input	X2
053	X3 input	X3
054	X4 input	X4
055	X5 input	X5
056	X6 input	X6
057	X7 input	X7
058	X8 input	X8

Block Model	Block Name	Block Address
<203>	Variable Comparator	001 to 500

Outline

This function block compares (one of >, = or < comparison mode) pairs of analog signals, and outputs the comparison results as contacts.

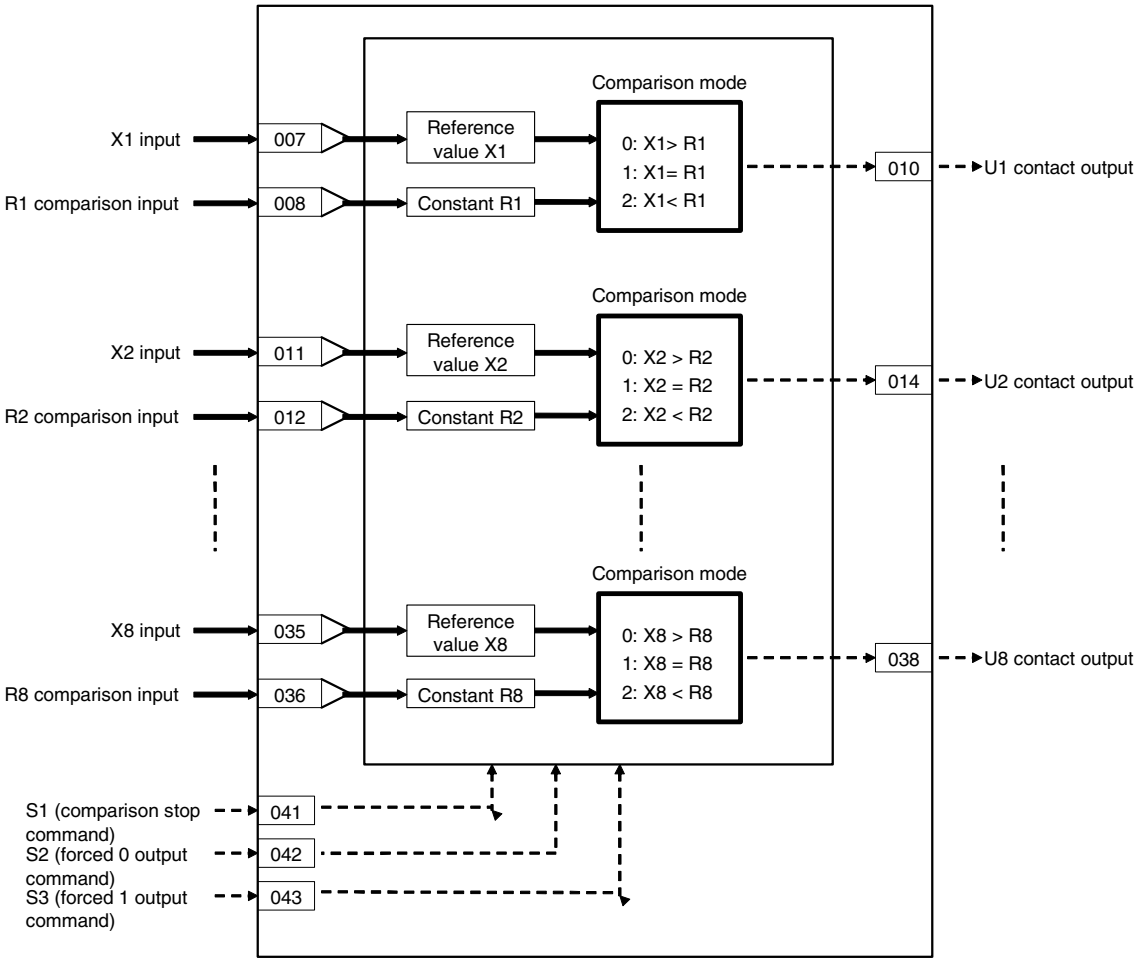
•Comparison can be performed on up to eight sets of analog input signal pairs.
•All outputs for the comparison results can be forcibly turned ON or OFF.
•All comparison operations can be stopped.

Note: When the comparison mode is set to either > or <, comparison contacts do not have hysteresis.

Function block applications

Switching of control conditions (PID constants, heat/cool control, etc.) when the input is equal to or higher than the comparison input (or matching the comparison input, or equal to or lower than the comparison input)

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Variable Comparator	203	203	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Analog input wiring information	007		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	008		R1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	009		C1 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	010	U1	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	011		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	012		R2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	013		C2 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	014	U2	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	015		X3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	016		R3 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	017		C3 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	018	U3	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	019		X4 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	020		R4 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	021		C4 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	022	U4	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	023		X5 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	024		R5 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	025		C5 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	026	U5	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	027		X6 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	028		R6 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	029		C6 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	030	U6	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	031		X7 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	032		R7 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	033		C7 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	034	U7	Comparison result	0, 1	0	Yes	–	–	R	S	1
Analog input wiring information	035		X8 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	036		R8 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
	037		C8 comparison mode (0: X>R, 1: X=R, 2: X<R)	0 to 2	1	–	R/W(O)	W	–	–	1
Contact output	038	U8	Comparison result	0, 1	0	Yes	–	–	R	S	1
Contact input	041	S1	Comparison stop command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	042	S2	Forced 0 output command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	043	S3	Forced 1 output command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Analog input	051	X1	X1 input	±320.00%	0.00	Yes	r	–	–	S	2
	052	X2	X2 input	±320.00%	0.00	Yes	r	–	–	S	2
	053	X3	X3 input	±320.00%	0.00	Yes	r	–	–	S	2
	054	X4	X4 input	±320.00%	0.00	Yes	r	–	–	S	2
	055	X5	X5 input	±320.00%	0.00	Yes	r	–	–	S	2
	056	X6	X6 input	±320.00%	0.00	Yes	r	–	–	S	2
	057	X7	X7 input	±320.00%	0.00	Yes	r	–	–	S	2
	058	X8	X8 input	±320.00%	0.00	Yes	r	–	–	S	2
	061	R1	R1 input	±320.00%	0.00	Yes	r	–	–	S	2
	062	R2	R2 input	±320.00%	0.00	Yes	r	–	–	S	2
	063	R3	R3 input	±320.00%	0.00	Yes	r	–	–	S	2
	064	R4	R4 input	±320.00%	0.00	Yes	r	–	–	S	2
	065	R5	R5 input	±320.00%	0.00	Yes	r	–	–	S	2
	066	R6	R6 input	±320.00%	0.00	Yes	r	–	–	S	2
	067	R7	R7 input	±320.00%	0.00	Yes	r	–	–	S	2
	068	R8	R8 input	±320.00%	0.00	Yes	r	–	–	S	2

Note
- When S1 comparison stop command turns 1 (ON), all comparison processing on inputs X1 to X8 is stopped. All comparison result outputs at that time are held at the output values that were current when S1 turned 1 (ON).
- When S2 forced 0 output command turns 1 (ON), all contact outputs U1 to U8 turn 0 (OFF) regardless of the comparison results.
- When S3 forced 1 output command turns 1 (ON), all contact outputs U1 to U8 turn 1 (ON) regardless of the comparison results.
- The S2 forced 0 output command and S3 forced 1 output command are given priority over the S1 comparison stop command.
- If both the S2 forced 0 output command and S3 forced 1 output command turn 1 (ON), an execution error (error code 19: illegal operation) occurs.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
010	U1 comparison result	U1
014	U2 comparison result	U2
018	U3 comparison result	U3
022	U4 comparison result	U4
026	U5 comparison result	U5
030	U6 comparison result	U6
034	U7 comparison result	U7
038	U8 comparison result	U8
041	Comparison stop command	S1
042	Forced 0 output command	S2
043	Forced 1 output command	S3
051	X1 input	X1
052	X2 input	X2
053	X3 input	X3
054	X4 input	X4
055	X5 input	X5
056	X6 input	X6
057	X7 input	X7
058	X8 input	X8
061	R1 input	R1
062	R2 input	R2
063	R3 input	R3
064	R4 input	R4
065	R5 input	R5
066	R6 input	R6
067	R7 input	R7
068	R8 input	R8

Block Model	Block Name	Block Address
<205>	Timer	001 to 005

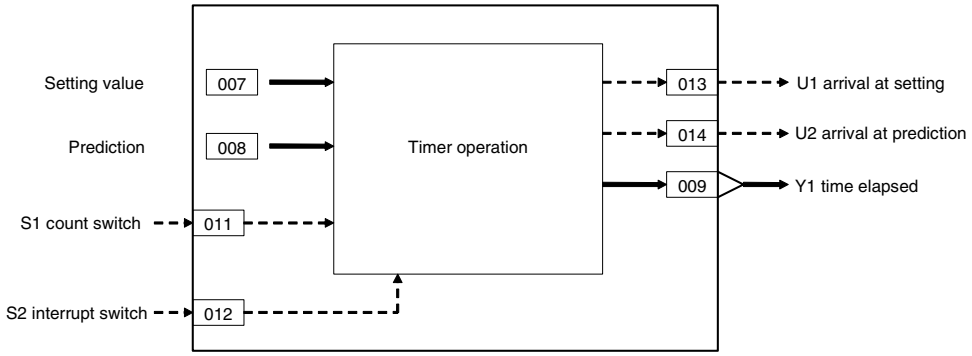
Outline

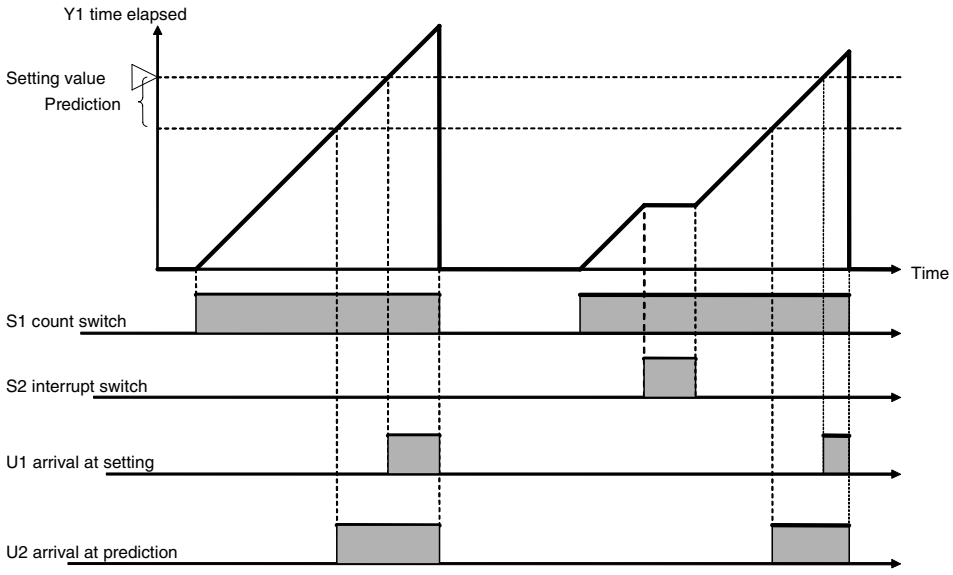
This function block performs 2-stage alarm operations.

- Timer operation is performed when S1 run/stop command is set to 1 (ON). When the count reaches "setting - prediction", U2 contact output is set to 1 (ON). When the setting is reached, U1 contact output is set to 1 (ON). When S1 run/stop command is set to 0 (OFF), the timer is reset, Y1 time elapsed is set to 0, and contact outputs U1 and U2 are set to 0 (OFF).
- Timer operation stops when S2 interrupt switch is set to 1 (ON).
- Set the number of hours before the setting as the prediction.
- The minimum resolution is the same as the operation cycle.
- Counting of the elapsed time continues even after the timer has reached the setting and stops when the timer reaches 3200.0.

Note: When a cold start is performed, the current timer value that was held before output OFF or before running of the Loop Controller was stopped are cleared from memory. This value is held when a hot start is performed.

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Timer	205	205	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
	007		Setting	0 to 3200.0	0.0	–	R/W(O)	W	–	S/R	2
	008		Prediction (subtracted from setting)	0 to 3200.0	0.0	–	R/W(O)	W	–	S/R	2
Analog output	009	Y1	Time elapsed	0 to 3200.0	0.0	Yes	r	W	–	S	2
Parameter	010		Time unit (0: s, 1: min, 2: hr, 3: 0.1 s)	0 to 3	0	–	R/W(S)	–	–	S/R	1
Contact input	011	S1	Count switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	012	S2	Interrupt switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	013	U1	Arrival at setting	0, 1	0	Yes	–	–	R	S	1
	014	U2	Arrival at prediction	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Setting	SP
008	Prediction (subtracted from setting)	PRS
009	Time elapsed	Y1
010	Time unit	TMU
011	Count switch	S1
012	Interrupt switch	S2
013	Arrival at setting	U1
014	Arrival at prediction	U2

Block Model	Block Name	Block Address
<206>	ON/OFF Timer	001 to 500

Outline

This function block is a timer for performing ON-OFF operation at preset ON and OFF times.

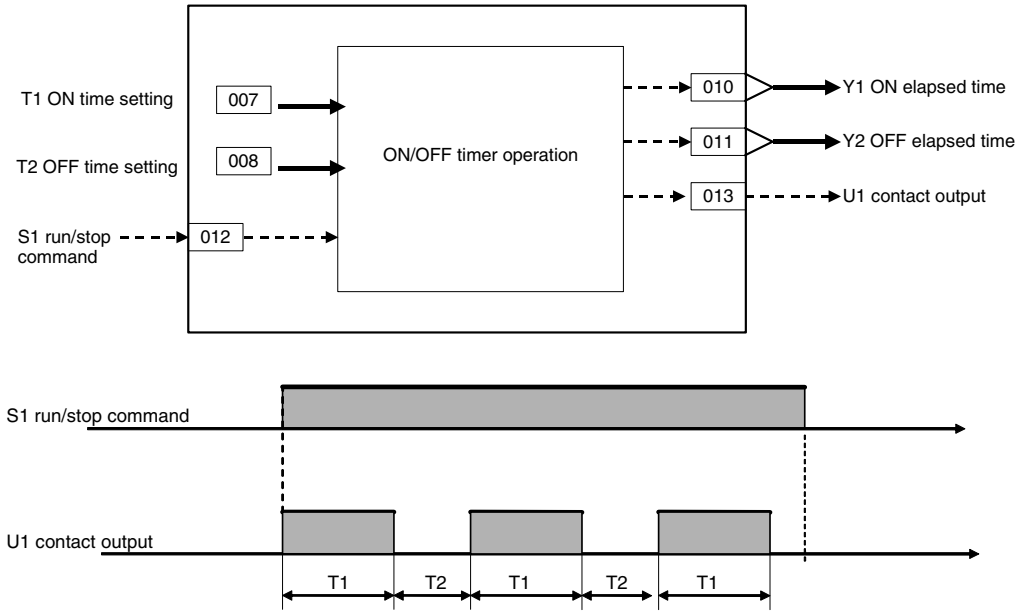
•The minimum resolution is the same as the operation cycle.
•Timer operation is performed when S1 run/stop command is set to 1 (ON), and is reset when set to 0 (ON).

Note: When a cold start is performed, the current timer value that was held before output OFF or before running of the Loop Controller was stopped are cleared from memory. This value is held when a hot start is performed.

Function block applications

Sample PI control

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: ON/OFF Timer	206	206	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	007	T1	ON time setting	0 to 3200.0	0.0	–	R/W(O)	W	–	S/R	2
	008	T2	OFF time setting	0 to 3200.0	0.0	–	R/W(O)	W	–	S/R	2
	009		Time unit (0: s, 1:min, 2: hr, 3:0.1 s)	0 to 3	0	–	R/W(S)	–	–	S/R	1
Analog output	010	Y1	Elapsed ON time	0 to 3200.0	0.0	Yes	r/w	–	–	S	2
	011	Y2	Elapsed OFF time	0 to 3200.0	0.0	Yes	r/w	–	–	S	2
Contact input/ parameter	012	S1	Run/stop command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	013	U1	Contact output	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	ON time setting	T1
008	OFF time setting	T2
009	Time unit	TMU
010	Elapsed ON time	Y1
011	Elapsed OFF time	Y2
012	Run/stop command	S1
013	Contact output	U1

Block Model	Block Name	Block Address
<207>	Clock Pulse	001 to 500

Outline

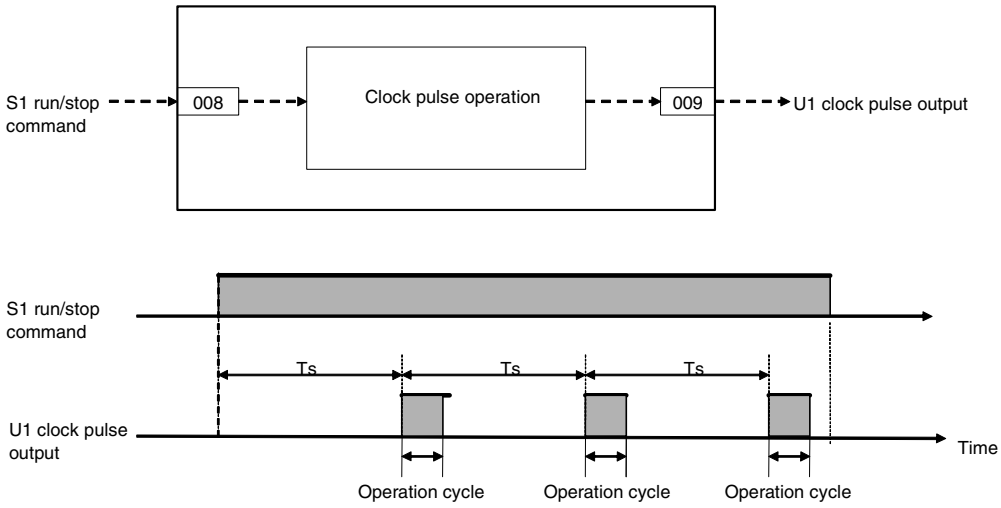
This function block outputs clock pulses that turn ON for one operation cycle only at each set time (Ts).

Clock pulses are output only for the duration that S1 operation command is 1 (ON). Output contacts remain 0 (OFF) when S1 operation command is 0 (OFF).

Function block applications

This function block is used to create a sequential control program (for example, for the measurement of current values at fixed time intervals) that takes the clock pulse as its input condition in Step Ladder Program block (Block Model 301).

Block diagram



Note: When Ts is 0, clock pulse output is always 1 (ON) when operation command is 1 (ON).

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Clock Pulse	207	207	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 4 6 to 8	1	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	007		Ts setting (unit: s) Note: When set to 0 s, clock pulse output remains at 1 (ON) all the time.	0 to 32000s	0	–	R/W(O)	W	–	S/R	2
Contact input	008	S1	Operation command (1: Clock pulse output ON)	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact output	009	U1	Clock pulse output	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Ts setting	TS
008	Operation command	S1
009	Clock pulse output	U1

Block Model	Block Name	Block Address
<208>	Counter	001 to 500

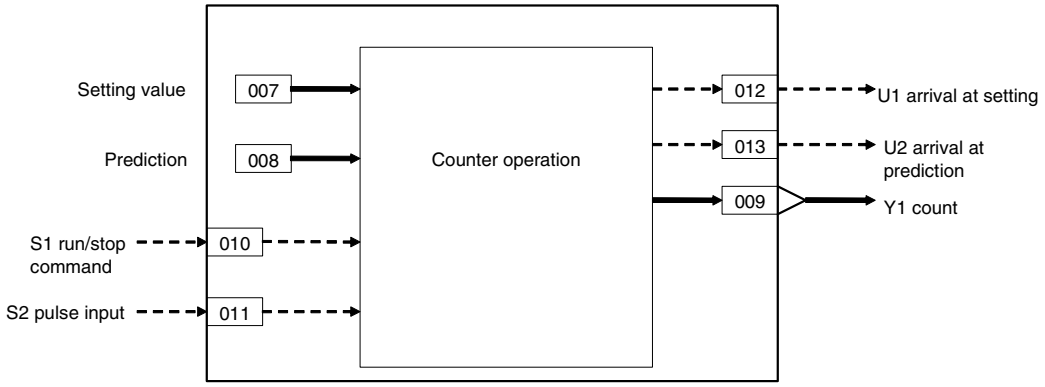
Outline

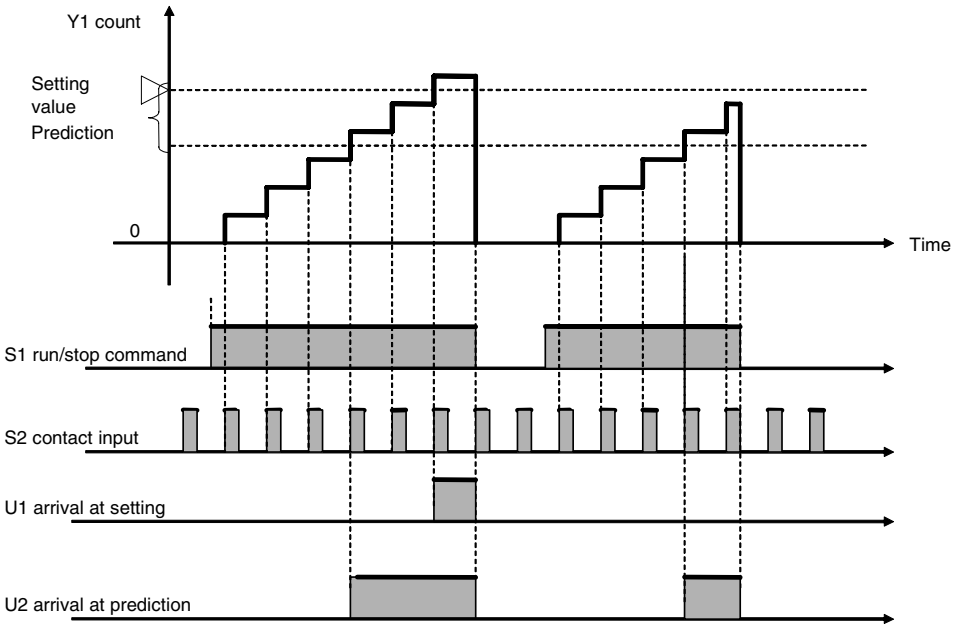
This function block performs 2-stage alarm operations.

- The number of rising edges of S2 contact pulse input is counted and Y1 count is output when S1 run/stop command is set to 1 (ON). When the count reaches "setting - prediction", U2 contact output is set to 1 (ON). When the U1 contact output is set to 1 (ON). When S1 run/stop command is set to 0 (OFF), the timer is reset, Y1 count is set to 0, and contact outputs U1 and U2 are set to 0 (OFF).
- Set the value to be subtracted from the setting as the prediction.
- Though the counter returns to 0 when the count reaches 9999, the prediction arrival and setting arrival signals are held.

Note: When a cold start is performed, the current counter value that was held before output OFF or before running of the Loop Controller was stopped are cleared from memory. This value is held when a hot start is performed.

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Counter	208	208	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	007		Setting	0 to 9999	0	–	R/W(O)	W	–	S/R	2
	008		Prediction (subtracted from setting)	0 to 9999	0	–	R/W(O)	W	–	S/R	2
Analog output	009	Y1	Count	0 to 9999	0	Yes	r	–	–	S	2
Contact input	010	S1	Run/stop command	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	011	S2	Pulse input	0, 1	0	Yes	R/W	–	R/W	–	1
Contact output	012	U1	Arrival at setting	0, 1	0	Yes	–	–	R	S	1
	013	U2	Arrival at prediction	0, 1	0	Yes	–	–	R	S	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Setting	SP
008	Prediction (subtracted from setting)	PRS
009	Count	Y1
010	Run/stop command	S1
012	Arrival at setting	U1
013	Arrival at prediction	U2

Block Model	Block Name	Block Address
<209>	Internal Switch	001 to 500

Outline

This function block is for inputting and temporarily storing contact signals, and is equivalent to Work Area (W) on a PLC (Programmable Controller). When CX-Process Tool is used, this Internal Switch is assigned to block address 349 as default, and is automatically created as "temporary storage" area. The Internal Switch in block address 349 is for system use only and cannot be used by the user. Use another block address if you need to use this function block.

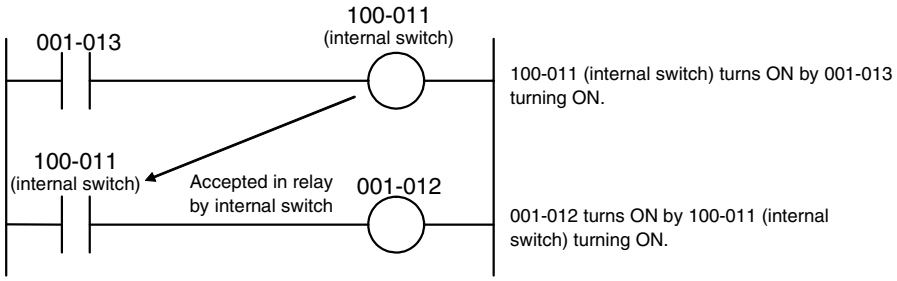
•224 internal switches can be used in one of these Internal Switch blocks.

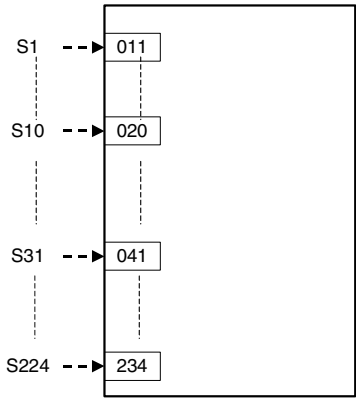
Note: When a cold start is performed, the temporary relay values that were held before output OFF or before running of the Loop Controller was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

This function block can be used to accept interim results of Step Ladder Program operation in internal relays without writing them to specific "contact input" ITEMs in the Step Ladder Program block (Block Model 301).
Results can be output to this internal switch by output type commands such as OUT, and read by input type commands such as LOAD.

Block diagram





ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Internal Switch	209	209	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Contact input	011	S1	Internal switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	to	to		to		Yes					
	020	S10	Internal switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	to	to		to		Yes					
	040	S30	Internal switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	041	S31	Internal switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	to	to		to		Yes					
	234	S224	Internal switch	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
011 to 026	S1 to S16 internal switch	S1 to S16
027 to 042	S17 to S32 internal switch	S17 to S32
043 to 058	S33 to S48 internal switch	S33 to S48
059 to 074	S49 to S64 internal switch	S49 to S64
075 to 090	S65 to S80 internal switch	S65 to S80
091 to 106	S81 to S96 internal switch	S81 to S96
107 to 122	S97 to S112 internal switch	S97 to S112
123 to 138	S113 to S128 internal switch	S113 to S128
139 to 154	S129 to S144 internal switch	S129 to S144
155 to 170	S145 to S160 internal switch	S145 to S160
171 to 186	S161 to S176 internal switch	S161 to S176
187 to 202	S177 to S192 internal switch	S177 to S192
203 to 218	S193 to S208 internal switch	S193 to S208
219 to 234	S209 to S224 internal switch	S209 to S224

Block Model	Block Name	Block Address
<210>	Level Check	001 to 500

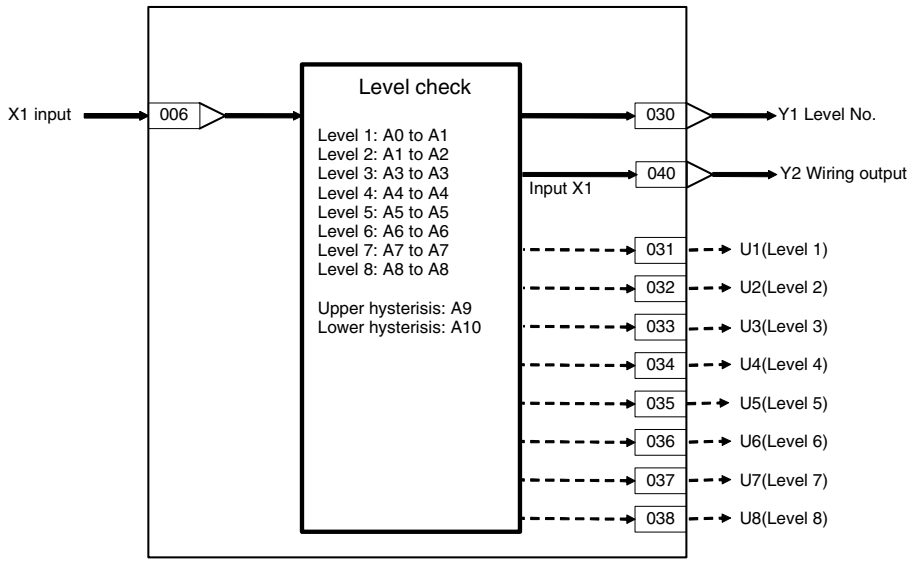
Outline

Each analog input is checked against eight levels and the contact corresponding to the level is output. The level number is also output at an analog value at the same time.
•Eight levels per block are checked.
•Hysteresis can be set for each level.
•A series connection of multiple blocks (using wiring outputs) enables checking of nine or more levels.

Function block applications

Combined with an ITEM write block (connecting a contact output to an ITEM Write block in response to level), this function can be used to change other block ITEMs in response to analog data levels.
Example: Changing the proportional band of a PID block in response to temperature levels (from this block to an ITEM Write block for constants to changing the proportional band of a basic PID block).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Level Check	210	210	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

Input

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input wiring information	006		X1 source destination BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	007	X1	Input	±320.00%	0.00	Yes	r	–	–	S	2

Level check boundaries

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	010	A0	Lower limit	±320.00%	-320.00	–	R/W(O)	W	–	S/R	2
	011	A1	Level 1 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	012	A2	Level 2 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	013	A3	Level 3 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	014	A4	Level 4 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	015	A5	Level 5 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	016	A6	Level 6 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	017	A7	Level 7 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	018	A8	Level 8 upper limit	±320.00%	320.00	–	R/W(O)	W	–	S/R	2
	019	A9	Upper hysteresis	0 to 320.00%	1.00	–	R/W(O)	W	–	S/R	2
	020	A10	Lower hysteresis	0 to 320.00%	1.00	–	R/W(O)	W	–	S/R	2

Level check results

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog output	030	Y1	Level No. (0: out of range)	0 to 8	0	Yes	–	–	–	S	2
Contact output	031	U1	Level 1 (A0 < X1 ≤A1)	0, 1	0	Yes	–	–	R	S	1
	032	U2	Level 2 (A1 < X1 ≤A2)	0, 1	0	Yes	–	–	R	S	1
	033	U3	Level 3 (A2 < X1 ≤A3)	0, 1	0	Yes	–	–	R	S	1
	034	U4	Level 4 (A3 < X1 ≤A4)	0, 1	0	Yes	–	–	R	S	1
	035	U5	Level 5 (A4 < X1 ≤A5)	0, 1	0	Yes	–	–	R	S	1
	036	U6	Level 6 (A5 < X1 ≤A6)	0, 1	0	Yes	–	–	R	S	1
	037	U7	Level 7 (A6 < X1 ≤A7)	0, 1	0	Yes	–	–	R	S	1
	038	U8	Level 8 (A7 < X1 ≤A8)	0, 1	0	Yes	–	–	R	S	1
Analog output	040	Y2	Wiring output (input value X1 output unchanged)	±320.00%	0.00	Yes	r	–	–	–	2

Note 1: Level upper limit (A1 to A8) setting

Set the upper limit so that A0 ≤ A1 ≤ A2 ≤ A3 ≤ A4 ≤ A5 ≤ A6 ≤ A7 ≤ A8. The reason for this is that, with a setting like A0 ≤ A1 ≤ A2 ≤ A3 > A4, the level check will proceed in the order A0, A1, A2...A8, making A4 and subsequent settings invalid. This would result in an execution error (error code 71: inappropriate parameter) for X1 > A4, and the output would be treated as out of range (Y1 = 0, U1 to U8 = 0).

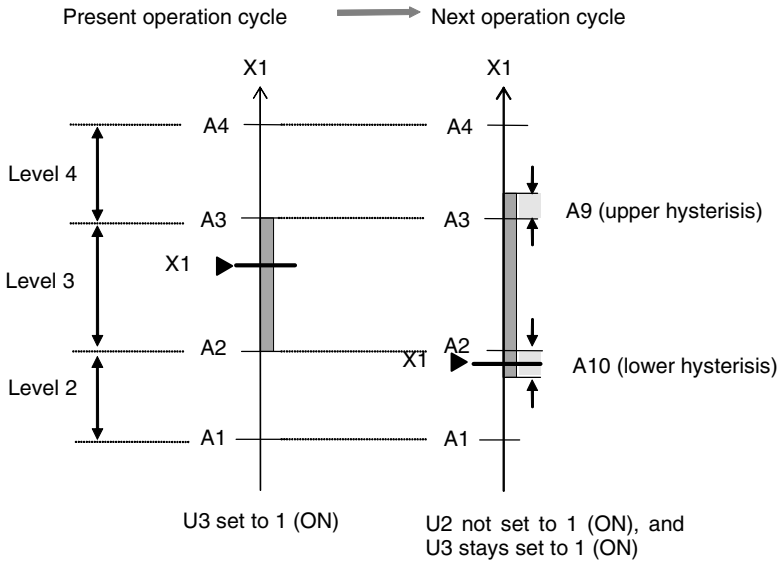
When equal values are included, such as A0 < A1 = A2 = A3 < A4 < A5..., they will be ignored (in this case A2 and A3), but this will not result in an execution error.

Note 2: Hysteresis

The level check is equipped with hysteresis to prevent chattering in ongoing level checks due to the oscillation of the X1 input.

For example, in an operation cycle where X1 is positioned at level 3 with A2 < X1 ≤ A3, the level check of the next operation cycle determines whether X1 is within the lower hysteresis (A2 – lower hysteresis value) and upper hysteresis (A3 + upper hysteresis value) range. Thus, even if (A2 – lower hysteresis value) < X1 ≤ A2, level 2 (U2) will not be set to 1 (ON) and level 3 (U3) will remain set to 1 (ON). Similarly, even if A3 < X1 ≤ (A3 + upper hysteresis value), level 4 (U4) will not be set to 1 (ON) and level 3 (U3) will remain set to 1 (ON).

Example



Note 3: Y2 wiring output

Wiring with the Y2 wiring output differs from simple X1 input branching, because it can be used to prevent operations, due to hysteresis, where different levels turn ON simultaneously.

Reference:

By linking the level settings of several function blocks, nine or more levels can be achieved. To do this, set as follows:

1. Connect the Y2 wiring output of the first function block to X1 input of the second function block.
2. Set A8 of the first function block and A0 of the second function block to the same value.
3. Set the upper hysteresis between the first and second function blocks to the same value.
4. Set the block address for the second function block to a higher value than the block address for the first function block.
5. Set the operation cycle of the first and second function blocks to the same value.

List of tag ITEMS on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

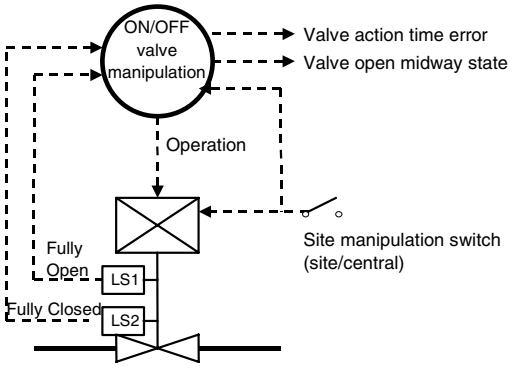
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
007	Input	X1
010	Lower limit	A0
011	Level 1 upper limit	A1
012	Level 2 upper limit	A2
013	Level 3 upper limit	A3
014	Level 4 upper limit	A4
015	Level 5 upper limit	A5
016	Level 6 upper limit	A6
017	Level 7 upper limit	A7
018	Level 8 upper limit	A8
019	Upper hysteresis	A9
020	Lower hysteresis	A10
030	Level No.	Y1
031	Level 1	U1
032	Level 2	U2
033	Level 3	U3
034	Level 4	U4
035	Level 5	U5
036	Level 6	U6
037	Level 7	U7
038	Level 8	U8

Block Model	Block Name	Block Address
<221>	ON/OFF Valve Manipulator	001 to 500

Outline

This function block manipulates and monitors ON/OFF valves with open/close limit switches.

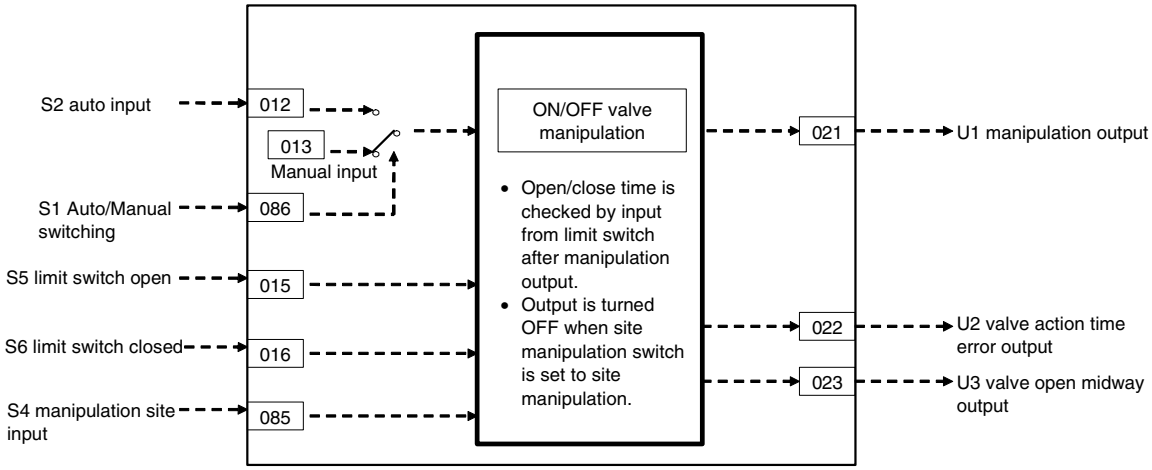
- Provided with a valve action time error detection function (The contact state is output as a valve action time error unless the limit switch turns ON after a fully close or open operation.)
- Provided with a site manipulation switch input function (This switch enables input of either valve manipulation from the site or from a central Loop Controller. Manipulation output is turned OFF when valve manipulation is input from the site.)
- Provided with an Auto/Manual switching function (When set to Auto, the input is taken as the manipulation output, and when set to Manual, the internal specified state is taken as the manipulation output.
- Provided with a valve open midway output function (When the limit switches for detecting valve fully open or closed are both OFF, the valve state is regarded as valve open midway and the output contact is turned ON.)
- When open limit switch (ITEM 006) is set to 0 and close limit switch (ITEM 008) is set to 0, valve open midway (ITEM 023) will be set to 1 (open midway).
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to.
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the manual input is matched to the value of the limit switch open/close input immediately prior to switching, in order to maintain actual site conditions.



Function block applications

Manipulation of pneumatic-operated valves and motor-operated valves

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: ON/OFF valve manipulator	221	221	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	006		Open limit switch (0: Used, 1: Not used) Note: When set to 0, open limit switch input (ITEM 015) turns 0 (OFF).	0, 1	1	–	R/W(S)	–	–	–	1
	007		Open time setting Note: This setting is enabled when open limit switch (ITEM 006) is set to 1.	0 to 32000s	5	–	R/W(O)	W	–	S/R	2
Parameter	008		Close limit switch (0: Used, 1: Not used) Note: When set to 0, close limit switch input (ITEM 016) turns 0 (OFF).	0, 1	1	–	R/W(S)	–	–	–	1
	009		Close time setting Note: This setting is enabled when close limit switch (ITEM 008) is set to 1.	0 to 32000s	5	–	R/W(O)	W	–	S/R	2
Parameter	010		Valve action direction 0: Forward (close at power ON) 1: Reverse (open at power ON)	0, 1	1		R/W(S)	–	–	–	1
Contact input	012	S2	Auto input	0, 1	0	Yes	–	–	R/W	S	1
Contact input/ parameter	013	S3	Manual input	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact input	015	S5	Open limit switch input 0: Open limit switch OFF 1: Open limit switch ON Note: This setting becomes 0 when ITEM 006 (open limit switch) is set to 0.	0, 1	0	Yes	–	–	R/W	S	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	016	S6	Close limit switch input 0: Close limit switch OFF 1: Close limit switch ON Note: This setting becomes 0 when ITEM 008 (close limit switch) is set to 0.	0, 1	0	Yes	–	–	R/W	S	1
Contact output	021	U1	Manipulation output	0, 1	0	Yes	–	–	R	S	1
	022	U2	Valve action time error (1: Error)	0, 1	0	Yes	–	–	R	S	1
	023	U3	Valve open midway (1: Open midway)	0, 1	0	Yes	–	–	R	S	1
Contact input	085	S4	Site manipulation switch input (1: Site, 0: Central) *1 Note: When 1 (Site) is input, ITEM 021 (Manipulation output) turns 0, and ITEM 022 (Valve action time error) and ITEM 023 (Valve open midway) turn 0.	0, 1	0	Yes	–	–	R/W	S	1
Contact input/ parameter	086	S1	Auto/Manual switching*2 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Parameter	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

*1: When the S4 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM 086) is forced to 0 (Man) and the U1 manipulation output is set as follows.
When the S5 open limit switch input is set to 1 (open) immediately prior to switching, ITEM 013 (manual input) will be 1 and U1 manipulation output will be1.
When the S6 close limit switch input is set to 1 (close) immediately prior to switching, ITEM 013 (manual input) will be 0 and U1 manipulation output will be 0.
When the S5 open limit switch input and S6 close limit switch input are both set to 1 or both set to 0 immediately prior to switching, if ITEM 010 (valve action direction) is 1 (reverse), U1 manipulation output will be 0. Similarly, if ITEM 010 (valve action direction) is 0 (forward), U1 manipulation output will be 1.

*2: When S1 auto/manual switching is changed from Auto to Manual, the value of ITEM 012 (auto input) is automatically transferred to ITEM 013 (manual input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

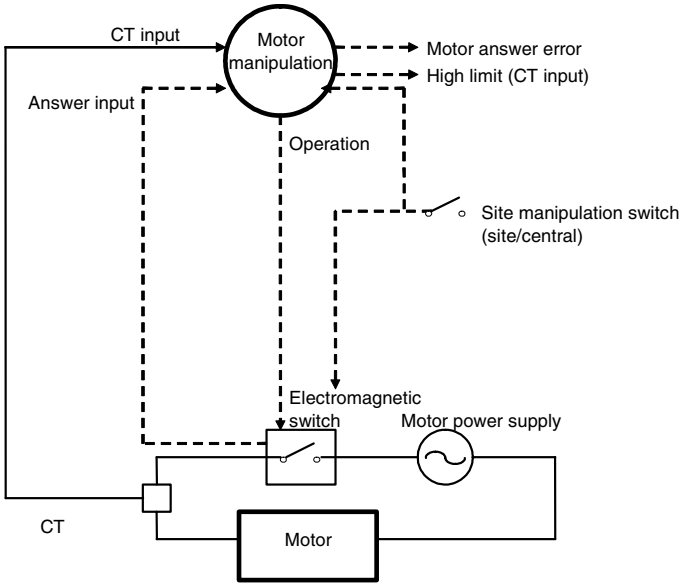
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command (0: Cancel stop, 1: Stop)	MT_ST
003	Execution error display	ERR
007	Open time setting	TO
009	Close time setting	TC
012	Auto input	S2
013	Manual input	S3
015	Open limit switch input	S5
016	Close limit switch input	S6
021	Manipulation output	U1
022	Valve action time error	U2
023	Valve open midway	U3
085	Site manipulation switch input	S4
086	Auto/Manual switching	S1
099	Label	OP_MK

Block Model	Block Name	Block Address
<222>	Motor Manipulator	001 to 500

Outline

This function block manipulates and monitors motor operation.

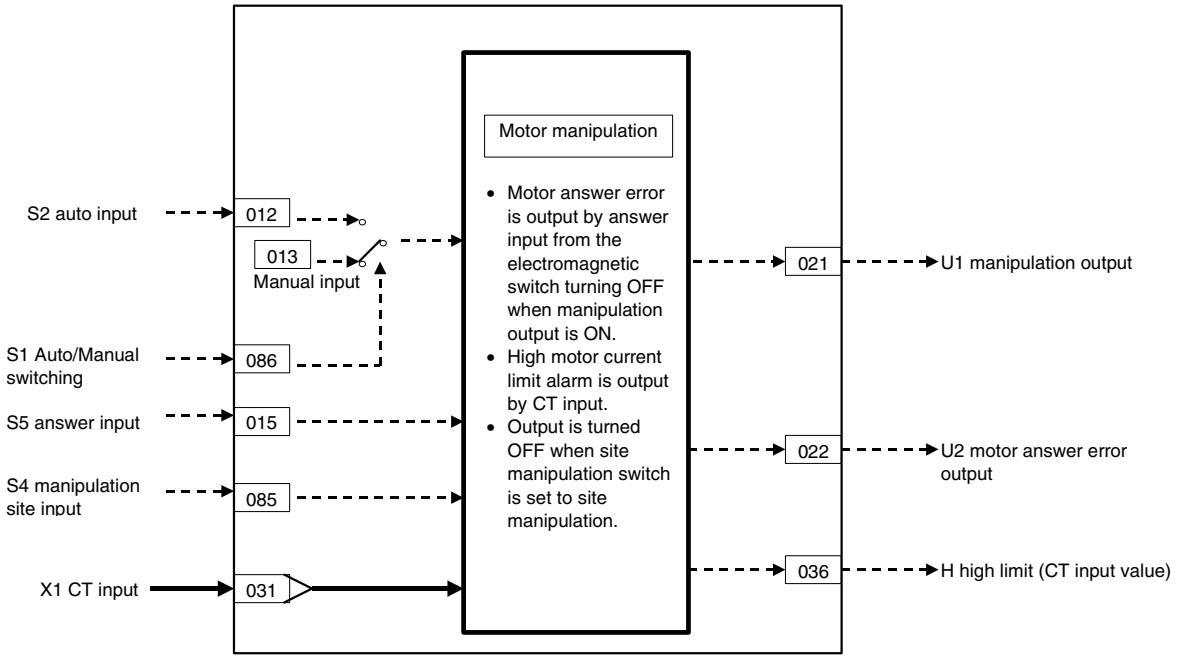
- Provided with a site manipulation switch input (This switch enables input of either motor manipulation from the site or from a central Loop Controller. Manipulation output is turned OFF when motor manipulation is input from the site.)
- Provided with an Auto/Manual switching function (When set to Auto, the input is taken as the manipulation output, and when set to Manual, the internal specified state is taken as the manipulation output.
- Provided with a motor answer error alarm (The contact state is output as an error if the answer contact input is OFF for the answer check time or longer during execution of the manipulation ON command on the motor.)
- Provided with a CT input high alarm output (The contact state is output as an error when the CT input from the CT is the setting value or higher.)
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to.
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the manual input is matched to the value of the answer input immediately prior to switching, in order to maintain actual site conditions.



Function block applications

Manipulation of motors on pumps, stirrer, conveyors, etc.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0 to 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Motor Manipulator	222	222	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	006		Answer check time (unit: s)	1 to 8s	3	–	R/W(S)	–	–	S/R	2
Contact input	012	S2	Auto input	0 to 1	0	Yes	–	–	R/W	S	1
Parameter	013	S3	Manual input	0 to 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact input	015	S5	Answer input 0: OFF, 1: ON	0 to 1	0	Yes	–	–	R/W	S	1
Contact output	021	U1	Manipulation output	0 to 1	0	Yes	–	–	R	S	1
	022	U2	Answer error (1: Error, 0: Normal) Note: When manipulation output (ITEM 021) is 1, an error is assumed if answer input (ITEM 015) stays 0 for the answer check time (ITEM 006) or longer. If answer input (ITEM 015) turns 1 after an error is assumed (1), the state is assumed to normal and this setting returns to 0.	0 to 1	0	Yes	–	–	R	S	1

CT input alarm

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input connection information	031		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	032	X1	CT input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	033		CT input high alarm setting	±320.00%	100.00	–	R/W(O)	W	–	S/R	2
	035		Hysteresis setting	0 to 320.00%	1.00	–	R/W(O)	W	–	S/R	2
Contact output	036	H	CT input high alarm output Note: Alarm output is functional even if site manipulation switch input (ITEM 085) is set to 1 (Site).	0 to 1	0	Yes	–	–	R	S	1
Contact input	085	S4	Site manipulation switch input*1 (1: Site, 0: Central) Note: When 1 (Site) is input, both manipulation output (ITEM 021) and motor answer output (ITEM 022) turn 0.	0 to 1	0	Yes	–	–	R/W	S	1
Contact input/ parameter	086	S1	Auto/Manual switching*2 0: Manual, 1: Auto	0 to 1	0	Yes	R/W(O)	–	R/W	S/R	1

*1: When the S4 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM 086) is forced to 0 (Man) and the value of ITEM 015 (answer input) is automatically transferred to ITEM 013 (manual input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching.

*2: When S1 auto/manual switching is switched from Auto to Manual, the value of ITEM 012 (auto input) is automatically transferred to ITEM 013 (manual input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching.

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	099		Label	0 to 15	0		R/W(O)	W	–	S/R	2

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

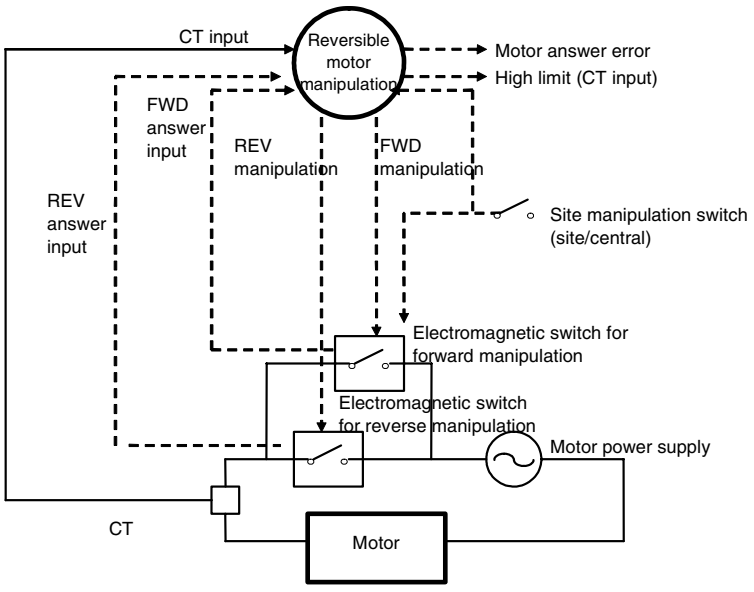
ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
006	Answer check time	ANS
012	Auto input	S2
013	Manual input	S3
015	Answer input	S5
021	Manipulation output	U1
022	Answer error	U2
032	CT input	X1
033	CT input high alarm setting	H_SP
035	Hysteresis setting	HS
036	CT input high alarm output	CTH
085	Site manipulation switch input	S4
086	Auto/Manual switching	S1
099	Label	OP_MK

Block Model	Block Name	Block Address
<223>	Reversible Motor Manipulator	001 to 500

Outline

Manipulates and monitors reversible motor operation.

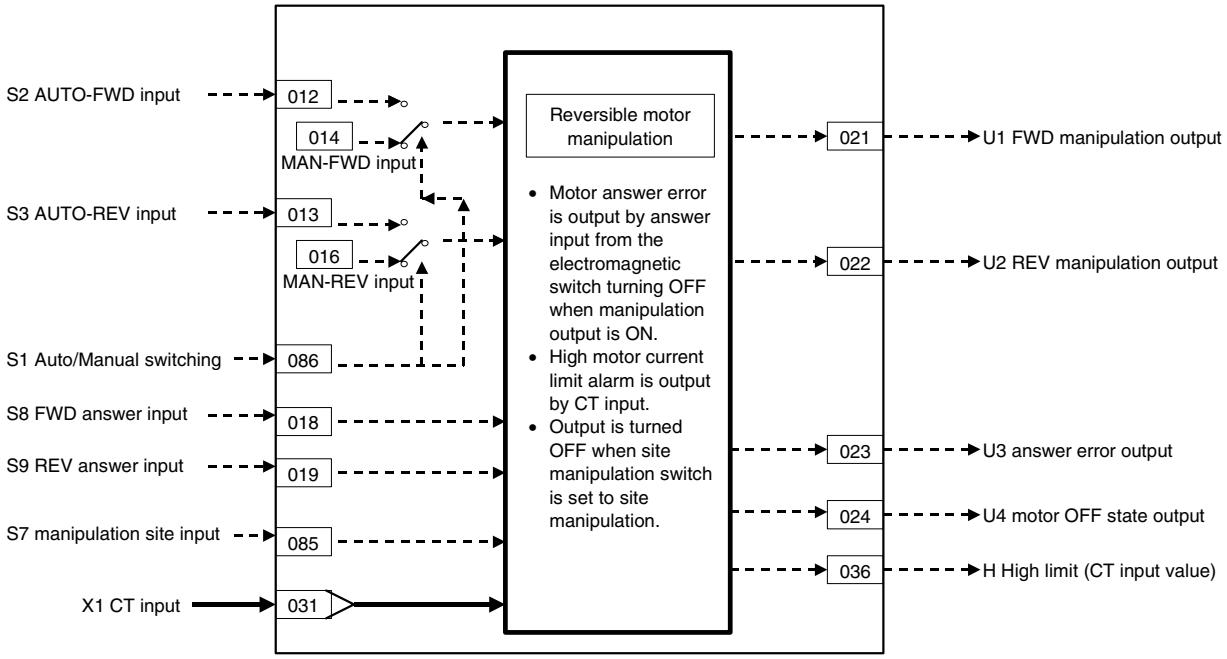
- Manipulation commands can be specified in both the forward and reverse directions for a reversible motor.
- Provided with a site manipulation switch input (This switch enables input of either motor manipulation from the site or from a central Loop Controller. Manipulation output is turned OFF when motor manipulation is input from the site.)
- Provided with an Auto/Manual switching function (When set to Auto in regular operation, the input is taken as the manipulation output, and when set to Manual, the internal specified state is taken as the manipulation output.)
- Provided with a motor answer error alarm (The contact state is output as an error if the FWD or REV answer contact input is OFF for the answer check time or longer during execution of the FWD or REV manipulation ON command on the motor.)
- Provided with a CT input high alarm output (The contact state is output as an error when the CT input from the CT is the setting value or higher.)
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to switching.
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the MAN-FWD and MAN-REV inputs are matched to the value FWD and REV answer inputs immediately prior to switching, in order to maintain actual site conditions.



Function block applications

Manipulation of motors on conveyors, for example, that are continuously run in the forward and reverse directions

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Reversible Motor Manipulator	223	223	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2
Parameter	006		Answer check time (unit: s)	1 to 8	3	–	R/W(S)	–	–	S/R	2
	007		OFF time during FWD/REV switching (unit: s) Note: When FWD input (Auto or Manual) and REV input (Auto or Manual) both turn 0 (motor operation is stopped) to switch the direction of motor rotation, 0 continues for both FWD manipulation output (ITEM 021) and REV manipulation output (ITEM 022) for the time set here. After the time set here has elapsed, REV manipulation output (ITEM 022) or FWD manipulation output (ITEM 021) is switched to 1.*1	1 to 8	1	–	R/W(S)	–	–	S/R	2
Contact input	012	S2	AUTO-FWD input	0, 1	0	Yes	–	–	R/W	S	1
	013	S3	AUTO-REV input	0, 1	0	Yes	–	–	R/W	S	1
Parameter	014	S4	MAN-FWD input	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
	016	S6	MAN-REV input	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1
Contact input	018	S8	FWD answer input 0: OFF 1: ON	0, 1	0	Yes	–	–	R/W	S	1
	019	S9	REV answer input 0: OFF 1: ON	0, 1	0	Yes	–	–	R/W	S	1
Contact output	021	U1	FWD manipulation output	0, 1	0	Yes	–	–	R	S	1
	022	U2	REV manipulation output	0, 1	0	Yes	–	–	R	S	1
	023	U3	Answer error (1: Error, 0: Normal) Note: An error is assumed when FWD manipulation output (ITEM 021) or REV manipulation output (ITEM 022) turns 1, and FWD answer input (ITEM 018) or REV answer input (ITEM 019) are 0 for answer check time (ITEM 006) or longer. If FWD answer input (ITEM 018) or REV answer input (ITEM 019) turns 1 after an error is assumed (1), the state is assumed to normal and this setting returns to 0.	0, 1	0	Yes	–	–	R	S	1
	024	U4	Motor OFF state output (1: OFF)	0, 1	0	Yes	–	–	R	S	1

CT input alarm

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input connection information	031		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	032	X1	CT input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	033		CT input high alarm setting	±320.00%	100.00	–	R/W(O)	W	–	S/R	2
	035		Hysteresis setting	0 to 320.00%	1.00	–	R/W(O)	W	–	S/R	2
Contact output	036	H	CT input high alarm output Note: Alarm output is functional even if site manipulation switch input (ITEM 085) is set to 1 (Site).	0, 1	0	Yes	–	–	R	S	1
Contact input	085	S7	Site manipulation switch input (1: Site, 1: Central) Note: When 1 (Site) is input, both FWD manipulation output (ITEM 021) and REV manipulation output (ITEM 022) turn 0.	0, 1	0	Yes	–	–	R/W	S	1
Contact input/ Parameter	086	S1	Auto/Manual switching 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

*1: When FWD input (Auto or Manual) and REV input (Auto or Manual) have both become 0 even if the direction of motor operation has not been switched, the 0 state is continued for both FWD manipulation output (ITEM 021) and REV manipulation output (ITEM 022) for the duration of the time set at this ITEM.
Both FWD manipulation output (ITEM 021) and REV manipulation output (ITEM 022) turn 0 for the OFF time during FWD/REV switching (ITEM 007) also when site manipulation switch input (ITEM 085) is switched from 1 (site) to 0 (central).

*2: When the S4 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM 086) is forced to 0 (Man), the value of ITEM 018 (forward answer input) is automatically transferred to ITEM 014 (manual-forward input), and the value of ITEM 019 (reverse answer input) is automatically transferred to ITEM 016 (manual-reverse input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching.

*3: When S1 auto/manual switching is switched from Auto to Manual, the value of ITEM 012 (auto-forward input) is automatically transferred to ITEM 014 (manual input) and the value of ITEM 013 (auto-reverse input) is automatically transferred to ITEM 016 (manual-reverse input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching.

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

List of tag ITEMs on CX-Process Monitor or SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
006	Answer check time (unit: s)	ANS
007	OFF time during FWD/REV switching	OFT
012	AUTO-FWD input	S2
013	AUTO-REV input	S3
014	MAN-FWD input	S4
016	MAN-REV input	S6
018	FWD answer input	S8
019	REV answer input	S9
021	FWD manipulation output	U1
022	REV manipulation output	U2
023	Answer error	U3
024	Motor OFF state output	U4
032	CT input	X1
033	CT input high alarm setting	H_SP
035	Hysteresis setting	HS
036	Hysteresis setting	CTH
085	CT input high alarm output	S7
086	Auto/Manual switching	S1
099	Label	OP_MK

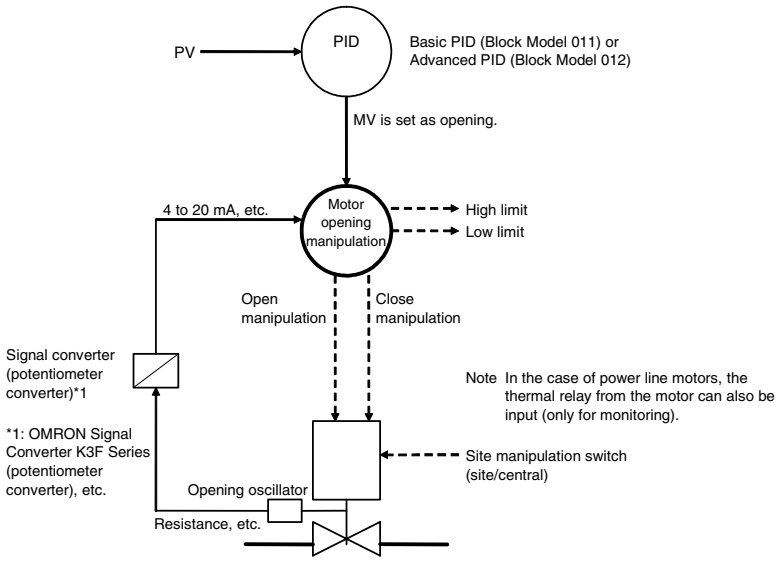
Block Model	Block Name	Block Address
<224>	Motor Opening Manipulator	001 to 500

Outline

This function block inputs a target opening to manipulate an open/close instruction input type electric position-proportional motor. Combining this function block with other Control blocks (e.g. PID block) enables position-proportional control of electric motors.

- The MV value from a Control block (e.g. PID block) is input as an analog signal, and this is taken to be the motor opening setting value. The motor is controlled so that the motor opening is this target opening.
- The open/close commands (stop) are instructed to the motor as contact outputs, and the feedback signal (current opening) from the motor is received as analog signals to control motor opening.
- Provided with an Auto/Manual switching function (When set to Auto in regular operation, the input is taken as the target opening, and when set to Manual, the internal specified state is taken as the target opening.)
- Provided with a restart control time function (This prevents damage to the motor caused by frequent forward/reverse operation.)
- Provided with an opening input high/low limit alarm function (The state of the contact is output as an error when the feedback signal input from the opening oscillator is at the alarm setting or higher or lower.)
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to switching
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the Manual input target opening setting is matched to the value of the Opening input immediately prior to switching, in order to maintain actual site conditions.

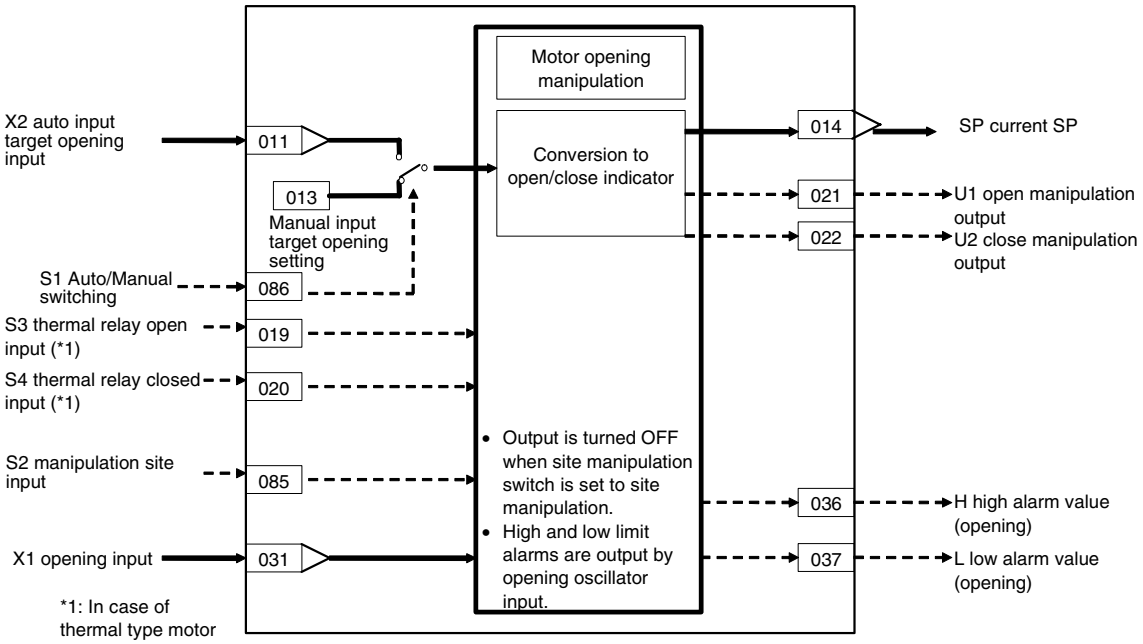
Function block



Function block application

Manipulation of an electric position-proportional motor

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	S/R	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	–	24
	002		Block Model: Motor Opening Manipulator	224	224	–	R/W(S)	–	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	–	–	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	–	R/W(S)	–	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	–	2

Target opening setting, open/close instruction output

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input connection information	011		X2 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	012	X2	Auto input target opening	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	013		Manual input target opening setting	±320.00%	0.00	Yes	R/W(O)	W	–	R	2
Analog output	014	SP	Current SP output	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	015	T1	Full-stroke time (unit: s) Note: Time required from fully closed to fully open.	0 to 999.9s	10.0	–	R/W(S)	–	–	S/R	2
	016	T2	Restart control time	0 to 999.9s	1.0	–	R/W(S)	–	–	S/R	2
Parameter	017		Dead-band	0 to 320.00%	1.00	–	R/W(S)	–	–	S/R	2
Contact input	019	S3	Open monitor switch thermal relay operation (1: ON) Note: Operation is mainly input when connected to thermal type motor. Operation is monitor only.	0, 1	0	Yes	–	–	R/W	S	1
	020	S4	Close monitor switch thermal relay operation (1: ON) Note: Operation is mainly input when connected to thermal type motor. Operation is monitor only.	0, 1	0	Yes	–	–	R/W	S	1
Contact output	021	U1	Open manipulation output	0, 1	0	Yes	–	–	R	S	1
	022	U2	Close manipulation output	0, 1	0	Yes	–	–	R	S	1

Opening feedback input

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Analog input connection information	031		X1 source designation BBB: Block address, III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	–	4
Analog input	032	X1	Opening input	±320.00%	0.00	Yes	r	–	–	S	2
Parameter	033		Opening input high limit alarm setting	±320.00%	100.00	–	R/W(O)	W	–	S/R	2
	034		Opening input low limit alarm setting	±320.00%	0.00	–	R/W(O)	W	–	S/R	2
	035		Hysteresis setting	0 to 320.00%	1.00	–	R/W(O)	W	–	S/R	2
Contact output	036	H	Opening input high limit alarm output	0, 1	0	Yes	–	–	R	S	1
	037	L	Opening input low limit alarm output	0, 1	0	Yes	–	–	R	S	1
Contact input	085	S2	Site manipulation switch input*1 (1: Site, 1: Central) Note: When 1 (Site) is input, open close manipulation output (ITEM 021) close manipulation output (ITEM 022) turn ON.	0, 1	0	Yes	–	–	R/W	S	1
Contact input/ parameter	086	S1	Auto/Manual switching*2 0: Manual, 1: Auto	0, 1	0	Yes	R/W(O)	–	R/W	S/R	1

*1: When the S2 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM 086) is forced to 0 (Man) and the value of ITEM 032 (opening input) is automatically transferred to ITEM 013 (Manual input target opening setting). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching.

*2: When S1 auto/manual switching is switched from Auto to Manual, the value of ITEM 012 (auto input) is automatically transferred to ITEM 013 (manual input target opening setting). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching.

Data for host display

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	099		Label	0 to 15	0	Yes	R/W(O)	W	–	S/R	2

Note: When both open manipulation output (ITEM 021) and close manipulation output (ITEM 022) both turn 0 for switching the direction of motor operation, the 0 state is continued for both open manipulation output (ITEM 021) and close manipulation output (ITEM 022) for the duration of the restart control time (ITEM 16). Close manipulation output (ITEM 022) and open manipulation output (ITEM 021) actually turn 1 after the set time has elapsed.
When both open manipulation output (ITEM 021) and close manipulation output (ITEM 022) turn 0 (motor operation is stopped) even if the direction of motor operation is not switched, the 0 state is continued for both open manipulation output (ITEM 021) and close manipulation output (ITEM 022) for the duration of the restart control time (ITEM 16).
Both open manipulation output (ITEM 021) and close manipulation output (ITEM 022) turn 0 for the duration of the restart control time (ITEM 16) also when site manipulation switch input (ITEM 085) is switched from 1 (site) to 0 (central).

Description of Operation

In the following description, the target deviation is "auto input target opening (manual input target opening setting) - opening input."
Opening input (ITEM 032) is compared with auto input target opening (ITEM 012) or manual input target opening setting (ITEM 013). If the opening deviation is greater than 0, open manipulation output (ITEM 021) is taken to be 1. If the opening deviation is smaller than 0, close manipulation output (ITEM 022) is taken to be 1.
Note, however, that when the opening deviation is smaller than the dead band (ITEM 017), both open manipulation output (ITEM 021) and close manipulation output (ITEM 022) are taken to be 0 to stop motor operation.
When the opening deviation is larger than the deadband (ITEM 017), operation will wait for the restart time (ITEM 016) and then a time corresponding to the opening deviation will be output.
The open/close time is calculated by multiplying the full-stroke time (ITEM 015) by opening deviation (1 when 100%).

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
012	Auto input target opening	X2
013	Manual input target opening setting	SP
014	Current SP output	SP
015	Full-stroke time.	T1
016	Restart control time	T2
017	Dead-band	DB
019	Open monitor switch thermal relay operation	S3
020	Close monitor switch thermal relay operation	S4
021	Open manipulation output	U1
022	Close manipulation output	U2
032	Opening input	X1
033	Opening input high limit alarm setting	H_SP
034	Opening input low limit alarm setting	L_SP
035	Hysteresis setting	HS
036	Opening input high limit alarm output	H
037	Opening input low limit alarm output	L
085	Site manipulation switch input	S2
086	Auto/Manual switching	S1
099	Label	OP_MK

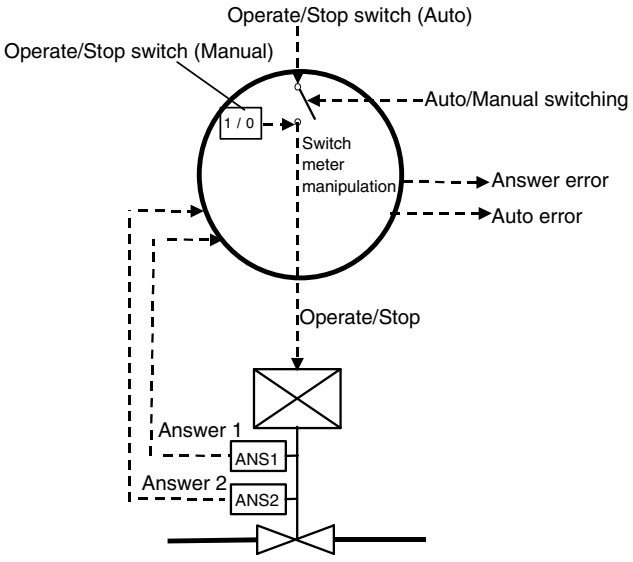
Block Model	Block Name	Block Address
<225>	Switch Instrument	001 to 500

Outline

This function block is supported only by Ver. 3.0 and later versions of the LCB01, LCB03, and LCB05.

This function block starts/stops multiple devices such as motors and pumps or controls/monitors the status of ON/OFF valves.

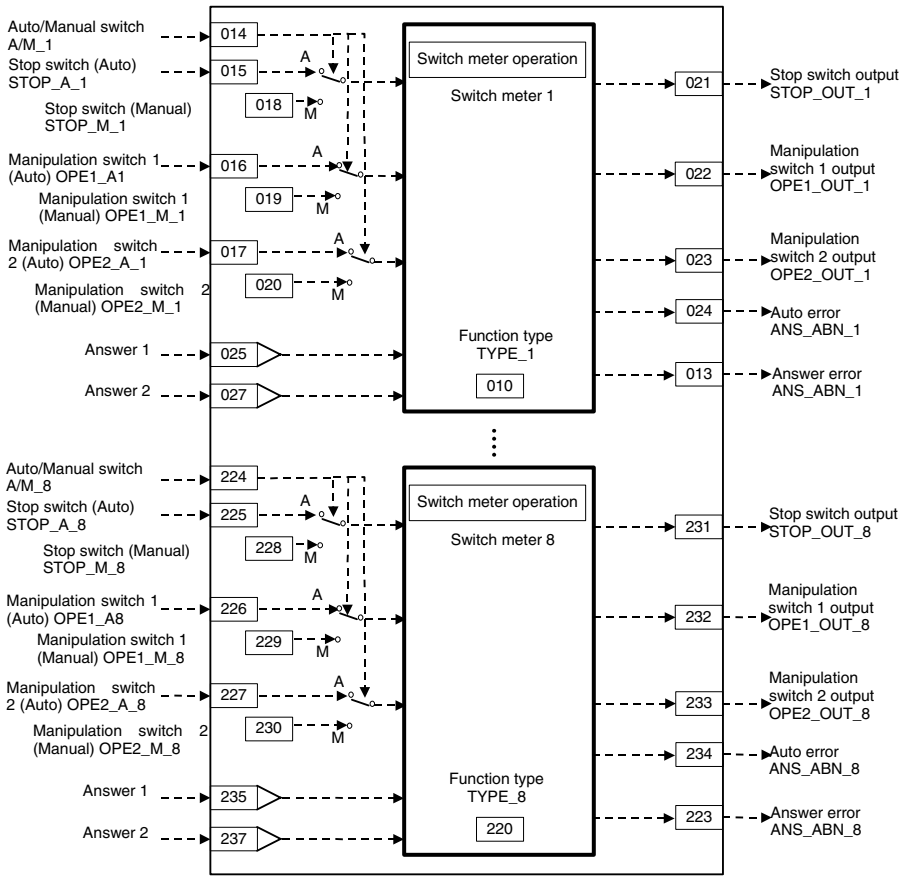
- Up to 8 Switch Instruments can be registered in this function block.
- The following 5 types of manipulation switch and answer signal combinations can be used.
  1. Type 1: 1 manipulation switch
  2. Type 2: 1 manipulation switch and 1 answer input
  3. Type 3: 1 manipulation switch and 2 answer inputs
  4. Type 4: 3 manipulation switches and 1 answer input
  5. Type 5: 3 manipulation switches and 2 answer inputs
- Provided with an answer check function.
- Provided with an Auto/Manual switching function.
  When set to Auto mode, the manipulation switch can be changed using the sequence control block.
  When set to Manual mode, the manipulation switch can be changed from the HMI interface.
- When switching to Manual mode, the function block inherits the Auto mode values of the stop switch, manipulation switch 1, and manipulation switch 2.



Function block applications

- Starting and stopping multiple devices such as motors and pumps
- Monitoring and manipulating the open/closed status of multiple ON/OFF valves such as air pressure valves and solenoid valves

Block diagram



Note 1: In Auto mode, set the sequence control block so that only one of the following switches is ON: Stop switch (Auto), Manipulation switch 1 (Auto), or Manipulation switch 2 (Auto). For example, if Manipulation switch 1 (Auto) is ON, execute Stop switch (Auto) = OFF, Manipulation switch 1 (Auto) = ON, and Manipulation switch 2 (Auto) = OFF instructions in the same step.

Note 2: In Auto mode, it is possible to switch between Manipulation switch 1 (Auto) ON and Manipulation switch 2 (Auto) ON. To prevent switching, use the sequence control block to turn ON the Stop switch output when Manipulation switch 1 (Auto) or Manipulation switch 2 (Auto) is ON.

Note 3: When there has been a Cold Start, turn OFF the Auto and Manual Stop switches, Manipulation switch 1, and Manipulation switch 2, initialize the Auto/Manual switch to Manual mode, and turn ON the Stop switch (Manual) when the Switch Instrument function is executed.

ITEM List

n = 010 + (Switch Instrument number – 1) x 30
(Switch Instrument number range: 1 to 8)

ITEM TYPE	ITEM	Symbol	Data Description	Usage in each function type (---: Not used)					
				0 (not used.)	1	2	3	4	5
Parameter	n	TYPE n	Function type (1 to 5)	Used	Used	Used	Used	Used	Used
	n+1	TM1_n	Answer 1 check time (s)	---	---	Used	Used	Used	Used
	n+2	TM2_n	Answer 2 check time (s)	---	---	---	Used	---	Used
Contact output	n+3	ANSABNn	Answer error	---	---	Used	Used	Used	Used
Contact input	n+4	A/Mn	Auto/Manual switch 0: Manual 1: Auto	---	Used	Used	Used	Used	Used
	n+5	STOP_An	Stop switch (Auto) 0: RUN; 1: STOP	---	---	---	---	Used	Used
	n+6	OPE1_An	Manipulation switch 1 (Auto)	---	Used	Used	Used	Used	Used
	n+7	OPE2 _An	Manipulation switch 2 (Auto)	---	---	---	---	Used	Used
	n+8	STOP_Mn	Stop switch (Manual) 0: RUN; 1: STOP	---	---	---	---	Used	Used
	n+9	OPE1_Mn	Manipulation switch 1 (Manual)	---	Used	Used	Used	Used	Used
	n+10	OPE2 _Mn	Manipulation switch 2 (Manual)	---	---	---	---	Used	Used
Contact output	n+11	STOP_On	Stop switch output 0: RUN; 1: STOP	---	---	---	---	Used	Used
	n+12	OPE1_On	Manipulation switch 1 output	---	Used	Used	Used	Used	Used
	n+13	OPE2_On	Manipulation switch 2 output	---	---	---	---	Used	Used
	n+14	AUTABNn	Auto error	---	---	---	---	Used	Used
Contact input information	n+15	ANS1ADn	Answer 1 source designation BBB: Block address III: ITEM Number	---	---	Used	Used	Used	Used
Contact output	n+16	ANS1_n	Answer 1 indication	---	---	Used	Used	Used	Used
Contact input information	n+17	ANS2ADn	Answer 2 source designation BBB: Block address III: ITEM Number	---	---	---	Used	---	Used
Contact output	n+18	ANS2_n	Answer 2 indication	---	---	---	Used	---	Used

Note: Loop Controllers do not support items marked as unused (---) in the table.

Operation of Meter Type 1

Overview

The Auto/Manual switch switches between Manipulation switch 1 (Auto) and Manipulation switch 1 (Manual) and that value is output to the Manipulation switch 1 output.

Applications

Applications requiring ON/OFF valve operation without an answer signal

Manipulation switch examples

Manipulation switch 1 output: 0 for Closed and 1 for Open

Operation of Meter Type 2

Overview

The Auto/Manual switch switches between Manipulation switch 1 (Auto) and Manipulation switch 1 (Manual) and that value is output to the Manipulation switch 1 output.

After the Manipulation switch 1 output goes from OFF to ON or ON to OFF, the Answer error output will go ON if the Answer 1 output does not match the value of the Manipulation switch 1 output within the Answer 1 check time.

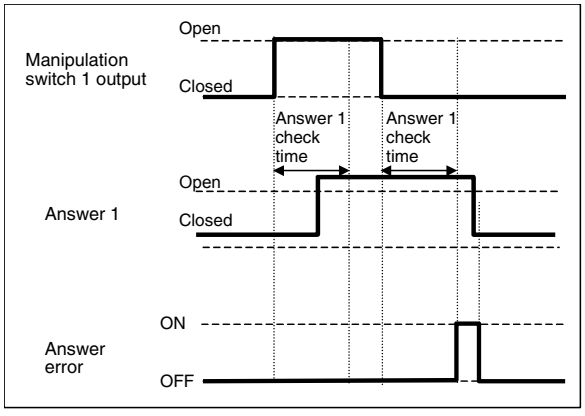
Applications

Applications requiring ON/OFF valve operation with one answer signal

Manipulation switch examples

Manipulation switch 1 output: 0 for Closed and 1 for Open

Answer 1 output: 0 for Closed and 1 for Open



Operation of Meter Type 3

Overview

The Auto/Manual switch switches between Manipulation switch 1 (Auto) and Manipulation switch 1 (Manual) and that value is output to the Manipulation switch 1 output.

After the Manipulation switch 1 output goes from OFF to ON, the Answer error output will go ON if the Answer 1 output does not go ON within the Answer 1 check time.

After the Manipulation switch 1 output goes from ON to OFF, the Answer error output will go ON if the Answer 2 output does not go ON within the Answer 2 check time.

Applications

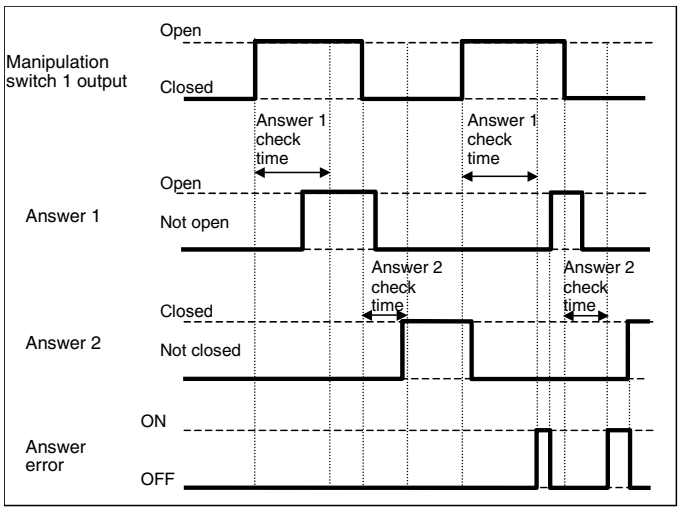
Applications requiring ON/OFF valve operation with two answer signals

Manipulation switch examples

Manipulation switch 1 output: 0 for Closed and 1 for Open

Answer 1 output: 0 for Not open and 1 for Open

Answer 2 output: 0 for Not closed and 1 for Closed



Operation of Meter Type 4

Overview

The Auto/Manual switch switches between the Auto and Manual modes of the Stop switches, Manipulation switch 1 switches, and Manipulation switch 2 switches. Those values are output to the Stop switch, Manipulation switch 1, and Manipulation switch 2 outputs.

After the Manipulation switch 1 output goes from OFF to ON or ON to OFF, the Answer error output will go ON if the Answer 1 output does not match the value of the Manipulation switch 1 output within the Answer 1 check time.

After the Manipulation switch 2 output goes from OFF to ON or ON to OFF, the Answer error output will go ON if the Answer 1 output does not match the value of the Manipulation switch 2 output within the Answer 1 check time.

Applications

Applications requiring motor operation with one answer signal

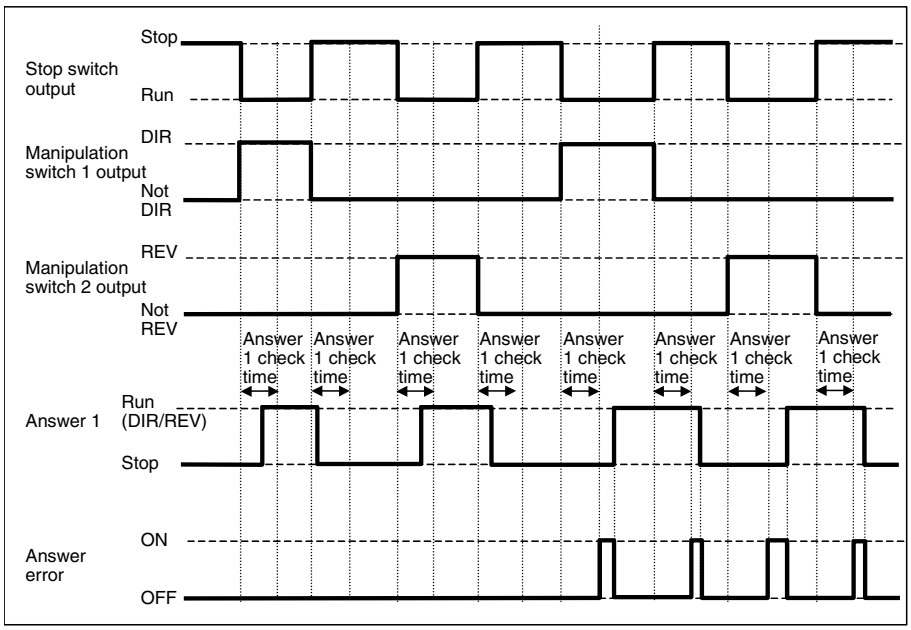
Manipulation switch examples

Stop switch output: 0 for Run and 1 for Stop

Manipulation switch 1 output: 0 for Not DIR and 1 for DIR

Manipulation switch 2 output: 0 for Not REV and 1 for REV

Answer 1 output: 0 for Open and 1 for Closed



Details of Operation

- Manual Mode Operation
  - Only one of the following outputs can be ON at a time: Stop switch output, Manipulation switch 1 output, or Manipulation switch 2 output.
  - The Stop switch output will be turned ON if the Stop switch (Manual), Manipulation switch 1 (Manual), and Manipulation switch 2 (Manual) are all ON or all OFF.
  - Turn ON the Stop switch temporarily when switching between having Manipulation switch 1 (Manual) ON and having Manipulation switch 2 (Manual) ON.
- Auto Mode Operation
  The Stop switch output will be turned ON if two or more of the following switches are ON or all three are OFF: Stop switch (Auto), Manipulation switch 1 (Auto), and Manipulation switch 2 (Auto).

Operation of Meter Type 5

Overview

The Auto/Manual switch switches between the Auto and Manual modes of the Stop switches, Manipulation switch 1 switches, and Manipulation switch 2 switches. Those values are output to the Stop switch, Manipulation switch 1, and Manipulation switch 2 outputs.

After the Manipulation switch 1 output goes from OFF to ON or ON to OFF, the Answer error output will go ON if the Answer 1 output does not match the value of the Manipulation switch 1 output within the Answer 1 check time.

After the Manipulation switch 2 output goes from OFF to ON or ON to OFF, the Answer error output will go ON if the Answer 1 output does not match the value of the Manipulation switch 2 output within the Answer 1 check time.

Applications

Applications requiring motor operation with two answer signals

Manipulation switch examples

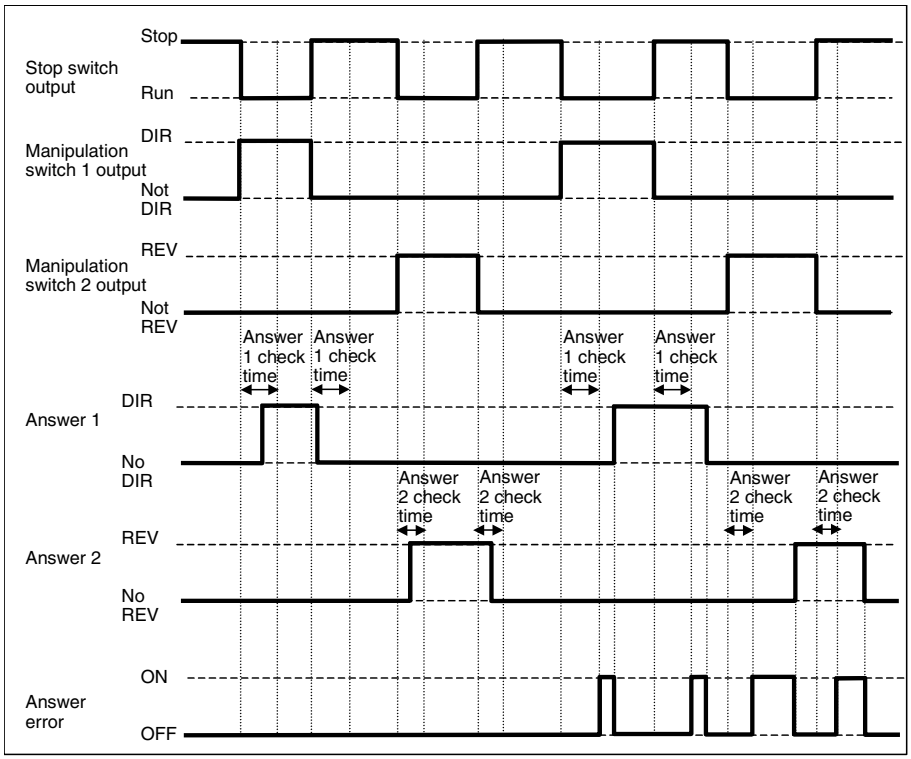
Stop switch output: 0 for Run and 1 for Stop

Manipulation switch 1 output: 0 for Not DIR and 1 for DIR

Manipulation switch 2 output: 0 for Not REV and 1 for REV

Answer 1 output: 0 for No DIR and 1 for DIR

Answer 2 output: 0 for No REV and 1 for REV



Details of Operation

- Manual Mode Operation
  - Only one of the following outputs can be ON at a time: Stop switch output, Manipulation switch 1 output, or Manipulation switch 2 output.
  - The Stop switch output will be turned ON if the Stop switch (Manual), Manipulation switch 1 (Manual), and Manipulation switch 2 (Manual) are all ON or all OFF.
  - Turn ON the Stop switch temporarily when switching between having

Manipulation switch 1 (Manual) ON and having Manipulation switch 2 (Manual) ON.

- Auto Mode Operation

  The Stop switch output will be turned ON if two or more of the following switches are ON or all three are OFF: Stop switch (Auto), Manipulation switch 1 (Auto), and Manipulation switch 2 (Auto).

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0 or 1	0	Yes	---	---	---	S/R	1
Parameter	001		Comment	23 charac-ters	Block name	---	R/W(S)	---	---	---	24
	002		Block Model: Switch Instrument	225	225	---	R/W(S)	---	---	---	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	---	---	S	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2	0 to 5	0	---	R/W(S)	---	---	---	2
	005	SCAN_NO	Execution order	1 to 2,000	2,000	---	R/W(S)	---	---	---	2

ITEM list for 1st Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	010	TYPE1	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	011	TM1_1	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	012	TM2_1	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	013	ANSABN1	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	014	A/M1	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	015	STOP_A1	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	016	OPE1_A1	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	017	OPE2_A1	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	018	STOP_M1	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1
	019	OPE1_M1	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	020	OPE2_M1	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	021	STOP_O1	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	022	OPE1_O1	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	023	OPE2_O1	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	024	AUTABN1	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	025	ANS1AD1	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	026	ANS1_1	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	027	ANS2AD1	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	028	ANS2_1	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

ITEM list for 2nd Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	040	TYPE2	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	041	TM1_2	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	042	TM2_2	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	043	ANSABN2	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	044	A/M2	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	045	STOP_A2	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	046	OPE1_A2	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	047	OPE2_A2	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	048	STOP_M2	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	049	OPE1_M2	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1
	050	OPE2_M2	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	051	STOP_O2	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	052	OPE1_O2	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	053	OPE2_O2	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	054	AUTABN2	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	055	ANS1AD2	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	056	ANS1_2	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	057	ANS2AD2	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	058	ANS2_2	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

ITEM list for 3rd Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	070	TYPE3	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	071	TM1_3	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	072	TM2_3	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	073	ANSABN3	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	074	A/M3	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	075	STOP_A3	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	076	OPE1_A3	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	077	OPE2_A3	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	078	STOP_M3	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1
	079	OPE1_M3	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1
	080	OPE2_M3	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	081	STOP_O3	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	082	OPE1_O3	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	083	OPE2_O3	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	084	AUTABN3	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	085	ANS1AD3	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	086	ANS1_3	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	087	ANS2AD3	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	088	ANS2_3	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

ITEM list for 4th Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	100	TYPE4	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	101	TM1_4	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	102	TM2_4	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	103	ANSABN4	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	104	A/M4	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	105	STOP_A4	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	106	OPE1_A4	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	107	OPE2_A4	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	108	STOP_M4	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1
	109	OPE1_M4	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1
	110	OPE2_M4	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	111	STOP_O4	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	112	OPE1_O4	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	113	OPE2_O4	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	114	AUTABN4	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	115	ANS1AD4	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	116	ANS1_4	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	117	ANS2AD4	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	118	ANS2_4	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

ITEM list for 5th Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	130	TYPE5	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	131	TM1_5	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	132	TM2_5	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	133	ANSABN5	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	134	A/M5	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	135	STOP_A5	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
	136	OPE1_A5	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	137	OPE2_A5	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	138	STOP_M5	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1
	139	OPE1_M5	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1
	140	OPE2_M5	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	141	STOP_O5	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	142	OPE1_O5	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	143	OPE2_O5	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	144	AUTABN5	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	145	ANS1AD5	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	146	ANS1_5	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	147	ANS2AD5	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	148	ANS2_5	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

ITEM list for 6th Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	160	TYPE6	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	161	TM1_6	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	162	TM2_6	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	163	ANSABN6	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	164	A/M6	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	165	STOP_A6	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	166	OPE1_A6	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	167	OPE2_A6	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	168	STOP_M6	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1
	169	OPE1_M6	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1
	170	OPE2_M6	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	171	STOP_O6	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	172	OPE1_O6	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	173	OPE2_O6	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	174	AUTABN6	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	175	ANS1AD6	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	176	ANS1_6	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	177	ANS2AD6	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	178	ANS2_6	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

ITEM list for 7th Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	190	TYPE7	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	191	TM1_7	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	192	TM2_7	Answer 2 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	193	ANSABN7	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	194	A/M7	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	195	STOP_A7	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	196	OPE1_A7	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	197	OPE2_A7	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	198	STOP_M7	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1
	199	OPE1_M7	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1
	200	OPE2_M7	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	201	STOP_O7	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	202	OPE1_O7	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	203	OPE2_O7	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	204	AUTABN7	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	205	ANS1AD7	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	206	ANS1_7	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	207	ANS2AD7	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	208	ANS2_7	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

ITEM list for 8th Switch Instrument

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	According to HMI I/F	
Parameter	220	TYPE8	Meter type 0: Not used.	0 or 1 to 5	0	---	R/W(S)	---	---	S	2
	221	TM1_8	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
	222	TM2_8	Answer 1 check time (s)	0 to 32,000	5	---	R/W(S)	---	---	---	2
Contact output	223	ANSABN8	Answer error	0 or 1	0	Yes	---	---	R	S	1
Contact input	224	A/M8	Auto/Manual switch 0: Manual; 1: Auto	0 or 1	0	Yes	R/W(O)	---	R/W	S/R	1
	225	STOP_A8	Stop switch (Auto) 0: RUN; 1: STOP	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	226	OPE1_A8	Manipulation switch 1 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	227	OPE2_A8	Manipulation switch 2 (Auto)	0 or 1	0	Yes	R/W(O)	---	R/W	---	1
	228	STOP_M8	Stop switch (Manual) 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	---	R	1
	229	OPE1_M8	Manipulation switch 1 (Manual)	0 or 1	0	Yes	---	---	---	R	1
	230	OPE2_M8	Manipulation switch 2 (Manual)	0 or 1	0	Yes	---	---	---	R	1
Contact output	231	STOP_O8	Stop switch output 0: RUN; 1: STOP	0 or 1	0	Yes	---	---	R	S	1
	232	OPE1_O8	Manipulation switch 1 output	0 or 1	0	Yes	---	---	R	S	1
	233	OPE2_O8	Manipulation switch 2 output	0 or 1	0	Yes	---	---	R	S	1
	234	AUTABN8	Auto error	0 or 1	0	Yes	---	---	R	S	1
Contact input information	235	ANS1AD8	Answer 1 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	236	ANS1_8	Answer 1 indication	0 or 1	0	Yes	---	---	R	S	1
Contact input information	237	ANS2AD8	Answer 2 source designation BBB: Block address, III: ITEM Number	BBB or III	000000	---	R/W(S)	---	---	---	4
Contact output	238	ANS2_8	Answer 2 indication	0 or 1	0	Yes	---	---	R	S	1

Execution Errors

Error Code 1: Source or destination designation not defined

The source designation's block address or ITEM number does not exist.

Note: If there was an execution error for one of the eight available Switch Instruments, processing will not be performed for the following Switch Instruments. For example, if an execution error occurred for Switch Instrument 2, Switch Instrument 3 and higher Switch Instruments would not be executed.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using the HMI function. All tag ITEMs are fixed and cannot be changed.

ITEM	Data Name	CSV Tags in SCADA Software
		Tag ITEM (fixed)
000	Stop block operation command	MT_ST
003	Execution error display	ERR
010	Meter type	TYPE_1
013	Answer error	ANS_ABN_1
014	Auto/Manual switch	A/M_1
018	Stop switch (Manual)	STOP_M_1
019	Manipulation switch 1 (Manual)	OPE1_M_1
020	Manipulation switch 1 (Manual)	OPE2_M_1
021	Stop switch output	STOP_OUT_1
022	Manipulation switch 1 output	OPE1_ OUT _1
023	Manipulation switch 2 output	OPE2_ OUT _1
024	Auto error	AUT_ABN_1
026	Answer 1 indication	ANS1_1
028	Answer 2 indication	ANS2_1
040	Meter type	TYPE_2
043	Answer error	ANS_ABN_2
044	Auto/Manual switch	A/M_2
048	Stop switch (Manual)	STOP_M_2
049	Manipulation switch 1 (Manual)	OPE1_M_2
050	Manipulation switch 1 (Manual)	OPE2_M_2
051	Stop switch output	STOP_OUT_2
052	Manipulation switch 1 output	OPE1_ OUT _2
053	Manipulation switch 2 output	OPE2_ OUT _2
054	Auto error	AUT_ABN_2
056	Answer 1 indication	ANS1_2
058	Answer 2 indication	ANS2_2
070	Meter type	TYPE_3
073	Answer error	ANS_ABN_3
074	Auto/Manual switch	A/M_3
078	Stop switch (Manual)	STOP_M_3
079	Manipulation switch 1 (Manual)	OPE1_M_3
080	Manipulation switch 1 (Manual)	OPE2_M_3
081	Stop switch output	STOP_OUT_3
082	Manipulation switch 1 output	OPE1_ OUT _3
083	Manipulation switch 2 output	OPE2_ OUT _3
084	Auto error	AUT_ABN_3
086	Answer 1 indication	ANS1_3
088	Answer 2 indication	ANS2_3
100	Meter type	TYPE_4
103	Answer error	ANS_ABN_4
104	Auto/Manual switch	A/M_4
108	Stop switch (Manual)	STOP_M_4
109	Manipulation switch 1 (Manual)	OPE1_M_4
110	Manipulation switch 1 (Manual)	OPE2_M_4
111	Stop switch output	STOP_OUT_4
112	Manipulation switch 1 output	OPE1_ OUT _4
113	Manipulation switch 2 output	OPE2_ OUT _4
114	Auto error	AUT_ABN_4

116	Answer 1 indication	ANS1_4
118	Answer 2 indication	ANS2_4
130	Meter type	TYPE_5
133	Answer error	ANS_ABN_5
134	Auto/Manual switch	A/M_5
138	Stop switch (Manual)	STOP_M_5
139	Manipulation switch 1 (Manual)	OPE1_M_5
140	Manipulation switch 1 (Manual)	OPE2_M_5
141	Stop switch output	STOP_OUT_5
142	Manipulation switch 1 output	OPE1_ OUT _5
143	Manipulation switch 2 output	OPE2_ OUT _5
144	Auto error	AUT_ABN_5
146	Answer 1 indication	ANS1_5
148	Answer 2 indication	ANS2_5
160	Meter type	TYPE_6
163	Answer error	ANS_ABN_6
164	Auto/Manual switch	A/M_6
168	Stop switch (Manual)	STOP_M_6
169	Manipulation switch 1 (Manual)	OPE1_M_6
170	Manipulation switch 1 (Manual)	OPE2_M_6
171	Stop switch output	STOP_OUT_6
172	Manipulation switch 1 output	OPE1_ OUT _6
173	Manipulation switch 2 output	OPE2_ OUT _6
174	Auto error	AUT_ABN_6
176	Answer 1 indication	ANS1_6
178	Answer 2 indication	ANS2_6
190	Meter type	TYPE_7
193	Answer error	ANS_ABN_7
194	Auto/Manual switch	A/M_7
198	Stop switch (Manual)	STOP_M_7
199	Manipulation switch 1 (Manual)	OPE1_M_7
200	Manipulation switch 1 (Manual)	OPE2_M_7
201	Stop switch output	STOP_OUT_7
202	Manipulation switch 1 output	OPE1_ OUT _7
203	Manipulation switch 2 output	OPE2_ OUT _7
204	Auto error	AUT_ABN_7
206	Answer 1 indication	ANS1_7
208	Answer 2 indication	ANS2_7
220	Meter type	TYPE_8
223	Answer error	ANS_ABN_8
224	Auto/Manual switch	A/M_8
228	Stop switch (Manual)	STOP_M_8
229	Manipulation switch 1 (Manual)	OPE1_M_8
230	Manipulation switch 1 (Manual)	OPE2_M_8
231	Stop switch output	STOP_OUT_8
232	Manipulation switch 1 output	OPE1_ OUT _8
233	Manipulation switch 2 output	OPE2_ OUT _8
234	Auto error	AUT_ABN_8
236	Answer 1 indication	ANS1_8
238	Answer 2 indication	ANS2_8

Block Model	Block Name	Block Address
<301>	Step Ladder Program	701 to 900

Outline

This function block is configured in the form of a ladder diagram comprising a logic sequence and step sequence. This function block differs from the Contact Distributor block (Block Model 201) in that not only are contacts connected but also ladder sequence operations can be executed in between.

- Each Loop Controller has enough program space to hold a total of 4,000 commands. These commands can be divided among up to 200 independent Step Ladder Program blocks in most Loop Controllers, or up to 20 independent Step Ladder Program blocks in the LCB01 or CJ1W-CPU42P. A logic sequence and step sequence co-exist within each single Step Ladder program block.
- Up to 100 commands can be programmed to a single Step Ladder Program block.

- The logic sequence is executed at each operation cycle. For this reason, this sequence is suited to control of devices that must be monitored at all times. The logic sequence is executed at all times when block startup mode (ITEM 006) is set to 0. The sequence is also executed for the duration S1 run/stop command is 1 (ON) when block setup mode is set to 1 or according to the BLOCK SET command in other Step Ladder Program blocks.
- A step sequence is a scheme where only one of a number of programmed STEPs is executed, and STEPs are assigned to processes of devices to be operated successively. Step sequences can be programmed with few commands that are executed at each scan cycle, which facilitates locating and remedying errors during debugging.

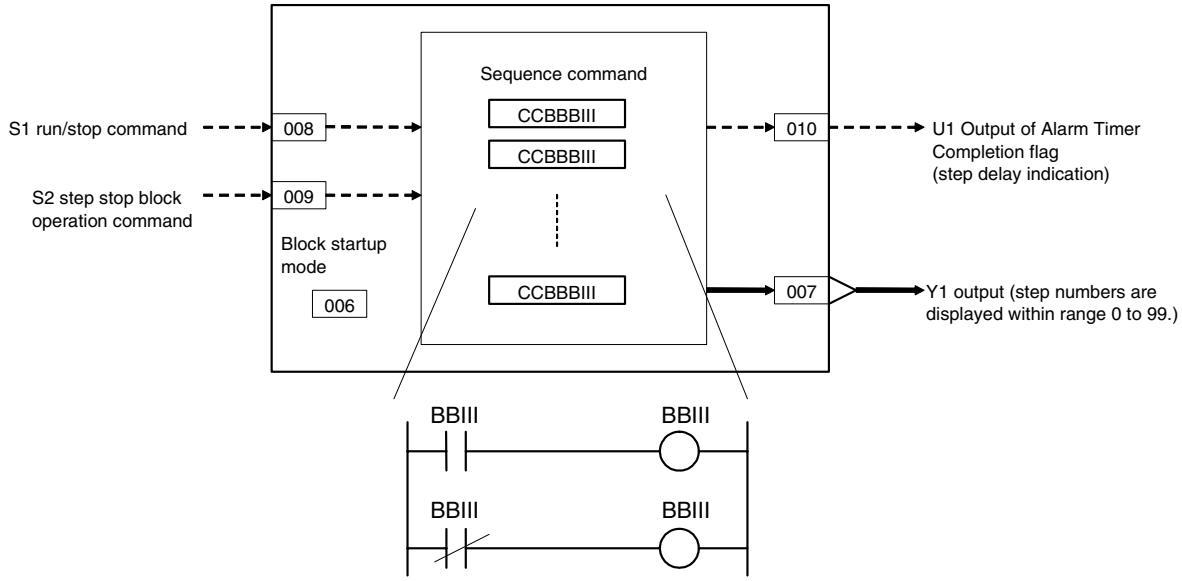
- ITEM types that can be specified as the operands of sequence commands are contact outputs or contact inputs in the case of input type instructions such as LOAD and contact inputs only in the case of output type instructions such as OUT. For details, refer to ITEM type or R/W Mode "According to Step Ladder Program" in function block ITEM lists.

ITEM TYPE		Settable Methods			Data Length (bytes)
		According to CX-Process Monitor	According to ITEM Setting block	According to Step Ladder Program	
Contact input		—	—	R/W	1

Note 1: Only "contact input" or "contact output" ITEMs can be specified by sequence commands such as LOAD and OUT. Other ITEM types cannot be specified.

Note 2: Also use "contact input" ITEMs in Field Terminal DI Terminal blocks or "contact output" ITEMs in Field Terminal DO Terminal blocks when the Step Ladder Program block is used to input and output signals at the field terminal's external contacts. External contacts cannot be input or output directly from the Step Ladder Program block.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: Step Ladder Program	301	301	–	R/W(S)	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	2
Parameter	006		Block startup mode (0: Start at all times, 1: Start by S1)	0 to 1	0	–	R/W(S)	–	–	2
Analog output	007	Y1	Output (step No.)	0 to 99	0	Yes	r	–	–	2
Contact input	008	S1	Run/stop command	0, 1	0	Yes	R/W(O)	–	R/W	1
	009	S2	Cancel "go to next step" switch	0, 1	0	Yes	R/W(O)	–	R/W	1
Contact output	010	U1	Output of Alarm Timer Completion flag	0, 1	0	Yes	–	–	R	1

ITEM lists for Timer (TIM) commands

Timer Completion Flags

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	User Link Table	
Contact output	040		Timer Completion Flag (for Timer 1)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	041		Timer Completion Flag (for Timer 2)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	042		Timer Completion Flag (for Timer 3)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	043		Timer Completion Flag (for Timer 4)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	044		Timer Completion Flag (for Timer 5)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	045		Timer Completion Flag (for Timer 6)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	046		Timer Completion Flag (for Timer 7)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	047		Timer Completion Flag (for Timer 8)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	048		Timer Completion Flag (for Timer 9)	0 or 1 (time up)	0	Yes	R	---	R	R	1
	049		Timer Completion Flag (for Timer 10)	0 or 1 (time up)	0	Yes	R	---	R	R	1

Timer Run Commands

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool (See note.)	According to ITEM Setting block	According to Sequential Control Block	User Link Table	
Contact input	080		Timer Run Command (for timer 1)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	081		Timer Run Command (for timer 2)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	082		Timer Run Command (for timer 3)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	083		Timer Run Command (for timer 4)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	084		Timer Run Command (for timer 5)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	085		Timer Run Command (for timer 6)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	086		Timer Run Command (for timer 7)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	087		Timer Run Command (for timer 8)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	088		Timer Run Command (for timer 9)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1
	089		Timer Run Command (for timer 10)	0 or 1 (Start timer)	0	Yes	R	W	R/W	R	1

Note: Timer Run Commands can be turned OFF with a CX-Process Tool operation.

Timer PVs

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	User Link Table	
Analog Output	120	---	Timer PV (s) for Timer 1	0 to 32,000	0	Yes	R	---	---	R	2
	121	---	Timer PV (s) for Timer 2	0 to 32,000	0	Yes	R	---	---	R	2
	122	---	Timer PV (s) for Timer 3	0 to 32,000	0	Yes	R	---	---	R	2
	123	---	Timer PV (s) for Timer 4	0 to 32,000	0	Yes	R	---	---	R	2
	124	---	Timer PV (s) for Timer 5	0 to 32,000	0	Yes	R	---	---	R	2
	125	---	Timer PV (s) for Timer 6	0 to 32,000	0	Yes	R	---	---	R	2
	126	---	Timer PV (s) for Timer 7	0 to 32,000	0	Yes	R	---	---	R	2
	127	---	Timer PV (s) for Timer 8	0 to 32,000	0	Yes	R	---	---	R	2
	128	---	Timer PV (s) for Timer 9	0 to 32,000	0	Yes	R	---	---	R	2
	129	---	Timer PV (s) for Timer 10	0 to 32,000	0	Yes	R	---	---	R	2

Timer SVs

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data				Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	User Link Table	
Parameter	160	---	Timer SV (s) for Timer 1	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	161	---	Timer SV (s) for Timer 2	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	162	---	Timer SV (s) for Timer 3	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	163	---	Timer SV (s) for Timer 4	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	164	---	Timer SV (s) for Timer 5	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	165	---	Timer SV (s) for Timer 6	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	166	---	Timer SV (s) for Timer 7	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	167	---	Timer SV (s) for Timer 8	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	168	---	Timer SV (s) for Timer 9	0 to 32,000	0	---	R/W	R/W	---	R/W	2
	169	---	Timer SV (s) for Timer 10	0 to 32,000	0	---	R/W	R/W	---	R/W	2

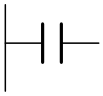
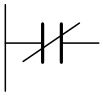
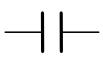
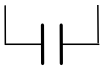
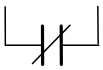
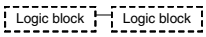
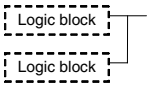
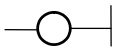
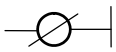
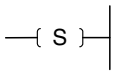
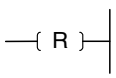
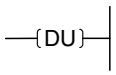
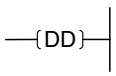
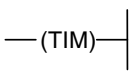
Disabling conversion between ladder diagrams and mnemonic programs

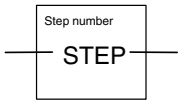
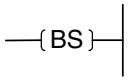
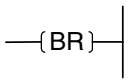
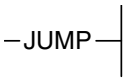
ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	200		Mnemonic flag *1 0: Conversion to ladder diagrams (reverse assembly) and from ladder diagrams (assembly) enabled. 1: Conversion to and from ladder diagrams disabled.	0, 1	0	–	R/W (S)	–	–	1

*1: Set ITEM 200 to 1 when inputting step ladder programs in mnemonic from the CX-Process Tool to prevent conversion of programs between ladder diagrams and mnemonic programs.

Note: Sequence commands (ITEM 011 to ITEM 110) cannot be read and written with FINS commands addressed to the Loop Controller (command codes: 0240, 0241, 0242, and 0243).

List of basic commands

Name	Command	Ladder Symbol	Description (command format, CC: command, BBB: block address, III: ITEM number)
Input operation			
LOAD	LOAD		Indicates a logical start of the logic block, creates an ON/OFF execution condition based on the ON/OFF status of the contact, and connects to the next stage.
LOAD NOT	LN		Indicates a logical start of the logic block, creates an ON/OFF execution condition based on the reverse of the ON/OFF status of the contact, and connects to the next stage.
AND	AD		Takes a logical AND of the status of the contact and the current execution condition.
AND NOT	AN		Reverses the status of the contact and takes a logical AND with the current execution condition.
OR	OR		Takes a logical OR of the status of the contact and the current execution condition.
OR NOT	RN		Reverses the status of the contact and takes a logical OR with the current execution condition.
AND LOAD	AL		Takes a logical AND between logic blocks.
OR LOAD	OL		Takes a logical OR between logic blocks.
Output operation			
OUT	OT		Outputs the result (execution condition) of logical processing: 0 (OFF) at condition 0 (OFF), and 1 (ON) at condition 1 (ON).
OUT NOT	TN		Outputs the result (execution condition) of logical processing: 1 (ON) at condition 0 (OFF), and 0 (OFF) at condition 1 (ON).
SET	ST		SET turns the operand bit 1 (ON) when the execution condition is 1 (ON), and does not affect the status of the operand bit when the execution condition is 0 (OFF). Use RESET to turn OFF a bit that has been turned ON with SET.
RESET	RS		RESET turns the operand bit 0 (OFF) when the execution condition is 1 (ON), and does not affect the status of the operand bit when the execution condition is 0 (OFF). Use SET to turn OFF a bit that has been turned ON with RESET.
Output operation			
DIFU	DU		Outputs 1 (ON) for one operation cycle only when the execution condition goes to 1 (ON) from 0 (OFF).
DIFD	DD		Outputs 1 (ON) for one operation cycle only when the execution condition goes to 0 (OFF) from 1 (ON).
TIM	TIM		When the execution condition is 1 (ON), the timer runs (increments up to 32,000 s and holds at that maximum PV). When the execution condition is 0 (OFF), the Timer PV is held.

Name	Command	Ladder Symbol	Description (command format, CC: command, BBB: block address, III: ITEM number)
Step Ladder Control Commands (SS: STEP number)			
STEP declaration	SP		STEP declares the step number, and has no input conditions (is a direction connection to the bus). Any numbers in the range 00 to 99 are used as the step number, and are placed in ascending order. 1) Logic sequence: The step number is fixed at 00, and is functional at all times. Declaration of step number 00 can be omitted. 2) Step sequence: When the step number is within the range 01 to 99, only one of the steps is functional. When the program is started, step number 01 is functional.
BLOCK SET	BS		When the input conditions turn ON, operation of the specified step number of the Step Ladder Program block at the specified block address (400 to 499) is started. Run/stop command S1 of the specified block turns automatically 1 (ON). Operation of currently executing steps in already operating Step Ladder Program block is interrupted, and execution of the program jumps to the specified step. Note: This command cannot be used in the logic sequence (STEP00).
BLOCK RESET	BR		When the input conditions turn ON, operation of the Step Ladder Program block is stopped at the specified block address (Execution of the self function block continues.) Run/stop command S1 of the specified block automatically turns 0 (OFF). Note: This command cannot be used in the logic sequence (STEP00).
JUMP	JP		When the input conditions turn ON, execution of the program jumps to the specified step number (01 to 99) of the Step Ladder Program block at the specified block address (400 to 499). -To specify a jump to the self step number, set the block address to 000. -When a jump is made to another Step Ladder Program block, run/stop command S1 of the source block automatically turns 0 (OFF), and run/stop command S1 of the destination block turns 1 (ON).
Step Ladder Control Commands (SS: STEP number)			
STEP TIMER	TS		This is the timer (setting range: 0 to 9999 sec) for moving between steps. It has no input conditions. (STEP TIMER is placed in the same line as the STEP command.) Operation is started when program execution moves to the line containing STEP command. When the time set by STEP TIMER is reached, the program execution moves to the next step. Note "Move conditions to next step" is performed on a first-come, first-served basis.
ALARM TIMER	TA		This is the timer (setting range: 0 to 9999 sec) for monitoring steps. It has no input conditions. (ALARM TIMER is placed in the same line as the STEP command.) Operation is started when program execution moves to the line containing STEP command. When the time set by ALARM TIMER is reached, the Step Timer Completion flag (step congestion indicator) turns 1 (ON). At this time, the step is held at the current values.
Others			
END	ED		Indicates the end of a program. Note The END command is automatically placed at the end of a program when the Step Ladder Program block is prepared using CX-Process Tool. It is placed after STEP00 when the program comprises STEP00 only, and is placed after the nth STEP where the program ends.
NO OPERATION	NP		This instruction has no function. (No Processing is for NOP.)

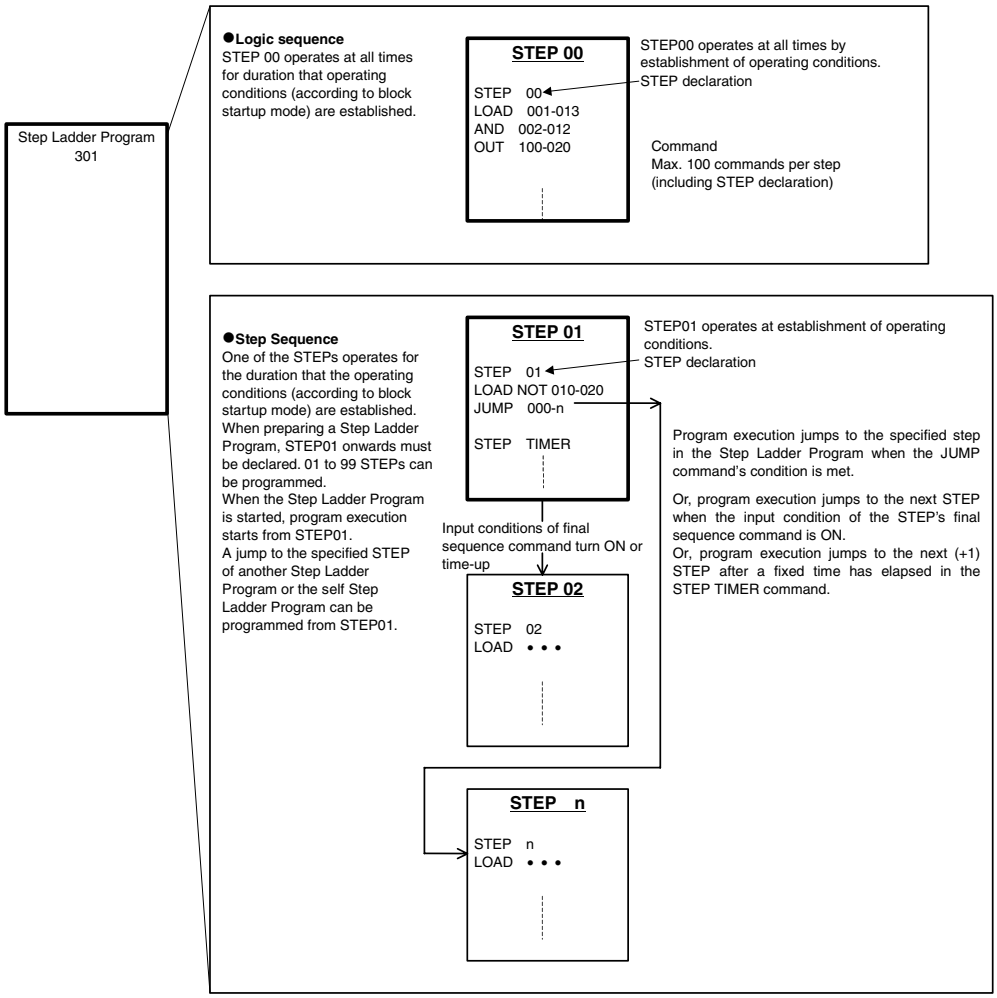
Note •The LOAD command cannot be input by entering "LD".
•Use the Internal Switch block (Block Model 209) for temporarily holding the results of operations on contacts.

Specifications of Step Ladder Program block

Item			Description
Total number of command in all Step Ladder Program blocks available on a single Loop Controller			4000
Per single Loop Controller		Total number of commands	98 (Maximum of 100 including STEP00 and END)
		Total number of steps	98 (Maximum of 100 including STEP00 and END)
Creating step ladder programs on the CX-Process Tool software		Ladder diagrams	22 rows and 10 columns max.
		Mnemonics	No restrictions
Function block operation conditions			You can select from the following two conditions (set in block startup mode [ITEM 006]): • Start at all times • Start by S1 run/stop command Note: Program execution can also be started by the BLOCK SET command programmed in other Step Ladder Program blocks.
Types of sequence	STEP00	Logic sequence	This sequence must be prepared. This sequence is operated at all times when the function block operation conditions are established.
	STEP 01 to 99	Step sequence	This sequence may be omitted. Program execution starts from STEP01 when the function block operation conditions are established. Program execution moves between STEPs by one of the following conditions (when two or more conditions are in contention, the first condition to have occurred takes priority): • When the input condition of the STEP's final sequence command is ON • By JUMP command • By STEP TIMER command
Usable command types	STEP00	Logic sequence	LOAD, LOAD NOT, AND, AND NOT, OR, OR NOT, AND LOAD, OR LOAD, OUT, OUT NOT, SET, RESET, DIFU, DIFD, NOP, END
	STEP 01 to 99	Step sequence	LOAD, LOAD NOT, AND, AND NOT, OR, OR NOT, AND LOAD, OR LOAD, OUT, OUT NOT, SET, RESET, DIFU, DIFD STEP, BLOCK SET, BLOCK RESET, JUMP, STEP TIMER, ALARM TIMER, NOP, END

Configuration of Step Ladder Program block

The Step Ladder Program block comprises a logic sequence (STEP00) and a step sequence (STEP01 onwards).



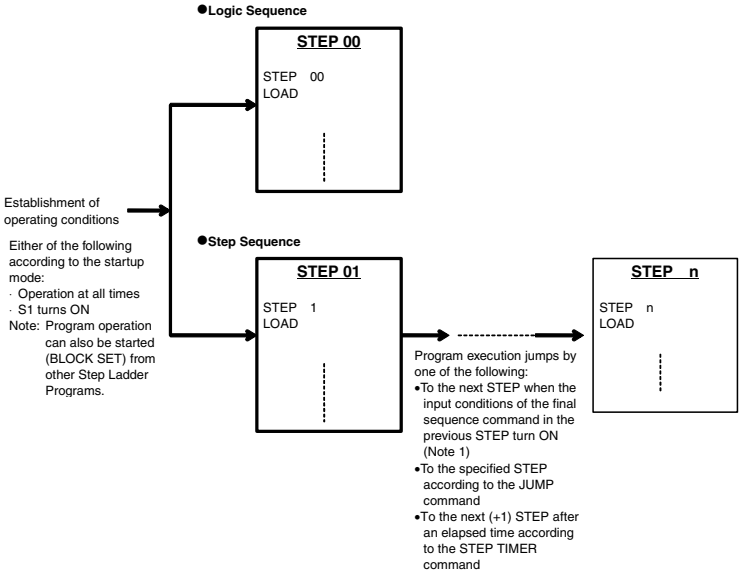
Mechanism of Step Ladder Programs

The logic sequence and step sequence can be executed simultaneously.

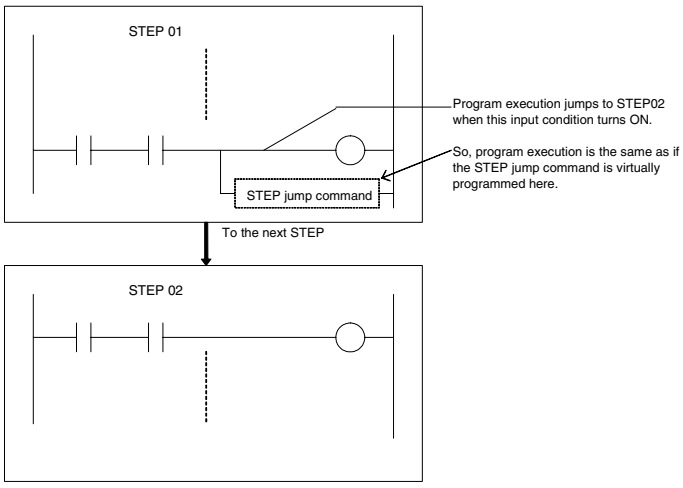
Note: When the step sequence is not used, create only STEP00 and do not create steps STEP01 onwards.
When the logic sequence is not used, create steps STEP01 onwards and do not create STEP00.

- The logic sequence is executed at all times at each operation cycle when the operating conditions of the function block are established.
- Execution of the step sequence normally*1 starts from STEP01 when the operating conditions of the function block are established. Basically, when the input conditions of the final sequence command in that STEP turns ON, program execution jumps to the next (+1) STEP. Program execution can also jump to other STEPs by using the JUMP command or STEP TIMER command. Only one STEP is executed at each operation cycle. For this reason, when program execution jumps to another STEP, the STEP at the jump destination is executed at the next operation cycle.

*1: Program execution can also be started from a STEP other than STEP01 by using the JUMP or BLOCK SET command.



Note 1. Program execution jumps to the next STEP in the following instances

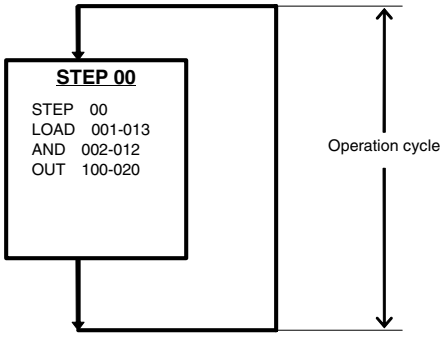


A "contact input" ITEM that has been turned ON by the OUT command before a jump in program execution stays ON even if program execution moves to the next STEP. To clear the state of the "contact input" ITEM, use the OUT NOT or RESET command on the same ITEM.

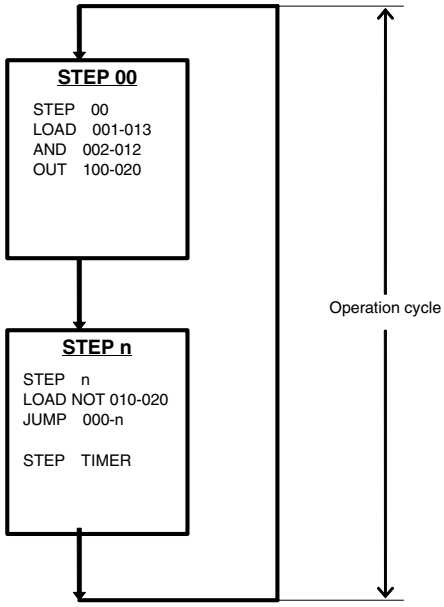
Execution of STEPs at each operation cycle is as follows.

- When the Step Ladder Program comprises only the logic sequence (STEP00 only), STEP00 is executed at each operation cycle (ITEM 004). When commands such as LOAD or OUT are executed, the specified ITEM of the specified function block is read and written.
- When the Step Ladder Program comprises both a logic sequence and a step sequence (STEP00 and STEP01 onwards), STEP00 and one of the STEPs (STEPn) are executed at each operation cycle.

● **Logic sequence only**



● **Logic sequence and step sequence**



Note: All commands can be input into the program regardless of whether ladder programs or mnemonic programs are being used.
When using ladder diagrams, however, a maximum of 22 rows and 10 columns can be input per circuit. If a circuit containing more than 22 rows or 10 columns is converted from mnemonic to ladder diagram form (reverse assembly), an error will occur. When entering programs in mnemonic form, set the Mnemonic Flag (ITEM 200)*1 to 1 (ON) to disable conversion to ladder diagrams.

*1: When The Mnemonic Flag (ITEM 200) flag is set to 1 (ON), conversion is not possible between ladder diagrams and mnemonic programs.

Description of sequence commands

Note: In the following descriptions, error code 80 means "Step Ladder Program command error" and error code 81 means "Step Ladder Program connection terminal not defined."

Basic commands

The following commands can be used in the logic sequence (STEP00) and in the step sequence (STEP01 to STEP99).

LOAD, LOAD NOT

Input conditions
Not required

Operand
Block address-ITEM number

Function
Reads the ON/OFF status of the specified "contact output" or "contact input" ITEM when this command is executed.

Supplementary description
•At least one LOAD or LOAD NOT command is required as the input condition for the following commands:

OUT, OUT NOT, SET, RESET, DIFU, DIFD, BLOCK SET, BLOCK RESET, JUMP

•To read changes in contact states (OFF to ON, ON to OFF), temporarily read the state of the contact using this command, and then use the differentiated up (DIFU) or differentiated down (DIFD) command.
•In the following cases, an execution error occurs and the command in question is not executed:

The specified block does not exist (is not registered). (error code: 81)
The specified ITEM does not exist. (error code: 81)
The specified ITEM is neither a "contact input" ITEM nor a "contact output" ITEM. (error code: 81. Note, however, that this is possible only when the command is entered by its mnemonic.)

AND, AND NOT, OR, OR NOT

Input conditions
Required

Operand
Block address-ITEM number

Function
Reads the ON/OFF status of the specified "contact output" or "contact input" ITEM when this command is executed (reverses the state in the case of NOT commands), and takes the logical AND or OR with the previous execution condition.

Supplementary description

•In the following cases, an execution error occurs and the command in question is not executed:
The LOAD or LOAD NOT command does not precede this command. (error code: 80, Step Ladder Program command error)
The specified block does not exist (is not registered). (error code: 81)
The specified ITEM does not exist. (error code: 81)
The specified ITEM is neither a "contact input" ITEM nor a "contact output" ITEM. (error code: 81)

AND LOAD, OR LOAD

Input conditions

Required

Operand

None (0000-00)

Function

Takes a logical AND or OR between logic blocks.
("Logic block" refers to a logical operation that starts from the LOAD or LOAD NOT command and continues up to before the next LOAD or LOAD NOT command.)

Supplementary description

•When three or more logic blocks are to be connected in series, the logic blocks can also be connected successively in such a way that two logic blocks are connected in series by this command and then the next logic block is connected in series by this command. This command can also be placed after three or more logic blocks so that all logic blocks are connected in series.
•In the following cases, an execution error occurs and the command in question is not executed:
Two or more LOAD or LOAD NOT commands do not precede this command. (error code: 80)
The total number of AND LOAD or OR LOAD commands is less than the "total number of LOAD or LOAD NOT commands - 1". (error code: 80)

OUT, OUT NOT

Input conditions

Required

Operand

Block address-ITEM number

Function

Outputs the result (OUT) or reverses the result (OUT NOT) of logical processing on the specified "contact input" ITEM when the input conditions are ON.

Note A contact ITEM that has been turned ON by the OUT command stays ON even if program execution moves to the next STEP. For this reason, to perform step progression control in a step sequence, use the RESET command at the next STEP to turn OFF the contact ITEM that has been turned ON.
Supplementary description

•This command differs from the SET and RESET commands in that ON is output if the input condition is ON, and OFF is output when the input condition is OFF. (This description applies to the OUT command.) For this reason, changes in states such as Auto/Manual or Remote/Local are used as output to take the result of logical processing. (When indicating manipulation of Auto/Manual switching or Remote/Local switching, use the SET and RESET commands with the DIFU command.)
•When program execution has jumped to a specified STEP by the JUMP command, contact ITEMs that have turned ON by the OUT command do not turn OFF and are held at the ON state.
•In the following cases, an execution error occurs and the command in question is not executed:

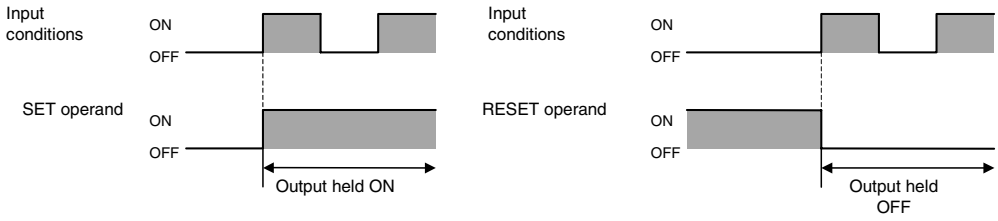
The specified block does not exist (is not registered). (error code: 81)
The specified ITEM is not a "contact input" ITEM. (error code: 81)
There are LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)

SET, RESET

Input conditions
Required

Operand
Block address-ITEM number

Function SET turns the specified "contact input" ITEM ON when the input condition is ON, and RESET turns the ITEM OFF when the input condition is ON. The ON (SET) or OFF (RESET) state of the ITEM is held as it is even if the input condition is OFF. The ON or OFF state of the ITEM is held as long as the RESET command is not executed for the SET command or vice versa.



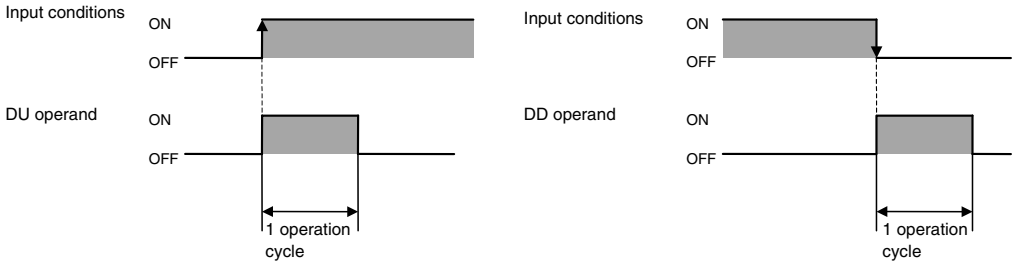
Supplementary description
•This command is used in combination with the DIFU command when indicating manipulation such as Auto/Manual switching or Remote/Local switching. (Refer to the example in the supplementary description for the DIFU and DIFD commands.)
•The state of contact ITEMs that are set or reset by these commands is held even if program execution moves to another STEP for as long as the RESET command and SET command are not executed.
•In the following cases, an execution error occurs and the command in question is not executed:
The specified block does not exist (is not registered). (error code: 81)
The specified ITEM is not a "contact input" ITEM. (error code: 81)
There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)

DIFU, DIFD

Input conditions
Required

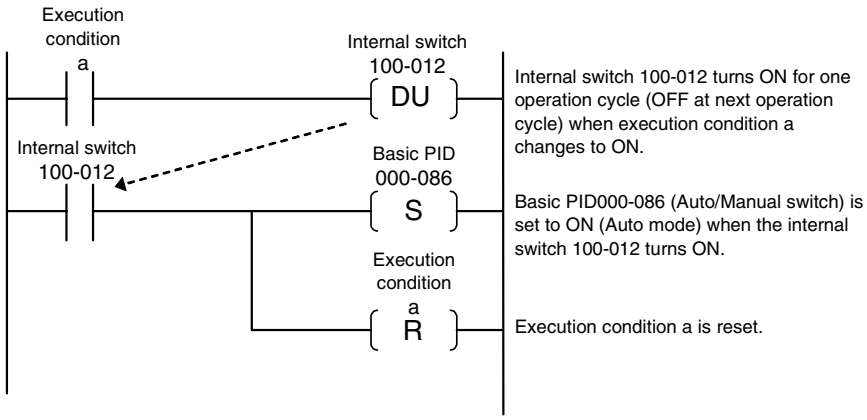
Operand
Block address-ITEM number

Function
DIFU turns the specified "contact input" ITEM ON for one cycle when the input condition goes from OFF to ON, and DIFD turn the ITEM ON for one cycle when the input condition goes from ON to OFF.



Note When an ON signal for one operation cycle that has been generated by this command is to be used as the input at another function block, set the operation cycle of that function block to the same as or longer than the operation cycle of the source Step Ladder Program block where this ON signal is to be generated. If an attempt is made to read at a function block having an operation cycle that is shorter than the Step Ladder Program block where this ON signal is generated, the ON signal may not be read correctly.

Supplementary description
- Note that the ON signal is held by this command at execution of the first command in the Step Ladder Program block and not at execution of this command at the next operation cycle.
- This command is canceled at the moment that program execution jumps to another STEP. When this command is canceled, the specified operand is returned to OFF.
- When this command is used in STEP00, it will not be canceled as program execution does not jump to other STEPs in the Step Ladder Program from this STEP, and the number of DIFU or DIFD commands that can be used in other STEPs is reduced by one. (The maximum number of DIFU or DIFD commands that can be executed simultaneously is 256.)
- This command can be used to specify a "contact input" ITEM in the Internal Switch block (Block Model 209) to create a differentiated contact that is ON or OFF for one operation cycle.
- The rising edge of the contact is not detected when a constantly ON contact (ITEM 021 of System Common block) is set as the input condition.
- Use the DIFU or DIFD commands to perform Auto/Manual switching or Remote/Local switching as shown below in PID or other Control blocks.
  Example)



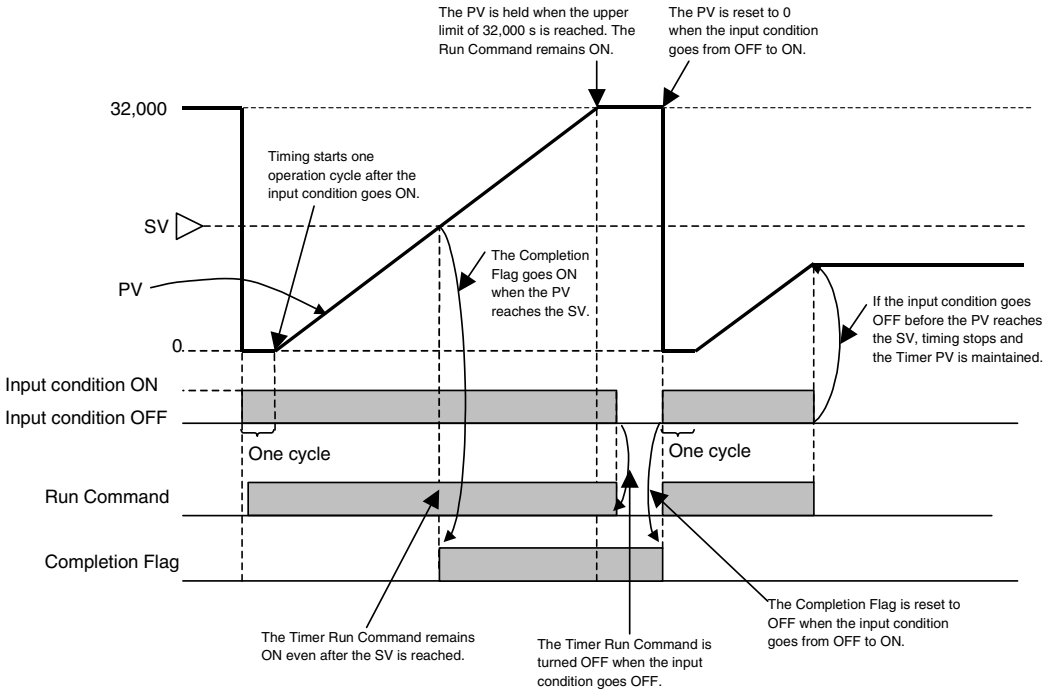
•In the following cases, an execution error occurs and the command in question is not executed:
The specified block does not exist (is not registered). (error code: 81)
The specified ITEM is not a "contact input" ITEM. (error code: 81)
There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)

TIM

Input conditions
Required

Operand
• Registered block address
• Timer number (1 to 10)
Note: Set the SV with the Step Ladder Program block's Timer SV (ITEM 160 to 169 for timer numbers 1 to 10).

Function
Ten timers (timers 1 to 10) can be used in one Step Ladder Program. The timers are incrementing ON-delay timers that time in 1-second units.
When the input condition goes from OFF to ON, the Run Command (ITEMs 080 to 089 for timers 1 to 10) is turned from OFF to ON. The Timer PV is reset, timing starts, and the PV (ITEMs 120 to 129 for timers 1 to 10) starts incrementing.
When the timer PV reaches the timer SV (ITEMs 160 to 169 for timers 1 to 10), the timer times out and the Timer Completion Flag (ITEMs 040 to 049 for timers 1 to 10) is turned ON.
The Timer SV can be set between 0 and 32,000 seconds.



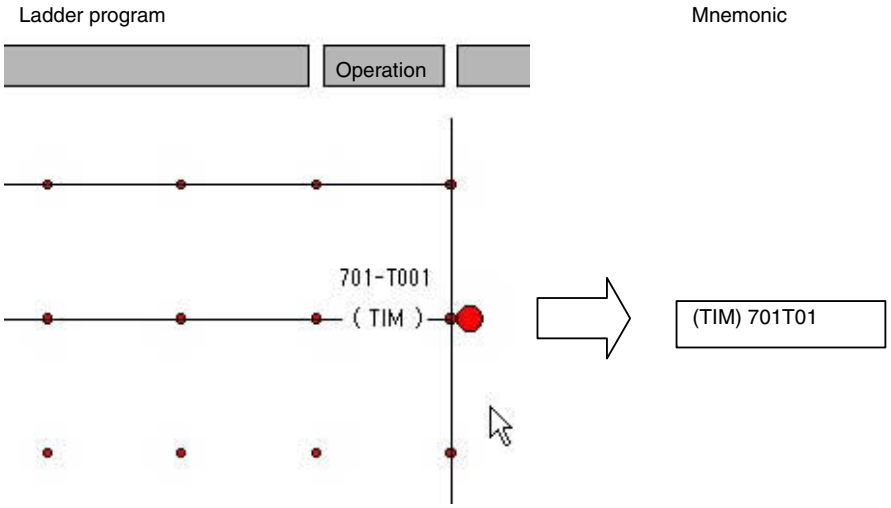
Note 1: Once the input condition goes from OFF to ON, timing continues even if the input condition goes OFF. When the input condition goes from OFF to ON again, the PV is reset to 0 and timing starts over.
Note 2: After the Timer Completion Flag has gone ON, it will remain ON even if the input condition goes OFF. (When the input condition goes from OFF to ON, the timer restarts and the Completion Flag is turned OFF.)
Note 3: The timer continues timing after the SV is reached and stops at 32,000 seconds. At that point, the Run Command is not turned OFF. (The Run Command remains ON and the PV remains at 32,000 s.)
Note 4: Timers can be referenced and controlled between Step Ladder Program blocks. For example, a timer in block 900 can be referenced or started from block 701. (The Run/Stop Command, ITEM 008, must be ON in the block containing the timer.)

Operation from the CX-Process Tool

Inputting a TIM (Timer) Command

Example: Inputting timer 1 in registered block address 701.

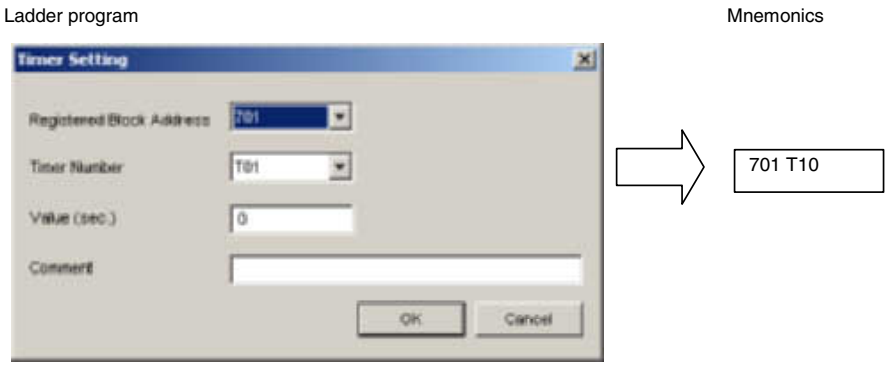
- For a ladder program, specify T001 with a TIM command.
- For mnemonics, specify the timer 1 Run Command (ITEM 080) with an OUT Command.



Setting the Timer

In this example, the timer 1 SV is set to 50 for timer 1 in registered block address 701. After the timer is allocated, the following dialog box can be displayed by double-clicking *(TIM)* or selecting *TIM* and pressing the **Enter** Key.

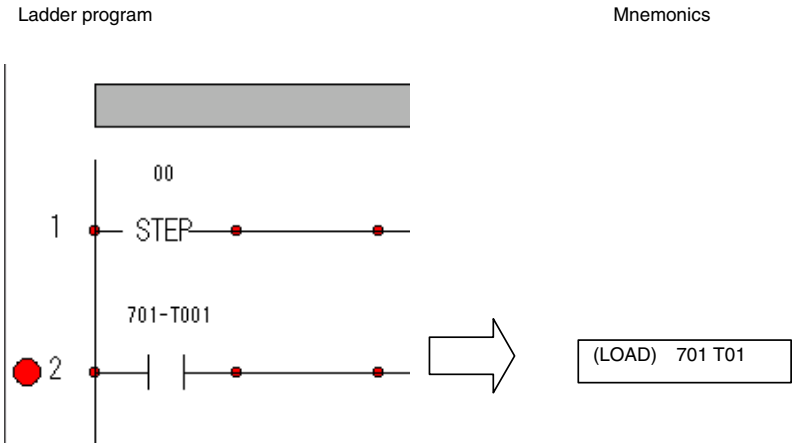
- For a ladder program, input 50 in the *Set Value* Field.
- For mnemonics, input 50 for the SV of timer 1 (ITEM 160).



Referencing the Timer Completion Flag with LOAD

In this example, LOAD is used to reference the Completion Flag for timer 1 in registered block address 701.

- For a ladder program, specify T001 in a LOAD command.
- For mnemonics, input the timer 1 Completion Flag (ITEM 160) in a LOAD command.



Supplementary description

- When the JUMP command moves program execution to another Step Ladder Program block, the original block's timer will continue timing and will not be reset.
- If the step containing the TIM command is not executed, the timer's operational status will not change even if the command's input condition changes.

Step sequence commands

The following commands (see Note) can be used only in the step sequence (STEP01 to STEP99).

Note: BLOCK SET and BLOCK RESET can also be used in the logic sequence (STEP00).

STEP

Input conditions

Not required

Operand

Step number (00 to 99)

Function

Sets finite break points (STEPs) in a step sequence.
When the logic sequence is used, STEP00 is automatically assigned as the default STEP. This step has no input conditions.
STEPs in the step sequence are automatically assigned a step number starting from 00.
Program execution jumps to the STEP declared by STEP at the next operation cycle when one of the following conditions is established:

1) When the input condition of the final command of the STEP having the immediately previous number is ON
2) When program execution has jumped to this STEP by the JUMP command
3) When the time count set by the STEP TIMER command in the STEP having the immediately previous number has been reached

The first of the above three conditions that is met is the valid condition.

Supplementary description

Example (Command description using mnemonics)

```
(SP) 01              Declares STEP01.
(LOAD) 2000101       Executes LOAD on ITEM 010 at block address 200.
          :
          :
(LOAD) 200011        Executes LOAD on ITEM 011 at block address 200.
(OUT) 20012          Executes OUT on ITEM 012 at block address 200.
(SP) 02              Declares STEP02.
          :
          :
```

In the above example, program execution jumps to STEP02 when ITEM 011 at block address 200, that is programmed as the input condition of the final command of the previous STEP, turns ON.

BLOCK SET

Input conditions
Required

Operand
Step Ladder Program block address, step number (00 to 99)

Function
(This function cannot be used in logic sequence STEP00.)
Starts program execution at the specified step number of the specified Step Ladder Program block at the next operation cycle when the input condition is ON. (This command differs from JUMP in that execution of the self STEP onwards is continued.)
When this command is executed, S1 run/stop command of the specified Step Ladder Program block is forcibly turned ON, and S2 step stop switch is forcibly turned OFF. (At the same time, execution of STEP TIMER or ALARM TIMER is canceled if they are currently executing, and the Step Timer Completion flag turns OFF if it is ON when the time set by the ALARM TIMER command is reached.)

Supplementary description
- When the specified Step Ladder Program block is already executing, the currently executing STEP in the program is quit, and program execution jumps to the specified STEP.
- When the block startup mode ITEM of the specified Step Ladder Program block is set to 0 (start at all times), the function block starts up as it is and program execution jumps to the specified step number.
- In the following cases, an execution error occurs and the command in question is not executed:

There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)
The self block address is specified as the specified function block. (error code: 80)
There is no specified block address. (error code: 81)
The specified block address is not the Step Ladder Program block (Block Model 301). (error code: 81)

BLOCK RESET

Input conditions
Required

Operand
Step Ladder Program block address, step number (00 to 99)

Function
(This function cannot be used in logic sequence STEP00.)
Stops program execution at the specified step number of the specified Step Ladder Program at the next operation cycle when the input condition is ON. When this command is executed, S1 run/stop command of the specified Step Ladder Program block is forcibly turned OFF.

Supplementary description
- This command is invalid when the block startup mode of the specified Step Ladder Program block is set to 0 (start at all times).
- In the following cases, an execution error occurs and the command in question is not executed:
  There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)
  The self block address is specified as the specified function block. (error code: 80)
  There is no specified block address. (error code: 81)
  The specified block address is not the Step Ladder Program block (Block Model 301). (error code: 81)

JUMP

Input conditions
Required

Operand
Step Ladder Program block address, step number (00 to 99)

Note: Block address 000 is the self block.

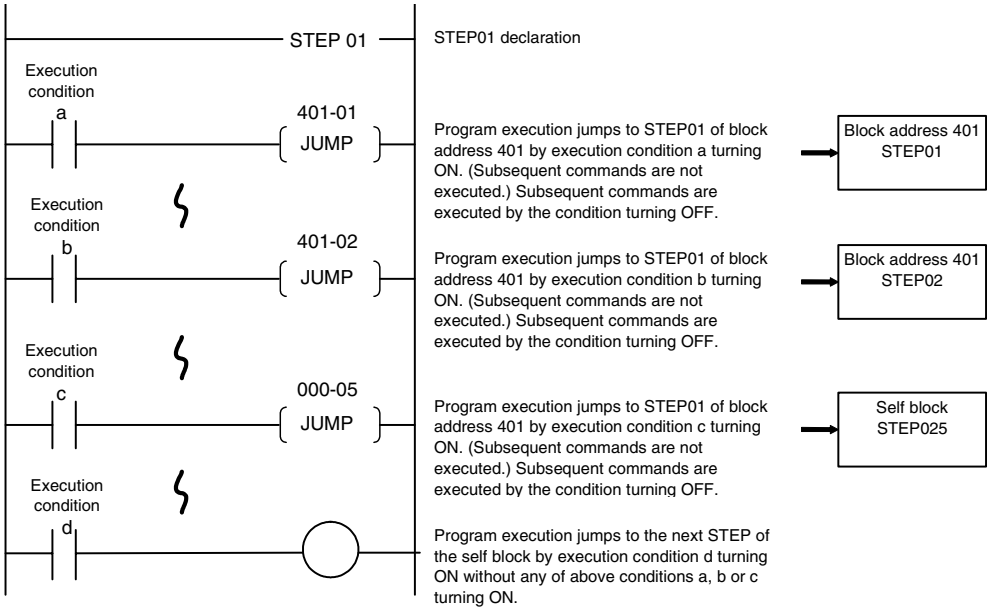
Function
- To jump to another Step Ladder Program block (block address other than 000)
  Causes program execution to jump to the specified step number of the specified Step Ladder Program block address at the next operation cycle when the input condition is ON. Commands onwards from the self STEP are not executed, and the self function block (including logic sequence STEP00) is stopped.
  When this command is executed, S1 run/stop command of the source Step Ladder Program block automatically turns OFF, and S1 run/stop command of the jump destination Step Ladder Program block automatically turns ON. At the same time, timer execution set by the STEP TIMER or ALARM TIMER commands is continued if it is executing while the specified STEP at the jump destination is being executed. Timer execution set by the STEP TIMER or ALARM TIMER commands is canceled if it is executing at other STEPs and the specified STEP at the jump destination is not being executed. The Alarm Timer Completion flag turns OFF if it is ON when the time set by the ALARM TIMER command is reached.
  When the input condition is OFF, nothing happens, and the subsequent commands are executed.

•To jump to a location within the self Step Ladder Program block (block address: 000)
Causes program execution to jump to the specified step number of the self function block when the input condition is ON. Commands onwards from the self STEP are not executed. The self function block (including logic sequence STEP00) continues to execute.
When the input condition is OFF, nothing happens, and the subsequent commands are executed.

Supplementary description

•When the specified STEP in the specified Step Ladder Program block is already executing, nothing happens on the specified Step Ladder Program block, and subsequent commands are not executed.

Example



•In the following cases, an execution error occurs and the command in question is not executed:
There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar)
There is no specified block address. (error code: 81)
The specified block address is not the Step Ladder Program block (Block Model 301). (error code: 81)
The specified STEP number does not exist. (error code 81)
The self step number of the self block is specified. (error code: 81)
The self step number is specified. (error code: 80)
The jump destination STEP number is STEP00. (error code: 81)

STEP TIMER

Input conditions
Not required

Operand
Timer setting value (0 to 9999 seconds)

Function
Automatically starts counting by the timer when program execution jumps to the self step. When the value set by this command is reached, execution of the self step is quit, and program execution jumps to the next (+1) STEP at the next operation cycle.
This command has no input condition and is described in the same line as the STEP declaration command.

Supplementary description
•This command is canceled at the moment that the self STEP jumps to another location. ("Cancel" here refers to the time count being stopped and cleared.)

```
Example:          (Command description using mnemonics)
(SP) 02               Declares STEP02.
(TS) 010              Sets STEP TIMER 10 seconds.
(LOAD) 200011         Executes LOAD on ITEM 011 at block address 200.
(OUT) 20012           Executes OUT on ITEM 012 at block address 200.
(SP) 02 STEP03        Declares STEP03.
          :
          :
```

In the above example, program execution jumps to STEP03 by whichever of the conditions is established the earliest ten seconds after program execution jumps to STEP02 when ITEM 011 of block address 200 (input condition of the final command in the previous STEP) turns ON.

•In the following case, an execution error occurs and the command in question is not executed:

The self step number is STEP00. (error code: 80)

ALARM TIMER

Input conditions
Not required

Operand
Timer setting value (0 to 9999 seconds)

Function
Automatically starts counting by the timer when program execution jumps to the self step. When the value set by this command is reached, the output of Alarm Timer Completion flag (ITEM 010) is turned ON.
This command has no input condition and is described in the same line as the STEP declaration command.

Supplementary description

- This command is canceled at the moment that program execution jumps to another STEP.
- The output of Alarm Timer Completion flag (ITEM 010) turns OFF when program execution jumps to another STEP or when program execution is stopped by the BLOCK RESET command at another Step Ladder Program block.

Example (Command description using mnemonics)

(SP) 02	Declares STEP02.
(TA) 010	Sets ALARM TIMER 10 seconds.
(LOAD) 200011	Executes LOAD on ITEM 011 at block address 200.
(OUT) 20012	Executes OUT on ITEM 012 at block address 200.
(SP) 02 STEP03	Declares STEP03.
:	
:	

Counting by the ALARM TIMER command is canceled and program execution jumps to STEP03 when ITEM 011 at block address 200 turns ON. Ten seconds after program execution jumps to STEP02 (and when it has not jumped to another STEP), output of Alarm Timer Completion flag (ITEM 010) turns ON.

- In the following case, an execution error occurs and the command in question is not executed:

The self step number is STEP00. (error code: 80)

Block Model	Block Name	Block Address
<302>	Sequence Table	701 to 900

Outline

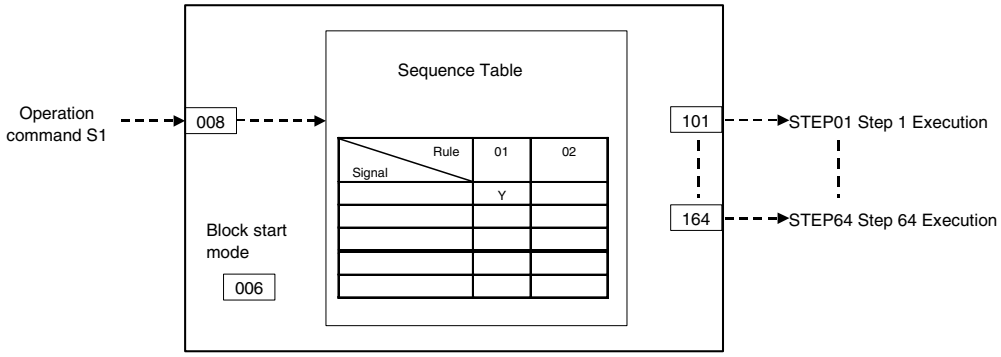
A Sequence Table block performs logic sequence or step progression control based on a table of conditions and actions. It is supported by the LCB05/05D only.

- Up to 200 sequence tables can be used for a Loop Controller. (Block address 701 to 900 can be allocated.)
- A sequence table is a table of rules, each of which defines conditions and actions that are performed when conditions are met.
- Sequence tables can be started under the following conditions (set as the execution form for ITEM 006).
  - Every cycle (always executed)
  - Starting with S1 (started when operation switch S1 turns ON, stopped when S1 is OFF)
  - First cycle only (started only once when Loop Controller operation is started).
- For each rule, multiple contact signals can be AND'ed as the condition and actions can be performed, such as turning ON or OFF multiple signals (outputting) while the condition is met or when the condition changes from not being met to being met.
- There is normally a maximum of 32 rules from 01 to 32. A sequence table, however, can be expanded to contain up to 64 rules from 01 to 64.
  Also, there is normally a maximum of 32 condition and 32 action signals, but these can be expanded to up to 64 each.
  Designation to expand rules or conditions/actions is made on the sequence table editing screen.
- Groups of rules called steps can be created so that all of the sequence tables are not executed simultaneously. Each step can contain one or more rules. The transitions between steps can also be specified by specifying the next step for both when the rule is met (THEN) and when it is not met (ELSE).
- When using LCB05D, the influence on Normal cycle time is "25 ms max +12 ms max". When sequence tables are used, the extra time is further extended. The additional extra time required depends on how the sequence table are used, as follows:
  - Not Expanding sequence tables: +3 ms
  - Expanding sequence tables vertically or horizontally: +6 ms
  - Expanding sequence tables both vertically and horizontally: +12 ms

  The extended cycle time will not be lengthened if the number of expanded sequence tables increases, but the number of times that the cycle time is extended will increase.
- When using a Ver. 1.5 or higher Loop Control Board, sequence table operation can be checked and sequence tables can be edited online while the Loop Control Board is running and the sequence table is operating. (This function is supported only by Ver. 3.2 and higher versions of the CX-Process Tool.)
- When using LCB Ver. 1.5 or higher, the PVs of elements (timers and counters) can be displayed while checking sequence table operation. In addition, the SVs of elements (timers and counters) can be changed while the Loop Control Board is running and the sequence table is operating. (This function is supported only by Ver. 3.2 and higher versions of the CX-Process Tool.)
- When using LCB 01/03/05 Ver. 3.0 or higher, the table reference function can be used to set a sequence table to either a master table or a slave table in ITEM 011. A sequence table for which ITEM 011 is set to 0 (master table) can obtain information on whether conditions have been met from the sequence table for which ITEM 011 is set to 1 (slave table).

Note: Refer to the Loop Controller Operation Manual (W406) for details on sequence tables.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: Sequence Table	302	302	–	R/W(S)	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
	005	SCAN_NO	Execution order	1 to 2000	2000	–	R/W(S)	–	–	2
Parameter	006		Block startup mode (0: Start at all times, 1: Start by S1)	0 to 3	0	–	R/W(S)	–	–	2
Contact input	008	S1	Run/Stop command	0, 1	0	Yes	R/W(O	–	R/W	1
Parameter	011	M/S_SET	Master/Slave table switch (0: Master table 1: Slave table)	0, 1	0	–	R/W(S)	–	–	1
	012		Expansion block addresses 1	000 to 999	0	–	R/W(S)	–	–	2
	013		Expansion block addresses 2	000 to 999	0	–	R/W(S)	–	–	2
	014		Expansion block addresses 3	000 to 999	0	–	R/W(S)	–	–	2

Monitor information for editing

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Special	021	RULE_1	Rules with conditions met (1 to 16)	0000 to FFFF	0000	Yes	r	–	–	2
	to		To							
	024	RULE_4	Rules with conditions met (49 to 64)	0000 to FFFF	0000	Yes	r	–	–	2
	025	COND_1	Condition contacts (1 to 16)	0000 to FFFF	0000	Yes	r	–	–	2
	to		To	to						
	028	COND_4	Condition contacts (49 to 64)	0000 to FFFF	0000	Yes	r	–	–	2
	029	ACTN_1	Action contacts (1 to 16)	0000 to FFFF	0000	Yes	r	–	–	2
	to		To	to						
	032	ACTN_4	Action contacts (49 to 64)	0000 to FFFF	0000	Yes	r	–	–	2

Note: A bit will be 1 when a rule is met or 0 when the rule is not met.
Bits 0 to 15 correspond to rules 1 to 16 (as well as rules 17 to 32, 33 to 48, or 49 to 64). A bit will be 1 when the corresponding condition contact or action contact is ON or 0 when the corresponding contact is OFF. Bits 0 to 15 correspond to contacts 1 to 16 (as well as contacts 17 to 32, 33 to 48, or 49 to 64).

Step execution flags

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact output	101	STEP 01	Step 1 being executed	0, 1	0	Yes	r/w	–	R	1
	to		to	to						
	164	STEP 64	Step 64 being executed	0, 1	0	Yes	r/w	–	R	1

Overview of rules

Conditions

The following contact signals can be used for sequence table conditions.

Signal	Notation on CX-Process Tool screen	Types	Settings on CX-Process Tool screen	Setting method	Example
Input	IN (source specification)	Contact input or contact output ITEMs from function blocks	Input Tab Page's IN source specification: Block and ITEM	Select the block and ITEM and select the ITEM number from the detailed information.	For block address 001 and ITEM 086: 001.086
		CSV tag and tag ITEM (contact input or contact output ITEM for control or operation block)	Input Tab Page's IN source specification: Tag No.	Select the ITEM tag and select the ITEM from the detailed information.	For the A/M switch for the Master01 CSV tag: Master01.A_M
		User link table tag name (I/O memory in CPU Unit)	Input Tab Page's IN source specification: User link table	Select the area type and select the user link table tag name from the detailed information.	For SW01 user link table tag: LNK007:SW01
		Timer/counter completion status or status contact, such as a pre-alarm status contact for a timer/counter	Input Tab Page's IN source specification: Element	Specify the timer/counter number and select the status contact from the detailed information.	
	TBL (block address)	Condition reference table	Input Tab Page's TBL option button: Block address	Specify the block address.	
Relational Expression	(parameter 1) < (parameter 2) (parameter) < #(value) "<" can be replaced with other comparison symbols	Result of comparison for relational expression	Relational expression types are set in the command classification on the Relational Expression Tab Page. The same settings are possible for parameters 1 and 2 as for the inputs listed above, i.e. Block and ITEM, Tag No., user link table, or element), or a value (constant) can be set.	Set the relational expression (<, #, #, =, >, or #) parameter 1, and parameter 2. For elements, specify the number and then select the present value of the PV, the remaining time, or the counter value.	For a user link table tag type value equals 200: (LNK005:type = #200)

Actions

The following contact signals can be used for sequence table outputs.

Signal	Notation on CX-Process Tool screen	Types	Settings on CX-Process Tool screen	Setting method	Example
Output (See note.)	OUT_H (destination): Holding contact output operation OUT_L (destination): Non-holding contact output operation OUT_P (destination): Pulse contact output operation OUT_F (destination): Flashing contact output operation	Function block contact output item	Output tab destination specification: Block ITEM	Select the block ITEM and select the ITEM number from the detailed information.	For block address 001 and ITEM 086: 001.086
		CSV tag and tag ITEM (Contact output ITEM for control and operation blocks)	Output tab destination specification: Tag No.	Select the ITEM tag and select the tag ITEM from the detailed information.	For the A/M switch for the Master01 CSV tag: Master01.A_M
		User link table name (I/O memory in CPU Unit)	Output tab destination specification: User link table	Select the block ITEM and select the ITEM number from the detailed information.	For Value1 user link table tag: LNK007:Value 01
		Timer/counter reset start, operation start/stop, and pause commands	Output tab destination specification: Element action (destination)	Select the area type and select the link table tag name from the detailed information.	
Table Com-mand	STEP(sequence table block address, step number)	Setting of a specific step in another sequence table	Table Command Tab command classification: STEP (block address, step number)	Block address and step number	For block address 702, step 03: 70203
	RUN(sequence table block address)	Starting another sequence table	Table Command Tab command classification: RUN (block address)	Block address	For block address 702: 702
	STOP(sequence table block address)	Stopping another sequence table	Table Command Tab command classification: STOP (block address)	Block address	For block address 702: 702
Write to ITEM	SET(#value, destination)	Writing a constant to a function block ITEM write parameter	Write to ITEM tab destination: Block ITEM	Select the block ITEM, select the ITEM number from the detailed information, and input the write data (-32,000 to 32,000).	-
		Writing a constant to an CSV tag and tag ITEM (Contact output ITEM for control and operation blocks)	Write to ITEM tab destination: Tag No.	Select the ITEM tag, select the tag ITEM from the detailed information, and input the write data (-32,000 to 32,000).	-
		User link table (writing a constant to I/O memory in the CPU Unit)	Write to ITEM tab destination: User link table	Select the area type, select the user link table tag from the detailed information, and input the write data (-32,000 to 32,000: Input the scaled value for the user link table).	-

Note The following output forms can be selected.

Signal	Output form	Setting screen on CX-Process Tool	Sequence table execute form (ITEM 006)		Y/N specification in rule	Execution condition
			For Every Cycle (0) and Start on S1 (1)	For Start Only First Cycle (2)		
Output	Holding	Output tab command classification: OUT_H (destination)	Y: ON when the condition is met and remains ON even when the condition is no longer met. Must be turned OFF from another rule. N: OFF when the condition is met and remains OFF even when the condition is no longer met. Must be turned ON from another rule.		Y (ON) or N (OFF)	When condition changes from not met to met
	Non-holding	Output tab command classification: OUT_L (destination)	Y: Remains ON while condition is met and remain OFF while condition is not met. N: Cannot be specified.	Cannot be used.	Only Y (always ON)	While condition is met
	Pulse	Output tab command classification: OUT_P (destination)	Y: ON only once when condition is met and turns OFF the next operating cycle. The condition must be not met and then met again before the signal will turn ON again. N: Cannot be specified.	Cannot be used.	Only Y (pulse output)	When condition changes from not met to met
	Flashing	Output tab command classification: OUT_F (destination)	Y: Changes between ON and OFF when the condition is met and continues flashing even when the condition is no longer met. N: The flashing output is turned ON while the condition is met and remains ON even when the condition is no longer met. Note: To turn OFF and output that is being held ON, Use OUT_H with an N specification. Even when this is done, however, the signal will not turn OFF until the condition for OUT_F is no longer met (for both a Y and N specification).	Cannot be used.	Y (flashing) or N (remains ON when flashing stops)	While condition is met

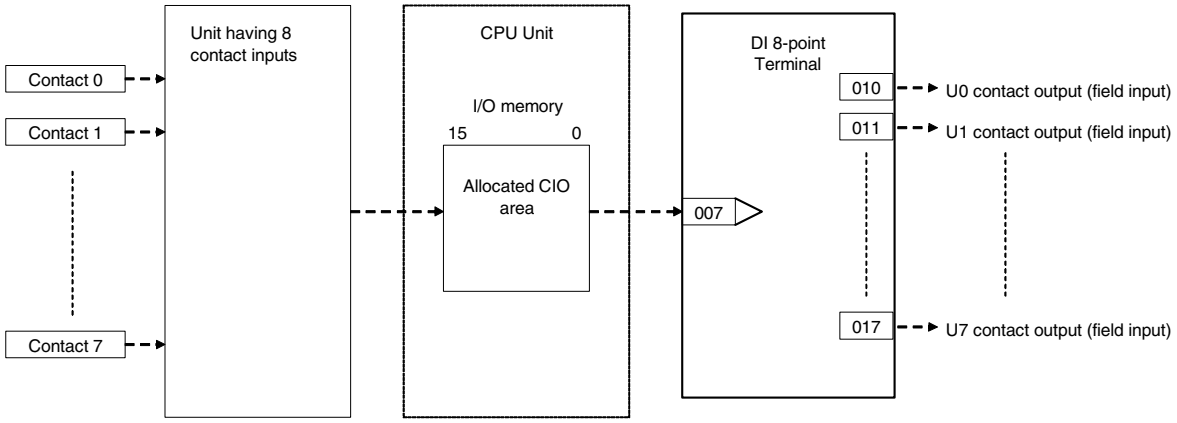
Block Model	Block Name	Block Address
<501>	DI 8-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for inputting eight contacts from 8-point Input Units (C200H-I□□□□, or CJ1W-I□201).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DI 8-point Terminal	501	501	–	R/W(S)	–		2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–		2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–		2
Contact output	010	U0	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	017	U7	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1

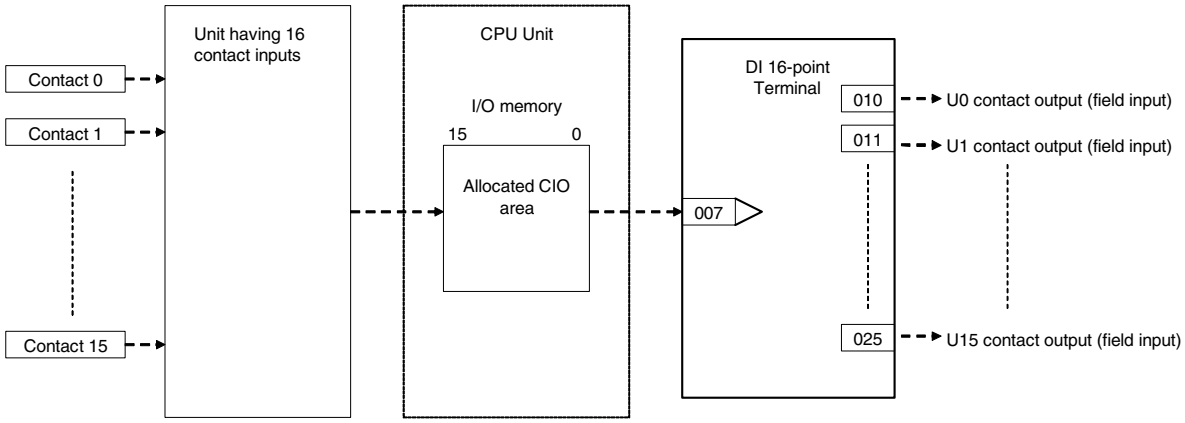
Block Model	Block Name	Block Address
<502>	DI 16-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for inputting 16 contacts from 16-point Input Units (C200H-I□□□□, CS1W-I□□1□, CS1W-INT01, CS1W-IDP01, CJ1W-I□□1□, CJ1W-INT01, or CJ1WIDP01).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DI 16-point Terminal	502	502	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact output (field contact input)	010	U0	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	025	U15	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1

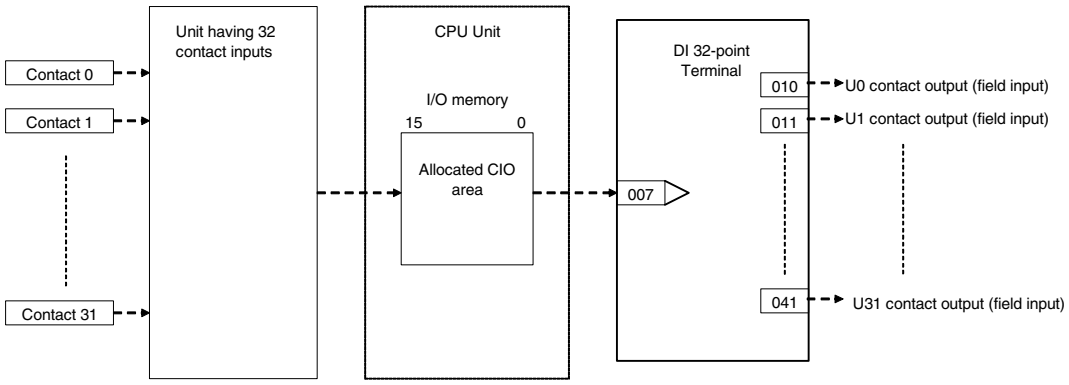
Block Model	Block Name	Block Address
<503>	DI 32-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for inputting 32 contacts from 32-point Input Units (C200H-ID216, CS1W-ID231, Special I/O Unit C200H-ID215, or CJ1W-ID23□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit (in the case of the Special I/O Unit, the leading word number allocated to Special I/O Unit relay area) must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DI 32-point Terminal	503	503	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact output (field contact input)	010	U0	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to							
	025	U15	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	026	U16	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	041	U31	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1

Block Model	Block Name	Block Address
<504>	DI 64-point Terminal	901 to 980

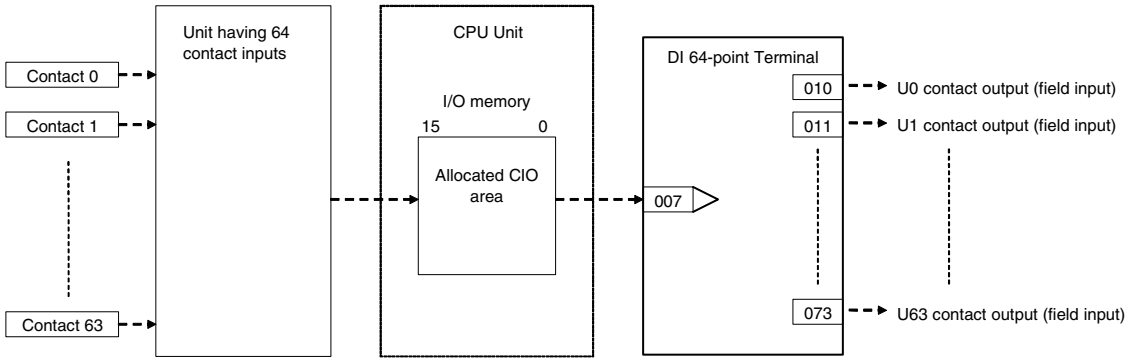
Outline

This function block is the Field Terminal block for inputting 64 contacts from 64-point Input Units (C200H-ID□□□, CS1W-ID261, or CJ1W-ID26□).

•The setting value set on the unit number setting switch on the front of the I/O Unit is not related to this function block. The CIO (channel I/O) Area is set according to the same rules as the Basic I/O Unit.

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit (in the case of the Special I/O Unit, the leading word number allocated to Special I/O Unit relay area) must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DI 64-point Terminal	504	504	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact output (field input)	010	U0	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to							
	025	U15	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	026	U16	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to			Yes	–			
	041	U31	Contact output (field contact input)	0, 1	0	Yes		–	R	1
	042	U32	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to			Yes	–			
	057	U47	Contact output (field contact input)	0, 1	0	Yes		–	R	1
	058	U48	Contact output (field contact input)	0, 1	0	Yes	–	–	R	1
	to		to			Yes	–			
	073	U63	Contact output (field contact input)	0, 1	0	Yes		–	R	1

Block Model	Block Name	Block Address
<511>	DO 5-point Terminal	901 to 980

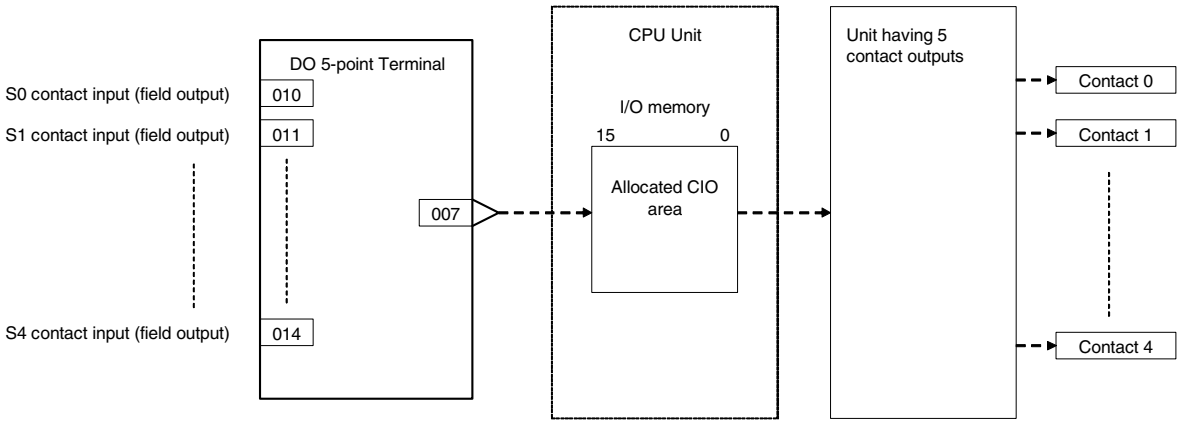
Outline

This function block is the Field Terminal block for outputting five contacts from 5-point Output Units (C200H-OC223).

Note1: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Note2: The data of the five contact points are written to the lower four bits 00 to 04 of 1st word of the allocated CIO. 0 (OFF) is written to remaining bits 05 to 15.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DO 5-point Terminal	511	511	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact input (field contact output)	010	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to							
	014	S4	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

Block Model	Block Name	Block Address
<512>	DO 8-point Terminal	901 to 980

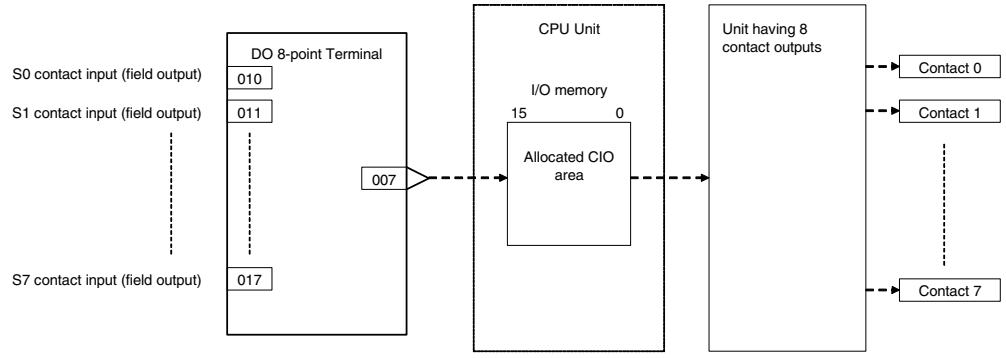
Outline

This function block is the Field Terminal block for outputting eight contacts from 8-point Output Units (C200H-O□□□□ or CJ1W-0□201).

Note1: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Note2: The data of the eight contact points are written to the lower eight bits 00 to 07 of 1st word of the allocated CIO. 0 (OFF) is written to remaining bits 08 to 15.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DO 8-point Terminal	512	512	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact input (field contact output)	010	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to							
	017	S7	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

Block Model	Block Name	Block Address
<513>	DO 12-point Terminal	901 to 980

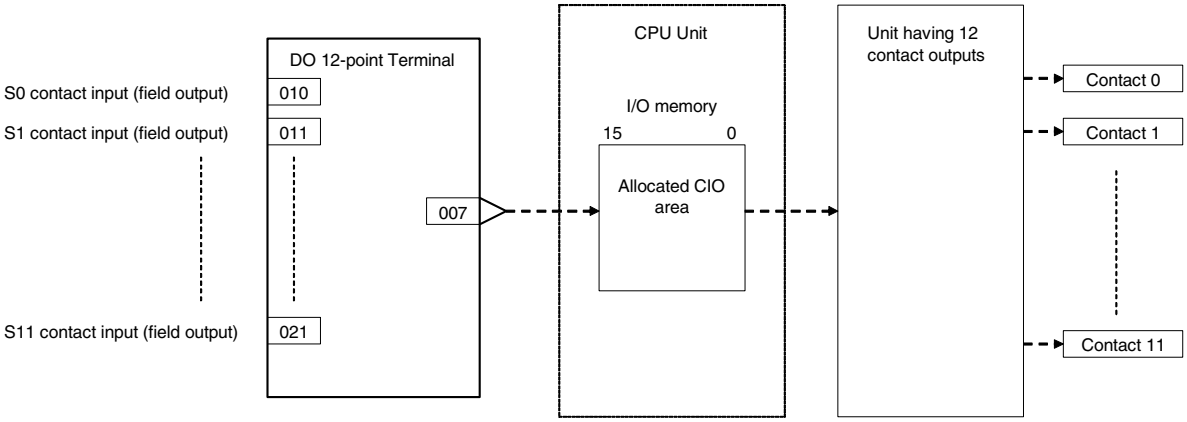
Outline

This function block is the Field Terminal block for outputting 12 contacts from 12-point Output Units (C200H-O□□□).

Note1: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Note2: The data of the 12 contact points are written to the lower 12 bits 00 to 11 of 1st word of the allocated CIO. 0 (OFF) is written to remaining bits 12 to 15.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DO 12-point Terminal	513	513	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact input (field contact output)	010	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to							
	021	S11	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

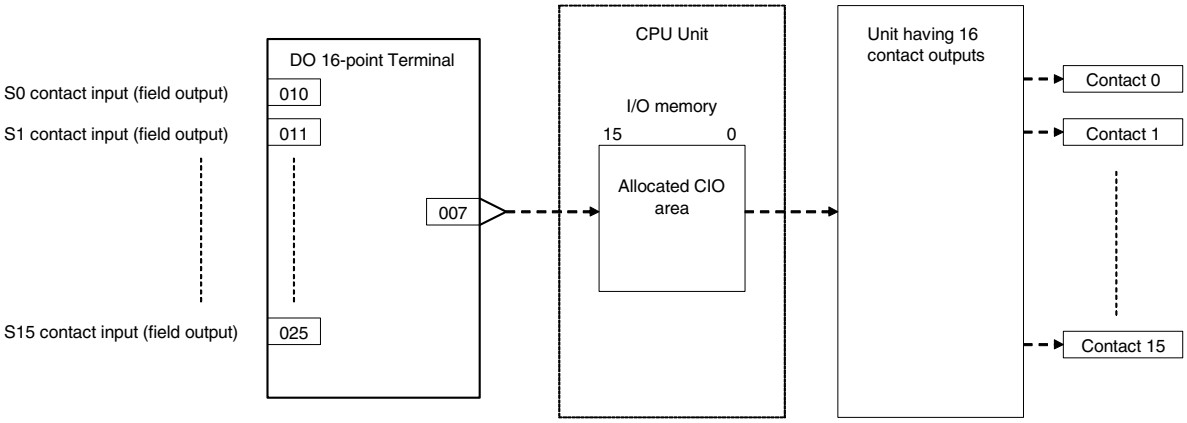
Block Model	Block Name	Block Address
<514>	DO 16-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for outputting 16 contacts from 16-point Output Units (C200H-OD□□□, CS1W-O□□□□, or CJ1W-O□□1□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DO 16-point Terminal	514	514	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact input (field contact output)	010	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to							
	025	S15	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

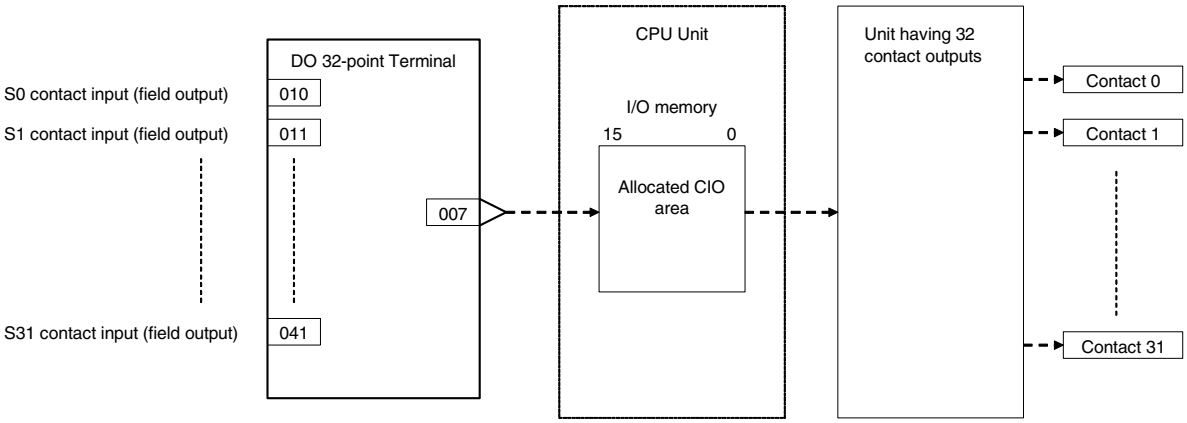
Block Model	Block Name	Block Address
<515>	DO 32-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for outputting 32 contacts from 32-point Output Units (C200H-OD218, CS1W-OD23□, Special I/O Unit C200H-OD215, or CJ1WOD23□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit (in the case of the Special I/O Unit, the leading word number allocated to Special I/O Unit relay area) must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DO 32-point Terminal	515	515	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact input (field contact output)	010	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to							
	025	S15	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	026	S16	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to			Yes				
	041	S31	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

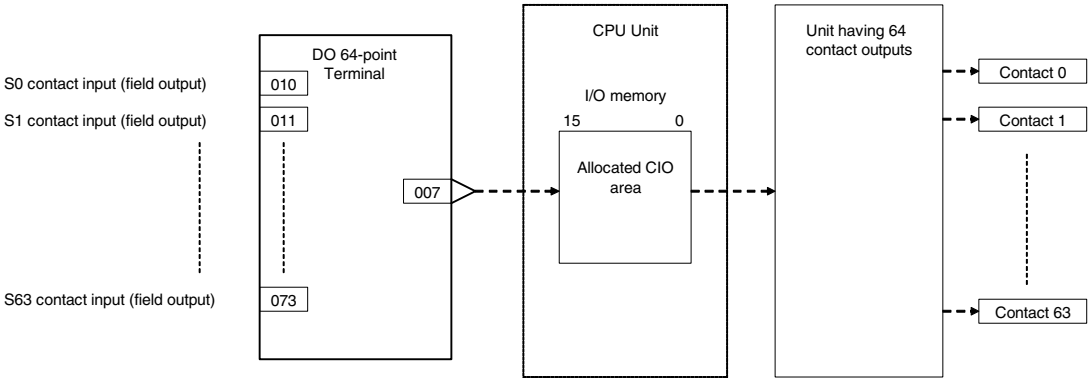
Block Model	Block Name	Block Address
<516>	DO 64-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for outputting 64 contacts from 64-point Output Units (C200H-OD219, CS1W-OD26□, or CJ1W-OD26□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DO 64-point Terminal	516	516	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact input (field contact output)	010	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to			Yes				
	025	S15	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	026	S16	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to			Yes				
	041	S31	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	042	S32	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to			Yes				
	073	S63	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

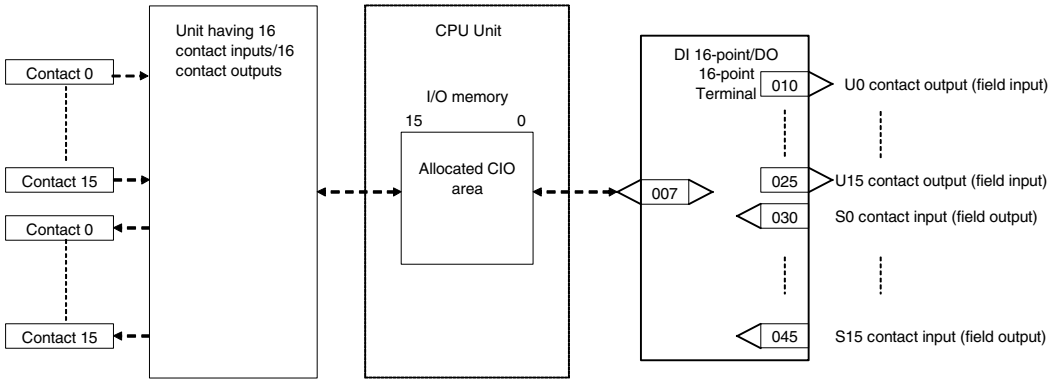
Block Model	Block Name	Block Address
<518>	DI 16-point/DO 16-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for inputting 16 contacts and outputting 16 contacts from 16-point Input/16-point Output Units (Special I/O Unit C200H-MD□□□ or CJ1W-MD□□□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DI 16-point/DO 16-point Terminal	518	518	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact output (field output)	010	U0	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1
	to		to							
	025	U15	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1
Contact input (field contact output)	030	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to			Yes				
	045	S15	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

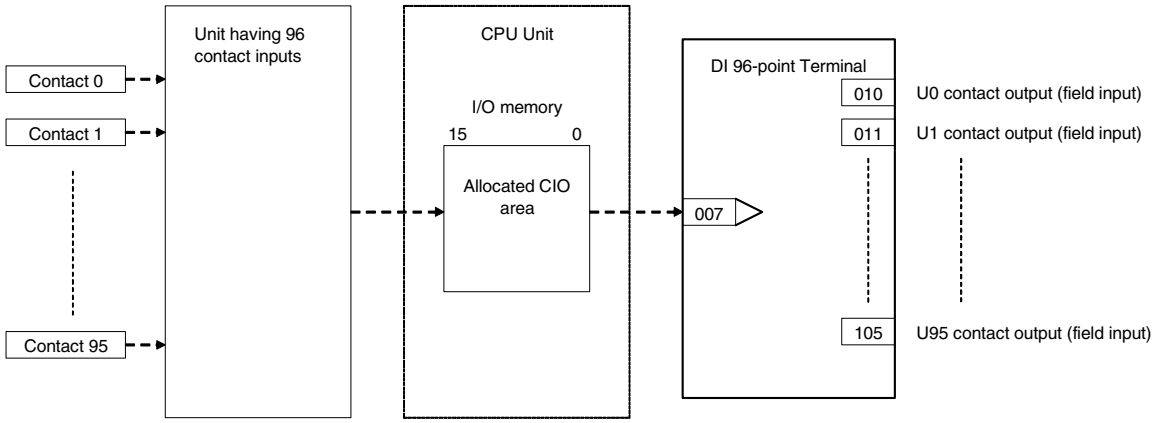
Block Model	Block Name	Block Address
<525>	DI 96-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for inputting 96 contacts from 96-point Input Units (CS1W-ID291).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DI 96-point Terminal	525	525	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact output (field contact input)	010	U0	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1
	to		to							
	025	U15	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1
	026	U16	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	105	U95	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1

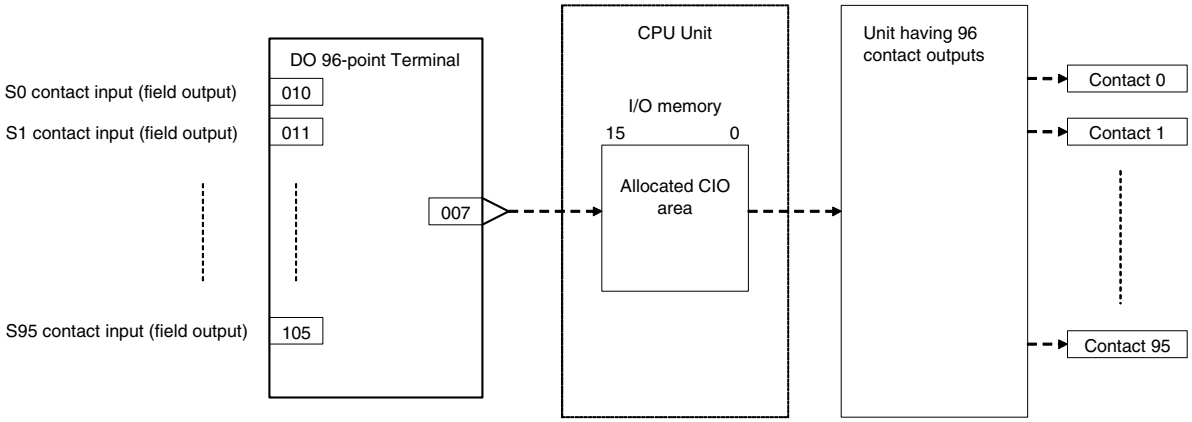
Block Model	Block Name	Block Address
<537>	DO 96-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for outputting 96 contacts from 96-point Output Units (CS1W-OD29□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DO 96-point Terminal	537	537	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact input (field contact output)	010	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to							
	025	S15	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	026	S16	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to			Yes				
	105	S95	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

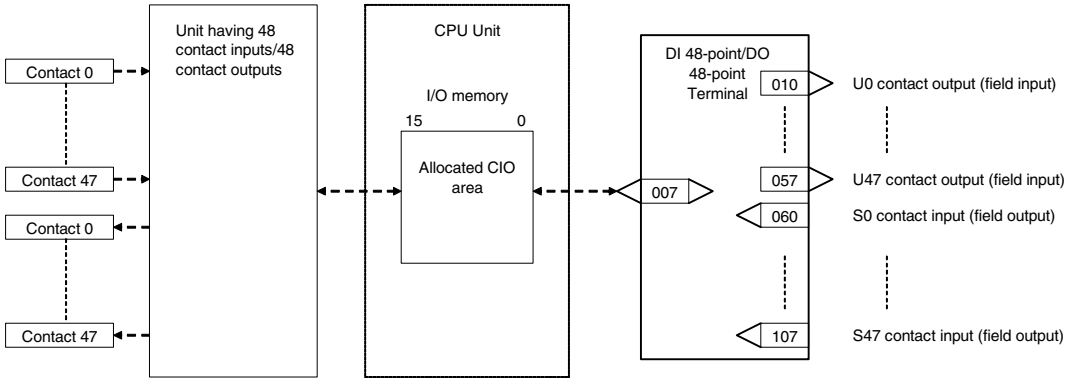
Block Model	Block Name	Block Address
<544>	DI 48-point/DO 48-point Terminal	901 to 980

Outline

This function block is the Field Terminal block for inputting 48 contacts and outputting 48 contacts from 48-point Input/48-point Output Units (CS1W-MD29□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: DI 48-point/ DO 48-point Terminal	544	544	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		CIO word No. (Enter leading word No. allocated to I/O.)	0 to 32767	32767	–	R/W(S)	–	–	2
Contact output (field contact input)	010	U0	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1
	to		to							
	057	U47	Contact input (field contact output)	0, 1	0	Yes	–	–	R	1
Contact input (field contact output)	060	S0	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1
	to		to			Yes				
	107	S47	Contact input (field contact output)	0, 1	0	Yes	–	–	R/W	1

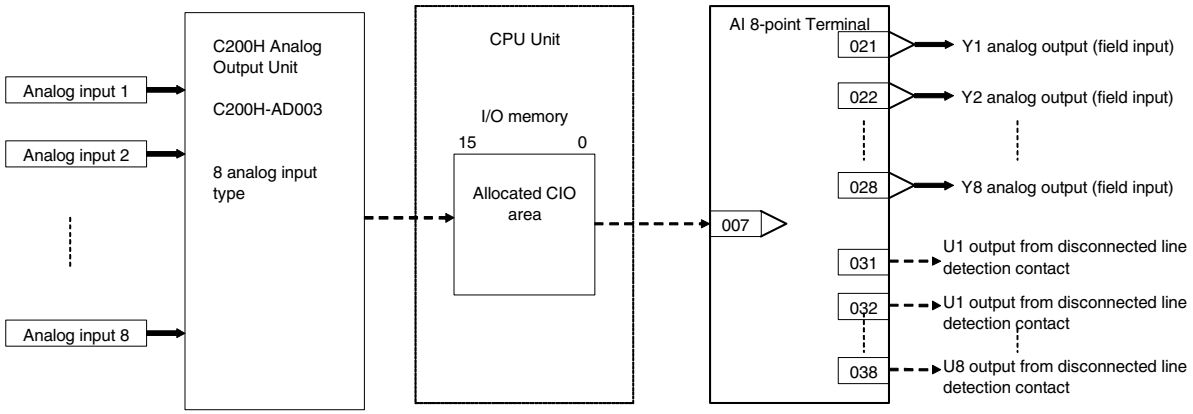
Block Model	Block Name	Block Address
<551>	AI 8-point Terminal (AD003)	901 to 980

Outline

This function block is the Field Terminal block for inputting eight analog signals from 8-point Input Units (C200H-AD003).

Note1: Prevent the averaging function of the Analog Input Unit from duplicating the functions of the function blocks on the Loop Controller.
Note2: For details on how to set the Analog Input Unit, see the Analog I/O Unit User's Manual.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 8-point Terminal (AD003)	551	551	–	R/W(S)	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 15	15	–	R/W(S)	–	–	2
	011	S1	No.1 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V)	0, 1	0	–	R/W(S)	–	–	2
	to		to							
	018	S8	No.8 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V)	0, 1	0	–	R/W(S)	–	–	2
Analog output (field input)	021	Y1	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
	to		to							
	028	Y8	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line)		0	Yes	–	–	R	1
	to		to			Yes				
	038	U8	Output from disconnected line detection contact (0: No error, 1: Disconnected line)		0	Yes	–	–	R	1

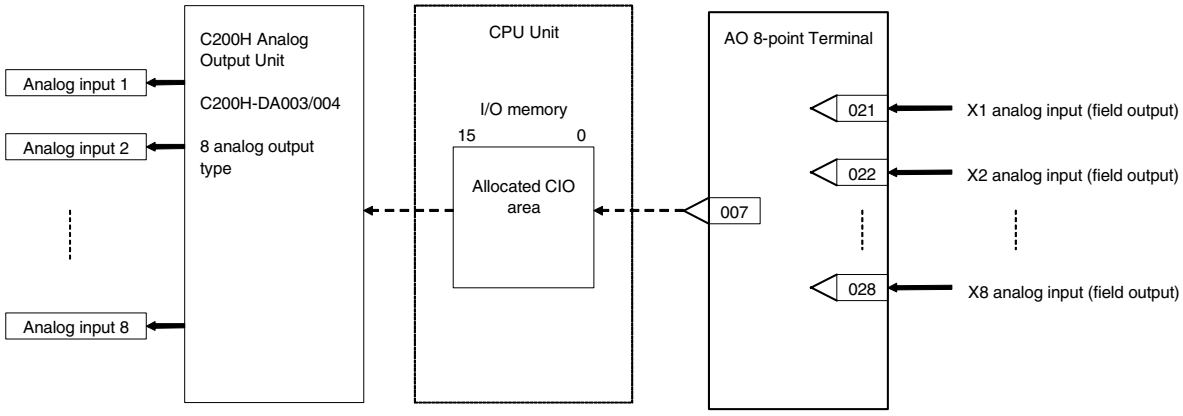
Block Model	Block Name	Block Address
<552>	AO 8-point Terminal (DA003/4)	901 to 980

Outline

This function block is the Field Terminal block for outputting eight analog signals from 8-point Output Units (C200H-DA003/004).

Note1: Prevent the output hold function of the Analog Output Unit from duplicating the functions of the function blocks on the Loop Controller.
Note2: For details on how to set the Analog Output Unit, see the Analog I/O Units Operation Manual (Cat. No. W325).
Note3: 00FF Hex is automatically set to the 1st word (n) of the allocated relay area of C200H-DA003/004. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of the Analog Output Unit cannot be stopped.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AO 8-point Terminal (DA003/4)	552	552	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 15	15	–	R/W(S)	–	–	2
	011		No.1 input range (0: 1 to 5 V/0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to							
	018		No.8 input range (0: 1 to 5 V/0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog input connection information	021		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	to		to							
	028		X8 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	031	X1	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	to		to							
	038	X8	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2

Block Model	Block Name	Block Address
<553>	AI 2-point/AO 2-point Terminal (MAD01)	901 to 980

Outline

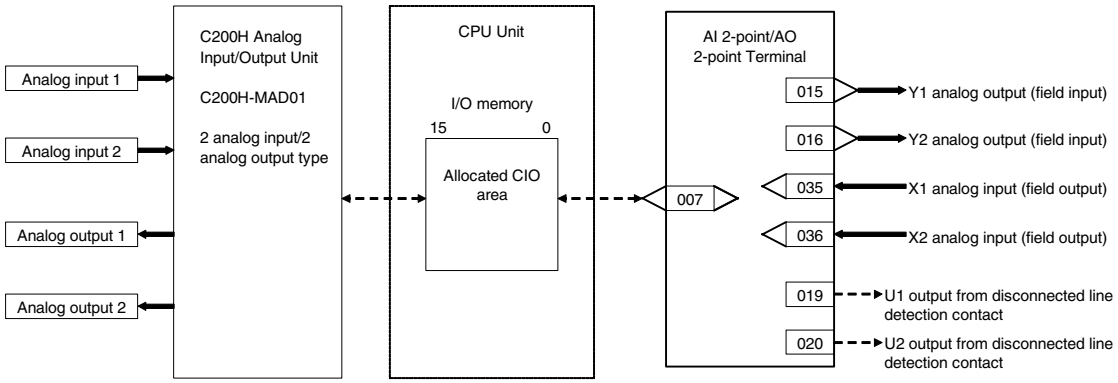
This function block is the Field Terminal block for inputting two analog signals and outputting two analog signals from 2-point Input/2-point Output Units (C200H-MAD01).

Note1: Prevent the averaging, peak hold, output hold and ratio conversion functions of the Analog Input/Output Unit from duplicating the functions of the function blocks on the Loop Controller.

Note2: For details on how to set the Analog Output Unit, see the Analog I/O Units Operation Manual (Cat. No. W325).

Note3: 0003 Hex is automatically set to the 1st word (n) of the allocated relay area of C200H-MAD01. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of analog output cannot be stopped, and the peak hold function of analog input cannot be used.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 2-point/AO 2-point Terminal (MAD01)	553	553	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 15	15	–	R/W(S)	–	–	2
	011		No.1 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V)	0, 1	0	–	R/W(S)	–	–	1
	012		No.2 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V)	0, 1	0	–	R/W(S)	–	–	1
Analog output	015	Y1	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
	016	Y2	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
Parameter	019	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line) Note)	0, 1	0	Yes	–	–	R	1
	020	U2	Output from disconnected line detection contact (0: No error, 1: Disconnected line) Note)	0, 1	0	Yes	–	–	R	1
	031		No.1 output range (0: 1 to 5V/0 to 10V, 1: -10 to +10V)	0, 1	0	–	R/W(S)	–	–	2
	032		No.2 output range (0: 1 to 5V/0 to 10V, 1: -10 to +10V)	0, 1	0	–	R/W(S)	–	–	2
Analog input connection information	035		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	036		X2 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	039	X1	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	040	X2	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2

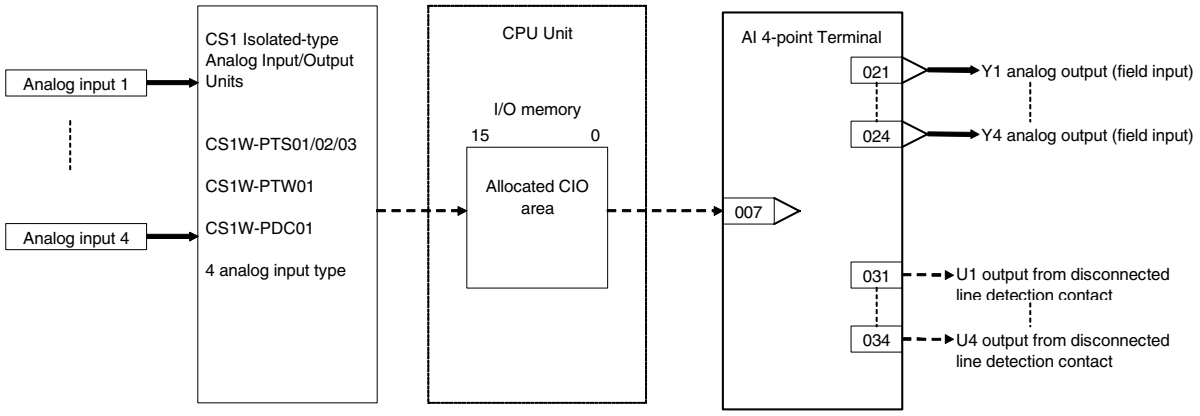
Note: Disconnected line detection functions only when the input is 1 to 5V/4 to 20mA.

Block Model	Block Name	Block Address
<561>	AI 4-point Terminal (PTS01/02/03, PDC01, PTW01, PTS11/12, PDC11)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals from one of Isolated-type Thermocouple Input Unit (CS1W-PTS01), Isolated-type Temperature-resistance Thermometer Input Unit (CS1W-PTS02/03), Isolated-type Analog Input Unit (CS1W-PDC01, CS1W-PTS11, CS1W-PTS12, CS1W-PDC11) or 2-lead Transmitter Input Unit (CS1W-PTW01).
Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

Block diagram



Note: Set the input range conversion method for Y1 to Y4 to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. Analog input will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point Terminal (PTS01/02/03, PDC01, PTW01)	561	561	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 011 and ITEM 012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 9	1	–	R/W(S)	–	–	1
	011		0% value for all ranges or Y1 range	±32000	0	–	R/W(S)	–	–	2
	012		100% value for all ranges or Y1 range	±32000	4000	–	R/W(S)	–	–	2
Analog output (field input)	021	Y1	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to							
	024	Y4	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to							
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

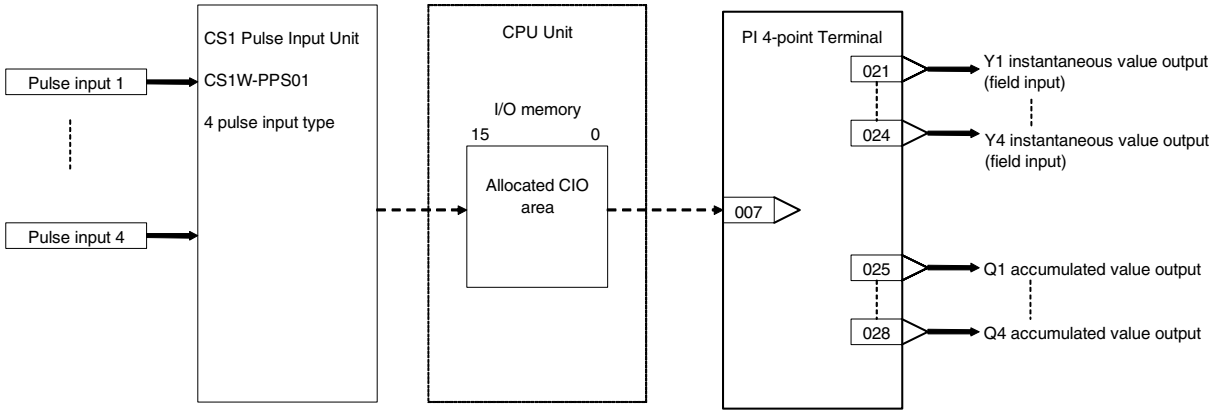
ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	1	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	053		Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 054 and 055)	0 to 4, 9	1	–	R/W(S)	–	–	1
	054		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	056		Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057 and 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2

Block Model	Block Name	Block Address
<562>	PI 4-point Terminal (PPS01)	901 to 980

Outline

This function block is the Field Block for inputting four pulses from Pulse Input Units (CS1W-PPS01).
Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

Block diagram



Note: Set the input range conversion method for Y1 to Y4 to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. Instantaneous value input will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: PI 4-point Terminal (PPS01)	562	562	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 011 and ITEM 012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 9	1	–	R/W(S)	–	–	1
	011		0% value for all ranges or Y1 range	±32000	0	–	R/W(S)	–	–	2
	012		100% value for all ranges or Y1 range	±32000	4000	–	R/W(S)	–	–	2
Analog output	021	Y1	Instantaneous value output	0.00 to 115.00%	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	024	Y4	Instantaneous value output	0.00 to 115.00%	0.00	Yes	r/w	–	–	2
Accumulated output value	025	Q1	Accumulated value output (Accumulation within range 0 to 9999 is repeated.)	0 to 9999	0	Yes	r/w	–	–	2
	to		to			Yes				
	028	Q4	Accumulated value output (Accumulation within range 0 to 9999 is repeated.)	0 to 9999	0	Yes	r/w	–	–	2
Contact output	031	U1	Pulse Input Unit Restart flag Output turns 1 (ON) for 10 sec. at reset of flag.	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	1	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	053		Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 054 and 055)	0 to 4, 9	1	–	R/W(S)	–	–	1
	054		0% value for Y3 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y3 range	±32000	4000	–	R/W(S)	–	–	2
	056		Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057 and 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2

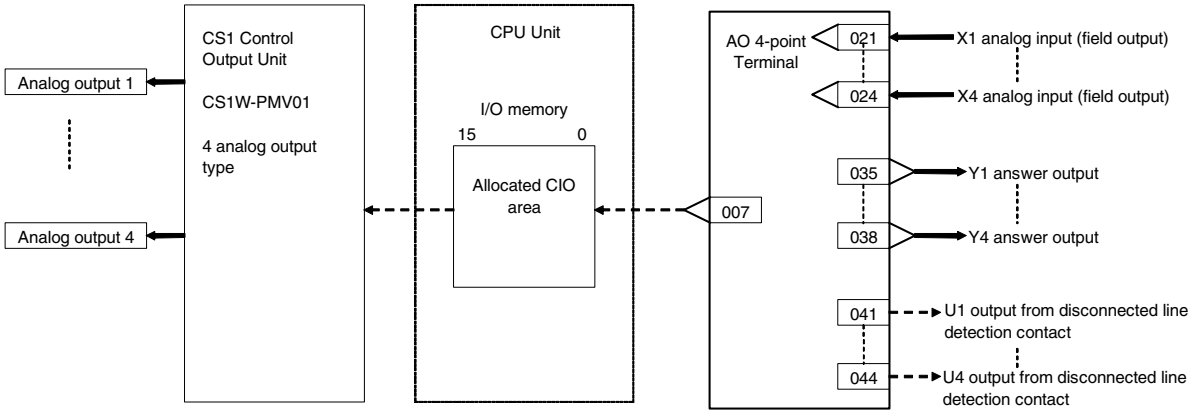
Note: Q1 to Q4 accumulated values are not accumulated values output by the Pulse Input Unit; they are values that are accumulated exclusively by this function block. When a cold start is performed, these accumulated values are cleared to 0. For this reason, if the accumulated values of the Pulse Input Unit are not 0 when a cold start is performed, the Q1 to Q4 accumulated values on the Loop Controller will not match the accumulated values that are output by the Pulse Input Unit.

Block Model	Block Name	Block Address
<563>	AO 4-point Terminal (PMV01)	901 to 980

Outline

This function block is the Field Block for outputting four analog signals from CS-series Control Output Units (CS1W-PMV01).

Block diagram



ITEM list

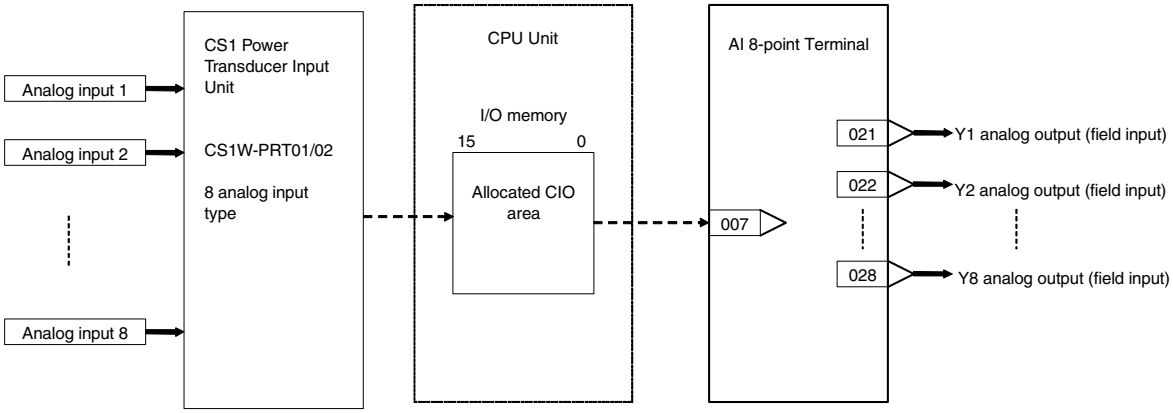
ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AO 4-point Terminal (PMV01)	563	563	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
Analog input connection information	021		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	to		to							
	024		X4 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	031	X1	Analog input (field output)	-20.00 to +115.00%	0.00	Yes	r	–	–	2
	to		to			Yes				
	034	X4	Analog input (field output)	-20.00 to +115.00%	0.00	Yes	r	–	–	2
Analog output (answer input)	035	Y1	Analog output (answer input)	-20.00 to +115.00%	0.00	Yes	r/w	–	–	2
	to		to							
	038	Y4	Analog output (answer input)	-20.00 to +115.00%	0.00	Yes	r/w	–	–	2
Contact output	041	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	2
	to		to							
	044	U4	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	2

Block Model	Block Name	Block Address
<564>	AI 8-point Terminal (PTR01/02)	901 to 980

Outline

This function block is the Field Block for inputting eight analog signals from CS-series Power Transducer Input Units (CS1W-PTR01/02).
Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

Block diagram



Note: Set the input range conversion method for Y1 to Y8 to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. Analog input will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 8-point Terminal (PTR01/02)	564	564	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008*1		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 011 and ITEM 012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 9	1	–	R/W(S)	–	–	1
	011		0% value for all ranges or Y1 range	±32000	0	–	R/W(S)	–	–	2
	012		100% value for all ranges or Y1 range	±32000	4000	–	R/W(S)	–	–	2
Analog output	021	Y1	Analog output (field input)	-15.00 to +115.00%	0.00	Yes	r/w	–	–	2
	to		to							
	028	Y8	Analog output (field input)	-15.00 to +115.00%	0.00	Yes	r/w	–	–	2

Individual range settings

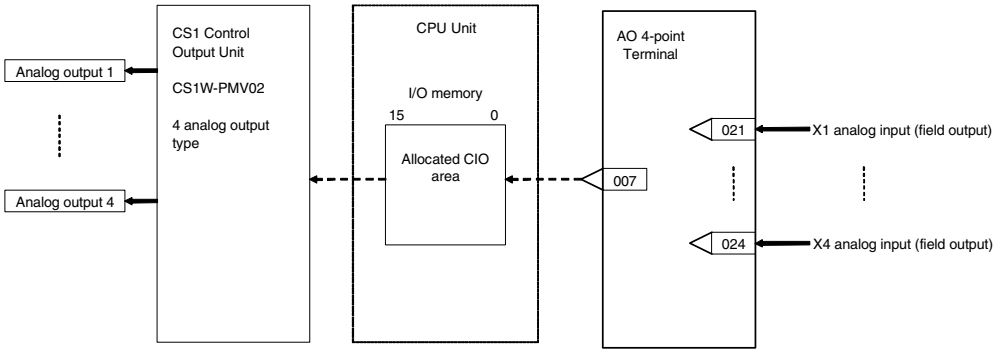
ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	1	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	053		Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 054 and 055)	0 to 4, 9	1	–	R/W(S)	–	–	1
	054		0% value for Y3 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y3 range	±32000	4000	–	R/W(S)	–	–	2
	056		Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057 and 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2
	059		Y5 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 060 and 061)	0 to 4, 9	1	–	R/W(S)	–	–	1
	060		0% value for Y5 range	±32000	0	–	R/W(S)	–	–	2
	061		100% value for Y5 range	±32000	4000	–	R/W(S)	–	–	2
	062		Y6 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 063 and 064)	0 to 4, 9	1	–	R/W(S)	–	–	1
	063		0% value for Y6 range	±32000	0	–	R/W(S)	–	–	2
	064		100% value for Y6 range	±32000	4000	–	R/W(S)	–	–	2
	065		Y7 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 066 and 067)	0 to 4, 9	1	–	R/W(S)	–	–	1
	066		0% value for Y7 range	±32000	0	–	R/W(S)	–	–	2
	067		100% value for Y7 range	±32000	4000	–	R/W(S)	–	–	2
	068		Y8 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 069 and 070)	0 to 4, 9	1	–	R/W(S)	–	–	1
	069		0% value for Y8 range	±32000	0	–	R/W(S)	–	–	2
	070		100% value for Y8 range	±32000	4000	–	R/W(S)	–	–	2

Block Model	Block Name	Block Address
<565>	AO 4-point Terminal (PMV02)	901 to 980

Outline

This function block is the Field Block for outputting four analog signals from CS-series Control Output Units (CS1W-PMV02).

Block diagram



Note: Set the output range conversion method for X1 to X4 to the same setting as the output data scaling value (allocated DM Area) used for the Unit's scaling function. Analog output will not be accurate if the parameter value is different from the Unit's output data scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AO 4-point Terminal (PMV02)	565	565	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008		Range conversion method 0: All ranges together, 1: Individual ranges	0, 1	0	–	R/W(S)	–	–	1
	010		Output range conversion for all ranges or for X1 (for all four ranges) (0: 0 to 10000,1: 0 to 4000, 2: 0 to 8000, 3: 0 to 16000, 9: Specified range (specified with ITEM 011 and ITEM 012.)) Note: Either all ranges or individual ranges (Y1) is selected in ITEM 008.	0 to 3, 9	1	–	R/W(S)	–	–	1
	011		Input range 0% value for all ranges or for X1	±32000	0	–	R/W(S)	–	–	2
	012		Input range 100% value for all ranges or for X1	±32000	4000	–	R/W(S)	–	–	2
Analog input connection information	021		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	to		to					–	–	
	024		X4 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	031	X1	Analog input (field output)	-15.00 to +115.00%	0.00	Yes	r	–	–	2
	to		to			Yes		–	–	
	034	X4	Analog input (field output)	-15.00 to +115.00%	0.00	Yes	r	–	–	2

Individual range settings

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		X2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: 0 to 8000, 3: 0 to 16000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	1	–	R/W(S)	–	–	1
	051		0% value for X2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for X2 range	±32000	4000	–	R/W(S)	–	–	2
	053		X3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: 0 to 8000, 3: 0 to 16000, 4: –3000 to 3000, 9: Range specified at ITEM 054 and 055)	0 to 4, 9	1	–	R/W(S)	–	–	1
	054		0% value for X3 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for X3 range	±32000	4000	–	R/W(S)	–	–	2
	056		X4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: 0 to 8000, 3: 0 to 16000, 4: –3000 to 3000, 9: Range specified at ITEM 057 and 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	057		0% value for X4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for X4 range	±32000	4000	–	R/W(S)	–	–	2

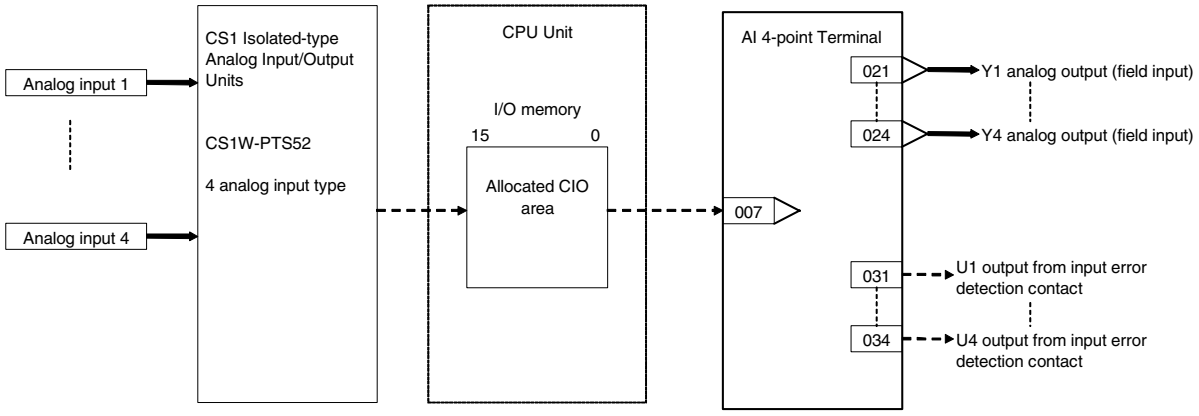
Block Model	Block Name	Block Address
<566>	AI 4-point Terminal (PTS51)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals from one of Isolated-type Thermocouple Input Unit (CS1W-PTS51).
Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

This function block are supported only for LCB01/05 Ver.2.0 or later, and LCB03.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment Field Ai_4 Rx Box	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point Terminal (PTS51)	566	566	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008*1		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion 0: -200 to +1300 °C 1: 0.0 to +500.0 °C 2: -100 to +850 °C 3: 0.0 to 400.0 °C 4: -200.0 to +400.0 °C 7: 0 to 1700 °C 9: 400 to 1800 °C 10: -300 to 2300 °F 11: 0.0 to 900.0 °F 12: -100 to 1500 °F 13: 0.0 to 750.0 °F 14: -300.0 to 700.0 °F 17: 0 to 3000 °F 19: 750 to 3200 °F Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 70 to 4, 7 to 14, 17, 19.	0	–	R/W(S)	–	–	1
Analog output (field input)	021	Y1	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to							
	024	Y4	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to							
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050 *1		Y2 input range conversion 0: -200 to +1300 °C 1: 0.0 to +500.0 °C 2: -100 to +850 °C 3: 0.0 to 400.0 °C 4: -200.0 to +400.0 °C 7: 0 to 1700 °C 9: 400 to 1800 °C 10: -300 to 2300 °F 11: 0.0 to 900.0 °F 12: -100 to 1500 °F 13: 0.0 to 750.0 °F 14: -300.0 to 700.0 °F 17: 0 to 3000 °F 19: 750 to 3200 °F	0 to 4, 7 to 14, 17, 19.	0	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	053 *1		Y3 input range conversion 0: -200 to +1300 °C 1: 0.0 to +500.0 °C 2: -100 to +850 °C 3: 0.0 to 400.0 °C 4: -200.0 to +400.0 °C 7: 0 to 1700 °C 9: 400 to 1800 °C 10: -300 to 2300 °F 11: 0.0 to 900.0 °F 12: -100 to 1500 °F 13: 0.0 to 750.0 °F 14: -300.0 to 700.0 °F 17: 0 to 3000 °F 19: 750 to 3200 °F	0 to 4, 7 to 14, 17, 19.	0	–	R/W(S)	–	–	1
	054		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	056 *1		Y4 input range conversion 0: -200 to +1300 °C 1: 0.0 to +500.0 °C 2: -100 to +850 °C 3: 0.0 to 400.0 °C 4: -200.0 to +400.0 °C 7: 0 to 1700 °C 9: 400 to 1800 °C 10: -300 to 2300 °F 11: 0.0 to 900.0 °F 12: -100 to 1500 °F 13: 0.0 to 750.0 °F 14: -300.0 to 700.0 °F 17: 0 to 3000 °F 19: 750 to 3200 °F	0 to 4, 7 to 14, 17, 19.	0	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2

*1: Can be set in the CS Series only. In the CJ Series, all inputs share the same setting.

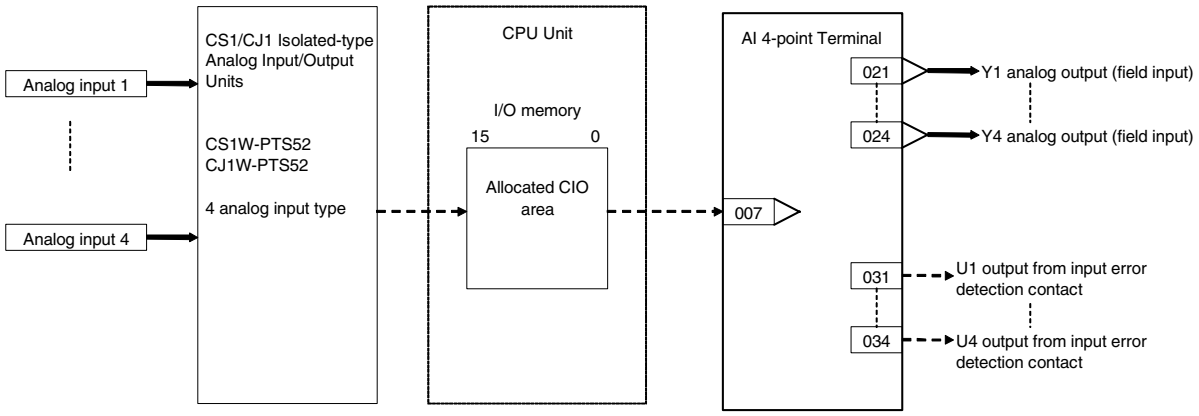
Block Model	Block Name	Block Address
<567>	AI 4-point Terminal (PTS52)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals from one of Isolated-type Temperature-resistance Thermometer Input Unit (CS1W-PTS52 or CJ1W-PTS52).
Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

This function block is supported only for LCB01/05 Ver.2.0 or later, and LCB03.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment Field Ai_4 Rx Box	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point Terminal (PTS52)	567	567	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 9	1	–	R/W(S)	–	–	1
Analog output (field input)	021	Y1	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to							
	024	Y4	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to							
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		Y2 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	053		Y3 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	054		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	056		Y4 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2

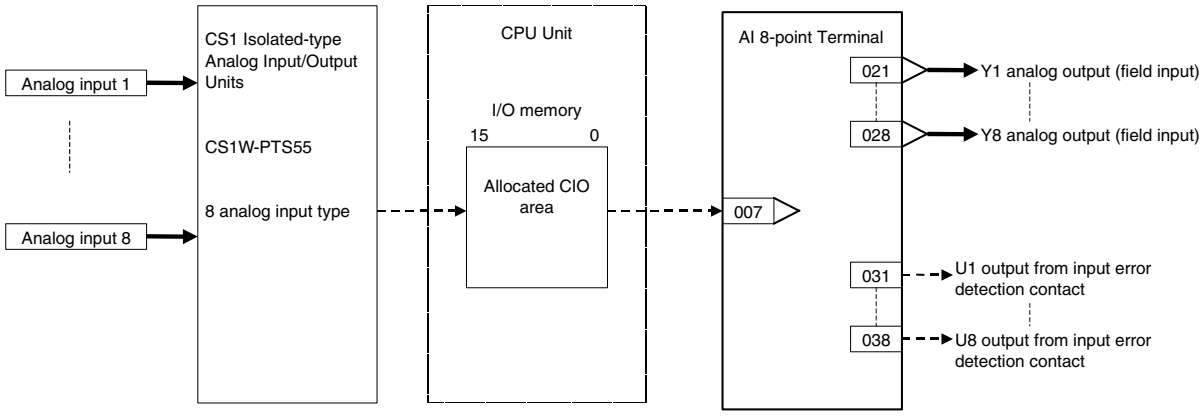
Block Model	Block Name	Block Address
<568>	AI 8-point Terminal (PTS55)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals from one of Isolated-type Thermocouple Input Unit (CS1W-PTS55).
Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

This function block is supported only for LCB01/05 Ver.2.0 or later, and LCB03.

Block diagram



Note: Set the data format in the operation settings for the CS1W-PTS55 (allocated DM Area) to the default (i.e. binary format).

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment Field Ai_8 Rx Box	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point Terminal (PTS55)	568	568	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008*1		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion 0: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 7, 9, 10 to 14, 17, 19	0	–	R/W(S)	–	–	1
Analog output (field input)	021	Y1	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to							
	024	Y4	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to							
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		Y2 input range conversion 0: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F	0 to 4, 7, 9, 10 to 14, 17, 19	0	–	R/W(S)	–	–	1
	051		Y3 input range conversion 00: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F	0 to 4, 7, 9, 10 to 14, 17, 19	0	–	R/W(S)	–	–	1
	052		Y4 input range conversion 00: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F	0 to 4, 7, 9, 10 to 14, 17, 19	0	–	R/W(S)	–	–	1
	059		Y5 input range conversion 0: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F	0 to 4, 7, 9, 10 to 14, 17, 19	0	–	R/W(S)	–	–	1

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
	062		Y6 input range conversion 0: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F	0, 10	0	–	R/W(S)	–	–	1
	065		Y7 input range conversion 0: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F	0 to 4, 7, 9, 10 to 14, 17, 19	0	–	R/W(S)	–	–	1
	068		Y8 input range conversion 0: -200 to +1300°C 1: 0.0 to +500.0°C 2: -100 to +850°C 3: 0.0 to 400.0°C 4: -200.0 to +400.0°C 7: 0 to 1700°C 9: 400 to 1800°C 10: -300 to +2300°F 11: 0.0 to 900.0°F 12: -100 to +1500°F 13: 0.0 to 750.0°F 14: -300.0 to +700.0°F 17: 0 to 3000°F 19: 750 to 3200°F	0 to 4, 7, 9, 10 to 14, 17, 19	0	–	R/W(S)	–	–	1

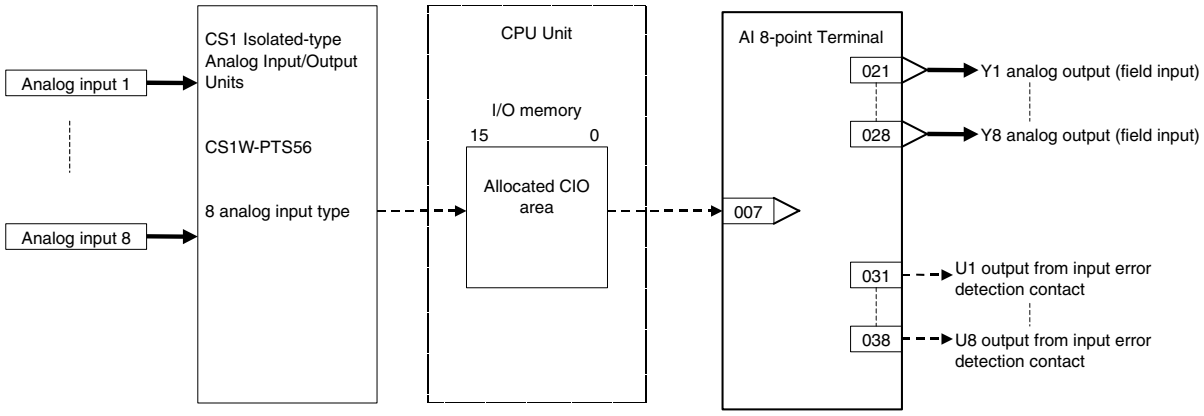
Block Model	Block Name	Block Address
<569>	AI 8-point Terminal (PTS56)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals from one of Isolated-type Temperature-resistance Thermometer Input Unit (CS1W-PTS56). Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

This function block is supported only for LCB01/05 Ver.2.0 or later, and LCB03.

Block diagram



Note: Set the data format in the operation settings for the CS1W-PTS56 (allocated DM Area) to the default (i.e. binary format).

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment Field Ai_8 Rx Box	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point Terminal (PTS55)	569	569	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008*1		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0, 10	1	–	R/W(S)	–	–	1
Analog output (field input)	021	Y1	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to							
	024	Y4	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to							
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		Y2 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	053		Y3 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	056		Y4 input range conversion 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	059		Y5 input range 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	062		Y6 input range 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	065		Y7 input range 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1
	068		Y8 input range 0: -200.0 to 650.0°C 10: -300.0 to 1200.0°F	0, 10	0	–	R/W(S)	–	–	1

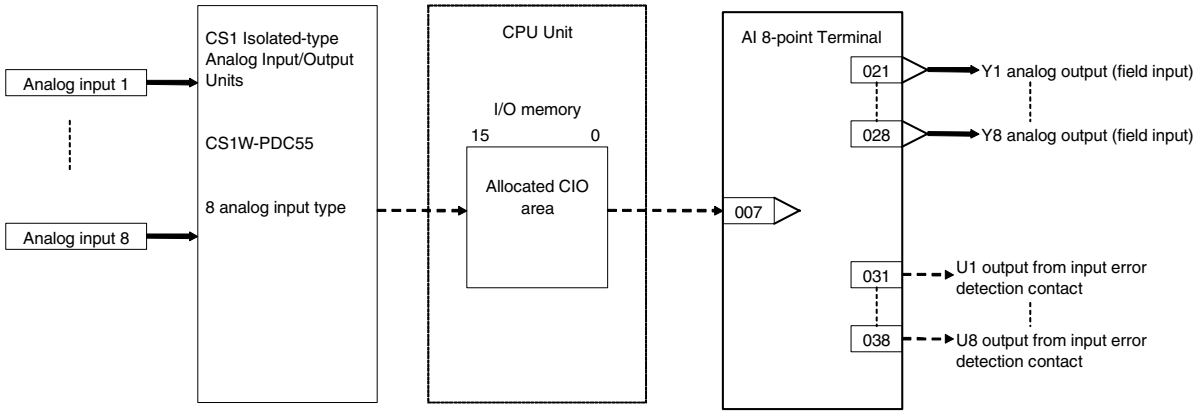
Block Model	Block Name	Block Address
<570>	AI 8-point Terminal (PDC55)	901 to 980

Outline

This function block is the Field Terminal for inputting eight analog signals from one of Isolated-type Direct current Input Unit (CS1W-PDC55).
Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point.

This function block is supported only for LCB01/05 Ver.2.0 or later, and LCB03.

Block diagram



Note1: Set the data format in the operation settings for the CS1W-PDC55 (allocated DM Area) to the default (i.e. binary format).

Note2: Set the input range conversion method for Y1 to Y8 to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. Y1 to Y8 output will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point Terminal (PDC55)	570	570	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008*1		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W (S)	–	–	1
Parameter	010		Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 011 and ITEM 012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 9	1	–	R/W(S)	–	–	1
	011		0% value for all ranges or Y1 range	±32000	0	–	R/W(S)	–	–	2
	012		100% value for all ranges or Y1 range	±32000	4000	–	R/W(S)	–	–	2
Analog output (field input)	021	Y1	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to							
	028	Y8	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to							
	038	U8	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

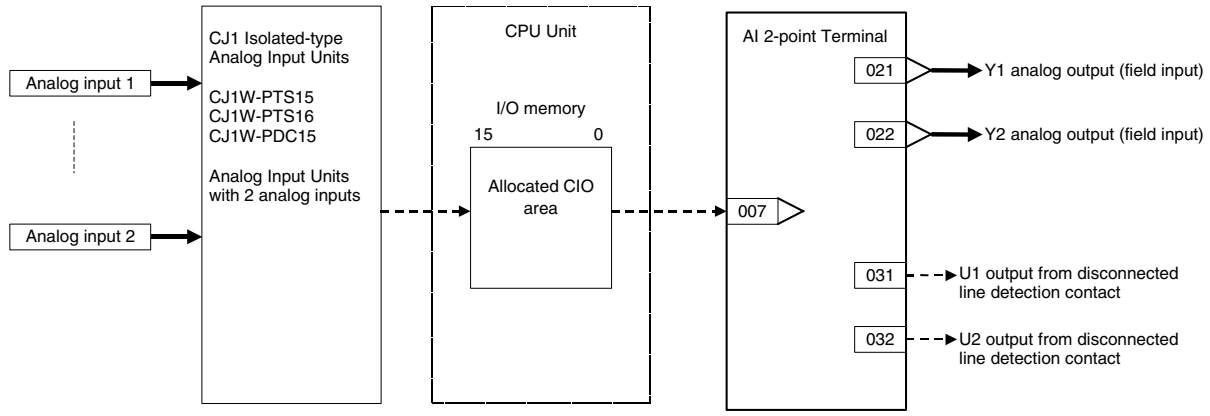
ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050		Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	1	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	053		Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 054 and 055)	0 to 4, 9	1	–	R/W(S)	–	–	1
	054		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	056		Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057 and 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2
	059		Y5 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	1	–	R/W(S)	–	–	1
	060		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	061		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	062		Y6 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 054 and 055)	0 to 4, 9	1	–	R/W(S)	–	–	1
	063		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	064		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	065		Y7 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057 and 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	066		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	067		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2
	068		Y8 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057 and 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	069		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	070		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2

Block Model	Block Name	Block Address
<571>	AI 2-point Terminal (PTS15/16, PDC15)	901 to 980

Outline

This function block is a Field Terminal used to input two analog signals from a CJ-series Isolated-type Analog Input Unit with two analog inputs (CJ1W-PTS15 Thermocouple Input Unit, CJ1W-PTS16 Temperature-resistance Thermometer Input Unit, or CJ1W-PDC15 Analog Input Unit).
Both of the outputs (Y1 and Y2) can be set to the same output range or a different range can be set for each output.

Block diagram



Note: Set the input range conversion method for Y1 and Y2 to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. The analog input will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000	---	Stop block operation command (0: Cancel stop, 1: Stop)	0 or 1	0	Yes	---	---	---	1
Parameter	001	COMMENT	Comment	23 characters	Block name	---	R/W(S)	---	---	24
	002	MODEL	Block Model: AI 2-point Terminal (PTS15/16 or PDC15)	571	571	---	R/W(S)	---	---	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	---	---	S
Parameter	004	CNTTMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01, 7: 0.02, 8: 0.05	0 to 8	0	---	R/W(S)	---	---	2
Parameter	007	U_No	Unit number	0 to 95	95	---	R/W(S)	---	---	2
	008	TYPE	Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0 or 1	0	---	R/W(S)	---	---	1
Parameter	010	R_TYP1	Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 011 and ITEM 012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4 or 9	1	---	R/W(S)	---	---	1
	011	RNG_L1	0% value of input range for both outputs or Y1 (when independent)	±32,000	0	---	R/W(S)	---	---	2
	012	RNG_H1	100% value of input range for both outputs or Y1 (when independent)	±32,000	4,000	---	R/W(S)	---	---	2
Analog output (field input)	021	Y1	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	---	---	2
	022	Y2	Analog output (field input)	-15.00 to +115.00	0.00	Yes	r/w	---	---	2
Contact output	031	U1	Output value of input error contact (0: No error, 1: Input error)	0 or 1	0	Yes	---	---	R	1
	032	U2	Output value of input error contact (0: No error, 1: Input error)	0 or 1	0	Yes	---	---	R	1

Individual Range Settings

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Parameter	050	R_TYP2	Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4 or 9	1	---	R/W(S)	---	---	1
	051	RNG_L2	0% value for Y2 range	±32,000	0	---	R/W(S)	---	---	2
	052	RNG_H2	100% value for Y2 range	±32,000	4,000	---	R/W(S)	---	---	2

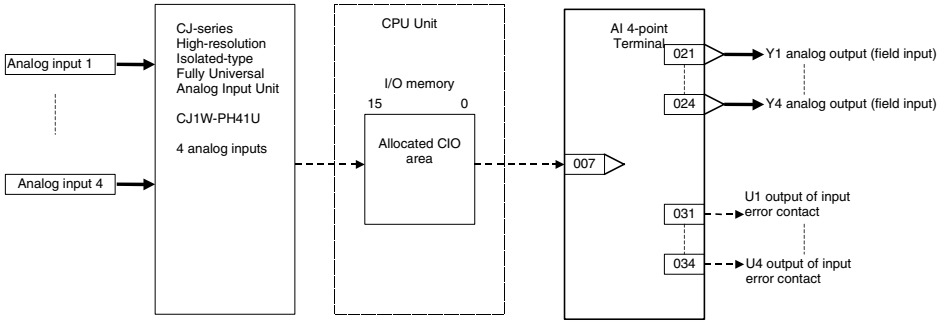
Block Model	Block Name	Block Address
<572>	AI 4-point Terminal (PH41U)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals from the High-resolution Isolated-type Fully Universal Analog Input Unit (CJ1W-PH41U).

- The 64,000 resolution mode is supported.
- Either one range can be set for all points (Y1 to Y4) or a different range can be set for each point.

Block diagram



Note:
- The Loop Controller cannot handle 4-byte analog input data. The analog input data from the CJ1W-PH41U must therefore be converted to 2-byte data.
- Use the following settings to convert the analog input data from the CJ1W-PH41U to 2-type data.
  - Process value data length for the CJ1W-PH41U:
    Set bits 04 to 07 of DM (m+1) to 0001. (m is D20000 + 100 × unit number).

  When this setting is made, the analog data input range will be ~32,768 to 32,767. Set scaling for this range.
- If you want to use the 4-byte analog input data, e.g., in the PLC, do not make the above settings, convert to 2-byte data in the ladder program (using the APR instruction), and input the 2-byte data though User Link Tables. (This Field Terminal would not be used.)
- Set the input range conversion method for Y1 to Y4 to the same settings as the PV scaling values (in allocated DM Area words) used for the Unit's scaling function. Analog inputs will not be accurate if the parameter values are different from the Unit's PV scaling values.

ITEM list

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write R/W: R/W-enabled, RW-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							Accord ing to CX-Process tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: Isolated-type AI 4-point Terminal (PH41U)	572	572	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01*, 7: 0.02*, 8 :0.05* *: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W(S)	–	–	1
Parameter	010		Common or Y1 input range conversion (one range set for all four points) (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 011 and ITEM 012) **Note:** ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 9	0	–	R/W(S)	–	–	1
	011		0% value for all ranges or Y1 range	±32000	0	–	R/W(S)	–	–	2
	012		100% value for all ranges or Y1 range	±32000	10000	–	R/W(S)	–	–	2
Analog output (field input)	021	Y1	Analog output (field input)	15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	024	Y4	Analog output (field input)	15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write R/W: R/W-enabled, RW-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							Accord-ing to CX-Process tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	
Parameter	050		Y2 input range conversion (0: 0 to 10000, 1:0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	0	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	10000	–	R/W(S)	–	–	2
	053		Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 054, 055)	0 to 4, 9	0	–	R/W(S)	–	–	1
	054		0% value for Y3 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y3 range	±32000	10000	–	R/W(S)	–	–	2
	056		Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057, 058)	0 to 4, 9	0	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	10000	–	R/W(S)	–	–	2

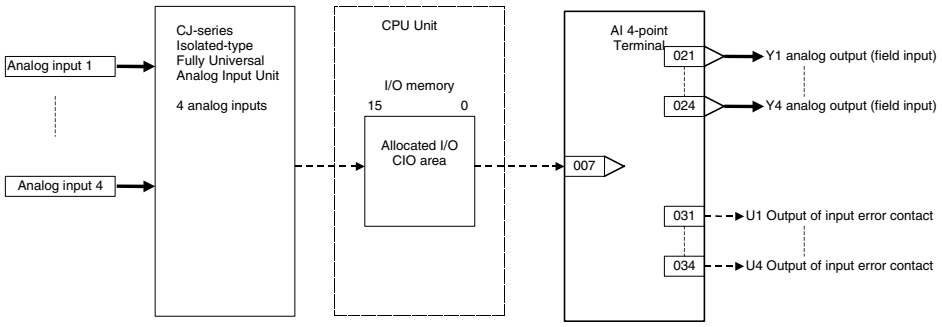
Block Model	Block Name	Block Address
<573>	AI 4-point Terminal (AD04U)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals from the Basic-type Isolated-type Fully Universal Analog Input Unit (CJ1W-AD04U).

- Either one range can be set for all points (Y1 to Y4) or a different range can be set for each point.

Block Diagram



Note: Set the input range conversion method for Y1 to Y4 to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. Analog input will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: Isolated-type AI 4-point Terminal (AD04U)	573	573	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01*, 7: 0.02*, 8: 0.05* *: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	008		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W(S)	–	–	1
Parameter	010		Common or Y1 input range conversion (one range set for all four points) (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 011 and ITEM 012) **Note:** ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 4, 9	1	–	R/W(S)	–	–	1
	011		0% value for all ranges or Y1 range	±32000	0	–	R/W(S)	–	–	2
	012		100% value for all ranges or Y1 range	±32000	4000	–	R/W(S)	–	–	2
Analog output (field output)	021	Y1	Analog output (field input)	–15.00 to 115.00	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	024	Y4	Analog output (field input)	–15.00 to 115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	
Parameter	050		Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2:–2000 to 2000, 3: 0 to 6000, 4: –3000 to +3000, 9: Range specified at ITEM 051 and 052)	0 to 4, 9	1	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	0	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	4000	–	R/W(S)	–	–	2
	053		Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 054, 055)	0 to 4, 9	1	–	R/W(S)	–	–	1
	054		0% value for Y3 range	±32000	0	–	R/W(S)	–	–	2
	055		100% value for Y3 range	±32000	4000	–	R/W(S)	–	–	2
	056		Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: –2000 to 2000, 3: 0 to 6000, 4: –3000 to 3000, 9: Range specified at ITEM 057, 058)	0 to 4, 9	1	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	0	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	4000	–	R/W(S)	–	–	2

Block Model	Block Name	Block Address
<581>	AI 4-point Terminal (ADG41)	901 to 980

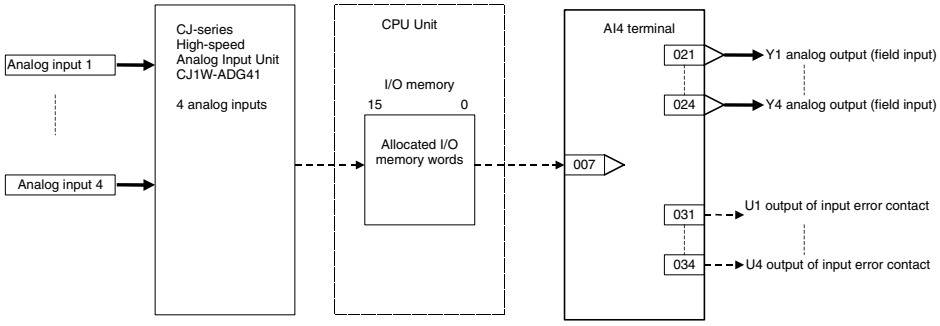
Outline

This function block is the Field Terminal for inputting four analog signals from the High-speed Analog Input Unit (CJ1W-ADG41).

- Either one range can be set for all points (Y1 to Y4) or a different range can be set for each point.

Note: The CJ1W-ADG41 is a CPU Bus Unit. Words area thus allocated to the analog inputs in the CPU Bus Unit Area (CIO 1500 to CIO 1899, 25 words allocated per Unit).

Block Diagram



Note: Set the input range conversion method for Y1 to Y4 to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. Analog input will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Sym-bol	Data description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							Accord-ing to CX-Process Tool	Accord-ing to ITEM Setting block	Accord-ing to Sequen-tial Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: Isolated-type AI 4-point Terminal (ADG41)	581	581	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01*, 7: 0.02*, 8: 0.05* *: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 15	15	–	R/W(S)	–	–	2
	008		Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range	0, 1	0	–	R/W(S)	–	–	1
Parameter	010		Common or Y1 input range conversion (one range set for all four points) (0: −30000 to 30000, 1: 0 to 30000, 2: 0 to 24000, 9: Range specified at ITEM 011 and ITEM 012) **Note:** ITEM 008 determines if this parameter is for all ranges or only the Y1 input range.	0 to 2, 9	0	–	R/W(S)	–	–	1
	011		0% value for all ranges or Y1 range	±32000	−30000	–	R/W(S)	–	–	2
	012		100% value for all ranges or Y1 range	±32000	30000	–	R/W(S)	–	–	2
Analog Output values (field inputs)	021	Y1	Analog output value (field input)	−15.00 to +115.00	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	024	Y4	Analog output value (field input)	−15.00 to +115.00	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	034	U4	Output of input error contact (0: No error, 1: Input error)	0, 1	0	Yes	–	–	R	1

Individual range settings

ITEM TYPE	ITEM	Sym-bol	Data Description	Data Range	Default	COLD start initializa-tion	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							Accord-ing to CX-Process Tool	**Accord-ing to ITEM Setting block**	**Accord-ing to Sequen-tial Control Block**	
Parameter	050		Y2 input range conversion (0: -30000 to 30000, 1: 0 to 30000, 2: 0 to 24000, 9: Range specified at ITEM 051 and 052)	0 to 2, 9	0	–	R/W(S)	–	–	1
	051		0% value for Y2 range	±32000	–30000	–	R/W(S)	–	–	2
	052		100% value for Y2 range	±32000	30000	–	R/W(S)	–	–	2
	053		Y3 input range conversion (0: –30000 to 30000, 1: 0 to 30000, 2: 0 to 24000, 9: Range specified at ITEM 054, 055)	0 to 2, 9	0	–	R/W(S)	–	–	1
	054		0% value for Y3 range	±32000	–30000	–	R/W(S)	–	–	2
	055		100% value for Y3 range	±32000	30000	–	R/W(S)	–	–	2
	056		Y4 input range conversion (0: –30000 to 30000, 1: 0 to 30000, 2: 0 to 24000, 9: Range specified at ITEM 057, 058)	0 to 2, 9	0	–	R/W(S)	–	–	1
	057		0% value for Y4 range	±32000	–30000	–	R/W(S)	–	–	2
	058		100% value for Y4 range	±32000	30000	–	R/W(S)	–	–	2

Block Model	Block Name	Block Address
<582>	AI 16-point Terminal (AD161)	901 to 980

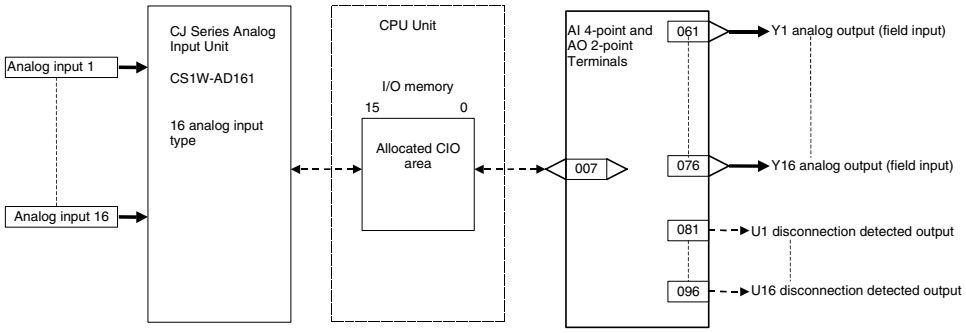
Outline

This function block is a Field Terminal block used to input signals from a CS1W-AD161 CS-series Analog Input Unit.

This function block can be used with LCB01/03/05 Ver. 3.0 and later Loop Control Board versions only.

Note 1: Do not duplicate the Analog Input Unit's averaging/smoothing and peak hold functions with the Loop Controller's function block functions.
Note 2: Refer to the Analog I/O Unit User's Manual for details on Analog Input Unit settings.
Note 3: One CS1W-AD161 Analog Input Unit uses the allocated CIO areas of two unit numbers (the areas for unit number set on the Unit and the following unit number). Set the unit number in ITEM 007 within the allowed range of 0 to 94.

Block diagram



Note: Set the input range conversion method for the inputs (Y1 to Y16) to the same setting as the PV scaling value (allocated DM Area) used for the Unit's scaling function. The analog input will not be accurate if the parameter value is different from the Unit's PV scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000	---	Stop block operation command (0: Cancel stop, 1: Stop)	0 or 1	0	Yes	---	---	---	1
Parameter	001	COMMENT	Comment Field Ai_16 Rx Box	23 characters	Block name	---	R/W(S)	---	---	24
	002	MODEL	Block Model: AI 16-point Terminal (AD161)	582	582	---	R/W(S)	---	---	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")		0000	Yes	r	---	---	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01, 7: 0.02, 8: 0.05	0 to 8	0	---	R/W(S)	---	---	2
Parameter	007	U_No	Unit number	0 to 94	94	---	R/W(S)	---	---	2
	009	TYPE	Resolution 0: 1/4000, 1: 1/8000	0 or 1	0	---	R/W(S)	---	---	1
	011	I_R_TYP1	No.1 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 012 and ITEM 013)	0, 1, or 9	0	---	R/W(S)	---	---	2
	012	I_RNG_L1	0% value of input range for input 1	±32,000	0	---	R/W(S)	---	---	2
	013	I_RNG_H1	100% value of input range for input 1	±32,000	4,000	---	R/W(S)	---	---	2
	014	I_R_TYP2	No.2 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 012 and ITEM 013)	0, 1, or 9	0	---	R/W(S)	---	---	2
	015	I_RNG_L2	0% value of input range for input 2	±32,000	0	---	R/W(S)	---	---	2
	016	I_RNG_H2	100% value of input range for input 2	±32,000	4,000	---	R/W(S)	---	---	2
	017	I_R_TYP3	No.3 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 012 and ITEM 013)	0, 1, or 9	0	---	R/W(S)	---	---	2
	018	I_RNG_L3	0% value of input range for input 3	±32,000	0	---	R/W(S)	---	---	2
	019	I_RNG_H3	100% value of input range for input 3	±32,000	4,000	---	R/W(S)	---	---	2
	020	I_R_TYP4	No.4 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 012 and ITEM 013)	0, 1, or 9	0	---	R/W(S)	---	---	2
	021	I_RNG_L4	0% value of input range for input 4	±32,000	0	---	R/W(S)	---	---	2
	022	I_RNG_H4	100% value of input range for input 4	±32,000	4,000	---	R/W(S)	---	---	2
	023	I_R_TYP5	No.5 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 012 and ITEM 013)	0, 1, or 9	0	---	R/W(S)	---	---	2
	024	I_RNG_L5	0% value of input range for input 5	±32,000	0	---	R/W(S)	---	---	2
	025	I_RNG_H5	100% value of input range for input 5	±32,000	4,000	---	R/W(S)	---	---	2
	026	I_R_TYP6	No.6 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
	027	I_RNG_L6	0% value of input range for input 6	±32,000	0	---	R/W(S)	---	---	2
	028	I_RNG_H6	100% value of input range for input 6	±32,000	4,000	---	R/W(S)	---	---	2
	029	I_R_TYP7	No.7 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	030	I_RNG_L7	0% value of input range for input 7	±32,000	0	---	R/W(S)	---	---	2
	031	I_RNG_H7	100% value of input range for input 7	±32,000	4,000	---	R/W(S)	---	---	2
	032	I_R_TYP8	No.8 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	033	I_RNG_L8	0% value of input range for input 8	±32,000	0	---	R/W(S)	---	---	2
	034	I_RNG_H8	100% value of input range for input 8	±32,000	4,000	---	R/W(S)	---	---	2
	035	I_R_TYP9	No.9 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	036	I_RNG_L9	0% value of input range for input 9	±32,000	0	---	R/W(S)	---	---	2
	037	I_RNG_H9	100% value of input range for input 9	±32,000	4,000	---	R/W(S)	---	---	2
	038	I_R_TYP10	No.10 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	039	I_RNG_L10	0% value of input range for input 10	±32,000	0	---	R/W(S)	---	---	2
	040	I_RNG_H10	100% value of input range for input 10	±32,000	4,000	---	R/W(S)	---	---	2
	041	I_R_TYP11	No.11 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	042	I_RNG_L11	0% value of input range for input 11	±32,000	0	---	R/W(S)	---	---	2
	043	I_RNG_H11	100% value of input range for input 11	±32,000	4,000	---	R/W(S)	---	---	2
	044	I_R_TYP12	No.12 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	045	I_RNG_L12	0% value of input range for input 12	±32,000	0	---	R/W(S)	---	---	2
	046	I_RNG_H12	100% value of input range for input 12	±32,000	4,000	---	R/W(S)	---	---	2
	047	I_R_TYP13	No.13 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	048	I_RNG_L13	0% value of input range for input 13	±32,000	0	---	R/W(S)	---	---	2
	049	I_RNG_H13	100% value of input range for input 13	±32,000	4,000	---	R/W(S)	---	---	2
	050	I_R_TYP14	No.14 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
	051	I_RNG_L14	0% value of input range for input 14	±32,000	0	---	R/W(S)	---	---	2
	052	I_RNG_H14	100% value of input range for input 14	±32,000	4,000	---	R/W(S)	---	---	2
	053	I_R_TYP15	No.15 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	054	I_RNG_L15	0% value of input range for input 15	±32,000	0	---	R/W(S)	---	---	2
	055	I_RNG_H15	100% value of input range for input 15	±32,000	4,000	---	R/W(S)	---	---	2
	056	I_R_TYP16	No.16 input range (0: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 4 to 20 mA; 1: –10 to +10 V; 9: Range specified in ITEM 021 and ITEM 022)	0, 1, or 9	0	---	R/W(S)	---	---	2
	057	I_RNG_L16	0% value of input range for input 16	±32,000	0	---	R/W(S)	---	---	2
	058	I_RNG_H16	100% value of input range for input 16	±32,000	4,000	---	R/W(S)	---	---	2
Analog output (field input)	061	Y1	Analog output (field input)	-5.00 to +105.00	0.00	Yes	r/w	---	---	2
	to	to	:	:	:	:	:	:	:	:
	076	Y16	Analog output (field input)	-5.00 to +105.00	0.00	Yes	r/w	---	---	2
Contact output	081	U1	Disconnection detected output value (0: No error, 1: Disconnection)	0 or 1	0	Yes	---	---	R	1
	to	to	:	:	:	:	:	:	:	:
	096	U16	Disconnection detected output value (0: No error, 1: Disconnection)	0 or 1	0	Yes	---	---	R	1

Block Model	Block Name	Block Address
<583>	AI 4-point/AO 4-point Terminal (MAD44)	901 to 980

Outline

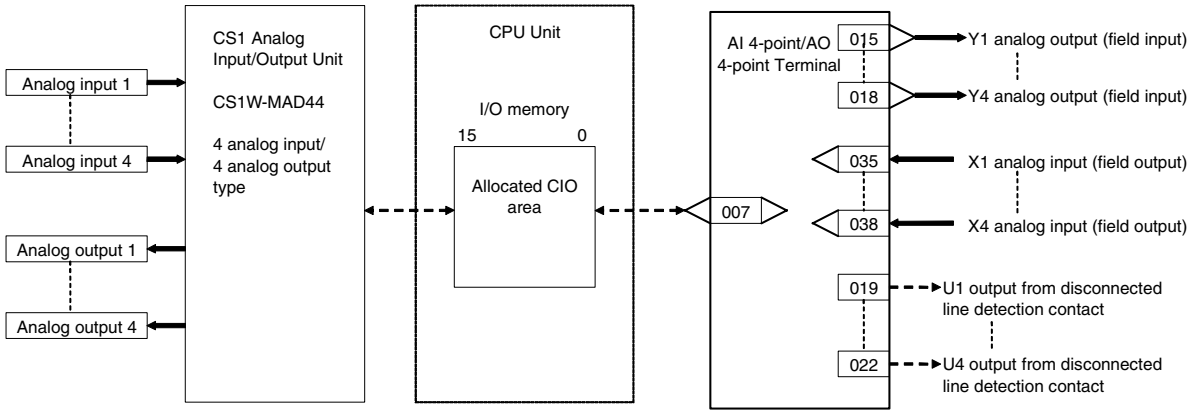
This function block is the Field Terminal for inputting four analog signals and outputting four analog signals from the 4-point Input/4-point Output Unit (CS1W-MAD44).

Note 1: Prevent the averaging, peak hold, output hold and ratio conversion functions of the Analog Input/Output Unit from duplicating the functions of the function blocks on the Loop Controller.

Note 2: For details on how to set the Analog Input/Output Unit, see the Analog I/O Units Operation Manual (Cat. No. W345).

Note 3: 000F Hex is automatically set to the 1st word (n) of the allocated relay area of CS1W-MAD44. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of analog output cannot be stopped, and the peak hold function of analog input cannot be used.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point/AO 4-point Terminal (MAD44)	583	583	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	011		No.1 input range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to			–				
	014		No.4 input range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog output	015	Y1	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	018	Y4	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
Contact output	019	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	022	U4	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1
Parameter	031		No.1 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 10 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to			–				
	034		No.1 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 10 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog input connection information	035		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	to		to			–				
	038		X4 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	039	X1	Analog output (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	to		to			Yes				
	042	X4	Analog output (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2

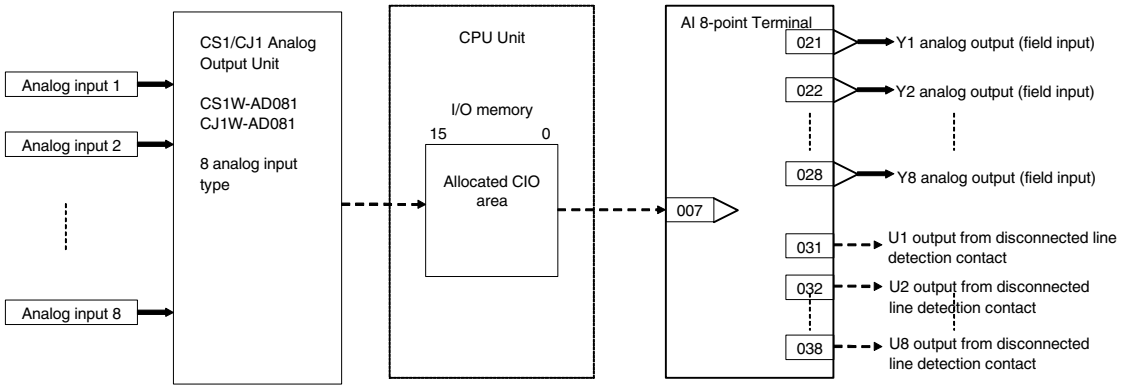
Block Model	Block Name	Block Address
<584>	AI 8-point Terminal (AD081)	901 to 980

Outline

This function block is the Field Terminal for inputting eight analog signals from the CS/CJ-series 8-point Analog Input Unit (CS1W-AD081 (-V) or CJ1W-AD081 (-V))

Note1: Prevent the averaging function of the Analog Input Unit from duplicating the functions of the function blocks on the Loop Controller.
Note2: For details on how to set the Analog Input Unit, see the Analog I/O Units Operation Manual (Cat. No. W345).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002	MODEL	Block Model: AI 8-point Terminal (AD081)	584	584	–	R/W(S)	–	–	2
Parameter	004	CNT, TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	009	V1_SW	Resolution 0: 1/4000, 1: 1/8000	0, 1	0	–	R/W(S)	–	–	2
	011	S1	No.1 input range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V 4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to			–				
	018	S8	No.8 input range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog output (field input)	021	Y1	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	028	Y8	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	038	U8	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1

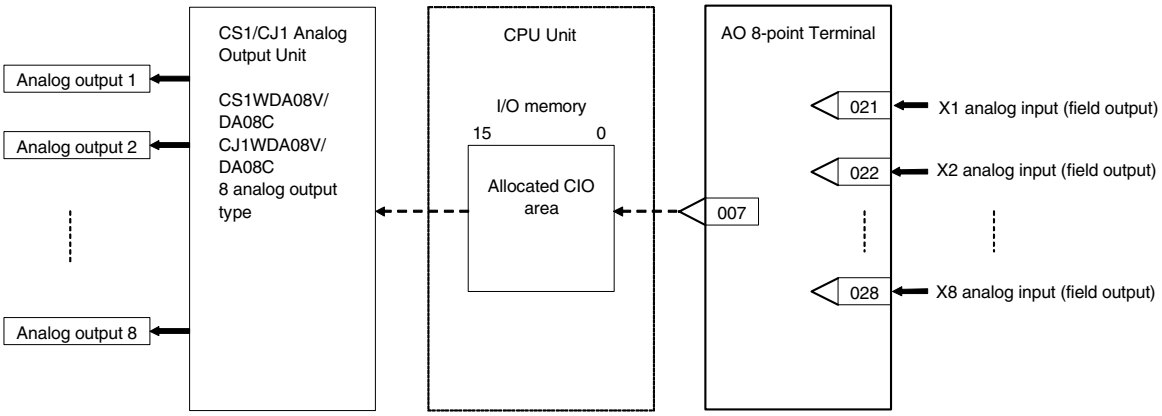
Block Model	Block Name	Block Address
<585>	AO 8-point Terminal (DA08V/C)	901 to 980

Outline

This function block is the Field Terminal for outputting eight analog signals from the CS/CJ-series 8-point Analog Output Units (CS1W-DA08V/DA08C or CJ1W-DA08V/DA08C).

Note 1: Prevent the output hold function of the Analog Output Unit from duplicating the functions of the function blocks on the Loop Controller.
Note 2: For details on how to set the Analog Output Unit, see the Analog I/O Units Operation Manual (Cat. No. W345).
Note 3: 00FF Hex is automatically set to the 1st word (n) of the allocated relay area of CS1W-DA08V/DA08C. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of the Analog Output Unit cannot be stopped.

Block diagram



Note: Set the output range conversion method for X1 to X8 to the same setting as the output data scaling value (allocated DM Area) used for the Unit's scaling function. Analog output will not be accurate if the parameter value is different from the Unit's output data scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AO 8-point Terminal (DA08V/C)	585	585	–	R/W(S)	–	–	2
Parameter	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List")	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	009	V1_SW	Resolution*2 0: 1/4000, 1: 1/8000 Note: Not supported by CS1W-DA08V/DA08C	0, 1	0	–	R/W(S)	–	–	2
	011		No.1 output range (0: 1 to 5 V/0 to 5 V/0 to 10 V/4 to 20 mA, 1: -10 to +10 V, 9:Range specified at ITEM 040 and ITEM 041)	0, 1, 9	0	–	R/W(S)	–	–	2
	to		to			–				
	018		No.8 output range (0: 1 to 5 V/0 to 5 V/0 to 10 V/4 to 20 mA, 1: -10 to +10 V, 9:Range specified at ITEM 054 and ITEM 055)	0, 1, 9	0	–	R/W(S)	–	–	2
Analog input connection information	021		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	Yes	R/W(S)	–	–	4
	to		to			Yes				
	028		X8 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	Yes	R/W(S)	–	–	4
Analog input (field output)	031	X1	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	to		to			Yes				
	038	X8	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
Parameter	040		Common or No.1 output range 0% value *2	±32000	0	–	R/W(S)	–	–	2
	041		Common or No.1 output range 100% value *2	±32000	4000	–	R/W(S)	–	–	2
	to		to							
	054		No.8 output range 0% value *2	±32000	0	–	R/W(S)	–	–	2
	055		No.8 output range 100% value *2	±32000	4000	–	R/W(S)	–	–	2

*2: Not supported by the CS1W-DA08V/DA08C

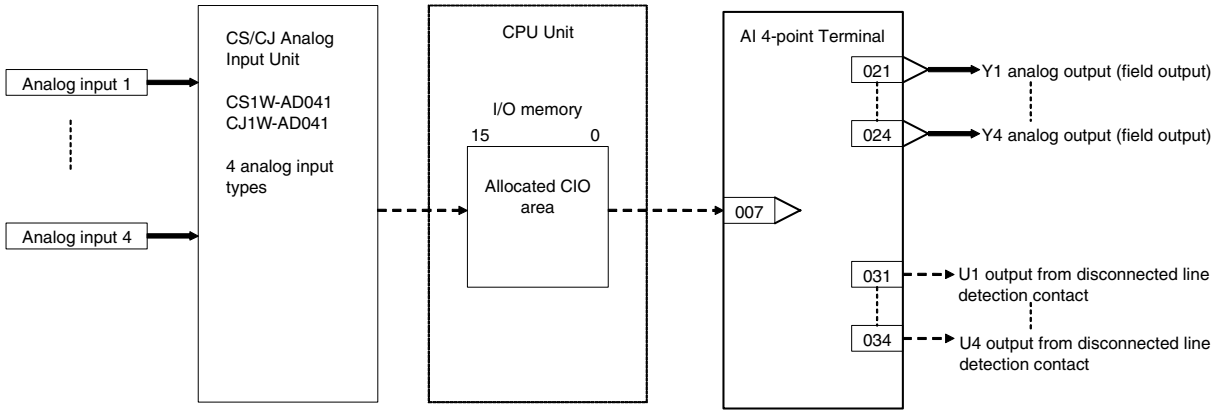
Block Model	Block Name	Block Address
<586>	AI 4-point Terminal (AD041)	901 to 980

Outline

This function block is the Field Terminal block for inputting four analog signals from the CS/CJ-series 4-point Analog Input Units (CS1W-AD041 (-V) or CJ1W-AD041 (-V).

Note 1: Prevent the averaging function of the Analog Input Unit from duplicating the functions of the function blocks on the Loop Controller.
Note 2: For details on how to set the Analog Input Unit, see the Analog I/O Units Operation Manual (Cat. No. W345).

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001	COMMENT	Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002	MODEL	Block Model: AI 4-point Terminal (AD041)	586	586	–	R/W(S)	–	–	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007	U_NO	Unit number	0 to 95	95	–	R/W(S)	–	–	2
	009	V1_SW	Resolution 0: 1/4000, 1: 1/8000	0, 1	0	–	R/W(S)	–	–	2
	011	S1	No.1 input range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to			–				
	014	S4	No.4 input range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog output (field input)	021	Y1	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	024	Y4	Analog output (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	034	U4	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1

Block Model	Block Name	Block Address
<587>	AO 4-point Terminal (DA041)	901 to 980

Outline

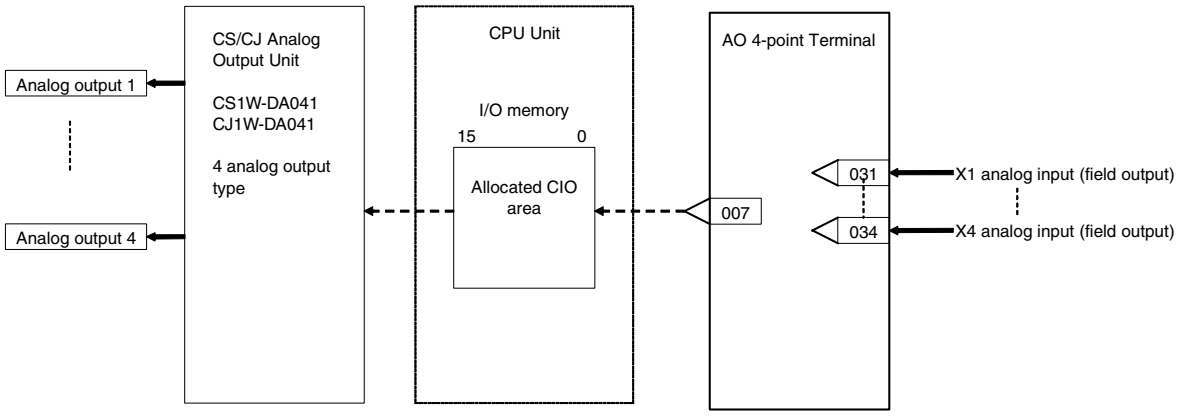
This function block is the Field Terminal for outputting four analog signals from the CS/CJ-series 4-point Analog Output Unit (CS1W-DA041 or CJ1N-DA041).

Note 1: Prevent the output hold function of the Analog Output Unit from duplicating the functions of the function blocks on the Loop Controller.

Note 2: For details on how to set the Analog Output Unit, see the Analog I/O Units Operation Manual (Cat. No. W345).

Note 3: 000F Hex is automatically set to the 1st word (n) of the allocated relay area of CS1W-DA041 or CJ1W-DA041. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of the Analog Output Unit cannot be stopped.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AO 4-point Terminal (DA041)	587	587	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	011		No.1 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to			–				
	014		No.4 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog input connection information	021	U1	X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	to		to			–				
	024	U4	X4 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	031	X1	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	to		to			Yes				
	034	X4	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2

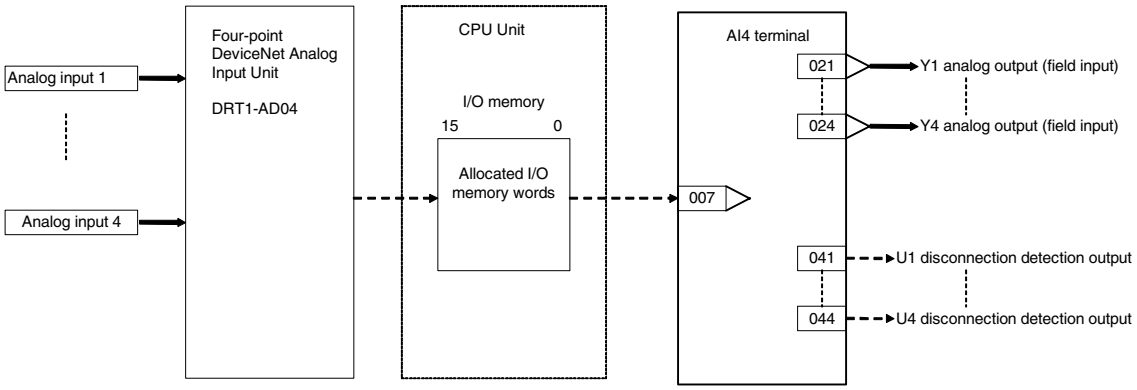
Block Model	Block Name	Block Address
<588>	AI 4-point Terminal (DRT1-AD04)	901 to 980

Outline

This function block is the Field Terminal block for a DRT1-AD04 DeviceNet Analog Input Unit. It enables directly inputting from the ladder program in the Loop Controller values input to the DRT1-AD04 without conversion (MSB (15) is the sign bit).

Note: Use a user link table for a DeviceNet Analog Input Terminal except for DRT1-AD04 Terminals, such as the DRT1-AD04H.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AI 4-point Terminal (DRT1-AD04)	588	588	–	R/W(S)	–	–	2
Parameters	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
	007		CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.0)	0 to 4	3	–	R/W(S)	–	–	1
	008		Leading Address	0 to 32767	32767	–	R/W(S)	–	–	2
Parameter	011		No. 1 input range (: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA/0 to 20 mA, 1: -10 to 10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to			–				
	014		No. 4 input range (: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA/0 to 20 mA, 1: -10 to 10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog output values (field inputs)	021	Y1	Analog output value (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	024	Y4	Analog output value (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
Contact output	031	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	034	U4	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1

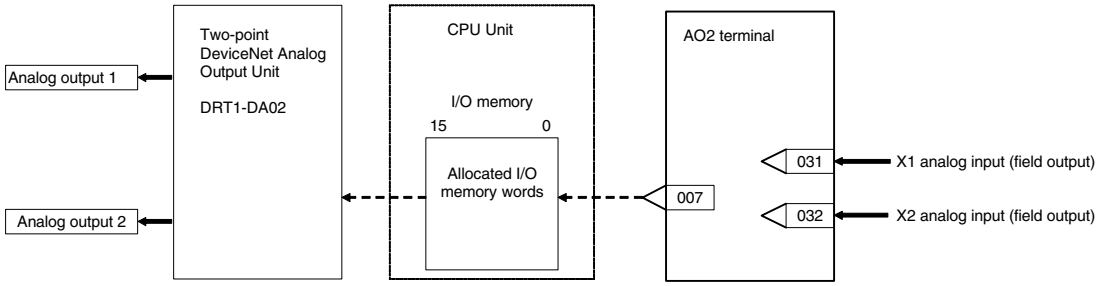
Block Model	Block Name	Block Address
<589>	AO 2-point Terminal (DRT1-DA02)	901 to 980

Outline

This function block is the Field Terminal block for a DRT1-DA02 DeviceNet Analog Output Unit. It enables directly outputting from the ladder program in the Loop Controller values to be output from the DRT1-DA02 without conversion (MSB (15) is the sign bit).

Note: Use a user link table for a DeviceNet Analog Output Terminal, except for the DRT1-DA02.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AO 2-point Terminal (DRT1-DA02)	589	589	–	R/W(S)	–	–	2
Special	003		Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.")		0000	Yes	r	–	–	2
Parameters	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
	007		CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.0)	0 to 4	3	–	R/W(S)	–	–	1
	008		Leading address	0 to 32767	32767	–	R/W(S)	–	–	2
	011		No. 1 output range (0: 1 to 5 V/0 to 10 V /4 to 20 mA/0 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	012		No. 2 output range (0: 1 to 5 V/0 to 10 V /4 to 20 mA/0 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog input connection information	021		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	022		X2 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input values (field outputs values)	031	X1	Analog input value (field output value)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	032	X2	Analog input value (field output value)	-5.00 to +105.00%	0.00	Yes	r	–	—	2

Block Model	Block Name	Block Address
<591>	AO 2-point Terminal (DA021)	901 to 980

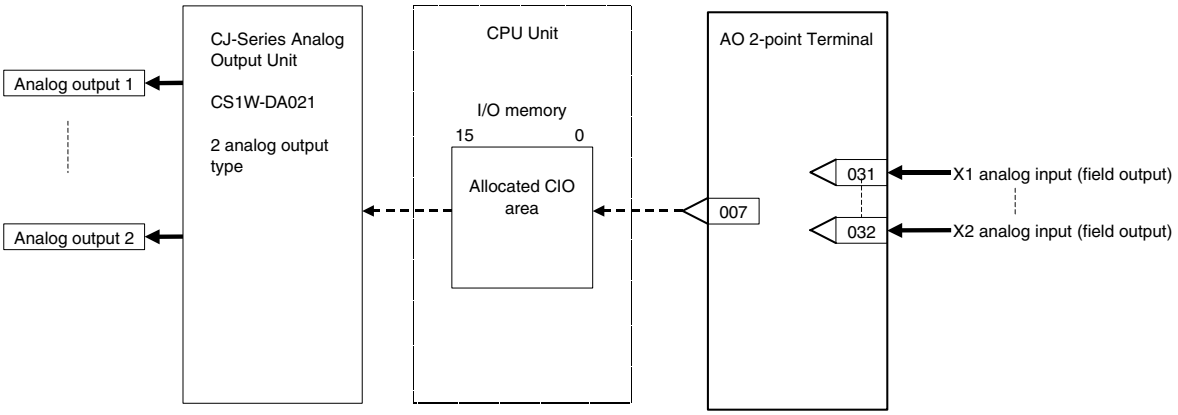
Outline

This function block is the Field Terminal for outputting two analog signals from the CS-series 2-point Analog Output Unit (CJ1W-DA021).

This function block are supported only for LCB01/05 Ver.2.0 or later, and LCB03.

Note 1: Prevent the output hold function of the Analog Output Unit from duplicating the functions of the function blocks on the Loop Controller.
Note 2: For details on how to set the Analog Output Unit, see the Analog I/O Unit User's Manual.
Note 3: 0003 Hex is automatically set to the 1st word (n) of the allocated relay area of CJ1W-DA021. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of the Analog Output Unit cannot be stopped.

Block diagram



ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001		Comment Field Ao_2 Tx Box	23 characters	Block name	–	R/W(S)	–	–	24
	002		Block Model: AO 2-point Terminal (DA021)	591	591	–	R/W(S)	–	–	2
Parameter	004		Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01, 7: 0.02, 8: 0.05	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007		Unit number	0 to 95	95	–	R/W(S)	–	–	2
	011		No.1 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
	to		to			–				
	012		No.4 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V)	0, 1	0	–	R/W(S)	–	–	2
Analog input connection information	021	U1	X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	to		to			–				
	022	U2	X4 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	031	X1	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	to		to			Yes				
	032	X2	Analog input (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2

Block Model	Block Name	Block Address
<592>	AI 4-point/AO 2-point Terminal (MAD42)	901 to 980

Outline

This function block is the Field Terminal for inputting four analog signals and outputting two analog signals from the 4-point Input/2-point Output Unit (CJ1W-MAD42).

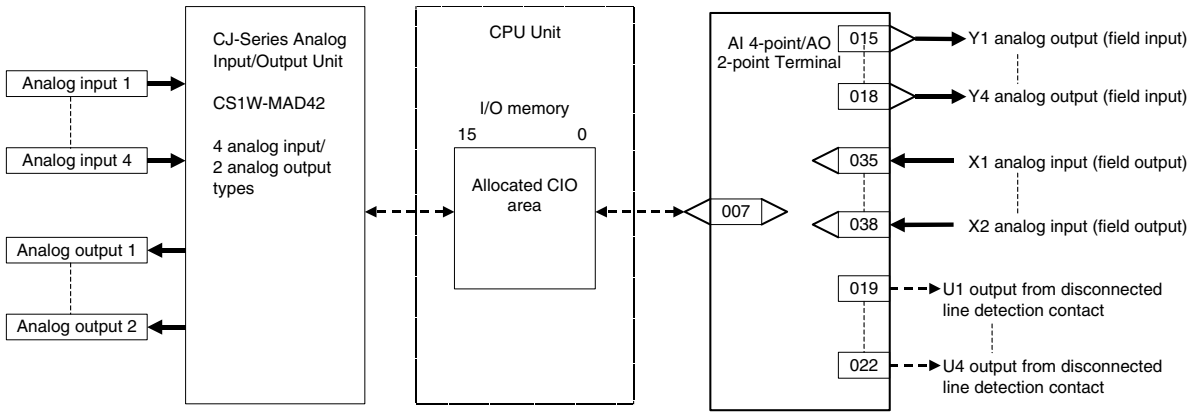
This function block are supported only for LCB01/05 Ver.2.0 or later, and LCB03.

Note 1: Prevent the averaging, peak hold, output hold and ratio conversion functions of the Analog Input/Output Unit from duplicating the functions of the function blocks on the Loop Controller.

Note 2: For details on how to set the Analog Input/Output Unit, see the Analog I/O Unit User's Manual.

Note 3: 0003 Hex is automatically set to the 1st word (n) of the allocated relay area of CJ1W-MAD42. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of analog output cannot be stopped, and the peak hold function of analog input cannot be used.

Block diagram



Note: Set the I/O range conversion method for Y1 to Y4 and X1 to X2 to the same setting as the PV scaling value and output data scaling value (allocated DM Area) used for the Unit's scaling function. Analog I/O will not be accurate if the parameter values are different from the Unit's PV scaling value and output data scaling value.

ITEM list

ITEM TYPE	ITEM	Symbol	Data Description	Data Range	Default	COLD start initialization	R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data			Data Length (bytes)
							According to CX-Process Tool	According to ITEM Setting block	According to Sequential Control Block	
Contact input	000		Stop block operation command (0: Cancel stop, 1: Stop)	0, 1	0	Yes	–	–	–	1
Parameter	001	COMMENT	Comment Field Aio_4_2 RxTx Box	23 characters	Block name	–	R/W(S)	–	–	24
	002	MODEL	Block Model: AI 4-point/AO 2-point Terminal (MAD42)	592	592	–	R/W(S)	–	–	2
Parameter	004	CNT_TMEX	Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, 6: 0.01 *1, 7: 0.02 *1, 8: 0.05 *1 *1: Not supported by the LCB05D	0 to 8	0	–	R/W(S)	–	–	2
Parameter	007	U_NO	Unit number	0 to 95	95	–	R/W(S)	–	–	2
	009	V1_SW	Resolution 0: 1/4000, 1: 1/8000	0, 1	0	–	R/W(S)	–	–	2
	011		No.1 input range (0: 1 to 5V/0 to 5V/ 0 to 10V/4 to 20mA, 1: -10 to +10V, 9: Range specified at ITEM 012 and ITEM 013)	0, 1, 9	0	–	R/W(S)	–	–	2
	012		No.1 input range 0% value	±32000	0	–	R/W(S)	–	–	2
	013		No.1 input range 100% value	±32000	4000	–	R/W(S)	–	–	2
	014	S2	No.2 input range (0: 1 to 5V/0 to 5V/ 0 to 10V/4 to 20mA, 1: -10 to +10V, 9: Range specified at ITEM 015 and ITEM 016)	0, 1, 9	0	–	R/W(S)	–	–	2
	015		No.2 input range 0% value	±32000	0	–	R/W(S)	–	–	2
	016		No.2 input range 100% value	±32000	4000	–	R/W(S)	–	–	2
	017		No.3 input range (0: 1 to 5V/0 to 5V/ 0 to 10V/4 to 20mA, 1: -10 to +10V, 9: Range specified at ITEM 018 and ITEM 019)	0, 1, 9	0	–	R/W(S)	–	–	2
	018		No.3 input range 0% value	±32000	0	–	R/W(S)	–	–	2
	019		No.3 input range 100% value	±32000	4000	–	R/W(S)	–	–	2
	020		No.4 input range (0: 1 to 5V/0 to 5V/ 0 to 10V/4 to 20mA, 1: -10 to +10V, 9: Range specified at ITEM 021 and ITEM 022)	0, 1	0	–	R/W(S)	–	–	2
	021		No.4 input range 0% value	±32000	0	–	R/W(S)	–	–	2
	022		No.4 input range 100% value	±32000	4000	–	R/W(S)	–	–	2
Analog output	023	Y1	Analog output value (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
	to		to			Yes				
	026	Y4	Analog output value (field input)	-5.00 to +105.00%	0.00	Yes	r/w	–	–	2
Contact output	027	U1	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1
	to		to			Yes				
	030	U4	Output from disconnected line detection contact (0: No error, 1: Disconnected line)	0, 1	0	Yes	–	–	R	1
Parameter	031		No.1 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V, 9: Range specified at ITEM 032 and ITEM 033)	0, 1, 9	0	–	R/W(S)	–	–	2
	032		No.1 output range 0% value	±32000	0	–	R/W(S)	–	–	2
	033		No.1 output range 100% value	±32000	4000	–	R/W(S)	–	–	2
	034		No.2 output range (0: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA, 1: -10 to +10 V, 9: Range specified at ITEM 035 and ITEM 036)	0, 1, 9	0	–	R/W(S)	–	–	2
	035		No.2 output range 0% value	±32000	0	–	R/W(S)	–	–	2
	036		No.2 output range 100% value	±32000	4000	–	R/W(S)	–	–	2
Analog input connection information	037		X1 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
	038		X2 source designation BBB: Block No., III: ITEM No.	BBB or III	000000	–	R/W(S)	–	–	4
Analog input (field output)	039	X1	Analog output (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2
	040	X2	Analog output (field output)	-5.00 to +105.00%	0.00	Yes	r	–	–	2

Appendix A
Execution Error Code List

- The execution error codes shown in the list below are stored in ITEM 003 of each function block.
- When there are function blocks containing an error code other than 0 (normal), the smallest block number in these function block numbers is stored to ITEM 093 of the System Common block (Block Model 000).
- The following information can be checked in the Monitor Run Status screen on CX-Process Tool ([Execute]-[Run]-[Validate Action]):
  - Smallest block address where execution error occurred (ITEM 093 of System Common block)
  - Execution error codes that occurred at each function block address (smallest code No. when multiple execution errors occur at a single function block) in the Detailed display screen

Code	Description	Explanation	Operation at Error	Remedy
0	Normal			
1	Source or destination not defined	Either the function block is not registered to the block address of the source designation or the destination, or the ITEM number does not exist.	Running of the function block in question is stopped, and the functions in question do not operate normally.	Check the block address and ITEM number of the source designation or destination designation.
		In the destination specifications for set values 1 to 5 of a Segment Program 3 block (Block Model 158), a specified block does not exist, an ITEM number does not exist, or ITEM 002 (Model Name) was incorrectly specified	The run/stop command (ITEM 013) turns OFF. The program output (ITEM 008) follows the reset output mode (ITEM 023).	
2	Default error	When the S1 run/stop command turned ON in the ramp program, segment program, segment program 2, or segment program 3, the reference input was outside the up ramp range.	The program does not start and ITEM 015 (X1 input error) turns ON.	Check the connection of the reference input and program settings.
		There are only up ramps or only down ramps when the “reference search input method” is set to “search in specified direction, first/second half” in Segment Program 2 (Block Model 157). (Execution error selection with ITEM 191 set to 0: No matching point)	The program does not start.	Check the settings for Segment Program 2 (Block Model 157).
		The specified search section does not exist when the “reference search input method” is set to “search in specified search section” in the Segment Program 2 block (Block Model 157). (Execution error selection with ITEM 191 set to 0: No matching point)	The program does not start.	Check the Segment Program 2 block (Block Model 157) settings.

Code	Description	Explanation	Operation at Error	Remedy
3	Variable value error	An undefined floating-point value (A1 to A8) or intermediate buffer value (B1 to B4) has been used in the conditional statement or calculation expressions in the Arithmetic Operation block (Block Model 126).	Stop execution of the Arithmetic Operation block.	Set the required floating-point value (A1 to A8) or intermediate buffer value (B1 to B4).
10	Operation process: Division by "0"	An attempt was made to execute division by a "0" denominator in the operation process.	In the case of Multiplication, DI/AI Terminal from CPU Unit, Expanded DI/AI Terminal from CPU Unit or Field Terminal blocks, the maximum value is output. In the case of the Segment Linearizer or Temperature and Pressure Correction blocks, the previous data is retained.	In the case of DI/AI Terminal from CPU Unit, Expanded DI/AI Terminal from CPU Unit or Field Terminal blocks, check the scaling value, and in the case of the Segment Linearizer block, check the setting value of the input coordinate side. In the case of temperature and pressure correction, check the gain bias value.
		An attempt was made to execute division by a "0" denominator in Arithmetic Operation block (Block Model 126).	Execution of the Arithmetic Operation block will be stopped.	Check the contents of the conditional statement and calculation expressions for division by 0.
11	Operation process: Operation out of restricted value	The output value of the operation result exceeded the data length of two bytes. Note: An error does not occur even if the output range (±320.00, e.g) is exceeded if the data length of two bytes is not exceeded.	Output becomes the maximum value or minimum value of the output range. (For example, when the output range is ±320.00, the output becomes +320.00 or −320.00.)	If there is a problem, review the settings of related ITEMs.
		The arguments or results for a Arithmetic Operation block exceed the defined limits.	Execution of the Arithmetic Operation block will be stopped.	Check the contents of the conditional statement and calculation expressions and correct the mistake.
12	Argument beyond definition	An argument used in Arithmetic Operation (Block Model 126) is beyond the definition.	Execution of the Arithmetic Operation block will be stopped.	Check the range of the arguments and correct the conditional statement or calculation expressions.
15	AT error	A limit cycle cannot be generated for Basic PID (Block Model 011) or Advanced PID (Block Model 012) or suitable PID constants cannot be calculated.	Execution of the relevant block will be stopped.	Check the contents of the following AT related parameters: Limit cycle MV amplitude (ITEM 036), Limit cycle hysteresis (ITEM 037), AT calculation gain (ITEM 038), Judgment deviation for provisional AT execution (ITEM 039), and the AT type (ITEM 040). Also, set the PID control processing cycle (ITEM 051) to 2 s or less.
		With the Segment Program 3 block (Block Model 158), an AT error occurred at the connected PID block.	The PID parameters are not saved in the bank.	Execute auto-tuning again or clear the execution error by setting the execution error display/clear (ITEM003) to 0 in the Segment Program 3 block (Block Model 158).

Code	Description	Explanation	Operation at Error	Remedy
19	Inappropriate operation	Two or more S1 to S3 select switches are set to 1 (ON) at the same time in the 3-output Selector block (Block Model 163) or 3-input Selector block (Block Model 164).	The output value that was active before the error occurred is held.	Re-program the Step Ladder Program block so that S1 to S3 select switches are set to 1 (ON) independent of each other.
		There is a syntax error in Arithmetic Operation (Block Model 126), the THEN or ELSE expression is not defined, or the output reverse scaling limits are not set.	Execution of the Arithmetic Operation block will be stopped.	Check the contents of the conditional statement and calculation expressions and check the settings of the output reverse scaling limits.
		There is a syntax error in the membership function or rules of a Fuzzy Logic block (Block Model 016) that prevents operation. 1) There is not one sign character and 5 numeric characters maximum (e.g., a + sign is specified). 2) Values are not separated by colons. 3) The values that are set are not sufficient. 4) More than two inflection points in membership functions are the same. 5) Inflection points in membership functions do not increase to the right. 6) A membership function (NL, NS, ZR, PS, or PL) used in a rule has not been defined.	Fuzzy logic block will be stopped.	Check the membership functions and rules. The number of the ITEM causing the problem will be provided in ITEM 006 (operation error details).
		The “synchronous operation reference parameter designation” set for Segment Program 2 in the slave was changed to 0 (master designation) during synchronous operation using Segment Program 2 (Block Model 157).	The slave’s output value is held.	If synchronous operation is not to be used for the Segment Program 2 block specified as the slave, download the setting that was changed during operation (as given in the Explanation column) to the flash memory. When the Segment Program 2 block is to be used as a slave, specify the correct block address in the “synchronous operation reference parameter designation” for the Segment Program 2 used as the master.
20	Download terminal data exchange error	Data exchange with the CPU Unit is not being executed correctly on the CPU Unit Terminal, Expanded CPU Unit Terminal, Node Terminals and Field Terminal blocks.	The data of the function block in question is not updated.	If a malfunction has occurred on the CPU Unit, follow the remedy for that error. If the CPU Unit is normal, turn ON the power supply again.

Code	Description	Explanation	Operation at Error	Remedy
21	I/O memory address out-of-range	An address out of the I/O memory address range has been specified on the CPU Unit Terminal, Expanded CPU Unit Terminal, Node Terminals and Field Terminal blocks.	Operation of the function block in question is stopped.	On the CPU Unit Terminal and Expanded CPU Unit Terminal blocks, check the leading address, and on field terminals check the setting of the CIO (channel I/O) Area number setting. In the case of Node Terminals, check the setting of the "leading address of the memory for the node terminals" specified by System Common block ITEM 043.
29	Reception error for external device	A communications frame error was generated by the data received from an ES100X Controller for an ES100X Controller Terminal (Block Model 045). (An FCS check error or frame error occurred 3 times in a row.	Communications will be stopped with the specified ES100X and tried with another ES100X.	Check the communications path and the communications settings (7 data bits, even parity, and 2 stop bits).
30	Response timeout	A response was not returned after sending data to the Controller for a ES100X Controller Terminal (Block Model 045). (Response was not returned for 5 s 3 times.)	Communications will be stopped with the specified ES100X and tried with another ES100X.	Check the communications path, the communications settings (7 data bits, even parity, and 2 stop bits), and other required settings in the ES100X (parameter setting mode, unit number, etc.).
31	Controller unit number duplicated	The unit number set in ITEM 006 for a ES100X Controller Terminal (Block Model 045) is the same as another ES100X Controller Terminal. (A response timeout (code 30) will occur if the unit number does not exist.)	Communications will be stopped with the ES100X Controllers.	Change the unit number settings (ITEM 006) so that each is used only once.
40	Master block execution error	An execution error occurred for the block set as the master when using synchronous operation for Segment Program 2 (Block Model 157)	The program in the slave block is stopped.	Fix the error in the master block.
70	Illegal combination of function blocks	The function block on the primary loop side is not basic PID or advanced PID when bumpless processing between primary/secondary loops was specified in basic PID or advanced PID.	Running of the function block in question is stopped.	Check the function block model number on the primary loop side.
		The block address specified as the master is not set to Segment Program 2 (Block Model 157) even though synchronous operation is set for Segment Program 2 (Block Model 157).	The slave's initial output value is not changed and operation does not start.	Specify the block address for Segment Program 2 in the master.
		The Segment Program 2 block specified as the master was deleted during execution of Segment Program 2 (Block Model 157).	The slave's output value is held.	Specify the master correctly.

Code	Description	Explanation	Operation at Error	Remedy
		The block address of the same Segment Program 2 (Block Model 157) block is set in the "synchronous operation reference parameter designation" (i.e., the Segment Program 2 block is set as its own master).	The initial values are not changed and operation does not start.	Specify the correct block address in the "synchronous operation reference parameter designation."
		A Basic PID block (Block Model 011) or Advanced PID block (Block Model 012) is not set as the "source designation of PID block's MV output" for Split Converter (Block Model 169).	The initial values are not changed and operation does not start.	Specify a Basic PID block (Block Model 011) or Advanced PID block (Block Model 012) for the "source designation of PID block's MV output."
		With the Segment Program 3 block (Block Model 158), the function block with the block address set in the target PID block's address (ITEM 032) is not a Basic PID or Advanced PID block or 000 (not specified).	The program does not start. Program outputs do not operate at the default settings.	Check the settings for the target PID block's address (ITEM 032).
71	Inappropriate parameter	a) When restricted conditions are applied across two ITEMs: (Example: when the unit pulse output is equal to or greater than the operation cycle when there is unit pulse output in run time accumulation) b) An attempt has been made to write out-of-range data at the ITEM Setting block.	a) The function block in question is not executed. b) Data cannot be written.	Check the settings of the ITEMs.
		The Segment Program 2 block operation cycle set for the Slave does not match the Segment Program 2 block operation cycle set for the Master in Segment Program 2 (Block Model 157).	The slave's initial Segment Program 2 block is not changed and operation does not start.	Change the Segment Program 2 block operation cycle set for the Slave so that it matches the Segment Program 2 block operation cycle set for the Master.
		With the Segment Program 3 block (Block Model 158), the bank number set for a step is greater than the maximum number of banks used.	Program outputs do not operate at the default settings.	Change the bank number so that it is within the maximum number of banks used.
		With the Segment Program 3 block (Block Model 158), an attempt was made to set a value out of range when writing to an ITEM set using a set value 1 to 5.	The run/stop command (ITEM 013) turns OFF. The program output (ITEM 008) is set according to the output mode when S1 is OFF (ITEM 023).	Check the value written to the ITEM set using set value 1 to 5.
		One of the following errors was detected in the Split Converter (Block Model 169): The Heating MV high limit is not greater than the Heating MV low limit. The Cooling MV high limit is not greater than the Cooling MV low limit.	The block in question is not executed.	Correct the limit value settings so that: Heating MV high limit > Heating MV low limit and Cooling MV high limit > Cooling MV low limit.
		One of the following errors was detected in the Split Converter (Block Model 169): The minimum input value for heating was above 100% or the maximum input value for cooling was below –100%.	The block in question is not executed.	Check and correct the settings for the input range type, dead band, and center value offset.

Code	Description	Explanation	Operation at Error	Remedy
72	Parameter inconsistency	With the Segment Program 3 block (Block Model 158), the block addresses of the maximum number of steps used (ITEM 038) and the step data block do not match.	Program outputs do not operate at the default values.	Correct the block address settings for the maximum number of steps used (ITEM 038) and the step data block, and then again turn ON the run/stop command.
		With the Segment Program 3 block (Block Model 158), the block addresses of the maximum number of banks used (ITEM 043) and the number of Bank Data blocks do not match.	Program outputs do not operate at the default values.	Correct the block address settings for the maximum number of banks used (ITEM 043) and the Bank Data blocks, and then again turn ON the run/stop command.
		With the Segment Program 3 block (Block Model 158), the “AT result reflection bank number” (ITEM 027) is greater than the maximum number of banks used (ITEM 043). (There is no bank in which to save the AT results.)	The AT command (ITEM 026) turns OFF and the AT command is not output at the connected PID block.	Change the “AT result reflection bank number” (ITEM 027) so that it is no more than the maximum number of banks used (ITEM 043), and then either again turn ON the AT command or clear the error by setting the execution error display/clear (ITEM 003) of the Segment Program 3 block (Block Model 158) to 0.
73	Parameter address error	With the Segment Program 3 block (Block Model 158), when a program pattern data transfer (LCB to CPU Unit) is used, sufficient memory is not available for the maximum number of steps used and the maximum number of banks used from the specified start address (The end address exceeds 32,767.)	Program pattern data is not transferred (LCB to CPU Unit).	Turn OFF the program pattern transfer order (ITEM 030), set the correct start address, and then again turn ON the program pattern transfer order (LCB to CPU Unit).
74	Transfer source parameter error	With the Segment Program 3 block (Block Model 158), when the program pattern transfer order (CPU Unit to LCB) is executed, the maximum numbers of steps and banks used in the program pattern data in the CPU Unit do not match the Segment Program 3 block (Block Model 158) maximum number of steps used (ITEM 038) and the maximum number of banks used (ITEM 043) settings.	Program pattern data is not transferred (CPU Unit to LCB). In ITEM 024 (error detection address), the parameter offset address where the CPU Unit to LCB transfer failed is indicated (only when an execution error occurs).	Turn OFF the program pattern transfer order (ITEM 031), match the maximum number of steps used and the maximum number of banks used at the CPU Unit with the values in the Segment Program 3, and then again turn ON the program pattern transfer order (CPU Unit to LCB).
		With the Segment Program 3 block (Block Model 158), some program pattern data at the CPU Unit is set out of range.	Program pattern data is not transferred (CPU Unit to LCB). In ITEM 024 (error detection address), the parameter offset address where the CPU Unit to LCB transfer failed is indicated (only when an execution error occurs).	Turn OFF the program pattern transfer order (ITEM 031), make sure all settings are within the specified ranges, and then again turn ON the program pattern transfer order (CPU Unit to LCB).

Code	Description	Explanation	Operation at Error	Remedy
		With the Segment Program 3 block (Block Model 158), when program pattern data was changed by downloading the ITEM, the time width for the step before the one being executed was changed to 0.0.	The run/stop command (ITEM 013) turns OFF. The program outputs will be the values set for the program outputs at reset.	When the run/stop command is turned ON, operation starts with the step with time width 0.0 as the final step, so reset the step time width before turning ON the run/stop command.
75	Download transfer interrupt detected error	Power was interrupted or LCB operation was stopped during execution of a program pattern transfer order (CPU Unit to LCB) with a Segment Program 3 block (Block Model 158).	The transfer stops. The program pattern transfer order (CPU Unit to LCB) (ITEM 031) stays ON.	Either turn the program pattern transfer order (CPU Unit to LCB) OFF and then back ON, or clear the error by setting the execution error display/clear (ITEM 003) of Segment Program 3 (Block Model 158) to 0.
76	Upload transfer interrupt detected error	Power was interrupted or LCB operation was stopped during execution of a program pattern transfer order (LCB to CPU Unit) with a Segment Program 3 block (Block Model 158).	The transfer stops. The program pattern data transfer command (LCB to CPU Unit) (ITEM 030) stays ON.	Either turn the program pattern data transfer command (LCB to CPU Unit) OFF and then back ON, or clear the error by setting the execution error display/clear (ITEM 003) of Segment Program 3 (Block Model 158) to 0.
77	Inappropriate pattern	The total of the time widths in a Segment Program 3 block (Block Model 158) exceeded the maximum value. Maximum value = 429496729.5 s (approx. 13.61 yr)	The run/stop command will turn OFF if it is ON.	Change the time widths so that the maximum total value is not exceeded.
80	Step Ladder Program command error	There is an irrelevant command in the Step Ladder Program, or the method of use of commands is wrong, for example, there is an AND command even though there is no input command.	The command in question and onwards are not executed.	Check the program within the Step Ladder Program block.
	Sequence Table command error	The condition signal type registered for a condition is invalid. The rule setting is not Y, N, or blank. The action signal type registered for an action is invalid.	The sequence table in question is not executed.	Check and correct the sequence table program.
81	Step Ladder Program connection terminal not defined	Either the function block is not registered to the block address currently specified by each command in the Step Ladder Program, or the ITEM number does not exist.	The command in question and onwards are not executed.	Check the block address and ITEM number.
	Sequence table connection terminal not defined	A function block specified as an input source or output destination has not been registered or the ITEM number does not exist. An invalid signal output was registered for a condition signal. An invalid timer/counter number was registered in the sequence table. An invalid expansion block address was registered in the sequence table.	The sequence table in question is not executed.	Check and correct the sequence table program.

Code	Description	Explanation	Operation at Error	Remedy
		A block specified in a TBL command has not been set in the reference table.	The sequence table using the TBL command is not executed.	Correctly set the referenced sequence table in the reference table.
	Sequence table STEP/STOP command block specification error	The local block is specified in the sequence table's STEP command or STOP command.	The sequence table in question is not executed.	Check and correct the sequence table program.
		A block that was set in the slave table is specified in the sequence table's STEP command.	The sequence table that executed the STEP command will stop operating.	Correct the settings so that the block specified by the STEP command is set as an master table.
89	Overuse of Step Ladder Program differentiated instruction	The number of differentiated instructions to be simultaneously executed has exceeded 256.	Differentiated instructions exceeding 256 instructions are not executed.	Reduce the number of differentiated instructions to be executed simultaneously.
99	Database error	There was a database error in the Step Data blocks (Block Model 601), Bank Data blocks (Block Model 602), and Segment Program 3 block (Block Model 158) when the Segment Program 3 block was executed.	Execution of the Segment Program 3 block stops.	Executed the Clear all, Download, or Recovery operation from the CX-Process Tool, or reset the Segment Program 3 block.

Appendix B
ITEM Allocations for HMI

The following tables list the ITEMs (HMI data) for which memory is allocated in the CPU Unit.

- Each function block is allocated 20 words.
- The left column in each table gives the offset in words from the first word. Offsets +0 to +17 are analog data and offsets +18 and +19 are bit data.

EM Area Allocation

Specified EM Bank	CS1W-LCB05 / CS1D-CPU□□P	
00000	System Common 20 WORDS	Send
00020	Control/Operation Block 10000 WORDS (Addresses 001 to 500)	
10020	Reserved 2000 WORDS (Addresses 501 to 600)	
12020	External Control Block 640 WORDS (except for CS1D-CPU□□P) (Addresses 601 to 632)	
12660	Reserved 1360 WORDS (Addresses 633 to 700)	
14020	System Use 700 WORDS 700 addresses	
14720	Reserved 280 WORDS	-
15000	System Common 20 WORDS	Receive
15020	Control/Operation Block 10000 WORDS (Addresses 001 to 500)	
25020	Reserved 2000 WORDS (Addresses 501 to 600)	
27020	External Control Block 640 WORDS (Addresses 601 to 632)	
27660	Reserved 1360 WORDS (Addresses 633 to 700)	
29020	Actual PV input value monitor area*1	Send
29520	Reserved	-
32767		

Specified EM Bank	CJ1G-CPU43/44/45P	
00000	System Common 20 WORDS	Send
00020	Control/Operation Block 6000 WORDS (Addresses 001 to 300)	
06020	Reserved 6640 WORDS	
12660	Reserved 1360 WORDS	
14020	System Use 700 WORDS 700 addresses	
14720	Reserved 280 WORDS	-
15000	System Common 20 WORDS	Receive
15020	Control/Operation Block 10000 WORDS (Addresses 001 to 300)	
21020	Reserved 6640 WORDS	
27660	Reserved 1360 WORDS	
29020	Actual PV input value monitor area*1	Send
29320	Reserved	-
32767		

Specified EM Bank	CS1W-LCB01 / CJ1G-CPU42P	
00000	System Common 20 WORDS	Send
00020	Control/Operation Block 1000 WORDS (Addresses 001 to 050)	
01020	Reserved 11000 WORDS (Addresses 051 to 600)	
12020	External Control Block 640 WORDS (except for CJ1G-CPU□□P) (Addresses 601 to 632)	
12660	Reserved 1360 WORDS (Addresses 633 to 700)	
14020	System Use 700 WORDS 700 addresses	
14720	Reserved 280 WORDS	-
15000	System Common 20 WORDS	Receive
15020	Control/Operation Block 1000 WORDS (Addresses 001 to 050)	
16020	Reserved 11000 WORDS (Addresses 051 to 600)	
27020	External Control Block 640 WORDS (except for CJ1G-CPU□□P) (Addresses 601 to 632)	
27660	Reserved 6856 WORDS	-
29020	Actual PV input value monitor area*1	Send
29070	Reserved	-
32767		

*Note: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.

Block Model 000: System Common blocks

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	–			
+1	047	LOAD	LCB load rate	S
+2	–			S
+3	048	M_LOAD	LCB maximum load rate	S
+4	–			S
+5	–			S
+6	–			S
+7	060	K_CODE	Data update check code	S
+8	104	BUP_CNT	Flash memory write count display	S
+9	120	BUP_ST	Backup status while running	S
+10	106	BUP_CNTD	Flash memory write count display (1/10)	S
+11	–			S
+12	–			S
+13	–			S
+14	–			S
+15	003	ERR	Execution error	S
+16	–			S
+17, bit 00	–			S
+17, bit 01	–	PVE_ST	PV error contact input (corresponds to A35501) 0: Normal, 1: Error	S
+17, bit 02	–	MVE_ST	MV error contact input (corresponds to A35502) 0: Normal, 1: Error	S
+17, bit 03	093	ERR_ST	Execution error (corresponds to A35503) 0: Normal, 1: Error	S
+17, bit 04	094	BLKDB_ST	Function block database error (corresponds to A35504) 0: Normal, 1: Error	S
+17, bit 07	045	DH_START	The state of Hot Start Disable	S
+17, bit 08	061	DPL_RUN	Duplex operation	S
+17, bit 09	062	ACT_FLG	Left-side CPU Unit status (active/standby)	S
+17, bit 13	–			S
+17, bit 15	039	BT_FLG	Function block change (corresponds to A35515) 0: No, 1: Yes	S
+18, bit 00	081	T_MLA	MV low limit reached (MLA) (corresponds to A35600)	S
+18, bit 01	082	T_MHA	MV high limit reached (MHA) (corresponds to A35601)	S
+18, bit 02	083	T_DVA	Deviation alarm (DVA) (corresponds to A35602)	S
+18, bit 03	084	T_LL	Low low limit alarm (LL) (corresponds to A35603)	S
+18, bit 04	085	T_PL	Low limit alarm (L) (corresponds to A35604)	S
+18, bit 05	086	T_PH	High limit alarm (H) (corresponds to A35605)	S
+18, bit 06	087	T_HH	High high limit alarm (HH) (corresponds to A35606)	S
+18, bit 13	126	BCNT_EN	Backup count disable flag	S/R
+18, bit 14	125	BACKUP	Backup start command while running	S/R
+19, bit 00	007	FAIL	Fatal CPU Unit error	S
+19, bit 01	008	RUN	CPU Unit operating	S
+19, bit 02	009	L_STOP	CPU Unit loads OFF	S
+19, bit 03	010	RUN_MD	CPU Unit in RUN mode	S
+19, bit 04	011	MON_MD	CPU Unit in MONITOR mode	S
+19, bit 06	013	PRG_MD	CPU Unit in PROGRAM mode	S

Block Model 001: 2-position ON/OFF

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)*1	007	PV	PV input	S/R*2
+1	029	SP	Current Set Point output	S
	023	SP	Local Set Point setting	R
+3	008	HH_SP	High/high alarm setting	S/R
+4	009	H_SP	High alarm setting	S/R
+5	010	L_SP	Low alarm setting	S/R
+6	011	LL_SP	Low/low alarm setting	S/R
+7	041	DVA_SP	Deviation alarm setting	S/R
+8	044	Y1	Deviation output	S
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 00	026	R/L_SW	Remote/Local switch	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R
+18, bit 03	024	CAS_SET	Set Point setting mode	S/R
+18, bit 08	093	MV	Host display of MV	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	HH	High/high alarm output	S
+19, bit 01	014	H	High alarm output	S
+19, bit 02	015	L	Low/low alarm output	S
+19, bit 03	016	LL	Low alarm output	S
+19, bit 04	042	DVA	Deviation alarm output	S
+19, bit 05	019	PV_ABN	PV error display	S
+19, bit 15*1	000	MT_ST	Calibration mode switch	S/R

*1: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.

*2: Can be set only when using calibration mode.

Block Model 002: System 3-position ON/OFF

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	PV	PV input	S/R*1*2
+1	029	SP	Current Set Point output	S
	023	SP	Local Set Point setting	R
+3	008	HH_SP	High/high alarm setting	S/R
+4	009	H_SP	High alarm setting	S/R
+5	010	L_SP	Low/low alarm setting	S/R
+6	011	LL_SP	Low/low alarm setting	S/R
+7	041	DVA_SP	Deviation alarm setting	S/R
+8	044	Y1	Deviation output	S
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 00	026	R/L_SW	Remote/Local switch	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R
+18, bit 03	024	CAS_SET	Set Point setting mode	S/R
+18, bit 08	093	MVH	Host display of MVH	S/R
+18, bit 09	095	MVL	Host display of MVL	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	HH	High/high alarm output	S
+19, bit 01	014	H	High alarm output	S
+19, bit 02	015	L	Low alarm output	S
+19, bit 03	016	LL	Low/low alarm output	S
+19, bit 04	042	DVA	Deviation alarm output	S
+19, bit 05	019	PV_ABN	PV error display 0: Normal, 1: Error → MANUAL mode	S
+19, bit 05*1	000	MT_ST	Calibration mode switch	S/R

*1: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.

*2: Can be set only when using calibration mode.

Block Model 011: Basic PID

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	PV	PV input	S/R*2*3
+1	029	SP	Current Set Point output	S
	023	SP	Local Set Point setting	R
+2	089	MV	Host display of MV	S/R
+3	008	HH_SP	High/high alarm setting	S/R
+4	009	H_SP	High alarm setting	S/R
+5	010	L_SP	Low alarm setting	S/R
+6	011	LL_SP	Low/low alarm setting	S/R
+7	041	DVA_SP	Deviation alarm setting	S/R
+8	044	DV	Deviation output	S
+9	054	P	Proportional band	S/R
+10	055	I	Integral time	S/R
+11	056	D	Differential time	S/R
+12	076	MH_LMT	High MV limit	S/R
+13	077	ML_LMT	Low MV limit	S/R
+15	003	ERR	Execution error display	S/R
+16	098	MV_IDX	MV index position	S/R
+17	099	OP_MK	Label	S/R
+18, bit 00	026	R/L_SW	Remote/Local switch	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 12	093*2	R/S	RUN/STOP switch	S/R
+18, bit 13	053*2	DIR_CHG	Control action switch	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R
+18, bit 03	024	CAS_SET	Set Point setting mode	S/R
+18, bit 11	095 *1	MVA_OFF	MV limit alarm OFF	S/R
+18, bit 14	035	AT	AT command/AT Executing	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	HH	High/high alarm output	S
+19, bit 01	014	H	High alarm output	S
+19, bit 02	015	L	Low alarm output	S
+19, bit 03	016	LL	Low/low alarm output	S
+19, bit 04	042	DVA	Deviation alarm output	S
+19, bit 05	019	PV_ABN	PV execution error display	S
+19, bit 06	091	MV_ABN	MV error display	S
+19, bit 07	078	MHA	MV upper limit output	S
+19, bit 08	079	MLA	MV lower limit output	S
19, bit 09	034	CAS_CLP	Primary loop MV held when secondary loop MV upper/lower limit is reached (LCB01/05 Ver.2.0 and LCB03 only)	S
19, bit 15*2	000	MT_ST	Calibration mode switch	S/R*2*3

*1: Supported by LCB 01/05 Ver.1.5 or later, and LCB03 only.

*2: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.

*3: Can be set only when using calibration mode.

Block Model 012: Advanced PID

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	PV	PV input	S/R*2*3
+1	029	SP	Current SP output	S
	023	SP	Local Set Point setting	R
+2	089	MV	Host display of MV	S/R
+3	008	HH_SP	High/high alarm setting	S/R
+4	009	H_SP	High alarm setting	S/R
+5	010	L_SP	Low alarm setting	S/R
+6	011	LL_SP	Low/low alarm setting	S/R
+7	041	DVA_SP	Deviation alarm setting	S/R
+8	044	DV	Deviation output	S
+9	054	P	Proportional band	S/R
+10	055	I	Integral	S/R
+11	056	D	Differential time	S/R
+12	076	MH_LMT	High MV limit	S/R
+13	077	ML_LMT	Low MV limit	S/R
+14	057	MRT	Manual reset	S/R
+15	003	ERR	Execution error display	S/R
+16	098	MV_IDX	MV index position	S/R
+17	099	OP_MK	Label	S/R
+18, bit 00	026	R/L_SW	Remote/Local switch	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R
+18, bit 03	024	CAS_SET	Set Point setting mode	S/R
+18, bit 04	027	S2	PV tracking switch	S/R
+18, bit 05	046	S3	PV compensation ON/OFF switch	S/R
+18, bit 06	059	S4	Input of accumulator stop switch	S/R
+18, bit 07	073	S5	MV compensation ON/OFF switch	S/R
+18, bit 08	080	S6	Preset MV switch	S/R
+18, bit 09	082	S7	MV hold switch	S/R
+18, bit 10	085	S8	MV tracking switch	S/R
+18, bit 11	095 *1	MVA_OFF	MV limit alarm OFF	S/R
+18, bit 14	035	AT	AT command/AT Executing	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	HH	High/high alarm output	S
+19, bit 01	014	H	High alarm output	S
+19, bit 02	015	L	Low alarm output	S
+19, bit 03	016	LL	Low/low alarm output	S
+19, bit 04	042	DVA	Deviation alarm output	S
+19, bit 05	019	PV_ABN	PV execution error display	S
+19, bit 06	091	MV_ABN	MV error display	S
+19, bit 07	078	MHA	High MV limit arrival output	S
+19, bit 08	079	MLA	Low MV limit arrival output	S
19, bit 09	034	CAS_CLP	Primary loop MV held when secondary loop MV upper/lower limit is reached (LCB01/05 Ver.2.0 and LCB03 only)	S
19, bit 15*2	000	MT_ST	Calibration mode switch	S/R

*1: Supported by LCB 01/05 Ver.1.5 or later, and LCB03 only.

*2: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.

*3: Can be set only when using calibration mode.

Block Model 013: Blended PID

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	P1	Input	S/R*2*3
+1	029	Y2	Current SP instantaneous value output	S
+2	089	MV	Host display of MV	S/R
+3	012	Q1	Accumulated value (lower 4 digits)	S
+4	013	Q2	Accumulated value (upper 4 digits)	S
+5	016	Y1	Instantaneous value output	S
+6	027	K1	Ratio	S/R
+7	044	DEV_Q	Cumulative deviation output	S
+9	054	P	Proportional band	S/R
+10	055	I	Integral time	S/R
+11	056	D	Differential time	S/R
+12	076	MH_LMT	High MV limit	S/R
+13	077	ML_LMT	Low MV limit	S/R
+15	003	ERR	Execution error display	S
+16	098	MV_IDX	MV index position	S/R
+17	099	OP_MK	Label	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R
+18, bit 08	014	S1	Accumulation counter reset switch (1: Reset)	S/R
+18, bit 09	043	S2	Cumulative deviation reset switch	S/R
+18, bit 11	095	MVA_OFF	MV limit alarm OFF	S/R

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
	*1			
+18, bit 15	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	S/R
+19, bit 00	036	DHH	Cumulative deviation High/high alarm output	S
+19, bit 01	037	DH	Cumulative deviation High alarm output	S
+19, bit 02	038	DL	Cumulative deviation Low alarm output	S
+19, bit 03	039	DLL	Cumulative deviation Low/low alarm output	S
+19, bit 06	091	MV_ABN	MV error display 0: Normal, 1: Error	S
+19, bit 07	078	MHA	High MV limit arrival (1: Limit or more)	S
+19, bit 08	079	MLA	Low MV limit arrival (1: Limit or less)	S
+19, bit 15*2	000	MT_ST	Calibration mode switch	S/R

*1: Supported by LCB 01/05 Ver.1.5 or later, and LCB03 only.
*2: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.
*3: Can be set only when using calibration mode.

Block Model 014: Batch Flowrate Capture

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	P1	Input	S/R*2
+1	029	SP	Current SP output (lower 4 digits)	S
	023	SP	Local SP setting (lower 4 digits)	R
+2	089	MV	Host display of MV	S/R
+3	030	SPU	Current SP output (upper 4 digits)	S
	024	SPU-W	Local SP setting (upper 4 digits)	R
+4	035	SM	Batch accumulated value (lower 4 digits) Fixed value	S
+5	032	B0	Overrun setting (value subtracted from BM)	S/R
+6	033	BP	Pre-batch setting (value subtracted from BM)	S/R
+7	034	B1	Flowrate limitation	S/R
+8	061	BMU	Preset value (upper 4 digits) (current SP is entered)	S
+9	065	SMU	Batch accumulated value (upper 4 digits)	S
+10	012	Q1	Accumulated value (lower 4 digits)	S
+11	013	Q2	Accumulated value (upper 4 digits)	S
+12	016	Y1	Instantaneous value output	S
+13	017	PR	Pulse rate (for host display: scale unit/pulse)	S/R
+14	031	BM	Preset value (lower 4 digits) (current SP is entered)	S
+15	003	ERR	Execution error display	S
+16	098	MV_IDX	MV index position	S/R
+17	099	OP_MK	Label	S/R
+18, bit 00	026	R/L_SW	Remote/Local switching	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 08	036	S1	Run/stop command	S/R
+18, bit 09	037	S2	Control interrupt switch	S/R
+18, bit 10	014	S3	Accumulation counter reset	S/R
+18, bit 11	095	MVA_OFF	MV limit alarm OFF	S/R
+18, bit 15	000	MT_ST	Stop block operation	S/R
+19, bit 00	038	U1	Main batch output	S
+19, bit 01	039	U2	Pre-batch output	S
+19, bit 06	091	MV_ABN	MV error display	S
+19, bit 15*1	000	MT_ST	Calibration mode switch	S/R

*1: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.
*2: Can be set only when using calibration mode.

Block Model 016: Fuzzy Logic

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	015	X1	X1 input value	S
+1	016	X2	X2 input value	S
+2	017	X3	X3 input value	S
+3	018	X4	X4 input value	S
+4	019	X5	X5 input value	S
+5	020	X6	X6 input value	S
+6	021	X7	X7 input value	S
+7	022	X8	X8 input value	S
+8	027	A1	Fixed value for output 1 when rules are not fulfilled	S/R
+9	028	A2	Fixed value for output 2 when rules are not fulfilled	S/R
+10	035	FN	Read rule numbers for fulfilled rules	S/R
+11	036	FT	Applicability for each rule	S
+12	031	Y1	Y1 output value	S
+13	032	Y2	Y2 output value	S
+15	003	ERR	Execution error display	S
+18, bit 00	023	S1	Output value selection switch for output 2 when rules are not fulfilled	S/R
+18, bit 01	024	S2	Output value selection switch for output 2 when rules are not fulfilled	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 031: Indication and Setting

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	PV	PV input	S/R*2
+1	029	SP	Current SP setting	S
	023	SP	Local Set Point setting	R
+3	008	HH_SP	High/high alarm setting	S/R
+4	009	H_SP	High alarm setting	S/R
+5	010	L_SP	Low alarm setting	S/R
+6	011	LL_SP	Low/low alarm setting	S/R
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 00	026	R/L_SW	Remote/Local switch	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R
+18, bit 03	024	CAS_SET	SP setting mode (default)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	HH	High/high alarm output	S
+19, bit 01	014	H	High alarm output	S
+19, bit 02	015	L	Low/low alarm output	S
+19, bit 03	016	LL	Low alarm output	S
+19, bit 05	019	PV_ABN	PV error display	S
+19, bit 15*1	000	MT_ST	Calibration mode switch	S/R

*1: Supported by LCB 01/05 Ver.1.5 or later, and LCB03 only.
*2: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.

Block Model 032: Indication and Operation

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	PV	PV input	S/R*3
+1	084	X1	Auto input	S
+2	089	MV	Host display of MV	S/R
+3	008	HH_SP	High/high alarm setting	S/R
+4	009	H_SP	High alarm setting	S/R
+5	010	L_SP	Low alarm setting	S/R
+6	011	LL_SP	Low/low alarm setting	S/R
+12	076	MH_LMT	High MV limit	S/R
+13	077	ML_LMT	Low MV limit	S/R
+15	003	ERR	Execution error display	S
+16	098	MV_IDX	MV index position	S/R
+17	099	OP_MK	Label	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+18, bit 11	095 *1	MVA_OFF	MV limit alarm OFF	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	HH	High/high alarm output	S
+19, bit 01	014	H	High alarm output	S
+19, bit 02	015	L	Low alarm output	S
+19, bit 03	016	LL	Low/low alarm output	S
+19, bit 05	019	PV_ABN	PV error display	S
+19, bit 06	091	MV_ABN	MV error display	S
+19, bit 07	078	MHA	MV upper limit output	S
+19, bit 08	079	MLA	MV lower limit output	S
+19, bit 15*3	000	MT_ST	Calibration mode switch	S/R

*1: Supported by LCB 01/05 Ver.1.5 or later, and LCB03 only.
*2: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.
*3: Can be set only when using calibration mode.

Block Model 033: Ratio Setting

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	PV	Reference input	S/R*3
+1	029	SP	Current SP output	S
	023	SP	Local ratio setting	R
+2	089	MV	Host display of MV	S/R
+9	054	K1	Ratio range	S/R
+10	055	A1	Input bias	S/R
+11	056	B1	Output bias	S/R
+12	076	MH_LMT	High MV limit	S/R
+13	077	ML_LMT	Low MV limit	S/R
+15	003	ERR	Execution error display	S
+16	098	MV_IDX	MV index position	S/R
+17	099	OP_MK	Label	S/R
+18, bit 00	026	R/L_SW	Remote/Local switch	S/R
+18, bit 01	086	A/M_SW	Auto/Manual switch	S/R
+18, bit 03	024	CAS_SET	Ratio setting mode (default)	S/R
+18, bit 11	095 *1	MVA_OFF	MV limit alarm OFF	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 05	019	PV_ABN	PV error display	S
+19, bit 06	091	MV_ABN	MV error display	S
+19, bit 07	078	MHA	MV upper limit output	S
+19, bit 08	079	MLA	MV lower limit output	S
+19, bit 15*1	000	MT_ST	Calibration mode switch	S/R

*1: Supported by LCB 01/05 Ver.1.5 or later, and LCB03 only.
*2: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.
*3: Can be set only when using calibration mode.

Block Model 034: Indicator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	PV	PV input	S/R*2
+3	008	HH_SP	High/high alarm setting	S/R
+4	009	H_SP	High alarm setting	S/R
+5	010	L_SP	Low alarm setting	S/R
+6	011	LL_SP	Low/low alarm setting	S/R
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 02	017	AOF	Alarm stop switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	HH	High/high alarm output	S
+19, bit 01	014	H	High alarm output	S
+19, bit 02	015	L	Low/low alarm output	S
+19, bit 03	016	LL	Low alarm output	S
+19, bit 05	019	PV_ABN	PV error display	S
+19, bit 15*1	000	MT_ST	Calibration mode switch	S/R

*1: Used only in Ver. 3.0 and higher LCB01/03/05 Loop Controllers.
*2: Can be set only when using calibration mode.

Block Model 045: ES100X Controller Terminal

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	PV	PV	S
+1	029	SP	Current SP output	S
	072	SP	Current SP setting	R
+2	089	MV	MV (Manipulated variable)	S/R
+3	040	HH_SP	PV high/high alarm setting	S/R
+4	041	H_SP	PV high alarm setting	S/R
+5	042	L_SP	PV low alarm setting	S/R
+6	043	LL_SP	PV low/low alarm setting	S/R
+7	039	DVA_SP	Deviation alarm setting	S/R
+8	010	RES	Response code	S
+9	024	P	P (proportional band) (for display)	S
	056	P	P (proportional band) (for setting)	R
+10	025	I	I (integral time) (for display)	S
	057	I	I (integral time) (for setting)	R
+11	026	D	D (derivative time) (for display)	S
	058	D	D (derivative time) (for setting)	R
+12	027	MH	MV upper limit (for display)	S
	052	MH	MV upper limit (for setting)	R
+13	028	ML	MV lower limit (for display)	S
	053	ML	MV lower limit (for setting)	R
+14	009	ERR1	Controller error level display	S
+15	003	ERR	Execution error display	S
+16	098	MV_IDX	Operating status display	S/R
+17	099	OP_MK	Label	S/R
+18, bit 00	030	RUN	Operating status display	S
	080	RUN	ES100X operation command	R
+18, bit 01	031	A/M_SW	A/M switch display	S
	081	A/M_SW	A/M switch	R
+18, bit 02	032	RMT	EX100 parameter setting method display	S
	082	RMT	EX100 parameter setting method Setting	R
+18, bit 03	033	AT	AT display	S
	083	AT	AT command	R
+18, bit 04	084	R/L_SW	RSP/LSP switch in this block	S/R
+18, bit 05	085	CAS_SET	SP setting method	S/R
+18, bit 06	050	AOF	Alarm stop switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 04	045	DVA	Deviation alarm value	S
+19, bit 05	046	HH	PV high/high alarm setting	S
+19, bit 06	047	H	PV high alarm value	S
+19, bit 07	048	L	PV low alarm value	S
+19, bit 08	049	LL	PV low/low alarm value	S
+19, bit 09	054	MHA	MV upper limit output	S
+19, bit 10	055	MLA	MV lower limit output	S

Block Model 111: High/Low Alarm

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	A1	High setting	S/R
+5	010	A2	Low setting	S/R
+6	011	A3	Hysteresis setting	S/R
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	012	U1	High alarm output	S
+19, bit 01	013	U2	Low alarm output	S

Block Model 112: Deviation Alarm

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	009	X1	Reference input	S
+1	010	X2	Input	S
+4	011	A1	Deviation high setting	S/R
+5	012	A2	Deviation low setting	S/R
+6	013	A3	Hysteresis	S/R
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	014	U1	Deviation high alarm output	S
+19, bit 01	015	U2	Deviation low alarm output	S

Block Model 113: Rate-of-change Operation and Alarm

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	012	A1	Positive direction alarm setting	S/R
+5	013	A2	Negative direction alarm setting	S/R
+6	014	A3	Hysteresis setting	S/R
+8	009	H	Sampling cycle (0: Operation cycle)	S/R
+9	010	N	Number of samples	S/R
+10	011	TM	Unit (0:%/s, 1:%/min, 2:%/h)	S/R
+12	015	Y1	Output rate-of-change	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	016	U1	Positive direction alarm output	S
+19, bit 01	017	U2	Negative direction alarm output	S

Block Model 115: High/Low Limit

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	A1	High limit	S/R
+5	010	A2	Low limit	S/R
+12	011	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 116: Deviation Limit

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	009	X1	Input	S
+1	010	X2	Reference input	S
+4	011	A1	High deviation limit	S/R
+5	012	A2	Low deviation limit	S/R
+12	013	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 118: Analog Signal Hold

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	006	KN	Hold mode (1: Maximum value, 2: Instantaneous value, 3: Minimum value)	S/R
+12	010	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	009	S1	Reset switch Contact inputs and parameters are reset when set to 1. When the switch setting changes to 0 from 1 when ITEM 006 is set to 2, inputs and parameters are held. When ITEM 006 is set to either 1 or 3, contacts and parameters are held when the switch setting is 1 and are not held when the switch setting is 0.	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 121: Addition or Subtraction

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	011	X1	Input	S
+1	012	X2	Input	S
+2	013	X3	Input	S
+3	014	X4	Input	S
+4	015	K1	K1 gain	S/R
+5	016	K2	K2 gain	S/R
+6	017	K3	K3 gain	S/R
+7	018	K4	K4 gain	S/R
+8	019	A1	A1 bias	S/R
+12	020	Y1	Output	S
+15	003	ERR	Execution error display 0: Normal, Other: Error	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 122: Multiplication

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	009	X1	Input	S
+1	010	X2	Input	S
+4	011	K1	K1 gain	S/R
+5	012	K2	K2 gain	S/R
+6	013	A1	A1 bias	S/R
+7	014	A2	A2 bias	S/R
+8	015	A3	A3 bias	S/R
+12	016	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 123: Division

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	009	X1	Input	S
+1	010	X2	Input	S
+4	011	K1	K1 gain	S/R
+5	012	K2	K2 gain	S/R
+6	013	A1	A1 bias	S/R
+7	014	A2	A2 bias	S/R
+8	015	A3	A3 bias	S/R
+12	016	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 126: Arithmetic Operation

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	X1	X1 input value	S
+1	022	X2	X2 input value	S
+2	023	X3	X3 input value	S
+3	024	X4	X4 input value	S
+4	025	X5	X5 input value	S
+5	026	X6	X6 input value	S
+6	027	X7	X7 input value	S
+7	028	X8	X8 input value	S
+12	093	Y1	Normalized output value	S
+13	094	Y2	Floating-point decimal output value (upper digits of Y0)	S
+14	095	Y3	Floating-point decimal	S

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
			output value (lower digits of Y0)	
+15	003	ERR	Execution error display	S
+18, bit 00	010	S0	Criteria mode	S/R
+18, bit 01	062	S2	Operation reset command	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	080	U0	Judgement	S
+19, bit 08	061	S1	Contact input	S/R

Block Model 127: Range Conversion)

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	X1	Input value	S
+1	022	X2	Input value	S
+2	023	X3	Input value	S
+3	024	X4	Input value	S
+4	025	X5	Input value	S
+5	026	X6	Input value	S
+6	027	X7	Input value	S
+7	028	X8	Input value	S
+8	071	Y1	Output value	S
+9	072	Y2	Output value	S
+10	073	Y3	Output value	S
+11	074	Y4	Output value	S
+12	075	Y5	Output value	S
+13	076	Y6	Output value	S
+14	077	Y7	Output value	S
+15	003	ERR	Execution error display	S
+16	078	Y8	Output value	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 131: Square Root

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	K1	Gain	S/R
+5	010	A1	Input low-end cutout setting	S/R
+12	011	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 132: Absolute Value

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+12	009	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 133: Non-linear Gain (Dead Band)

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	K1	K1 gain	S/R
+5	010	K2	K2 gain	S/R
+6	011	K3	K3 gain	S/R
+7	012	A1	Segment point	S/R
+12	013	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 134: Low-end Cutout

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	A1	Low-end cutout setting	S/R
+12	010	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 135: Segment Linearizer

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	X1	Input	S
+12	008	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 136: Temperature and Pressure Correction

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	010	X1	Flow input	S
+1	011	X2	Pressure input	S
+2	012	X3	Temperature input	S
+4	013	K1	K1 gain	S/R
+5	014	K2	K2 gain	S/R
+6	015	K3	K3 gain	S/R
+7	016	A2	A2 gain	S/R
+8	017	A3	A3 gain	S/R
+12	018	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 141: First-order Lag

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	T	Time constant (0: No delay)	S/R
+12	011	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	010	S1	Reset switch (1: Y1=X1)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 143: Rate-of-change Limit

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	A1	Positive ramp rate (Rate-of-change limit OFF when 0.00)	S/R
+5	010	A2	Negative ramp rate (Rate-of-change limit OFF when 0.00)	S/R
+6	013	TMU	Time unit	S/R
+12	012	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	011	S1	Reset Switch (1: Y1=X1)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 145: Moving Average

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	H	Sampling cycle 0: Same as operation cycle	S/R
+5	010	N	Number of samples	S/R
+12	013	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	011	S1	Reset switch (1: Y1=X1)	S/R

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+18, bit 01	012	S2	External sync contact (DIFU/DIFD commands used)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 147: Lead/Delay

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	K1	Gain	S/R
+5	010	T1	Time constant (0: No Lead)	S/R
+6	011	T2	Time constant (0: No delay)	S/R
+12	013	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	012	S1	Reset switch (1:Y1=X1)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 148: Dead Time

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	T	Time constant (0: No delay)	S/R
+5	010	H	Sampling cycle (0: Operation cycle)	S/R
+6	011	N	Number of samples	S/R
+12	013	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	012	S1	Reset switch (1:Y1=X1)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 149: Dead Time Compensation

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	K	Gain	S/R
+5	010	T	Time constant	S/R
+6	011	H	Sampling cycle	S/R
+7	012	N	Number of samples	S/R
+12	014	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	013	S1	Reset switch (1:Y1=X1)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 150: Accumulator for Instantaneous Value Input

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	012	Q1	Accumulated value (lower 4 digits)	S
+5	013	Q2	Accumulated value (upper 4 digits)	S
+6	022	Q3	Batch accumulated value	S
+7	010	TU	Time unit	S/R
+8	021	BM	Preset value	S/R
+15	003	ERR	Execution error display	S
+18, bit 00	014	S1	Reset switch (1: Reset)	S/R
+18, bit 01	015	S2	Interrupt switch (1: Interrupt)	S/R
+18, bit 02	023	S3	Batch controller reset switch (1: Reset)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	024	U1	Arrival at preset value	S

Block Model 151: Run Time Accumulator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+4	008	Q1	Accumulated time (lower 4 digits)	S
+5	009	Q2	Accumulated time (upper 4 digits)	S
+6	007	PT	Pulse unit (0: s, 1: 10 s, 2: min, 3: 10 min, 4: h)	S/R
+15	003	ERR	Execution error display	S
+18, bit 00	010	S1	Input	S/R
+18, bit 01	011	S2	Stop	S/R
+18, bit 02	012	S3	Reset	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	U1	Unit pulse output	S

Block Model 153: Time Sequence Data Statistics

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	H	Sampling cycle	S/R
+5	010	A	First data number in range	S/R
+6	011	N	Number of samples	S/R
+7	021	Y1	Average	S
+8	022	Y2	Smallest value	S
+9	023	Y3	Largest value	S
+10	024	Y4	Lower 4 digits of range	S
+11	025	Y5	Upper 4 digits of range	S
+12	026	Y6	Average deviation	S
+13	027	Y7	Lower 4 digits of variance	S
+14	028	Y8	Upper 4 digits of variance	S
+15	003	ERR	Execution error display	S
+16	029	Y9	Standard deviation	S
+18, bit 00	012	S1	Reset command	S/R
+18, bit 01	013	S2	External sync contact	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 155: Ramp Program

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	X1	Reference input (input for external setting of start point)	S
+4	010	H0	Elapsed time unit	S/R
+5	020	A0	Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.)	S/R
+6	096	WB	Wait width (0: No wait operation)	S/R
+7	097	WT	Max. wait time (0.0: Unlimited)	S/R
+12	008	Y1	Program output	S
+13	009	Y2	Elapsed time output	S
+14	011	Y3	Process output (Process distinguishes between ramp and soak.)	S/R
+15	003	ERR	Execution error display	S
+18, bit 00	012	S1	Run/stop command (0: Reset, 1: Run)	S/R
+18, bit 01	013	S2	Hold switch (1: Hold)	S/R
+18, bit 02	014	S3	Move to next step command	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	015	U1	X1 input error	S
+19, bit 01	016	U2	Arrival at final step	S
+19, bit 02	017	U3	Holding	S
+19, bit 03	019	U4	Waiting (0: Not waiting, 1: Waiting)	S

Block Model 156: Segment Program

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	X1	Reference input (input for external setting of start point)	S
+4	012	H1	Time axis unit	S/R
+12	008	Y1	Program output	S
+13	009	Y2	Time axis output	S/R
+14	011	Y3	Step output	S/R
+15	003	ERR	Execution error display	S
+18, bit 00	013	S1	Run/stop command	S/R
+18, bit 01	014	S2	Hold switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	015	U1	X1 input (1: Error. Output is 0 when reference input X1 is not matching between No.1 segment B0 and B1.)	S
+19, bit 01	016	U2	Arrival at final segment	S

Block Model 157: Segment Program 2

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	X1	Reference input (input for external setting of start point)	S
+1	194	SRCHSECT	Search section number	S/R
+4	012	H1	Elapsed time unit	S/R
+12	008	Y1	Program output	S
+13	009	Y2	Elapsed time output	S
+14	011	Y3	Step output	S/R
+15	003	ERR	Execution error display	S
+18, bit 00	013	S1	Run/stop command	S/R
+18, bit 01	014	S2	Hold switch (1: Stop)	S/R
+18, bit 02	017	S3	Move to next wait command	S/R
+18, bit 03	018	S4	Move to next step command	S/R
+18, bit 04	020	S5	Reference input disable switch	S/R
+18, bit 05	192	REF_F	Reference input search area designation: First half (LCB01/05 Ver. 2.0 or later, or LCB03 Only)	S/R
+18, bit 06	193	REF_L	Reference input search area designation: Second half (LCB01/05 Ver. 2.0 or later, or LCB03 Only)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	015	U1	X1 input error	S
+19, bit 01	016	U2	Arrival at final segment	S
+19, bit 02	019	U10	Waiting (0: Not waiting, 1: Waiting)	S
+19, bit 03	189	SRCHWAIT	Search wait	S

Block Model 158: Segment Program 3

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0	007	X1	Reference input	S
+2	009	Y2L	Elapsed time output (Low)	S
+3	010	Y2H	Elapsed time output (High)	S
+4	012	H1	Elapsed time unit	S/R
+5	025	C_BNK	Selecting bank No.	S
+6	197	PG_ALTML	Program total time (Low)	S
+7	198	PG_ALTMH	Program total time (High)	S
+8	199	PG_TML	Program time output (Low)	S
+9	200	PG_TMH	Program time output (High)	S
+10	201	PG_REMTL	Program remaining time (Low)	S
+11	202	PG_REMTH	Program remaining time (High)	S

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+12	008	Y1	Program output	S
+14	011	Y3	Step output	S/R
+15	003	ERR	Execution error display	S/R
+16	027	AT_PIDNO	AT result reflection bank number	S/R
+18, bit 00	013	S1	Run/stop command	S/R
+18, bit 01	014	S2	Hold switch	S/R
+18, bit 02	017	S3	Move to next wait command	S/R
+18, bit 03	018	S4	Move to next step command	S/R
+18, bit 04	020	S5	Reference input disable switch	S/R
+18, bit 12	030	PTN_UL	Program pattern transfer order (LCB to CPU Unit)	S/R
+18, bit 13	031	PTN_DL	Program pattern transfer order (CPU Unit to LCB)	S/R
+18, bit 14	026	AT	AT command/AT executing	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	015	U1	X1 input error	S
+19, bit 01	016	U2	Arrival at final segment	S
+19, bit 02	019	U10	Waiting	S

Block Model 161: Rank Selector

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	X1	Input	S
+1	022	X2	Input	S
+2	023	X3	Input	S
+3	024	X4	Input	S
+4	025	X5	Input	S
+5	026	X6	Input	S
+6	027	X7	Input	S
+7	028	X8	Input	S
+12	007	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	031	U1	X1 selected	S
+19, bit 01	032	U2	X2 selected	S
+19, bit 02	033	U3	X3 selected	S
+19, bit 03	034	U4	X4 selected	S
+19, bit 04	035	U5	X5 selected	S
+19, bit 05	036	U6	X6 selected	S
+19, bit 06	037	U7	X7 selected	S
+19, bit 07	038	U8	X8 selected	S

Block Model 162: Input Selector

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	X1	Input	S
+1	022	X2	Input	S
+2	023	X3	Input	S
+3	024	X4	Input	S
+4	025	X5	Input	S
+5	026	X6	Input	S
+6	027	X7	Input	S
+7	028	X8	Input	S
+12	007	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	031	S1	X1 select switch	S/R
+18, bit 01	032	S2	X2 select switch	S/R
+18, bit 02	033	S3	X3 select switch	S/R
+18, bit 03	034	S4	X4 select switch	S/R
+18, bit 04	035	S5	X5 select switch	S/R
+18, bit 05	036	S6	X6 select switch	S/R
+18, bit 06	037	S7	X7 select switch	S/R
+18, bit 07	038	S8	X8 select switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 163: 3-Input Selector

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	X1	Input	S
+1	022	X2	Input	S
+2	023	X3	Input	S
+3	024	X4	Input	S
+4	025	X5	Input	S
+5	026	X6	Input	S
+6	027	X7	Input	S
+7	028	X8	Input	S
+8	029	X9	Input	S
+12	006	Y1	Output	S
+13	007	Y2	Output	S
+14	008	Y3	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	031	S1	S1 select switch	S/R
+18, bit 01	032	S2	S2 select switch	S/R
+18, bit 02	033	S3	S3 select switch	S/R
+18, bit 03	034	S4	Output hold switch – Output is held when set to ON.	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 164: 3-Output Selector

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	014	X1	X1 input	S
+1	015	X2	X2 input	S
+2	016	X3	X3 input	S
+3	024	Y4	Output	S
+4	025	Y5	Output	S
+5	026	Y6	Output	S
+6	027	Y7	Output	S
+7	028	Y8	Output	S
+8	029	Y9	Output	S
+12	021	Y1	Output	S
+13	022	Y2	Output	S
+14	023	Y3	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	031	S1	S1 select switch	S/R
+18, bit 01	032	S2	S2 select switch	S/R
+18, bit 02	033	S3	S3 select switch	S/R
+18, bit 03	034	S4	Output hold switch – Output is held when set to ON.	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 165: Constant Selector

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	011	A1	A1 constant	S/R
+1	012	A2	A2 constant	S/R
+2	013	A3	A3 constant	S/R
+3	014	A4	A4 constant	S/R
+4	015	A5	A5 constant	S/R
+5	016	A6	A6 constant	S/R
+6	017	A7	A7 constant	S/R
+7	018	A8	A8 constant	S/R
+12	006	Y1	Output	S
+15	003	ERR	Execution error display	S
+18, bit 00	021	S1	A1 select switch	S/R
+18, bit 01	022	S2	A2 select switch	S/R
+18, bit 02	023	S3	A3 select switch	S/R
+18, bit 03	024	S4	A4 select switch	S/R
+18, bit 04	025	S5	A5 select switch	S/R
+18, bit 05	026	S6	A6 select switch	S/R
+18, bit 06	027	S7	A7 select switch	S/R
+18, bit 07	028	S8	A8 select switch	S/R
+18, bit 15	000	MT_ST	Stop block operation	S/R

Block Model 166: Constant Generator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	011	A1	A1 constant	S/R
+1	012	A2	A2 constant	S/R
+2	013	A3	A3 constant	S/R
+3	014	A4	A4 constant	S/R
+4	015	A5	A5 constant	S/R
+5	016	A6	A6 constant	S/R
+6	017	A7	A7 constant	S/R
+7	018	A8	A8 constant	S/R
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 167: Ramped Switch

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	015	X1	Input value	S
+1	016	X2	Input value	S
+4	025	T	Time width	S/R
+5	026	TU	Time Unit	S/R
+12	030	Y1	Output value	S
+13	031	Y2	Remaining time	S
+15	003	ERR	Execution error display	S/R
+18, bit 00	027	S1	Input change command	S/R
+18, bit 01	028	S2	Reset command	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	032 *1	U1	Input switching	S

*1: Supported by CS1W-LCB05D,LCB01/05 Ver.1.20 later.

Block Model 168: Bank Selector

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	X1	Input value for PID parameter auto-selection	S
+1	098	SET_BAK	Bank number specification	S/R
+2	110	C_BNK	Current bank number (SP)	S
+3	111	C_PID	Current bank number (P, I, D, MH, and ML)	S
+4	112	C_SP	Current SP	S
+5	113	C_P	Current P	S
+6	114	C_I	Current I	S
+7	115	C_D	Current D	S
+8	116	C_MH	Current MH	S
+9	117	C_ML	Current ML	S
+15	003	ERR	Execution error display	S
+18, bit 00	090	SEL_BNK0	Bank 0 select bit	S/R
+18, bit 01	091	SEL_BNK1	Bank 1 select bit	S/R
+18, bit 02	092	SEL_BNK2	Bank 2 select bit	S/R
+18, bit 03	093	SEL_BNK3	Bank 3 select bit	S/R
+18, bit 04	094	SEL_BNK4	Bank 4 select bit	S/R
+18, bit 05	095	SEL_BNK5	Bank 5 select bit	S/R
+18, bit 06	096	SEL_BNK6	Bank 6 select bit	S/R
+18, bit 07	097	SEL_BNK7	Bank 7 select bit	S/R
+18, bit 08	013	HLD_BNK	Bank switching disable bit	S/R
+18, bit 09	014	UP_PID	PID block parameters (P, I, D, MH, and ML) copy bit (Copies parameters from PID block to bank selector block.)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	100	SET_BNK0	Bank 0 selected flag	S
+19, bit 01	101	SET_BNK1	Bank 1 selected flag	S
+19, bit 02	102	SET_BNK2	Bank 2 selected flag	S
+19, bit 03	103	SET_BNK3	Bank 3 selected flag	S
+19, bit 04	104	SET_BNK4	Bank 4 selected flag	S
+19, bit 05	105	SET_BNK5	Bank 5 selected flag	S
+19, bit 06	106	SET_BNK6	Bank 6 selected flag	S
+19, bit 07	107	SET_BNK7	Bank 7 selected flag	S

*1: Supported by CS1W-LCB01/05 Ver.1.50 later.

Block Model 169: Split Converter

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	X1	PID block's MV output value	S
+2	012	MV_CH	Heating MV	S

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+3	013	MV_CC	Cooling MV	S
+4	022	DB	Dead band	S/R
+5	031	MHA_H_SP	Heating MV high limit	S/R
+6	032	MLA_H_SP	Heating MV low limit	S/R
+7	033	MHA_C_SP	Cooling MV high limit	S/R
+8	034	MLA_C_SP	Cooling MV low limit	S/R
+9	045	P_H	Heating system P	S/R
+10	046	I_H	Heating system I	S/R
+11	047	D_H	Heating system D	S/R
+12	048	P_C	Cooling system P	S/R
+13	049	I_C	Cooling system I	S/R
+14	050	D_C	Cooling system D	S/R
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	014	MHA_H	Heating MV high limit output	S
+19, bit 01	015	MLA_H	Heating MV low limit output	S
+19, bit 02	016	MHA_C	Cooling MV high limit output	S
+19, bit 03	017	MLA_C	Cooling MV low limit output	S

*1: Supported by CS1W-LCB01/05 Ver.1.50 later.

Block Model 171: Constant ITEM Setting

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	E1	E1 setting	S/R
+1	022	E2	E2 setting	S/R
+2	023	E3	E3 setting	S/R
+3	024	E4	E4 setting	S/R
+4	025	E5	E5 setting	S/R
+5	026	E6	E6 setting	S/R
+6	027	E7	E7 setting	S/R
+7	028	E8	E8 setting	S/R
+8	051	E9	E9 setting	S/R
+9	052	E10	E10 setting	S/R
+10	053	E11	E11 setting	S/R
+11	054	E12	E12 setting	S/R
+12	055	E13	E13 setting	S/R
+13	056	E14	E14 setting	S/R
+14	057	E15	E15 setting	S/R
+15	003	ERR	Execution error display	S
+16	058	E16	E16 setting	S/R
+18, bit 00	031	S1	E1 send switch	S/R
+18, bit 01	032	S2	E2 send switch	S/R
+18, bit 02	033	S3	E3 send switch	S/R
+18, bit 03	034	S4	E4 send switch	S/R
+18, bit 04	035	S5	E5 send switch	S/R
+18, bit 05	036	S6	E6 send switch	S/R
+18, bit 06	037	S7	E7 send switch	S/R
+18, bit 07	038	S8	E8 send switch	S/R
+18, bit 08	039	S_ALL	Batch send switch	S/R
+18, bit 09	061	S9	E9 send switch	S/R
+18, bit 10	062	S10	E10 send switch	S/R
+18, bit 11	063	S11	E11 send switch	S/R
+18, bit 12	064	S12	E12 send switch	S/R
+18, bit 13	065	S13	E13 send switch	S/R
+18, bit 14	066	S14	E14 send switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	067	S15	E15 send switch	S/R
+19, bit 01	068	S16	E16 send switch	S/R

Block Model 172: Variable ITEM Setting

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	X1	Input	S
+1	022	X2	Input	S
+2	023	X3	Input	S
+3	024	X4	Input	S
+4	025	X5	Input	S
+5	026	X6	Input	S
+6	027	X7	Input	S
+7	028	X8	Input	S
+15	003	ERR	Execution error display	S
+18, bit 00	041	S1	E1 send switch	S/R
+18, bit 01	042	S2	E2 send	S/R
+18, bit 02	043	S3	E3 send switch	S/R
+18, bit 03	044	S4	E4 send switch	S/R
+18, bit 04	045	S5	E5 send	S/R
+18, bit 05	046	S6	E6 send switch	S/R
+18, bit 06	047	S7	E7 send switch	S/R
+18, bit 07	048	S8	E8 send	S/R
+18, bit 08	049	S9	Batch send switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 174: Batch Data Collector

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	021	D1	D1	S
+1	022	D2	D2 input	S
+2	023	D3	D3 input	S
+3	024	D4	D4 input	S
+4	025	D5	D5 input	S
+5	026	D6	D6 input	S
+6	027	D7	D7 input	S
+7	028	D8	D8 input	S
+15	003	ERR	Execution error display	S
+18, bit 00	031	S01	D1 input switch	S/R
+18, bit 01	032	S02	D2 input switch	S/R
+18, bit 02	033	S03	D3 input switch	S/R
+18, bit 03	034	S04	D4 input switch	S/R
+18, bit 04	035	S05	D5 input switch	S/R
+18, bit 05	036	S06	D6 input switch	S/R
+18, bit 06	037	S07	D7 input switch	S/R
+18, bit 07	038	S08	D8 input switch	S/R
+18, bit 08	039	S09	Batch input switch	S/R
+18, bit 09	040	S10	Batch clear buffer switch – Contents (held values) of D1 to D8 buffers area batch-cleared when switch state changes from 0 to 1.	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 182: Accumulated Value Input Adder

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	011	P1	Input	S
+1	012	P2	Input	S
+2	013	P3	Input	S
+3	014	P4	Input	S
+4	024	Q1	Accumulated value (lower 4 digits)	S
+5	025	Q2	Accumulated value (upper 4 digits)	S
+10	020	N	Sample number for moving average in instantaneous value conversion	S/R
+12	023	Y1	Instantaneous value output	S
+15	003	ERR	Execution error display	S
+18, bit 00	021	S1	Counter reset switch	S/R
+18, bit 01	022	S2	Interrupt switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 183: Accumulated Value Analog Multiplier

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	012	X1	Input	S
+1	011	P1	Input	S
+4	021	Q1	Accumulated value (lower 4 digits)	S
+5	022	Q2	Accumulated value (upper 4 digits)	S
+8	014	K1	Gain	S/R
+9	015	A1	Bias	S/R

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+10	017	N	Sample number for moving average in instantaneous value conversion	S/R
+12	020	Y1	Instantaneous value output	S
+15	003	ERR	Execution error display	S
+18, bit 00	018	S1	Counter reset switch	S/R
+18, bit 01	019	S2	Interrupt switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 184: Accumulator for Accumulated Value Input

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	P1	Input	S
+4	012	Q1	Accumulated value (lower 4 digits)	S
+5	013	Q2	Accumulated value (upper 4 digits)	S
+6	022	Q3	Batch accumulated value	S
+8	021	BM	Preset value	S/R
+12	016	Y1	Instantaneous value output	S
+15	003	ERR	Execution error display	S
+18, bit 00	014	S1	Counter reset switch	S/R
+18, bit 01	015	S2	Interrupt switch	S/R
+18, bit 02	023	S3	Batch controller reset switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	024	U1	Arrival at preset value	S

Block Model 185: Contact Input/Accumulated Value Output

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+4	011	Q1	Accumulated value (lower 4 digits)	S
+5	012	Q2	Accumulated value (upper 4 digits)	S
+15	003	ERR	Execution error display	S
+18, bit 00	008	S1	Contact input	S/R
+18, bit 01	009	S2	Reset switch	S/R
+18, bit 02	010	S3	Interrupt switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Block Model 186: Accumulated Value Input/Contact Output

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	P1	Input	S
+15	003	ERR	Execution error display	S
+18, bit 00	010	S1	Counter reset switch	S/R
+18, bit 01	011	S2	Interrupt switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	012	U1	Contact output	S

Block Model 192: Analog/Pulse Width Converter

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	008	X1	Input	S
+4	009	CT	Pulse cycle time	S/R
+15	003	ERR	Execution error display	S
+18, bit 00	010	S1	Reset switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	011	U1	Contact output	S

Block Model 202: Constant Comparator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	051	X1	X1 input value	S
+1	052	X2	X2 input value	S
+2	053	X3	X3 input value	S
+3	054	X4	X4 input value	S
+4	055	X5	X5 input value	S
+5	056	X6	X6 input value	S
+6	057	X7	X7 input value	S
+7	058	X8	X8 input value	S
+8	008	R1	R1 constant	S/R
+9	012	R2	R2 constant	S/R
+10	016	R3	R3 constant	S/R
+11	020	R4	R4 constant	S/R
+12	024	R5	R5 constant	S/R
+13	028	R6	R6 constant	S/R
+14	032	R7	R7 constant	S/R
+15	003	ERR	Execution error display	S
+16	036	R8	R8 constant	S/R
+18, bit 00	041	S1	Comparison stop command	S/R
+18, bit 01	042	S2	Forced 0 output command	S/R
+18, bit 02	043	S3	Forced 1 output command	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	010	U1	Comparison result	S
+19, bit 01	014	U2	Comparison result	S
+19, bit 02	018	U3	Comparison result	S
+19, bit 03	022	U4	Comparison result	S
+19, bit 04	026	U5	Comparison result	S
+19, bit 05	030	U6	Comparison result	S
+19, bit 06	034	U7	Comparison result	S
+19, bit 07	038	U8	Comparison result	S

Block Model 203: Variable Comparator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	051	X1	X1 input value	S
+1	052	X2	X2 input value	S
+2	053	X3	X3 input value	S
+3	054	X4	X4 input value	S
+4	055	X5	X5 input value	S
+5	056	X6	X6 input value	S
+6	057	X7	X7 input value	S
+7	058	X8	X8 input value	S
+8	061	R1	R1 input value	S
+9	062	R2	R2 input value	S
+10	063	R3	R3 input value	S
+11	064	R4	R4 input value	S
+12	065	R5	R5 input value	S
+13	066	R6	R6 input value	S
+14	067	R7	R7 input value	S
+15	003	ERR	Execution error display	S
+16	068	R8	R8 input value	S
+18, bit 00	041	S1	Comparison stop command	S/R
+18, bit 01	042	S2	Forced 0 output command	S/R
+18, bit 02	043	S3	Forced 1 output command	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	010	U1	Comparison result	S
+19, bit 01	014	U2	Comparison result	S
+19, bit 02	018	U3	Comparison result	S
+19, bit 03	022	U4	Comparison result	S
+19, bit 04	026	U5	Comparison result	S
+19, bit 05	030	U6	Comparison result	S
+19, bit 06	034	U7	Comparison result	S
+19, bit 07	038	U8	Comparison result	S

Block Model 205: Timer

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+4	008	PRS	Prediction (subtracted from setting)	S/R
+5	010	TMU	Time unit	S/R
+8	007	SP	Setting	S/R
+12	009	Y1	Time elapsed	S
+15	003	ERR	Execution error display	S
+18, bit 00	011	S1	Count switch	S/R
+18, bit 01	012	S2	Interrupt switch	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	U1	Arrival at setting	S
+19, bit 01	014	U2	Arrival at prediction	S

Block Model 206: ON/OFF Timer

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+4	007	T1	ON time setting	S/R
+5	008	T2	OFF time setting	S/R
+6	009	TMU	Time unit	S/R
+12	010	Y1	Elapsed ON time	S
+13	011	Y2	Elapsed OFF time	S
+15	003	ERR	Execution error display	S
+18, bit 00	012	S1	Run/stop command	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	013	U1	Contact output	S

Block Model 207: Clock Pulse

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+4	007	TS	Ts setting (unit: s)	S/R
+15	003	ERR	Execution error display	S
+18, bit 00	008	S1	Operation command (1: Clock pulse output ON)	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	009	U1	Clock pulse output	S

Block Model 208: Counter

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+4	008	PRS	Prediction (subtracted from setting)	S/R
+8	007	SP	Setting	S/R
+12	009	Y1	Count	S
+15	003	ERR	Execution error display	S
+18, bit 00	010	S1	Run/stop command	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	012	U1	Arrival at setting	S
+19, bit 01	013	U2	Arrival at prediction	S

Block Model 209: Internal Switch

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	011 to 026	S1 to S16	Internal switches S1 to S16	S/R
+1	027 to 042	S17 to S32	Internal switches S17 to S32	S/R
+2	043 to 058	S33 to S48	Internal switches S33 to S48	S/R
+3	059 to 074	S49 to S64	Internal switches S49 to S64	S/R
+4	075 to 090	S65 to S80	Internal switches S65 to S80	S/R
+5	091 to 106	S81 to S96	Internal switches S81 to S96	S/R
+6	107 to 122	S97 to S112	Internal switches S97 to S112	S/R
+7	123 to 138	S113 to S128	Internal switches S113 to S128	S/R
+8	139 to 154	S129 to S144	Internal switches S129 to S144	S/R
+9	155 to 170	S145 to S160	Internal switches S145 to S160	S/R
+10	171 to 186	S161 to S176	Internal switches S161 to S176	S/R
+11	187 to 202	S177 to S192	Internal switches S177 to S192	S/R
+12	203 to 218	S193 to S208	Internal switches S193 to S208	S/R
+13	219 to 234	S209 to S224	Internal switches S209 to S224	S/R
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation	S/R

Block Model 210: Level Check

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	007	X1	Input value	S
+1	010	A0	Lower limit	S/R
+2	011	A1	Level 1 upper limit	S/R
+3	012	A2	Level 2 upper limit	S/R
+4	013	A3	Level 3 upper limit	S/R
+5	014	A4	Level 4 upper limit	S/R
+6	015	A5	Level 5 upper limit	S/R
+7	016	A6	Level 6 upper limit	S/R
+8	017	A7	Level 7 upper limit	S/R
+9	018	A8	Level 8 upper limit	S/R
+10	019	A9	Upper hysteresis	S/R
+11	020	A10	Lower hysteresis	S/R
+12	030	Y1	Level No.	S
+15	003	ERR	Execution error display	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	031	U1	Level 1	S
+19, bit 01	032	U2	Level 2	S
+19, bit 02	033	U3	Level 3	S
+19, bit 03	034	U4	Level 4	S
+19, bit 04	035	U5	Level 5	S
+19, bit 05	036	U6	Level 6	S
+19, bit 06	037	U7	Level 7	S
+19, bit 07	038	U8	Level 8	S

Block Model 221: ON/OFF Valve Manipulator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+4	007	TO	Open time setting	S/R
+5	009	TC	Close time setting	S/R
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 00	086	S1	Auto/Manual switching	S/R
+18, bit 02	013	S3	Manual input	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	021	U1	Manipulation output	S
+19, bit 01	022	U2	Valve action time error (1: Error)	S
+19, bit 02	023	U3	Valve open midway (1: Open midway)	S
+19, bit 07	012	S2	Auto input	S
+19, bit 08	085	S4	Site manipulation switch input (1: Site, 0: Central)	S
+19, bit 09	015	S5	Open limit switch input	S
+19, bit 10	016	S6	Close limit switch input	S

Block Model 222: Motor Manipulator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	032	X1	CT input	S
+4	033	H_SP	CT input high alarm setting	S/R
+6	035	HS	Hysteresis setting	S/R
+7	006	ANS	Answer check time (unit: s)	S/R
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 00	086	S1	Auto/Manual switching 0: Manual, 1: Auto	S/R
+18, bit 02	013	S3	Manual input	S/R
+18, bit 15	000	MT_ST	Stop block operation command (0: Cancel stop, 1: Stop)	S/R
+19, bit 00	021	U1	Manipulation output	S

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+19, bit 01	022	U2	Answer error (1: Error, 0: Normal)	S
+19, bit 04	036	CTH	CT input high alarm output	S
+19, bit 07	012	S2	Auto input	S
+19, bit 08	085	S4	Site manipulation switch input (1: Site, 0: Central)	S
+19, bit 09	015	S5	Answer input	S

Block Model 223: Reversible Motor Manipulator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	032	X1	CT input	S
+4	033	H_SP	CT input high alarm setting	S/R
+6	035	HS	Hysteresis setting	S/R
+7	006	ANS	Answer check time (unit: s)	S/R
+8	007	OFT	OFF time during FWD/REV switching (unit: s)	S/R
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 00	086	S1	Auto/Manual switching 0: Manual, 1: Auto	S/R
+18, bit 03	014	S4	MAN-FWD input	S/R
+18, bit 05	016	S6	MAN-REV input	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	021	U1	FWD manipulation output	S
+19, bit 01	022	U2	REV manipulation output	S
+19, bit 02	023	U3	Answer error (1: Error, 0: Normal)	S
+19, bit 03	024	U4	Motor OFF state output (1: OFF)	S
+19, bit 04	036	CTH	CT input high alarm output	S
+19, bit 08	012	S2	AUTO-FWD input	S
+19, bit 09	013	S3	AUTO-REV input	S
+19, bit 10	085	S7	Site manipulation switch input	S
+19, bit 11	018	S8	FWD answer input	S
+19, bit 12	019	S9	REV answer input	S

Block Model 224: Motor Opening Manipulator

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	032	X1	Opening input	S
+1	014	SP	Current SP output	S
	013	SP	Manual input target opening setting	R
+2	012	X2	Auto input target opening	S
+4	033	H_SP	Opening input high limit alarm setting	S/R
+5	034	L_SP	Opening input low limit alarm setting	S/R
+6	035	HS	Hysteresis setting	S/R
+7	017	DB	Dead-band	S/R
+8	015	T1	Full-stroke time (unit: s)	S/R
+9	016	T2	Restart control time	S/R
+15	003	ERR	Execution error display	S
+17	099	OP_MK	Label	S/R
+18, bit 00	086	S1	Auto/Manual switching	S/R
+18, bit 15	000	MT_ST	Stop block operation command	S/R
+19, bit 00	021	U1	Open manipulation output	S
+19, bit 01	022	U2	Close manipulation output	S
+19, bit 02	036	H	Opening input high limit alarm output	S
+19, bit 03	037	L	Opening input low limit alarm output	S
+19, bit 08	085	S2	Site manipulation switch input (1: Site, 1: Central)	S
+19, bit 09	019	S3	Open monitor switch thermal relay operation (1: ON)	S
+19, bit 10	020	S4	Close monitor switch thermal relay operation (1: ON)	S

Block Model 225: Switch Instrument

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+0 (first word)	010	TYPE1	Meter type	S
+1, bit 00	014	A/M1	Auto/Manual switch	S/R
+1, bit 01	018	STOP_M1	Stop switch (Manual)	R
	021	STOP_O1	Stop switch output	S
+1, bit 02	019	OPE1_M1	Manipulation switch 1 (Manual)	R
	022	OPE1_O1	Manipulation switch 1 output	S
+1, bit 03	020	OPE2_M1	Manipulation switch 2 (Manual)	R
	023	OPE2_O1	Manipulation switch 2 output	S
+1, bit 04	026	ANS1_1	Answer 1 indication	S
+1, bit 05	028	ANS2_1	Answer 2 indication	S
+1, bit 06	013	ANSABN1	Answer error	S
+1, bit 07	024	AUTABN1	Auto error	S
+2	040	TYPE2	Meter type	S
+3, bit 00	044	A/M2	Auto/Manual switch	S/R
+3, bit 01	048	STOP_M2	Stop switch (Manual)	R
	051	STOP_O2	Stop switch output	S
+3, bit 02	049	OPE1_M2	Manipulation switch 1 (Manual)	R
	052	OPE1_O2	Manipulation switch 1 output	S
+3, bit 03	050	OPE2_M2	Manipulation switch 2 (Manual)	R
	053	OPE2_O2	Manipulation switch 2 output	S
+3, bit 04	056	ANS1_2	Answer 1 indication	S
+3, bit 05	058	ANS2_2	Answer 2 indication	S
+3, bit 06	043	ANSABN2	Answer error	S
+3, bit 07	054	AUTABN2	Auto error	S
+4	070	TYPE3	Meter type	S
+5, bit 00	074	A/M3	Auto/Manual switch	S/R
+5, bit 01	078	STOP_M3	Stop switch (Manual)	R
	081	STOP_O3	Stop switch output	S
+5, bit 02	079	OPE1_M3	Manipulation switch 1 (Manual)	R
	082	OPE1_O3	Manipulation switch 1 output	S
+5, bit 03	080	OPE2_M3 .	Manipulation switch 2 (Manual)	R
	083	OPE2_O3	Manipulation switch 2 output	S
+5, bit 04	086	ANS1_3	Answer 1 indication	S

Offset (words)	ITEM	Tag ITEM	Data name	Send/ Receive
+5, bit 05	088	ANS2_3	Answer 2 indication	S
+5, bit 06	073	ANSABN3	Answer error	S
+5, bit 07	084	AUTABN3	Auto error	S
+6	100	TYPE4	Meter type	S
+7, bit 00	104	A/M4	Auto/Manual switch	S/R
+7, bit 01	108	STOP_M4	Stop switch (Manual)	R
	111	STOP_O4	Stop switch output	S
+7, bit 02	109	OPE1_M4	Manipulation switch 1 (Manual)	R
	112	OPE1_O4	Manipulation switch 1 output	S
+7, bit 03	110	OPE2_M4 .	Manipulation switch 2 (Manual)	R
	113	OPE2_O4	Manipulation switch 2 output	S
+7, bit 04	116	ANS1_4	Answer 1 indication	S
+7, bit 05	118	ANS2_4	Answer 2 indication	S
+7, bit 06	103	ANSABN4	Answer error	S
+7, bit 07	114	AUTABN4	Auto error	S
+8	130	TYPE5	Meter type	S
+9, bit 00	134	A/M5	Auto/Manual switch	S/R
+9, bit 01	138	STOP_M5	Stop switch (Manual)	R
	141	STOP_O5	Stop switch output	S
+9, bit 02	139	OPE1_M5	Manipulation switch 1 (Manual)	R
	142	OPE1_O5	Manipulation switch 1 output	S
+9, bit 03	140	OPE2_M5 .	Manipulation switch 2 (Manual)	R
	143	OPE2_O5	Manipulation switch 2 output	S
+9, bit 04	146	ANS1_5	Answer 1 indication	S
+9, bit 05	148	ANS2_5	Answer 2 indication	S
+9, bit 06	133	ANSABN5	Answer error	S
+9, bit 07	144	AUTABN5	Auto error	S
+10	160	TYPE6	Meter type	S
+11, bit 00	164	A/M6	Auto/Manual switch	S/R
+11, bit 01	168	STOP_M6	Stop switch (Manual)	R
	171	STOP_O6	Stop switch output	S
+11, bit 02	169	OPE1_M6	Manipulation switch 1 (Manual)	R
	172	OPE1_O6	Manipulation switch 1 output	S
+11, bit 03	170	OPE2_M6 .	Manipulation switch 2 (Manual)	R
	173	OPE2_O6	Manipulation switch 2 output	S
+11, bit 04	176	ANS1_6	Answer 1 indication	S
+11, bit 05	178	ANS2_6	Answer 2 indication	S
+11, bit 06	163	ANSABN6	Answer error	S
+11, bit 07	174	AUTABN6	Auto error	S
+12	190	TYPE7	Meter type	S
+13, bit 00	194	A/M7	Auto/Manual switch	S/R
+13, bit 01	198	STOP_M7	Stop switch (Manual)	R
	201	STOP_O7	Stop switch output	S
+13, bit 02	199	OPE1_M7	Manipulation switch 1 (Manual)	R
	202	OPE1_O7	Manipulation switch 1 output	S
+13, bit 03	200	OPE2_M7 .	Manipulation switch 2 (Manual)	R
	203	OPE2_O7	Manipulation switch 2 output	S
+13, bit 04	206	ANS1_7	Answer 1 indication	S
+13, bit 05	208	ANS2_7	Answer 2 indication	S
+13, bit 06	193	ANSABN7	Answer error	S
+13, bit 07	204	AUTABN7	Auto error	S
+14	220	TYPE8	Meter type	S
+15	003	ERR	Execution error indication	S/R
+16, bit 00	224	A/M8	Auto/Manual switch	R
+16, bit 01	228	STOP_M8	Stop switch (Manual)	S
	231	STOP_O8	Stop switch output	R
+16, bit 02	229	OPE1_M8	Manipulation switch 1 (Manual)	S
	232	OPE1_O8	Manipulation switch 1 output	R
+16, bit 03	230	OPE2_M8 .	Manipulation switch 2 (Manual)	S
	233	OPE2_O8	Manipulation switch 2 output	S
+16, bit 04	236	ANS1_8	Answer 1 indication	S
+16, bit 05	238	ANS2_8	Answer 2 indication	S
+16, bit 06	223	ANSABN8	Answer error	S
+16, bit 07	234	AUTABN8	Auto error	S
+18, bit 15	000	MT_ST	Stop block operation command	S/R

Appendix C
Auxiliary Area Flags Relevant to the Loop Control Board

Flags (Loop Control Board to CPU Unit)

Word	Bit	Name	Explanation	Settings
A324	06	Right-side Inner Board Nonfatal Error Flag (CS1D-LCB05D only)	This flag is set to 1 (ON) when the right-side Inner Board has a nonfatal error when the CS1D CPU Unit is in duplex mode.	1: Nonfatal error 0: No nonfatal error
	07	Left-side Inner Board Nonfatal Error Flag (CS1D-LCB05D only)	This flag is set to 1 (ON) when the left-side Inner Board has a nonfatal error when the CS1D CPU Unit is in duplex mode.	1: Nonfatal error 0: No nonfatal error
A358	01	PV Error Input Flag	This flag notifies the CPU Unit whether ITEM 018 (PV error input) of the Basic PID block (block model 011) or Advanced PID block (block model 012) is ON or OFF. **Note:** Normally specify the Analog Input Block's “output from disconnected line detection contact ITEM” as the source of ITEM 018 (PV error contact source designation.)	1: PV error input is ON. 0: PV error input is OFF.
	02	MV Error Input Flag	This flag notifies the CPU Unit whether ITEM 090 (MV error input) of the Basic PID block (block model 011) or Advanced PID block (block model 012) is ON or OFF. **Note:** Normally specify the Analog Output Unit's “output from disconnected line detection contact ITEM” as the source of ITEM 090 (MV error contact source designation.)	1: MV error input is ON. 0: MV error input is OFF.
	03	Execution Error Flag	This flag notifies the CPU Unit that a function block execution error has occurred when ITEM 003 (the execution error code) of one or more blocks is non-zero. **Note:** When an execution error has occurred (there is an error code other than 0), refer to *7-1 Errors and Alarm Troubleshooting* for details on troubleshooting the error.	1: Execution error(s) occurred 0: No execution errors
	04	Function Block Database (RAM) Error Flag	This flag notifies the CPU Unit that the function block data in the Loop Control Board's RAM has been corrupted. If the function block data in RAM is invalid, a cold start will be performed even if a hot start is specified. **Note:** When an error has occurred, use the CX-Process Tool to execute the ***Clear All***, ***Download***, or ***Recovery*** operation or transfer the affected function block's settings again.	1: Function block database error occurred 0: No function block database error
	07	Automatic Cold Start Execution Flag	This flag notifies the CPU Unit that a cold start was executed automatically because the RAM data was invalid due to a discharged backup capacitor or other cause while power was not being supplied (i.e., that the Board is running with the data that was last backed up to flash memory). This flag will be 0 (OFF) when the Board is not running. When necessary, check whether this flag is 1 (ON) and download the most up-to-date function block data.	1: A cold start was executed automatically after writing backup data from the flash memory to RAM. 0: Automatic cold start not executed.
	11	Run Status Flag	This flag notifies the CPU Unit that the Loop Control Board is running. The flag is 1 (ON) when the Board is running.	1: Loop Control Board running 0: Stopped
	13	Backup during Operation Flag	Notifies the CPU Unit whether or not the Loop Control Board is backing up data during operation.	1: Backup during operation 0: No backup during operation.
A358	15	Function Block Changed Flag	This flag notifies the CPU Unit that the function block data download (change) operation was executed from the CX-Process Tool while the Loop Control Board was	1: Function block data (file) was downloaded.

Word	Bit	Name	Explanation	Settings
			running. Monitor the status of this flag in the CPU Unit's ladder program and perform any required processes, such as a notification of function block data change, if the function block data has been changed during operation (i.e., if online editing of the Loop Control Board has been executed). **Note:** When the function block data has been downloaded (changed) by an operation from the CX-Process Tool, the function block data is not stored in flash memory. Always execute the ***Backup*** operation from the CX-Process Tool to backup data to flash memory after downloading function block data.	0: Function block data (file) was not downloaded, a hot start was performed, or a cold start was performed.
A356	00 to 06	ORed Function Block Alarm Outputs	These flags notify the CPU Unit when one of the following alarms occurred in any function block (logical OR of all function block outputs.)	–
	00		MV Low Limit Alarm Flag (MLA: ITEM 079)	1: At or below the low limit 0: Above the low limit
	01		MV High Limit Alarm Flag (MHA: ITEM 078)	1: At or above the high limit 0: Below the high limit
	02		Deviation Alarm Flag (DVA: ITEM 042)	1: At or above the set value 0: Below the set value
	03		Low/Low Limit Alarm Flag (LL: ITEM 016)	1: At or below the set value 0: Above the set value
	04		Low Limit Alarm Flag (L: ITEM 015)	1: At or below the set value 0: Above the set value
	05		High Limit Alarm Flag (H: ITEM 014)	1: At or above the set value 0: Below the set value
	06		High/High Limit Alarm Flag (HH: ITEM 013)	1: At or above the set value 0: Below the set value
A357	00	Duplex Operation Flag (for CS1D-LCB05D)	This flag is set to 1 (ON) while the Inner Board is performing duplex operation when CS1D CPU Unit is in duplex mode.	1: Performing duplex operation 0: Not performing duplex operation
	02	Duplex Initialization Flag (for CS1D-LCB05D)	This flag is set to 1 (ON) while duplex initialization being performed on Inner Board (while data being transferred/verified from active Inner Board to standby Inner Board) when CS1D CPU Unit in duplex mode.	1: Performing duplex initialization 0: Not performing duplex initialization
A401	12	Inner Board Stopped Error Flag (Fatal error)	This flag is set to 1 (ON) when an error occurs in the Loop Control Board such as a WDT error or Inner Board bus error. The CPU Unit will stop running and the ERR/ALM Indicator on the front of the CPU Unit will light. If an error occurs on a CS1D-LCB05D Duplex Loop Control Board mounted to the active CPU Unit, operation will be switched to the Loop Control Board mounted to the standby CPU Unit. **Note 1:** This flag can be reset to 0 (OFF) by clearing the error, but it will go ON again unless the cause of the error is eliminated. **Note 2:** The cause of the error is indicated in bits A42400 to A42403.	1: Error occurred 0: Normal
A402	08	Inner Board Error Flag (Non-fatal	This flag is set to 1 (ON) when an error occurs in the data exchange between the Loop Control Board and	1: Error occurred 0: No error

Word	Bit	Name	Explanation	Settings
		error)	CPU Unit (including errors originating in the Loop Control Board itself). The CPU Unit will continue running and the ERR/ALM Indicator on the front of the CPU Unit will flash. The Loop Control Board will stop operating. **Note 1:** The cause of the error is indicated in bits A42404 to A42415. **Note 2:** This flag will be reset to 0 (OFF) when the error is cleared.	
A424	00	Inner Board Error Information	The following flags provide details on Inner Board errors (errors common to all Inner Boards as well as errors specific to Loop Control Boards.)	–
		Inner Board WDT Error Flag (fatal error)	This flag is set to 1 (ON) if the Loop Control Board is faulty.	1: Inner Board WDT Error 0: Normal
	01	Inner Board Bus Error Flag (fatal error)	This flag is set to 1 (ON) if an Inner Board Bus Error has occurred.	1: Inner Board Bus Error 0: Normal
	02	Cyclic Monitor Error Flag (fatal error)	This flag is set to 1 (ON) when a Cyclic Monitor Error is detected, i.e., the cyclic area's access right token was not returned to the Loop Control Board within the cyclic monitor time.	1: Cyclic Monitor Error 0: Normal
	03	Flash Memory Data Error or All Function Block Database (RAM) Error during Duplex Operation Flag (fatal error)	This flag is set to 1 (ON) in the situations outlined below. Use the CX-Process Tool software to download all function blocks (LCB/LCU unit). Alternatively, backup to flash memory. When there is a flash memory data error during the data check at a cold start. A database (RAM) error occurred for all function blocks during operation in duplex mode when mounted to a CS1D CPU Unit.	1: Flash Memory Data Error or All Function Block Database (RAM) Error 0: Flash memory normal and all function block database (RAM) normal during duplex operation
	04	Incompatible CPU Unit Error Flag (non-fatal error)	This flag is set to 1 (ON) when the Loop Control Board is mounted in a CPU Unit other than a CS1-H CPU Unit. **Note:** The CS1 CPU Units without the “-H” suffix do not support the Loop Control Board.	1: The Loop Control Board is mounted in a CPU Unit that does not support the Board. 0: Normal
	05	Not used.	–	–
	06	CPU Bus Unit Settings Area Error Flag	(Does not apply to the Loop Control Board.)	–
	07	Routing Table Error Flag	(Does not apply to the Loop Control Board.)	–
	08	Loop Control Board High Load Flag (non-fatal error)	This flag is set to 1 (ON) when the LCB load rate exceeds 80% for three consecutive cycles. If this error occurs, extend the operation cycles of function blocks that can be extended. If the error recurs after extending the operation cycles, add a Loop Control Unit and divert some of the load to that Unit.	1: Loop Control Board running at a high load rate 0: Normal
	09	Operation Cycle Error Flag (nonfatal error) (for CS1D-LCB05D only)	This flag is set to 1 (ON) when the Loop Control Board's operation cycle is inaccurate because the cycle time is too long (when the CPU Unit's cycle time is more than 20% of the minimum operation cycle) during duplex mode operation when mounted in a CS1D CPU Unit.	1: Operation cycle error 0: Normal
	10	Partial Function Block Database (RAM) Error During Simplex Operation (nonfatal error) (for CS1D-LCB05D only)	Changes to 1 (turns ON) when a database (RAM) error occurs for some function blocks when mounted to CS1D CPU Units and operating in simplex mode or when mounted to CS1-H CPU Units.	1: Function block database error during simplex operation. 0: Normal
	11	Backup Data (Flash Memory) Error Flag	This flag is set to 1 (ON) when the parameter data stored in flash memory has been corrupted.	1: Flash memory data error 0: Normal

Word	Bit	Name	Explanation	Settings
A424	12	Specified EM Bank Unusable Error Flag	This flag is set to 1 (ON) when specified EM bank is not a usable bank.	1: Cannot be used. 0: Can be used.
	13 to 14	Not used.	–	–
	15	Automatic Recovery from Cycle Offset Flag (nonfatal error)	If something unforeseen causes the cycle to the right or left to be offset, duplex initialization is automatically executed to restore synchronous operation. The flag is set to 1 (ON) when recovery is achieved.	1: Duplex initialization executed for synchronous displacement recovery. 0: Normal

Index

Numerics

2-position ON/OFF 31
3-input Selector 294
3-output Selector 297
3-position ON/OFF 38

A

Absolute Value 171
Accumulated Value Analog Multiplier 343
Accumulated Value Input Adder 340
Accumulated Value Input/ Contact Output 353
Accumulator for accumulated value input 346
Accumulator for instantaneous value input 196
Addition or Subtraction 150
Advanced PID 67
AI 2-point/AO 2-point Terminal (MAD01) 475
AI 4-point Terminal (PDC55) 504
AI 4-point Terminal (PTS01/02/03, PDC01, PTW01, PTS11/12, PDC11) 477
AI 4-point Terminal (PTS51) 491
AI 4-point Terminal (PTS52) 494
AI 4-point Terminal (PTS55) 497
AI 4-point Terminal (PTS56) 501
AI 4-point Terminal (AD041) 529
AI 4-point Terminal (AD04U) 513
AI 4-point Terminal (ADG41) 516
AI 4-point Terminal (DRT1-AD04) 533
AI 4-point Terminal (PH41U) 510
AI 4-point/AO 4-point Terminal (MAD42) 539
AI 4-point/AO 4-point Terminal (MAD44) 523
AI 8-point Terminal (AD003) 471
AI 8-point Terminal (AD081) 525
AI 8-point Terminal (PTR01/02) 485
ALARM TIMER 430, 448
Analog Signal Hold 148
Analog/Pulse Width Converter 356
AND 429
AND LOAD 429, 437
AND NOT 429
AO 2-point Terminal (DRT1-DA02) 535
AO 4-point Terminal (DA021) 537
AO 4-point Terminal (DA041) 531
AO 4-point Terminal (PMV01) 483
AO 4-point Terminal (PMV02) 488
AO 8-point Terminal (DA003/4) 473
AO 8-point Terminal (DA08V/C) 527
Arithmetic Operation 156

B

Bank (e.g., PID) Change Function 246, 258
Bank Data 281
Bank Data Blocks 248
Bank Number 259
Bank Selector 308
Basic PID 45
Batch Data Collector 337
Batch Flowrate Capture 90
Batch Reading and Writing of Program Pattern Data 246, 261
Blended PID 82
BLOCK RESET 430, 446
BLOCK SET 430, 445

C

Changing Banks (e.g., PID) 246
Clock Pulse 373
Constant Comparator 361
Constant Generator 303
Constant ITEM Setting 328
Constant Selector 300
Contact Distributor 359
Contact Input/ Accumulated Value Output 350
Counter 375

D

DD 429
Dead Time 192
Dead Time Compensation 194
Deviation Alarm 140
Deviation Limit 146
DI 16-point Terminal 457
DI 16-point/DO 16-point Terminal 467
DI 32-point Terminal 458
DI 48-point/DO 48-point Terminal 470
DI 64-point Terminal 459
DI 8-point Terminal 456
DI 96-point Terminal 468
DIFD 429, 439
DIFU 429, 439
Division 154
DO 12-point Terminal 463
DO 16-point Terminal 464
DO 32-point Terminal 465
DO 5-point Terminal 461
DO 64-point Terminal 466
DO 8-point Terminal 462
DO 96-point Terminal 469
DU 429

E

END 430
ES100X Controller Terminal 126

F

First-order Lag 184
Fuzzy Logic 96

H

High/Low Alarm 138
High/Low Limit 144

I

Indication and Operation 114
Indication and Setting 110
Indicator 123
Input Selector 291
Internal Switch 377

J

JUMP 430, 446

L

Lead/Delay 190
Level Check 379
LOAD 429, 436
LOAD NOT 429, 436
Low-end Cutout 175

M

Motor Manipulator 388
Motor Opening Manipulator 398
Moving Average 188
Multiplication 152

N

NO OPERATION 430
Non-linear Gain (Dead Band) 173

O

ON/OFF Timer 371
ON/OFF Valve Manipulator 384
OR 429
OR LOAD 429, 437
OR NOT 429
OUT 429, 437
OUT NOT 429, 437

P

PI 4-point Terminal (PPS01) 480

R

Ramp Program 207
Ramped Switch 305, 308, 318
Range Conversion 165
Rank Selector 288
Rate-of-change Limit 186
Rate-of-change Operation and Alarm 142
Ratio Setting 118
RESET 429, 438
Reversible Motor Manipulator 393
Run Time Accumulator 200

S

Segment Linearizer 177
Segment Program 216
Segment Program 2 220
Segment Program 3 246
Sequence Table 450
SET 429, 438
Split Converter 318
Square Root 169
STEP 443
Step Data 274
Step Data Blocks 248
STEP declaration 430
Step Ladder Program 423
Step Number 260
STEP TIMER 430, 448
System Common blocks 18

T

Temperature and Pressure Correction 180
TIM 429
Time Display 246
Time Sequence Data Statistics 202
Timer 369

V

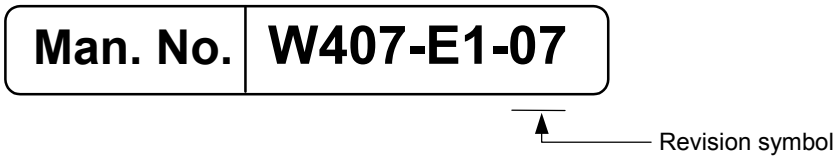
Variable Comparator 365
Variable ITEM Setting 333

W

Wait Function 246

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	October 2002	Original production
02	March 2003	Revisions and additions to add the CS1D-LCB05D.
03	August 2003	Corrections made to errors.
04	December 2003	Add the following information: Block Model 168: Bank Selector, Block Model 169: Split Converter Disturbance overshoot function
05	August 2004	Add the following information: LCB01/05 Version 2.0 Upgrade and Loop-control CPU Units (CJ1G-CPU42P/43P/44P/45P)
06	September 2005	Add and modified information for upgrade to LCB01/03/05 version 3.0, including the following: Added Block Model 582: AI 16-point Terminal (AD161), Block Model 571: AI 2-point Terminal (PRS15/16, PDC15), and Block Model 225: Switch Meter. Greatly modified Block Model 301: Step Ladder. Added and modified other functionality as outlined in /1-1-5 LCB01/03/05 Version 3.0 Upgrade Information/ of W406-E1-6.
07	November 2007	Add and modified information for upgrade to LCB01/03/05 version 3.5.