

R7D

SmartStep 2 servo drive

Another step forward in drive simplicity

- Easy set up and on-line auto tuning
- The footprint is only 48% that of the SmartStep series
- Two torque limits
- Electronic gear, four internal speed settings and wide range of pulse settings
- Adaptive filters for suppression of vibration and resonance
- Configuration and commissioning with CX Drive-ware

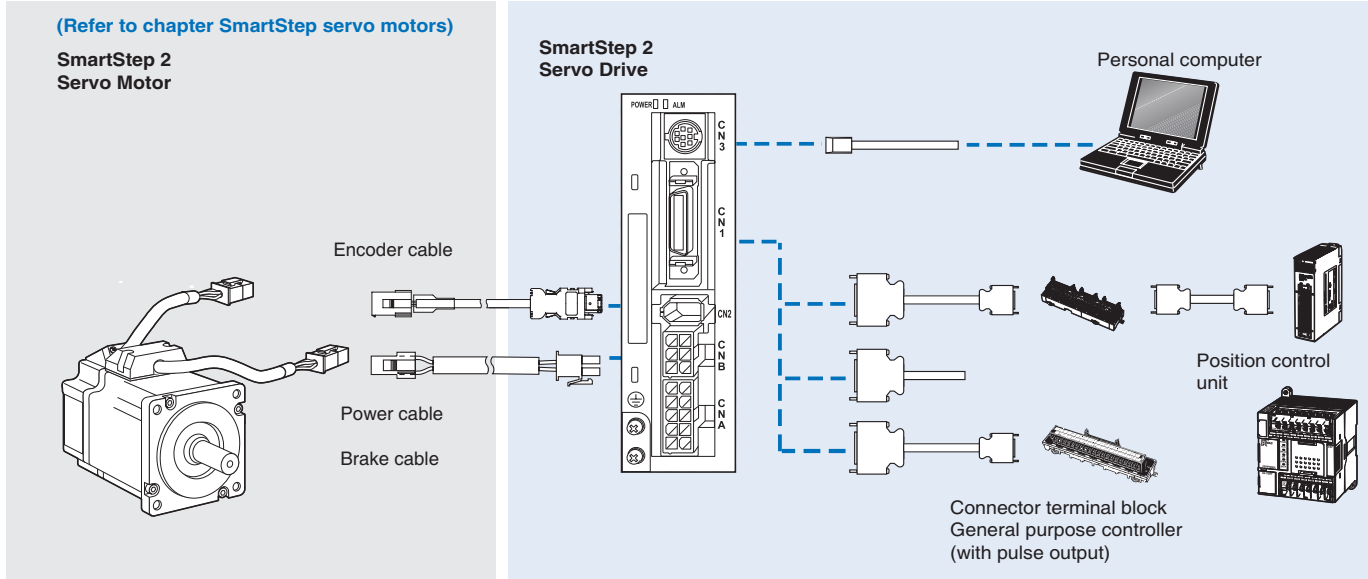
Ratings

- 230 VAC single-phase 50 W to 400 W (0.16 to 1.3 Nm)

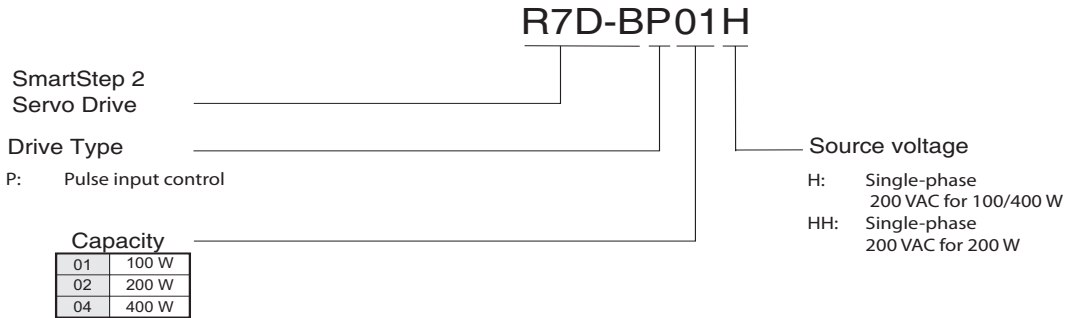


AC Servo systems



System configuration



Servo drive type designation



Servo motor supported

Servo motor							
Family		Voltage	Speed	Rated torque	Capacity	Model	
Cylindric	50 - 400 W 	230 V	3000 min ⁻¹	0.16 Nm	50 W	R88M-G05030H-□S2	
				0.32 Nm	100 W	R88M-G10030H-□S2	
				0.64 Nm	200 W	R88M-G20030H-□S2	
				1.3 Nm	400 W	R88M-G40030H-□S2	
Flat	100-400 W 	230 V	3000 min ⁻¹	0.32 Nm	100 W	R88M-GP10030H-□S2	
				0.64 Nm	200 W	R88M-GP20030H-□S2	
				1.3 Nm	400 W	R88M-GP40030H-□S2	

Servo drive specifications

General specifications

Item	Specification
Ambient operating temperature	0 to 55°C
Ambient operating humidity	90% max. (with no condensation)
Ambient storage temperature	-20 to 65°C
Ambient storage humidity	90% max. (with no condensation)
Storage/operating atmosphere	No corrosive gases.
Vibration resistance	10 to 60 Hz; acceleration : 5.9 m/s ² (0.6G) max.
Impact resistance	Acceleration 19.6 m/s ² max., 3 times each in X, Y, and Z directions,
Insulation resistance	Between power supply/power line terminals and frame ground: 0.5 MΩ min. (at 500 VDC)
Dielectric strength	Between power supply/power terminals and frame ground: 1,500 VAC for 1 min at 50/60 Hz Between each control signal and frame ground: 500 VAC for 1 min
Protective structure	Built into panel (IP10).
International standards	Approval obtained for UL: UL 508C; cUL: cUL C22.2 No 14 Approval EC : EMC EN55011 class A Group 1, EN 61000-6-2, low voltage EN50178

Performance specifications

Item	200 VAC input type		
	100 W	200 W	400 W
	R7D-BP01H	R7D-BP02HH	R7D-BP04H
Continuous output current (rms)	1.0 A	1.6 A	2.5 A
Momentary maximum output current (rms)	3.3 A	4.9 A	7.8 A
Main-circuit power supply	Single-phase 200 to 240 VAC (170 to 264 V), 50/60 Hz		
Control method	All-digital servo		
Speed feedback	10,000 pulses/revolution incremental encoder		
Inverter method	PWM method based on IGBT		
PWM frequency	12 kHz		6 kHz
Weight	0.35 kg	0.42 kg	0.42 kg
Compatible motor voltage	200 V		
Command pulse response	Line drive: 500 kpps		
Compatible motor capacity	50 W 100 W	200 W	400 W
Applicable servo motor (R88M-)	G05030H G10030H GP10030H	G020030H GP20030H	G40030H GP40030H

I/O specifications

Main circuit connector (CNA) specifications

Pin	Symbol	Name	Function
10	L1	Main circuits power supply	For single-phase 100/200 V, connect to L1 (pin 10) and L3 (pin 6).
8	L2		
6	L3		
5	P	External regeneration resistance	If regenerative energy is high, connect an External Regeneration Resistor.
3	B1		
1	FG		This is the ground terminal. Ground to 100 Ω or less.

Servomotor connector (CNB) specifications

Pin	Symbol	Name	Function
1,4,6	U, V, W	Servo motor connection terminals	These are the output terminals to the Servomotor.
3	GND	Frame ground	

Control I/O (CN1) specifications

Pin	Symbol	Name	Function
1	+24 Vin	DC power supply input for control	Power supply input terminal (12 to 24 VDC) for sequence input (pin 1).
2	RUN	RUN Command Input	ON: Servo ON (Starts power to Servomotor.)
3	RESET	Alarm Reset Input	ON: Servo alarm status is reset. ¹ Must be ON for 120 ms min.
4	ECRST/ VSEL2	Deviation Counter Reset Input or Internally Set Speed Selection 2 Input	
5	GSEL/ VZERO/ TLSEL	Gain Switch Input, Zero Speed Designation Input, or Torque Limit Switch Input	
6	GESEL/ VSEL1	Electronic Gear Switch Input or Internally Set Speed Selection 1 Input	Electronic Gear Switch Input or internally Set Speed Selection 1 Input *2
7	NOT	Reverse Drive prohibit Input	Reverse rotation overtravel input. OFF: Prohibited, ON: Permitted
8	POT	Forward Drive prohibit Input	Forward rotation overtravel input. OFF: Prohibited, ON: Permitted
22	+CW/ PULS/ FA	Reverse Pulses Input, Feed Pulses Input, or 90° Phase difference Pulses (Phase A)	Input terminals for position command pulses. Line-driver input: Maximum response frequency: 500 kpps Open-collector input: Maximum response frequency: 200 kpps
23	-CW/ PULS/ FA		
24	+CCW/ SIGN/ FB	Forward Pulses Input, Direction signal, or 90° Phase Difference Pulses (Phase B)	
25	-CCW/SIGN/ FB		
9	/ALM	Alarm Output	When the Servo Drive generates an alarm, the output turns OFF. ²
10	INP/TGON	Positioning Completed Output or Servomotor Rotation Amount Detection Output	
11	BKIR	Brake Interlock Output	Outputs the holding brake timing signals. Release the holding brake when this signal is ON.
12	WARN	Warning Output	The signal selected in the Warning Output Selection (Pn09) is output.
13	OGND	Output Ground Common	Ground common for sequence outputs (pins 9, 10, 11, and 12).
14	GND	Ground Common	Common for Encoder output and phase-Z output (pin 21).
15	+A	Encoder Phase-A Output	These signals output encoder pulses according to the Encoder Dividing Ratio Setting (Pn44).
16	-A		
17	-B	Encoder Phase-B Output	This is the line-driver output (equivalent to RS-422).
18	+B		
19	+Z	Encoder Phase-Z Output	
20	-Z		
21	Z	Phase-Z Output	Outputs the phase Z for the Encoder (1 pulse/rotation). This is the open-collector output.

1. Some alarms cannot be cleared using this input. For details, refer to 8-2 Alarm Table.
2. This is OFF for approximately 2 seconds after turning ON the power.

Encoder connector (CN2) specifications

Pin	Symbol	Name	Function
1	E5V	Encoder power supply +5 V	Power supply output for the encoder 5 V, 70 mA
2	E0V	Encoder power supply GND	
3	NC		Do not connect anything to these pins.
4	NC		
5	S+	Encoder + phase S I/O	RS-485 line-driver I/O
6	S-	Encoder - phase S I/O	
Shell	FG	Shield ground	Cable shield ground

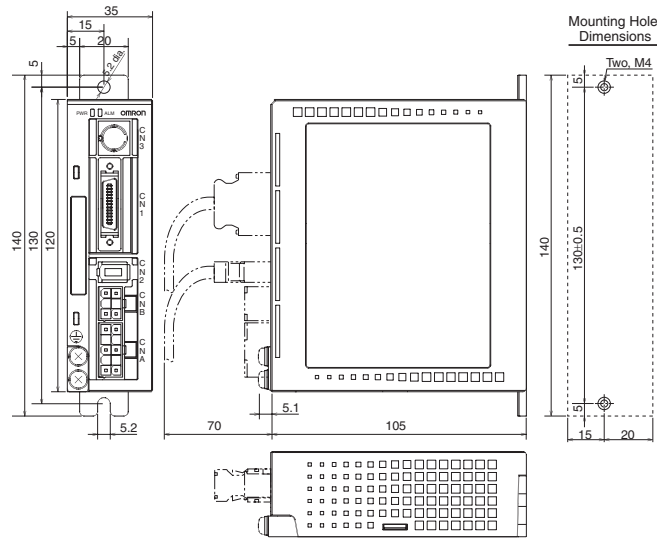
Power supply and alarm indicator (PWR and ALM)

Indicator	Color	Status
PWR	Lit green	Main power is ON.
	Lit orange	Flashes at a 1-second intervals when there is a warning (i.e., overload, excessive regenerative energy, or fan speed error).
	Lit red	An alarm has occurred.
ALM		Lights when an alarm has occurred

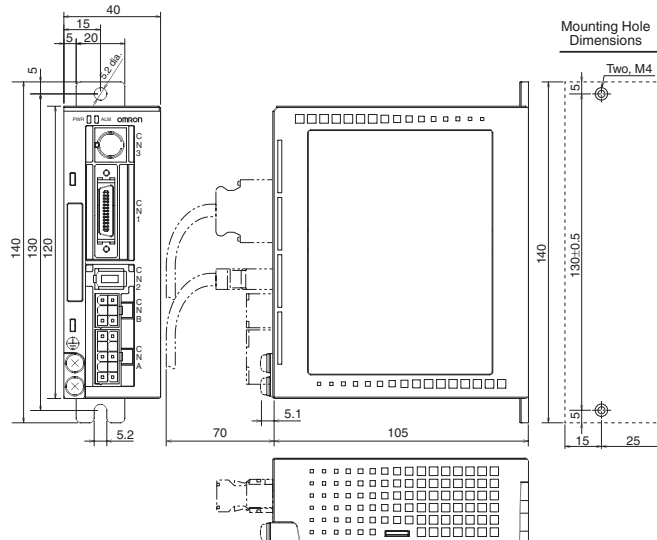
Dimensions

Servo drives

R7D-BP01H (200 V, 100 W)

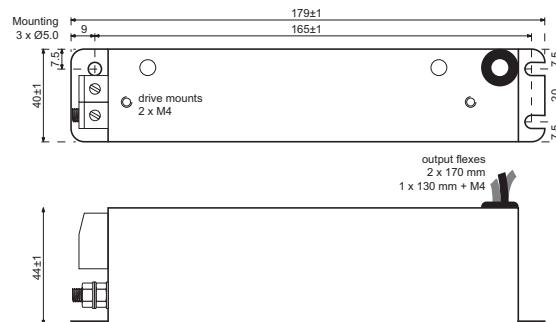


R88D-BP02HH/04H (200 V, 400 W)



Filters

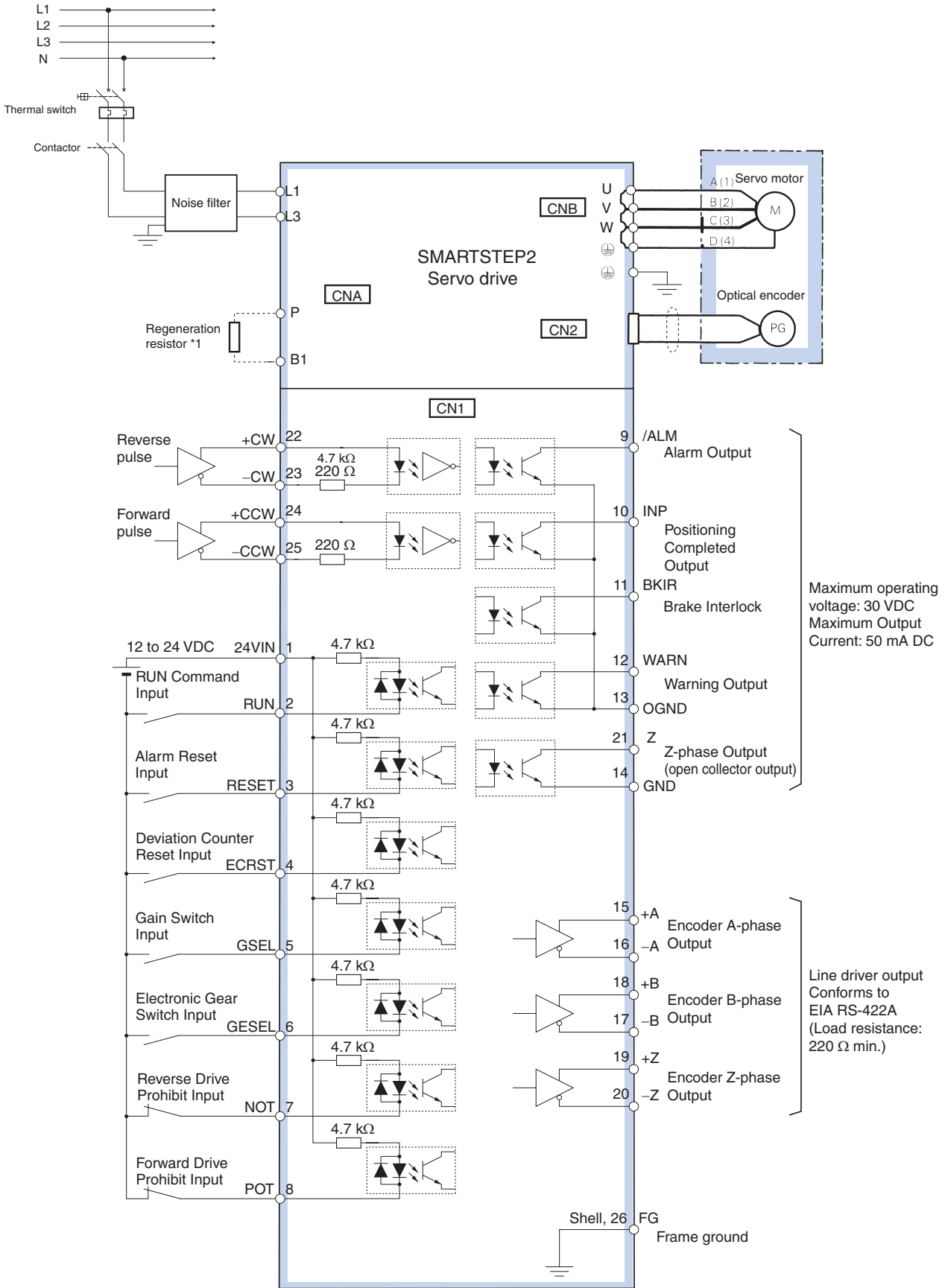
R7A-FIB104-RE



Filter model	Rated current	Leakage current	Rated voltage
R7A-FIB104-RE	4A	3.5 mA	250 VAC single-phase

Installation

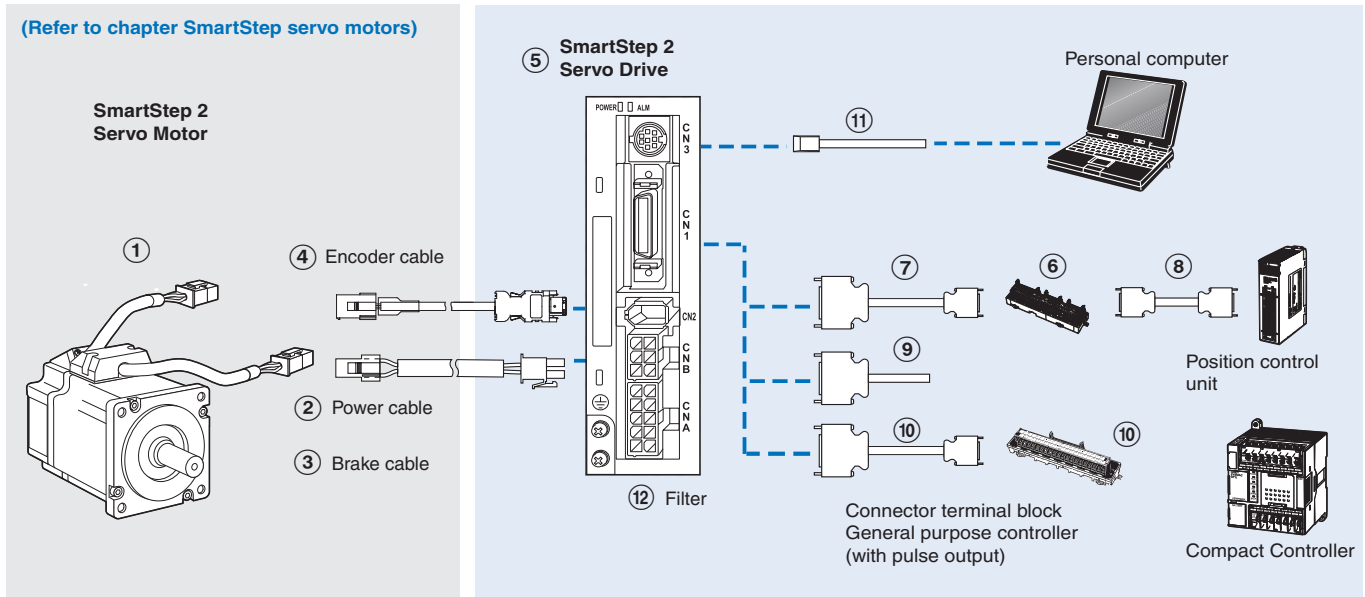
Single-phase, 230 VAC



*1. An External Regeneration Resistor can be connected.
Connect this resistor if the regenerative energy exceeds regeneration absorption capacity in the Servo Drive.

Note:1. The dynamic brake operates when the main circuit power supply or the control circuit power supply is turned OFF.
Note:2. When turning OFF the main circuit power supply, turn OFF the RUN Command Input (RUN) signal at the same time.

Ordering information



Note: The symbols ①②③④⑤... show the recommended sequence to select the components in a SmartStep 2 servo system

Servo motors

Note: ①②③④ Refer to the SmartStep 2 servo motor chapter for detailed motor specifications and selection

Servo drives

Symbol	Specifications		SmartStep 2 drive model	Compatible servo motors ①	
				Cylindrical type	Flat type
⑤	200 VAC	100 W	R7D-BP01H	R88M-G05030H-□	-
		200 W	R7D-BP02HH	R88M-G10030H-□	R88M-GP10030H-□
		400 W	R7D-BP04H	R88M-G20030H-□	R88M-GP20030H-□
				R88M-G40030H-□	R88M-GP40030H-□

Power Supply cables (for CNA)

Symbol	Specifications	Model	Appearance
⑤	Power Supply Input Cable for Single-Phase Power (connectors attached)	R7A-CLB002S2	

Control cables (for CN1)

Symbol	Name	Compatible units	Model	Available lengths
⑥	Servo relay unit	Use with position control units (doesn't support communications functions.) Units: CS1W-NC113/133, CJ1W-NC113/133 and C200HW-NC113/NC112	XW2B-20J6-1B (1 axis)	---
		Use with position control units (doesn't support communications functions.) Units: CS1W-NC213/233/413/433, CJ1W-NC213/233/413/433 and C200HW-NC213/413	XW2B-40J6-2B (2 axes)	
		Use with position control units (doesn't support communications functions.) Units: CQM1H-PLB21	XW2B-20J6-3B (1 axis)	
		Use with position control units (supports communications functions.) Units: CS1W-NC213/233/413/433, CJ1W-NC213/233/413/433	XW2B-40J6-4A (2 axes)	
		Use with CJ1M-CPU21/22/23 (doesn't support communications functions.)	XW2B-20J6-8A (1 axis) XW2B-40J6-9A (2 axes)	
⑦	Cable to servo drive	Position Control Unit/ CQM1H	XW2Z-□□□J-B29	1 m or 2 m (the cable length goes in the empty boxes.)
		CJ1M	XW2Z-□□□J-B32	

Symbol	Name	Compatible units	Model	Available lengths
⑧	Cable to position control unit	CQM1H-PLB21	XW2Z-□□□J-A3	0.5 m or 1 m (the cable length goes in the empty boxes.)
		C200H-NC112	XW2Z-□□□J-A4	
		C200H-NC211 and C500-NC113/211	XW2Z-□□□J-A5	
		CS1W-NC113 and C200HW-NC113	XW2Z-□□□J-A6	
		CS1W-NC213/413 and C200HW-NC213/413	XW2Z-□□□J-A7	
		CS1W-NC133	XW2Z-□□□J-A10	
		CS1W-NC233/433	XW2Z-□□□J-A11	
		CJ1W-NC113	XW2Z-□□□J-A14	
		CJ1W-NC213/413	XW2Z-□□□J-A15	
		CJ1W-NC133	XW2Z-□□□J-A18	
		CJ1W-NC233/433	XW2Z-□□□J-A19	
	CJ1M-CPU21/22/23	XW2Z-□□□J-A33		
⑨	Control cable	For general-purpose controllers	R7A-CPB-□□□S	1 m or 2 m (the cable length goes in the empty boxes.)
⑩	Connector terminal block cable	For general-purpose controllers	XW2Z-□□□J-B28	---
	Connector-Terminal Block Conversion Units	For general-purpose controllers	XW2B-34G4	Terminal block with M3 screws
			XW2B-34G5	Terminal block with M3.5 screws
			XW2D-34G6	Terminal block with M3 screws

Cable for CN3

Symbol	Name	Connected to	Length	Model
⑪	Personal Computer Monitor Cable	Windows	2 m	R88A-CCG002P2

Filters

Symbol	Applicable servo drive	Filter model	Rated current	Rated voltage
⑫	R7D-BP01H/ 02HH/ 04H	R7A-FIB104-RE	4 A	1 pH, 230 V

Connectors

Specifications	Model
Main Circuit Connector (CNA)	R7A-CNB01P
Servomotor Connector (CNB)	R7A-CNB01A
Control I/O Connector (CN1)	R88A-CNW01C
Encoder Input Connector (CN2)	R88A-CNW01R
Servomotor Connector for Encoder Cable	R88A-CNG02R
Servomotor Connector for Servomotor Power Cable	R88A-CNG01A
Brake Cable Connector	R88A-CNG01B

External regeneration resistor

Specification	Model
80 W, 50 Ω	R88A-RR08050S
80 W, 100 Ω	R88A-RR080100S
220 W, 47 Ω	R88A-RR22047S

External regeneration resistor cable

Specifications	Model
External Regenerative Resistor Connection Cable, 2 meters	R7A-CLB002RG

Parameter unit & computer software

Specifications	Model
Parameter copy unit (with cable)	R88A-PR02G
Configuration and monitoring software tool for servo drives and inverters. (CX-drive version 1.8 or higher)	CX-drive

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.