

R7D-BP□, R88D-GP08H

# SmartStep 2 servo drive

## Another step forward in drive simplicity

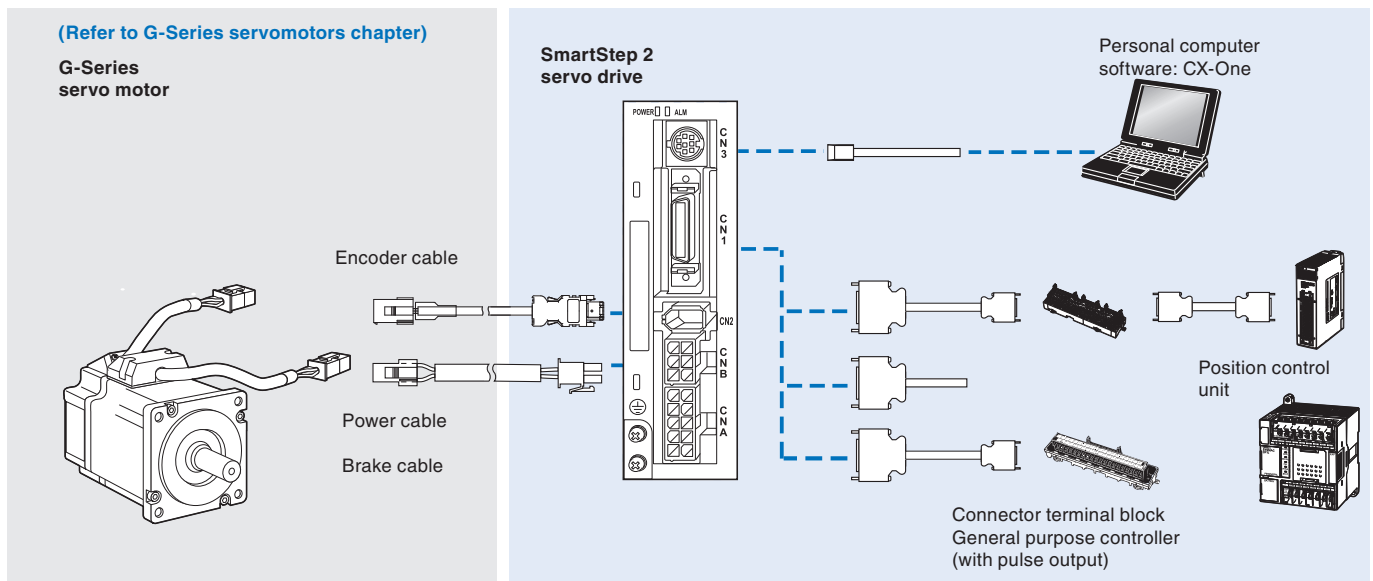
- On-line Auto-tuning and Easy set up
- Ultra-compact size. The footprint is only 48% that of the SmartStep series
- Two torque limits
- Electronic gear, four internal speed settings and wide range of pulse settings
- Adaptive filters for suppression of vibration and resonance
- Configuration and commissioning using CX Drive- software

## Ratings



- 230 VAC single-phase 50 W to 750 W (0.16 to 2.4 Nm)



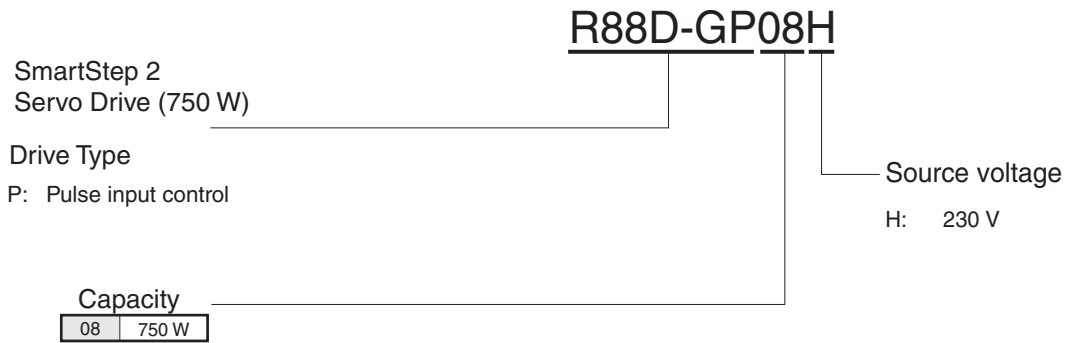
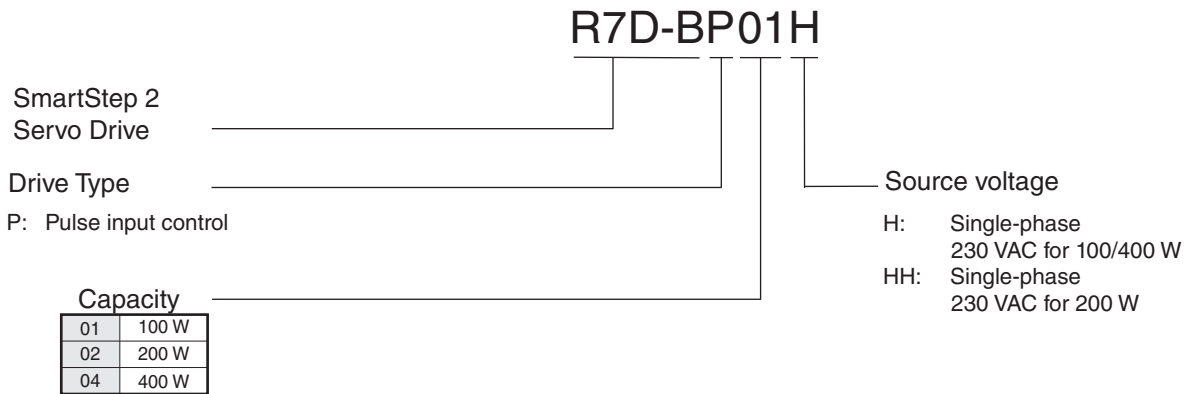
## System configuration



Servo motor / servo drive combination

Servo motor							SmartStep2 servo drive	
Family	Power	Image	Voltage	Speed	Rated torque	Capacity	Model	
Cylindric	50 -750 W		230 V	3000 min <sup>-1</sup>	0.16 Nm	50 W	R88M-G05030H-□S2	R7D-BP01H
					0.32 Nm	100 W	R88M-G10030H-□S2	R7D-BP01H
					0.64 Nm	200 W	R88M-G20030H-□S2	R7D-BP02HH
					1.3 Nm	400 W	R88M-G40030H-□S2	R7D-BP04H
					2.4 Nm	750 W	R88M-G75030H-□S2	R88D-GP08H
Flat	100-400 W		230 V	3000 min <sup>-1</sup>	0.32 Nm	100 W	R88M-GP10030H-□S2	R7D-BP01H
					0.64 Nm	200 W	R88M-GP20030H-□S2	R7D-BP02HH
					1.3 Nm	400 W	R88M-GP40030H-□S2	R7D-BP04H

Servo drive type designation



## Servo drive specifications

### General specifications

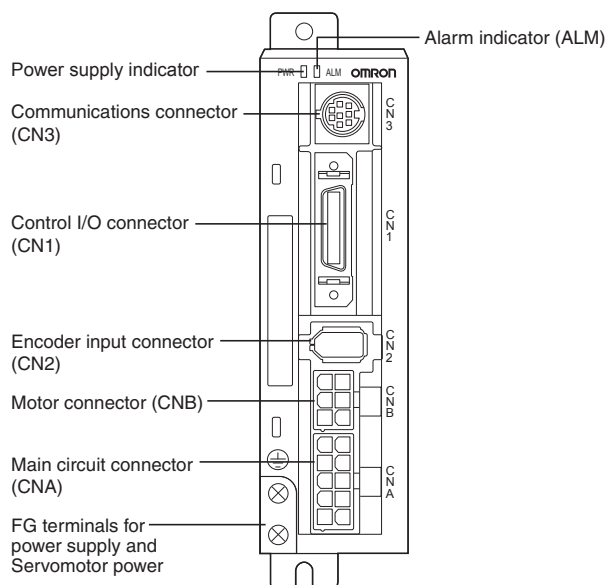
Item	Specification
Ambient operating temperature	0 to 55°C
Ambient operating humidity	90% max. (with no condensation)
Ambient storage temperature	-20 to 65°C
Ambient storage humidity	90% max. (with no condensation)
Storage/operating atmosphere	No corrosive gases.
Vibration resistance	10 to 60 Hz; acceleration : 5.9 m/s <sup>2</sup> (0.6G) max.
Impact resistance	Acceleration 19.6 m/s <sup>2</sup> 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

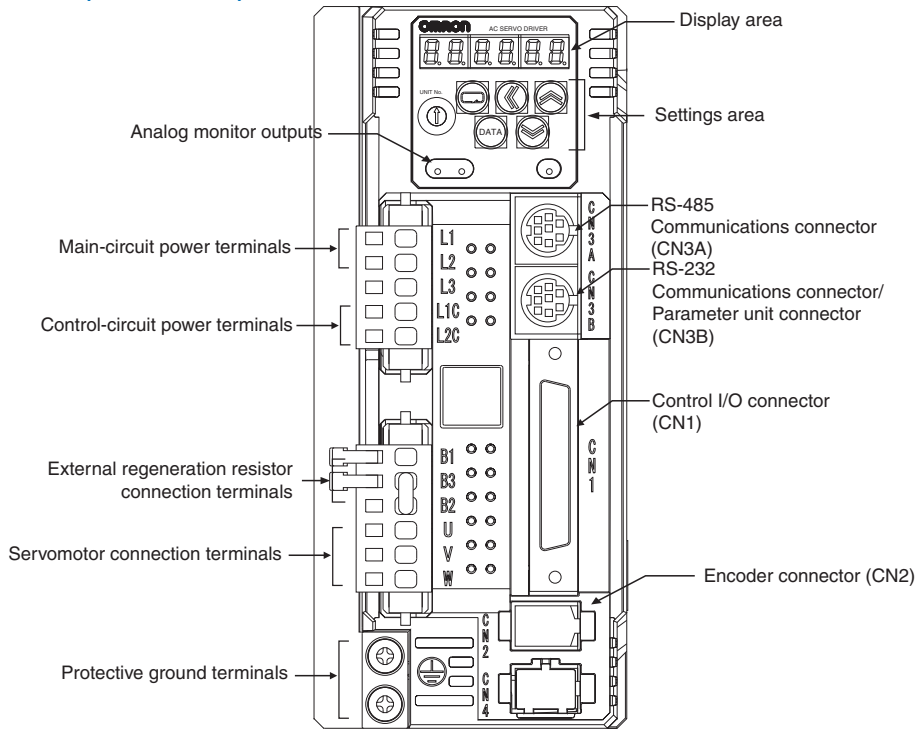
Item	200 VAC input type			
	100 W R7D-BP01H	200 W R7D-BP02HH	400 W R7D-BP04H	750 W R88D-GP08H
Continuous output current (rms)	1.0 A	1.6 A	2.5 A	4 A
Momentary maximum output current (rms)	3.3 A	4.9 A	7.8 A	14.1 A
Main-circuit power supply	Single-phase 200 to 240 VAC (170 to 264 V), 50/60 Hz			Single-phase/three-phase 200 to 240 VAC (170 to 264 V), 50/60 Hz
Control circuit input power	-			Single-phase 200 to 240 VAC (170 to 264 V)
Control method	All-digital method			
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	1.5 kg
Compatible motor voltage	200 V			
Command pulse response	Line drive: 500 kpps			
Compatible motor capacity	50 W 100 W	200 W	400 W	750 W
Applicable servo motor (R88M-)	G05030H G10030H GP10030H	G020030H GP20030H	G40030H GP40030H	G75030H

### Servodrive part names

#### SmartStep2 Servo Drive (100 - 400 W models)



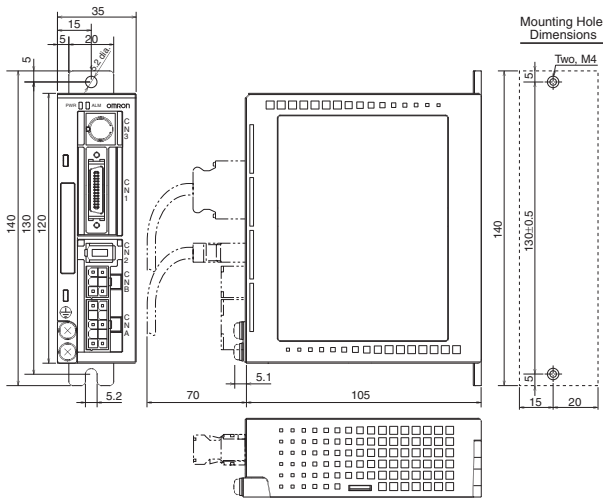
SmartStep2 Servo Drive (750 W model)



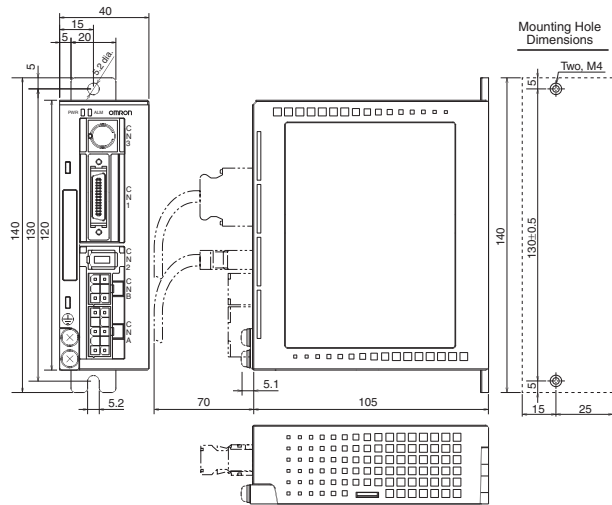
Dimensions

Servo drives

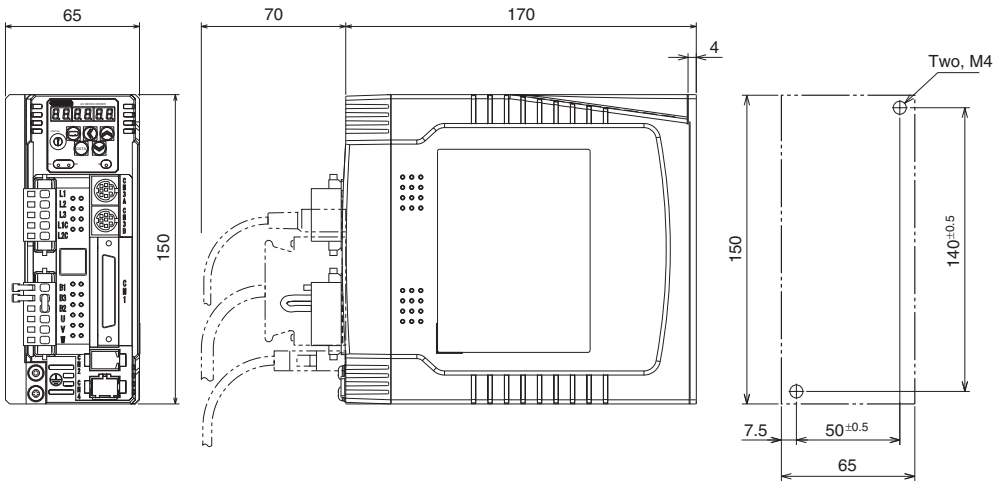
R7D-BP01H (230 V, 100 W)



R7D-BP02HH/04H (230 V, 200-400 W)

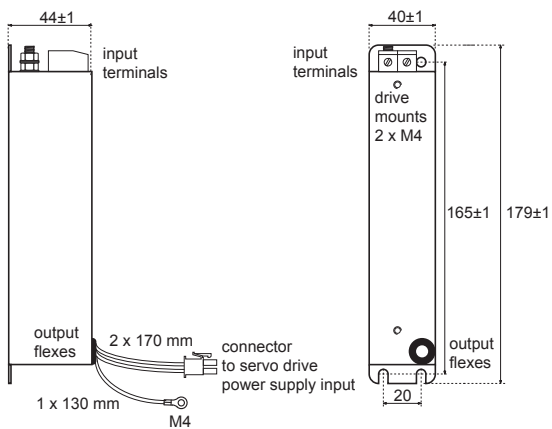


R88D-GP08H (230 V, 750 W)

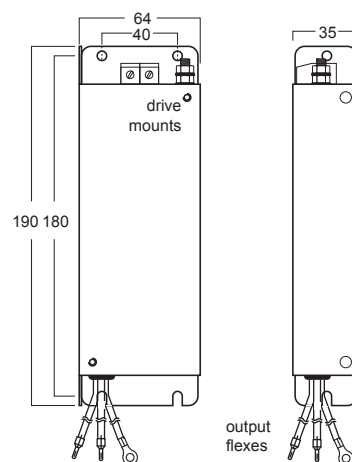


Filters

R7A-FIB104-RE



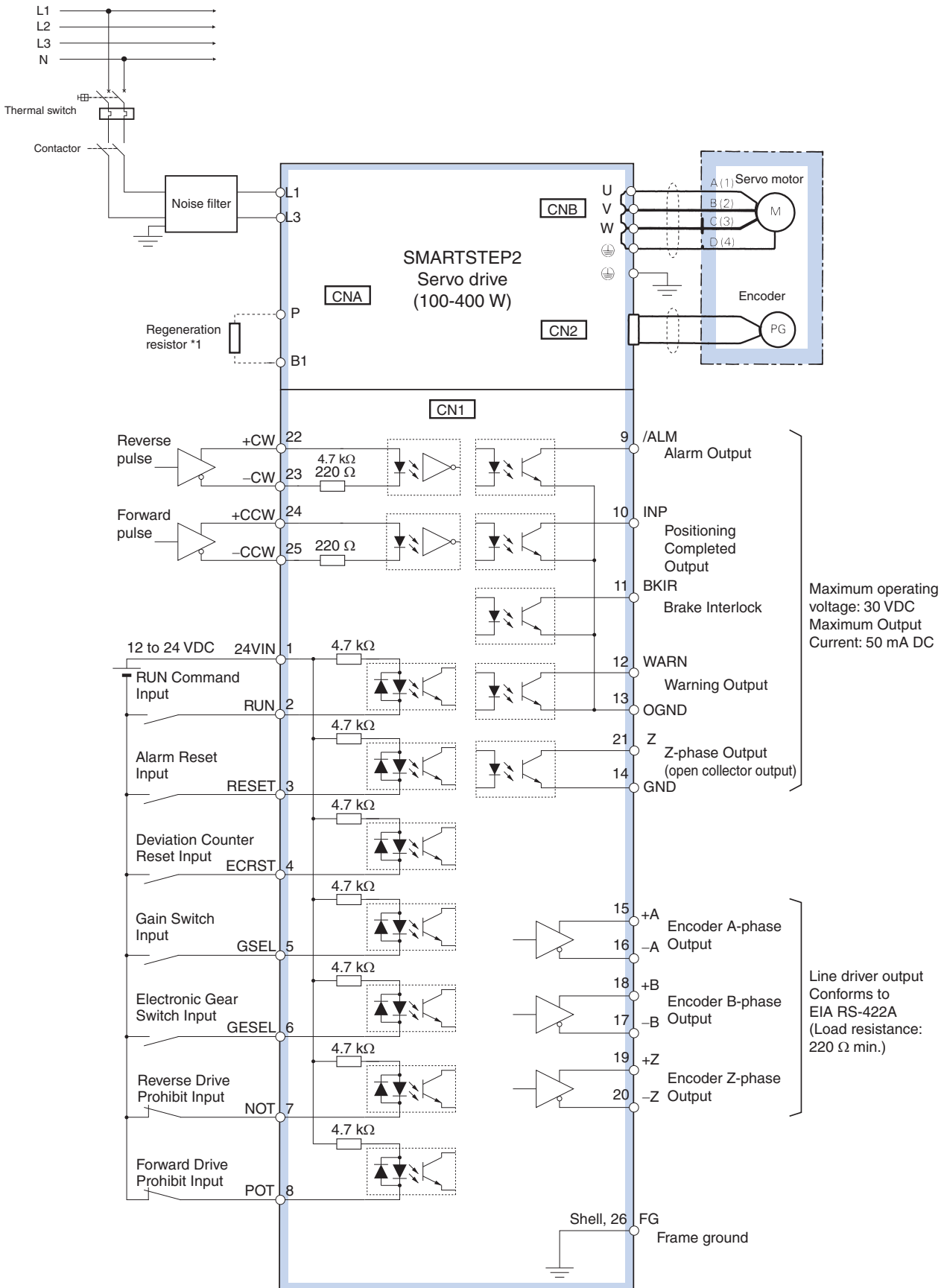
R88A-FIK107-RE



Filter model	Rated current	Leakage current	Rated voltage
R7A-FIB104-RE	4 A	3.5 mA	250 VAC single-phase
R88A-FIK107-RE	6.6 A	3.5 mA	250 VAC single-phase

Installation

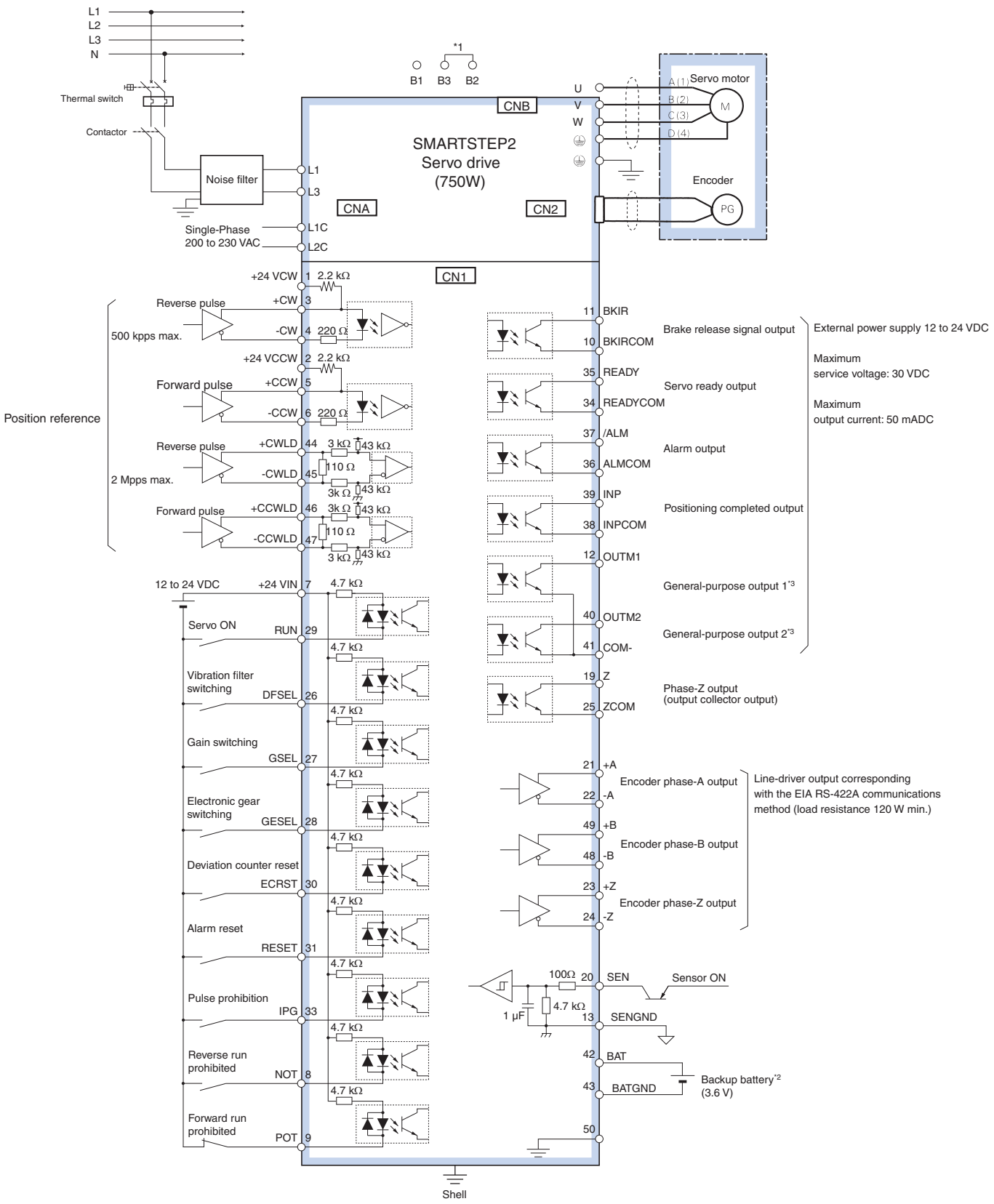
Single-phase, 230 VAC



\*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.

2. When turning OFF the main circuit power supply, turn OFF the RUN Command Input (RUN) signal at the same time.



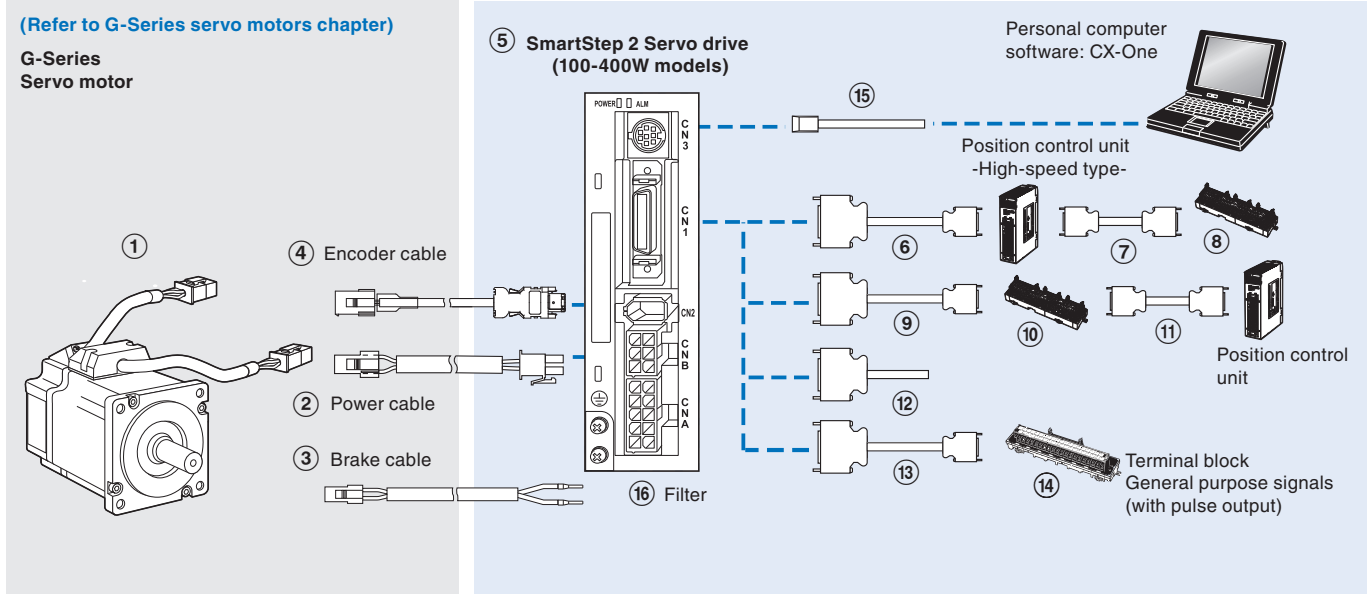
\*1 B3-B2 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.

\*2 Use only when an absolute encoder. If a backup battery is connected, an encoder cable with a battery is not required.

\*3 The default values are ZSP (zero-speed detection) for OUTM1 and T-LIMIT (at torque limit) for OUTM2.

Ordering information

SmartStep2 Servo Drive Configuration (100-400 W)



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

Servo motor

Note: ①②③④ refer to G-Series 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	Description	Connect to		Model
⑥	Control cable (line-driver output for 1 axis)	Position control unit (high-speed type) CJ1W-NC234 CJ1W-NC434	1 m	XW2Z-100J-G12
			5 m	XW2Z-500J-G12
			10 m	XW2Z-10MJ-G12
	Control cable (open-collector output for 1 axis)	Position control unit (high-speed type) CJ1W-NC214 CJ1W-NC414	1 m	XW2Z-100J-G16
			3 m	XW2Z-300J-G16
⑥	Control cable (line-driver output for 2 axis)	Position control unit (high-speed type) CJ1W-NC234 CJ1W-NC434	1 m	XW2Z-100J-G4
			5 m	XW2Z-500J-G4
			10 m	XW2Z-10MJ-G4
⑥	Control cable (open-collector output for 2 axis)	Position control unit (high-speed type) CJ1W-NC214 CJ1W-NC414	1 m	XW2Z-100J-G8
			3 m	XW2Z-300J-G8
⑦	Terminal block cable for external signals (for input common, forward/reverse run prohibited inputs, emergency stop input, origin proximity input and interrupt input)	Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 CJ1W-NC214 CJ1W-NC414	0.5 m	XW2Z-C50X
			1 m	XW2Z-100X
			2 m	XW2Z-200X
			3 m	XW2Z-300X
			5 m	XW2Z-500X
			10 m	XW2Z-010X
⑧	Terminal block for external signals ( with M3 screw and for pin terminals)		-	XW2B-20G4
	Terminal block ext. signals ( with M3.5 screw and for fork/round terminals)		-	XW2B-20G5
	Terminal block ext. signals ( with M3 screw and fork/round pin terminals)		-	XW2D-20G6



Symbol	Description	Connect to		Model
⑨	Cable from servo relay unit to servo drive	CS1W-NC1□3, CJ1W-NC1□3, C200HW-NC113, CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3, C200HW-NC213/413, CQM1H-PLB21 or CQM1-CPU43-V1	1 m	XW2Z-100J-B29
			2 m	XW2Z-200J-B29
		CJ1M-CPU21/22/23	1 m	XW2Z-100J-B32
			2 m	XW2Z-200J-B32
⑩	Servo relay unit	CS1W-NC1□3, CJ1W-NC1□3 or C200HW-NC113 position control unit	-	XW2B-20J6-1B (1 axis)
			-	XW2B-40J6-2B (2 axes)
		CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3 or C200HW-NC213/413 position control unit	-	XW2B-20J6-3B (1 axis)
			-	XW2B-20J6-8A (1 axis)
		CJ1M-CPU21/22/23	-	XW2B-40J6-9A (2 axes)
⑪	Position control unit connecting cable	CJ1W-NC133	0.5 m	XW2Z-050J-A18
			1 m	XW2Z-100J-A18
		CJ1W-NC233/433	0.5 m	XW2Z-050J-A19
			1 m	XW2Z-100J-A19
		CS1W-NC133	0.5 m	XW2Z-050J-A10
			1 m	XW2Z-100J-A10
		CS1W-NC233/433	0.5 m	XW2Z-050J-A11
			1 m	XW2Z-100J-A11
		CJ1W-NC113	0.5 m	XW2Z-050J-A14
			1 m	XW2Z-100J-A14
		CJ1W-NC213/413	0.5 m	XW2Z-050J-A15
			1 m	XW2Z-100J-A15
		CS1W-NC113 C200HW-NC113	0.5 m	XW2Z-050J-A6
			1 m	XW2Z-100J-A6
		CS1W-NC213/413 C200HW-NC213/413	0.5 m	XW2Z-050J-A7
			1 m	XW2Z-100J-A7
		CJ1M-CPU21/22/23	0.5 m	XW2Z-050J-A33
			1 m	XW2Z-100J-A33
		CQM1H-PLB21 CQM1-CPU43-V1	0.5 m	XW2Z-050J-A3
			1 m	XW2Z-100J-A3
⑫	General purpose cable	For general purpose controllers	1 m	R7A-CPB001S
			2 m	R7A-CPB002S
⑬	Terminal block cable	For general purpose controllers	1 m	XW2Z-100J-B28
			2 m	XW2Z-200J-B28
⑭	Terminal block ( with M3 screw and for pin terminals)	-	XW2B-34G4	
	Terminal block ( with M3.5 screw and for fork/round terminals)	-	XW2B-34G5	
	Terminal block ( with M3 screw and fork/round pin terminals)	-	XW2D-34G6	

**Cable for CN3**

Symbol	Name	Length	Model
⑮	Personal Computer Monitor Cable	2 m	R88A-CCG002P2

**Filters**

Symbol	Applicable servo drive	Rated current	Rated voltage	Filter model
⑯	R7D-BP01H/ 02HH/ 04H	4 A	1 pH, 230 V	R7A-FIB104-RE

**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 cable**

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

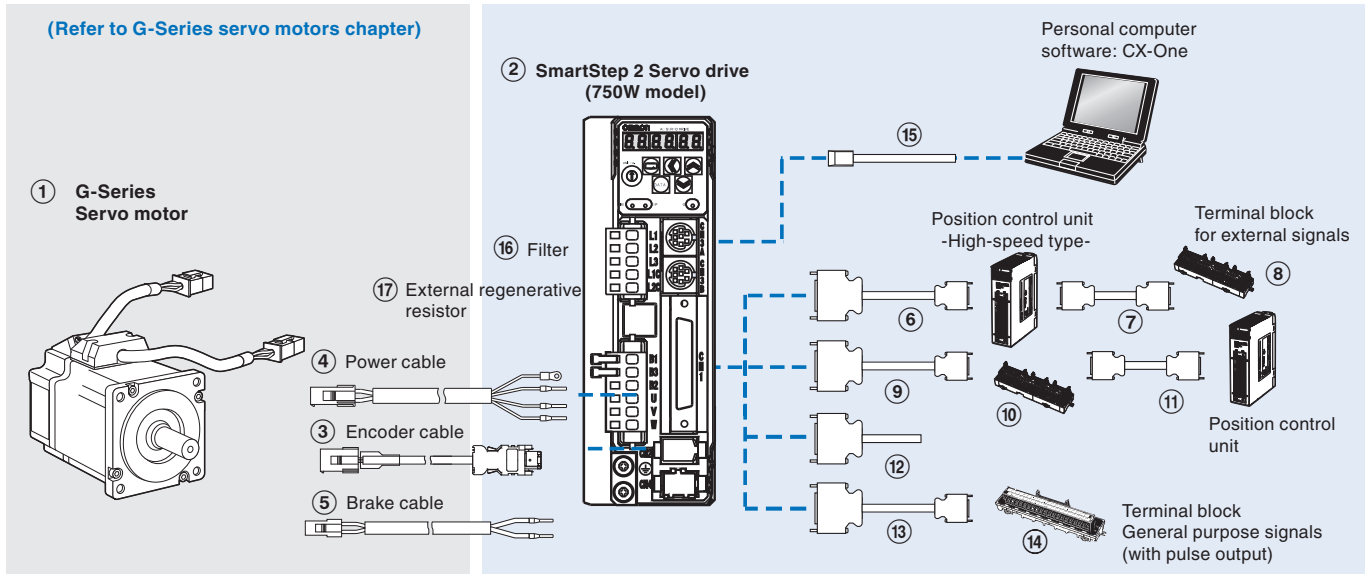
**Parameter unit & computer software**

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

**External regeneration resistor**

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

SmartStep2 Servo Drive Configuration (750W)



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

**Servo motor**

**Note:** ①③④⑤ refer to G-Series motor chapter for detailed motor specifications and selection.

**Servo drives**

Symbol	Specifications	Servo drive model	① Compatible rotary servo motors
②	1 phase 200 VAC    750 W	R88D-GP08H	<b>Cylindric type</b> R88M-G75030H-□

**Control cables (for CN1)**

Symbol	Description	Connect to	Model		
⑥	Control cable (line-driver output for 1 axis)	Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434	1 m XW2Z-100J-G9 5 m XW2Z-500J-G9 10 m XW2Z-10MJ-G9		
	Control cable (open-collector output for 1 axis)	Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414	1 m XW2Z-100J-G13 3 m XW2Z-300J-G13		
	Control cable (line-driver output for 2 axis)	Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434	1 m XW2Z-100J-G1 5 m XW2Z-500J-G1 10 m XW2Z-10MJ-G1		
	Control cable (open-collector output for 2 axis)	Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414	1 m XW2Z-100J-G5 3 m XW2Z-300J-G5		
⑦	Terminal block cable for external signals (for input common, forward/reverse run prohibited inputs, emergency stop input, origin proximity input and interrupt input)	Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 CJ1W-NC214 CJ1W-NC414	0.5 m XW2Z-C50X		
			1 m XW2Z-100X		
			2 m XW2Z-200X		
			3 m XW2Z-300X		
			5 m XW2Z-500X		
			10 m XW2Z-010X		
⑧	Terminal block for external signals (M3 screw, pin terminals)	-	XW2B-20G4		
	Terminal block ext. signals(M3.5 screw, fork/round terminals)	-	XW2B-20G5		
	Terminal block ext. signals(M3 screw, fork/round terminals)	-	XW2D-20G6		
⑨	Cable from servo relay unit to servo drive	CS1W-NC1□3, CJ1W-NC1□3, C200HW-NC113/213/413, CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3 or CQM1H-PLB21	1 m XW2Z-100J-B25 2 m XW2Z-200J-B25		
		CJ1M-CPU21/22/23	1 m XW2Z-100J-B31 2 m XW2Z-200J-B31		
		⑩	Servo relay unit	CS1W-NC1□3, CJ1W-NC1□3 or C200HW-NC113 position control unit	- XW2B-20J6-1B (1 axis)
				CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3 or C200HW-NC213/413 position control unit	- XW2B-40J6-2B (2 axes)
⑩	Servo relay unit	CQM1H-PLB21	- XW2B-20J6-3B (1 axis)		
		CJ1M-CPU21/22/23	- XW2B-20J6-8A (1 axis)		
			- XW2B-40J6-9A (2 axes)		

Symbol	Description	Connect to	Model	
⑪	Position control unit connecting cable	CQM1H-PLB21	0.5 m	XW2Z-050J-A3
			1 m	XW2Z-100J-A3
		CS1W-NC113 or C200HW-NC113	0.5 m	XW2Z-050J-A6
			1 m	XW2Z-100J-A6
		CS1W-NC213/413 or C200HW-NC213/413	0.5 m	XW2Z-050J-A7
			1 m	XW2Z-100J-A7
		CS1W-NC133	0.5 m	XW2Z-050J-A10
			1 m	XW2Z-100J-A10
		CS1W-NC233/433	0.5 m	XW2Z-050J-A11
			1 m	XW2Z-100J-A11
		CJ1W-NC113	0.5 m	XW2Z-050J-A14
			1 m	XW2Z-100J-A14
		CJ1W-NC213/413	0.5 m	XW2Z-050J-A15
			1 m	XW2Z-100J-A15
CJ1W-NC133	0.5 m	XW2Z-050J-A18		
	1 m	XW2Z-100J-A18		
CJ1W-NC233/433	0.5 m	XW2Z-050J-A19		
	1 m	XW2Z-100J-A19		
CJ1M-CPU21/22/23	0.5 m	XW2Z-050J-A33		
	1 m	XW2Z-100J-A33		
⑫	General purpose cable	For general purpose controllers	1 m	R88A-CPG001S
			2 m	R88A-CPG002S
⑬	Terminal block cable	For general purpose controllers	1 m	XW2Z-100J-B24
			2 m	XW2Z-200J-B24
⑭	Terminal block (M3 screw and for pin terminals)	-	XW2B-50G4	
	Terminal block (M3.5 screw and for fork/round terminals)	-	XW2B-50G5	
	Terminal block (M3 screw and for fork/round terminals)	-	XW2D-50G6	

**Computer cable (for CN3)**

Symbol	Name		Model
⑮	Computer cable RS232	2 m	R88A-CCG002P2

**Filter**

Symbol	Applicable servodrive	Filter model	Rated current	Leakage current	Rated voltage
⑯	R88D-GP08H	R88A-FIK107-RE	6.6 A	3.5 mA	250 VAC single-phase

**External regenerative resistor**

Symbol	Regenerative resistor unit model	Specifications
⑰	R88A-RR08050S	50 Ω, 80 W
	R88A-RR080100S	100 Ω, 80 W
	R88A-RR22047S	47 Ω, 220 W
	R88A-RR50020S	20 Ω, 500 W

**Connectors**

Specifications	Model
I/O connector kit -50 pins- (for CN1)	R88A-CNU11C
Power cable connector (motor side)	R88A-CNG01A
Encoder connector (Servo drive side CN2)	R88A-CNW01R
Incremental encoder cable connector (motor side)	R88A-CNG02R

**Computer software**

Specifications	Model
Configuration and monitoring software tool for servo drives and inverters (CX-drive version 1.91 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.