chanhvinh.com



R7D-BP□, R88D-GP08H

# SmartStep 2 servo drive





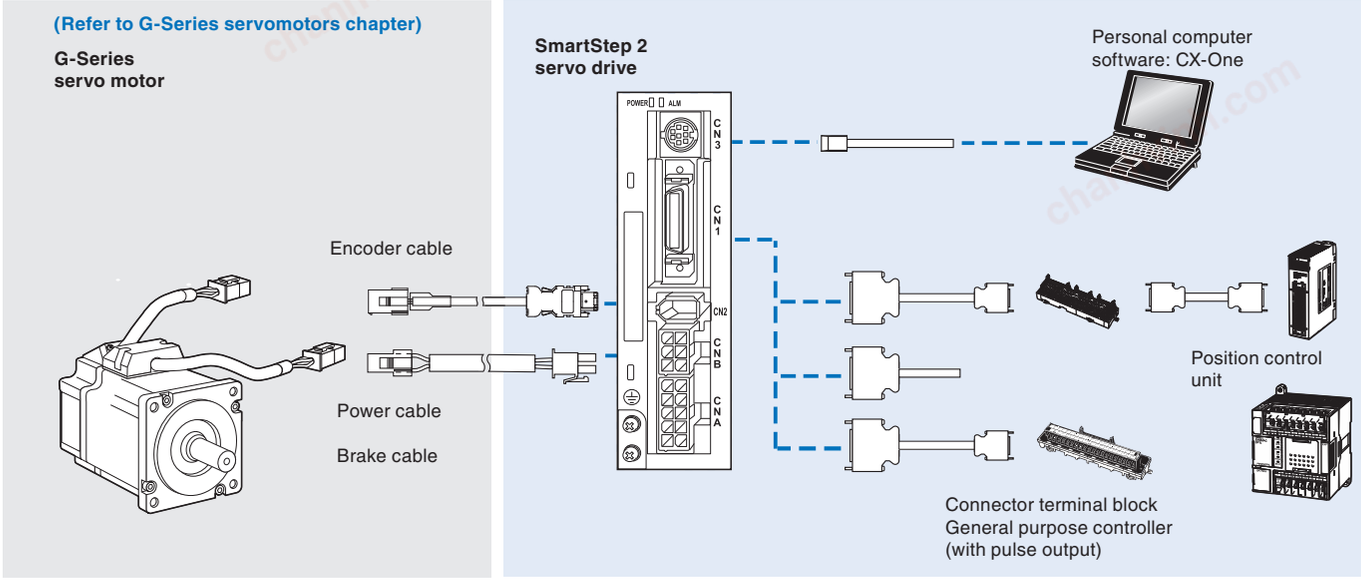
### Another step forward in drive simplicity

- 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 suppresion 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



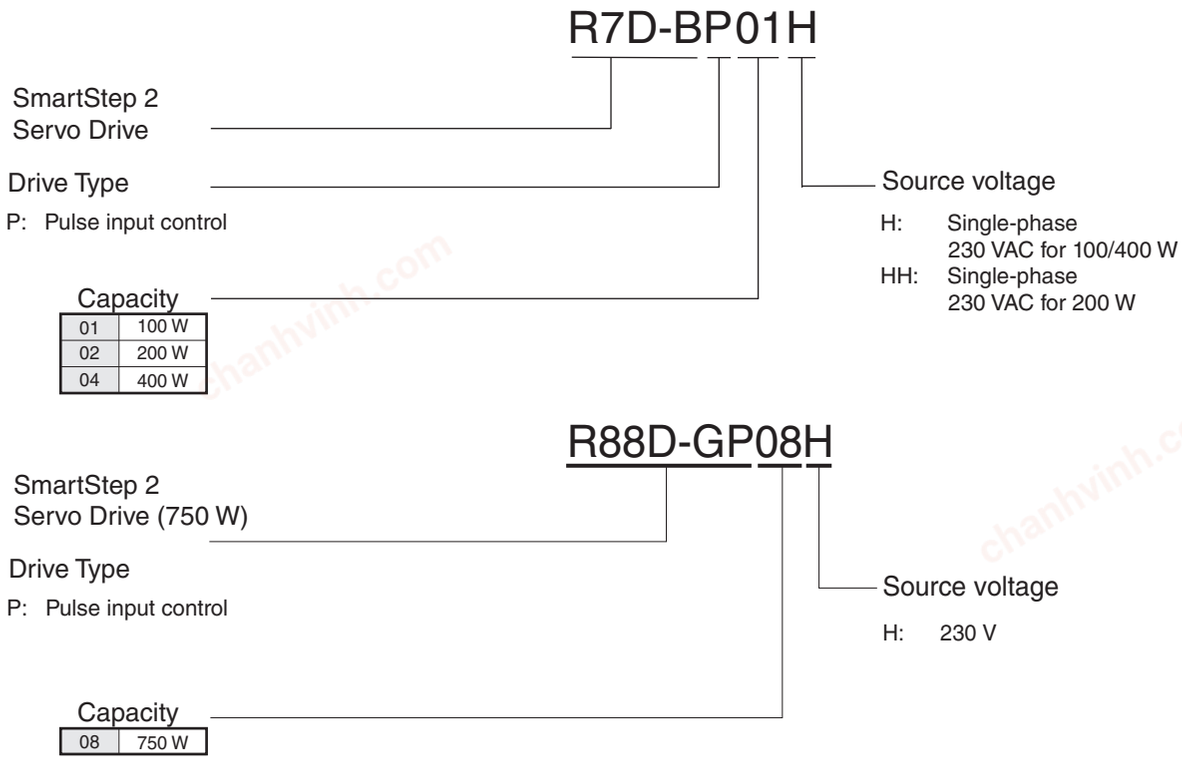
chanhvinh.com

OMRON

## Servo motor / servo drive combination

| Servo motor | | | | | | | SmartStep2 servo drive |
|---|---|---|---|---|---|---|---|
| Family | | Voltage | Speed | Rated torque | Capacity | Model | |
| Cylindric | 50 -750 W  | 230 V | 3000 min$^{-1}$ | 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  | | | 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



chanhvinh.com





# Servo drive specifications

## General specifications

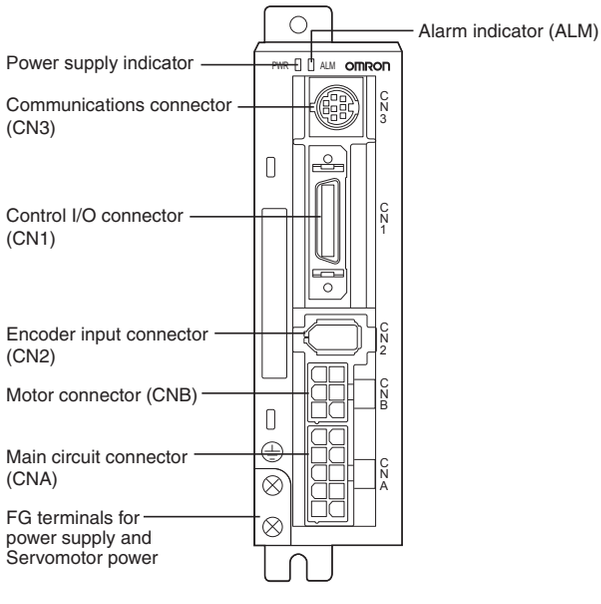
| Item | Specification |
|---|---|
| Ambient operating temperature | 0 to 55°C |
| Ambient operating humidity | 90% max. (with no condensation) |
| Ambient storage temperature | -20 to 65°C |
| Ambient storage humidity | 90% max. (with no condensation) |
| Storage/operating atmosphere | No corrosive gases. |
| Vibration resistance | 10 to 60 Hz; acceleration : 5.9 m/s² (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<br>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 | 750 W |
| | R7D-BP01H | R7D-BP02HH | R7D-BP04H | 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<br>100 W | 200 W | 400 W | 750 W |
| Applicable servo motor (R88M-) | G05030H<br>G10030H<br>GP10030H | G020030H<br>GP20030H | G40030H<br>GP40030H | G75030H |

## Servodrive part names

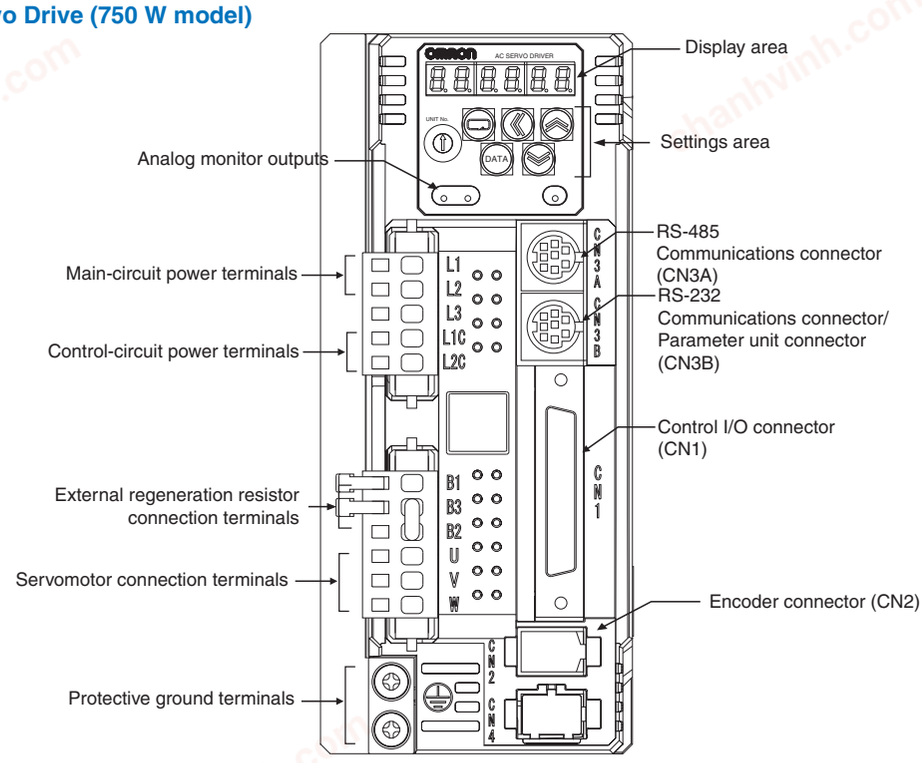
### SmartStep2 Servo Drive (100 - 400 W models)



chanhvinh.com



## SmartStep2 Servo Drive (750 W model)



chanhvinh.com

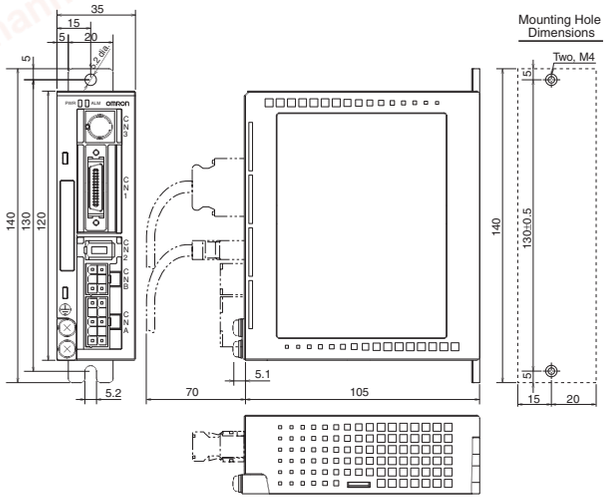




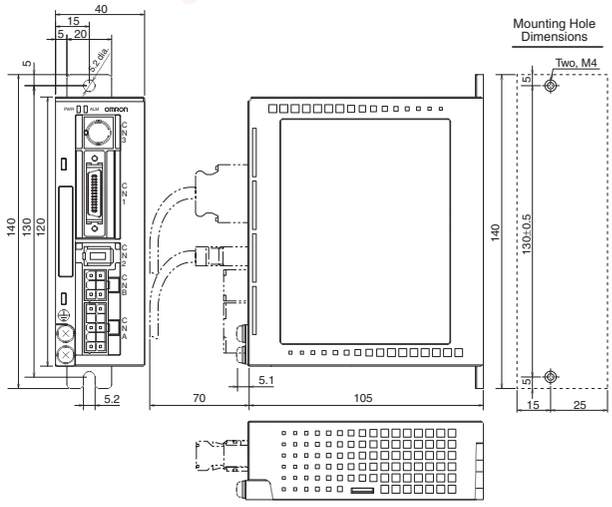
# Dimensions

## Servo drives

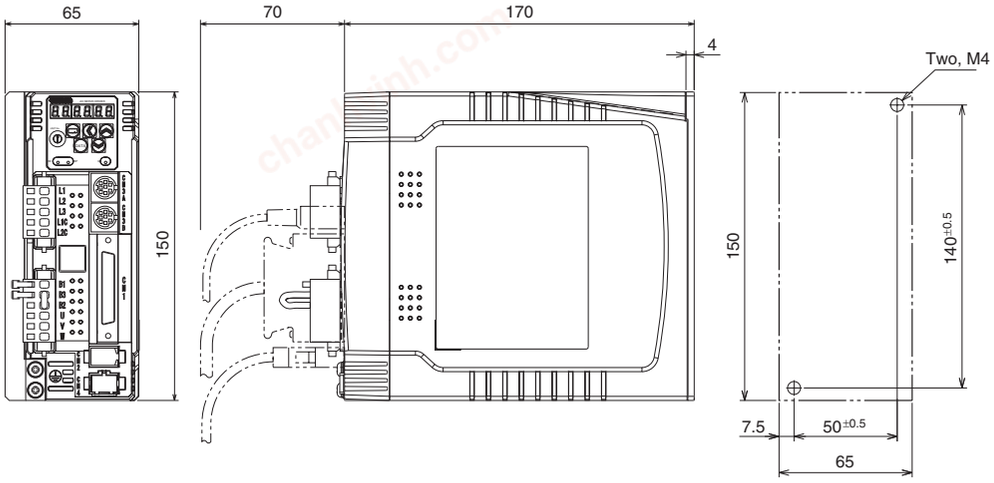
### R7D-BP01H (230 V, 100 W)




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

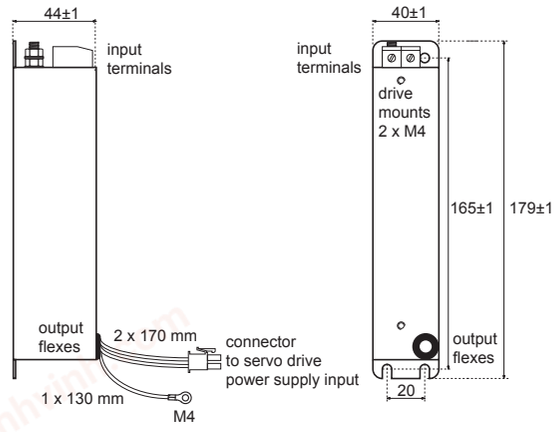



### R88D-GP08H (230 V, 750 W)

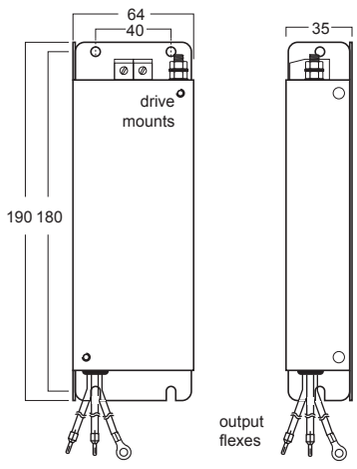



## Filters

### R7A-FIB104-RE




### R88A-FIK107-RE



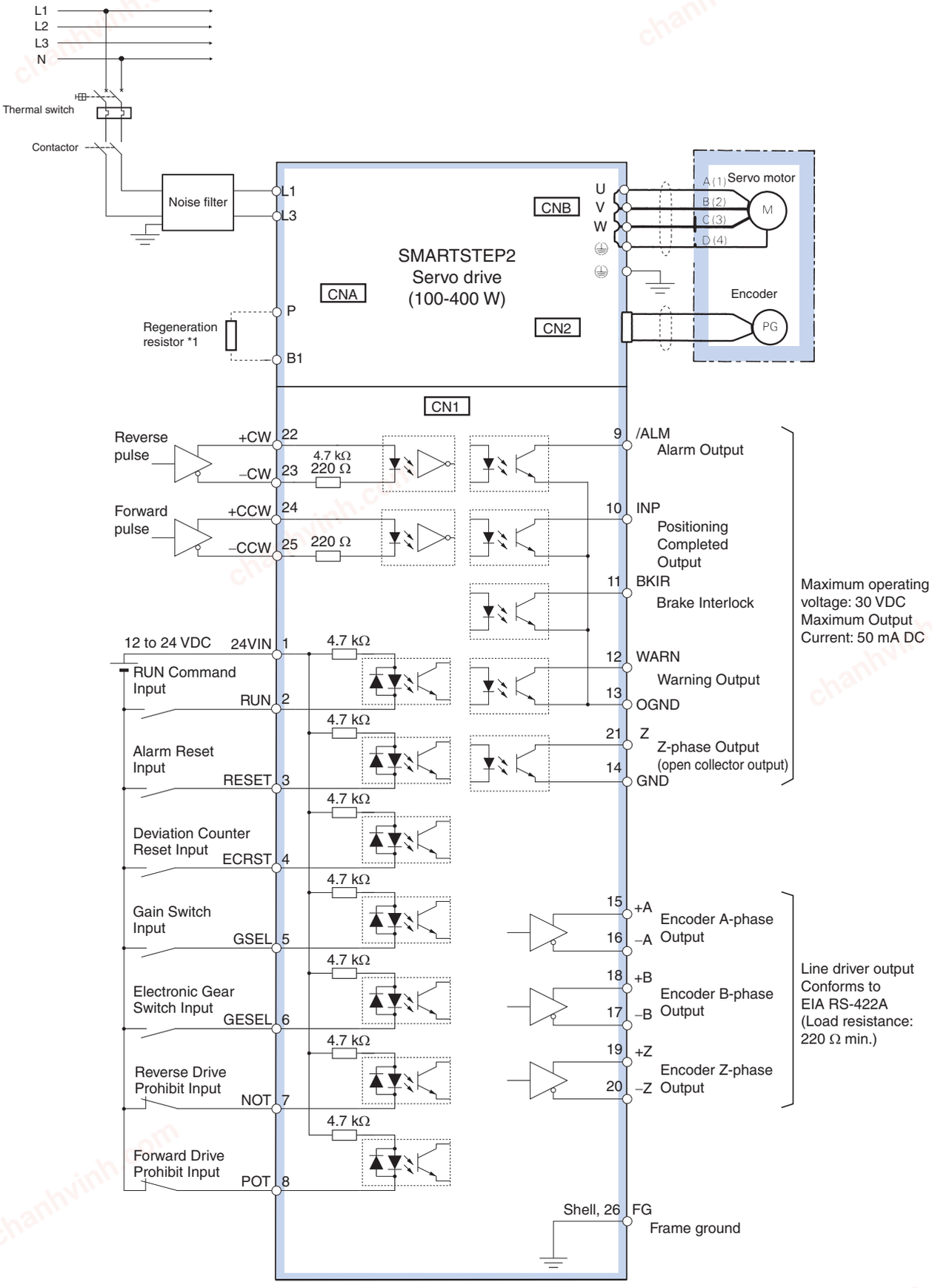

| Filter model | Rated current | Leakage current | Rated voltage |
|---|---|---|---|
| R7A-FIB104-RE | 4 A | 3.5 mA | 250 VAC single-phase |
| R88A-FIK107-RE | 6.6 A | 3.5 mA | 250 VAC single-phase |

chanhvinh.com



## Installation

### Single-phase, 230 VAC



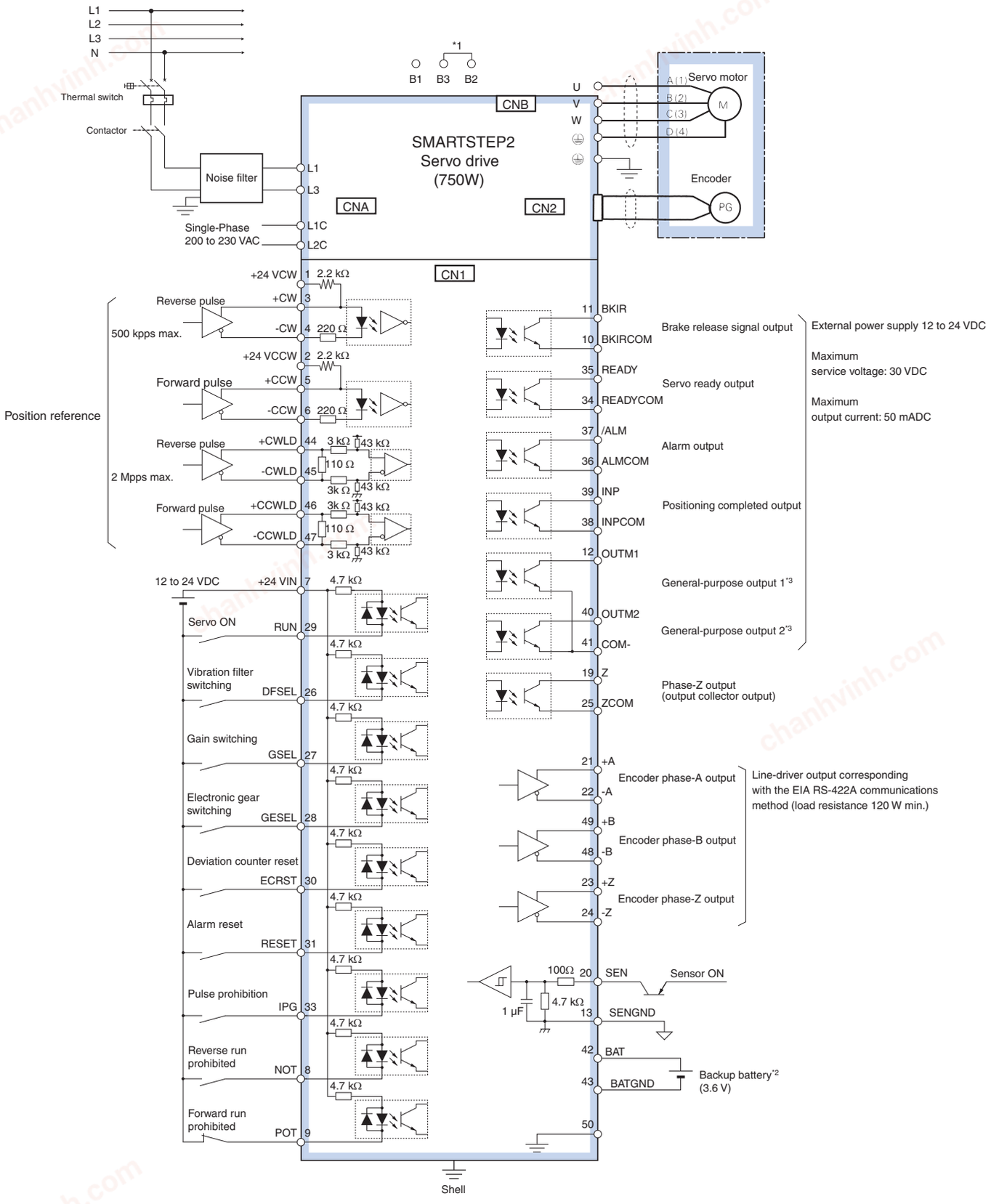

*1. An External Regeneration Resistor can be connected. Connect this resistor if the regenerative energy exceeds regeneration absorption capacity in the Servo Drive.

**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.

chanhvinh.com








*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.

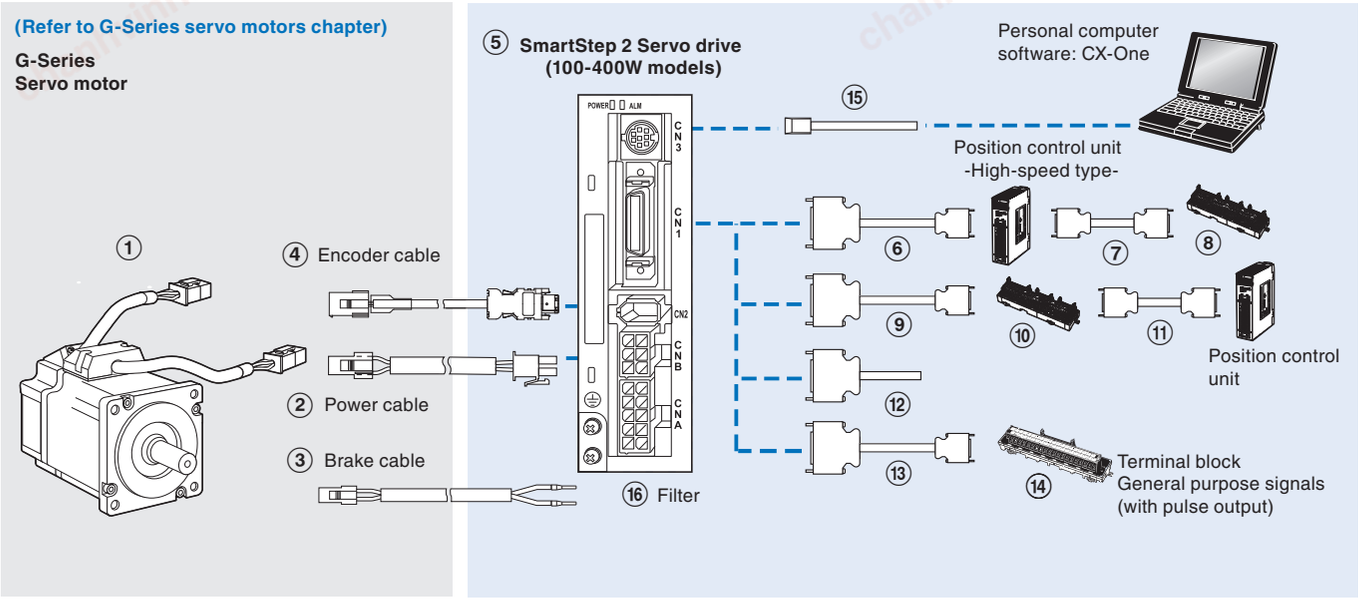
*3 The default values are ZSP (zero-speed detection) for OUTM1 and T-LIMIT (at torque limit) for OUTM2.

chanhvinh.com

OMRON

## 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-□ | - |
| | | | | R88M-G10030H-□ | R88M-GP10030H-□ |
| | | 200 W | R7D-BP02HH | R88M-G20030H-□ | R88M-GP20030H-□ |
| | | 400 W | R7D-BP04H | 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<br>(line-driver output for 1 axis) | Position control unit (high-speed type)<br>CJ1W-NC234<br>CJ1W-NC434 | 1 m | XW2Z-100J-G12 |
| | | | 5 m | XW2Z-500J-G12 |
| | | | 10 m | XW2Z-10MJ-G12 |
| | Control cable<br>(open-collector output for 1 axis) | Position control unit (high-speed type)<br>CJ1W-NC214<br>CJ1W-NC414 | 1 m | XW2Z-100J-G16 |
| | | | 3 m | XW2Z-300J-G16 |
| | Control cable<br>(line-driver output for 2 axis) | Position control unit (high-speed type)<br>CJ1W-NC234<br>CJ1W-NC434 | 1 m | XW2Z-100J-G4 |
| | | | 5 m | XW2Z-500J-G4 |
| | | | 10 m | XW2Z-10MJ-G4 |
| | Control cable<br>(open-collector output for 2 axis) | Position control unit (high-speed type)<br>CJ1W-NC214<br>CJ1W-NC414 | 1 m | XW2Z-100J-G8 |
| | | | 3 m | XW2Z-300J-G8 |
| ⑦ | Terminal block cable for external signals<br>(for input common, forward/reverse run prohibited inputs, emergency stop input, origin proximity input and interrupt input) | Position control units (high-speed type)<br>CJ1W-NC234<br>CJ1W-NC434<br>CJ1W-NC214<br>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 |

chanhvinh.com





| 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) |
| | | CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3 or C200HW-NC213/413 position control unit | - | XW2B-40J6-2B (2 axes) |
| | | CQM1H-PLB21 or CQM1-CPU43-V1 | - | XW2B-20J6-3B (1 axis) |
| | | CJ1M-CPU21/22/23 | - | XW2B-20J6-8A (1 axis) |
| | | | | 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 | Lengh | 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

| 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 |

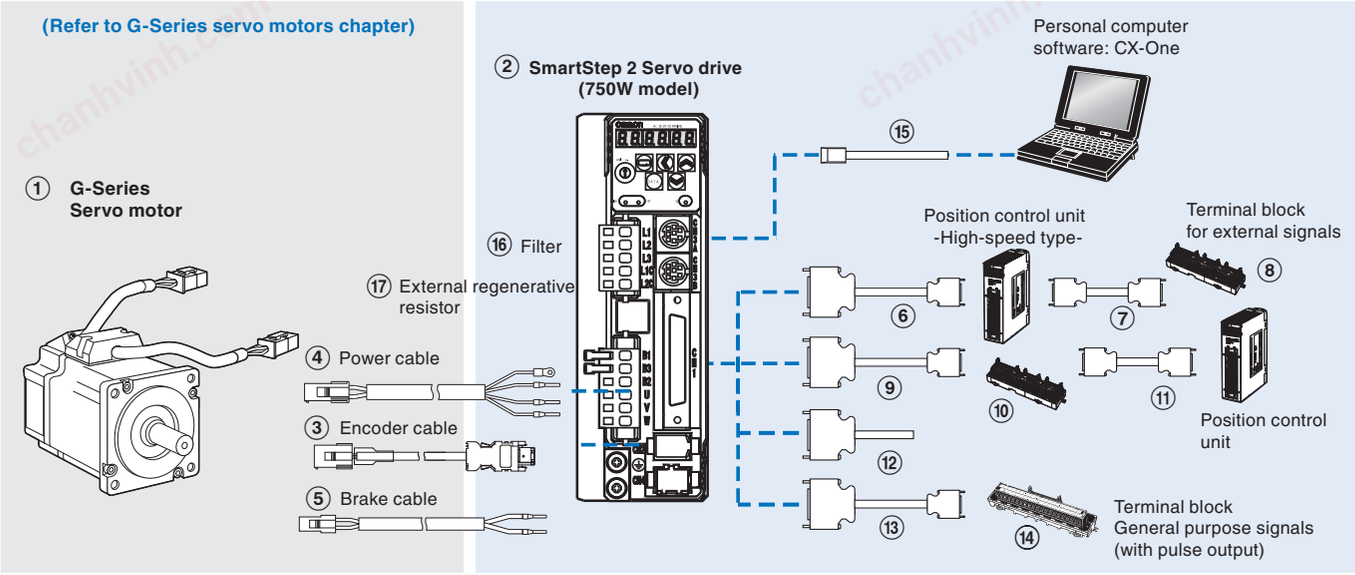
## Parameter unit & computer software

| 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 |

chanhvinh.com

OMRON

## 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 |
|---|---|---|---|---|
| | | | | Cylindric type |
| ② | 1 phase 200 VAC | 750 W | R88D-GP08H | 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) |
| | | CQM1H-PLB21 | - | XW2B-20J6-3B (1 axis) |
| | | CJ1M-CPU21/22/23 | - | XW2B-20J6-8A (1 axis) |
| | | | | XW2B-40J6-9A (2 axes) |

chanhvinh.com



| 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/found 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 |

chanhvinh.com

OMRON

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

Cat. No. I106E-EN-02B

In the interest of product improvement, specifications are subject to change without notice.