

R88M-G□, R88M-GP□

# SmartStep 2 servo motors

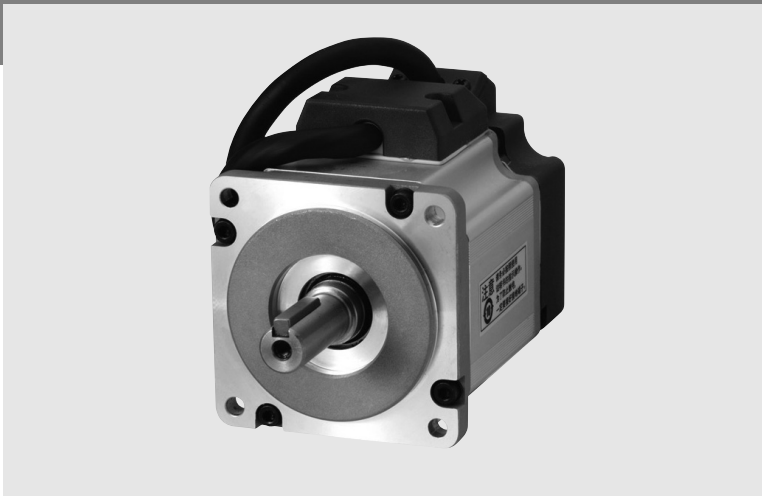
AC Servo systems

### Another step forward in drive simplicity

- SmartStep 2 motors can be controlled by G-Series drive
- Flange compatible with SmartStep servo motors
- Cylindrical and flat servo motor types are available
- Easy to setup, easy to operate. SmartStep 2 is as easy to use as a stepper motor
- Models with brake available
- Easy to connect to the drive using prebuilt cables

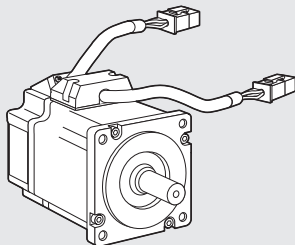
### Ratings

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



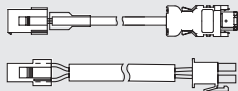
## System configuration

### SmartStep 2 Servo motor



R88M-GP (Flat type)  
Servo Motor  
3,000 rpm  
(100-400 W)

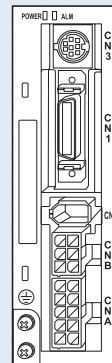
Power and encoder cables



R88M-G (cylindrical type)  
Servo Motor  
3,000 rpm  
(50-400 W)

### SmartStep 2 Servo Drive

Servo Drive controlled by pulses



## Servo motor type designation

### R88M-GP10030H-BOS2

SmartStep2 Servomotor

Motor Type

Blank: Cylinder type

P: Flat type

Capacity

|     |       |
|-----|-------|
| 050 | 50 W  |
| 100 | 100 W |
| 200 | 200 W |
| 400 | 400 W |

Rated Speed (r/min)

|    |      |
|----|------|
| 30 | 3000 |
|----|------|

Shaft end specifications

|       |                       |
|-------|-----------------------|
| Blank | Straigh shaft, no key |
| S2    | Straigh, key, tapped  |

Oil seal specifications

|       |             |
|-------|-------------|
| Blank | No oil seal |
| O     | Oil seal    |

Brake specifications

|       |          |
|-------|----------|
| Blank | No brake |
| B     | Brake    |

Voltage and encoder specifications

H: 230 V with incremental encoder

## Servo motor / servo drive combination

| Servo motor |            |         |                        |              |          |                   | Servo drive |              |
|-------------|------------|---------|------------------------|--------------|----------|-------------------|-------------|--------------|
| Family      |            | Voltage | Speed                  | Rated torque | Capacity | Model             | SmartStep2  | G-Series     |
| Cylindric   | 50 - 400 W | 230 V   | 3000 min <sup>-1</sup> | 0.16 Nm      | 50 W     | R88M-G05030H-□S2  | R7D-BP01H   | R88D-G□01H-□ |
|             |            |         |                        | 0.32 Nm      | 100 W    | R88M-G10030H-□S2  | R7D-BP01H   | R88D-G□01H-□ |
|             |            |         |                        | 0.64 Nm      | 200 W    | R88M-G20030H-□S2  | R7D-BP02HH  | R88D-G□02H-□ |
|             |            |         |                        | 1.3 Nm       | 400 W    | R88M-G40030H-□S2  | R7D-BP04H   | R88D-G□04H-□ |
| Flat        | 100-400W   |         |                        | 0.32 Nm      | 100 W    | R88M-GP10030H-□S2 | R7D-BP01H   | R88D-G□01H-□ |
|             |            |         |                        | 0.64 Nm      | 200 W    | R88M-GP20030H-□S2 | R7D-BP02HH  | R88D-G□02H-□ |
|             |            |         |                        | 1.3 Nm       | 400 W    | R88M-GP40030H-□S2 | R7D-BP04H   | R88D-G□04H-□ |

**Note:** 1. For servo motor and cable part numbers, refer to ordering information at the end of this chapter.  
2. Refer to the servo drive chapter for drive options selection and detailed specifications.

## Servo motor specifications

### General specifications

| Item                          | Specification                                                                       |
|-------------------------------|-------------------------------------------------------------------------------------|
| Ambient operating temperature | 0 to 40°C                                                                           |
| Ambient operating humidity    | 85% max. (with no condensation)                                                     |
| Ambient storage temperature   | -20 to 65°C                                                                         |
| Ambient storage humidity      | 85% max. (with no condensation)                                                     |
| Storage/operating atmosphere  | No corrosive gases                                                                  |
| Vibration resistance          | 49 m/s <sup>2</sup> max. in the X, Y, and Z directions                              |
| Impact resistance             | Acceleration of 98 m/s <sup>2</sup> max. 3 times each in the X, Y, and Z directions |
| Insulation resistance         | 20 MΩ min. at 500 VDC between the power terminals and FG terminal                   |
| Dielectric strength           | 1,500 VAC (50 or 60 Hz) for 1 minute between the power terminals and FG terminal    |
| Run position                  | Any direction                                                                       |
| Insulation grade              | Type B                                                                              |
| Structure                     | Totally-enclosed, self-cooling                                                      |
| Protective structure          | IP65 (excluding the through-shaft portion)                                          |
| Vibration grade               | V-15                                                                                |
| Mounting method               | Flange-mounting                                                                     |
| International standards       | Approval obtained for UL, cUL, and EN (EMC directive and low-voltage directive)     |

### Performance specifications

#### Cylindric servo motors

| Item                             |                                | Unit              | R88M-G05030H                                                    | R88M-G10030H           | R88M-G20030H           | R88M-G40030H           |
|----------------------------------|--------------------------------|-------------------|-----------------------------------------------------------------|------------------------|------------------------|------------------------|
| Rated output                     |                                | W                 | 50                                                              | 100                    | 200                    | 400                    |
| Rated torque                     |                                | N·m               | 0.16                                                            | 0.32                   | 0.64                   | 1.3                    |
| Rated rotation speed             |                                | r/min             | 3000                                                            |                        |                        |                        |
| Momentary maximum rotation speed |                                | r/min             | 5000                                                            |                        |                        |                        |
| Momentary maximum torque         |                                | N·Em              | 0.48                                                            | 0.95                   | 1.78                   | 3.60                   |
| Rated current                    |                                | A (rms)           | 1.1                                                             |                        | 1.6                    | 2.6                    |
| Momentary maximum current        |                                | A (rms)           | 3.4                                                             |                        | 4.9                    | 7.9                    |
| Rotor inertia                    |                                | kg·m <sup>2</sup> | 2.5 × 10 <sup>-6</sup>                                          | 5.1 × 10 <sup>-6</sup> | 1.4 × 10 <sup>-5</sup> | 2.6× 10 <sup>-5</sup>  |
| Power rate                       |                                | kW/s              | 10.4                                                            | 20.1                   | 30.3                   | 62.5                   |
| Allowable radial load            |                                | N                 | 68                                                              |                        | 245                    |                        |
| Allowable thrust load            |                                | N                 | 58                                                              |                        | 98                     |                        |
| Weight                           | Without brake                  | kg                | 0.3                                                             | 0.5                    | 0.8                    | 1.2                    |
|                                  | With brake                     | kg                | 0.5                                                             | 0.7                    | 1.3                    | 1.7                    |
| Encoder resolution               |                                | ---               | Phase A and B: 2,500 pulses/rotation, Phase Z: 1 pulse/rotation |                        |                        |                        |
| Radiation shield dimensions      |                                | ---               | 100 × 80 × t10 (Al)                                             |                        | 130 × 120 × t12 (Al)   |                        |
| Brake specifications             | Brake inertia                  | kg·m <sup>2</sup> | 2.0 × 10 <sup>-7</sup>                                          | 2.0 × 10 <sup>-7</sup> | 1.8 × 10 <sup>-6</sup> | 7.5 × 10 <sup>-6</sup> |
|                                  | Excitation voltage             | V                 | 24 VDC ±10%                                                     |                        |                        |                        |
|                                  | Power consumption (at 20 °C)   | W                 | 7                                                               |                        | 9                      |                        |
|                                  | Current consumption (at 20 °C) | A                 | 0.30                                                            |                        | 0.36                   |                        |
|                                  | Static friction torque         | N·m               | 0.29 min.                                                       |                        | 1.27 min.              |                        |
|                                  | Attraction time                | ms                | 35 max.                                                         |                        | 50 max.                |                        |
|                                  | Release time                   | ms                | 20 max.                                                         |                        | 15 max.                |                        |
|                                  | Backlash                       | -                 | ±1° max.                                                        |                        |                        |                        |
|                                  | Rating                         | -                 | Continuous                                                      |                        |                        |                        |
| Brake life                       |                                | -                 | 10,000,000 operations min.                                      |                        |                        |                        |
| Applicable servo driver (R7D-)   |                                |                   | BP01H                                                           |                        | BP02HH                 | BP04H                  |

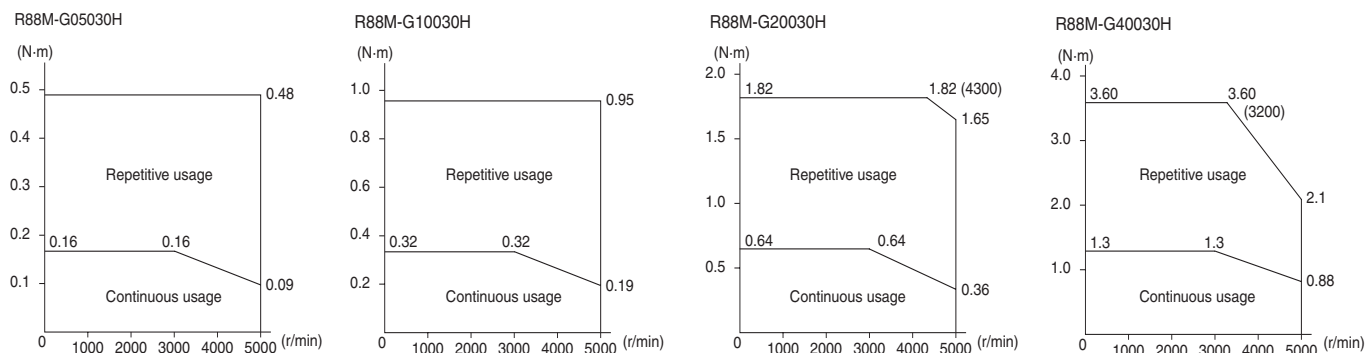
## Flat servo motors

| Item                             | Unit                           | R88M-GP10030H                                                   | R88M-G20030H         | R88M-G40030H         |
|----------------------------------|--------------------------------|-----------------------------------------------------------------|----------------------|----------------------|
| Rated output                     | W                              | 100                                                             | 200                  | 400                  |
| Rated torque                     | N·m                            | 0.32                                                            | 0.64                 | 1.3                  |
| Rated rotation speed             | r/min                          | 3000                                                            |                      |                      |
| Momentary maximum rotation speed | r/min                          | 5000                                                            |                      |                      |
| Momentary maximum torque         | N·m                            | 0.90                                                            | 1.82                 | 3.60                 |
| Rated current                    | A (rms)                        | 1.0                                                             | 1.6                  | 4.4                  |
| Momentary maximum current        | A (rms)                        | 4.3                                                             | 6.8                  | 18.6                 |
| Rotor inertia                    | kg·m <sup>2</sup>              | $9.0 \times 10^{-6}$                                            | $3.4 \times 10^{-5}$ | $6.4 \times 10^{-5}$ |
| Power rate                       | kW/s                           | 11.4                                                            | 11.8                 | 25.5                 |
| Allowable radial load            | N                              | 68                                                              | 245                  |                      |
| Allowable thrust load            | N                              | 58                                                              | 98                   |                      |
| Weight                           | Without brake                  | kg                                                              | 0.7                  | 1.3                  |
|                                  | With brake                     | kg                                                              | 0.9                  | 2.0                  |
| Encoder resolution               | ---                            | Phase A and B: 2,500 pulses/rotation, Phase Z: 1 pulse/rotation |                      |                      |
| Radiation shield dimensions      | ---                            | 130 × 120 × t10 (Al) 170 × 160 × t12 (Al)                       |                      |                      |
| Brake specifications             | Brake inertia                  | kg·m <sup>2</sup>                                               | $3.0 \times 10^{-6}$ | $9.0 \times 10^{-6}$ |
|                                  | Excitation voltage             | V                                                               | 24 VDC ±10%          |                      |
|                                  | Power consumption (at 20 °C)   | W                                                               | 7                    | 10                   |
|                                  | Current consumption (at 20 °C) | A                                                               | 0.29                 | 0.41                 |
|                                  | Static friction torque         | N·m                                                             | 0.29 min.            |                      |
|                                  | Attraction time                | ms                                                              | 50 max.              | 60 max.              |
|                                  | Release time                   | ms                                                              | 15 max.              |                      |
|                                  | Backlash                       | -                                                               | ±1° max.             |                      |
|                                  | Rating                         | -                                                               | Continuous           |                      |
| Applicable servo driver (R7D-)   |                                |                                                                 | BP01H                | BP02HH               |
|                                  |                                |                                                                 |                      | BP04                 |

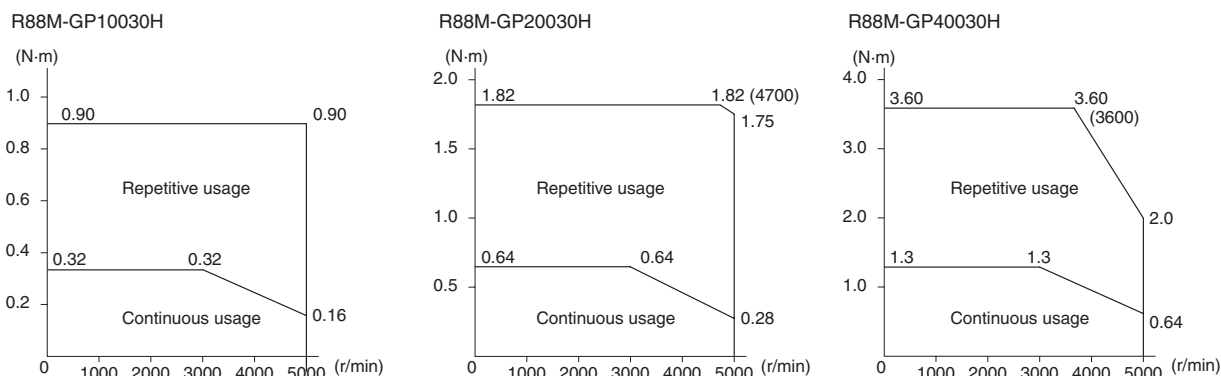
## Torque-speed characteristics

The following graphs show the characteristics with a 3 m standard cable and R7D-AP□H servo driver (200 VAC input)

### Cylindric servo motor



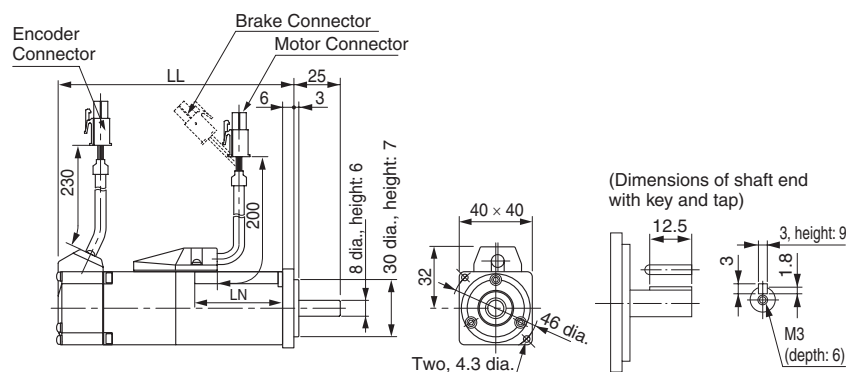
## Flat servo motors



# Dimensions

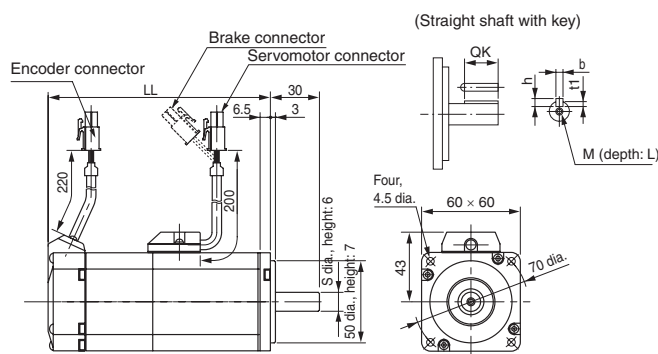
## Cylindrical type 3000 r/min (230 V, 50 - 100W)

| Dimensions (mm)  | Without brake | With brake | LN   | Aprox. Mass (Kg) |            |
|------------------|---------------|------------|------|------------------|------------|
| Model            | LL            | LL         |      | Without brake    | With brake |
| R88M-G05030H-□S2 | 72            | 102        | 26.5 | 0.3              | 0.5        |
| R88M-G10030H-□S2 | 92            | 122        | 46.5 | 0.5              | 0.7        |



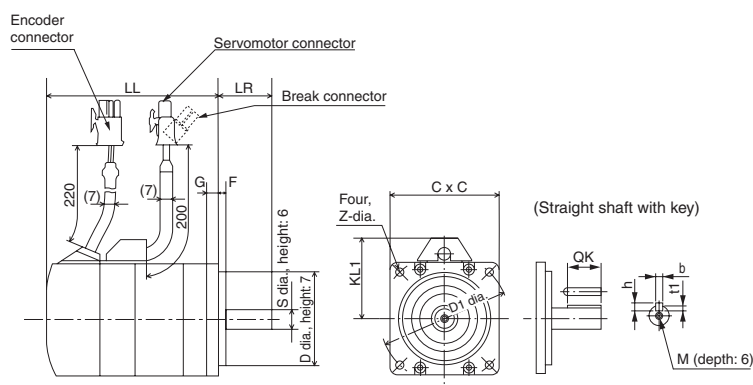
## Cylindrical type 3000 r/min (230 V, 200 - 400W)

| Dimensions (mm)  | Without brake | With brake | LR | KL1 | Flange surface |    |    |     |     | Shaft end |      |     |   |    |     |    | Aprox. Mass (Kg) |            |
|------------------|---------------|------------|----|-----|----------------|----|----|-----|-----|-----------|------|-----|---|----|-----|----|------------------|------------|
| Model            | LL            | LL         |    |     | D1             | D2 | C  | G   | Z   | S         | QK   | b   | h | M  | t1  | L  | Without brake    | With brake |
| R88M-G20030H-□S2 | 79.5          | 116        | 30 | 43  | 70             | 50 | 60 | 6.5 | 4.5 | 11        | 18   | 4h9 | 4 | M4 | 2.5 | 8  | 0.8              | 1.3        |
| R88M-G40030H-□S2 | 99            | 135.5      |    |     |                |    |    |     |     | 14        | 22.5 | 5h9 | 5 | M5 | 3   | 10 | 1.2              | 1.7        |
| R88M-G75030H-□S2 | 112.2         | 149.2      | 35 | 53  | 90             | 70 | 80 | 8   | 6   | 19        | 22   | 6h9 | 6 |    | 3.5 |    | 2.3              | 3.1        |



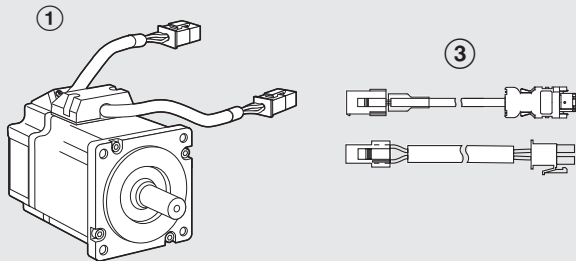
## Flat type 3000 r/min (230 V, 100 W - 400 W)

| Dimensions (mm)   | Without brake | With brake | LR | KL1 | Flange surface |    |    |   |   | Shaft end |    |      |     |   |     |             | Aprox. Mass (Kg) |            |
|-------------------|---------------|------------|----|-----|----------------|----|----|---|---|-----------|----|------|-----|---|-----|-------------|------------------|------------|
| Model             | LL            | LL         |    |     | D1             | D2 | C  | F | G | Z         | S  | QK   | b   | h | t1  | Tap x depth | Without brake    | With brake |
| R88M-GP10030H-□S2 | 60.5          | 84.5       | 25 | 43  | 70             | 50 | 60 | 3 | 7 | 4.5       | 8  | 12.5 | 3h9 | 3 | 1.8 | M3x6        | 0.7              | 0.9        |
| R88M-GP20030H-□S2 | 67.5          | 100        | 30 | 53  | 90             | 70 | 80 | 5 | 8 | 5.5       | 11 | 18   | 4h9 | 4 | 2.5 | M4x8        | 1.3              | 2          |
| R88M-GP40030H-□S2 | 82.5          | 115        |    |     |                |    |    |   |   |           | 14 | 22.5 | 5h9 | 5 | 3.0 | M5x10       | 1.8              | 2.5        |



Ordering information

SmartStep 2 Servo motor

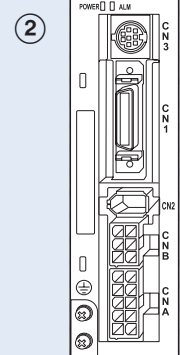


R88M-GP (Flat type) Servo Motor  
3,000 rpm  
(100-400 W)

R88M-G (cylindrical type) Servo Motor  
3,000 rpm  
(50-400 W)

SmartStep 2 Servo Drive

Servo Drive controlled by pulses



**Note:** The symbols ①②③... show the recommended sequence to select the servo motor and cables.

Servo motor

Cylindrical servo motors (3,000-r/min)

| Symbol | Specifications                                                        |               |              |          | Servo motor model | Compatible servo drives ②<br>SmartStep 2 |
|--------|-----------------------------------------------------------------------|---------------|--------------|----------|-------------------|------------------------------------------|
|        | Design                                                                |               | Rated torque | Capacity |                   |                                          |
| ①      | Cylindrical servo motors (3,000-r/min)<br><br>Straight shaft with key | Without brake | 0.16 Nm      | 50 W     | R88M-G05030H-S2   | R7D-BP01H                                |
|        |                                                                       |               | 0.32 Nm      | 100 W    | R88M-G10030H-S2   |                                          |
|        |                                                                       |               | 0.64 Nm      | 200 W    | R88M-G20030H-S2   | R7D-BP02HH                               |
|        |                                                                       |               | 1.3 Nm       | 400 W    | R88M-G40030H-S2   | R7D-BP04H                                |
|        |                                                                       | With brake    | 0.16 Nm      | 50 W     | R88M-G05030H-BS2  | R7D-BP01H                                |
|        |                                                                       |               | 0.32 Nm      | 100 W    | R88M-G10030H-BS2  |                                          |
|        |                                                                       |               | 0.64 Nm      | 200 W    | R88M-G20030H-BS2  | R7D-BP02HH                               |
|        |                                                                       |               | 1.3 Nm       | 400 W    | R88M-G40030H-BS2  | R7D-BP04H                                |

Flat servo motors (3,000-r/min)

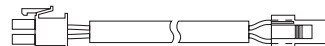
| Symbol | Specifications                                                 |               |              |          | Servo motor model | Compatible servo drives ②<br>SmartStep 2 |
|--------|----------------------------------------------------------------|---------------|--------------|----------|-------------------|------------------------------------------|
|        | Design                                                         |               | Rated torque | Capacity |                   |                                          |
| ①      | Flat servo motors (3,000-r/min)<br><br>Straight shaft with key | Without brake | 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                                |
|        |                                                                | With brake    | 0.32 Nm      | 100 W    | R88M-GP10030H-BS2 | R7D-BP01H                                |
|        |                                                                |               | 0.64 Nm      | 200 W    | R88M-GP20030H-BS2 | R7D-BP02HH                               |
|        |                                                                |               | 1.3 Nm       | 400 W    | R88M-GP40030H-BS2 | R7D-BP04H                                |

Servo drive

**Note:** 1. Refer to SmartStep 2 servo drive chapter for detailed drive specifications and selection of drive accessories.

## Servo motor cables for SmartStep 2 drive

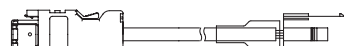
### Power cables (for CNB)

| Symbol | Specifications                            |                          | Model |                  | Appearance                                                                          |
|--------|-------------------------------------------|--------------------------|-------|------------------|-------------------------------------------------------------------------------------|
| ③      | Power cables for SmartStep 2 Servo motors | Flexible cables shielded | 1.5 m | R7A-CAB001-5SR-E |  |
|        |                                           |                          | 3 m   | R7A-CAB003SR-E   |                                                                                     |
|        |                                           |                          | 5 m   | R7A-CAB005SR-E   |                                                                                     |
|        |                                           |                          | 10 m  | R7A-CAB010SR-E   |                                                                                     |
|        |                                           |                          | 15 m  | R7A-CAB015SR-E   |                                                                                     |
|        |                                           |                          | 20 m  | R7A-CAB020SR-E   |                                                                                     |

### Brake cables

| Symbol | Specifications                            |                 | Model | Appearance                                                                          |
|--------|-------------------------------------------|-----------------|-------|-------------------------------------------------------------------------------------|
| ③      | Brake cables for SmartStep 2 Servo motors | Flexible cables | 1.5 m | R88A-CAGA001-5BR-E                                                                  |
|        |                                           |                 | 3 m   | R88A-CAGA003BR-E                                                                    |
|        |                                           |                 | 5 m   | R88A-CAGA005BR-E                                                                    |
|        |                                           |                 | 10 m  | R88A-CAGA010BR-E                                                                    |
|        |                                           |                 | 15 m  | R88A-CAGA015BR-E                                                                    |
|        |                                           |                 | 20 m  | R88A-CAGA020BR-E                                                                    |
|        |                                           |                 |       |  |

### Encoder cables (for CN2)

| Symbol | Specifications                              |                          | Model |                    | Appearance                                                                          |
|--------|---------------------------------------------|--------------------------|-------|--------------------|-------------------------------------------------------------------------------------|
| ③      | Encoder cables for SmartStep 2 Servo motors | Flexible cables shielded | 1.5 m | R88A-CRGB001-5CR-E |  |
|        |                                             |                          | 3 m   | R88A-CRGB003CR-E   |                                                                                     |
|        |                                             |                          | 5 m   | R88A-CRGB005CR-E   |                                                                                     |
|        |                                             |                          | 10 m  | R88A-CRGB010CR-E   |                                                                                     |
|        |                                             |                          | 15 m  | R88A-CRGB015CR-E   |                                                                                     |
|        |                                             |                          | 20 m  | R88A-CRGB020CR-E   |                                                                                     |

### Connectors

| Specifications                                  | Model       |
|-------------------------------------------------|-------------|
| 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 |

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