YASKAWA

# Sigma-7 400V

## Product Catalog




www.yaskawa.eu.com

# Your Production.
# Your Choice.
# Our Best.



# Contents


## Rotary Servomotors

| | |
|---|---|
| SGM7J | 20 |
| SGM7A | 34 |
| SGM7G | 58 |

## Linear Servomotors

| | |
|---|---|
| SGLF (Models with F-Type Iron Cores) | 82 |

## SERVOPACKs

| | |
|---|---|
| SGD7S Single Axis | 108 |
| SGD7W Dual Axis | 130 |

## Option Modules

| | |
|---|---|
| Option Modules Advanced Safety | 145 |
| Option Module Safety | 152 |
| Option Module Feedback | 156 |

## Periphery

| | |
|---|---|
| Serial Converter Units | 167 |
| Periphery | 172 |
| Software | 182 |

## Appendix

| | |
|---|---|
| Capacity Selection for Servomotors | 187 |
| Capacity Selection for Regenerative Resistors | 194 |
| International Standards | 199 |
| Warranty | 200 |

# Seven reasons for Sigma-7

The Sigma Series of Servo Drives has evolved into the Sigma-7 Servo Drives, which provides you with the ultimate experience in seven key areas and delivers the optimal solution that only Yaskawa can offer.

## 1 Comprehensive motor and amplifier power range

### Wide power range

- Very compact motors from 50 W to 15 kW
- Linear motors with iron core or ironless and peak forces up to 7,560 N

## 2 Savings through performance

### Lower production costs

- Speed loop bandwidth of 3.1 kHz
- Shorter settling time, reduced positioning time, higher throughput

### No additional cooling necessary

- Ambient temperature -5 – 55 °C (max. 60 °C with derating)

### Energy savings and higher productivity

- High peak torque, fast acceleration, no amplifier oversizing
- Lightweight mechanics

### Higher performance

- Overload 350 % for 3 – 5 seconds
- High peak torque, fast acceleration



## 3 Safety features

**Smooth integration of mandatory legal safety standards**

- The STO function is implemented by default in all Sigma-7 series servo amplifiers
- Build safer machines - Sigma-7 satisfies the requirements of SIL 3 and PLe
- The safety functions STO, SS1, SS2, SOS, SLS, SLA, SSR, SDI, SLP, SLI, SLT, SMT, SCA and SSM can be integrated by using the safety module

## 4 High efficiency

**Very low heat generation**

- Optimized magnetic circuit improves motor efficiency
- Improved motor efficiency reduces heat generation and allows for more compact machines

## 5 High accuracy

**Next level 24-bit absolute encoder for maximum accuracy**

- Resolution of 16 million pulses per revolution for extremely precise positioning

## 6 Impressive system performance

**Very high precision teamed up with fast, smooth operation**

- Ripple compensation for highest demands in smoothness and dynamics
- Even for machines for which speed loop gains cannot be set high

## 7 Outstanding reliability

**Even more reliability for your production**

- More than 20 million servo systems in the field
- Improved machine reliability, reduced service and maintenance costs, less downtime



## Servomotors

### Rotary

#### SGM7J



- Medium inertia, high speed
- 200 W - 1.5 kW

#### SGM7A



- Low inertia, high speed
- 200 W - 7.0 kW

#### SGM7G



- Medium inertia, high torque, low speed or high speed models
- 450 W - 15 kW

### Linear

#### SGLFW2



- Model with F-type iron core
- Rated: 45 N - 2,520 N
  Peak: 135 N - 7,560 N

## SERVOPACKS

### Single Axis

#### SGD7S EtherCAT

EtherCAT

#### SGD7S MECHATROLINK-III

MECHATROLINK

#### SGD7S PROFINET

PROFINET

#### SGD7S Siec

with integrated iec-Controller



### Dual Axis

#### SGD7W EtherCAT

EtherCAT

#### SGD7W MECHATROLINK-III

MECHATROLINK



# Option modules

## Safety

### SGD7S-OSB01A

Advanced Safety Module FSoE
(STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SDI, SLP, SLI, SCA, SSM)

Safety over EtherCAT®

### SGD7S-OSB02A

Advanced Safety Module FSoE + I/O
(STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SDI, SLP, SLI, SLT, SMT, SCA, SSM)

Safety over EtherCAT®

### SGDV-OSA01A000FT900

Safety Module
(SBB, SBB-D, SPM-D, SLS-D)

## Other

### SGDV-OF□□□A

Feedback Option/
Fully Closed Loop
Module

Trademark notes:

EtherCAT® and Safety over EtherCAT® are a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

# Combination of SERVOPACKs and option modules

| SERVOPACK Model | Option Module | | |
|---|---|---|---|
| | Safety Module (SGDV-OSA01A000FT900) | Advanced Safety Modules (SGD7S-OSB0#A) | Feedback Option/Fully Closed Loop Module (SGDV-OF□□□A) |
| Single-axis EtherCAT Communications Reference Type (SGD7S-□□□DA0B8□□F91) | – | O | – |
| Single-axis EtherCAT Communications Reference Type (SGD7S-□□□DA0B□□□F64) | O | – | O |
| Single-axis MECHATROLINK III Communications Reference Type (SGD7S-□□□D30B□□□F64) | O | – | O |
| Single-axis PROFINET Communications Reference Type (SGD7S-□□□DC0B□□□) | – | – | O |
| Dual-axis EtherCAT Communications Reference Type (SGD7W-□□□DA0B□□□) | O* | – | – |
| Dual-axis MECHATROLINK III Communications Reference Type (SGD7W-□□□D30B□□□) | O* | – | – |

*O : Possible* *– : Not Possible* **Only for one axis*

# Combination of rotary servomotors and SERVOPACKs

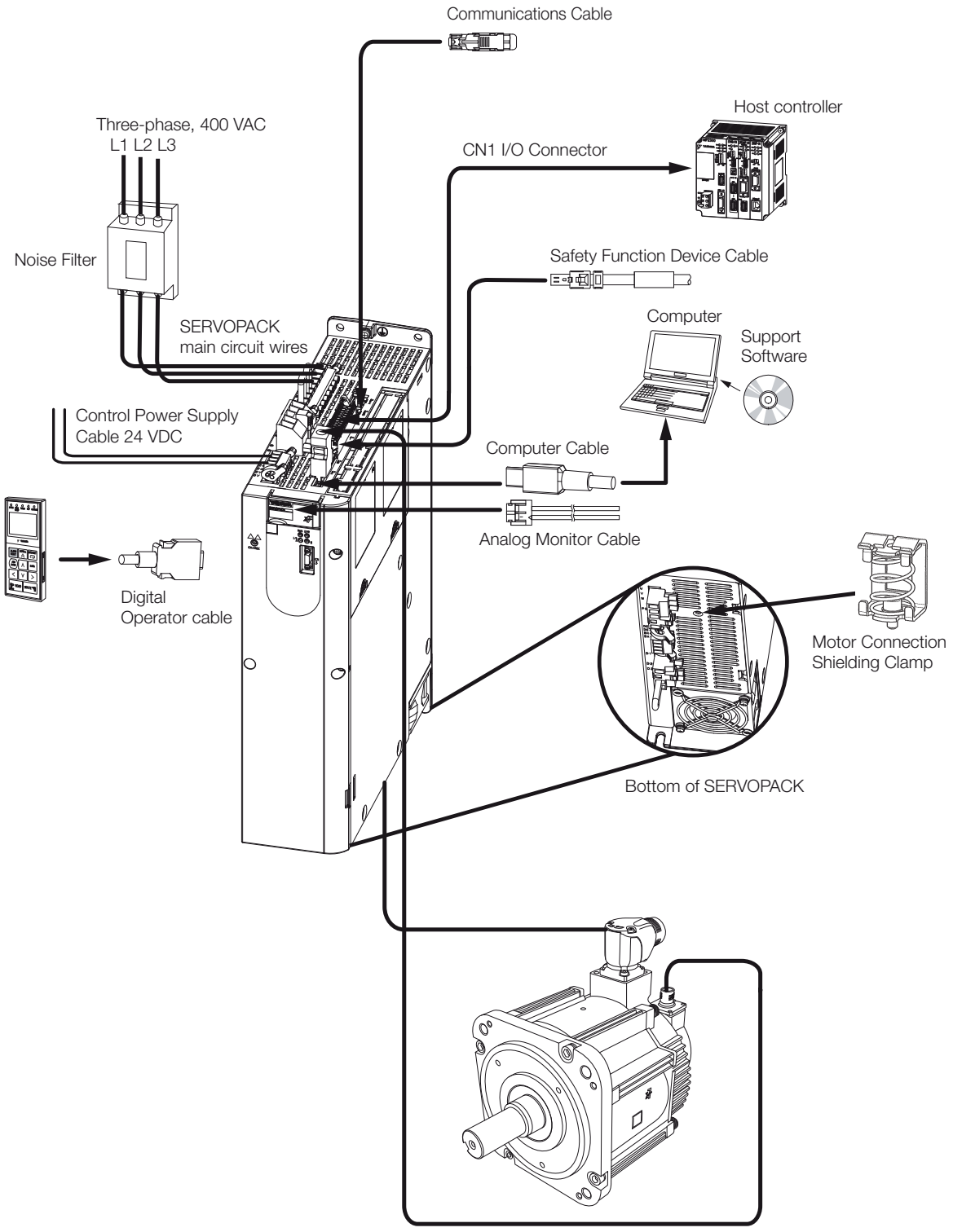
| Rotary servomotor model | | Rated output | SERVOPACK model | |
|---|---|---|---|---|
| | | | SGD7S- | SGD7W- |
| SGM7J (Medium inertia, high speed) 3,000 min$^{-1}$ | SGM7J-02D□F | 200 W | 1R9D | 2R6D* |
| | SGM7J-04D□F | 400 W | | 2R6D* oder 5R4D* |
| | SGM7J-08D□F | 750 W | 3R5D | 2R6D oder 5R4D* |
| | SGM7J-15D□F | 1.5 kW | 5R4D | 5R4D |
| SGM7A (Low inertia, high speed) 3,000 min$^{-1}$ | SGM7A-02D□F | 200 W | 1R9D | 2R6D* |
| | SGM7A-04D□F | 400 W | | 2R6D* oder 5R4D* |
| | SGM7A-08D□F | 750 W | 3R5D | 2R6D oder 5R4D* |
| | SGM7A-10D□F | 1.0 kW | 5R4D | 5R4D* |
| | SGM7A-15D□F | 1.5 kW | | 5R4D |
| | SGM7A-20D□F | 2.0 kW | 8R4D | – |
| | SGM7A-25D□F | 2.5 kW | 120D | |
| | SGM7A-30D□F | 3.0 kW | | |
| | SGM7A-40D□F | 4.0 kW | 170D | |
| | SGM7A-50D□F | 5.0 kW | | |
| | SGM7A-70D□F | 7.0 kW | 260D | |
| SGM7G Standard models (Medium inertia, Low speed, high torque) 1,500 min$^{-1}$ | SGM7G-05D□F | 450 W | 1R9D | 2R6D* oder 5R4D* |
| | SGM7G-09D□F | 850 W | 3R5D | 5R4D* |
| | SGM7G-13D□F | 1.3 kW | 5R4D | 5R4D |
| | SGM7G-20D□F | 1.8 kW | 8R4D | – |
| | SGM7G-30D□F | 2.9 kW | 120D | |
| | SGM7G-44D□F | 4.4 kW | 170D | |
| | SGM7G-55D□F | 5.5 kW | 210D | |
| | SGM7G-75D□F | 7.5 kW | 260D | |
| | SGM7G-1AD□F | 11.0 kW | 280D | |
| | SGM7G-1ED□F | 15.0 kW | 370D | |
| SGM7G High-speed models (Medium inertia, High speed, high torque) 1,500 min$^{-1}$ | SGM7G-05D□R | 450 W | 3R5D | 2R6D oder 5R4D* |
| | SGM7G-09D□R | 850 W | 5R4D | 5R4D |
| | SGM7G-13D□R | 1.3 kW | 8R4D | – |
| | SGM7G-20D□R | 1.8 kW | 120D | |
| | SGM7G-30D□R | 2.9 kW | 170D | |
| | SGM7G-44D□R | 4.4 kW | 210D | |

* If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Sigma-7 single axis SERVOPACK.

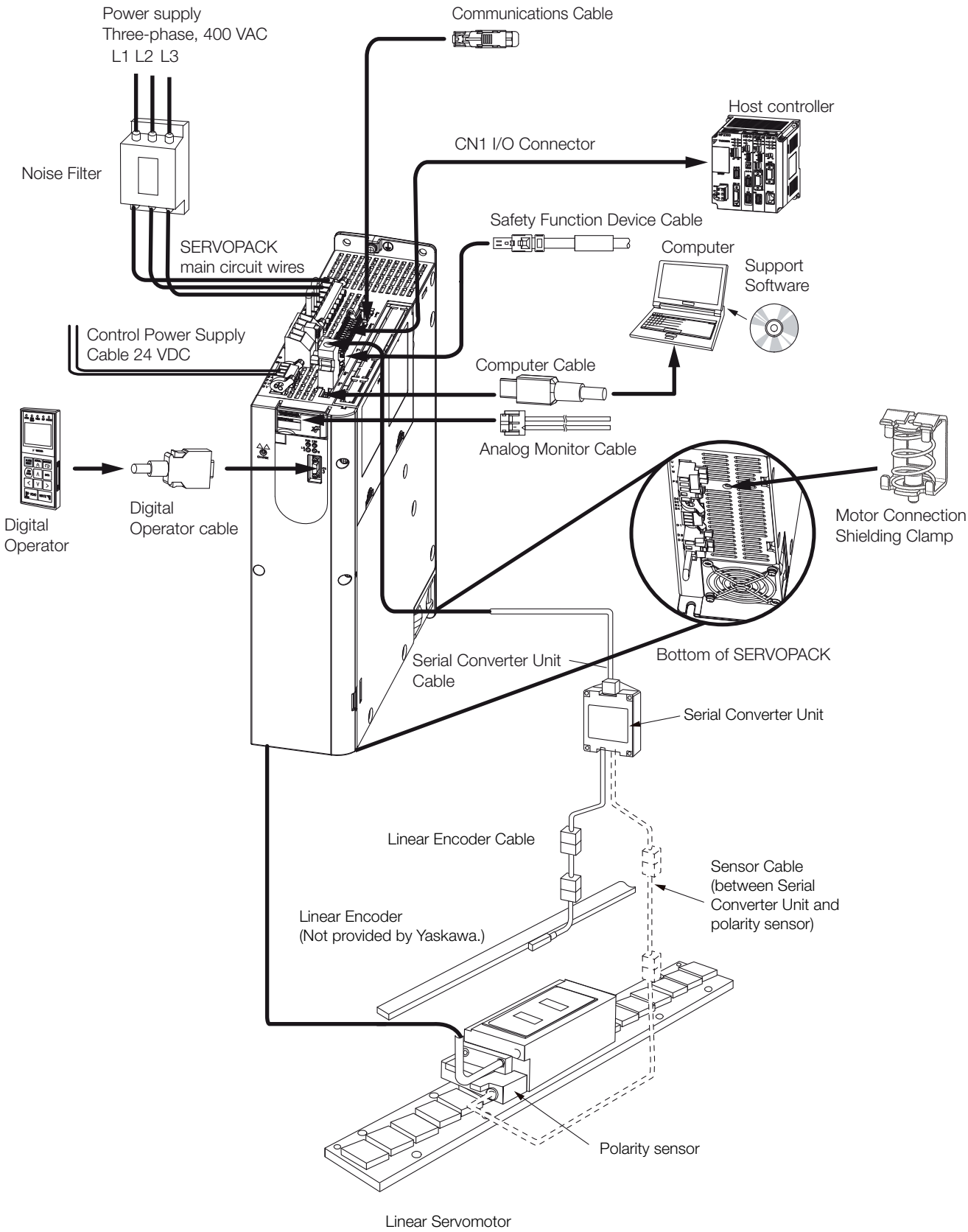
# Combination of linear servomotors and SERVOPACKs

| Linear Servomotor Model | | Rated Output Force | SERVOPACK Model | |
|---|---|---|---|---|
| | | | SGD7S- | SGD7W- |
| SGLFW2 F-Type with iron core | SGLFW2-30D070A | 45 N | 1R9D | 2R6D |
| | SGLFW2-30D120A | 90 N | 1R9D | 2R6D |
| | SGLFW2-30D230A | 180 N | 1R9D | 2R6D |
| | SGLFW2-45D200A | 280 N | 3R5D | 2R6D |
| | SGLFW2-45D380A | 560 N | 5R4D | 5R4D |
| | | | 8R4D | - |
| | SGLFW2-90D200A | 560 N | 5R4D | - |
| | SGLFW2-90D380A | 1,120 N | 120D | - |
| | SGLFW2-90D560A | 1,680 N | 170D | - |
| | SGLFW2-1DD380A | 1,680 N | 170D | - |
| | SGLFW2-1DD560A | 2,520 N | 260D | - |

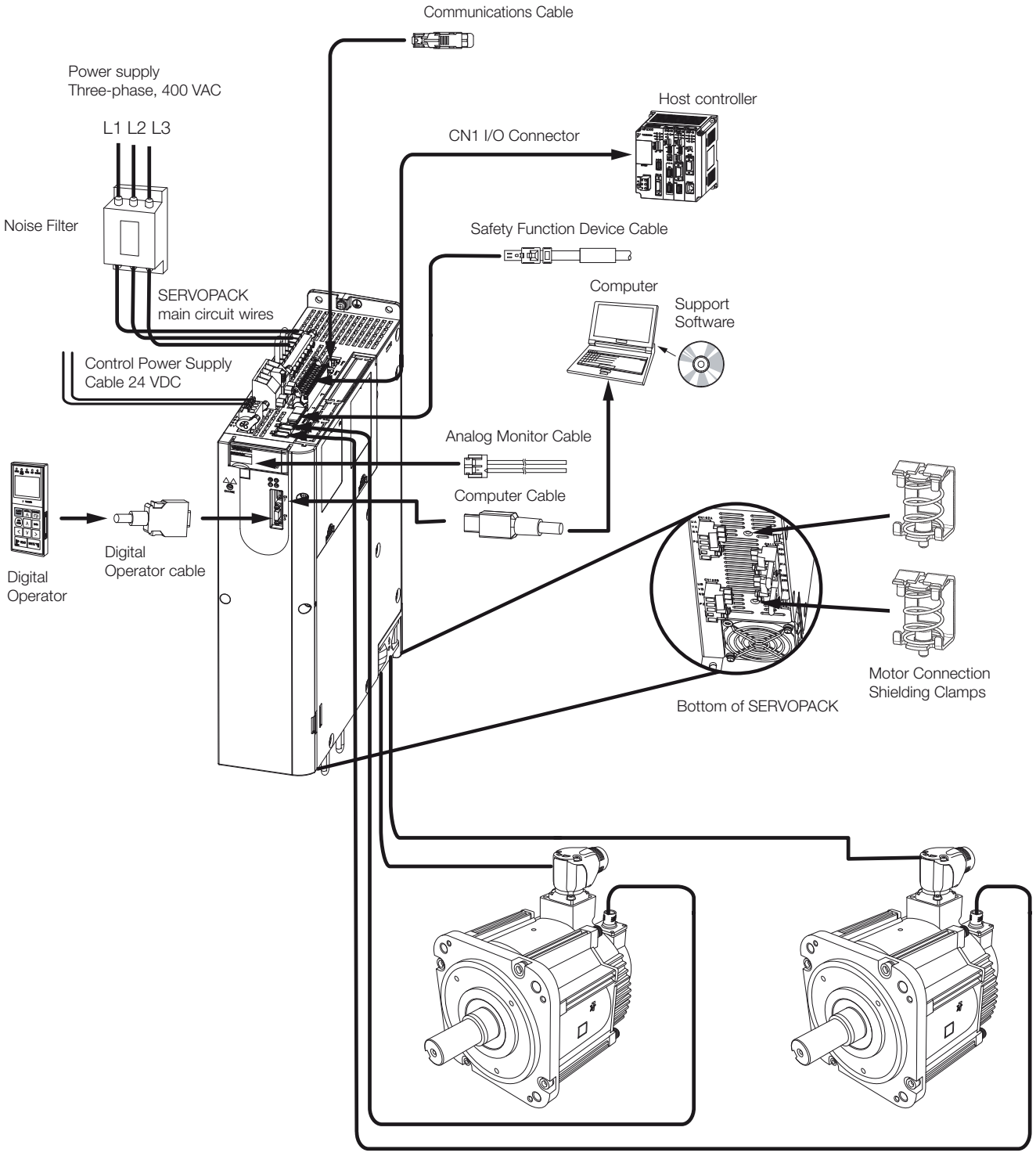
# SGD7S SERVOPACK and rotary servomotor



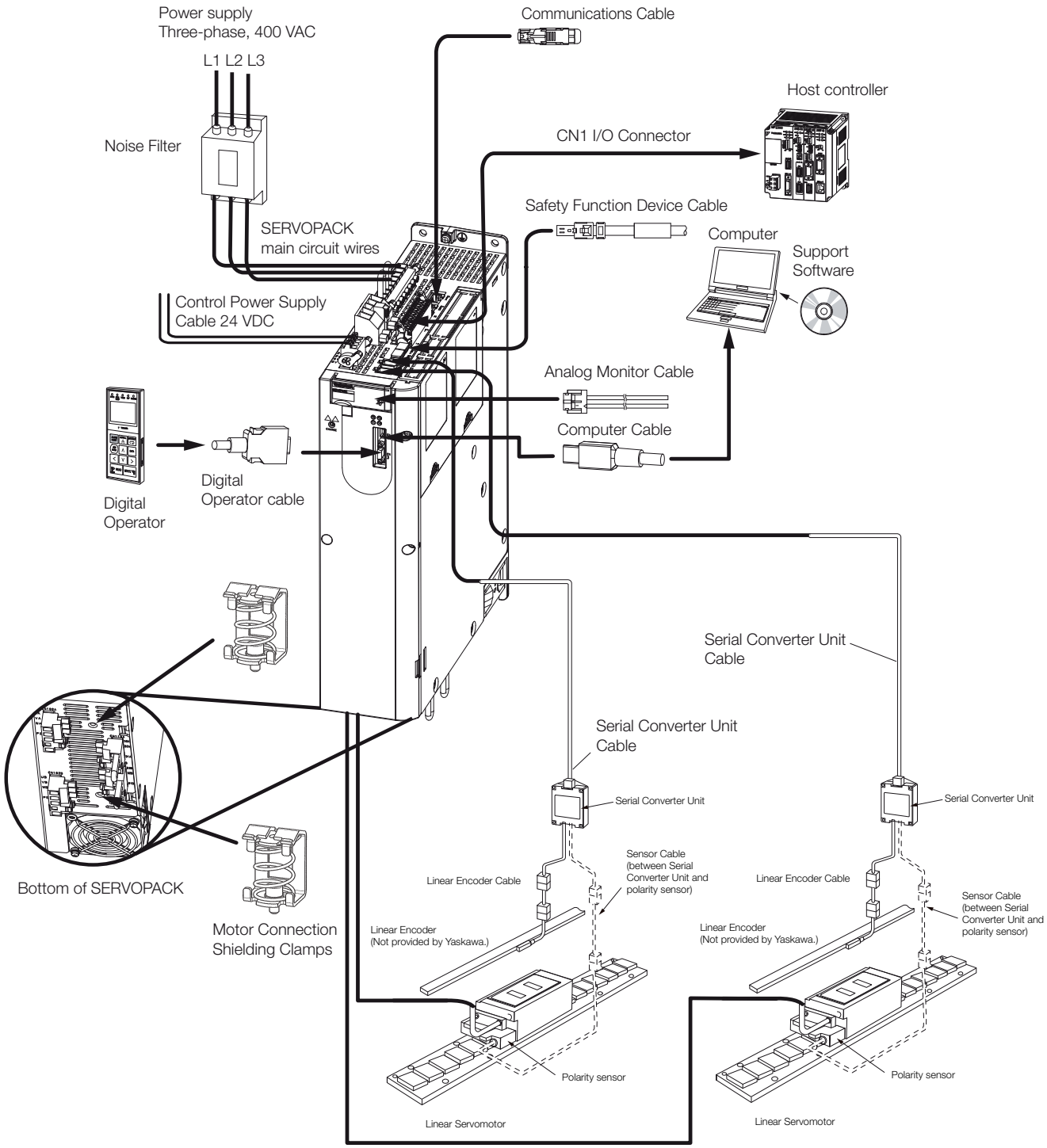
# SGD7S SERVOPACK and linear servomotor



# SGD7W SERVOPACK and rotary servomotor



# SGD7W SERVOPACK and linear servomotor



# Rotary servomotors

## SGM7J - 02 D F F 6 1

Sigma-7 Series Servomotors: SGM7J

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

| 1st + 2nd digit - Rated Output | |
|---|---|
| Code | Specification |
| 02 | 200 W |
| 04 | 400 W |
| 08 | 750 W |
| 15 | 1.5 kW |

| 3rd digit - Power Supply Voltage | |
|---|---|
| Code | Specification |
| D | 400 VAC |

| 4th digit - Serial Encoder | |
|---|---|
| Code | Specification |
| 6*1 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

| 5th digit - Design Revision Order | |
|---|---|
| Code | Specification |
| F | Standard Model |

| 6th digit - Shaft End | |
|---|---|
| Code | Specification |
| 2 | Straight without key |
| 6 | Straight with key and tap |

| 7th digit - Options | |
|---|---|
| Code | Specification |
| 1 | Without options |
| C | With holding brake (24 VDC) |

*1 Please contact your Yaskawa representative about availability.

## SGM7A - 02 D F F 6 1

Sigma-7 Series Servomotors: SGM7A

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

| 1st + 2nd digit - Rated Output | |
|---|---|
| Code | Specification |
| 02 | 200 W |
| 04 | 400 W |
| 08 | 750 W |
| 10 | 1.0 kW |
| 15 | 1.5 kW |
| 20 | 2.0 kW |
| 25 | 2.5 kW |
| 30 | 3.0 kW |
| 40 | 4.0 kW |
| 50 | 5.0 kW |
| 70 | 7.0 kW |

| 3rd digit - Power Supply Voltage | |
|---|---|
| Code | Specification |
| D | 400 VAC |

| 4th digit - Serial Encoder | |
|---|---|
| Code | Specification |
| 6*1 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

| 5th digit - Design Revision Order | |
|---|---|
| Code | Specification |
| F | Standard Model |

| 6th digit - Shaft End | |
|---|---|
| Code | Specifications |
| 2 | Straight without key |
| 6 | Straight with key and tap |

| 7th digit - Options | |
|---|---|
| Code | Specifications |
| 1 | Without options |
| C*3 | With holding brake (24 VDC) |
| F*2, *3 | With dust seal |
| H*2, *3 | With dust seal and holding brake (24 VDC) |

*1 Please contact your Yaskawa representative about availability.
*2 This option is supported only for SGM7A-10 to -50 Servomotors.
*3 These options are not supported by SGM7A-70 Servomotors.

## SGM7G - 05 D F F 6 F

Sigma-7 Series Servomotors: SGM7G

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

| 1st + 2nd digit - Rated Output | |
|---|---|
| Code | Specification |
| 05 | 450 W |
| 09 | 850 W |
| 13 | 1.3 kW |
| 20 | 1.8 kW |
| 30 | 2.9 kW |
| 44 | 4.4 kW |
| 55 | 5.5 kW |
| 75 | 7.5 kW |
| 1A | 11.0 kW |
| 1E | 15.0 kW |

| 3rd digit - Power Supply Voltage | |
|---|---|
| Code | Specification |
| D | 400 VAC |

| 4th digit - Serial Encoder | |
|---|---|
| Code | Specification |
| 6*1 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

| 5th digit - Design Revision Order | |
|---|---|
| Code | Specification |
| F | Standard Model |
| R*3 | High-speed Model |

| 6th digit - Shaft End | |
|---|---|
| Code | Specification |
| 2 | Straight without key (450 W, 1.8 kW, 2.9 kW) |
| 6 | Straight with key and tap (450 W, 1.8 kW, 2.9 kW) |
| S*2 | Straight without key (850 W, 1.3 kW) |
| K*2 | Straight with key and tap (850 W, 1.3 kW) |

| 7th digit - Options | |
|---|---|
| Code | Specification |
| 1 | Without options |
| C | With holding brake (24 VDC) |
| F | With dust seal |
| H | With dust seal and holding brake (24 VDC) |

*1 Please contact your Yaskawa representative about availability.
*2 The shaft end codes are different for 850 kW and 1.3 kW Servomotors.
The shaft diameter for 850 W Servomotors is 19 mm.
The shaft diameter for 1.3 kW Servomotors is 22 mm.
*3 Available up to 4.4 kW.

# SERVOPACKs

## Single axis amplifier

SGD7S - 1R9 D A0 B 000 F64

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th digit |
|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| **Three-phase, 400 V** | |
| 1R9 | 0.5 kW |
| 3R5 | 1.0 kW |
| 5R4 | 1.5 kW |
| 8R4 | 2.0 kW |
| 120 | 3.0 kW |
| 170 | 5.0 kW |
| 210 | 6.0 kW |
| 260 | 7.5 kW |
| 280 | 11.0 kW |
| 370 | 15.0 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| D | 400 V AC |

**5th + 6th digit - Interface*1**

| Code | Specification |
|---|---|
| A0 | EtherCAT communication reference |
| C0 | PROFINET communication reference |
| 30 | MECHATROLINK-III, RJ45 communication reference |
| M0 | Sigma-7Siec (with built-in single-axis control) |

**7th digit - Design Revision Order**

| | |
|---|---|
| B | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 026*2 | With relay for holding brake | All models |
| 800 | With Advanced Safety Module*4 | F91 |
| 826 | With Advanced Safety Module and built-in Servomotor brake control*4 | F91 |

**11th ... 13th digit - FT/EX Specification**

| Code | Specification |
|---|---|
| None | Without Options |
| F64*3 | Zone table |
| F50 | Application function for Sigma-7Siec |
| F91 | For use with SGD7S-OSB0□A (including F64 function) |

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

*1. The same SERVOPACKs are used for both rotary and linear servomotors.
*2. For specification of the internal brake relay, please refer to the hardware manual of the amplifier.
*3. Only available for EtherCAT (CoE) and MECHATROLINK-III communication references.
*4. Purchase the Advanced Safety Module (model: SGD7S-OSB□□□) separately.

## Dual axis amplifier

SGD7W - 2R6 D A0 B 026

| Sigma-7 Series Sigma-7W Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th digit |
|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| **Three-phase, 400 V** | |
| 2R6 | 2 × 0.75 kW |
| 5R4 | 2 × 1.5 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| D | 400 V AC |

**5th + 6th digit - Interface**

| Code | Specification |
|---|---|
| A0 | EtherCAT communication reference |
| 30 | MECHATROLINK-III, RJ45 communication reference |

**7th digit - Design Revision Order**

| | |
|---|---|
| B | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 026* | With relay for holding brake | All models |

* For specification of the internal brake relay, please refer to the hardware manual of the amplifier.

# Linear servomotors with F-Type iron cores

## Moving coil

S G L F W2 - 30 D 070 A S 1 E

Sigma-7 Series Linear Servomotors: 1st 2nd 3rd + 4th 5th 6th - 8th 9th 10th 11th 12th digit

| 1st digit - Servomotor Type | |
|---|---|
| **Code** | **Specification** |
| F | With F-type iron core |

| 2nd digit - Moving Coil/Magnetic Way | |
|---|---|
| **Code** | **Specification** |
| W2 | Moving Coil |

| 3rd + 4th digit - Magnet Height | |
|---|---|
| **Code** | **Specification** |
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

| 5th digit - Power Supply Voltage | |
|---|---|
| **Code** | **Specification** |
| D | 400 VAC |

| 6th ... 8th digit - Length of Moving Coil | |
|---|---|
| **Code** | **Specification** |
| 070 | 70 mm |
| 120 | 125 mm |
| 200 | 205 mm |
| 230 | 230 mm |
| 380 | 384 mm |

| 9th digit - Design Revision Order | |
|---|---|
| **Code** | **Specification** |
| A | Standard Model |

| 10th digit - Sensor Specification | |
|---|---|
| **Code** | **Specification** |
| T | Without polarity sensor, with thermal protector |
| S | With polarity sensor and thermal protector |

| 11th digit - Options | |
|---|---|
| **Code** | **Cooling Method** |
| 1 | Self-cooled |
| L | Water-cooled* |

| 12th digit - Options | |
|---|---|
| **Code** | **Connection** |
| E | Metal round connector (Phoenix) |

* Contact your Yaskawa representative for information on water-cooled model.

## Magnetic way

S G L F M2 - 30 270 A

Sigma-7 Series Linear Servomotors: 1st 2nd 3rd + 4th 5th - 7th 8th digit

| 1st digit - Servomotor Type | |
|---|---|
| **Code** | **Specification** |
| F | With F-type iron core |

| 2nd digit - Moving Coil/Magnetic Way | |
|---|---|
| **Code** | **Specification** |
| M2 | Magnetic Way |

| 3rd + 4th digit - Magnet Height | |
|---|---|
| **Code** | **Specification** |
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

| 5th ... 7th digit - Length of Magnetic Way | |
|---|---|
| **Code** | **Specification** |
| 270 | 270 mm |
| 306 | 306 mm |
| 450 | 450 mm |
| 510 | 510 mm |
| 630 | 630 mm |
| 714 | 714 mm |

| 8th digit - Design Revision Order | |
|---|---|
| **Code** | **Specification** |
| A | Standard Model |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# Related documents

The documents that are related to Sigma-7 series AC Servo Drives are shown in the following table.
Refer to these documents as required.

| Document Name (Document No.) | Description of Document |
|---|---|
| Sigma-7 Series Product Manual | |
| Sigma-7 Single Axis SERVOPACK with 400V-Input Power and EtherCAT (CoE) Communications References Product Manual [SIEP S800001 80□] | Provide detailed information on selecting Sigma-7 Series SERVOPACKs and information on installing, connecting, setting, performing trial operation for, tuning, and monitoring the Servo Drives. |
| Sigma-7 Single Axis SERVOPACK with 400V-Input Power and MECHATROLINK III Communications References Product Manual [SIEP S800002 14□] | |
| Sigma-7 Single Axis SERVOPACK with 400V-Input Power and EtherCAT (CoE) Communications References Product Manual FTZ/EX Specification for Advanced Safety Module [SIEP S800002 30□] | |
| Sigma-7 Single Axis SERVOPACK with 400V-Input Power and PROFINET Communications References Product Manual [SIEP YEUOC7P 01] | |
| Sigma-7Siec Single Axis SERVOPACK with 400V-Input Power and integrated iec-Controller Communications References Product Manual [IG.S7Siec.01] | |
| Sigma-7 Dual Axis SERVOPACK with 400V-Input Power and EtherCAT (CoE) Communications References Product Manual [SIEP S800002 19□] | |
| Sigma-7 Dual Axis SERVOPACK with 400V-Input Power and MECHATROLINK III Communications References Product Manual [SIEP S800002 20□] | |
| Supplement for using with Sigma-7 SERVOPACKs (400 V-Input power models) [900-200-100] | Provides details information required for the design and maintenance of Safety Module SGDV-OSA01A000FT900. |
| Series Servomotor Product Manual | |
| Rotary Servomotor with 400 V-Input Power Product Manual [SIEP S800001 86□] | Provides detailed information on selecting, installing, and connecting the Sigma-7 Series Servomotors. |
| Linear Servomotor with 400 V-Input Power Product Manual [SIEP S800001 81□] | |
| Others | |
| Digital Operator Operating Manual [SIEP S800001 33□] | Describes the operating procedures for a Digital Operator for a Sigma-7 Series Servo System. |
| Engineering Tool SigmaWin+ Version 7.2□ Online Manual Component [SIET S800001 34□] | Provides detailed operating procedures for the SigmaWin+ Engineering Tool for a Sigma-7 Series Servo System. |
| Function Block Manual [HB00 \| YMC-LIB_PN \| YMC-LIB_Sigma7-PN V2.0 \| de] | |

# Content - Rotary Servomotors

## SGM7J



- Medium inertia, high speed
- 200 W - 1.5W

## SGM7A



- Low inertia, high speed
- 200 W - 7.0 kW

## SGM7G



- Medium inertia, high torque, low speed or high-speed models
- 450 W - 15 kW

# Rotary Servomotors


| | |
|---|---|
| SGM7J | 20 |
| SGM7A | 34 |
| SGM7G | 58 |

# Model designations

| SGM7J | - | 02 | D | F | F | 6 | 1 |
|---|---|---|---|---|---|---|---|
| Sigma-7 Series Servomotors: SGM7J | | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit |

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| 02 | 200 W |
| 04 | 400 W |
| 08 | 750 W |
| 15 | 1.5 kW |

**3rd digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| D | 400 VAC |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 6* | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| F | Standard Model |

**6th digit - Shaft End**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 VDC) |

* Please contact your Yaskawa representative about availability.

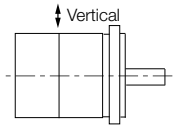
# Specifications and ratings

## Specifications

| Voltage | | 400 V | | | |
|---|---|---|---|---|---|
| **Model SGM7J-** | | **02D** | **04D** | **08D** | **15D** |
| Time Rating | | Continuous | | | |
| Thermal Class | | B | | | |
| Insulation Resistance | | 500 VDC, 10 MOhm min. | | | |
| Withstand Voltage | | 1,800 VAC for 1 minute | | | |
| Excitation | | Permanent magnet | | | |
| Mounting | | Flange-mounted | | | |
| Drive Method | | Direct drive | | | |
| Rotation Direction | | Counterclockwise (CCW) for forward reference when viewed from the load side | | | |
| Vibration Class*1 | | V15 | | | |
| Environmental Conditions | Surrounding Air Temperature | 0 °C to 40 °C (With derating, usage is possible between 40 °C and 60 °C)*4 | | | |
| | Surrounding Air Humidity | 20% to 80% relative humidity (with no condensation) | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*5<br>• Must be free of strong magnetic fields. | | | |
| | Storage Environment | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20 °C to 60 °C (with no freezing)<br>Storage Humidity: 20% to 80% relative humidity (with no condensation) | | | |
| Shock Resistance*2 | Impact Acceleration Rate at Flange | 490 $m/s^2$ | | | |
| | Number of Impacts | 2 times | | | |
| Vibration Resistance*3 | Vibration Acceleration Rate at Flange | 49 $m/s^2$ | | | |
| Applicable SERVOPACKs | SGD7S- | 1R9D | | 3R5D | 5R4D |

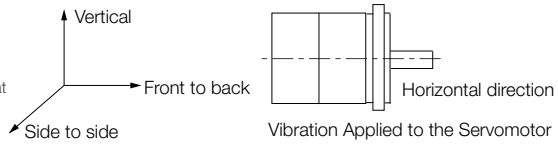
*1. A Vibration class of V15 indicates a vibration amplitude of 15 µm maximum on the Servomotor without a load at the rated motor speed.

*2. The shock resistance for shock in the vertical direction when the Servomotor is mounted with the shaft in a horizontal position is given in the above table.



Shock Applied to the Servomotor

*3. The vertical, side-to-side, and front-to-back vibration resistance for vibration in three directions when the Servomotor is mounted with the shaft in a horizontal position is given in the above table. The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.



Vibration Applied to the Servomotor

*4. If the surrounding air temperature will exceed 40°C, refer to the section "Applications where the Surrounding Air Temperature of the Servomotor Exceeds 40°C".

*5. If the altitude will exceed 1,000 m, refer to the section "Applications where the Altitude of the Servomotor Exceeds 1000m".

## Ratings

| Voltage | | | 400 V | | | |
|---|---|---|---|---|---|---|
| **Model SGM7J-** | | | **02D** | **04D** | **08D** | **15D** |
| Rated Output *1 | | W | 200 | 400 | 750 | 1500 |
| Rated Torque *1, *2 | | Nm | 0.637 | 1.27 | 2.39 | 4.77 |
| Instantaneous Maximum Torque *1 | | Nm | 2.23 | 4.46 | 8.36 | 14.3 |
| Rated Current *1 | | A | 1.5 | 1.4 | 2.2 | 4.5 |
| Instantaneous Maximum Current *1 | | A | 5.5 | 5.3 | 8.2 | 14.0 |
| Rated Motor Speed *1 | | $min^{-1}$ | 3000 | | | |
| Maximum Motor Speed | | $min^{-1}$ | 6000 | | | |
| Torque Constant | | Nm/A | 0.461 | 0.965 | 1.17 | 1.13 |
| Motor Moment of Inertia | | $\times 10^{-4}$ kg $m^2$ | 0.263 (0.333) | 0.486 (0.556) | 1.59 (1.77) | 4.02 (4.90) |
| Rated Power Rate *1 | | kW/s | 15.4 (12.1) | 33.1 (29.0) | 35.9 (32.2) | 56.6 (46.6) |
| Rated Angular Acceleration Rate *1 | | rad/$s^2$ | 24200 (19100) | 26100 (22800) | 15000 (13500) | 11900 (9700) |
| Heat Sink Size (Aluminium) | | mm | 250 × 250 × 6 | | | 300 × 300 × 12 |
| Protective Structure *3 | | | Totally enclosed, self-cooled, IP67 | | | |
| Holding Brake Specifications *4 | Rated Voltage | V | 24 VDC±10% | | | |
| | Capacity | W | 6 | | 6.5 | 7.5 |
| | Holding Torque | Nm | 0.637 | 1.27 | 2.39 | 4.77 |
| | Coil Resistance | Ω (at 20 °C) | 96±10% | | 88.6±10% | 76.8±10% |
| | Rated Current | A (at 20 °C) | 0.25 | | 0.27 | 0.31 |
| | Time Required to Release Brake | ms | 60 | | 80 | |
| | Time Required to Brake | ms | 100 | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | Standard | | 15 times | 10 times | 12 times | 6 times |
| | With External Regenerative Resistor or Dynamic Brake Resistor Connected | | 25 times | | 15 times | 12 times |
| Allowable Shaft Load *5 | LF | mm | 25 | | 35 | |
| | Allowable Radial Load | N | 245 | | 392 | 490 |
| | Allowable Thrust Load | N | 74 | | 147 | |

Note: The values in parentheses are for Servomotors with holding brakes.

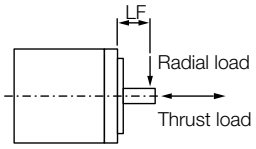
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

3. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

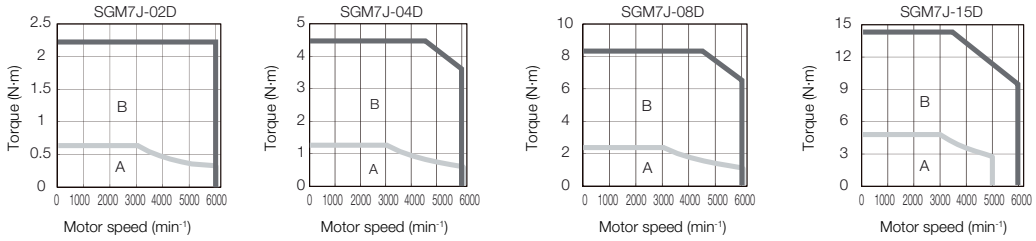
4. Observe the following precautions if you use a Servomotor with a holding brake.
   - The holding brake cannot be used to stop the Servomotor.
   - The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
   - The 24-VDC power supply is not provided by Yaskawa.

5. The allowable shaft loads are illustrated in the following figure. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.



## Motor speed-torque characteristics

A : Continuous duty zone
B : Intermittent duty zone

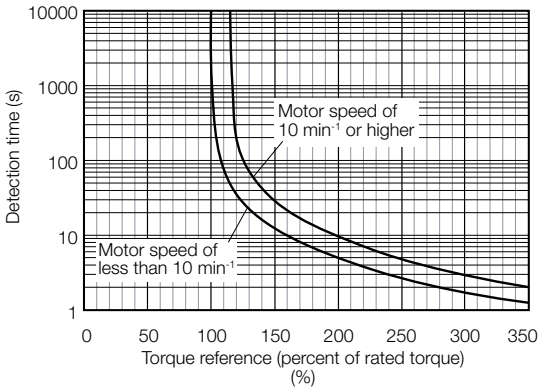



Notes:

1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage. The intermittent duty zones in the graphs show the characteristics when a three-phase, 400-VAC power supply voltage is used.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

## Servomotor overload protection characteristics

The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40°C.




Note:

The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.

Use the Servomotor so that the effective torque remains within the continuous duty zone given in Motor Speed-Torque Characteristics above.

## Load moment of inertia

The load moment of inertia indicates the inertia of the load. The larger the load moment of inertia, the worse the response. If the moment of inertia is too large, operation will become unstable.
The allowable size of the load moment of inertia ($J_L$) for the Servomotor is restricted. Refer to Ratings of Rotary Serovmotors SGM7J. This value is provided strictly as a guideline and results depend on Servomotor driving conditions.

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Perform one of the following steps if this occurs.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.
- Install an external regenerative resistor if the alarm cannot be cleared using the above steps.

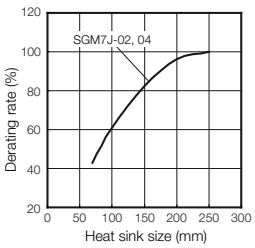
## Servomotor heat dissipation conditions

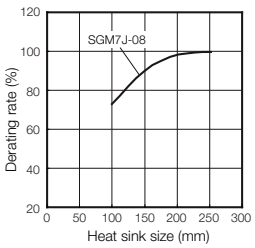
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.

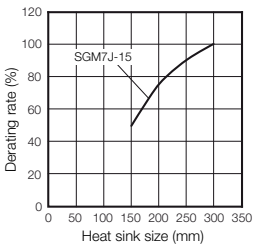
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the Servomotor Overload Protection Characteristics.

Note:
The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed.
If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.

**Important:**
The actual temperature rise depends on how the heat sink (i.e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.



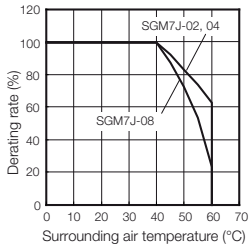

See Servomotor Ratings for more information.

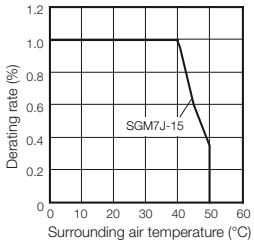
## Applications where the surrounding air temperature of the servomotor exceeds 40°C

The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the Servomotor Overload Protection Characteristics.

Note:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.



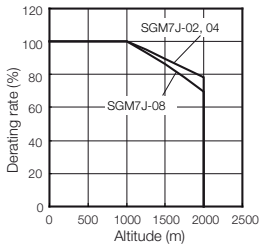



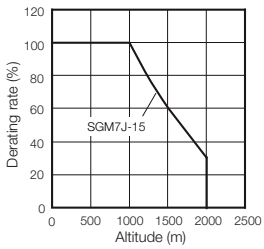

## Applications where the altitude of the servomotor exceeds 1,000 m

The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.

Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the Servomotor Overload Protection Characteristics.

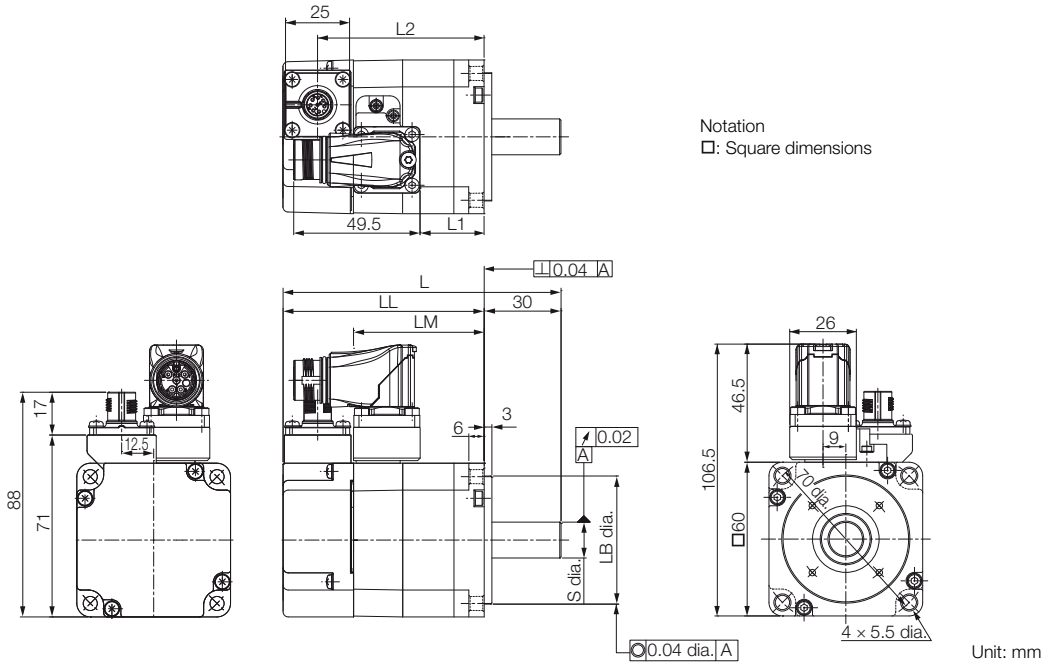
Note:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.



# External dimensions

## SGM7J-02 and -04



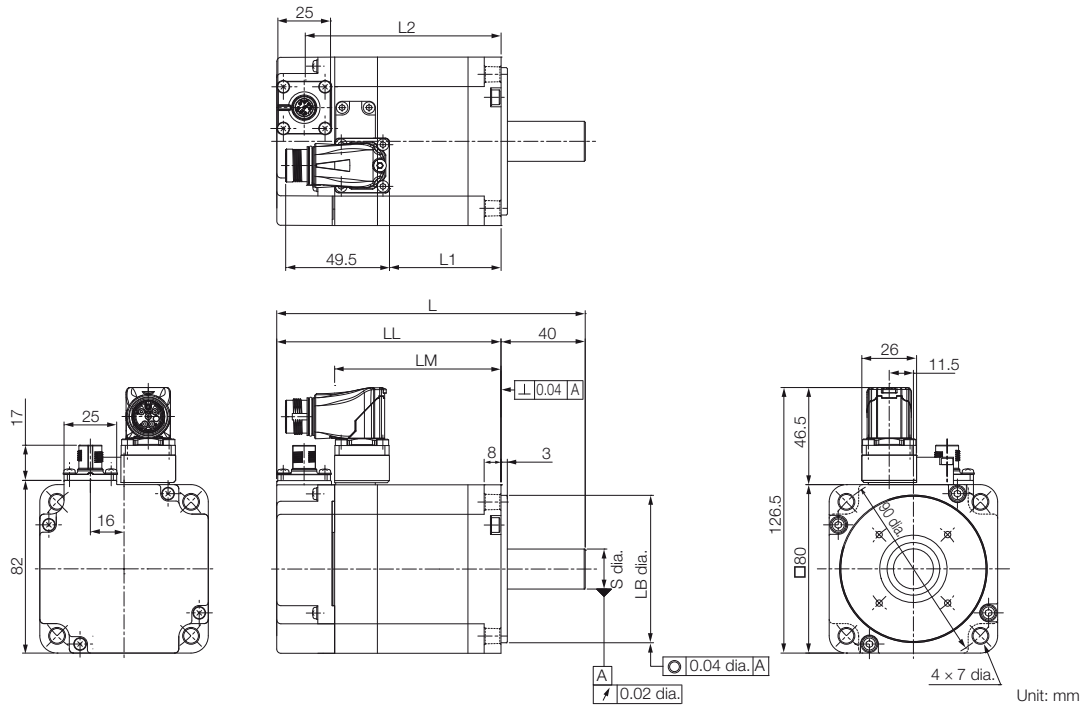

Unit: mm

| Model SGM7J- | L | LL | LM | LB | S | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 02D□F2□ | 108.5<br>(148.5) | 78.5<br>(118.5) | 51.2 | $50^{0}_{-0.025}$ | $14^{0}_{-0.011}$ | 25 | 65<br>(105) | 0.9<br>(1.5) |
| 04D□F2□ | 125<br>(165) | 95<br>(135) | 67.2 | $50^{0}_{-0.025}$ | $14^{0}_{-0.011}$ | 41.5 | 81.5<br>(121.5) | 1.2<br>(1.8) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Refer to the section Shaft End Specification.
3. Refer to the section Connectors Specification.

## SGM7J-08



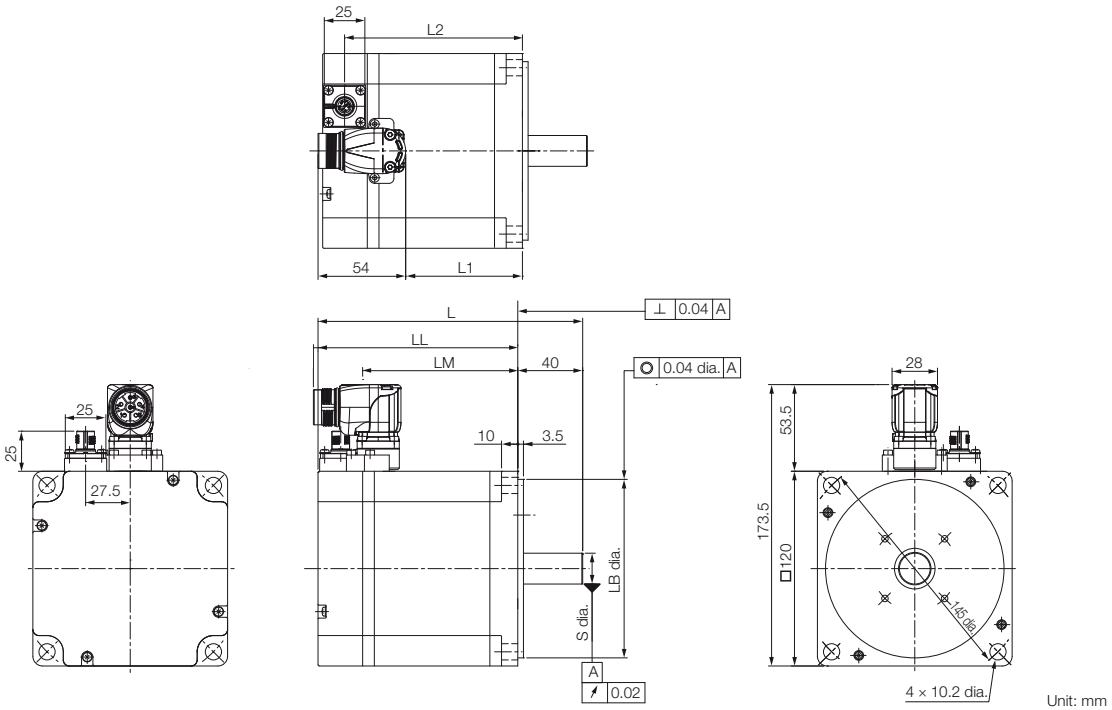

Unit: mm

| Model SGM7J- | L | LL | LM | LB | S | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 08D□F2□ | 146.5<br>(193.5) | 106.5<br>(153.5) | 79 | $70^{0}_{-0.030}$ | $19^{0}_{-0.013}$ | 53 | 93<br>(121.5) | 2.3<br>(2.9) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Refer to the section Shaft End Specification.
3. Refer to the section Connectors Specification.

## SGM7J-15




Unit: mm

| Model SGM7J- | L | LL | LM | LB | S | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 15D□F2□ | 163.5<br>(196.5) | 123.5<br>(156.5) | 95.6 | $110^{0}_{-0.035}$ | $19^{0}_{-0.013}$ | 72 | 110<br>(143) | 6.4<br>(8.1) |

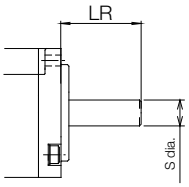
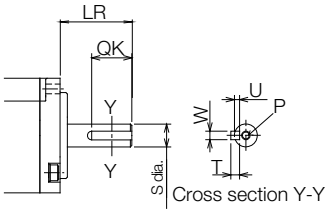
Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Refer to the section Shaft End Specification.
3. Refer to the section Connectors Specification SGM7J-15D.

## Shaft end specifications

**SGM7J-□□□□□□□**

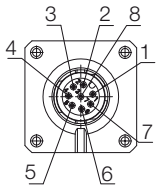
| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap for one location (Key slot is JIS B1301-1996 fastening type.) |

| Shaft End Details | | Servomotor Model SGM7J- | | | |
|---|---|---|---|---|---|
| | | 02 | 04 | 08 | 15 |
| **Code: 2 (Straight without Key)** | | | | | |
|  | LR | 30 | | 40 | |
| | S | $14^{0}_{-0.011}$ | | $19^{0}_{-0.013}$ | |
| **Code: 6 (Straight with Key and Tap)** | | | | | |
|  | LR | 30 | | 40 | |
| | QK | 14 | | 22 | |
| | S | $14^{0}_{-0.011}$ | | $19^{0}_{-0.013}$ | |
| | W | 5 | | 6 | |
| | T | 5 | | 6 | |
| | U | 3 | | 3.5 | |
| | P | M5 × 8L | | M6 × 10L | |

## Connector specifications

### SGM7J-02 to -15

- Encoder Connector Specifications

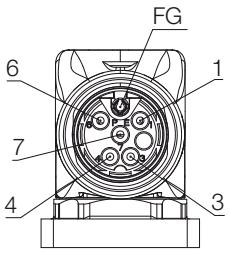



Receptacle
Size: M12
Part number: 1419959
Model: SACC-MSQ-M12MS-25-3,2 SCO
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | PG 5V |
| 2 | PG 0V |
| 3 | FG |
| 4 | BAT (+) |
| 5 | BAT (-) |
| 6 | Data (+) |
| 7 | Data (-) |
| 8 | Empty |
| Housing | Shield |

### SGM7J-02 to -08

- Servomotor Connector Specifications

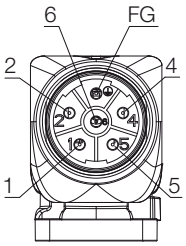



Receptacle
Size: M17
Part number: 1620448
Model: ST-5EP1N8AA500S
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | (Brake) |
| 3 | U |
| 4 | V |
| 5 | Empty |
| 6 | (Brake) |
| 7 | W |
| FG | FG |
| Housing | Shield |

### SGM7J-15

- Servomotor Connector Specifications

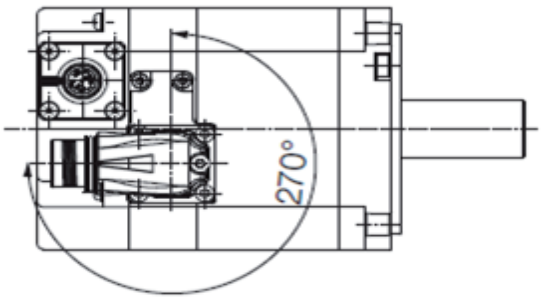



Receptacle
Size: M23
Part number: 1617905
Model: SF-5EP1N8AAD00S
Manufacturer: Phoenix Contact

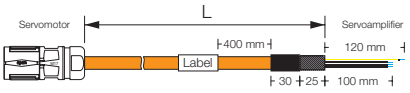
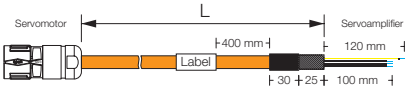
| | |
|---|---|
| 1 | V |
| 2 | (Brake) |
| 4 | (Brake) |
| 5 | U |
| 6 | W |
| FG | FG |
| Housing | Shield |

## Servomotor connector rotational angle

Allowable number of rotations: 10



## Power cables for rotary servomotors without holding brake

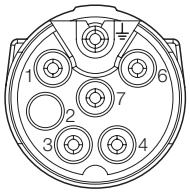
| Servomotor Model | Cable & connector type | Length | Order No. | Symbolic representation |
|---|---|---|---|---|
| SGM7J-02 to -08 | Flexible Power cable 4 x 1.5 mm² with M17 connector | 3 m | JZSP-C7M143-03-E-G# |  |
| | | 5 m | JZSP-C7M143-05-E-G# | |
| | | 10 m | JZSP-C7M143-10-E-G# | |
| | | 15 m | JZSP-C7M143-15-E-G# | |
| | | 20 m | JZSP-C7M143-20-E-G# | |
| SGM7J-15 | Flexible Power cable 4 x 1.5 mm² with M23 connector | 3 m | JZSP-C7M144-03-E-G# |  |
| | | 5 m | JZSP-C7M144-05-E-G# | |
| | | 10 m | JZSP-C7M144-10-E-G# | |
| | | 15 m | JZSP-C7M144-15-E-G# | |
| | | 20 m | JZSP-C7M144-20-E-G# | |



Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

## Pin layout for power cables for rotary servomotors without holding brake

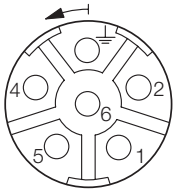
### JZSP-C7M143-xx-E-G#




Connector: ST-5ES1N8A8005S - 1624544
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | n.c. | n.c. |
| 2 | n.c. | n.c. |
| 3 | U | Black wire 1 |
| 4 | V | Black wire 2 |
| 6 | n.c. | n.c. |
| 7 | W | Black wire 3 |
| PE (5) | PE | Green-yellow |
| Housing | | Shield |

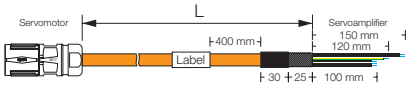
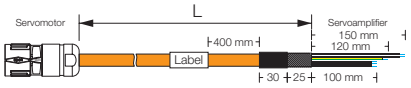
### JZSP-C7M144-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | n.c. | n.c. |
| 4 | n.c. | n.c. |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

## Power cables for rotary servomotors with holding brake

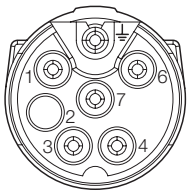
| Servomotor Model | Cable & connector type | Length | Order No. | Symbolic representation |
|---|---|---|---|---|
| SGM7J-02 to -08 | Flexible Power cable 4 x 1.5 mm² & 2 x 1.5 mm² for brake with M17 connector | 3 m | JZSP-C7M343-03-E-G# |  |
| | | 5 m | JZSP-C7M343-05-E-G# | |
| | | 10 m | JZSP-C7M343-10-E-G# | |
| | | 15 m | JZSP-C7M343-15-E-G# | |
| | | 20 m | JZSP-C7M343-20-E-G# | |
| SGM7J-15 | Flexible Power cable 4 x 1.5 mm² & 2 x 1.5 mm² for brake with M23 connector | 3 m | JZSP-C7M344-03-E-G# |  |
| | | 5 m | JZSP-C7M344-05-E-G# | |
| | | 10 m | JZSP-C7M344-10-E-G# | |
| | | 15 m | JZSP-C7M344-15-E-G# | |
| | | 20 m | JZSP-C7M344-20-E-G# | |



Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

## Pin layout for power cables for rotary servomotors with holding brake

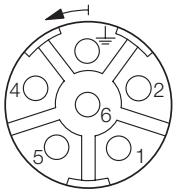
### JZSP-C7M343-xx-E-G#




Connector: ST-5ES1N8A8005S - 1624544
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | + | Black |
| 2 | n.c. | n.c. |
| 3 | U | Black wire 1 |
| 4 | V | Black wire 2 |
| 6 | - | Black |
| 7 | W | Black wire 3 |
| PE (5) | PE | Green-yellow |
| Housing | | Shield |

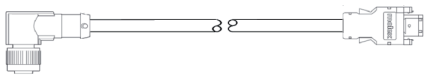
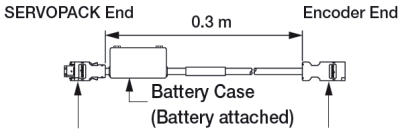
### JZSP-C7M344-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | + | Black |
| 4 | - | Black |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

## Encoder cables for rotary servomotors

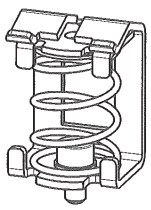
| Cable & connector type | Length | Sigma-7 cable for absolute encoder* | Sigma-7 cable for incremental encoder | Appearance |
|---|---|---|---|---|
| Flexible Encoder cable with straight connector M12 | 3 m | JZSP-C7PA2M-03-E-G# | JZSP-C7PI2M-03-E-G# |  |
| | 5 m | JZSP-C7PA2M-05-E-G# | JZSP-C7PI2M-05-E-G# | |
| | 10 m | JZSP-C7PA2M-10-E-G# | JZSP-C7PI2M-10-E-G# | |
| | 15 m | JZSP-C7PA2M-15-E-G# | JZSP-C7PI2M-15-E-G# | |
| | 20 m | JZSP-C7PA2M-20-E-G# | JZSP-C7PI2M-20-E-G# | |
| Flexible Encoder cable with angled connector M12 | 3 m | JZSP-C7PA2N-03-E-G# | JZSP-C7PI2N-03-E-G# |  |
| | 5 m | JZSP-C7PA2N-05-E-G# | JZSP-C7PI2N-05-E-G# | |
| | 10 m | JZSP-C7PA2N-10-E-G# | JZSP-C7PI2N-10-E-G# | |
| | 15 m | JZSP-C7PA2N-15-E-G# | JZSP-C7PI2N-15-E-G# | |
| | 20 m | JZSP-C7PA2N-20-E-G# | JZSP-C7PI2N-20-E-G# | |
| Sigma-7 Extension for Encoder cable with Connectors length 0.3m for Abs. Encoder | 0.3 m | JZSP-CSP12-E-G# | - |  |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

* Sigma-7 cables for absolute encoders have a battery case (Battery attached).

## Motor connection shielding clamp

Shielding clamp mountable on Sigma-7 400 V SERVOPACKs up to 15 kW.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Order No. | Specification |
|---|---|---|
| Sigma-7 400 V up to 3.0 kW | KLBUE 4-13.5_SC |  |
| Sigma-7 400 V from 5 kW up to 7.5 kW | KLBUE 10-20_SC | |
| Sigma-7 400 V for 11 kW & 15 kW | KLBUE 15-32_SC | |

# Model designations

SGM7A - 02 D F F 6 1

| Sigma-7 Series Servomotors: SGM7A | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th | digit |
|---|---|---|---|---|---|---|---|

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| 02 | 200 W |
| 04 | 400 W |
| 08 | 750 W |
| 10 | 1.0 kW |
| 15 | 1.5 kW |
| 20 | 2.0 kW |
| 25 | 2.5 kW |
| 30 | 3.0 kW |
| 40 | 4.0 kW |
| 50 | 5.0 kW |
| 70 | 7.0 kW |

**3rd digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| D | 400 VAC |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 6*1 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| F | Standard Model |

**6th digit - Shaft End**

| Code | Specifications |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap |

**7th digit - Options**

| Code | Specifications |
|---|---|
| 1 | Without options |
| C*3 | With holding brake (24 VDC) |
| F*2, *3 | With dust seal |
| H*2, *3 | With dust seal and holding brake (24 VDC) |

*1 Please contact your Yaskawa representative about availability.
*2 This option is supported only for SGM7A-10 to -50 Servomotors.
*3 These options are not supported by SGM7A-70 Servomotors.

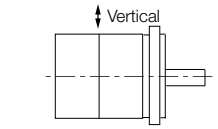
# Specifications and ratings

## Specifications

| Voltage | | 400 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model SGM7A-** | | **02D** | **04D** | **08D** | **10D** | **15D** | **20D** | **25D** | **30D** | **40D** | **50D** | **70D** |
| Time Rating | | Continuous | | | | | | | | | | |
| Thermal Class | | B | | | | F | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | | | | | | |
| Withstand Voltage | | 1,800 VAC for 1 minute | | | | | | | | | | |
| Excitation | | Permanent magnet | | | | | | | | | | |
| Mounting | | Flange-mounted | | | | | | | | | | |
| Drive Method | | Direct drive | | | | | | | | | | |
| Rotation Direction | | Counterclockwise (CCW) for forward reference when viewed from the load side | | | | | | | | | | |
| Vibration Class*1 | | V15 | | | | | | | | | | |
| Environmental Conditions | Surrounding Air Temperature | 0 °C to 40 °C (With derating, usage is possible between 40 °C and 60 °C)*4 | | | | | | | | | | |
| | Surrounding Air Humidity | 20 % to 80 % relative humidity (with no condensation) | | | | | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*5<br>• Must be free of strong magnetic fields. | | | | | | | | | | |
| | Storage Environment | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20 °C to 60 °C (with no freezing)<br>Storage Humidity: 20 % to 80 % relative humidity (with no condensation) | | | | | | | | | | |
| Shock Resistance*2 | Impact Acceleration Rate at Flange | 490 m/s$^2$ | | | | | | | | | | |
| | Number of Impacts | 2 times | | | | | | | | | | |
| Vibration Resistance*3 | Vibration Acceleration Rate at Flange | 49 m/s$^2$ (Models 15A to 30D: 24.5 m/s$^2$ front to back) | | | | | | | | | | 14.7 m/s$^2$ |
| Applicable SERVOPACKs | SGD7S- | 1R9D | | 3R5D | 5R4D | | 8R4D | 120D | | 170D | | 260D |
| | SGD7W- | 2R6D*6 | 2R6D*6 or 5R4D*6 | 2R6D or 5R4D*6 | 5R4D*6 | 5R4D | – | | | | | |

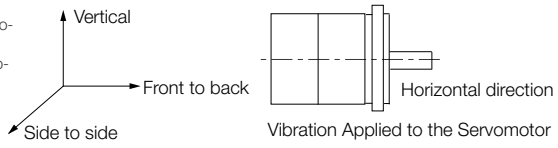
*1 A Vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.

*2 The shock resistance for shock in the vertical direction when the Servomotor is mounted with the shaft in a horizontal position is given in the above table.



Shock Applied to the Servomotor

*3 The vertical, side-to-side, and front-to-back vibration resistance for vibration in three directions when the Servomotor is mounted with the shaft in a horizontal position is given in the above table. The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.



Vibration Applied to the Servomotor

*4 Refer to the section "Applications where the Surrounding Air Temperature of the Servomotor Exceeds 40°C".

*5 If the altitude will exceed 1,000 m, refer to the section "Applications where the Altitude of the Servomotor Exceeds 1000m".

*6 If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Sigma-7 Single Axis SERVOPACK.

## Servomotor ratings

| Voltage | | | 400 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model SGM7A-** | | | **02D** | **04D** | **08D** | **10D** | **15D** | **20D** | **25D** | **30D** | **40D** | **50D** | **70D** |
| Rated Output*1 | | W | 200 | 400 | 750 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 4,000 | 5,000 | 7,000 |
| Rated Torque*1, *2 | | Nm | 0.637 | 1.27 | 2.39 | 3.18 | 4.90 | 6.36 | 7.96 | 9.80 | 12.6 | 15.8 | 22.3 |
| Instantaneous Maximum Torque*1 | | Nm | 2.23 | 4.46 | 8.36 | 11.1 | 14.7 | 19.1 | 23.9 | 29.4 | 37.8 | 47.6 | 54.0 |
| Rated Current*1 | | A | 1.2 | 1.2 | 2.2 | 3.2 | 4.7 | 6.1 | 7.4 | 8.9 | 12.5 | 13.8 | 19.2 |
| Instantaneous Maximum Current*1 | | A | 5.1 | 4.9 | 8.5 | 12 | 14 | 20 | 25 | 28 | 38 | 42 | 52.5 |
| Rated Motor Speed*1 | | $min^{-1}$ | 3000 | | | | | | | | | | |
| Maximum Motor Speed*1 | | $min^{-1}$ | 6000*6 | | | | | | | | | | |
| Torque Constant | | Nm/A | 0.556 | 1.11 | 1.16 | 1.07 | 1.23 | 1.18 | 1.15 | 1.16 | 1.06 | 1.21 | 1.21 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg $m^2$ | 0.139 (0.209) | 0.216 (0.286) | 0.775 (0.955) | 0.971 (1.15) | 2.00 (2.25) | 2.47 (2.72) | 3.19 (3.44) | 7.00 (9.20) | 9.60 (11.8) | 12.3 (14.5) | 12.3 |
| Rated Power Rate*1 | | kW/s | 29.2 (19.4) | 74.7 (56.3) | 73.7 (59.8) | 104 (87.9) | 120 (106) | 164 (148) | 199 (184) | 137 (104) | 165 (134) | 203 (172) | 404 |
| Rated Angular Acceleration Rate*1 | | $rad/s^2$ | 45,800 (30,400) | 58,700 (44,400) | 30,800 (25,000) | 32,700 (27,600) | 24,500 (21,700) | 25,700 (23,300) | 24,900 (23,100) | 14,000 (10,600) | 13,100 (10,600) | 12,800 (10,800) | 18,100 |
| Derating Rate for Servomotor with Dust Seal | | % | – | | | 95 | | | | 100 | | | |
| Heat Sink Size | | mm | 250 × 250 × 6 | | | 300 × 300 × 12 | | | | 400 × 400 × 20 | | | |
| Protective Structure*3 | | | Totally enclosed, self-cooled, IP67 | | | | | | | | | | Totally enclosed, separately cooled (with fan), IP22 cooled (with fan) |
| Holding Brake Specifications*4 | Rated Voltage | V | 24 VDC ± 10 % | | | | | | | | | | - |
| | Capacity | W | 6 | | 6.5 | | 12 | | | 10 | | | - |
| | Holding Torque | Nm | 0.637 | 1.27 | 2.39 | 3.18 | 7.84 | 7.84 | 10 | 20 | | | - |
| | Coil Resistance | Ω (at 20 °C) | 96±10 % | | 88.6±10 % | | 48±10 % | | | 59 | | | - |
| | Rated Current | A (at 20 °C) | 0.25 | | 0.27 | | 0.5 | | | 0.41 | | | - |
| | Time required to release Brake | ms | 60 | | 80 | | 170 | | | 100 | | | - |
| | Time required to brake | ms | 100 | | | | 80 | | | | | | - |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | Standard | | 30 times | | 20 times | | 10 times | | | 5 times | | | 15 times |
| | With External Regenerative Resistor and Dynamic Brake Resistor Connected | | 30 times | 20 times | 30 times | | 20 times | | | 15 times | | | |
| Allowable Shaft Load*5 | LF | mm | 25 | | 35 | | 45 | | | 63 | | | |
| | Allowable Radial Load | N | 245 | | 392 | | 686 | | | 980 | 1,176 | | |
| | Allowable Thrust Load | N | 74 | | 147 | | 196 | | | 392 | | | |

Note: The values in parentheses are for Servomotors with Holding Brakes.

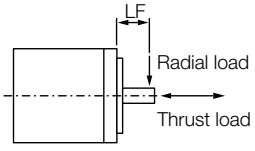
*1. For the SGM7A-02D to SGM7A-10D, these values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. For the SGM7A-15D to SGM7A-30D, these values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

*3. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

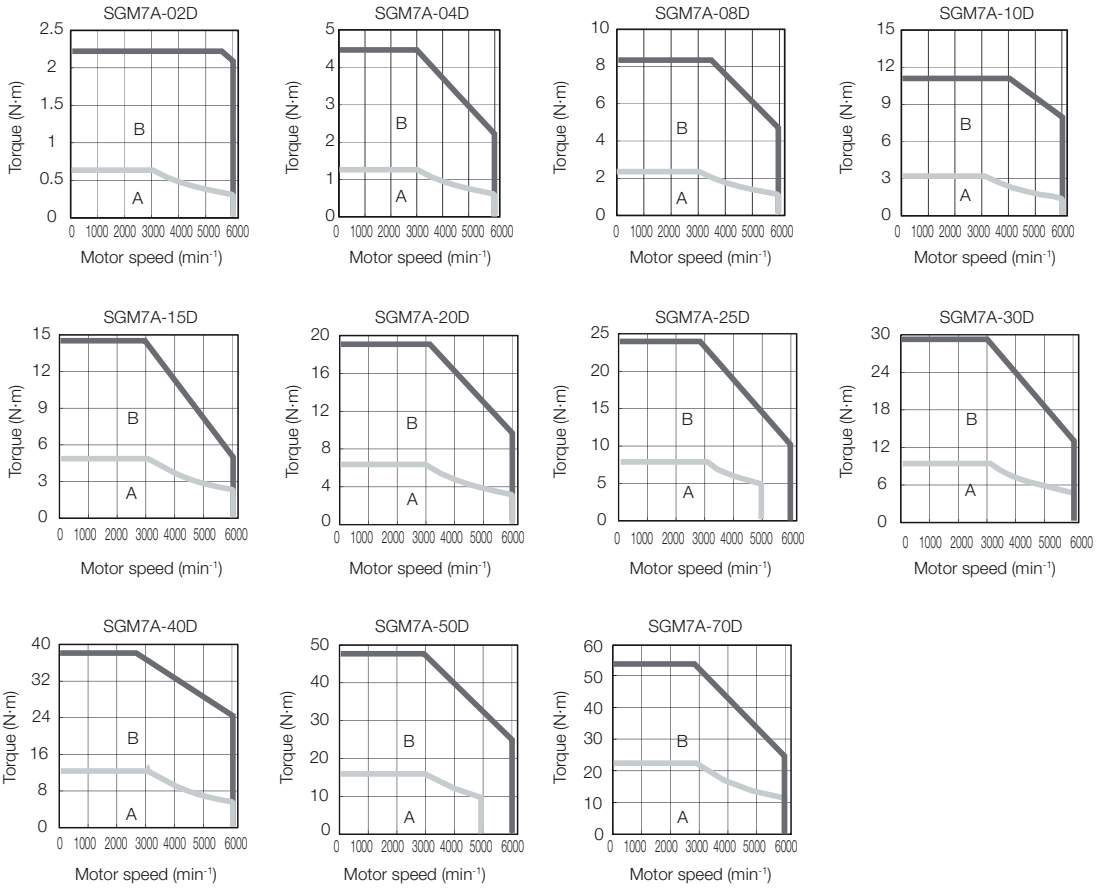
*4. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*5. The allowable shaft loads are illustrated in the following figure. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.




*6. For the SGM7A-25D, the maximum motor speed for the continuous duty zone is 5,000 min-1. Use the Servomotor within the continuous duty zone for the average motor speed and effective torque.

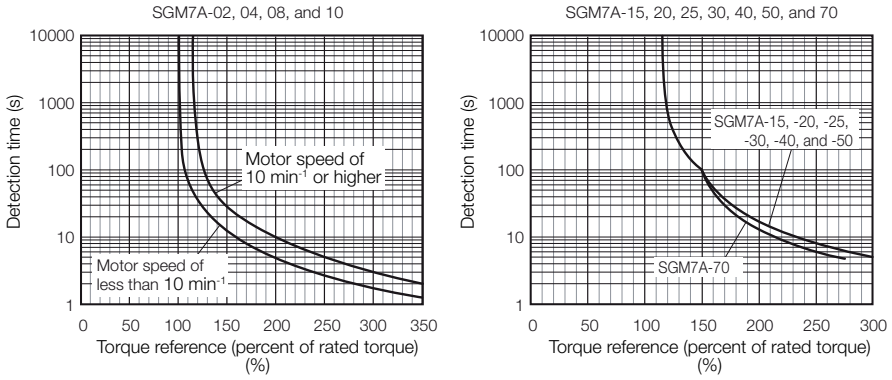
## Motor speed-torque characteristics




Note:
1. For the SGM7A-02D to SGM7A-10D, these values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
   For the SGM7A-15D to SGM7A-30D, these values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage. The intermittent duty zones in the graphs show the characteristics when a three-phase, 400-VAC power supply voltage is used.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

## Servomotor overload protection characteristics

The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
Use the Servomotor so that the effective torque remains within the continuous duty zone given in Motor Speed-Torque Characteristics.

## Load moment of inertia

The load moment of inertia indicates the inertia of the load. The larger the load moment of inertia, the worse the response. If the moment of inertia is too large, operation will become unstable.

The allowable size of the load moment of inertia ($J_L$) for the Servomotor is restricted. Refer to Ratings of Rotary Serovmotors SGM7J. This value is provided strictly as a guideline and results depend on Servomotor driving conditions.

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Perform one of the following steps if this occurs.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.
- Install an external regenerative resistor if the alarm cannot be cleared using the above steps.

## Servomotor heat dissipation conditions

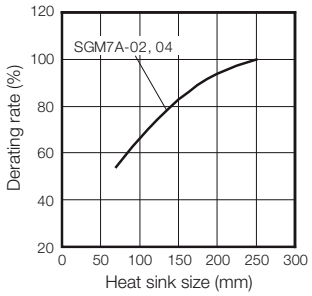
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.

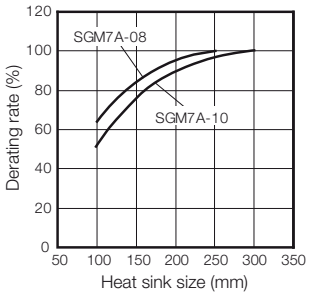
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

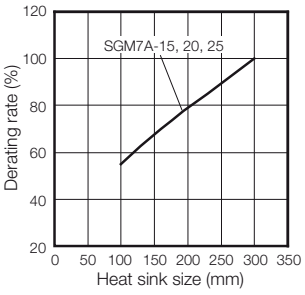
Note:
The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.

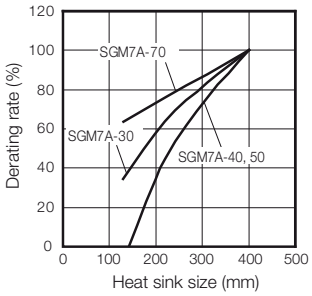
**Important:**

The actual temperature rise depends on how the heat sink (i.e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.



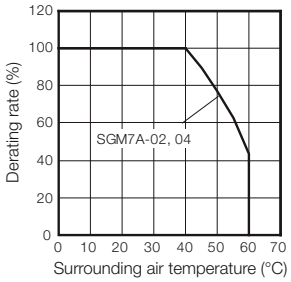

See Servomotor Ratings for more information.

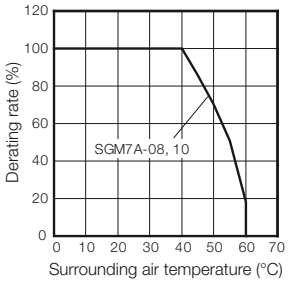
## Applications where the surrounding air temperature of the servomotor exceeds 40°C

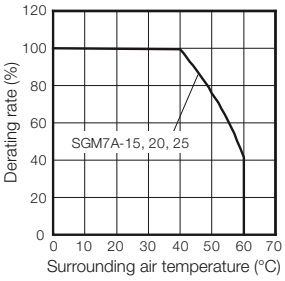
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

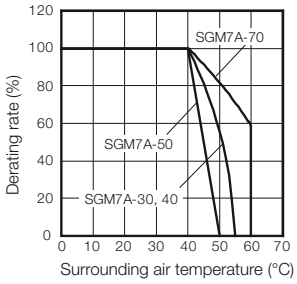
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

Note:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.



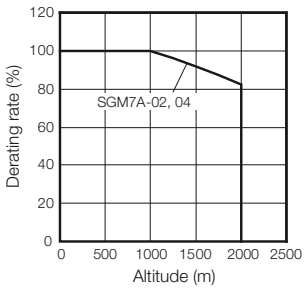



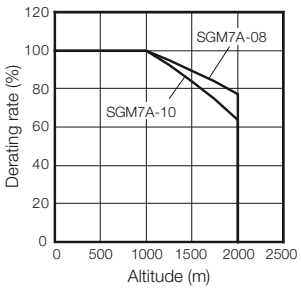
## Applications where the altitude of the servomotor exceeds 1,000 m

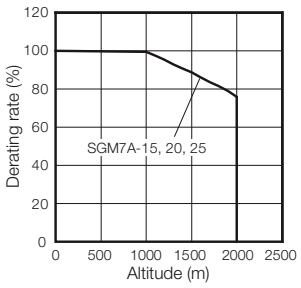
The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.

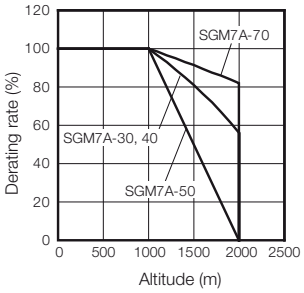
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

Note:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.



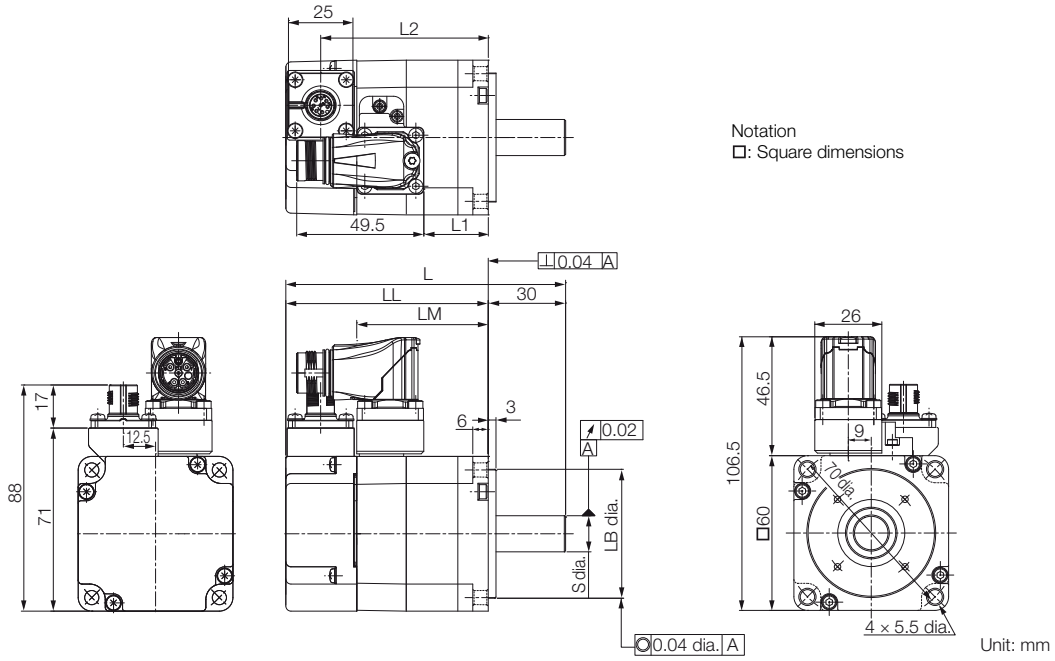



# External dimensions

## SGM7A-02, -04

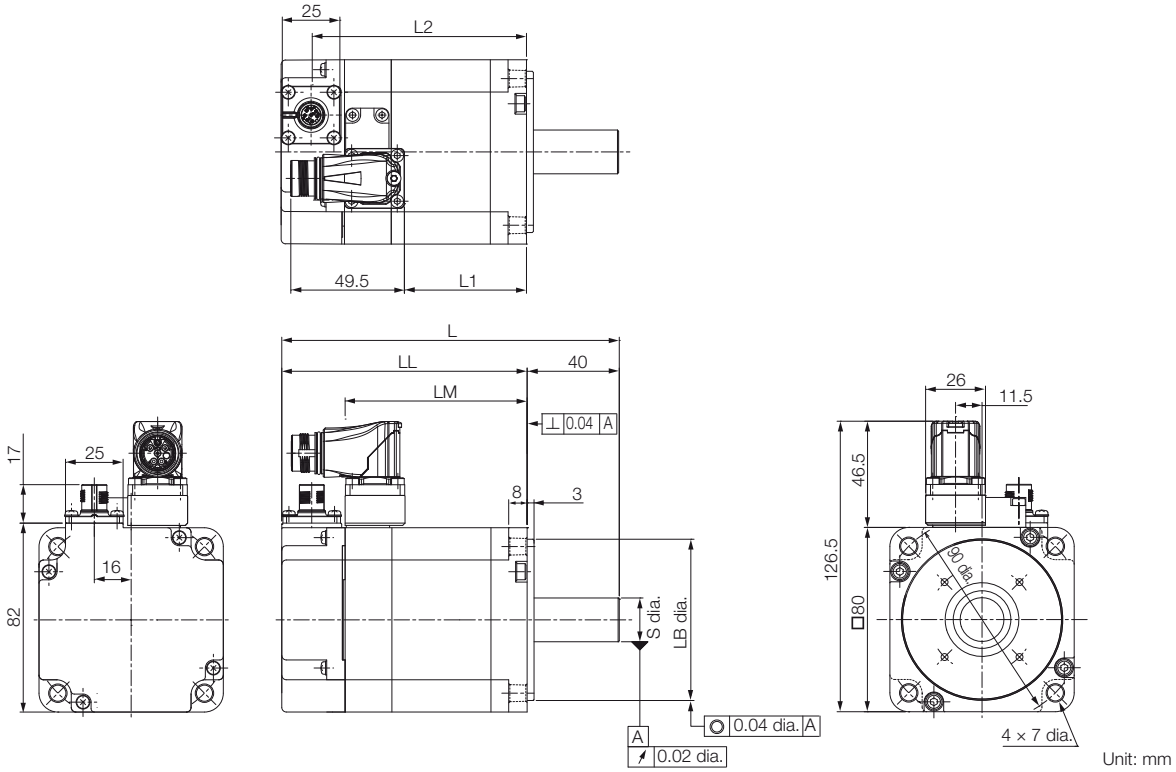



| Model SGM7A- | L | LL | LM | LB | S | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 02D□F2□ | 108.5<br>(148.5) | 78.5<br>(118.5) | 51.2 | $50^{0}_{-0.025}$ | $14^{0}_{-0.011}$ | 25 | 65<br>(105) | 0.9<br>(1.5) |
| 04D□F2□ | 125<br>(165) | 95<br>(135) | 67.2 | $50^{0}_{-0.025}$ | $14^{0}_{-0.011}$ | 41.5 | 81.5<br>(121.5) | 1.2<br>(1.8) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

The values in parentheses are for Servomotors with Holding Brakes.
Refer to the section Shaft End Specifications for SGMA7A-02 to -10.
Refer to the section Connector Specifications.

## SGM7A-08



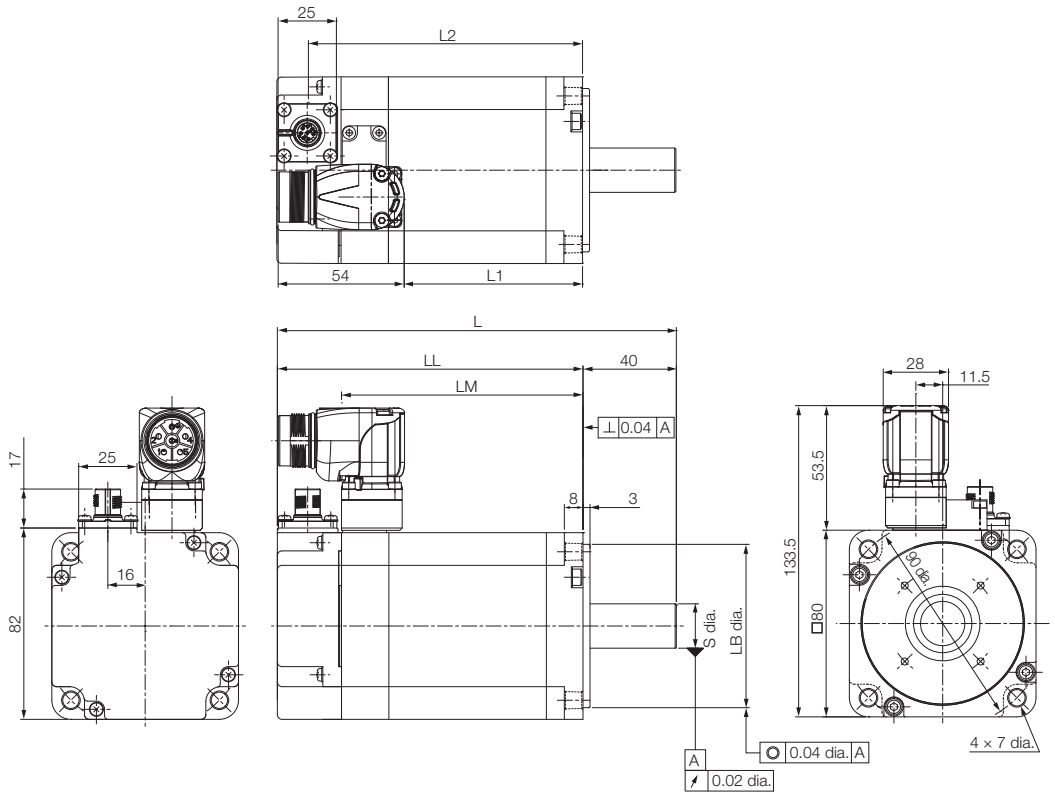

Unit: mm

| Model SGM7A- | L | LL | LM | LB | S | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 08D□F2□ | 146.5<br>(193.5) | 106.5<br>(153.5) | 79 | $70^{0}_{-0.030}$ | $19^{0}_{-0.013}$ | 53 | 93<br>(140) | 2.4<br>(3.0) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

The values in parentheses are for Servomotors with Holding Brakes.
Refer to the section Shaft End Specifications for SGMA7A-02 to -10.
Refer to the section Connector Specifications.

## SGM7A-10




Unit: mm

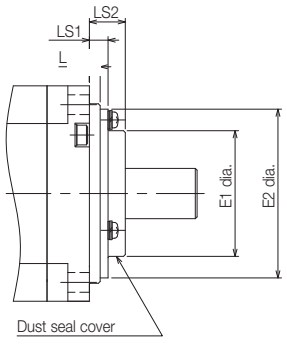
| Model SGM7A- | L | LL | LM | LB | S | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 10D□F2□ | 171<br>(218) | 131<br>(178) | 103.5 | $70^{0}_{-0.030}$ | $19^{0}_{-0.013}$ | 77 | 117.5<br>(164.5) | 3.2<br>(3.8) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

The values in parentheses are for Servomotors with Holding Brakes.
Refer to the section Shaft End Specifications for SGMA7A-02 to -10.
Refer to the section Connector Specifications.

## Dimensions with dust seal option

| Model SGM7A- | Dimensions with Dust Seal | | | |
|---|---|---|---|---|
| | E1 | E2 | LS1 | LS2 |
| 10D | 47 | 61 | 5.5 | 11 |

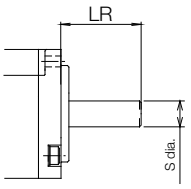
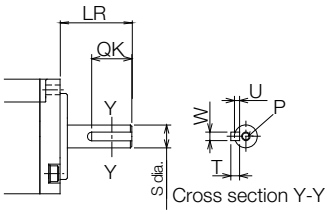



Unit: mm

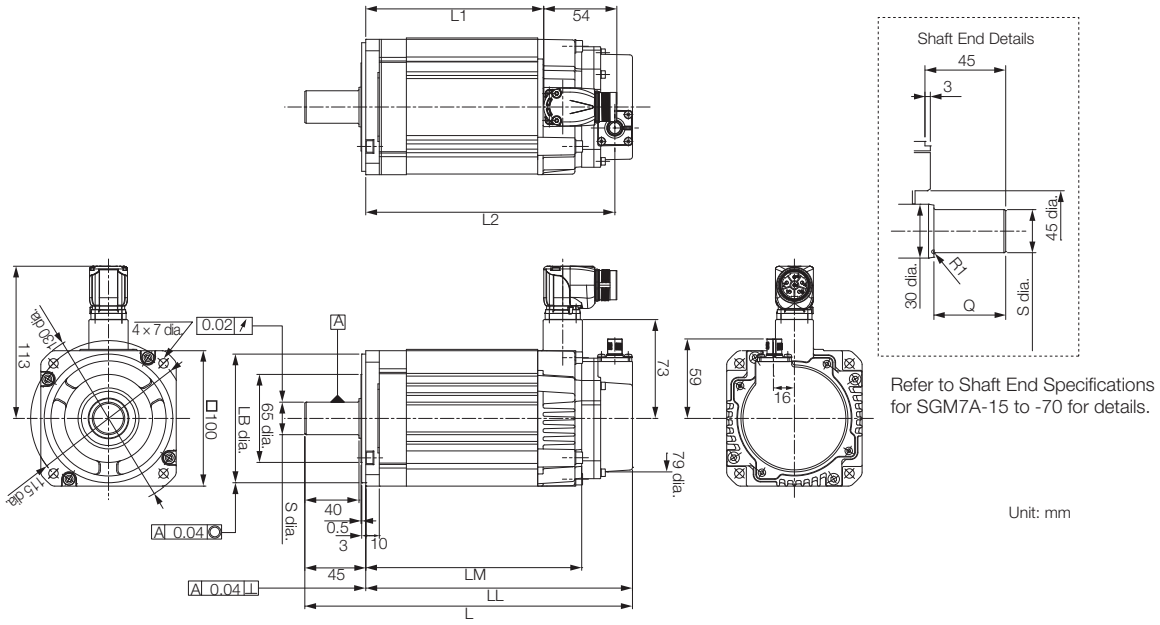
## Shaft end specifications for SGM7A-02 to -10

**SGM7A-□□□□□□□**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap for one location (Key slot is JIS B1301-1996 fastening type.) |

| Shaft End Details | | Servomotor Model SGM7A- | | | |
|---|---|---|---|---|---|
| | | 02 | 04 | 08 | 10 |
| **Code: 2 (Straight without Key)** | | | | | |
|  | LR | 30 | | 40 | |
| | S | $14^{0}_{-0.011}$ | | $19^{0}_{-0.013}$ | |
| **Code: 6 (Straight with Key and Tap)** | | | | | |
|  | LR | 30 | | 40 | |
| | QK | 14 | | 22 | |
| | S | $14^{0}_{-0.011}$ | | $19^{0}_{-0.013}$ | |
| | W | 5 | | 6 | |
| | T | 5 | | 6 | |
| | U | 3 | | 3.5 | |
| | P | M5 × 8L | | M6 × 10L | |

## SGM7A-15, -20, and -25



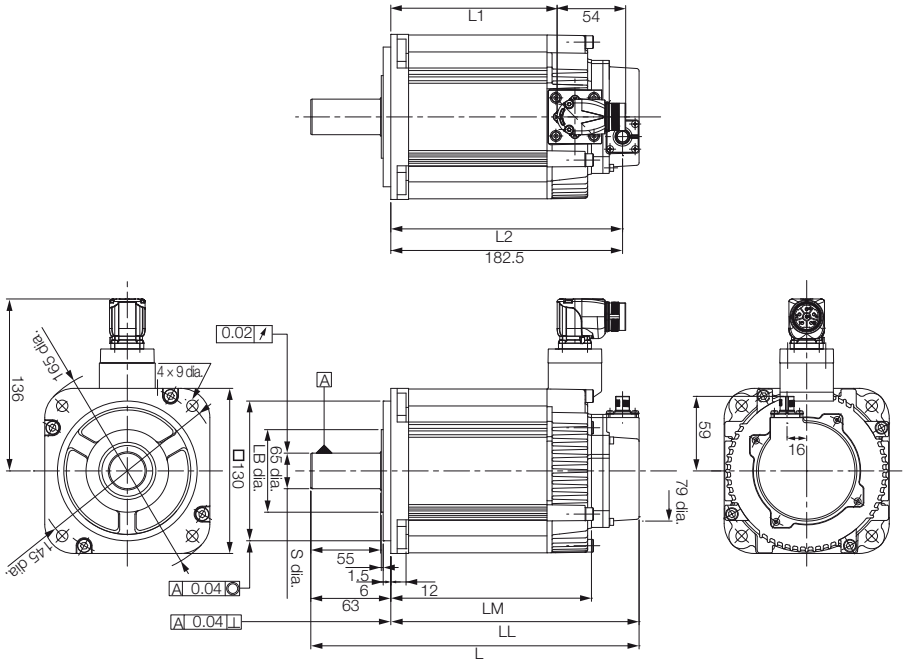

Unit: mm

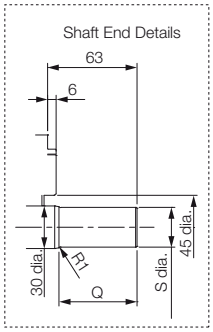
| Model SGM7A- | L | LL | LM | L1 | L2 | LB | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | Q | |
| 15D□F2□ | 204 (245) | 159 (200) | 121 (162) | 90 | 145 (187) | $95^{0}_{-0.035}$ | $24^{0}_{-0.013}$ | 40 | 4.7 (6.1) |
| 20D□F2□ | 220 (261) | 175 (216) | 137 (178) | 106 | 161 (203) | $95^{0}_{-0.035}$ | $24^{0}_{-0.013}$ | 40 | 5.5 (6.9) |
| 25D□F2□ | 243 (294) | 198 (249) | 160 (211) | 129 | 184 (235) | $95^{0}_{-0.035}$ | $24^{0}_{-0.013}$ | 40 | 6.9 (8.8) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to Shaft End Specifications for SGM7A-15 to -70 for details.
4. Refer to the section Connector Specifications.

## SGM7A-30 to -50




Refer to Shaft End Specifications for SGM7A-15 to -70 for details.

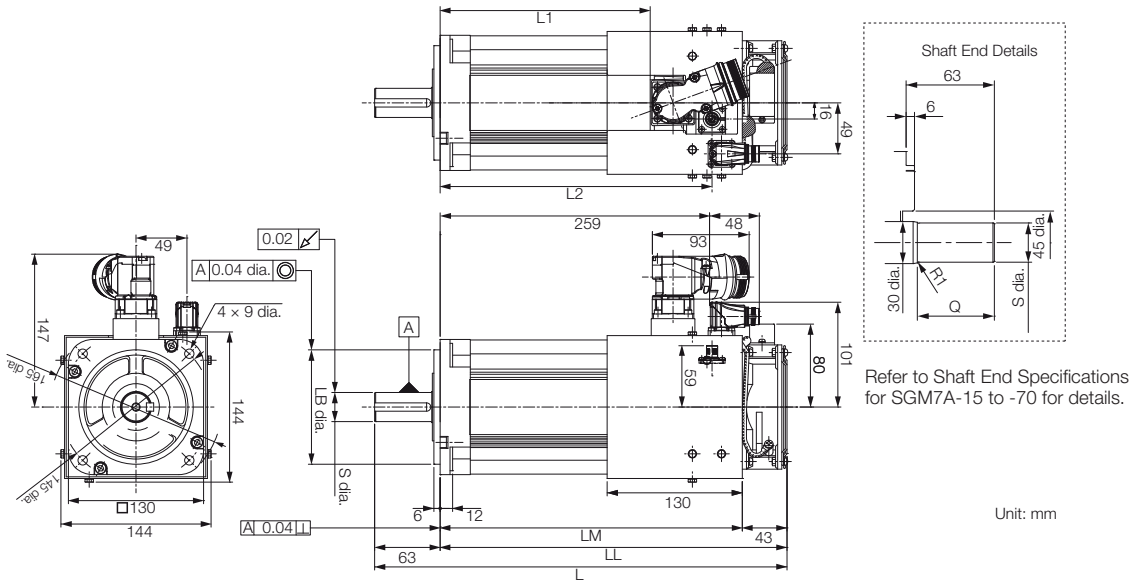
Unit: mm

| Model SGM7A- | L | LL | LM | L1 | L2 | LB | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | Q | |
| 30D□F2□ | 259 (295) | 196 (232) | 158 (194) | 131 | 183 (219) | $110^{0}_{-0.035}$ | $28^{0}_{-0.013}$ | 55 | 10.6 (13.1) |
| 40D□F2□ | 298 (334) | 235 (271) | 197 (233) | 170 | 222 (258) | $110^{0}_{-0.035}$ | $28^{0}_{-0.013}$ | 55 | 14.0 (16.5) |
| 50D□F2□ | 338 (374) | 275 (311) | 237 (273) | 210 | 262 (298) | $110^{0}_{-0.035}$ | $28^{0}_{-0.013}$ | 55 | 17.0 (19.5) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to Shaft End Specifications for SGM7A-15 to -70 for details.
4. Refer to the section Connector Specifications.

## SGM7A-70




Refer to Shaft End Specifications for SGM7A-15 to -70 for details.

Unit: mm

| Model SGM7A- | L | LL | LM | L1 | L2 | LB | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | Q | |
| 70D□F2□ | 397 | 334 | 291 | 204 | 262 | $110^{0}_{-0.035}$ | $28^{0}_{-0.013}$ | 55 | 19.0 |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to Shaft End Specifications for SGM7A-15 to -70 for details.
4. Refer to the section Connector Specifications.

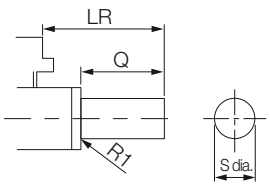
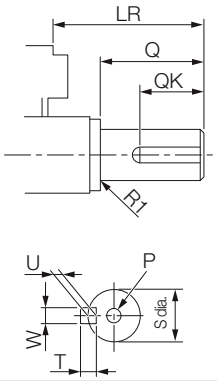
## Cooling fan specification

- Single-Phase, 220 V
- 50/60 Hz
- 17/15 W
- 0.11/0.09 A

## Shaft end specifications for SGM7A-15 to -70

**SGM7A-□□□□□□□**

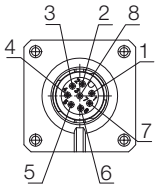
| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap for one location (Key slot is JIS B1301-1996 fastening type.) |

| Shaft End Details | | Servomotor Model SGM7A- | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 15 | 20 | 25 | 30 | 40 | 50 | 70 |
| **Code: 2 (Straight without Key)** | | | | | | | | |
|  | LR | 45 | | | 63 | | | |
| | Q | 40 | | | 55 | | | |
| | S | $24^{0}_{-0.013}$ | | | $28^{0}_{-0.013}$ | | | |
| **Code: 6 (Straight with Key and Tap)** | | | | | | | | |
|  | LR | 45 | | | 63 | | | |
| | Q | 40 | | | 55 | | | |
| | QK | 32 | | | 50 | | | |
| | S | $24^{0}_{-0.013}$ | | | $28^{0}_{-0.013}$ | | | |
| | W | 8 | | | | | | |
| | T | 7 | | | | | | |
| | U | 4 | | | | | | |
| | P | M8 screw, Depth: 16 | | | | | | |

## Connector specifications

### SGM7A-02 to -70

- Encoder Connector Specifications

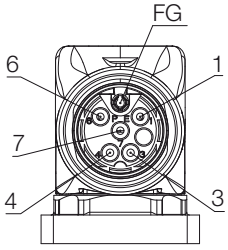



Receptacle
Size: M12
Part number: 1419959
Model: SACC-MSQ-M12MS-25-3,2 SCO
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | PG 5V |
| 2 | PG 0V |
| 3 | FG |
| 4 | BAT (+) |
| 5 | BAT (-) |
| 6 | Data (+) |
| 7 | Data (-) |
| 8 | Empty |
| Housing | Shield |

### SGM7A-02 to -08

- Servomotor Connector Specifications

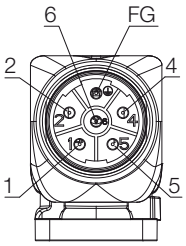



Receptacle
Size: M17
Part number: 1620448
Model: ST-5EP1N8AA500S
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | (Brake) |
| 3 | U |
| 4 | V |
| 5 | Empty |
| 6 | (Brake) |
| 7 | W |
| FG | FG |
| Housing | Shield |

### SGM7A-10 to -50

- Servomotor Connector Specifications

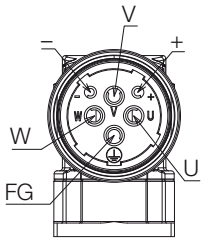



Receptacle
Size: M23
Part number: 1617905
Model: SF-5EP1N8AAD00S
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | V |
| 2 | (Brake) |
| 4 | (Brake) |
| 5 | U |
| 6 | W |
| FG | FG |
| Housing | Shield |

### SGM7A-70

- Servomotor Connector Specifications

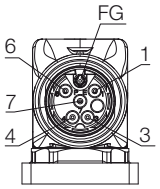



Receptacle
Size: M40
Part number: 1607927
Model: SM-5EPWN8AAD00S
Manufacturer: Phoenix Contact

| | |
|---|---|
| U | U |
| V | V |
| W | W |
| + | Empty |
| - | Empty |
| FG | FG |
| Housing | Shield |

### SGM7A-70

- Fan Connector Specifications



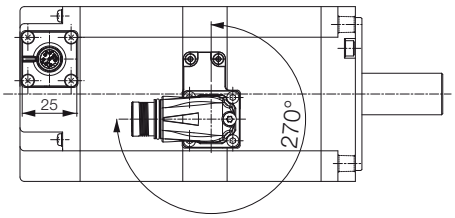

Receptacle
Size: M17
Part number: 1620448
Model: ST-5EP1N8AA500S
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | ALARM TERMINAL |
| 3 | FAN MOTOR |
| 4 | FAN MOTOR |
| 6 | ALARM TERMINAL |
| 7 | Empty |
| FG | FG |
| Housing | Shield |

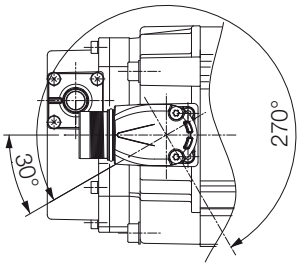
## Servomotor connector rotational angle

Allowable number of rotations: 10

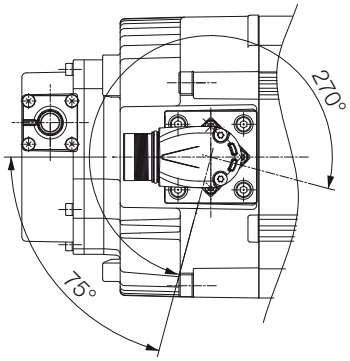
SGM7A-02 to -10



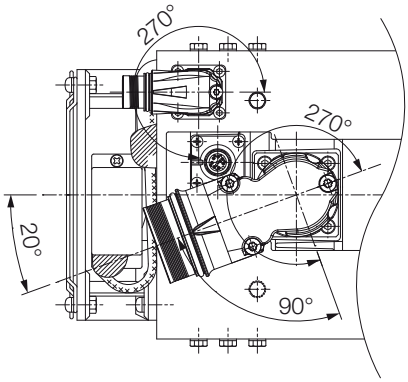

SGM7A-15 to -25



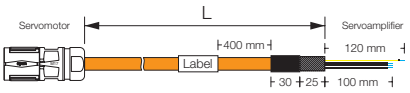
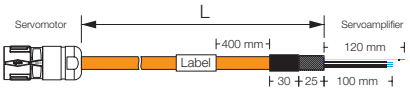
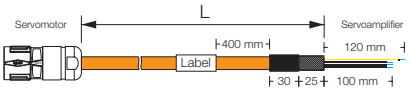
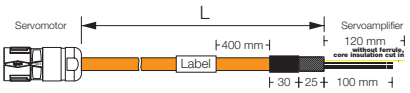
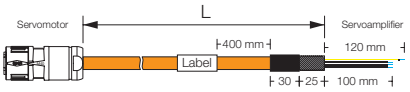

SGM7A-30 to -50




SGM7A-70



## Power cables for rotary servomotors without holding brake

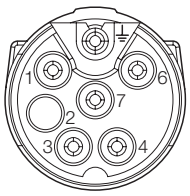
| Servomotor Model | Cable & connector type | Length | Order No. | Symbolic representation |
|---|---|---|---|---|
| SGM7A-02 to -08 | Flexible Power cable 4 x 1.5 mm² with M17 connector | 3 m | JZSP-C7M143-03-E-G# |  |
| | | 5 m | JZSP-C7M143-05-E-G# | |
| | | 10 m | JZSP-C7M143-10-E-G# | |
| | | 15 m | JZSP-C7M143-15-E-G# | |
| | | 20 m | JZSP-C7M143-20-E-G# | |
| SGM7A-10 to -25 | Flexible Power cable 4 x 1.5 mm² with M23 connector | 3 m | JZSP-C7M144-03-E-G# |  |
| | | 5 m | JZSP-C7M144-05-E-G# | |
| | | 10 m | JZSP-C7M144-10-E-G# | |
| | | 15 m | JZSP-C7M144-15-E-G# | |
| | | 20 m | JZSP-C7M144-20-E-G# | |
| SGM7A-30 | Flexible Power cable 4 x 2.5 mm² with M23 connector | 3 m | JZSP-C7M154-03-E-G# |  |
| | | 5 m | JZSP-C7M154-05-E-G# | |
| | | 10 m | JZSP-C7M154-10-E-G# | |
| | | 15 m | JZSP-C7M154-15-E-G# | |
| | | 20 m | JZSP-C7M154-20-E-G# | |
| SGM7A-40 to -50 | Flexible Power cable 4 x 4 mm² with M23 connector | 3 m | JZSP-C7M164-03-E-G# |  |
| | | 5 m | JZSP-C7M164-05-E-G# | |
| | | 10 m | JZSP-C7M164-10-E-G# | |
| | | 15 m | JZSP-C7M164-15-E-G# | |
| | | 20 m | JZSP-C7M164-20-E-G# | |
| SGM7A-70 | Flexible Power cable 4 x 6.0 mm² with M40 connector | 3 m | JZSP-C7M175-03-E-G# |  |
| | | 5 m | JZSP-C7M175-05-E-G# | |
| | | 10 m | JZSP-C7M175-10-E-G# | |
| | | 15 m | JZSP-C7M175-15-E-G# | |
| | | 20 m | JZSP-C7M175-20-E-G# | |



Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

## Pin layout for power cables for rotary servomotors without holding brake

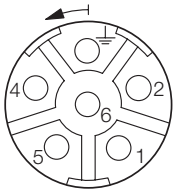
### JZSP-C7M143-xx-E-G#




Connector: ST-5ES1N8A8005S - 1624544
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | n.c. | n.c. |
| 2 | n.c. | n.c. |
| 3 | U | Black wire 1 |
| 4 | V | Black wire 2 |
| 6 | n.c. | n.c. |
| 7 | W | Black wire 3 |
| PE (5) | PE | Green-yellow |
| Housing | | Shield |

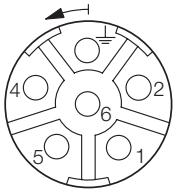
### JZSP-C7M144-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | n.c. | n.c. |
| 4 | n.c. | n.c. |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

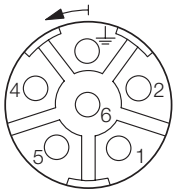
### JZSP-C7M154-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | n.c. | n.c. |
| 4 | n.c. | n.c. |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

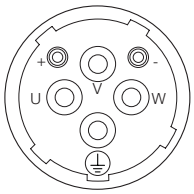
### JZSP-C7M164-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | n.c. | n.c. |
| 4 | n.c. | n.c. |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

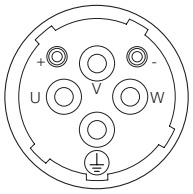
### JZSP-C7M175-xx-E-G#




Connector: SM-5ES1N8A8L33S - 1613429
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| U | U | Black wire 2 |
| + | n.c. | n.c. |
| - | n.c. | n.c. |
| V | V | Black wire 1 |
| W | W | Black wire 3 |
| PE | PE | Green-yellow |
| Housing | | Shield |

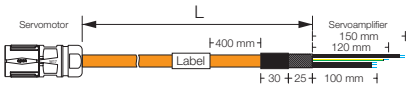
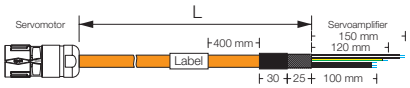
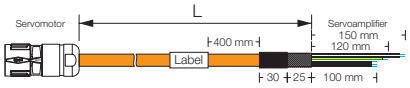
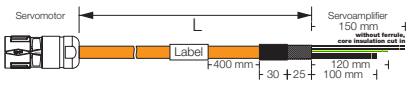
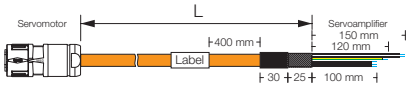
### JZSP-C7M185-xx-E-G#




Connector: SM-5ES1N8A8L33S - 1613429
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| U | U | Black wire 2 |
| + | n.c. | n.c. |
| - | n.c. | n.c. |
| V | V | Black wire 1 |
| W | W | Black wire 3 |
| PE | PE | Green-yellow |
| Housing | | Shield |

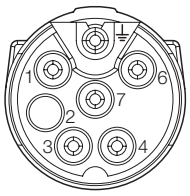
## Power cables for rotary servomotors with holding brake

| Servomotor Model | Cable & connector type | Length | Order No. | Symbolic representation |
|---|---|---|---|---|
| SGM7A-02 to -08 | Flexible Power cable 4 x 1.5 mm² & 2 x 1.5 mm² for brake with M17 connector | 3 m | JZSP-C7M343-03-E-G# |  |
| | | 5 m | JZSP-C7M343-05-E-G# | |
| | | 10 m | JZSP-C7M343-10-E-G# | |
| | | 15 m | JZSP-C7M343-15-E-G# | |
| | | 20 m | JZSP-C7M343-20-E-G# | |
| SGM7A-10 to -25 | Flexible Power cable 4 x 1.5 mm² & 2 x 1.5 mm² for brake with M23 connector | 3 m | JZSP-C7M344-03-E-G# |  |
| | | 5 m | JZSP-C7M344-05-E-G# | |
| | | 10 m | JZSP-C7M344-10-E-G# | |
| | | 15 m | JZSP-C7M344-15-E-G# | |
| | | 20 m | JZSP-C7M344-20-E-G# | |
| SGM7A-30 | Flexible Power cable 4 x 2.5 mm² & 2 x 1.5 mm² for brake with M23 connector | 3 m | JZSP-C7M354-03-E-G# |  |
| | | 5 m | JZSP-C7M354-05-E-G# | |
| | | 10 m | JZSP-C7M354-10-E-G# | |
| | | 15 m | JZSP-C7M354-15-E-G# | |
| | | 20 m | JZSP-C7M354-20-E-G# | |
| SGM7A-40 to -50 | Flexible Power cable 4 x 4 mm² & 2 x 1.5 mm² for brake with M23 connector | 3 m | JZSP-C7M364-03-E-G# |  |
| | | 5 m | JZSP-C7M364-05-E-G# | |
| | | 10 m | JZSP-C7M364-10-E-G# | |
| | | 15 m | JZSP-C7M364-15-E-G# | |
| | | 20 m | JZSP-C7M364-20-E-G# | |
| SGM7A-70 | Flexible Power cable 4 x 6.0 mm² & 2 x 1.5 mm² for brake with M40 connector | 3 m | JZSP-C7M375-03-E-G# |  |
| | | 5 m | JZSP-C7M375-05-E-G# | |
| | | 10 m | JZSP-C7M375-10-E-G# | |
| | | 15 m | JZSP-C7M375-15-E-G# | |
| | | 20 m | JZSP-C7M375-20-E-G# | |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

# Pin layout for power cables for rotary servomotors with holding brake

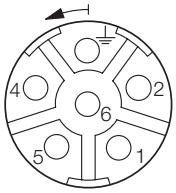
## JZSP-C7M343-xx-E-G#




Connector: ST-5ES1N8A8005S - 1624544
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | + | Black |
| 2 | n.c. | n.c. |
| 3 | U | Black wire 1 |
| 4 | V | Black wire 2 |
| 6 | - | Black |
| 7 | W | Black wire 3 |
| PE (5) | PE | Green-yellow |
| Housing | | Shield |

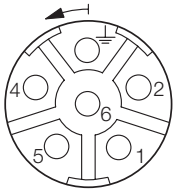
## JZSP-C7M344-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | + | Black |
| 4 | - | Black |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

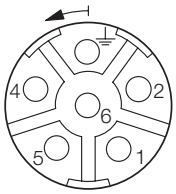
## JZSP-C7M354-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | + | Black |
| 4 | - | Black |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

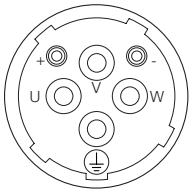
## JZSP-C7M364-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | + | Black |
| 4 | - | Black |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

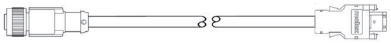
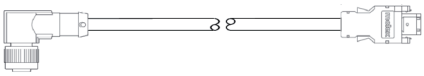
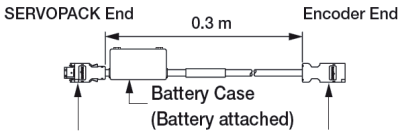
## JZSP-C7M375-xx-E-G#




Connector: SM-5ES1N8A8L33S - 1613429
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| U | U | Black wire 2 |
| + | + | Black wire 1.50 |
| - | - | Black wire 1.50 |
| V | V | Black wire 1 |
| W | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

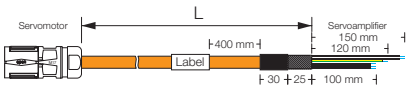
## Encoder cables for rotary servomotors

| Cable & connector type | Length | Sigma-7 cable for absolute encoder* | Sigma-7 cable for incremental encoder | Appearance |
|---|---|---|---|---|
| Flexible Encoder cable with straight connector M12 | 3m | JZSP-C7PA2M-03-E-G# | JZSP-C7PI2M-03-E-G# |  |
| | 5m | JZSP-C7PA2M-05-E-G# | JZSP-C7PI2M-05-E-G# | |
| | 10m | JZSP-C7PA2M-10-E-G# | JZSP-C7PI2M-10-E-G# | |
| | 15m | JZSP-C7PA2M-15-E-G# | JZSP-C7PI2M-15-E-G# | |
| | 20m | JZSP-C7PA2M-20-E-G# | JZSP-C7PI2M-20-E-G# | |
| Flexible Encoder cable with angled connector M12 | 3m | JZSP-C7PA2N-03-E-G# | JZSP-C7PI2N-03-E-G# |  |
| | 5m | JZSP-C7PA2N-05-E-G# | JZSP-C7PI2N-05-E-G# | |
| | 10m | JZSP-C7PA2N-10-E-G# | JZSP-C7PI2N-10-E-G# | |
| | 15m | JZSP-C7PA2N-15-E-G# | JZSP-C7PI2N-15-E-G# | |
| | 20m | JZSP-C7PA2N-20-E-G# | JZSP-C7PI2N-20-E-G# | |
| Sigma-7 Extension for Encoder cable with Connectors length 0.3m for Abs. Encoder | 0.3m | JZSP-CSP12-E-G# | - |   |

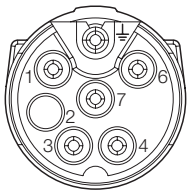
Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

* Sigma-7 cables for absolute encoders have a battery case (Battery attached).

## Fan cables for rotary servomotors

| Description | Cable & connector type | Length | Sigma-7 Flexible Cable | Symbolic representation |
|---|---|---|---|---|
| Fan cable for SGM7A-70 | Flexible Power cable for FAN 4 x 1.5mm² & 2 x 1.5mm² with M17 connector (Standard Power cable used for FAN) | 3m | JZSP-C7M343-03-E-G# |   |
| | | 5m | JZSP-C7M343-05-E-G# | |
| | | 10m | JZSP-C7M343-10-E-G# | |
| | | 15m | JZSP-C7M343-15-E-G# | |
| | | 20m | JZSP-C7M343-20-E-G# | |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

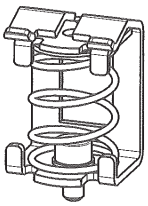



Connector: ST-5ES1N8A8005S - 1624544
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | Alarm terminal | Black |
| 2 | n.c. | n.c. |
| 3 | Fan motor | Black (U) |
| 4 | Fan motor | Black (V) |
| 6 | Alarm terminal | Black |
| 7 | n.c. | Black (W) |
| PE | PE | Green-yellow |
| Housing | - | Shield |

## Motor connection shielding clamp

Shielding clamp mountable on Sigma-7 400 V SERVOPACKs up to 15 kW.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Order No. | Specification |
|---|---|---|
| Sigma-7 400 V up to 3.0 kW | KLBUE 4-13.5_SC |  |
| Sigma-7 400 V<br>from 5 kW up to 7.5 kW | KLBUE 10-20_SC | |
| Sigma-7 400 V<br>for 11 kW & 15 kW | KLBUE 15-32_SC | |

# Model designations

SGM7G - 05 D F F 6 F

| Sigma-7 Series Servomotors: SGM7G | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit |
|---|---|---|---|---|---|---|

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| 05 | 450 W |
| 09 | 850 W |
| 13 | 1.3 kW |
| 20 | 1.8 kW |
| 30 | 2.9 kW |
| 44 | 4.4 kW |
| 55 | 5.5 kW |
| 75 | 7.5 kW |
| 1A | 11.0 kW |
| 1E | 15.0 kW |

**3rd digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| D | 400 VAC |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 6*1 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| F | Standard Model |
| R*3 | High-speed Model |

**6th digit - Shaft End**

| Code | Specification |
|---|---|
| 2 | Straight without key (450 W, 1.8 kW, 2.9 kW) |
| 6 | Straight with key and tap (450 W, 1.8 kW, 2.9 kW) |
| S*2 | Straight without key (850 W, 1.3 kW) |
| K*2 | Straight with key and tap (850 W, 1.3 kW) |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 VDC) |
| F | With dust seal |
| H | With dust seal and holding brake (24 VDC) |

*1 Please contact your Yaskawa representative about availability.
*2 The shaft end codes are different for 850 kW and 1.3 kW Servomotors.
The shaft diameter for 850 W Servomotors is 19 mm.
The shaft diameter for 1.3 kW Servomotors is 22 mm.
*3 Available up to 4.4 kW.

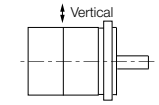
# Specifications and ratings

## Specifications

| Voltage | | | 400 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model SGM7G-** | | | **05D** | **09D** | **13D** | **20D** | **30D** | **44D** | **55D** | **75D** | **1AD** | **1ED** |
| Time Rating | | | Continuous | | | | | | | | | |
| Thermal Class | | | F | | | | | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MΩ min. | | | | | | | | | |
| Withstand Voltage | | | 1,800 VAC for 1 minute | | | | | | | | | |
| Excitation | | | Permanent magnet | | | | | | | | | |
| Mounting | | | Flange-mounted | | | | | | | | | |
| Drive Method | | | Direct drive | | | | | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward reference when viewed from the load side | | | | | | | | | |
| Vibration Class*1 | | | V15 | | | | | | | | | |
| Environmental Conditions | Surrounding Air Temperature | | 0 °C to 40 °C (With derating, usage is possible between 40 °C and 60 °C)*4 | | | | | | | | | |
| | Surrounding Air Humidity | | 20% to 80% relative humidity (with non-condensing) | | | | | | | | | |
| | Installation Site | | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*5<br>• Must be free of strong magnetic fields. | | | | | | | | | |
| | Storage Environment | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20 °C to 60 °C (with no freezing)<br>Storage Humidity: 20 % to 80% relative humidity (non-condensing) | | | | | | | | | |
| Shock Resistance*2 | Impact Acceleration Rate at Flange | | 490 m/s$^2$ | | | | | | | | | |
| | Number of Impacts | | 2 times | | | | | | | | | |
| Vibration Resistance*3 | Vibration Acceleration Rate at Flange | | 49 m/s$^2$ (24.5 m/s$^2$ front to back) | | | | | | 24.5 m/s$^2$ | | | |
| Applicable SERVOPACKs | When using a Standard Servomotor | SGD7S- | 1R9D | 3R5D | 5R4D | 8R4D | 120D | 170D | 210D | 260D | 280D | 370D |
| | | SGD7W- | 2R6D*6 or 5R4D*6 | 5R4D*6 | 5R4D | | | | – | | | |
| | When using a High-speed Servomotor | SGD7S- | 3R5D | 5R4D | 8R4D | 120D | 170D | 210D | – | | | |
| | | SGD7W- | 2R6D or 5R4D*6 | 5R4D | – | | | | | | | |

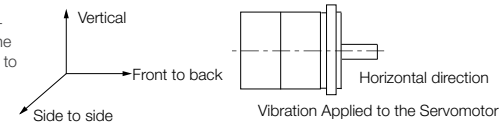
*1. A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.

*2. The shock resistance for shock in the vertical direction when the Servomotor is mounted with the shaft in a horizontal position is given in the above table.



Shock Applied to the Servomotor

*3. The vertical, side-to-side, and front-to-back vibration resistance for vibration in three directions when the Servomotor is mounted with the shaft in a horizontal position is given in the above table. The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.



Vibration Applied to the Servomotor

*4. If the surrounding air temperature will exceed 40°C, refer to the section "Applications where the Surrounding Air Temperature of the Servomotor Exceeds 40°C".

*5. If the altitude will exceed 1,000 m, refer to the section "Applications where the Altitude of the Servomotor Exceeds 1000m".

*6. If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Sigma-7S SERVOPACK.

# Servomotor ratings

## Standard servomotors

| Voltage | | | 400 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model SGM7G-** | | | **05D** | **09D** | **13D** | **20D** | **30D** | **44D** | **55D** | **75D** | **1AD** | **1ED** |
| Rated Output *1 | | kW | 0.45 | 0.85 | 1.3 | 1.8 | 2.9 | 4.4 | 5.5 | 7.5 | 11 | 15 |
| Rated Torque *1, *2 | | Nm | 2.86 | 5.39 | 8.34 | 11.5 | 18.6 | 28.4 | 35.0 | 48.0 | 70.0 | 95.4 |
| Instantaneous Maximum Torque *1 | | Nm | 8.92 | 13.8 | 23.3 | 28.7 | 45.1 | 71.6 | 87.6 | 119 | 175 | 224 |
| Rated Current *1 | | A | 1.9 | 3.5 | 5.4 | 8.4 | 11.9 | 16 | 20.8 | 25.7 | 28.1 | 37.2 |
| Instantaneous Maximum Current *1 | | A | 5.5 | 8.5 | 14 | 20 | 28 | 40.5 | 52 | 65 | 70 | 85 |
| Rated Motor Speed *1 | | $min^{-1}$ | 1,500 | | | | | | | | | |
| Maximum Motor Speed *1 | | $min^{-1}$ | 3,000 | | | | | | | | 2,000 | |
| Torque Constant | | Nm/A | 1.71 | 1.72 | 1.78 | 1.50 | 1.70 | 1.93 | 1.80 | 1.92 | 2.76 | 2.86 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg $m^2$ | 3.33 (3.58) | 13.9 (16.0) | 19.9 (22.0) | 26.0 (28.1) | 46.0 (53.9) | 67.5 (75.4) | 89 (96.9) | 125 (133) | 242 (261) | 303 (341) |
| Rated Power Rate *1 | | kW/s | 24.6 (22.8) | 20.9 (18.2) | 35.0 (31.6) | 50.9 (47.1) | 75.2 (64.2) | 119 (107) | 138 (126) | 184 (173) | 202 (188) | 300 (267) |
| Rated Angular Acceleration Rate *1 | | rad/$s^2$ | 8,590 (7,990) | 3,880 (3,370) | 4,190 (3,790) | 4,420 (4,090) | 4,040 (3,450) | 4,210 (3,770) | 3,930 (3,610) | 3840 (3,610) | 2,890 (2,680) | 3,150 (2,800) |
| Heat Sink Size | | mm | 250 × 250 × 6 (aluminium) | 400 × 400 × 20 (steel) | | | 550 × 550 × 30 (steel) | | | | 650 × 650 × 35 (steel) | |
| Protective Structure *3 | | | Totally enclosed, self-cooled, IP67 | | | | | | | | | |
| Holding Brake Specifications *4 | Rated Voltage | V | 24 VDC 0 / +10% | | | | | | | | | |
| | Capacity | W | 10 | | | | 18.5 | | 25 | | 32 | 35 |
| | Holding Torque | Nm | 4.5 | 12.7 | 19.6 | | 43.1 | | 72.6 | | 84.3 | 114.6 |
| | Coil Resistance | Ω (at 20 °C) | 56 | 59 | | | 31 | | 23 | | 18 | 17 |
| | Rated Current | A (at 20 °C) | 0.43 | 0.41 | | | 0.77 | | 1.05 | | 1.33 | 1.46 |
| | Time Required to Release Brake | ms | 100 | | | | 170 | | | | | 250 |
| | Time Required to Brake | ms | 80 | | | | 100 | | 80 | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | Standard | | 15 times | 5 times | | | | | 10 times | | | |
| | With External Regenerative Resistor and Dynamic Brake Resistor Connected | | 15 times | 10 times | | | | | | | | |
| Allowable Shaft Load *5 | LF | mm | 40 | 58 | | | 79 | | 113 | | 116 | |
| | Allowable Radial Load | N | 490 | | 686 | 980 | 1,470 | | 1,764 | | 4,998 | |
| | Allowable Thrust Load | N | 98 | | 343 | 392 | 490 | | 588 | | 2,156 | |

Note:
The values in parentheses are for Servomotors with Holding Brakes.

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

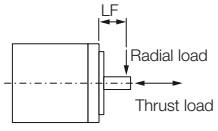
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum or steel heat sink of the dimensions given in the table.

*3. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

*4. Observe the following precautions if you use a Servomotor with a Holding Brake.

- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*5. The allowable shaft loads are illustrated in the following figure. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.



## High-speed servomotors

| Voltage | | | 400 V | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Model SGM7G-** | | | **05D** | **09D** | **13D** | **20D** | **30D** | **44D** |
| Rated Output *1 | | kW | 0.45 | 0.85 | 1.3 | 1.8 | 2.9 | 4.4 |
| Rated Torque *1, *2 | | Nm | 2.86 | 5.39 | 8.34 | 11.5 | 18.6 | 28.4 |
| Instantaneous Maximum Torque *1 | | Nm | 8.8 | 15 | 22 | 28.7 | 50.0 | 71.1 |
| Rated Current *1 | | A | 2.6 | 5.3 | 8.3 | 10.1 | 14.4 | 19.3 |
| Instantaneous Maximum Current *1 | | A | 8.2 | 14 | 21 | 24 | 40 | 50 |
| Rated Motor Speed *1 | | $min^{-1}$ | 1,500 | | | | | |
| Maximum Motor Speed *1 | | $min^{-1}$ | 5,000 | | | | 4,500 | |
| Allowable Continuous Motor Speed | | $min^{-1}$ | 5,000 | 4,000 | | | 3,300 | 3,000 |
| Torque Constant | | Nm/A | 1.13 | 1.12 | 1.09 | 1.27 | 1.36 | 1.58 |
| Motor Moment of Inertia | | $\times 10^{-4}$ kgm$^2$ | 3.33 (3.58) | 13.9 (16) | 19.9 (22) | 26 (28.1) | 46.0 (53.9) | 67.5 (75.4) |
| Rated Power Rate *1 | | kW/s | 24.6 (22.8) | 20.9 (18.2) | 35 (31.6) | 50.9 (47.1) | 75.2 (64.2) | 119 (107) |
| Rated Angular Acceleration Rate *1 | | rad/s$^2$ | 8,590 (7,990) | 3,880 (3,370) | 4,190 (3,790) | 4,420 (4,090) | 4,040 (3,450) | 4,210 (3,770) |
| Heat Sink Size | | mm | 250 × 250 × 6 (aluminium) | 400 × 400 × 20 (steel) | | | | |
| Protective Structure *3 | | | Totally enclosed, self-cooled, IP67 | | | | | |
| Holding Brake Specifications *4 | Rated Voltage | V | 24 VDC 0 / +10% | | | | | |
| | Capacity | W | 10 | | | | 18.5 | |
| | Holding Torque | Nm | 4.5 | 12.7 | 19.6 | | 43.1 | |
| | Coil Resistance | Ω (at 20 °C) | 56 | 59 | | | 31 | |
| | Rated Current | A (at 20 °C) | 0.43 | 0.41 | | | 0.77 | |
| | Time Required to Release Brake | ms | 100 | | | | 170 | |
| | Time Required to Brake | ms | 80 | | | | 100 | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | Standard | | 8 times | 2 times | 4 times | 3 times | 2 times | 5 times |
| | With External Regenerative Resistor and Dynamic Brake Resistor Connected | | 15 times | 4 times | 7 times | 6 times | 6 times | |
| Allowable Shaft Loads *5 | LF | mm | 40 | | 58 | | 79 | |
| | Allowable Radial Load | N | 490 | | 686 | 980 | 1,470 | |
| | Allowable Thrust Load | N | 98 | | 343 | 392 | 490 | |

Note:
The values in parentheses are for Servomotors with Holding Brakes.

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

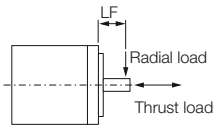
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum or steel heat sink of the dimensions given in the table.

*3. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

*4. Observe the following precautions if you use a Servomotor with a Holding Brake.

- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

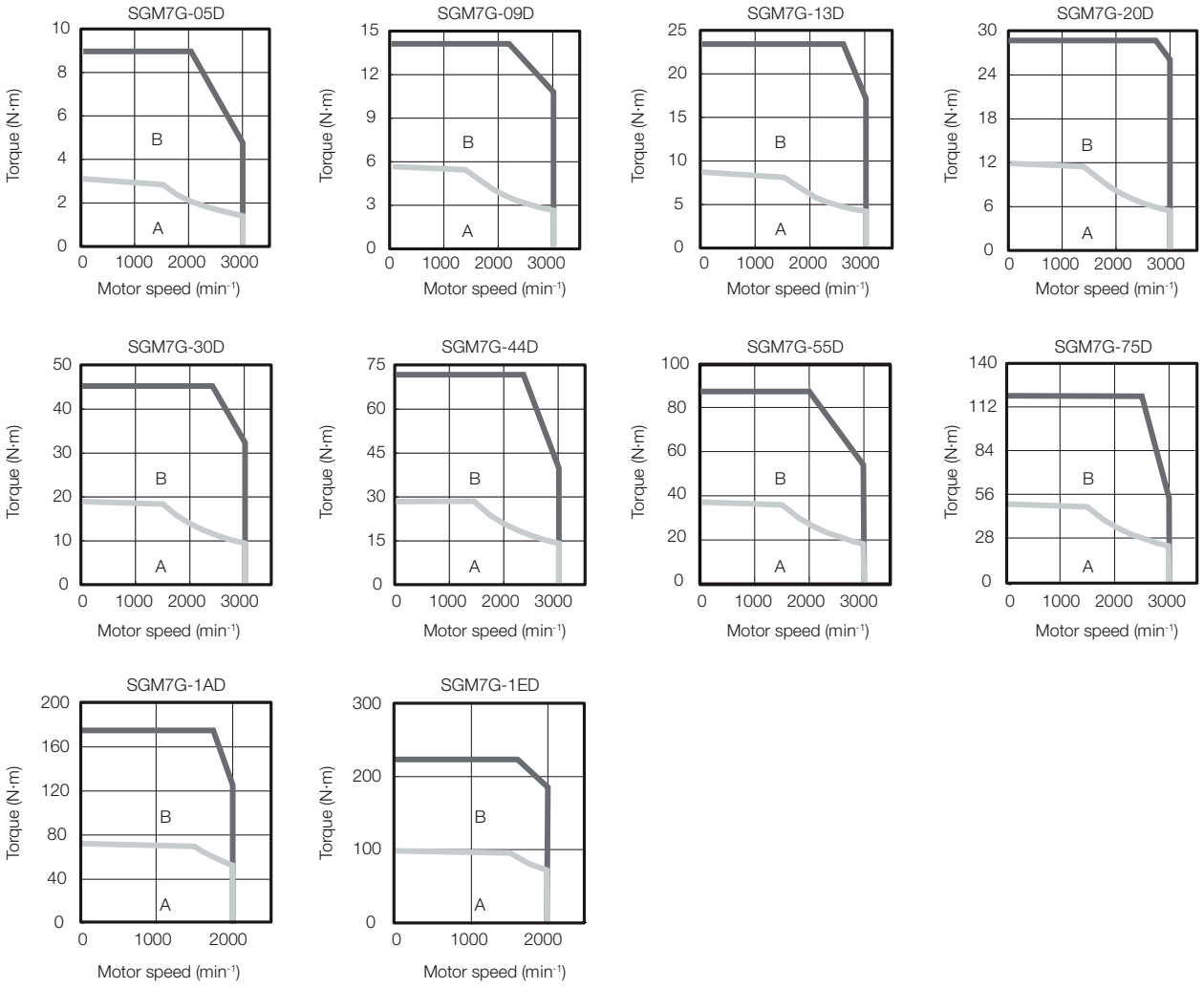
*5. The allowable shaft loads are illustrated in the following figure. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.



# Motor speed-torque characteristics

## Standard servomotors

A : Continuous duty zone
B : Intermittent duty zone

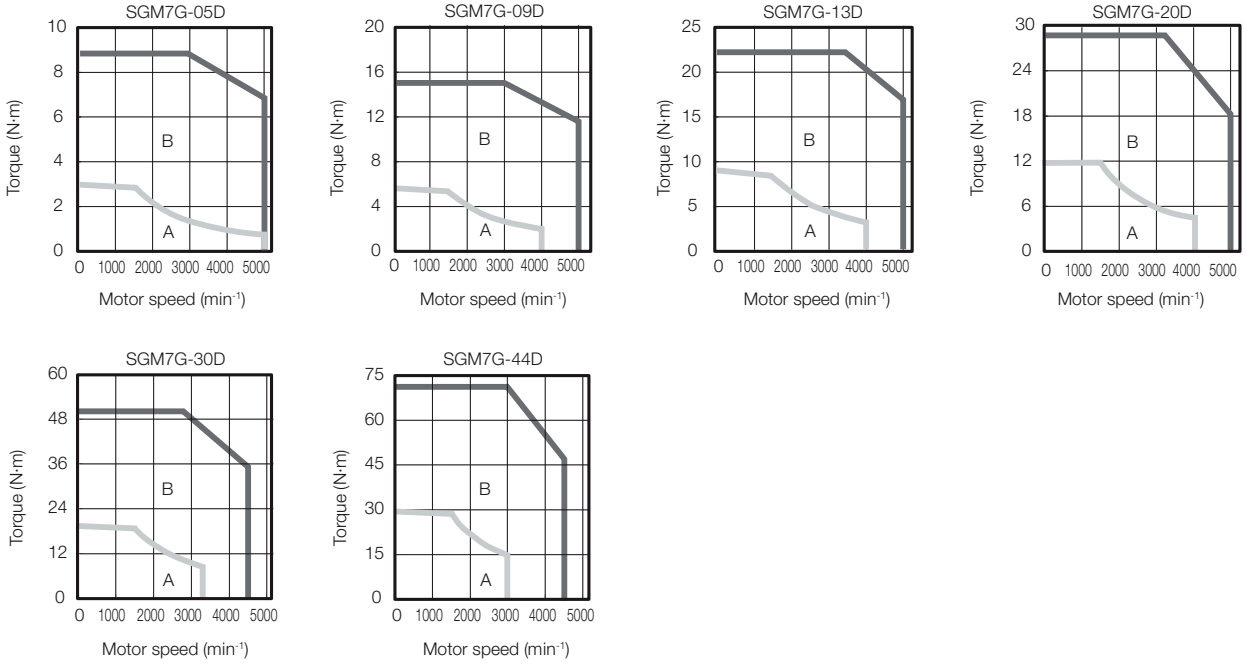



Note:

1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage. The intermittent duty zone in the graphs show the characteristics when a three-phase, 400-VAC power supply voltage is used.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

## High-speed servomotors

A : Continuous duty zone
B : Intermittent duty zone




Note:

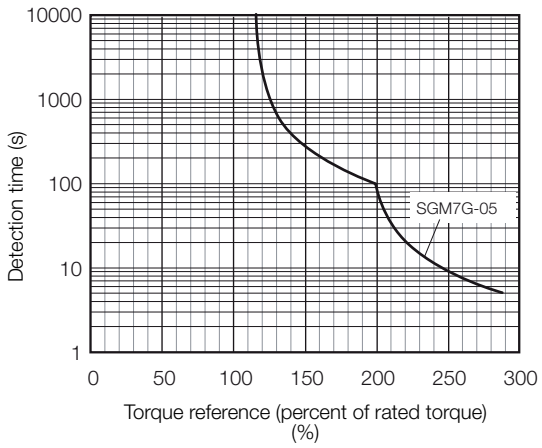
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage. The intermittent duty zone in the graphs show the characteristics when a three-phase, 400-VAC power supply voltage is used.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

# Servomotor overload protection characteristics

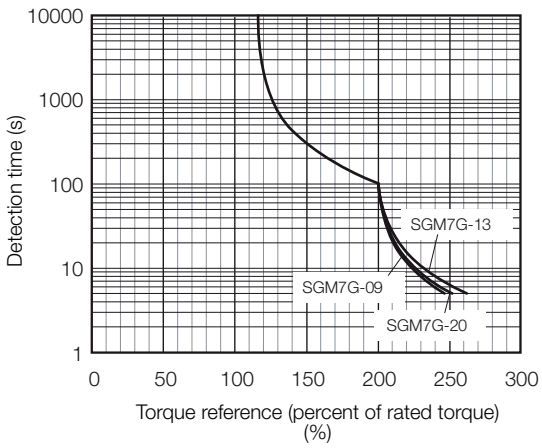
The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.

## Standard servomotors

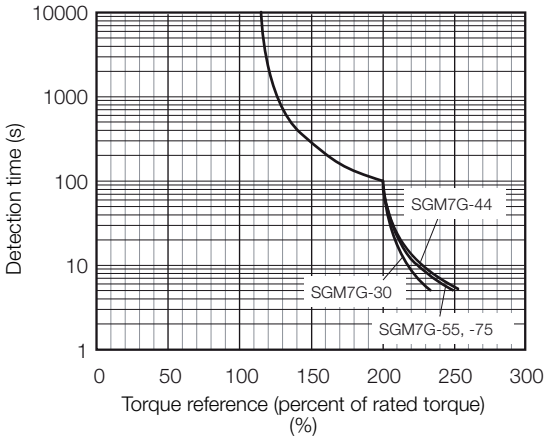
SGM7G-05



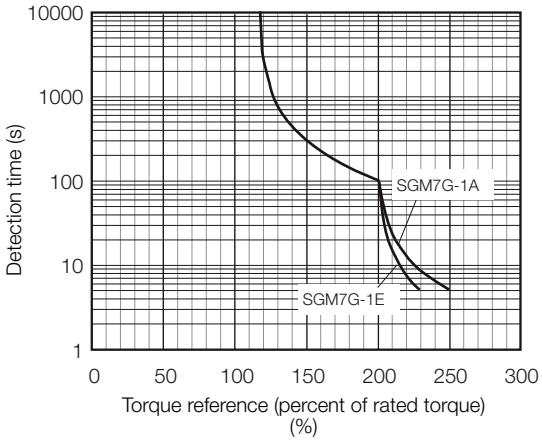

SGM7G-09, -13, and -20




SGM7G-30, -44, -55, and -75



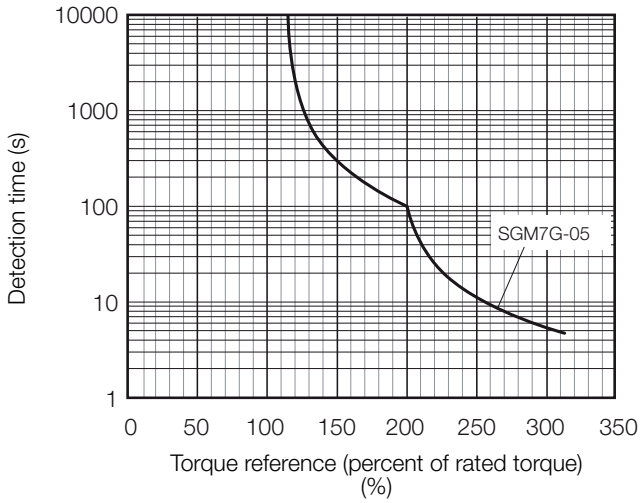

SGM7G-1A and -1E



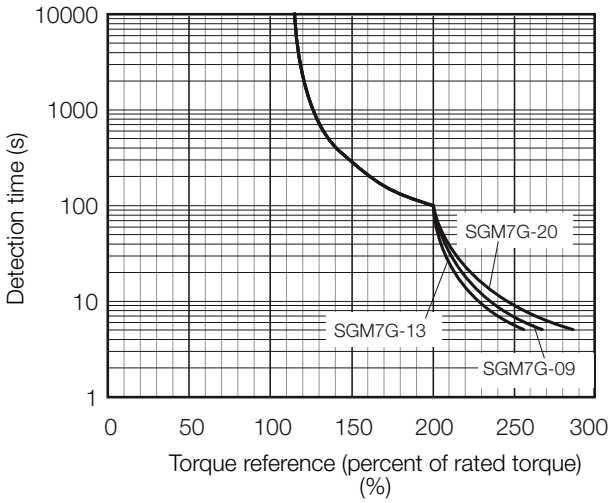

Note:
The overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100 % or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Motor Speed-Torque Characteristics.

## High-speed servomotors

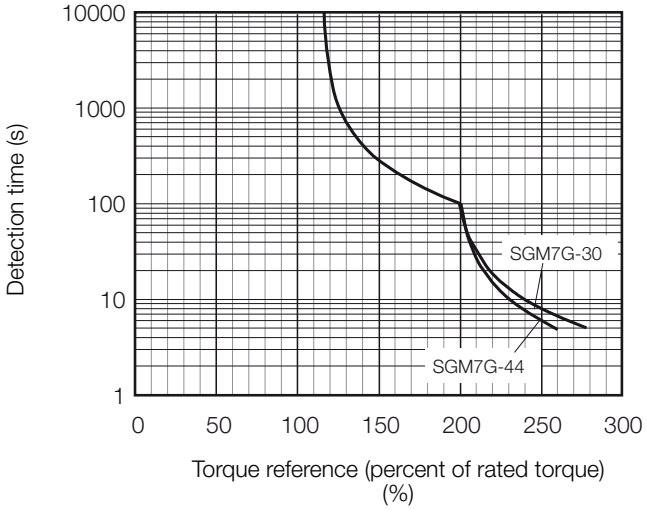
SGM7G-05




SGM7G-09, -13, and -20




SGM7G-30 and -44




Note:
The overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100 % or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Motor Speed-Torque Characteristics.

## Load moment of inertia

The load moment of inertia indicates the inertia of the load. The larger the load moment of inertia, the worse the response. If the moment of inertia is too large, operation will become unstable.
The allowable size of the load moment of inertia (JL) for the Servomotor is restricted. Refer to Ratings of Rotary Serovmotors SGM7J. This value is provided strictly as a guideline and results depend on Servomotor driving conditions.
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

Perform one of the following steps if this occurs.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.
- Install an external regenerative resistor if the alarm cannot be cleared using the above steps.

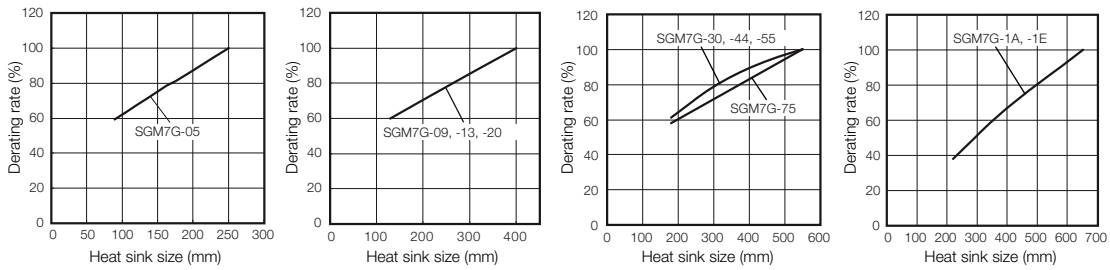
## Servomotor heat dissipation conditions

The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.

Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

Note:
The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed.
If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.

**Important:**
The actual temperature rise depends on how the heat sink (i. e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.



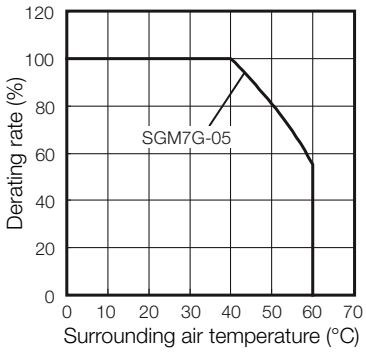

See Servomotor Ratings for more information.

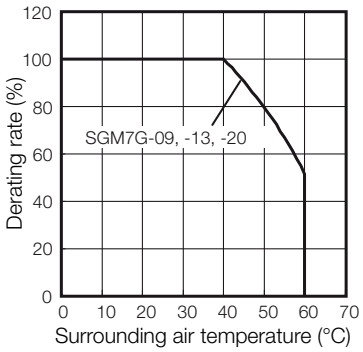
## Applications where the surrounding air temperature of the servomotor exceeds 40°C

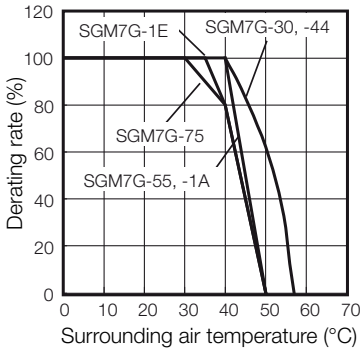
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

Note:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.



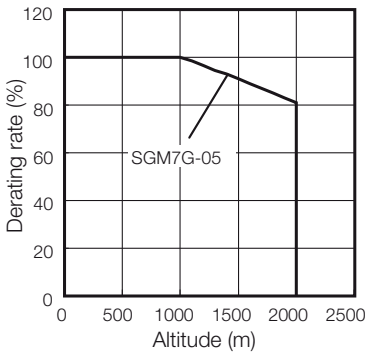



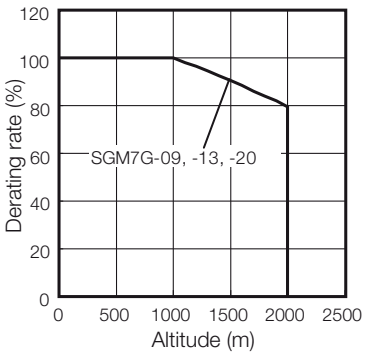

## Applications where the altitude of the servomotor exceeds 1,000 m

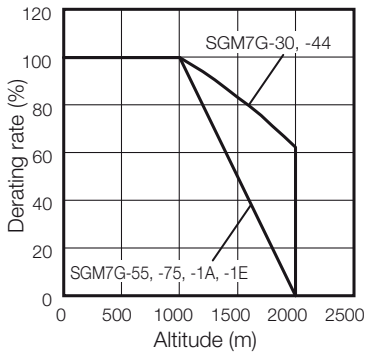
The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.

Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

Note:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.

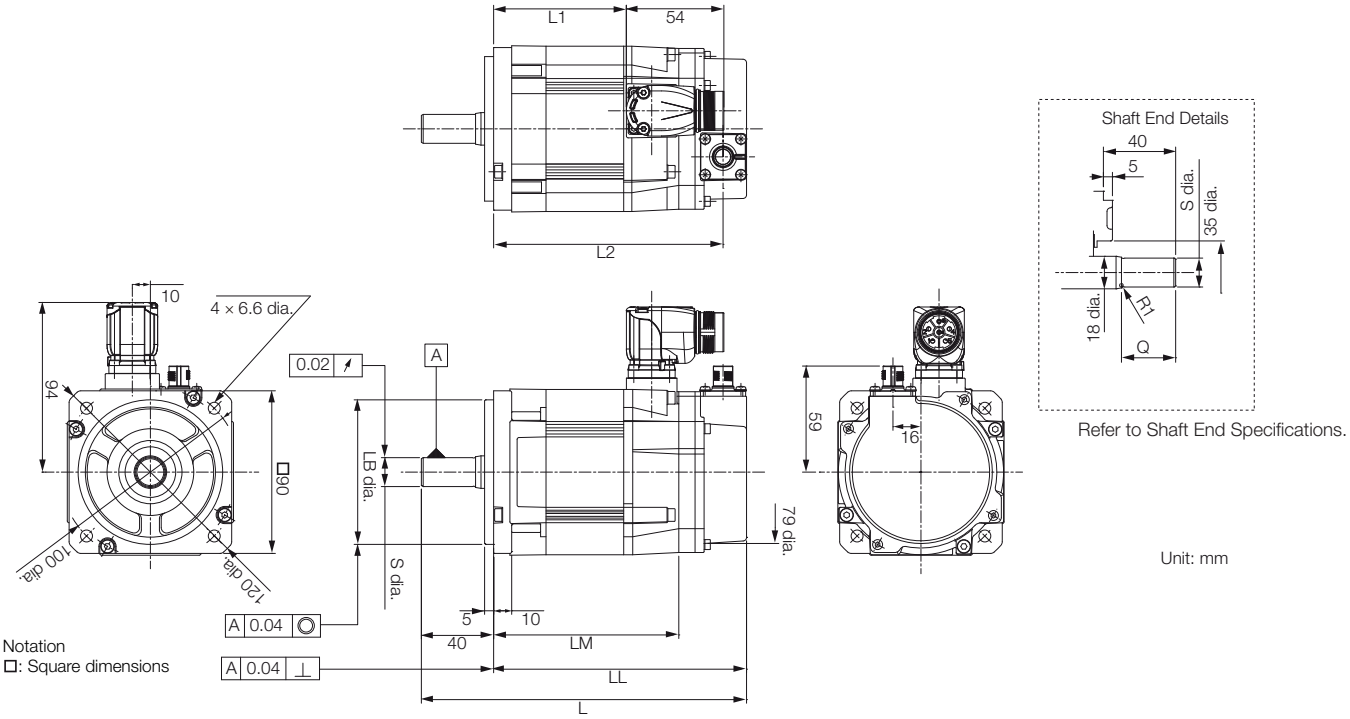


# External dimensions

## SGM7G-05

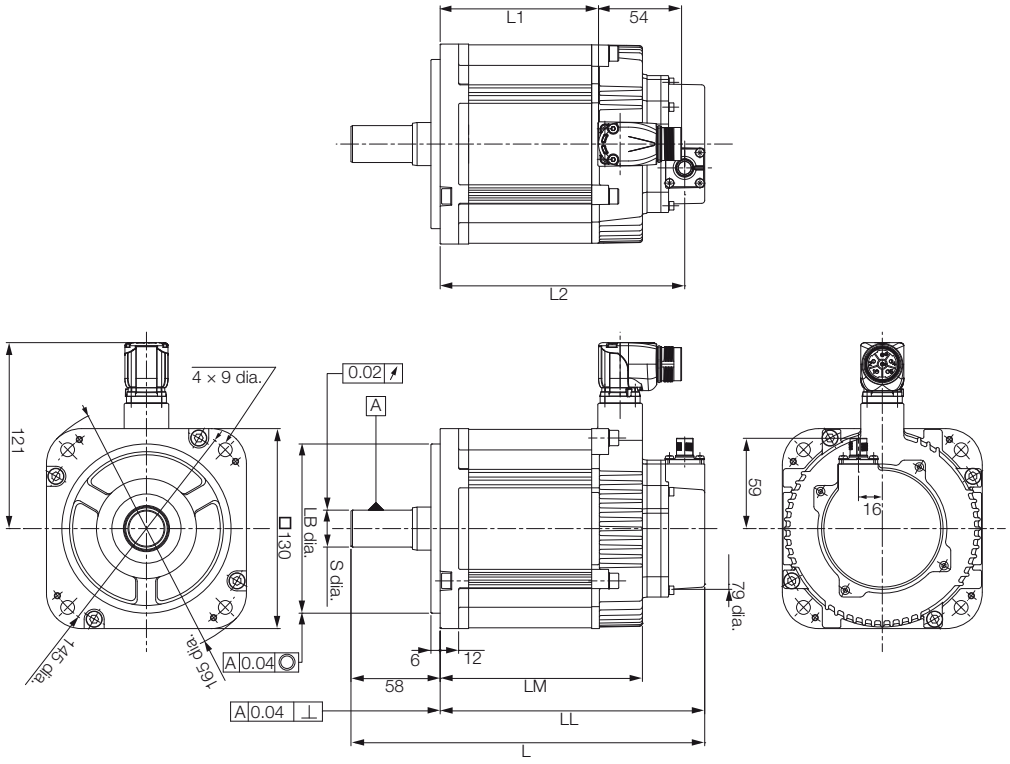


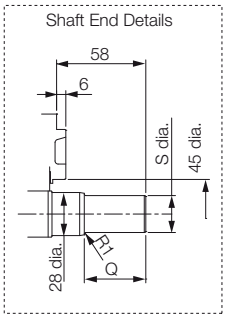

| Model SGM7G- | L | LL | LM | L1 | L2 | LB | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | Q | |
| 05D□F2□ | 181<br>(214) | 141<br>(174) | 103<br>(136) | 74 | 127<br>(161) | $80^{0}_{-0.030}$ | $16^{0}_{-0.011}$ | 30 | 3.3<br>(4.3) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Refer to the section Shaft End Specifications.
3. Refer to the section Connector Specifications.

## SGM7G-09, -13, -20




Refer to Shaft End Specifications.

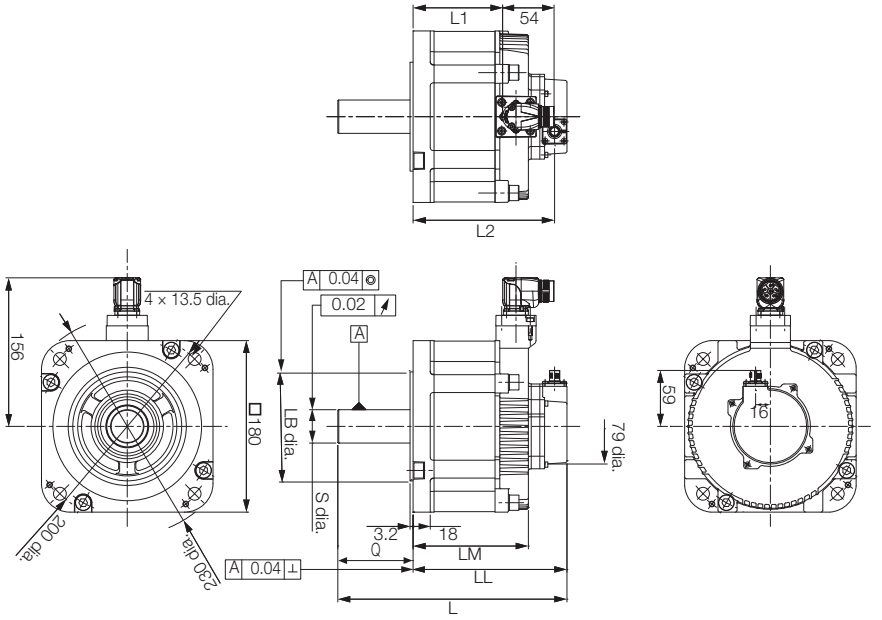
Unit: mm

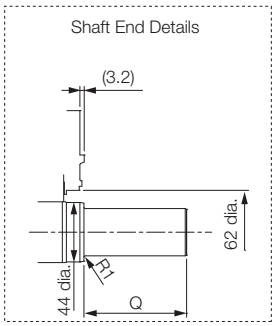
| Model SGM7G- | L | LL | LM | L1 | L2 | LB | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | Q | |
| 09D□FS□ | 197 (233) | 139 (175) | 101 (137) | 69 | 125 (161) | $110^{0}_{-0.035}$ | $19^{0}_{-0.013}$ | 40 | 5.6 (7.6) |
| 13D□FS□ | 213 (249) | 155 (191) | 117 (153) | 85 | 141 (177) | $110^{0}_{-0.035}$ | $22^{0}_{-0.013}$ | 40 | 7.2 (9.1) |
| 20D□F2□ | 231 (267) | 173 (209) | 135 (171) | 103 | 159 (195) | $110^{0}_{-0.035}$ | $24^{0}_{-0.013}$ | 40 | 8.7 (11.1) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to the section Shaft End Specifications.
4. Refer to the section Connector Specifications SGM7G.

## SGM7G-30, -44, -55 and -75




Refer to Shaft End Specifications.

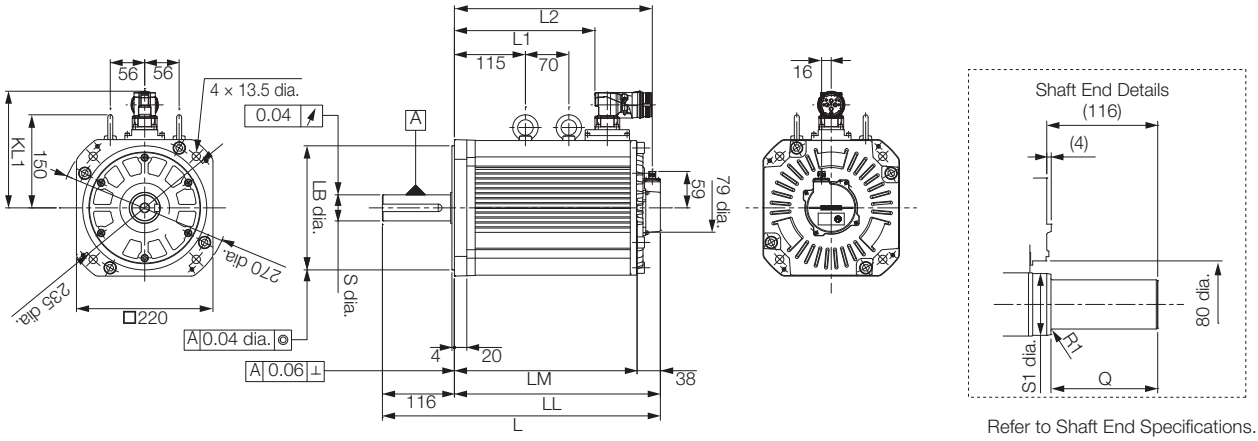
Unit: mm

| Model SGM7G- | L | LL | LM | L1 | L2 | LB | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | Q | |
| 30D□F2□ | 241<br>(289) | 162<br>(210) | 124<br>(172) | 94 | 149<br>(197) | $114.3^{0}_{-0.035}$ | $35^{+0.01}_{0}$ | 76 | 13.6<br>(19.6) |
| 44D□F2□ | 265<br>(313) | 186<br>(234) | 148<br>(196) | 118 | 173<br>(221) | $114.3^{0}_{-0.025}$ | $35^{+0.01}_{0}$ | 76 | 18.0<br>(24.0) |
| 44D□R2□ | 265<br>(313) | 186<br>(234) | 148<br>(196) | 112 | 173<br>(221) | $114.3^{0}_{-0.025}$ | $35^{+0.01}_{0}$ | 76 | 18.0<br>(24.0) |
| 55D□F2□ | 336<br>(380) | 223<br>(267) | 185<br>(229) | 143 | 210<br>(254) | $114.3^{0}_{-0.025}$ | $42^{0}_{-0.016}$ | 110 | 22.0<br>(28.0) |
| 75D□F2□ | 382<br>(426) | 269<br>(313) | 231<br>(275) | 189 | 256<br>(300) | $114.3^{0}_{-0.025}$ | $42^{0}_{-0.016}$ | 110 | 30.0<br>(35.5) |

Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to the section Shaft End Specifications.
4. Refer to the section Connector Specifications.

## SGM7G-1A and -1E




Refer to Shaft End Specifications.

Unit: mm

| Model SGM7G- | L | LL | LM | L1 | L2 | LB | KL1 | Shaft End Dimensions | | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | S1 | Q | |
| 1AD□F2□ | 449 (500) | 333 (384) | 295 (346) | 227 | 319 (371) | $200^{0}_{-0.046}$ | 188 | $42^{0}_{-0.016}$ | 50 | 110 | 57.5 (65.5) |
| 1ED□F2□ | 511 (600) | 395 (484) | 357 (446) | 289 | 382 (470) | $200^{0}_{-0.046}$ | 188 | $55^{+0.030}_{+0.011}$ | 60 | 110 | 67.5 (79.5) |

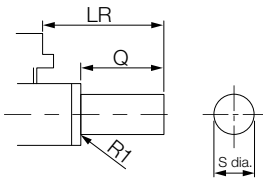
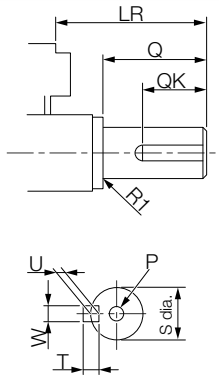
Note:
Motors with batteryless encoder have different dimensions. Please contact your Yaskawa representative.

1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to the section Shaft End Specifications.
4. Refer to the section Connector Specifications.

## Shaft end specifications

SGM7G-□□□□□□□

| Code | Specification |
|---|---|
| 2 or S* | Straight without key |
| 6 or K* | Straight with key and tap for one location (Key slot is JIS B1301-1996 fastening type.) |

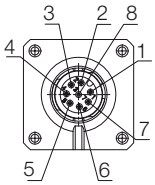
| Shaft End Details | | Servomotor Model SGM7G- | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 05 | 09 | 13 | 20 | 30 | 44 | 55 | 75 | 1A | 1E |
| **Code: 2 or S* (Straight without Key)** | | | | | | | | | | | |
|  | LR | 40 | 58 | 58 | 58 | 79 | | 113 | | 116 | |
| | Q | 30 | 40 | 40 | 40 | 76 | | | | 110 | |
| | S | $16^{0}_{-0.011}$ | $19^{0}_{-0.013}$ | $22^{0}_{-0.013}$ | $24^{0}_{-0.013}$ | $35^{+0.01}_{0}$ | | $42^{0}_{-0.016}$ | | $42^{0}_{-0.016}$ | $55^{+0.030}_{+0.011}$ |
| **Code: 6 or K* (Straight with Key and Tap)** | | | | | | | | | | | |
|  | LR | 40 | 58 | 58 | 58 | 79 | | 113 | | 116 | |
| | Q | 30 | 40 | 40 | 40 | 76 | | | | 110 | |
| | QK | 20 | 25 | 25 | 25 | 60 | | | | 90 | |
| | S | $16^{0}_{-0.011}$ | $19^{0}_{-0.013}$ | $22^{0}_{-0.013}$ | $24^{0}_{-0.013}$ | $35^{+0.01}_{0}$ | | $42^{0}_{-0.016}$ | | $42^{0}_{-0.016}$ | $55^{+0.030}_{+0.011}$ |
| | W | 5 | 5 | 6 | 8 | | 10 | | | 12 | 16 |
| | T | 5 | 5 | 6 | 7 | | | 8 | | | 10 |
| | U | 3 | 3 | 3.5 | 4 | | | 5 | | | 6 |
| | P | M5 screw, Depth: 12 | | | | M12 screw, Depth: 25 | | M16 x 32L | | | M20 x 40L |

* The code for the shaft end depends on the model:
SGM7G-05, -20, -30, -44, -55, -75, -1A, or -1E: 2 or 6
SGM7G-09 or -13: S or K

# Connector specifications

## SGM7G-05D□F to -44D□F and SGM7G-05D□R to -30D□R

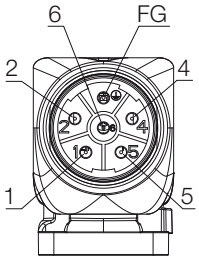
- Encoder Connector Specifications




Receptacle
Size: M12
Part number: 1419959
Model: SACC-MSQ-M12MS-25-3,2 SCO
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | PG 5V |
| 2 | PG 0V |
| 3 | FG |
| 4 | BAT (+) |
| 5 | BAT (-) |
| 6 | Data (+) |
| 7 | Data (-) |
| 8 | Empty |
| Housing | Shield |

- Servomotor Connector Specifications

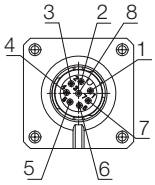



Receptacle
Size: M23
Part number: 1617905
Model: SF-5EP1N8AAD00S
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | V |
| 2 | (Brake) |
| 4 | (Brake) |
| 5 | U |
| 6 | W |
| FG | FG |
| Housing | Shield |

## SGM7G-55D□F to -1ED□F and SGM7G-44D□R

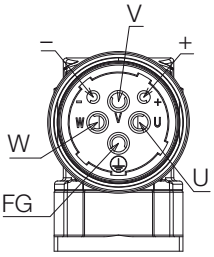
- Encoder Connector Specifications




Receptacle
Size: M12
Part number: 1419959
Model: SACC-MSQ-M12MS-25-3,2 SCO
Manufacturer: Phoenix Contact

| | |
|---|---|
| 1 | PG 5V |
| 2 | PG 0V |
| 3 | FG |
| 4 | BAT (+) |
| 5 | BAT (-) |
| 6 | Data (+) |
| 7 | Data (-) |
| 8 | Empty |
| Housing | Shield |

- Servomotor Connector Specifications



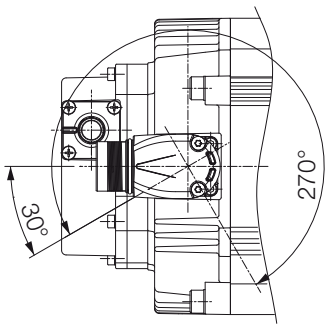

Receptacle
Size: M40
Part number: 1607927
Model: SM-5EPWN8AAD00S
Manufacturer: Phoenix Contact

| | |
|---|---|
| U | U |
| V | V |
| W | W |
| + | (Brake) |
| 7 | (Brake) |
| FG | FG |
| Housing | Shield |

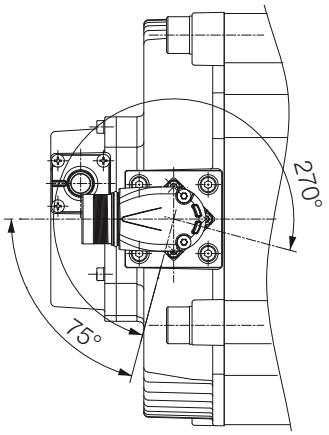
## Servomotor connector rotational angle

Allowable number of rotations: 10

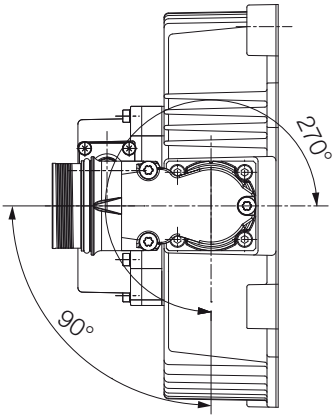
**SGM7G-05D□□ to -20D□□**



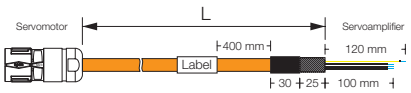
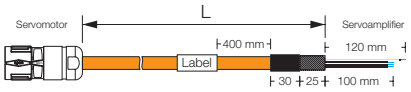
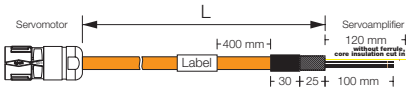
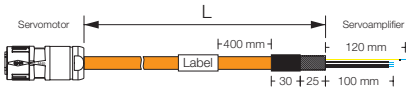
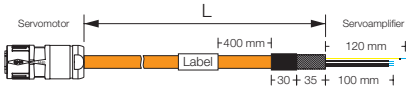

**SGM7G-30D□□, -44D□F**




**SGM7G-44D□R, -55D□F, -75D□F, -1AD□F and -1AD□F**



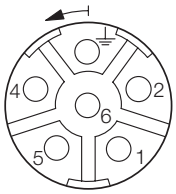
## Power cables for rotary servomotors without holding brake

| Servomotor Model | Cable & connector type | Length | Order No. | Symbolic representation |
|---|---|---|---|---|
| SGM7G-05 to -20<br>SGM7G-05 to -09 High Speed | Flexible Power cable 4 x 1.5 mm² with M23 connector | 3 m | JZSP-C7M144-03-E-G# |  |
| | | 5 m | JZSP-C7M144-05-E-G# | |
| | | 10 m | JZSP-C7M144-10-E-G# | |
| | | 15 m | JZSP-C7M144-15-E-G# | |
| | | 20 m | JZSP-C7M144-20-E-G# | |
| SGM7G-30<br>SGM7G-13 to -20 High Speed | Flexible Power cable 4 x 2.5 mm² with M23 connector | 3 m | JZSP-C7M154-03-E-G# |  |
| | | 5 m | JZSP-C7M154-05-E-G# | |
| | | 10 m | JZSP-C7M154-10-E-G# | |
| | | 15 m | JZSP-C7M154-15-E-G# | |
| | | 20 m | JZSP-C7M154-20-E-G# | |
| SGM7G-44<br>SGM7G-30 High Speed | Flexible Power cable 4 x 4 mm² with M23 connector | 3 m | JZSP-C7M164-03-E-G# |  |
| | | 5 m | JZSP-C7M164-05-E-G# | |
| | | 10 m | JZSP-C7M164-10-E-G# | |
| | | 15 m | JZSP-C7M164-15-E-G# | |
| | | 20 m | JZSP-C7M164-20-E-G# | |
| SGM7G-55 to -75<br>SGM7G-44 High Speed | Flexible Power cable 4 x 6.0 mm² with M40 connector | 3 m | JZSP-C7M175-03-E-G# |  |
| | | 5 m | JZSP-C7M175-05-E-G# | |
| | | 10 m | JZSP-C7M175-10-E-G# | |
| | | 15 m | JZSP-C7M175-15-E-G# | |
| | | 20 m | JZSP-C7M175-20-E-G# | |
| SGM7G-1A to -1E | Flexible Power cable 4 x 10.0 mm² with M40 connector | 3 m | JZSP-C7M185-03-E-G# |  |
| | | 5 m | JZSP-C7M185-05-E-G# | |
| | | 10 m | JZSP-C7M185-10-E-G# | |
| | | 15 m | JZSP-C7M185-15-E-G# | |
| | | 20 m | JZSP-C7M185-20-E-G# | |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

## Pin layout for power cables for rotary servomotors without holding brake

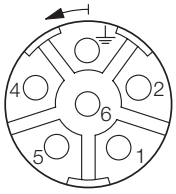
### JZSP-C7M144-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | n.c. | n.c. |
| 4 | n.c. | n.c. |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

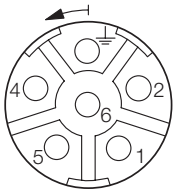
### JZSP-C7M154-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | n.c. | n.c. |
| 4 | n.c. | n.c. |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

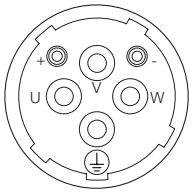
### JZSP-C7M164-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | n.c. | n.c. |
| 4 | n.c. | n.c. |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

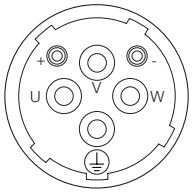
### JZSP-C7M175-xx-E-G#




Connector: SM-5ES1N8A8L33S - 1613429
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| U | U | Black wire 2 |
| + | n.c. | n.c. |
| - | n.c. | n.c. |
| V | V | Black wire 1 |
| W | W | Black wire 3 |
| PE | PE | Green-yellow |
| Housing | | Shield |

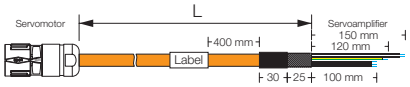
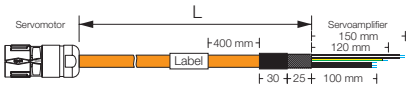
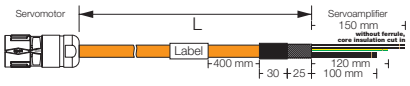
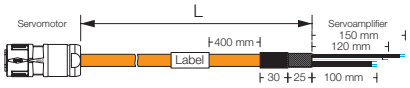
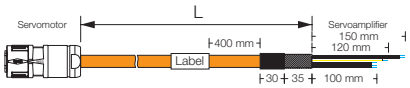
### JZSP-C7M185-xx-E-G#




Connector: SM-5ES1N8A8L33S - 1613429
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| U | U | Black wire 2 |
| + | n.c. | n.c. |
| - | n.c. | n.c. |
| V | V | Black wire 1 |
| W | W | Black wire 3 |
| PE | PE | Green-yellow |
| Housing | | Shield |

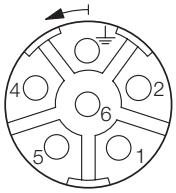
## Power cables for rotary servomotors with holding brake

| Servomotor Model | Cable & connector type | Length | Order No. | Symbolic representation |
|---|---|---|---|---|
| SGM7G-05 to -20<br>SGM7G-05 to -09 High Speed | Flexible Power cable 4 x 1.5 mm² & 2 x 1.5 mm² for brake with M23 connector | 3 m | JZSP-C7M344-03-E-G# |  |
| | | 5 m | JZSP-C7M344-05-E-G# | |
| | | 10 m | JZSP-C7M344-10-E-G# | |
| | | 15 m | JZSP-C7M344-15-E-G# | |
| | | 20 m | JZSP-C7M344-20-E-G# | |
| SGM7G-30<br>SGM7G-13 to -20 High Speed | Flexible Power cable 4 x 2.5 mm² & 2 x 1.5 mm² for brake with M23 connector | 3 m | JZSP-C7M354-03-E-G# |  |
| | | 5 m | JZSP-C7M354-05-E-G# | |
| | | 10 m | JZSP-C7M354-10-E-G# | |
| | | 15 m | JZSP-C7M354-15-E-G# | |
| | | 20 m | JZSP-C7M354-20-E-G# | |
| SGM7G-44<br>SGM7G-30 High Speed | Flexible Power cable 4 x 4 mm² & 2 x 1.5 mm² for brake with M23 connector | 3 m | JZSP-C7M364-03-E-G# |  |
| | | 5 m | JZSP-C7M364-05-E-G# | |
| | | 10 m | JZSP-C7M364-10-E-G# | |
| | | 15 m | JZSP-C7M364-15-E-G# | |
| | | 20 m | JZSP-C7M364-20-E-G# | |
| SGM7G-55 to -75<br>SGM7G-44 High Speed | Flexible Power cable 4 x 6.0 mm² & 2 x 1.5 mm² for brake with M40 connector | 3 m | JZSP-C7M375-03-E-G# |  |
| | | 5 m | JZSP-C7M375-05-E-G# | |
| | | 10 m | JZSP-C7M375-10-E-G# | |
| | | 15 m | JZSP-C7M375-15-E-G# | |
| | | 20 m | JZSP-C7M375-20-E-G# | |
| SGM7G-1A to -1E | Flexible Power cable 4 x 10.0 mm² & 2 x 1.5 mm² for brake with M40 connector | 3 m | JZSP-C7M385-03-E-G# |  |
| | | 5 m | JZSP-C7M385-05-E-G# | |
| | | 10 m | JZSP-C7M385-10-E-G# | |
| | | 15 m | JZSP-C7M385-15-E-G# | |
| | | 20 m | JZSP-C7M385-20-E-G# | |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

## Pin layout for power cables for rotary servomotors with holding brake

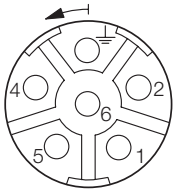
### JZSP-C7M344-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | + | Black |
| 4 | - | Black |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

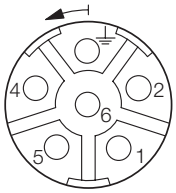
### JZSP-C7M354-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | + | Black |
| 4 | - | Black |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

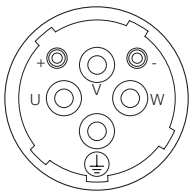
### JZSP-C7M364-xx-E-G#




Connector: SF-5ES1N8A80A3S - 1618196
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| 1 | V | Black wire 2 |
| 2 | - | Black (L=150) |
| 4 | - | Black (L=150) |
| 5 | U | Black wire 1 |
| 6 | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

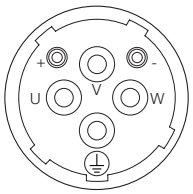
### JZSP-C7M375-xx-E-G#




Connector: SM-5ES1N8A8L33S - 1613429
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| U | U | Black wire 2 |
| + | + | Black wire 1.50 |
| - | - | Black wire 1.50 |
| V | V | Black wire 1 |
| W | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

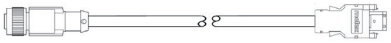
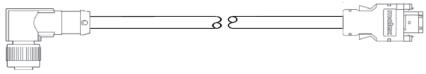
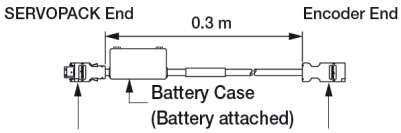
### JZSP-C7M385-xx-E-G#




Connector: SM-5ES1N8A8L33S - 1613429
From Phoenix Contact GmbH & Co. KG

| Pin No. | Function | Wire Color |
|---|---|---|
| U | U | Black wire 2 |
| + | + | Black |
| - | - | Black |
| V | V | Black wire 1 |
| W | W | Black wire 3 |
| PE (3) | PE | Green-yellow |
| Housing | | Shield |

## Encoder cables for rotary servomotors

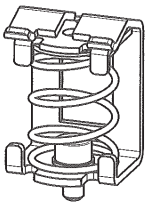
| Cable & connector type | Length | Sigma-7 cable for absolute encoder* | Sigma-7 cable for incremental encoder | Appearance |
|---|---|---|---|---|
| Flexible Encoder cable with straight connector M12 | 3m | JZSP-C7PA2M-03-E-G# | JZSP-C7PI2M-03-E-G# |  |
| | 5m | JZSP-C7PA2M-05-E-G# | JZSP-C7PI2M-05-E-G# | |
| | 10m | JZSP-C7PA2M-10-E-G# | JZSP-C7PI2M-10-E-G# | |
| | 15m | JZSP-C7PA2M-15-E-G# | JZSP-C7PI2M-15-E-G# | |
| | 20m | JZSP-C7PA2M-20-E-G# | JZSP-C7PI2M-20-E-G# | |
| Flexible Encoder cable with angled connector M12 | 3m | JZSP-C7PA2N-03-E-G# | JZSP-C7PI2N-03-E-G# |  |
| | 5m | JZSP-C7PA2N-05-E-G# | JZSP-C7PI2N-05-E-G# | |
| | 10m | JZSP-C7PA2N-10-E-G# | JZSP-C7PI2N-10-E-G# | |
| | 15m | JZSP-C7PA2N-15-E-G# | JZSP-C7PI2N-15-E-G# | |
| | 20m | JZSP-C7PA2N-20-E-G# | JZSP-C7PI2N-20-E-G# | |
| Sigma-7 Extension for Encoder cable with Connectors length 0.3m for Abs. Encoder | 0.3m | JZSP-CSP12-E-G# | - |  |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

* Sigma-7 cables for absolute encoders have a battery case (Battery attached).

## Motor connection shielding clamp

Shielding clamp mountable on Sigma-7 400 V SERVOPACKs up to 15 kW.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Order No. | Specification |
|---|---|---|
| Sigma-7 400 V up to 3.0 kW | KLBUE 4-13.5_SC |  |
| Sigma-7 400 V from 5 kW up to 7.5 kW | KLBUE 10-20_SC | |
| Sigma-7 400 V for 11 kW & 15 kW | KLBUE 15-32_SC | |

## SGLFW2



- Model with
  F-type iron core
- Rated force: 45 N - 2,520 N
  Peak force: 135 N - 7,560 N

# Linear Servomotors

SGLF (Models with F-Type Iron Cores) 82

# SGLF (Models with F-Type Iron Cores)

## Model designations

### Moving coil

S G L F W2 - 30 D 070 A S 1 E

Sigma-7 Series Linear Servomotors: 1st 2nd 3rd + 4th 5th 6th - 8th 9th 10th 11th 12th digit

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| W2 | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

**5th digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| D | 400 VAC |

**6th ... 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 070 | 70 mm |
| 120 | 125 mm |
| 200 | 205 mm |
| 230 | 230 mm |
| 380 | 384 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**10th digit - Sensor Specification**

| Code | Specification |
|---|---|
| T | Without polarity sensor, with thermal protector |
| S | With polarity sensor and thermal protector |

**11th digit - Options**

| Code | Cooling Method |
|---|---|
| 1 | Self-cooled |
| L | Water-cooled* |

**12th digit - Options**

| Code | Connection |
|---|---|
| E | Metal round connector (Phoenix) |

* Contact your Yaskawa representative for information on water-cooled model.

### Magnetic way

S G L F M2 - 30 270 A

Sigma-7 Series Linear Servomotors: 1st 2nd 3rd + 4th 5th - 7th 8th digit

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| M2 | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

**5th ... 7th digit - Length of Magnetic Way**

| Code | Specification |
|---|---|
| 270 | 270 mm |
| 306 | 306 mm |
| 450 | 450 mm |
| 510 | 510 mm |
| 630 | 630 mm |
| 714 | 714 mm |

**8th digit - Design Revision Order**

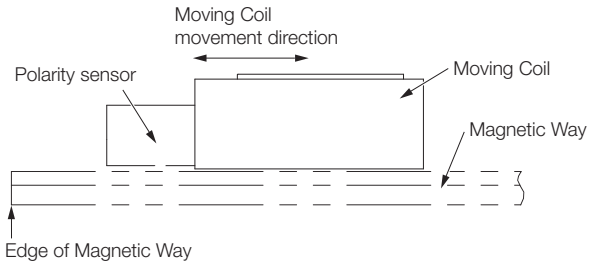
| Code | Specification |
|---|---|
| A | Standard Model |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

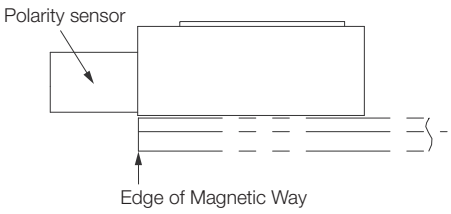
# Precautions on moving coils with polarity sensors

Note:
When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.
When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length (L) of the Moving Coil and the polarity sensor. Refer to the following table.

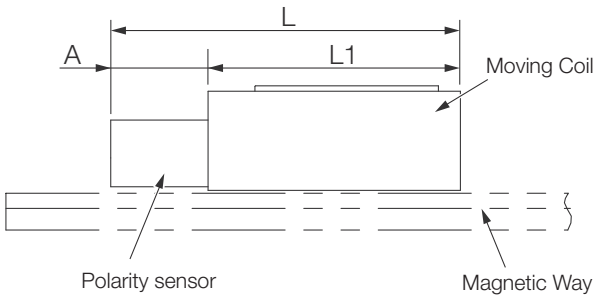
### Correct installation




### Incorrect installation




### Total length of moving coil with polarity sensor




| Moving Coil Model SGLFW2- | Length of Moving Coil, L1 (mm) | Length of Polarity Sensor, A (mm) | Total Length, L (mm) |
|---|---|---|---|
| 30D070AS | 70 | 27 | 97 |
| 30D120AS | 125 | | 152 |
| 30D230AS | 230 | | 257 |
| 45D200AS | 205 | 32 | 237 |
| 45D380AS | 384 | | 416 |
| 90D200AS | 205 | | 237 |
| 90D380AS | 384 | | 416 |

# Ratings and specifications: SGLFW2 models

## Specifications

| Linear Servomotor Moving Coil | | 30D | | | 45D | | 90D | | | 1DD | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model SGLFW2-** | | 030A□ | 120A□ | 230A□ | 200A□ | 380A□ | 200A□ | 380A□ | 560A□ | 380A□ | 560A□ |
| Time Rating | | Continuous | | | | | | | | | |
| Thermal Class | | B | | | | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | | | | | |
| Withstand Voltage | | 1,800 VAC for 1 minute | | | | | | | | | |
| Excitation | | Permanent magnet | | | | | | | | | |
| Cooling Method | | Self-cooled or water-cooled* | | | | | | | | | |
| Protective Structure | | IP00 | | | | | | | | | |
| Environmental Conditions | Ambient Temperature | 0°C to 40°C (without freezing) | | | | | | | | | |
| | Ambient Humidity | 20% to 80% relative humidity (without condensation) | | | | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | | | | | |
| Shock Resistance | Impact Acceleration Rate | 196 $m/s^2$ | | | | | | | | | |
| | Number of Impacts | 2 times | | | | | | | | | |
| Vibration Resistance | Vibration Acceleration Rate | 49 $m/s^2$ (the vibration resistance in three directions, vertical, side-to-side, and front-to-back) | | | | | | | | | |

* Contact your Yaskawa representative for information on water-cooled models.

## Ratings

| Linear Servomotor Moving Coil | | 30D | | | 45D | | |
|---|---|---|---|---|---|---|---|
| **Model SGLFW2-** | | 070A□ | 120A□ | 230A□ | 200A□ | 380A□ | |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | m/s | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Maximum Speed*1 | m/s | 5.0 | 5.0 | 5.0 | 4.5 | 4.5 | |
| Rated Force*1, *2 | N | 45 | 90 | 180 | 280 | 560 | |
| Maximum Force*1 | N | 135 | 270 | 540 | 840 | 1500 | 1680 |
| Rated Current*1 | A | 1.4 | 1.5 | 1.5 | 2.2 | 4.3 | |
| Maximum Current*1 | A | 5.3 | 5.2 | 5.1 | 8.1 | 13.6 | 16.2 |
| Moving Coil Mass | kg | 0.50 | 0.90 | 1.7 | 2.9 | 5.4 | |
| Force Constant | N/A | 33.3 | 64.5 | 129.0 | 137.0 | 136.7 | |
| BEMF Constant | Vrms / (m/s) / phase | 11.1 | 21.5 | 43.0 | 45.6 | 45.6 | |
| Motor Constant | N/√W | 11.3 | 17.3 | 24.4 | 37.6 | 53.2 | |
| Electrical Time Constant | ms | 7.6 | 7.3 | 7.3 | 20 | 19.6 | |
| Mechanical Time Constant | ms | 3.9 | 3.0 | 2.9 | 2.1 | 1.9 | |
| Thermal Resistance (with Heat Sink) | K/W | 2.62 | 1.17 | 0.79 | 0.60 | 0.44 | |
| Thermal Resistance (without Heat Sink) | K/W | 11.3 | 4.43 | 2.55 | 2.64 | 1.49 | |
| Magnetic Attraction | N | 200 | 630 | 1260 | 2120 | 4240 | |
| Combined Magnetic Way, SGLFM2- | | 30□□□A | | | 45□□□A | | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 651 | 652 | 653 | 654 | 655 | |
| Applicable SERVOPACKs | SGD7S-<br>SGD7W- | 1R9D<br>2R6D | 1R9D<br>2R6D | 1R9D<br>2R6D | 3R5D<br>2R6D | 5R4D<br>5R4D | 8R4D<br>- |

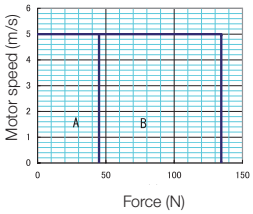
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*2. The rated forces are the continuous allowable force values at a ambient temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
Heat Sink Dimensions:
- 150 mm × 100 mm × 10 mm: SGLFW2-30D070A
- 254 mm × 254 mm × 25 mm: SGLFW2-30D120A and -30D230A
- 400 mm × 500 mm × 40 mm: SGLFW2-45D200A and -45D380A

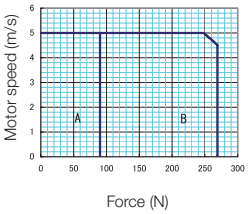
## Force-motor speed characteristics

A : Continuous duty zone ———— With three-phase 400-V input
B : Intermittent duty zone - - - - - - - - With three-phase 400-V input

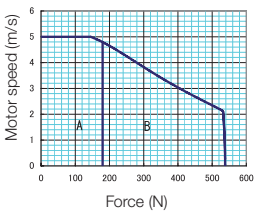
SGLFW2-30D070A



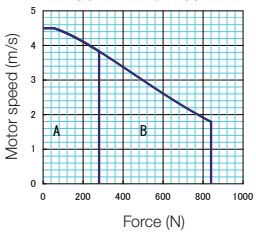

SGLFW2-30D120A



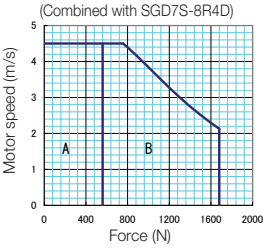

SGLFW2-30D230A



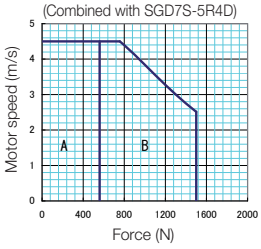

SGLFW2-45D200A




SGLFW2-45D380A
(Combined with SGD7S-8R4D)




SGLFW2-45D380A
(Combined with SGD7S-5R4D)




Notes:

1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

## Ratings

| Linear Servomotor Moving Coil | | 90D | | | 1DD | |
|---|---|---|---|---|---|---|
| **Model SGLFW2-** | | **200A□** | **380A□** | **560A□** | **380A□** | **560A□** |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | m/s | 4.0 | 4.0 | 4.0 | 3.5 | 3.5 |
| Maximum Speed*1 | m/s | 4.0 | 4.0 | 4.0 | 3.5 | 3.5 |
| Rated Force*1, *2 | N | 560 | 1120 | 1680 | 1680 | 2520 |
| Maximum Force*1 | N | 1680 | 3360 | 5040 | 5040 | 7560 |
| Rated Current*1 | A | 3.8 | 7.7 | 11.5 | 10.9 | 16.3 |
| Maximum Current*1 | A | 14.0 | 28.0 | 42.0 | 39.7 | 59.6 |
| Moving Coil Mass | kg | 5.3 | 10.1 | 14.9 | 14.6 | 21.5 |
| Force Constant | N/A | 154.0 | 154.0 | 154.0 | 163.0 | 163.0 |
| BEMF Constant | Vrms / (m/s) / phase | 51.3 | 51.3 | 51.3 | 54.3 | 54.3 |
| Motor Constant | N/√W | 59.2 | 83.7 | 102 | 103 | 126 |
| Electrical Time Constant | ms | 24 | 24 | 24 | 25 | 25 |
| Mechanical Time Constant | ms | 1.5 | 1.4 | 1.4 | 1.4 | 1.3 |
| Thermal Resistance (with Heat Sink) | K/W | 0.45 | 0.21 | 0.18 | 0.18 | 0.12 |
| Thermal Resistance (without Heat Sink) | K/W | 1.81 | 1.03 | 0.72 | 0.79 | 0.55 |
| Magnetic Attraction | N | 4240 | 8480 | 12700 | 12700 | 19100 |
| Combined Magnetic Way, SGLFM2- | | | 90□□□A | | 1D□□□A | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 657 | 658 | 659 | 660 | 661 |
| Applicable SERVOPACKs | SGD7S- | 5R4D | 120D | 170D | 170D | 260D*3 |

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

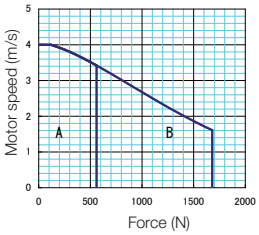
*2. The rated forces are the continuous allowable force values at a ambient air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
Heat Sink Dimensions:
- 400 mm × 500 mm × 25 mm: SGLFW2-90D200A
- 609 mm × 762 mm × 40 mm: SGLFW2-90D380A
- 900 mm × 762 mm × 40 mm: SGLFW2-90D560A and -1DD380A
- 1400 mm x 900 mm x 40 mm: SGLFW2-1DD560A

*3. Contact your Yaskawa representative for information on these servopack models.

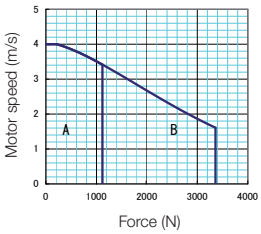
## Force-motor speed characteristics

A : Continuous duty zone ———— With three-phase 400-V input
B : Intermittent duty zone - - - - - - - - With three-phase 400-V input

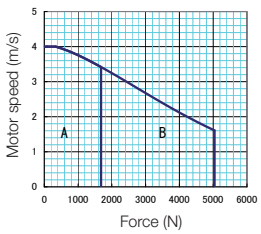
SGLFW2-90D200A



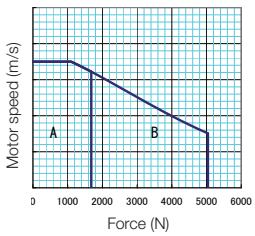

SGLFW2-90D380A



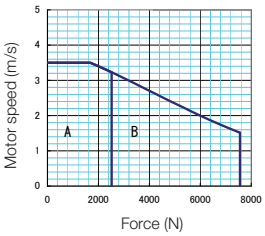

SGLFW2-90D560A




SGLFW2-1DD380A




SGLFW2-1DD560A



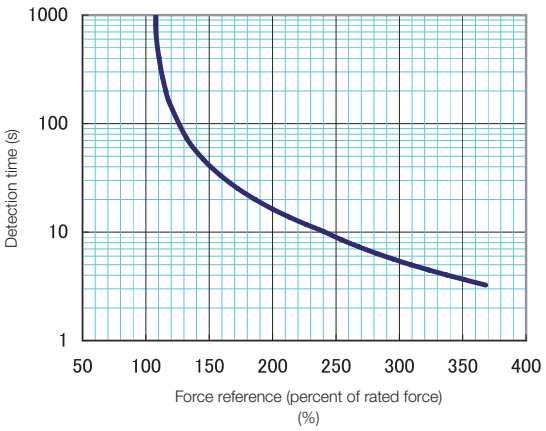

Notes:

1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

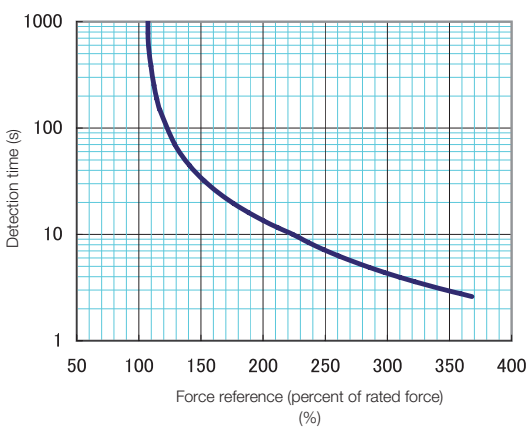
## Servomotor overload protection characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

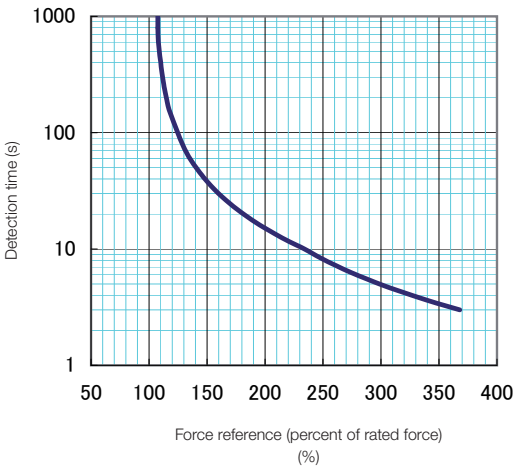
SGLFW2-30D070A




SGLFW2-30D120A and -230A




SGLFW2-45D, -90D, and -1DD

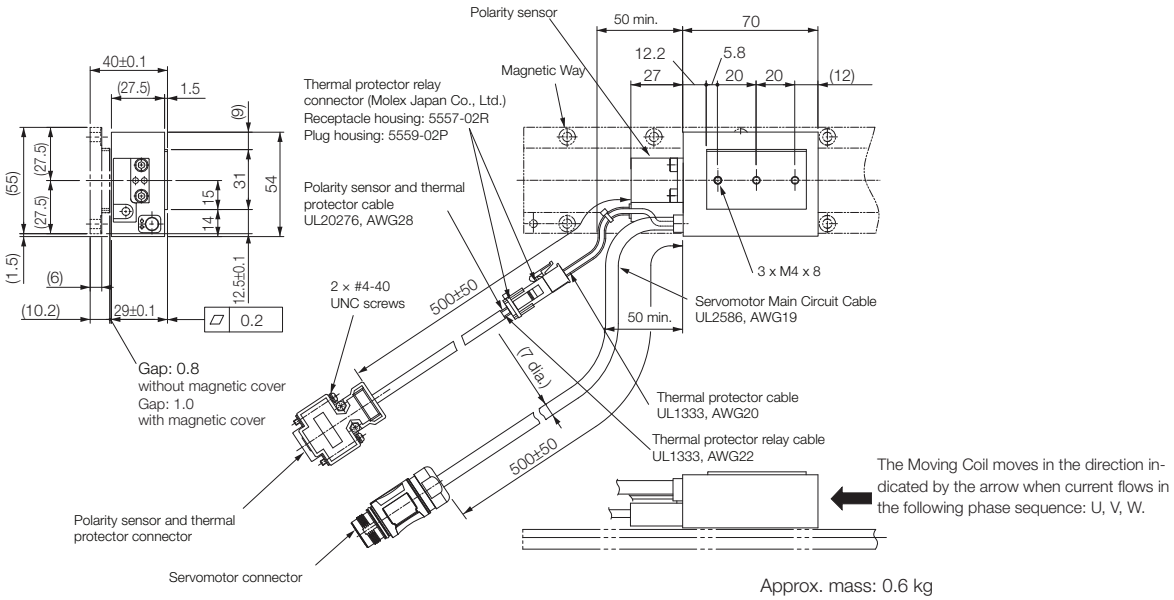



Notes:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in Force-Motor Speed Characteristics.

# External dimensions

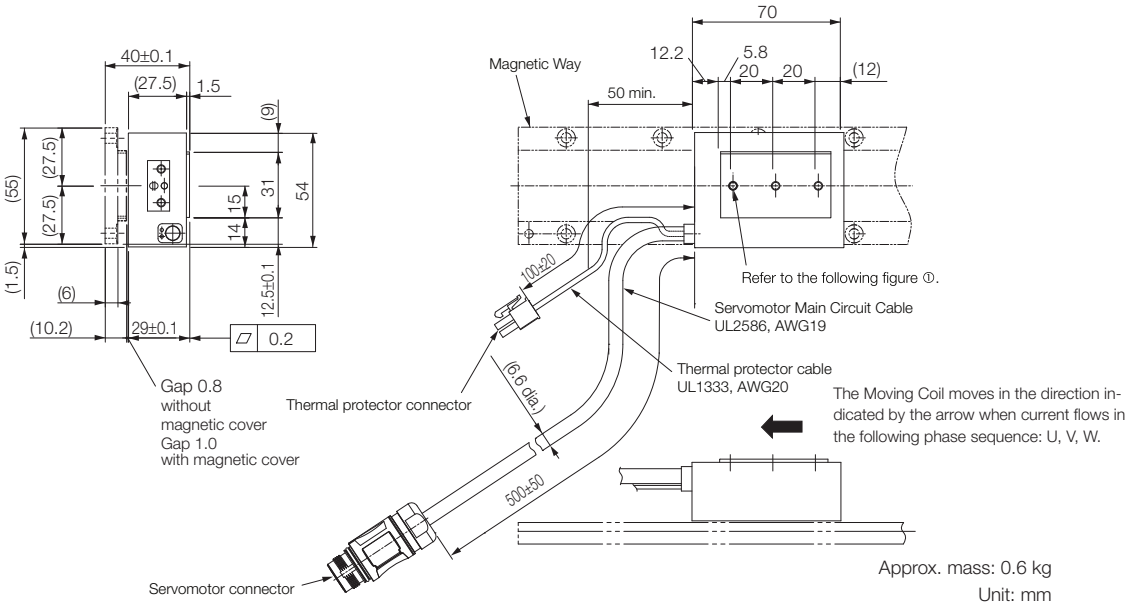
## SGLFW2-30

### Moving Coil with Polarity Sensor: SGLFW2-30D070AS




Approx. mass: 0.6 kg
Unit: mm

### Moving Coil without Polarity Sensor: SGLFW2-30D070AT

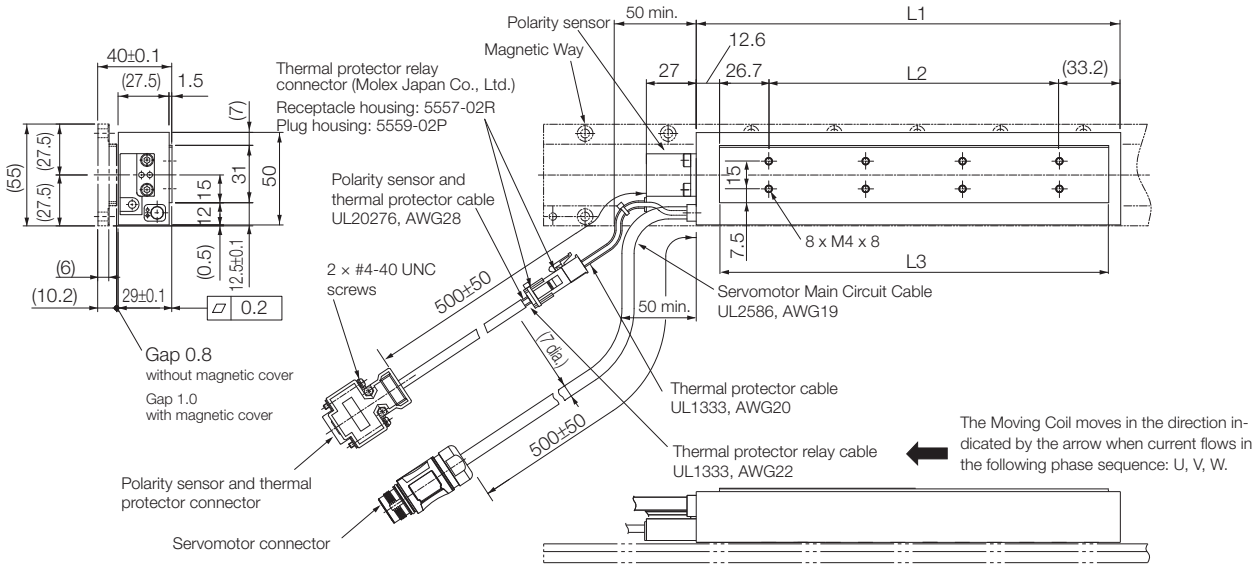



Approx. mass: 0.6 kg
Unit: mm

| Moving Coil Model SGLFM2- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 30D070AS<br>30D070AT | 70 | 40 | 54.6 | 0.6 |

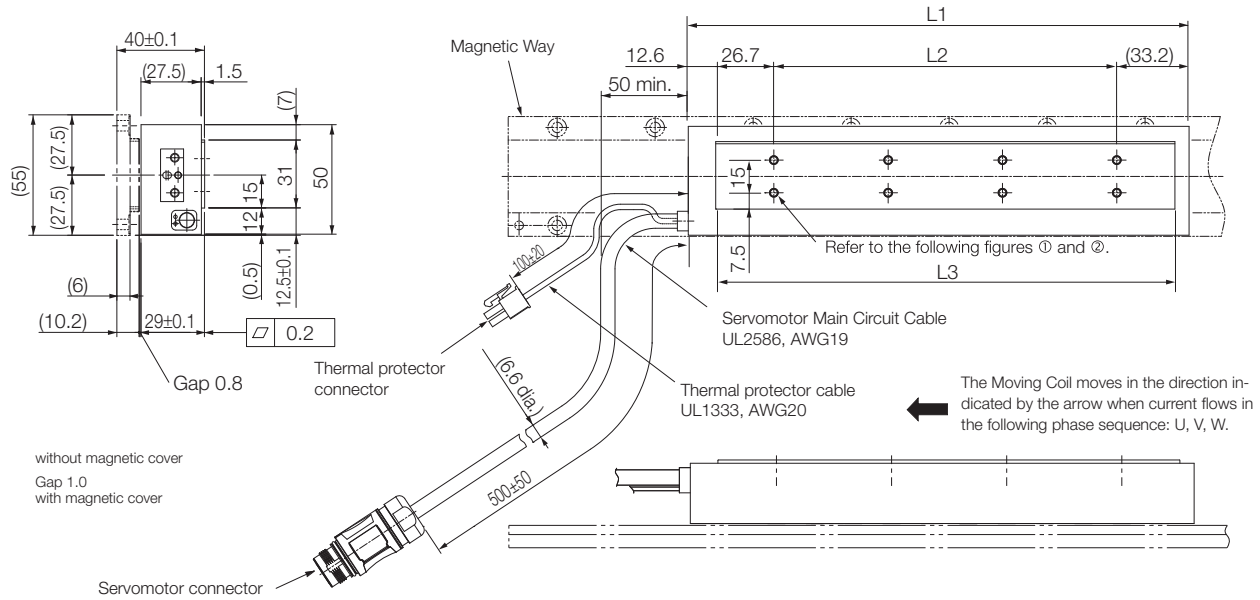
Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-30 and -45.

## Moving Coils with Polarity Sensors: SGLFW2-30D□□□AS




Unit: mm

## Moving Coils without Polarity Sensors: SGLFW2-30D□□□AT

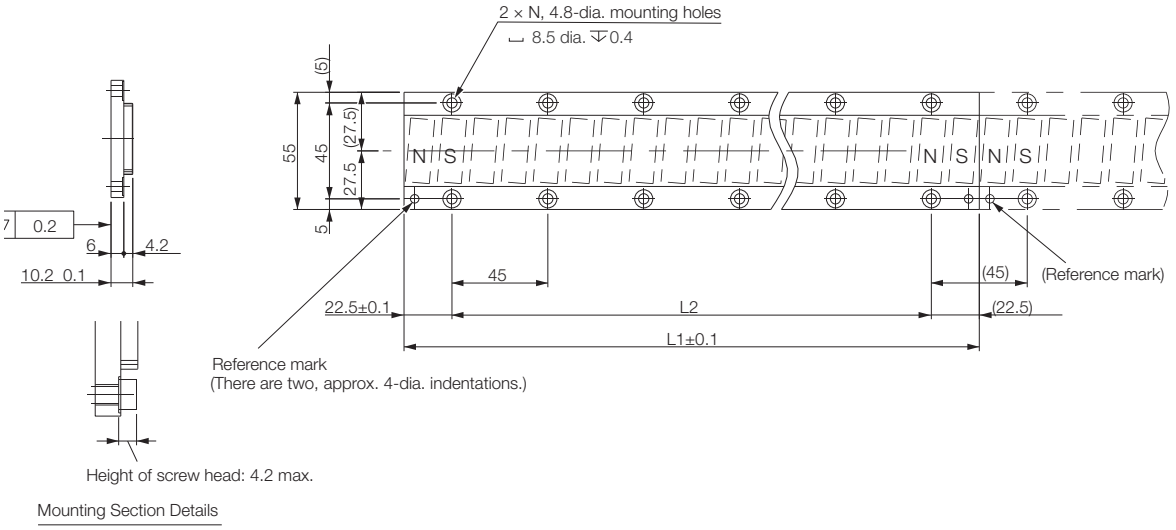



Unit: mm

| Moving Coil Model SGLFM2- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 30D120A□ | 125 | 52.5 | 105.9 | 1.0 |
| 30D230A□ | 230 | 157.5 | 210.9 | 1.8 |

Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-30 and -45.

## Magnetic Ways: SGLFM2-30□□□A



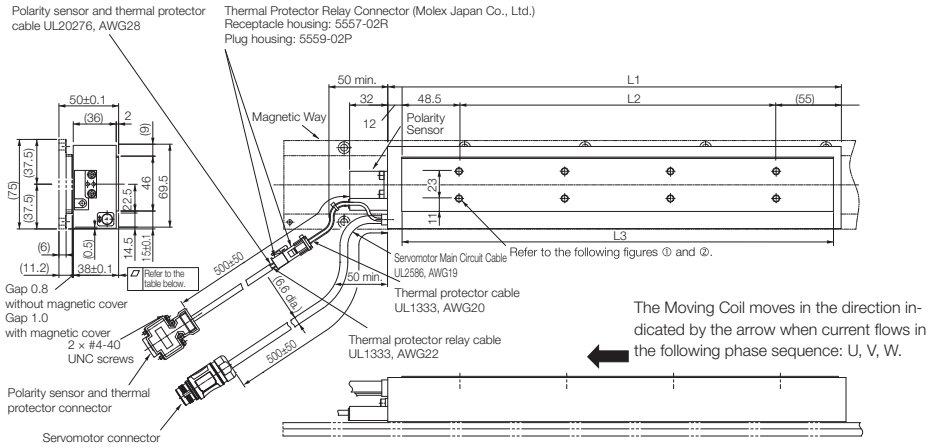

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Mgnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| **30270A** | 270 | 225 (45 × 5) | 6 | 0.9 |
| **30450A** | 450 | 405 (45 × 9) | 10 | 1.5 |
| **30630A** | 630 | 585 (45 × 13) | 14 | 2.0 |

# SGLFW2-45

## Moving Coils with Polarity Sensors: SGLFW2-45D□□□AS

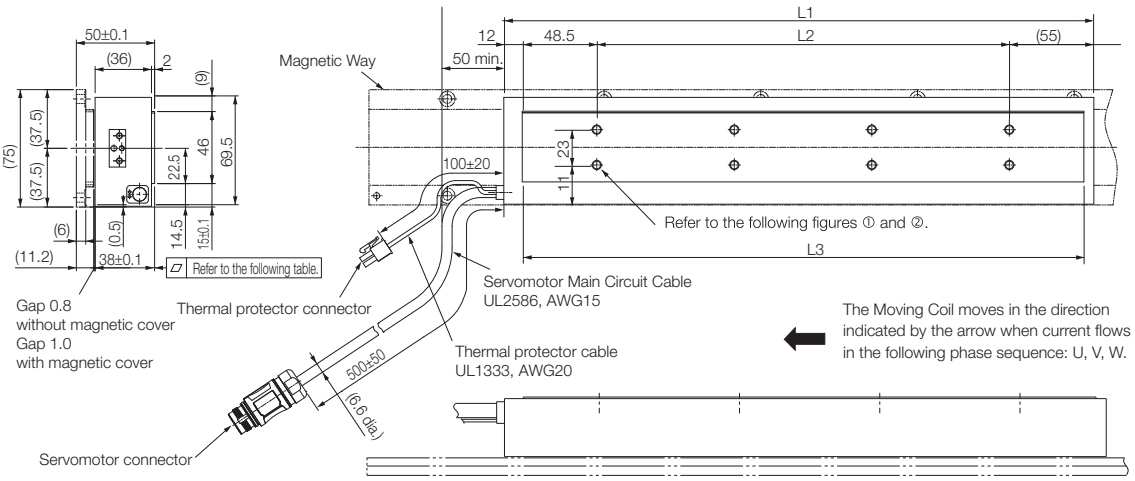



Unit: mm

| Moving Coil Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| **45D200AS** | 205 | 89.5 | 187 | 0.2 | 2.9 |
| **45D380AS** | 384 | 268.5 | 365.5 | 0.3 | 5.5 |

Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-30 and -45.

## Moving Coils without Polarity Sensors: SGLFW2-45D□□□AT

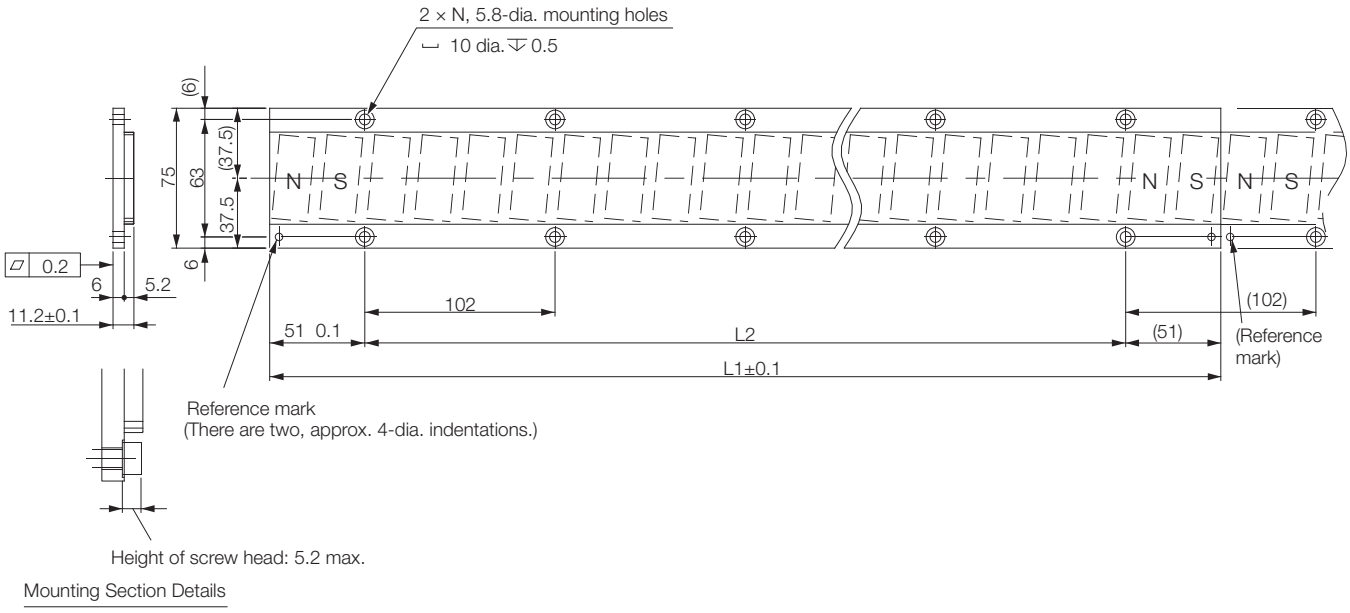



Unit: mm

| Moving Coil Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| **45D200AT** | 205 | 89.5 | 187 | 0.2 | 2.9 |
| **45D380AT** | 384 | 268.5 | 365.5 | 0.3 | 5.5 |

Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-30 and -45.

## Magnetic Ways: SGLFM2-45□□□A



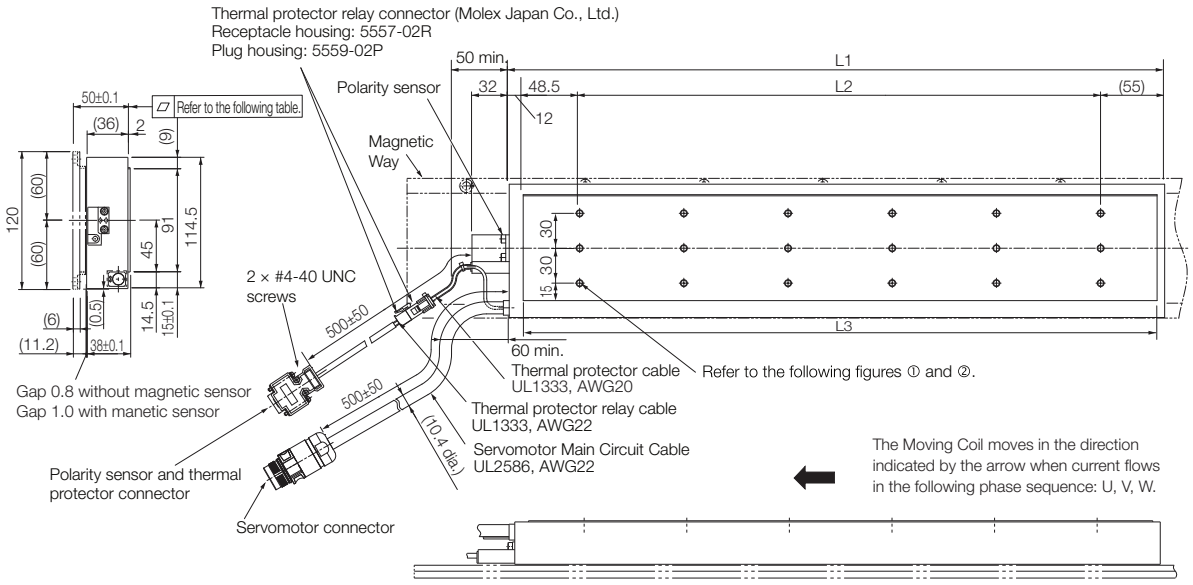

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Mgnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| **45306A** | 306 | 204 (102 × 2) | 3 | 1.5 |
| **45510A** | 510 | 408 (102 × 4) | 5 | 2.5 |
| **45714A** | 714 | 612 (102 × 6) | 7 | 3.4 |

# SGLFW2-90

## Moving Coils with Polarity Sensors: SGLFW2-90D□□□AS

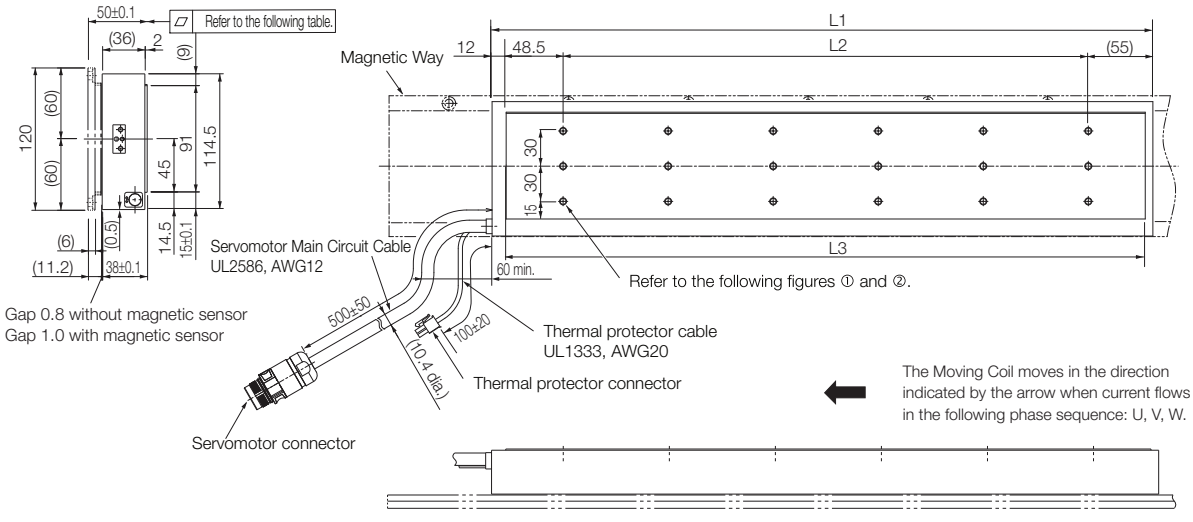



Unit: mm

| Moving Coil Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90D200AS | 205 | 89.5 | 187 | 0.2 | 5.3 |
| 90D380AS | 384 | 268.5 | 365.5 | 0.3 | 10.1 |
| 90D560AS | 563 | 447.5 | 544 | 0.3 | 14.9 |

Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-90 and -1D.

## Moving Coils without Polarity Sensors: SGLFW2-90D□□□AT

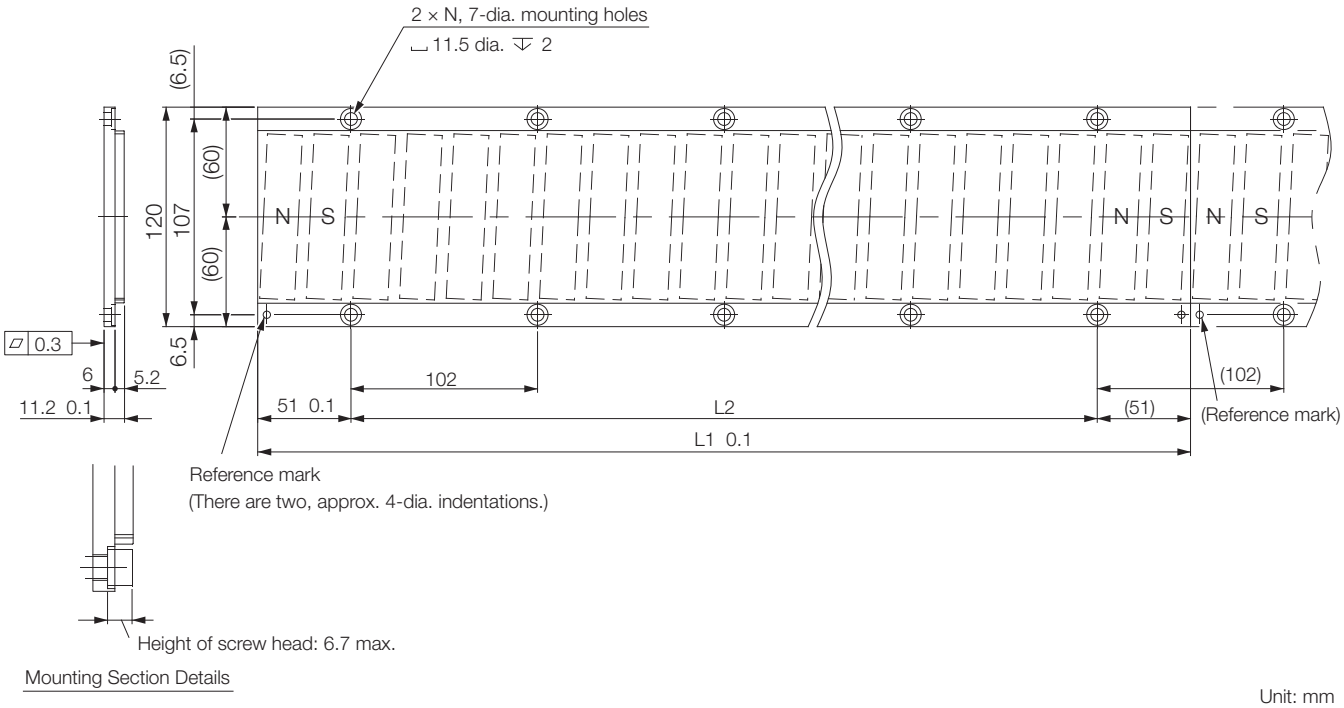



Unit: mm

| Moving Coil Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90D200AT | 205 | 89.5 | 187 | 0.2 | 5.3 |
| 90D380AT | 384 | 268.5 | 365.5 | 0.3 | 10.1 |

Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-90 and -1D.

## Magnetic Ways: SGLFM2-90□□□A



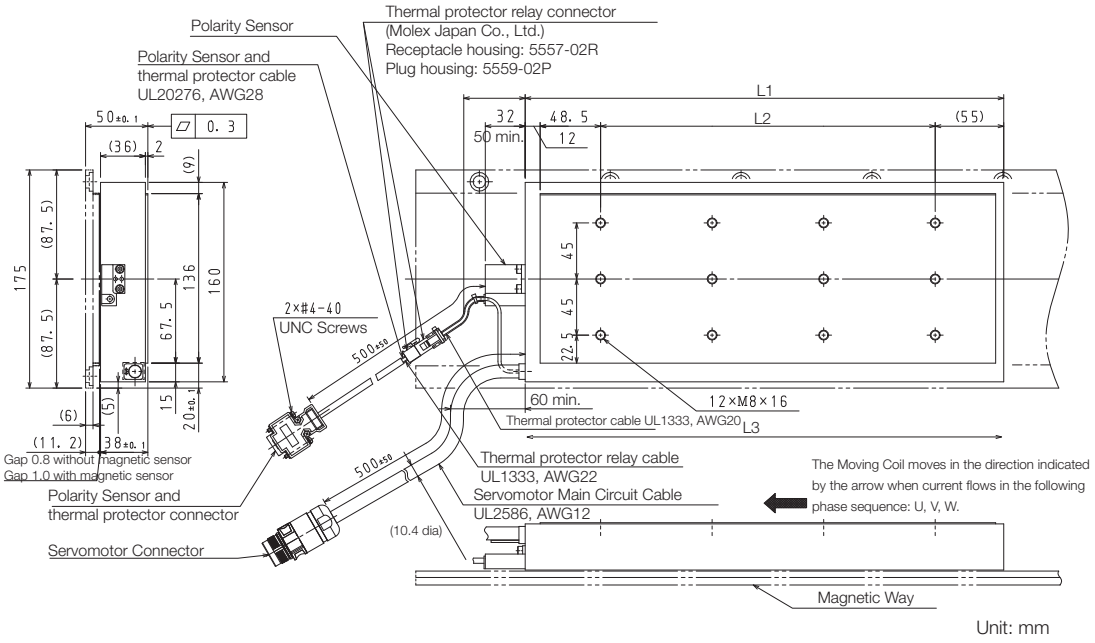

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Magnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| **90306A** | 306 | 204 (102 × 2) | 3 | 2.6 |
| **90510A** | 510 | 408 (102 × 4) | 5 | 4.2 |
| **90714A** | 714 | 612 (102 × 6) | 7 | 5.9 |

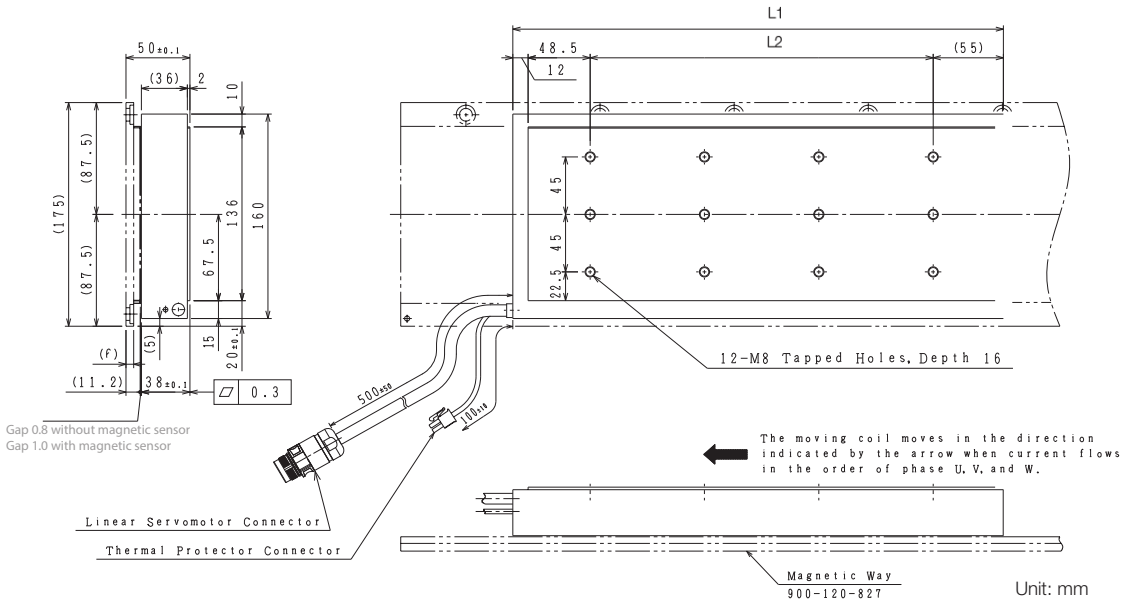
# SGLFW2-1D

## Moving Coils with Polarity Sensors: SGLFW2-1DD□□□AS




Unit: mm

## Moving Coils without Polarity Sensors: SGLFW2-1DD□□□AT



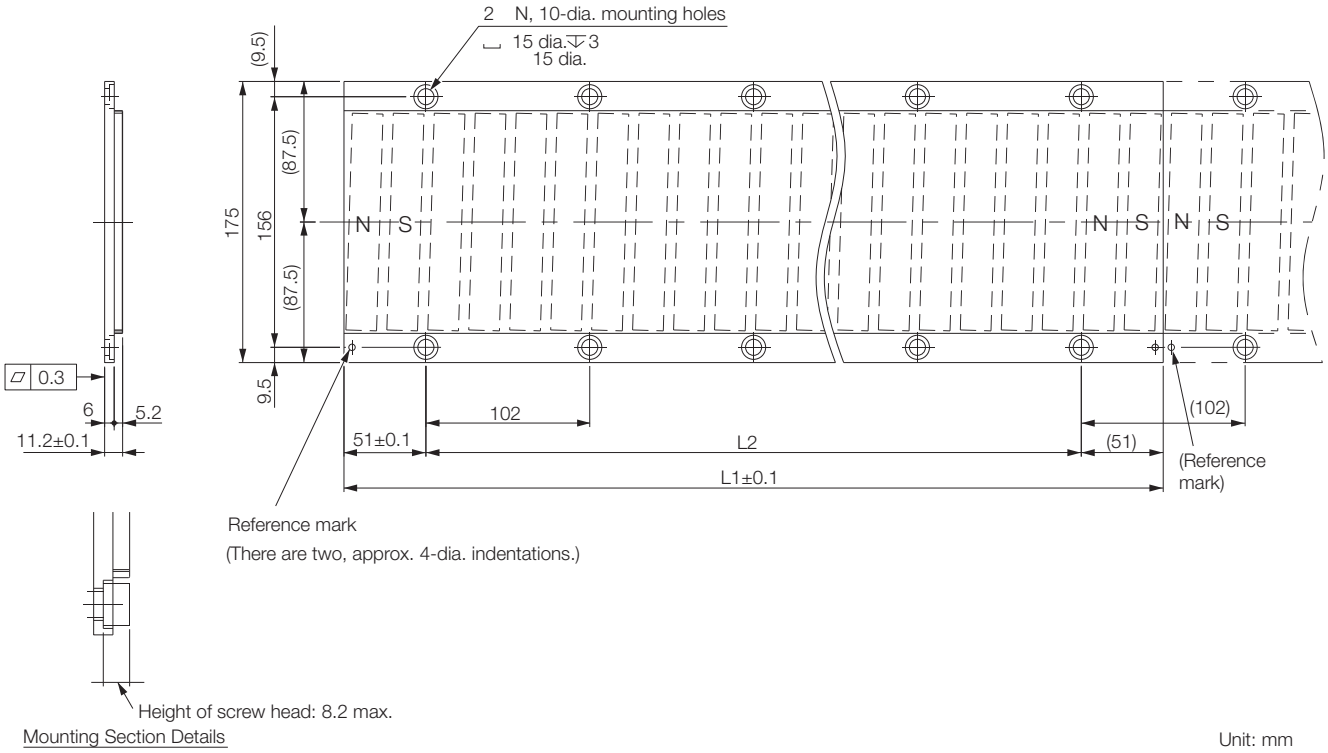

Unit: mm

Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-90 and -1D.

| Moving Coil Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 1DD380A□ | 384 | 268.5 | 365.5 | 0.3 | 14.6 |
| 1DD560A□ | 563 | 447.5 | 544 | 0.3 | 21.5 |

Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-90 and -1D.

## Magnetic Ways: SGLFM2-1D□□□A




Unit: mm

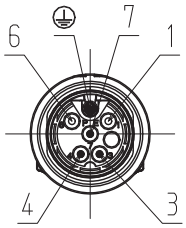
Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Magnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| **1D306A** | 306 | 204 (102 × 2) | 3 | 3.7 |
| **1D510A** | 510 | 408 (102 × 4) | 5 | 6.2 |
| **1D714A** | 714 | 612 (102 × 6) | 7 | 8.6 |

# Connector specifications

## Moving Coils with Polarity Sensors: SGLFW2-30 and -45

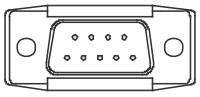
- Servomotor Connector




Connector: ST-5EP1N8A9003S (1607706)
Contact: ST-10KP030 (1618261)
From Phoenix Contact GmbH & Co. KG

| | |
|---|---|
| 1 | - |
| 3 | Phase U |
| 4 | Phase V |
| 6 | - |
| 7 | Phase W |
| Ground | FG |
| Case | Shield |

- Polarity Sensor and Thermostat Connector



Pin connector: 17JE-23090-02 (D8C) -CG
From DDK Ltd.

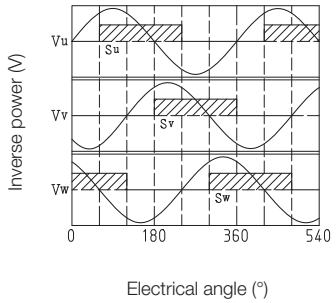
Mating Connector
Socket connector: 17JE-13090-02 (D8C) A-CG
Studs: 17L-002C or 17L-002C1

| | |
|---|---|
| 1 | +5 V (thermal protector)<br>+5 V (power supply) |
| 2 | Su |
| 3 | Sv |
| 4 | Sw |
| 5 | 0 V (power supply) |
| 6 | Not used |
| 7 | |
| 8 | |
| 9 | Thermal protector |

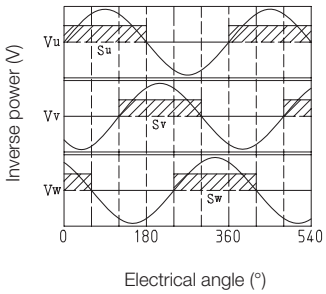
- Polarity Sensor Output Signal

The following figures show the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.

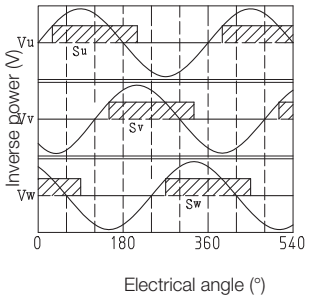
SGLFW2-30D070AS




SGLFW2-30D120AS
SGLFW2-30D230AS

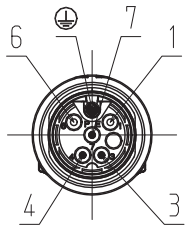



SGLFW2-45D200AS
SGLFW2-45D380AS



## Moving Coils without Polarity Sensors: SGLFW2-30 and -45

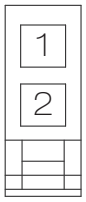
### • Servomotor Connector




Connector: ST-5EP1N8A9003S (1607706)
Contact: ST-10KP030 (1618261)
From Phoenix Contact GmbH & Co. KG

| | |
|---|---|
| 1 | - |
| 3 | Phase U |
| 4 | Phase V |
| 6 | - |
| 7 | Phase W |
| Ground | FG |
| Case | Shield |

### • Thermostat Connector



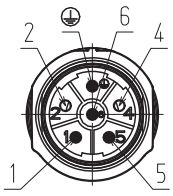

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan Co., Ltd.

Mating Connector
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

| | |
|---|---|
| 1 | Thermal protector |
| 2 | Thermal protector |

## Moving Coils with Polarity Sensors: SGLFW2-90 and -1D

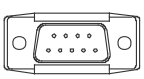
### • Servomotor Connector




Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

| | |
|---|---|
| 1 | Phase V |
| 2 | - |
| 4 | - |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

### • Polarity Sensor and Thermostat Connector



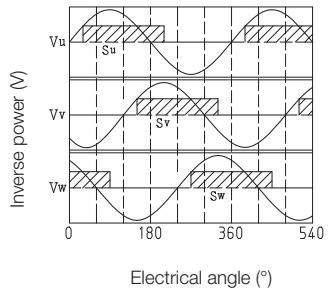
Pin connector: 17JE-23090-02 (D8C) -CG
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C) A-CG
Studs: 17L-002C or 17L-002C1

| | |
|---|---|
| 1 | +5 V (thermal protector)<br>+5 V (power supply) |
| 2 | Su |
| 3 | Sv |
| 4 | Sw |
| 5 | 0 V (power supply) |
| 6 | Not used |
| 7 | |
| 8 | |
| 9 | Thermal protector |

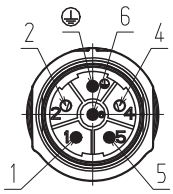
### • Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.




## Moving Coils without Polarity Sensors: SGLFW2-90D and -1DD

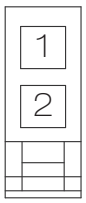
### • Servomotor Connector




Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

| | |
|---|---|
| 1 | Phase V |
| 2 | - |
| 4 | - |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

### • Thermostat Connector

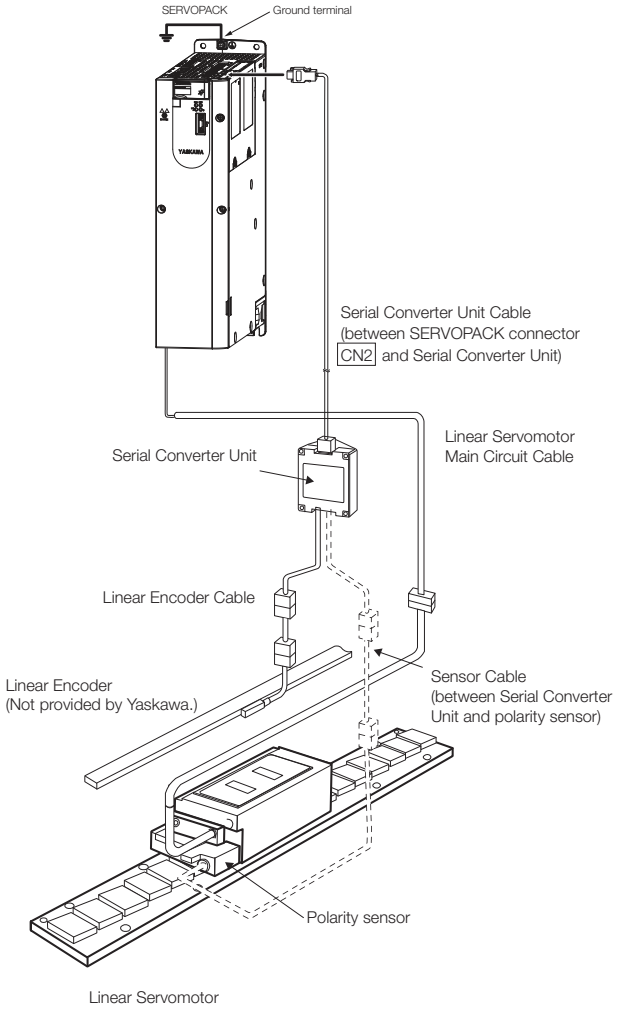



Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan Co., Ltd.

Mating Connector
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

| | |
|---|---|
| 1 | Thermal protector |
| 2 | Thermal protector |

# System configurations



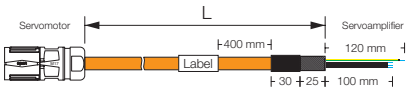
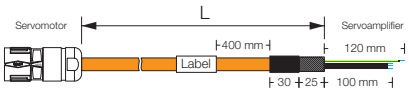
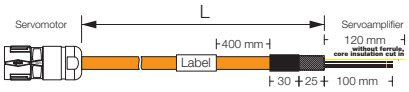

* You can connect directly to an absolute linear encoder.

Notes:

1. The above system configurations are for SGLFW2 Servomotors with F-Type Iron Cores (with thermal protectors). Refer to the manual for the Linear Servomotor for configurations with other models.
2. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual.

## Power cables for linear servomotors

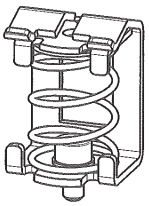
| Linear Motor Model | Cable & connector type | Length | Order No. | Symbolic representation |
|---|---|---|---|---|
| SGLFW2-30D070 to SGLFW2-45D380 | Flexible Power cable 4 x 1.5 mm² with M17 connector | 3 m | JZSP-C7M143-03-E-G# |  |
| | | 5 m | JZSP-C7M143-05-E-G# | |
| | | 10 m | JZSP-C7M143-10-E-G# | |
| | | 15 m | JZSP-C7M143-15-E-G# | |
| | | 20 m | JZSP-C7M143-20-E-G# | |
| SGLFW2-90D200 to SGLFW2-1DD380 | Flexible Power cable 4 x 2.5 mm² with M23 connector | 3 m | JZSP-C7M154-03-E-G# |  |
| | | 5 m | JZSP-C7M154-05-E-G# | |
| | | 10 m | JZSP-C7M154-10-E-G# | |
| | | 15 m | JZSP-C7M154-15-E-G# | |
| | | 20 m | JZSP-C7M154-20-E-G# | |
| SGLFW2-1DD560 | Flexible Power cable 4 x 4 mm² with M23 connector | 3 m | JZSP-C7M164-03-E-G# |  |
| | | 5 m | JZSP-C7M164-05-E-G# | |
| | | 10 m | JZSP-C7M164-10-E-G# | |
| | | 15 m | JZSP-C7M164-15-E-G# | |
| | | 20 m | JZSP-C7M164-20-E-G# | |



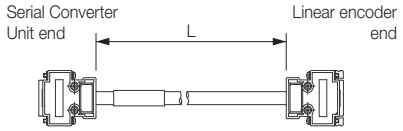
Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

## Motor connection shielding clamp

Shielding clamp mountable on Sigma-7 400 V SERVOPACKs up to 15 kW.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Order No. | Specification |
|---|---|---|
| Sigma-7 400 V up to 3.0 kW | KLBUE 4-13.5_SC |  |
| Sigma-7 400 V from 5 kW up to 7.5 kW | KLBUE 10-20_SC | |
| Sigma-7 400 V for 11 kW & 15 kW | KLBUE 15-32_SC | |

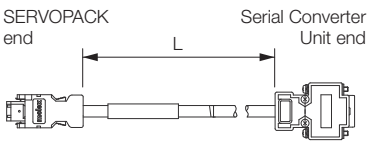
## Linear encoder cables

| Servomotor Model | | Length* | Order No. | Specification |
|---|---|---|---|---|
| All Models | For linear encoder from Renishaw PLC | 1m | JZSP-CLL00-01-E |  |
| | | 3m | JZSP-CLL00-03-E | |
| | | 5m | JZSP-CLL00-05-E | |
| | | 10m | JZSP-CLL00-10-E | |
| | | 15m | JZSP-CLL00-15-E | |
| | For linear encoder from Heidenhain Corporation | 1m | JZSP-CLL30-01-E | |
| | | 3m | JZSP-CLL30-03-E | |
| | | 5m | JZSP-CLL30-05E | |
| | | 10m | JZSP-CLL30-10-E | |
| | | 15m | JZSP-CLL30-15-E | |



* When using a JZDP-J00□-□□□-E Serial Converter Unit, do not exceed a cable length of 3m.

## Serial converter unit cables

| Servomotor Model | Length | Order No. | Specification |
|---|---|---|---|
| All Models | 1m | JZSP-CLP70-01-E |  |
| | 3m | JZSP-CLP70-03-E | |
| | 5m | JZSP-CLP70-05-E | |
| | 10m | JZSP-CLP70-10-E | |
| | 15m | JZSP-CLP70-15-E | |
| | 20m | JZSP-CLP70-20-E | |



### Servoamplifier connector

Connector Kit : JZSP-CMP9-1-E-G1
Receptacle hosung: 55100-0670 (soldered)
From Molex Japan Co., Ltd.

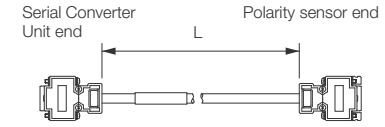
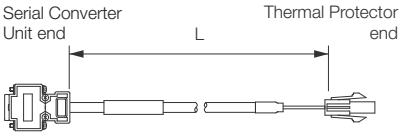
| Pin No. | Function | Wire Color |
|---|---|---|
| Shell | FG | Shield |
| 1 | PG 5V | White |
| 2 | PG 0V | Brown |
| 3 | – | Grey |
| 4 | – | Pink |
| 5 | PS | Green |
| 6 | /PS | Yellow |

### Serial converter connector

Connector Kit: 17JE-23090-02 (D8C)
From DDK Ltd.

| Pin No. | Function | Wire Color |
|---|---|---|
| Shell | FG | Shield |
| 1 | PG +˝5V | White |
| 2 | PS | Green |
| 3 | – | – |
| 4 | – | – |
| 5 | PG 0V | Brown |
| 6 | /PS | Yellow |
| 7 | – | – |
| 8 | – | – |
| 9 | – | – |

## Sensor cables

| Servomotor Model | Length | Order No. | Specification |
|---|---|---|---|
| SGLFW2-□□A□□□AS□ (with Polarity Sensor) | 1 m | JZSP-CL2L100-01-E |   |
| | 3 m | JZSP-CL2L100-03-E | |
| | 5 m | JZSP-CL2L100-05-E | |
| | 10 m | JZSP-CL2L100-10-E | |
| | 15 m | JZSP-CL2L100-15-E | |
| SGLFW2-□□A□□□AT□ (without Polarity Sensor) | 1 m | JZSP-CL2TH00-01-E |   |
| | 3 m | JZSP-CL2TH00-03-E | |
| | 5 m | JZSP-CL2TH00-05E | |
| | 10 m | JZSP-CL2TH00-10-E | |
| | 15 m | JZSP-CL2TH00-15-E | |

## Single Axis

### SGD7S-□□□DA0B

EtherCAT
Communication
Reference



### SGD7S-□□□D30B

MECHATROLINK-III
Communication
Reference



### SGD7S-□□□DC0B

PROFINET
Communication
Reference



### SGD7S-□□□DM0B

Siec (with integrated
iec-Controller)



## Dual Axis

### SGD7W-□□□DA0B

EtherCAT
Communication
Reference



### SGD7W-□□□D30B

MECHATROLINK-III
Communication
Reference



# SERVOPACKs

SGD7S 108
SGD7W 130

# SGD7S Single Axis

## Model designation

### Single axis amplifier

SGD7S - 1R9 D A0 B 000 F64

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th digit |
|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| **Three-phase, 400 V** | |
| 1R9 | 0.5 kW |
| 3R5 | 1.0 kW |
| 5R4 | 1.5 kW |
| 8R4 | 2.0 kW |
| 120 | 3.0 kW |
| 170 | 5.0 kW |
| 210 | 6.0 kW |
| 260 | 7.5 kW |
| 280 | 11.0 kW |
| 370 | 15.0 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| D | 400 V AC |

**5th + 6th digit - Interface*1**

| Code | Specification |
|---|---|
| A0 | EtherCAT communication reference |
| C0 | PROFINET communication reference |
| 30 | MECHATROLINK-III, RJ45 communication reference |
| M0 | Sigma-7Siec (with built-in single-axis control) |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| B | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 026*2 | With relay for holding brake | All models except F91 |
| 800 | With Advanced Safety Module*4 | F91 |
| 826*2 | With Advanced Safety Module and built-in Servomotor brake control*4 | F91 |

**11th ... 13th digit - FT/EX Specification**

| Code | Specification |
|---|---|
| None | Without Options |
| F64*3 | Zone table |
| F50 | Application function for Sigma-7Siec |
| F91 | For use with SGD7S-OSB0□A (including F64 function) |

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

*1. The same SERVOPACKs are used for both rotary and linear servomotors.
*2. For specification of the internal brake relay, please refer to the hardware manual of the amplifier.
*3. Only available for EtherCAT (CoE) and MECHATROLINK-III communication references.
*4. Purchase the Advanced Safety Module (model: SGD7S-OSB□□□) separately.

# Ratings and specifications

## Ratings

### Three-phase, 400 VAC

| Model SGD7S- | | | 1R9D | 3R5D | 5R4D | 8R4D | 120D | 170D | 210D | 260D | 280D | 370D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.5 | 1 | 1.5 | 2 | 3 | 5 | 6 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 1.9 | 3.5 | 5.4 | 8.4 | 11.9 | 16 | 20.8 | 25.7 | 28.1 | 37.2 |
| Instantaneous Maximum Output Current [A] | | | 5.5 | 8.5 | 14 | 21 | 28 | 42 | 55 | 65 | 70 | 85 |
| Main Circuit | Power Supply | | Three-phase, 380 VAC to 480 VAC, -15 % to +10 %, 50 Hz/60 Hz | | | | | | | | | |
| | Input Current [A]* | | 1.4 | 2.9 | 4.3 | 5.8 | 8.6 | 14.5 | 17.4 | 21.7 | 31.8 | 43.4 |
| Control Power Supply | Power Supply | | 24 VDC ±15 % | | | | | | | | | |
| | Input Current [A]* | | 1.2 | | | | | | 1.4 | | 1.5 | |
| Power Supply Capacity [kVA]* | | | 1.1 | 2.3 | 3.5 | 4.5 | 7.1 | 11.7 | 12.4 | 14.4 | 21.9 | 30.6 |
| Power Loss* | Main Circuit Power Loss [W] | | 19.2 | 30 | 62.3 | 89.4 | 136.8 | 188.7 | 188.4 | 228.5 | 278.2 | 389.8 |
| | Control Circuit Power Loss [W] | | 21 | | | | | 22 | 28 | | 32 | |
| | Built-in Regenerative Resistor Power Loss [W] | | 14 | 14 | 28 | 28 | 28 | 36 | (180)* | | (240)* | |
| | Total Power Loss [W] | | 54.2 | 65 | 111.3 | 138.4 | 185.5 | 246.7 | 216.4 | 256.5 | 310.2 | 389.8 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | 75 | 75 | 75 | 43 | 43 | 27 | - | | | |
| | | Capacity [W] | 70 | 70 | 140 | 140 | 140 | 180 | - | | | |
| | Minimum Allowable External Resistance [Ω] | | 75 | 75 | 75 | 43 | 43 | 27 | 18 | | 14.25 | |
| Overvoltage Category | | | III | | | | | | | | | |

* This is the net value at the rated load.

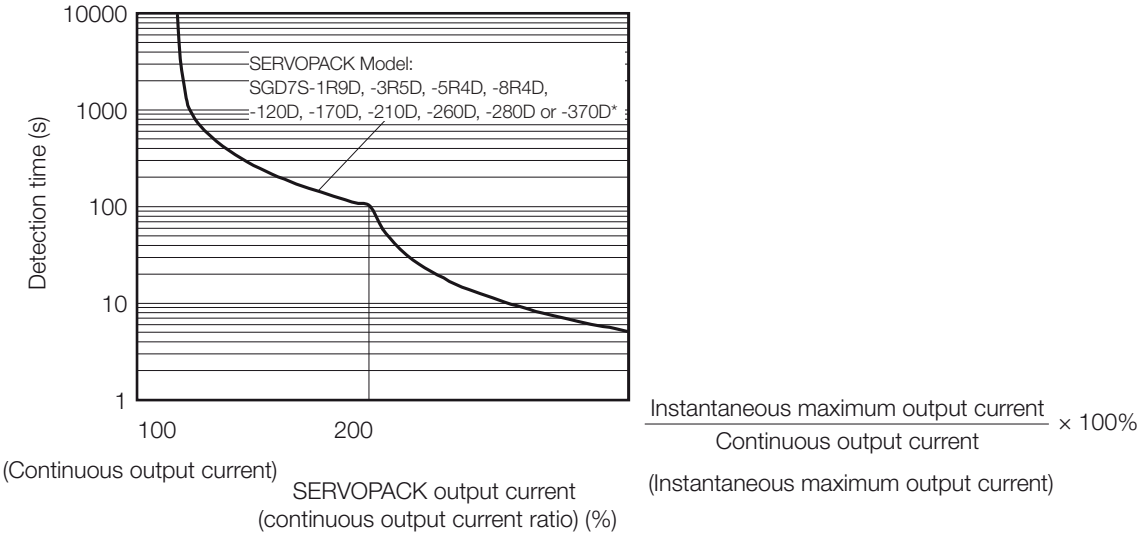
### 540 VDC

| Model SGD7S- | | | 1R9D | 3R5D | 5R4D | 8R4D | 120D | 170D | 210D | 260D | 280D | 370D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.5 | 1 | 1.5 | 2 | 3 | 5 | 6 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 1.9 | 3.5 | 5.4 | 8.4 | 11.9 | 16 | 20.8 | 25.7 | 28.1 | 37.2 |
| Instantaneous Maximum Output Current [A] | | | 5.5 | 8.5 | 14 | 21 | 28 | 42 | 55 | 65 | 70 | 85 |
| Main Circuit | Power Supply | | 513 VDC to 648 VDC, -15 % to +10 % | | | | | | | | | |
| | Input Current [A]* | | 2 | 3.3 | 5.5 | 6.8 | 11 | 18 | 19.6 | 26.2 | 38.3 | 47.6 |
| Control Power Supply | Power Supply | | 24 VDC ±15 % | | | | | | | | | |
| | Input Current [A]* | | 1.2 | | | | | | 1.4 | | 1.5 | |
| Power Supply Capacity [kVA]* | | | 1.1 | 2.3 | 3.5 | 4.5 | 7.1 | 11.7 | 12.4 | 14.4 | 21.9 | 30.6 |
| Power Loss* | Main Circuit Power Loss [W] | | 16.4 | 24.4 | 48.5 | 73.7 | 110.4 | 144.5 | 188.4 | 228.5 | 278.2 | 389.8 |
| | Control Circuit Power Loss [W] | | 21 | | | | | 22 | 28 | | 32 | |
| | Built-in Regenerative Resistor Power Loss [W] | | 14 | 14 | 28 | 28 | 28 | 36 | (180)* | | (240)* | |
| | Total Power Loss [W] | | 37.4 | 45.4 | 69.5 | 94.7 | 131.4 | 166.5 | 216.4 | 228.5 | 310.2 | 389.8 |
| Overvoltage Category | | | III | | | | | | | | | |

* This is the net value at the rated load.

## SERVOPACK overload protection characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C*.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics. In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a Yaskawa-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.
* However, the range for the SGD7S-370D is -5°C to 40°C.

# Specifications using EtherCAT communication reference

| Item | | | Specification |
|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 24 bits (incremental encoder/absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Surrounding Air Temperature*1 | | -5°C to 55°C (60°C with derating)<br>However, the range for the SGD7S-370D is -5°C to 40°C. |
| | Storage Temperature | | -20°C to 85°C |
| | Surrounding Air Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 $m/s^2$ |
| | Shock Resistance | | 19.6 $m/s^2$ |
| | Degree of Protection | | IP10 |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | | 1,000 m or less (above 1,000 m with derating) |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | Refer to the section Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK). |
| Mounting | | | Base-mounted |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*2 | | ±0.01 % of rated speed max. (for a load fluctuation of 0 % to 100 %) |
| | | | 0% of rated speed max. (for a voltage fluctuation of ±10 %) |
| | | | ±0.1 % of rated speed max. (for a temperature fluctuation of 25 °C ±25 °C) |
| | Torque Control Precision (Repeatability) | | ±1 % |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20 %<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /Probe1 (Probe 1 Latch Input) signal<br>• /Probe2 (Probe 2 Latch Input) signal<br>• /Home (Home Switch Input) signal<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• /SI0 and /SI3 (General-Purpose Input) signals<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 5<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>• /ZONE0 (ZONE Signal 1 Output) signal<br>• /ZONE1 (ZONE Signal 2 Output) signal<br>• /ZONE2 (ZONE Signal 3 Output) signal<br>• /ZONE3 (ZONE Signal 4 Output) signal<br>• /nZONE (nZONE Output) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN502) | Interfaces | Digital Operator (JUSP-OP05A-1-E) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+)<br>The software version of the SigmaWin+ must be version 7.11 or higher. |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |

Continued on next page.

Continued from previous page.

| Item | | Specification |
|---|---|---|
| Displays/Indicators | | CHARGE, PWR, RUN, ERR, and L/A (A and B) indicators, and one-digit seven-segment display |
| EtherCAT Communications Setting Switches | | EtherCAT secondary address (S1 and S2), 16 positions |
| EtherCAT Communications | Applicable Communications Standards | IEC 61158 Type 12, IEC 61800-7 CiA402 Drive Profile |
| | Physical Layer | 100BASE-TX (IEEE 802.3) |
| | Communications Connectors | CN6A (RJ45): EtherCAT signal input connector<br>CN6B (RJ45): EtherCAT signal output connector |
| | Cable | Category 5, 4 shielded twisted pairs<br>* The cable is automatically detected with AUTO MDIX. |
| | Sync Manager | SM0: Mailbox output, SM1: Mailbox input, SM2: Process data output, and SM3: Process data input |
| | FMMU | FMMU 0: Mapped in process data output (RxPDO) area.<br>FMMU 1: Mapped in process data input (TxPDO) area.<br>FMMU 2: Mapped to mailbox status. |
| | EtherCAT Commands (Data Link Layer) | APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, and FRMW<br>(APRW, FPRW, BRW, and LRW commands are not supported.) |
| | Process Data | Assignments can be changed with PDO mapping. |
| | Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, and SDO information<br>(TxPDO/RxPDO and remote TxPDO/RxPDO are not supported.) |
| | Distributed Clocks | Free-Run Mode and DC Mode (Can be switched.)<br>Applicable DC cycles: 125 µs to 4 ms in 125-µs increments |
| | Slave Information Interface | 256 bytes (read-only) |
| | Indicators | EtherCAT communications in progress: Link/Activity x 2<br>EtherCAT communications status: RUN x 1<br>EtherCAT error status: ERR x 1 |
| CiA402 Drive Profile | | • Homing Mode<br>• Profile Position Mode<br>• Interpolated Position Mode<br>• Profile Velocity Mode<br>• Profile Torque Mode<br>• Cyclic Synchronous Position Mode<br>• Cyclic Synchronous Velocity Mode<br>• Cyclic Synchronous Torque Mode<br>• Touch Probe Function<br>• Torque Limit Function |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1 %): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in<br>Refer to the catalog for details. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Fully-closed Modules, Option Module Safety |

*1. If you combine a Sigma-7 SERVOPACK with a Sigma-V Option Module, the surrounding air temperature specification of the Sigma-V SERVOPACKs must be used, i.e., 0 °C to 55 °C. Also, the applicable surrounding range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. The SGD7S-210D, -260D, -280D, and -370D do not have a dynamic brake (DB). If a dynamic brake is necessary, create an external dynamic brake circuit.

*4. Always perform risk assessment for the system and confirm that the safety requirements are met.

# Specifications using Sigma-7Siec communication reference

| Item | | | Specification |
|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 24 bits (incremental encoder/absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Surrounding Air Temperature*1 | | -5°C to 55°C (60°C with derating)<br>However, the range for the SGD7S-370D is -5°C to 40°C. |
| | Storage Temperature | | -20°C to 85°C |
| | Surrounding Air Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 $m/s^2$ |
| | Shock Resistance | | 19.6 $m/s^2$ |
| | Degree of Protection | | IP10 |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | | 1,000 m or less (above 1,000 m with derating) |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | Refer to the section Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK). |
| Mounting | | | Base-mounted |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*2 | | ±0.01 % of rated speed max. (for a load fluctuation of 0 % to 100 %) |
| | | | 0% of rated speed max. (for a voltage fluctuation of ±10 %) |
| | | | ±0.1 % of rated speed max. (for a temperature fluctuation of 25 °C ±25 °C) |
| | Torque Control Precision (Repeatability) | | ±1 % |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20 %<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /Probe1 (Probe 1 Latch Input) signal<br>• /Probe2 (Probe 2 Latch Input) signal<br>• /Home (Home Switch Input) signal<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• /SI0 and /SI3 (General-Purpose Input) signals<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 5<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>• /ZONE0 (ZONE Signal 1 Output) signal<br>• /ZONE1 (ZONE Signal 2 Output) signal<br>• /ZONE2 (ZONE Signal 3 Output) signal<br>• /ZONE3 (ZONE Signal 4 Output) signal<br>• /nZONE (nZONE Output) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN502) | Interfaces | Digital Operator (JUSP-OP05A-1-E) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+)<br>The software version of the SigmaWin+ must be version 7.11 or higher. |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |

Continued on next page.

Continued from previous page.

| Item | | Specification |
|---|---|---|
| Displays/Indicators | | CHARGE, PWR, RUN, ERR, and L/A (A and B) indicators, and one-digit seven-segment display |
| EtherCAT Communications Setting Switches | | EtherCAT secondary address (S1 and S2), 16 positions |
| EtherCAT Communications | Applicable Communications Standards | IEC 61158 Type 12, IEC 61800-7 CiA402 Drive Profile |
| | Physical Layer | 100BASE-TX (IEEE 802.3) |
| | Communications Connectors | CN6A (RJ45): EtherCAT signal input connector<br>CN6B (RJ45): EtherCAT signal output connector |
| | Cable | Category 5, 4 shielded twisted pairs<br>* The cable is automatically detected with AUTO MDIX. |
| | Sync Manager | SM0: Mailbox output, SM1: Mailbox input, SM2: Process data output, and SM3: Process data input |
| | FMMU | FMMU 0: Mapped in process data output (RxPDO) area.<br>FMMU 1: Mapped in process data input (TxPDO) area.<br>FMMU 2: Mapped to mailbox status. |
| | EtherCAT Commands (Data Link Layer) | APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, and FRMW<br>(APRW, FPRW, BRW, and LRW commands are not supported.) |
| | Process Data | Assignments can be changed with PDO mapping. |
| | Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, and SDO information<br>(TxPDO/RxPDO and remote TxPDO/RxPDO are not supported.) |
| | Distributed Clocks | Free-Run Mode and DC Mode (Can be switched.)<br>Applicable DC cycles: 125 µs to 4 ms in 125-µs increments |
| | Slave Information Interface | 256 bytes (read-only) |
| | Indicators | EtherCAT communications in progress: Link/Activity x 2<br>EtherCAT communications status: RUN x 1<br>EtherCAT error status: ERR x 1 |
| CiA402 Drive Profile | | • Homing Mode<br>• Profile Position Mode<br>• Interpolated Position Mode<br>• Profile Velocity Mode<br>• Profile Torque Mode<br>• Cyclic Synchronous Position Mode<br>• Cyclic Synchronous Velocity Mode<br>• Cyclic Synchronous Torque Mode<br>• Touch Probe Function<br>• Torque Limit Function |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1 %): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in<br>Refer to the catalog for details. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Fully-closed Modules, Option Module Safety |

*1. If you combine a Sigma-7 SERVOPACK with a Sigma-V Option Module, the surrounding air temperature specification of the Sigma-V SERVOPACKs must be used, i.e., 0 °C to 55 °C. Also, the applicable surrounding range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. The SGD7S-210D, -260D, -280D, and -370D do not have a dynamic brake (DB). If a dynamic brake is necessary, create an external dynamic brake circuit.

*4. Always perform risk assessment for the system and confirm that the safety requirements are met.

## Specifications using MECHATROLINK-III communication reference

| Item | | | Specification |
|---|---|---|---|
| Drive Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 24 bits (incremental encoder/absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Surrounding Air Temperature*1 | | -5°C to 55°C (60°C with derating)<br>However, the range for the SGD7S-370D is -5°C to 40°C. |
| | Storage Temperature | | -20°C to 85°C |
| | Surrounding Air Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 m/s$^2$ |
| | Shock Resistance | | 19.6 m/s$^2$ |
| | Degree of Protection | | IP10 |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | | 1,000 m or less (above 1,000 m with derating) |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | Refer to the section Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK). |
| Mounting | | | Base-mounted |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*2 | | ±0.01 % of rated speed max. (for a load fluctuation of 0 % to 100 %) |
| | | | 0 % of rated speed max. (for a voltage fluctuation of ± 10 %) |
| | | | ±0.1 % of rated speed max. (for a temperature fluctuation of 25 °C ± 25 °C) |
| | Torque Control Precision (Repeatability) | | ±1 % |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20 %<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• /DEC (Origin Return Deceleration Switch) signal<br>• /EXT1 to /EXT3 (External Latch Input 1 to 3) signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• /P-DET (Polarity Detection) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 5<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>• /ZONE0 (ZONE Signal 1 Output) signal<br>• /ZONE1 (ZONE Signal 2 Output) signal<br>• /ZONE2 (ZONE Signal 3 Output) signal<br>• /ZONE3 (ZONE Signal 4 Output) signal<br>• /nZONE (nZONE output) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+)<br>The software version of the SigmaWin+ must be version 7.11 or higher. |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |
| Displays/Indicators | | | CHARGE, PWR, CN, L1, and L2 indicators, and one-digit seven-segment display |

Continued on next page.

Continued from previous page.

| Item | | Specification |
|---|---|---|
| MECHATROLINK-III Communications | Communications Protocol | MECHATROLINK-III |
| | Station Address Settings | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | Transmission Speed | 100 Mbps |
| | Transmission Cycle | 125 µs, 250 µs, 500 µs, 750 µs, 1.0 ms to 4.0 ms (multiples of 0.5 ms) |
| | Number of Transmission Bytes | 32 or 48 bytes/station<br>A DIP switch (S3) is used to select the number of transmission bytes. |
| Reference Method | Performance | Position, speed, or torque control with MECHATROLINK-III communications |
| | Reference Input | MECHATROLINK-III commands (sequence, motion, data setting, data access, monitoring, adjustment, etc.) |
| | Profile | MEACHATROLINK-III standard servo profile |
| MECHATROLINK-III Communications Setting Switches | | Rotary switch (S1 and S2) positions: 16<br>Number of DIP switch (S3) pins: 4 |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in<br>Refer to the catalog for details. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Fully-closed Modules |

*1. If you combine a Sigma-7 SERVOPACK with a Sigma-V Option Module, the surrounding air temperature specification of the Sigma-V SERVOPACKs must be used, i.e., 0 °C to 55 °C. Also, the applicable surrounding range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. The SGD7S-210D, -260D, -280D, and -370D do not have a dynamic brake (DB). If a dynamic brake is necessary, create an external dynamic brake circuit.

*4. Always perform risk assessment for the system and confirm that the safety requirements are met.

# Specifications using PROFINET communication reference

| Item | | | Specification |
|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 24 bits (incremental encoder/absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Surrounding Air Temperature*1 | | -5°C to 55°C (60°C with derating)<br>However, the range for the SGD7S-370D is -5°C to 40°C. |
| | Storage Temperature | | -20°C to 85°C |
| | Surrounding Air Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 $m/s^2$ |
| | Shock Resistance | | 19.6 $m/s^2$ |
| | Degree of Protection | | IP10 |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | | 1,000 m or less (above 1,000 m with derating) |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | Refer to the section Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK). |
| Mounting | | | Base-mounted |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*2 | | ±0.01 % of rated speed max. (for a load fluctuation of 0 % to 100 %) |
| | | | 0% of rated speed max. (for a voltage fluctuation of ±10 %) |
| | | | ±0.1 % of rated speed max. (for a temperature fluctuation of 25 °C ±25 °C) |
| | Torque Control Precision (Repeatability) | | ±1 % |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20 %<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /EXT1 (Probe 1 Latch Input) signal<br>• /EXT2 (Probe 2 Latch Input) signal<br>• /DEC (Home Switch Input) signal<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• /SI0 and /SI6 (General-Purpose Input) signals<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 5<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN502) | Interfaces | Digital Operator (JUSP-OP05A-1-E) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+)<br>The software version of the SigmaWin+ must be version 7.28 or higher. |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |

Continued on next page.

Continued from previous page.

| Item | | Specification |
|---|---|---|
| Displays/Indicators | | CHARGE, PWR, RUN, ERR, and L/A (A and B) indicators, and one-digit seven-segment display |
| PROFINET Communications | Applicable Communications Standards | IEC 61158 Type 12, IEC 61800-7 PROFIdrive Profile, Ethernet PROFINET IO RT |
| | Physical Layer | 100BASE-TX (IEEE 802.3) |
| | Communications Connectors | CN6A (RJ45): PROFINET signal input connector<br>CN6B (RJ45): PROFINET signal output connector<br>Full-duplex, Auto-negotiation, Auto-crossover |
| | Cable | Category 5, 4 shielded twisted pairs<br>* The cable is automatically detected with AUTO MDIX. |
| | Baud Rate Setting | 100 MBit/s |
| | Supported Protocols | • RTC - Real time cyclic protocol - RT class 1 (unsynchronized)<br>• RTA - Real time acyclic protocol<br>• DCP - Discovery and configuration protocol<br>• CL-RPC - Connectionless remote procedure call<br>• LLDP - Link layer discovery protocol<br>• SNMP - Simple network management protocol |
| | Node Address Setting | DCP |
| | Indentification & Maintenance Functions | I&MO-3 |
| | Topology Recognition | LLDP, SNMP V1, MIB2 |
| | Power Supply | 5 V ± 5 %, 500 mA (max.) supplied internal from drive CN10 |
| | LED Indicator | Red (ERR), Green (RUN), PROFINET communicating (L/A) × 2 |
| | Node Type | Axis Drive Unit |
| | Acyclic Parameter Access | Read/Write Record |
| | Cyclic Messaging | Set of pre-defined standard telegram: ST1, ST2, ST7, ST8, ST9<br>Set of pre-defined manufacture telegram: Telegram number 100<br>Telegram mapping: Dynamic with max. 16 signal entries of free telegram number 999 |
| | Alarm Notification PDU | Optional |
| PROFIdrive Profile | Standard | IEC 61800-7-1/2/3 |
| | Motor Type / Axis Type | Servo / Rotary, Linear |
| | Profile Services | Cycle messaging, Acyclic parameter access mechanism, Identification & maintenance functions (I&M03), PROFIdrive parameters, Diagnostic and alarm mechanism, Fault buffer mechanism |
| | Application Classes | 1, 3 |
| | PROFIdrive Position and Velocity Modes | Motion profile type: Linear |
| | CIA402 Homing Modes | CIA402 Supported methods: 1-6, 17-22, 35, 33, 34<br>Motion profile type: Linear<br>Homing persistent in absolute motor encoder |
| | CIA402 Torque Mode | Torque Profile Type: Linear |
| Drive Profile | | • Homing Mode<br>• PROFIdrive Position Mode<br>• PROFIdrive Velocity Mode<br>• Profile Torque Mode<br>• Touch Probe Function<br>• Torque Limit Function |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1 %): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in. Refer to the catalog for details. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Fully-closed Modules, Option Module Safety |

*1. If you combine a Sigma-7 SERVOPACK with a Sigma-V Option Module, the surrounding air temperature specification of the Sigma-V SERVOPACKs must be used, i.e., 0 °C to 55 °C. Also, the applicable surrounding range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. The SGD7S-210D, -260D, -280D, and -370D do not have a dynamic brake (DB). If a dynamic brake is necessary, create an external dynamic brake circuit.

*4. Always perform risk assessment for the system and confirm that the safety requirements are met.

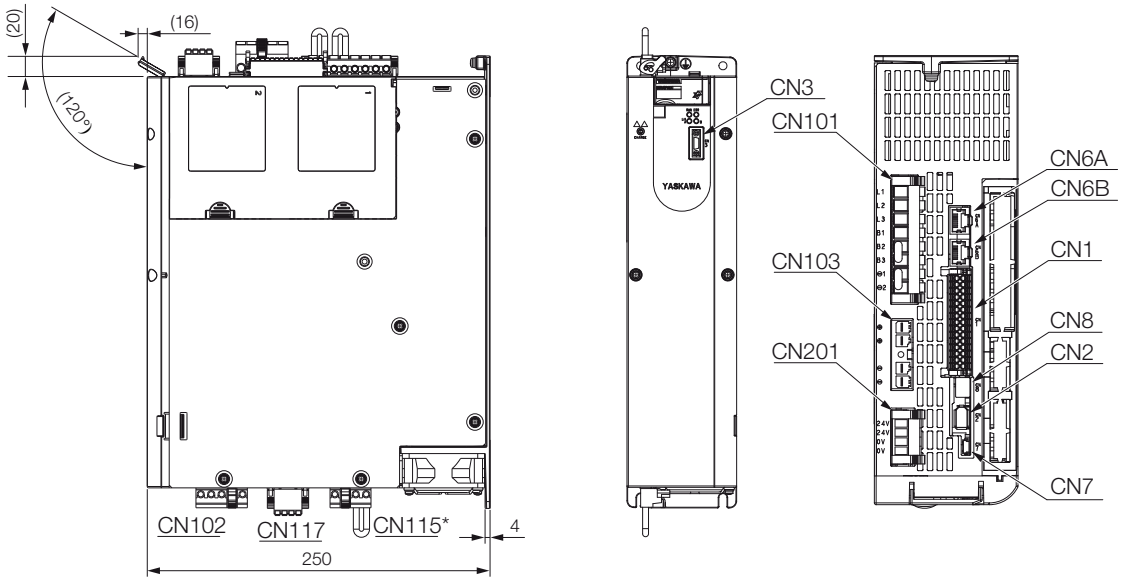
# Front cover dimensions and connector specifications

The front cover dimensions and panel connectors depend on the SERVOPACK interface. Refer to the following figures.

## Front cover dimensions and connector specifications

The front cover dimensions and panel connector section are the same for all models.
Refer to the following figures and table.

### • Front Cover Dimensions and Connectors



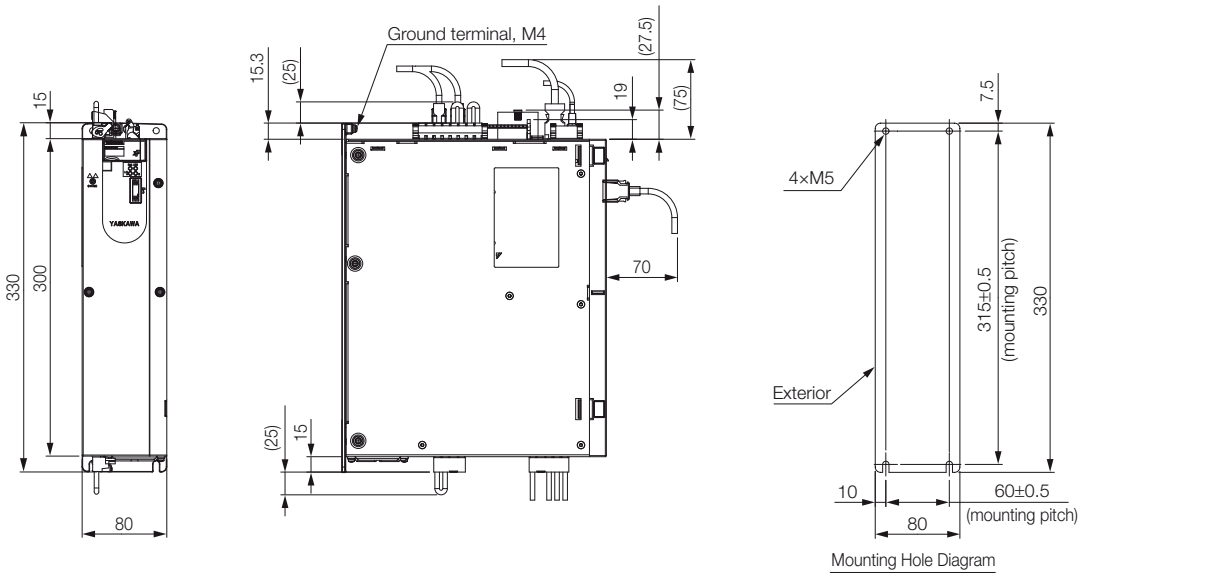

* Dynamic Brake Connector only for SGD7S-1R9D up to -170D.

### • Connector Specifications

| Connector No. | Function | Model | Yaskawa Order Code | Number of Pins | Manufacturer |
|---|---|---|---|---|---|
| CN1 | I/O Connector | DFMC1,5/15-ST-3,5-LRBK | JUSP-7CN001 | 30 | Phoenix Contact |
| CN2 | Encoder Connector | - | JZSP-CMP9-1-E | 6 | Sumitomo 3M Ltd. |
| CN3 | Digital Operator | - | - | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | | - | | | |
| CN6A/ CN6B | Fieldbus Connector | - | - | 8 | Tyco Electronics Japan G.K. |
| CN7 | USB Connector for SigmaWin | - | - | 5 | Tyco Electronics Japan G.K. |
| CN8 | Safety Connector Kit | - | 2013595-1 | 8 | Tyco Electronics Japan G.K. |
| CN8 | Safety Jumper Connector | - | JZSP-CVH05-E | 8 | Tyco Electronics Japan G.K. |
| CN101 | Main Power Connector SGD7S-1R9D to -170D | BLZ 7.62HP/08/180LR SN BK BX PRT | JUSP-7CN101 | 8 | Weidmüller |
| | Main Power Connector SGD7S-210D to -370D | BUZ 10.16HP/07/180F AG BK BX LPR SO | JUSP-7CN101-1 | 7 | Weidmüller |
| CN102 | Motor Power Connector SGD7S-1R9D to -170D | BLZ 7.62IT/04/180MF4 SN BK BX PRT | JUSP-7CN102 | 4 | Weidmüller |
| | Motor Power Connector SGD7S-210D to -370D | BUZ 10.16IT/04/180MF4 AG BK BX LPR SO | JUSP-7CN102-1 | 4 | Weidmüller |
| CN103 | DC Power Input SGD7S-1R9D to -170D | BVZ 7.62IT/04/180MF3 SN BK BX PRT | JUSP-7CN103 | 4 | Weidmüller |
| | DC Power Input SGD7S-210D to -370D | BUZ 10.16IT/04/180MF3 AG BK BX LPR SO | JUSP-7CN103-1 | 4 | Weidmüller |
| CN115 | Dynamic Brake Connector SGD7S-1R9D to -170D | BLZ 7.62IT/03/180MF2 SN BK BX PRT | JUSP-7CN115 | 3 | Weidmüller |
| | Dynamic Brake Connector SGD7S-210D to -370D | No integrated Dynamic Brake circuit. External Dynamic Brake circuit is possible as an option. | | | |
| CN117 | Holding Brake Connector | BLF 5.08HC/04/180LR SN BK BX SO | JUSP-7CN117 | 4 | Weidmüller |
| CN201 | 24 V Control Power Input | BLF 5.08HC/04/180LR SN OR BX SO | JUSP-7CN201 | 4 | Weidmüller |

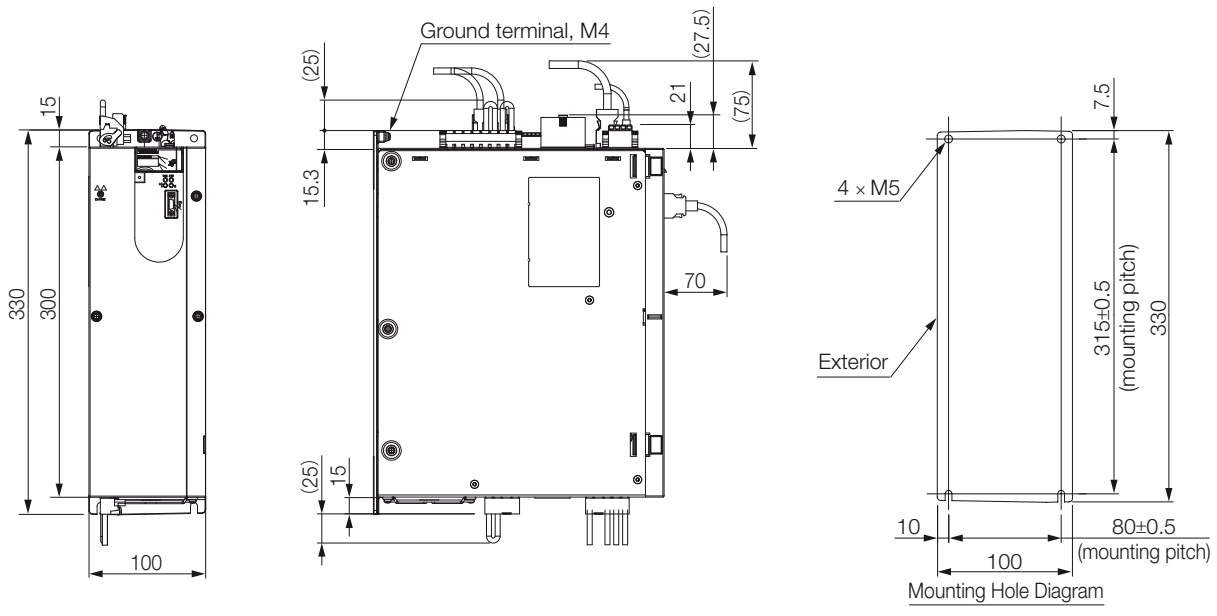
# Dimensions of base-mounted SERVOPACKs

## • Three-Phase, 400 VAC: SGD7S-1R9D, -3R5D, -5R4D, -8R4D, and -120D



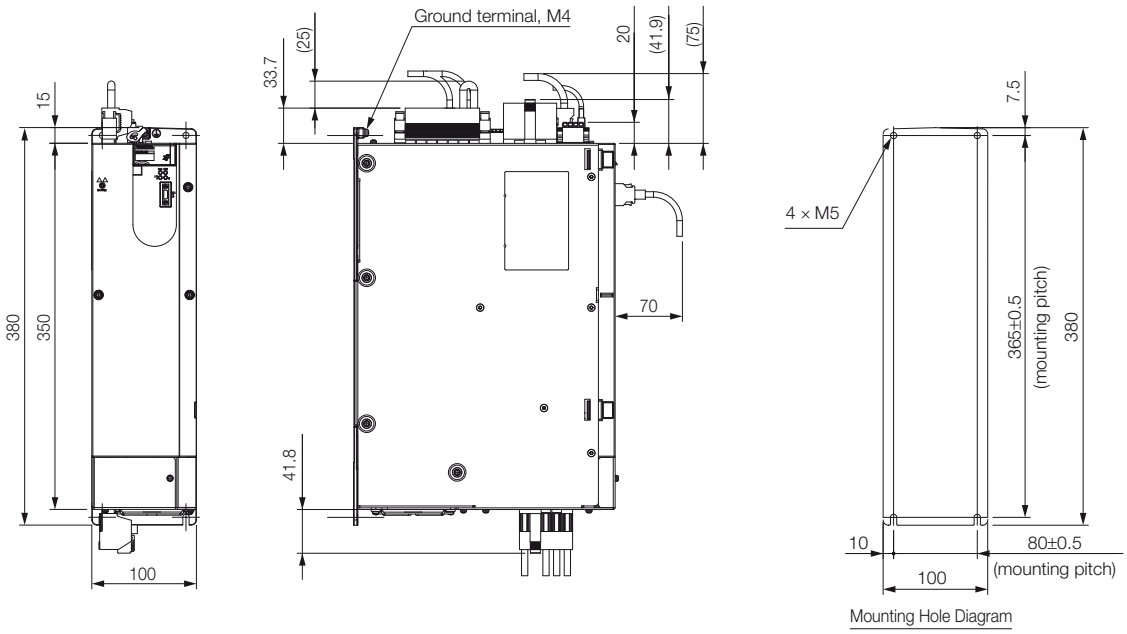

Approx. mass: SGD7S-1R9D, -3R5D, or -5R4D: 3.4 kg
SGD7S-8R4D or -120D: 3.7 kg
Unit: mm

## • Three-Phase, 400 VAC: SGD7S-170D




Approx. mass: 5.5 kg
Unit: mm

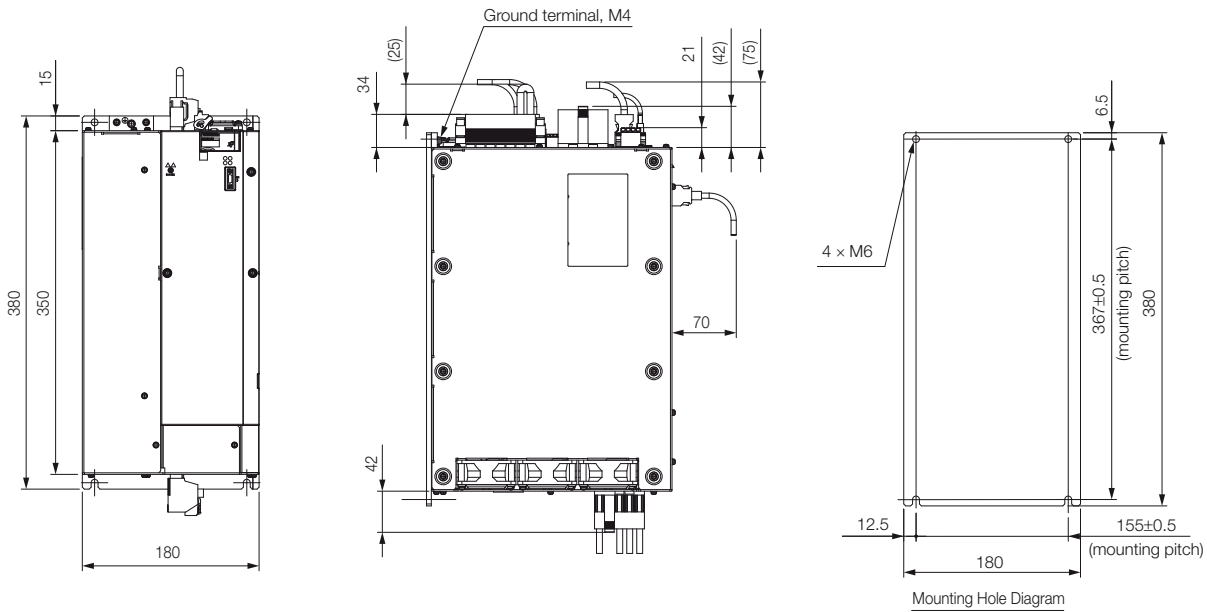
## • Three-Phase, 400 VAC: SGD7S-210D and -260D




Mounting Hole Diagram

Approx. mass: 7.0 kg
Unit: mm

## • Three-Phase, 400 VAC: SGD7S-280D and -370D

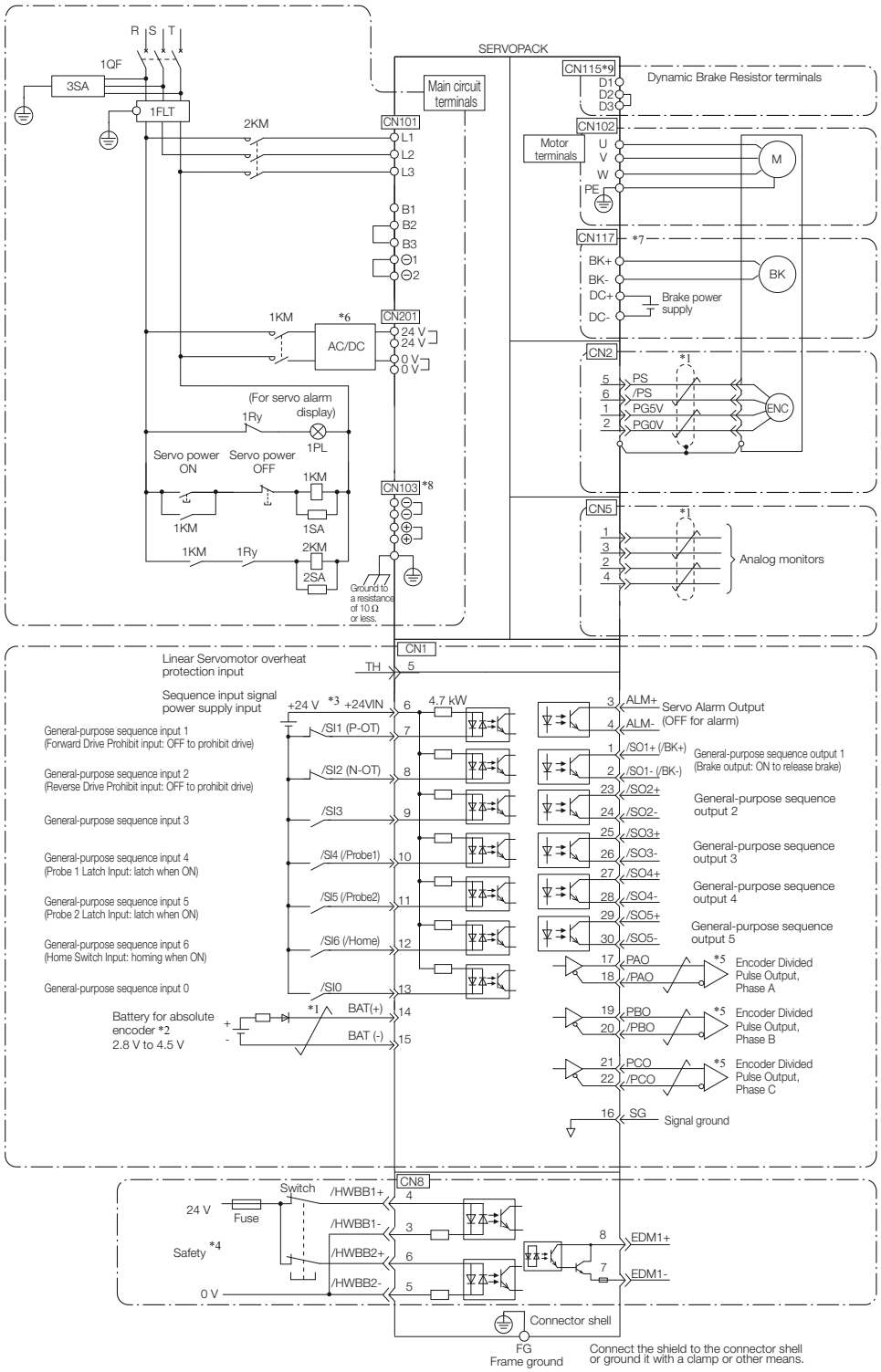



Mounting Hole Diagram

Approx. mass: 13.5 kg
Unit: mm

# System configurations up to 5 kW

## SGD7S single-axis EtherCAT reference SERVOPACKs

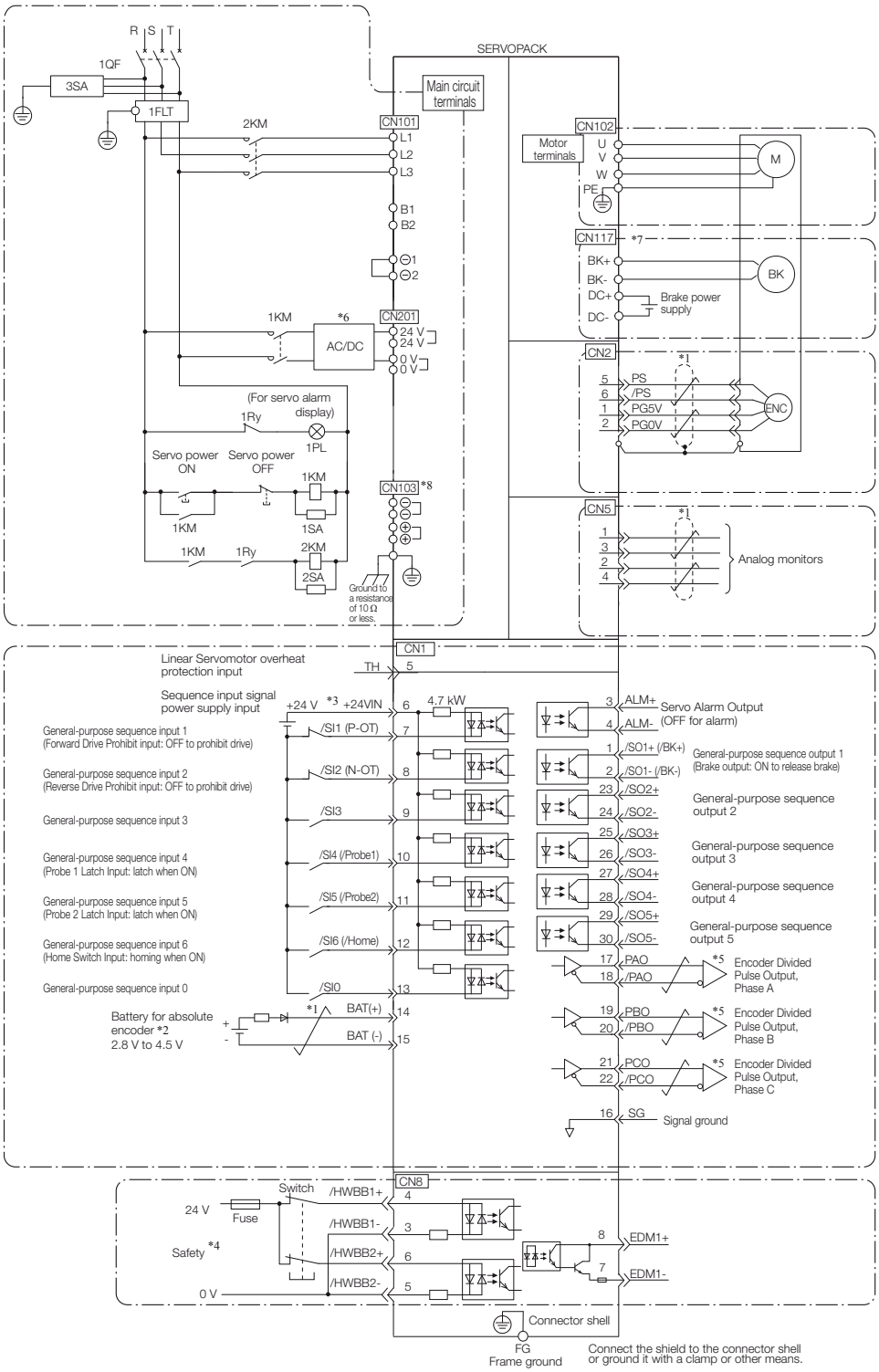



*1. represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.
*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.
*4. Refer to the manual if you use a safety function device. If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.
*5. Always use line receivers to receive the output signals.
*6. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24-VDC to the control power supply input terminals.
*7. The CN117 connector is only used for SERVOPACKs with built-in Servomotor brake control, SGD7S-oooDooB026F64 and SGD7W-oooDooB026.
*8. If using these terminals, contact your Yaskawa representative.
*9. The CN115 Dynamic Brake Connector is only for SGD7S-1R9D up to -170D.

# System configurations with 6 kW and more

## SGD7S single-axis EtherCAT reference SERVOPACKs



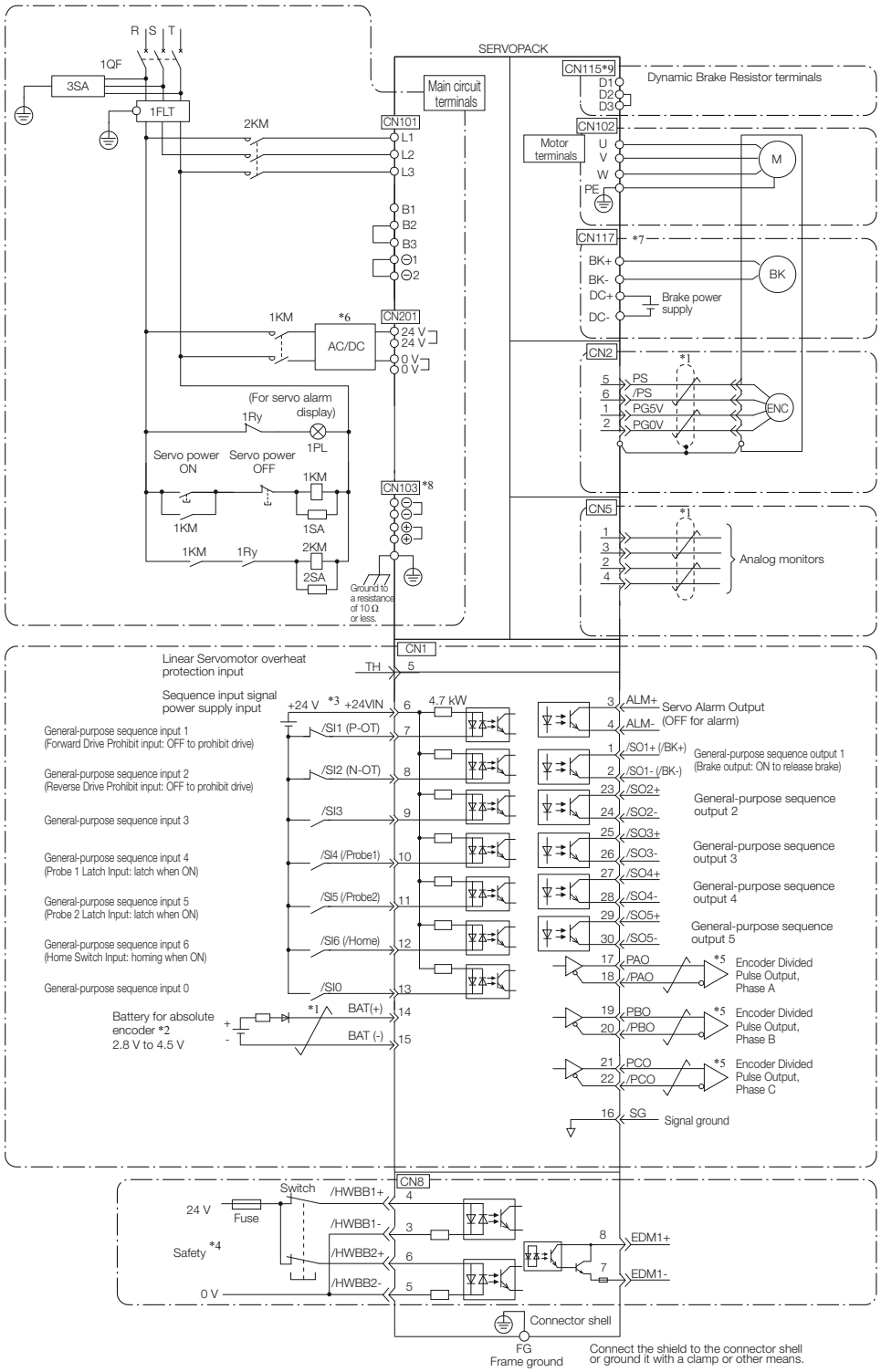

*1. ≠ represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.
*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.
*4. Refer to the manual if you use a safety function device. If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.
*5. Always use line receivers to receive the output signals.
*6. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24-VDC to the control power supply input terminals.
*7. The CN117 connector is only used for SERVOPACKs with built-in Servomotor brake control, SGD7S-oooDooB026F64 and SGD7W-oooDooB026.
*8. If using these terminals, contact your Yaskawa representative.

With the SGD7S-210D, -260D, -280D, or -370D, connect a Regenerative Resistor Unit between B1 and B2.

# System configurations up to 5 kW

## SGD7S single-axis PROFINET reference SERVOPACKs

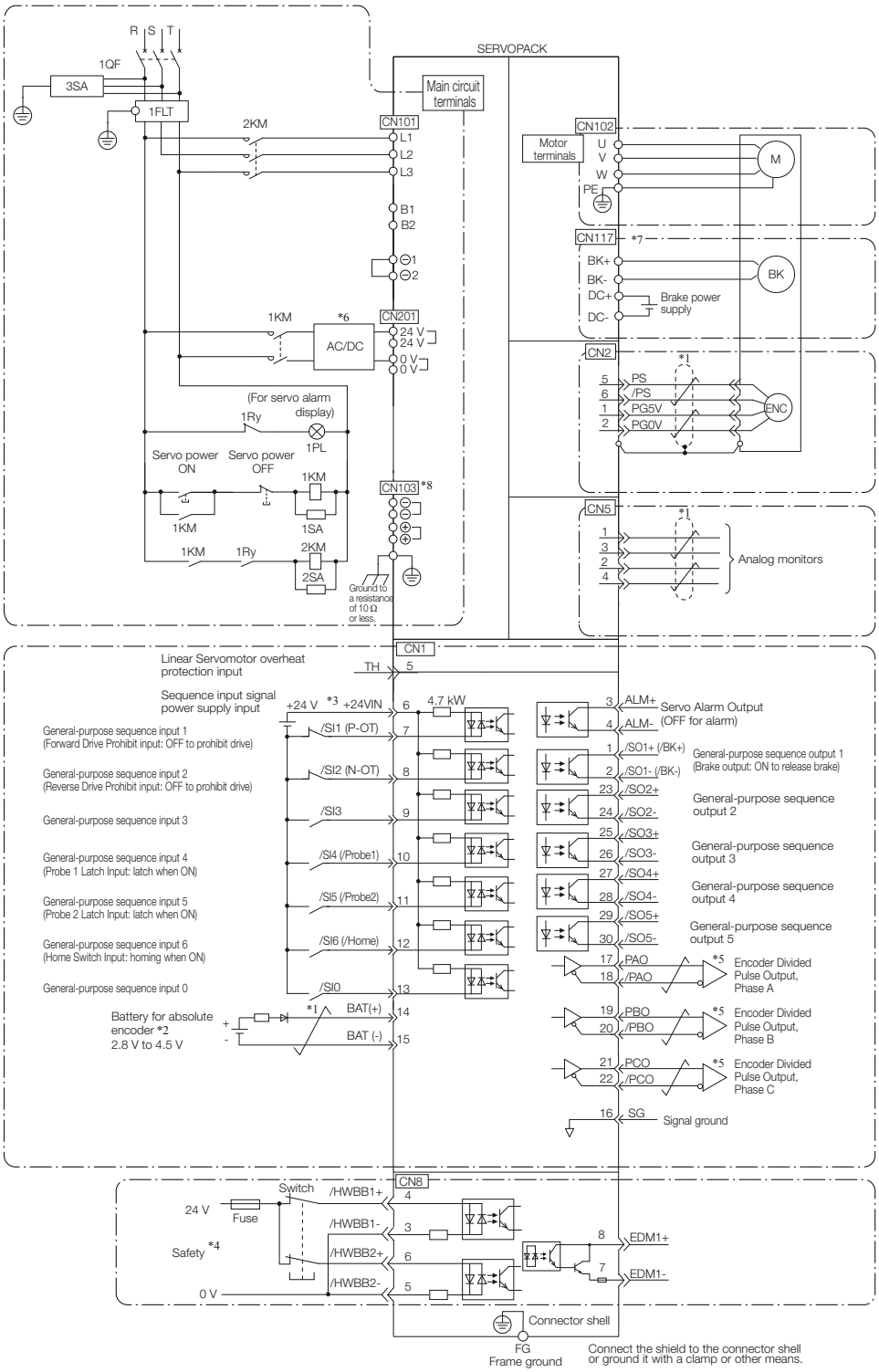



*1. represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.
*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.
*4. Refer to the manual if you use a safety function device. If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.
*5. Always use line receivers to receive the output signals.
*6. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24-VDC to the control power supply input terminals.
*7. The CN117 connector is only used for SERVOPACKs with built-in Servomotor brake control, SGD7S-oooDooB026F64 and SGD7W-oooDooB026.
*8. If using these terminals, contact your Yaskawa representative.
*9. The CN115 Dynamic Brake Connector is only for SGD7S-1R9D up to -170D.

# System configurations with 6 kW and more

## SGD7S single-axis PROFINET reference SERVOPACKs



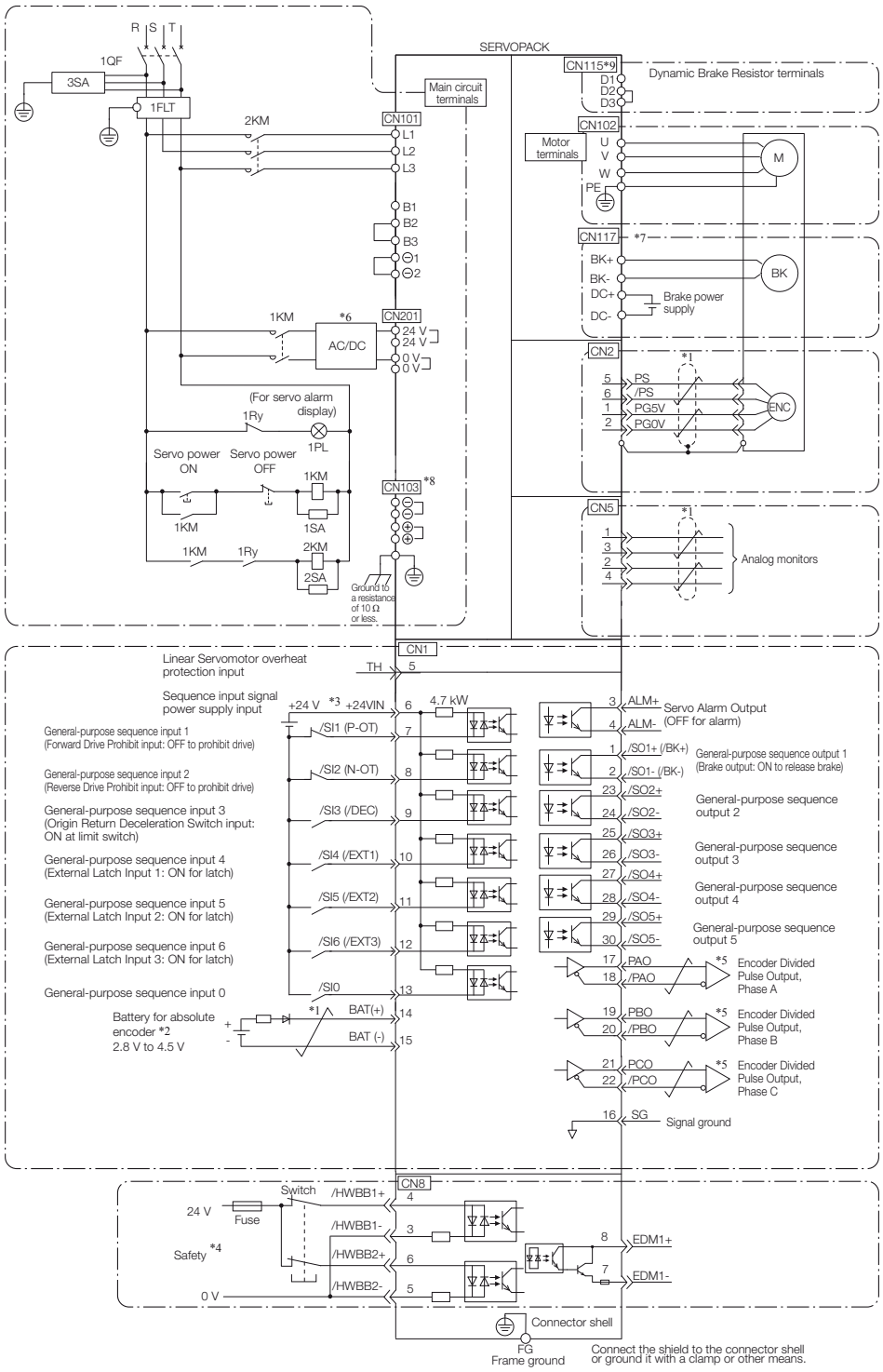

*1. represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.
*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.
*4. Refer to the manual if you use a safety function device. If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.
*5. Always use line receivers to receive the output signals.
*6. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24-VDC to the control power supply input terminals.
*7. The CN117 connector is only used for SERVOPACKs with built-in Servomotor brake control, SGD7S-oooDooB026F64 and SGD7W-oooDooB026.
*8. If using these terminals, contact your Yaskawa representative.

With the SGD7S-210D, -260D, -280D, or -370D, connect a Regenerative Resistor Unit between B1 and B2.

# System configurations up to 5 kW

## SGD7S single-axis MECHATROLINK-III reference SERVOPACKs

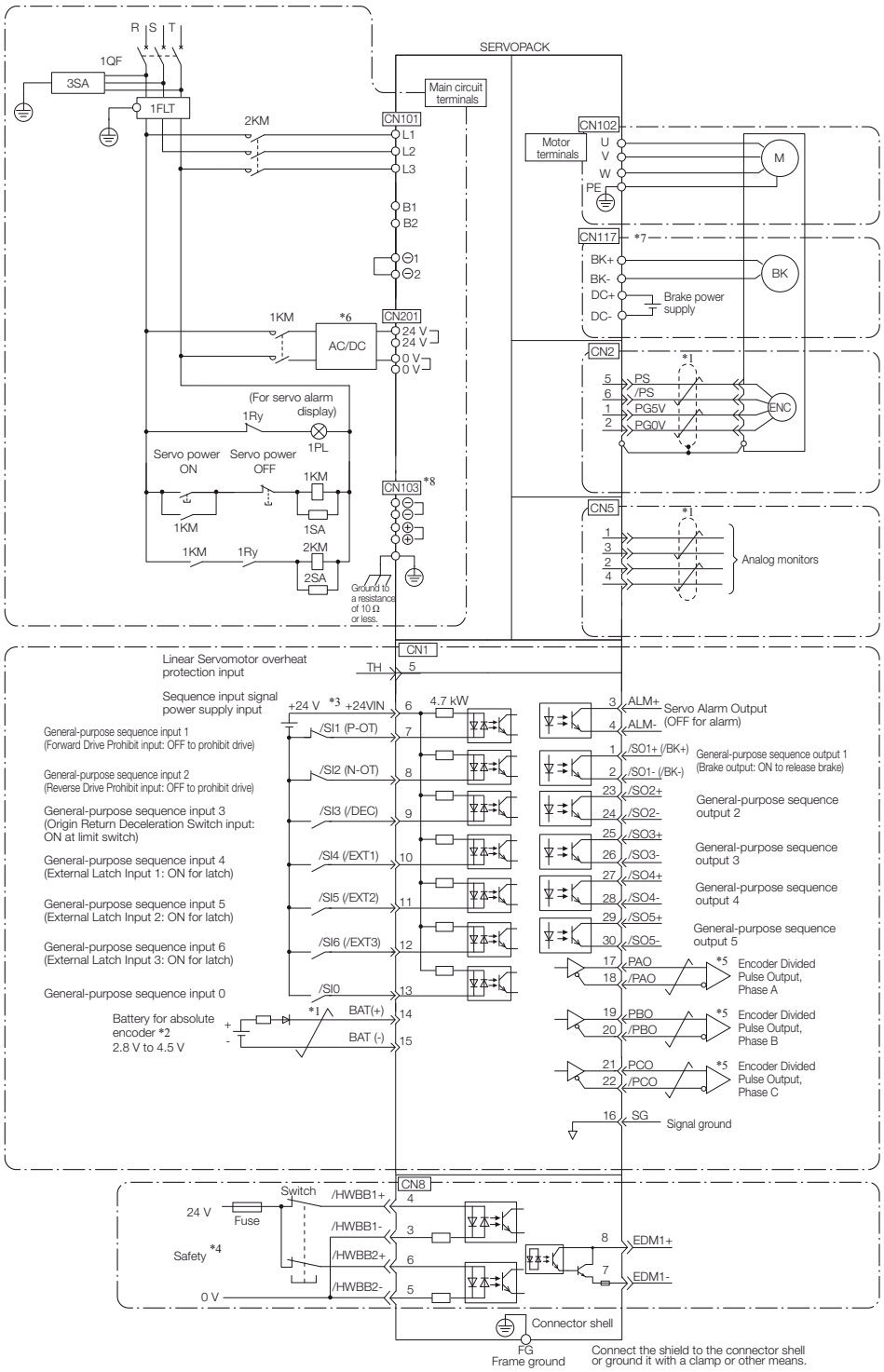



*1. represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.
*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.
*4. Refer to the manual if you use a safety function device. If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.
*5. Always use line receivers to receive the output signals.
*6. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24-VDC to the control power supply input terminals.
*7. The CN117 connector is only used for SERVOPACKs with built-in Servomotor brake control, SGD7S-oooDooB026F64 and SGD7W-oooDooB026.
*8. If using these terminals, contact your Yaskawa representative.
*9. The CN115 Dynamic Brake Connector is only for SGD7S-1R9D up to -170D.

# System configurations with 6 kW and more

## SGD7S single-axis MECHATROLINK-III reference SERVOPACKs




*1. represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.
*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.
*4. Refer to the manual if you use a safety function device. If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.
*5. Always use line receivers to receive the output signals.
*6. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24-VDC to the control power supply input terminals.
*7. The CN117 connector is only used for SERVOPACKs with built-in Servomotor brake control, SGD7S-oooDooB026F64 and SGD7W-oooDooB026.
*8. If using these terminals, contact your Yaskawa representative.

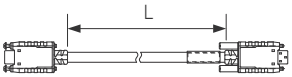
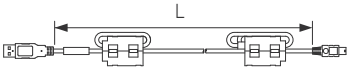
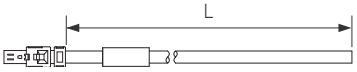
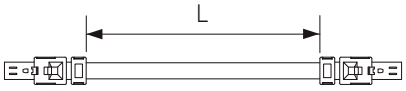
With the SGD7S-210D, -260D, -280D, or -370D, connect a Regenerative Resistor Unit between B1 and B2.

## Cables for SERVOPACKs

Important

1. Use the cable specified by Yaskawa for the computer cable.
   Operation may not be dependable with any other cable.

Notes:
Refer to the manual for the following information. Cable dimensional drawings and cable connection specifications.
Order numbers and specifications of individual connectors for cables. Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual.

| Name | | Length (L) | Order Number | Appearance |
|---|---|---|---|---|
| Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| Digital Operator (including 1 m cable) | | 1 m | JUSP-OP05A-1-E |  |
| Digital Operator Cable | | 0.3 m | JZSP-CVS07-A3-E*2 |  |
| Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |
| Safety Function Device Cable | Cables with Connectors*1 | 1 m | JZSP-CVH03-01-E-G# |  |
| | | 3 m | JZSP-CVH03-03-E-G# | |
| | Connector Kit*2 | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | | |
| MECHATROLINK-III<br>EtherCAT<br>PROFINET<br>Communications Cables*3 | | 0.2 m | CM3R□M0-00P2-E |  |
| | | 0.5 m | CM3R□M0-00P5-E | |
| | | 1 m | JZSP-CM3R□M0-01-E | |
| | | 3 m | JZSP-CM3R□M0-03-E | |
| | | 5 m | JZSP-CM3R□M0-05-E | |
| | | 10 m | JZSP-CM3R□M0-10-E | |
| | | 20 m | JZSP-CM3R□00-20-E | |
| | | 30 m | JZSP-CM3R□00-30-E | |
| | | 40 m | JZSP-CM3R□01-40-E | |
| | | 50 m | JZSP-CM3R□01-50-E | |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

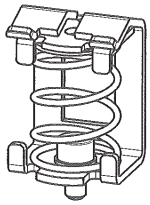
*1. When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.

*2. Use the connector kit when you make cables yourself.

*3. This cable is available in two variants. The order number for these cables differs at the marked □, an „R“ at this place is used for Cables with RJ45 Connectors on both ends, while an „M“ is used for Cables with RJ45 Connector on One End and IMI Connector on the other End. „M“ Variant not available for PROFINET cables.

## Motor connection shielding clamp

Shielding clamp mountable on Sigma-7 400 V SERVOPACKs up to 15 kW.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Order No. | Specification |
|---|---|---|
| Sigma-7 400 V up to 3.0 kW | KLBUE 4-13.5_SC |  |
| Sigma-7 400 V<br>from 5 kW up to 7.5 kW | KLBUE 10-20_SC | |
| Sigma-7 400 V<br>for 11 kW & 15 kW | KLBUE 15-32_SC | |

# SGD7W Dual Axis

## Model designation

### Dual axis amplifier

SGD7W - 2R6 D A0 B 026

| Sigma-7 Series Sigma-7W Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | digit |
|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| **Three-phase, 400 V** | |
| 2R6 | 2 × 0.75 kW |
| 5R4 | 2 × 1.5 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| D | 400 V AC |

**5th + 6th digit - Interface**

| Code | Specification |
|---|---|
| A0 | EtherCAT communication reference |
| 30 | MECHATROLINK-III, RJ45 communication reference |

**7th digit - Design Revision Order**

| | |
|---|---|
| B | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 026* | With relay for holding brake | All models |

* For specification of the internal brake relay, please refer to the hardware manual of the amplifier.

# Ratings and specifications

## Ratings

### Three-phase, 400 V AC

| Model SGD7W- | | | 2R6D | 5R4D |
|---|---|---|---|---|
| Maximum Applicable Motor Capacity per Axis [kW] | | | 0.75 | 1.5 |
| Continuous Output Current per Axis [A] | | | 2.6 | 5.4 |
| Instantaneous Maximum Output Current per Axis [A] | | | 8.5 | 14 |
| Main Circuit | Power Supply | | Three-phase, 380 V AC to 480 V AC, -15 % to +10 %, 50 Hz/60 Hz | |
| | Input Current [A]* | | 4.4 | 8.6 |
| Control | Power Supply | | 24 V DC ±15 % | |
| | Input Current [A]* | | 1.2 | |
| Power Supply Capacity [kVA]* | | | 3.5 | 6.8 |
| Power Loss* | Main Circuit Power Loss [W] | | 65.4 | 108.6 |
| | Control Circuit Power Loss [W] | | 21 | |
| | Built-in Regenerative Resistor Power Loss [W] | | 28 | 28 |
| | Total Power Loss [W] | | 114.4 | 157.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | 43 | 43 |
| | | Capacity [W] | 140 | 140 |
| | Minimum Allowable External Resistance [Ω] | | 43 | 43 |
| Overvoltage Category | | | III | |

* This is the net value at the rated load.

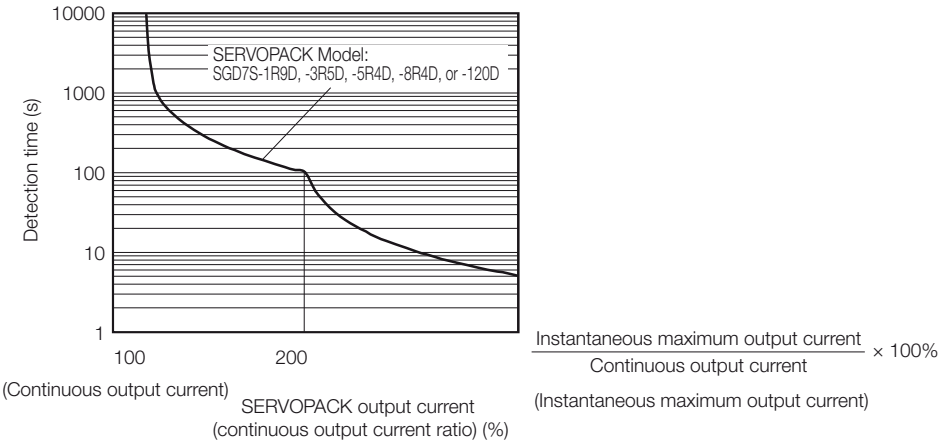
### 540 V DC

| Model SGD7W- | | | 2R6D | 5R4D |
|---|---|---|---|---|
| Maximum Applicable Motor Capacity per Axis [kW] | | | 0.75 | 1.5 |
| Continuous Output Current per Axis [A] | | | 2.6 | 5.4 |
| Instantaneous Maximum Output Current per Axis [A] | | | 8.5 | 14 |
| Main Circuit | Power Supply | | 513 V DC to 648 V DC, -15 % to +10 % | |
| | Input Current [A]* | | 5 | 11 |
| Control | Power Supply | | 24 V DC ±15 % | |
| | Input Current [A]* | | 1.2 | |
| Power Supply Capacity [kVA]* | | | 3.5 | 6.8 |
| Power Loss* | Main Circuit Power Loss [W] | | 47.4 | 90.6 |
| | Control Circuit Power Loss [W] | | 21 | |
| | Total Power Loss [W] | | 68.4 | 111.6 |
| Overvoltage Category | | | III | |

* This is the net value at the rated load.

## SERVOPACK overload protection characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C. An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed. The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics. In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. For a Yaskawa-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

## Specifications using EtherCAT communication reference

| Item | | | Specification |
|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 24 bits (incremental encoder/absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Surrounding Air Temperature | | -5°C to 55°C (60°C with derating) |
| | Storage Temperature | | -20°C to 85°C |
| | Surrounding Air Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 $m/s^2$ |
| | Shock Resistance | | 19.6 $m/s^2$ |
| | Degree of Protection | | IP10 |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | | 1,000 m or less (above 1,000 m with derating) |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | Refer to the section Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK). |
| Mounting | | | Base-mounted |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*1 | | ±0.01 % of rated speed max. (for a load fluctuation of 0 % to 100 %) |
| | | | 0% of rated speed max. (for a voltage fluctuation of ± 10 %) |
| | | | ±0.1 % of rated speed max. (for a temperature fluctuation of 25 °C ± 25 °C) |
| | Torque Control Precision (Repeatability) | | ±1 % |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20 %<br>Number of input points: 10<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /Probe1 (Probe 1 Latch Input) signal<br>• /Probe2 (Probe 2 Latch Input) signal<br>• /Home (Home Switch Input) signal<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 6<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN502) | Interfaces | Digital Operator (JUSP-OP05A-1-E) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+)<br>The software version of the SigmaWin+ must be version 7.11 or higher. |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |

Continued on next page.

Continued from previous page.

| Item | | Specification |
|---|---|---|
| Displays/Indicators | | CHARGE, PWR, RUN, ERR, and L/A (A and B) indicators, and two, one-digit seven-segment display |
| EtherCAT Communications Setting Switches | | EtherCAT secondary address (S1 and S2), 16 positions |
| EtherCAT Communications | Applicable Communications Standards | IEC 61158 Type 12, IEC 61800-7 CiA402 Drive Profile |
| | Physical Layer | 100BASE-TX (IEEE 802.3) |
| | Communications Connectors | CN6A (RJ45): EtherCAT signal input connector<br>CN6B (RJ45): EtherCAT signal output connector |
| | Cable | Category 5, 4 shielded twisted pairs<br>The cable is automatically detected with AUTO MDIX. |
| | Sync Manager | SM0: Mailbox output, SM1: Mailbox input, SM2: Process data output, and SM3: Process data input |
| | FMMU | FMMU 0: Mapped in process data output (RxPDO) area.<br>FMMU 1: Mapped in process data input (TxPDO) area.<br>FMMU 2: Mapped to mailbox status. |
| | EtherCAT Commands (Data Link Layer) | APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, and FRMW<br>(APRW, FPRW, BRW, and LRW commands are not supported.) |
| | Process Data | Assignments can be changed with PDO mapping. |
| | Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, and SDO information<br>(TxPDO/RxPDO and remote TxPDO/RxPDO are not supported.) |
| | Distributed Clocks | Free-Run Mode and DC Mode (Can be switched.)<br>Applicable DC cycles: 125 µs to 4 ms in 125-µs increments |
| | Slave Information Interface | 256 bytes (read-only) |
| | Indicators | EtherCAT communications in progress: Link/Activity x 2<br>EtherCAT communications status: RUN x 1<br>EtherCAT error status: ERR x 1 |
| CiA402 Drive Profile | | • Homing Mode<br>• Profile Position Mode<br>• Interpolated Position Mode<br>• Profile Velocity Mode<br>• Profile Torque Mode<br>• Cyclic Synchronous Position Mode<br>• Cyclic Synchronous Velocity Mode<br>• Cyclic Synchronous Torque Mode<br>• Touch Probe Function<br>• Torque Limit Function |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1 %): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in<br>Refer to the catalog for details. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB_A1, /HWWB_A2, /HWWB_B1 and /HWBB_B2: Base block signals for Power Modules |
| | Output | EDM_A and EDM_B: Monitor the status of built-in safety circuits (fixed outputs). |
| | Applicable Standards*2 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Option Module Safety |

*1. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*2. Always perform risk assessment for the system and confirm that the safety requirements are met.

## Specifications using MECHATROLINK-III communication reference

| Item | | | Specification |
|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 24 bits (incremental encoder/absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Surrounding Air Temperature | | -5°C to 55°C (60°C with derating) |
| | Storage Temperature | | -20°C to 85°C |
| | Surrounding Air Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 $m/s^2$ |
| | Shock Resistance | | 19.6 $m/s^2$ |
| | Degree of Protection | | IP10 |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | | 1,000 m or less (above 1,000 m with derating) |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | Refer to the section Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK). |
| Mounting | | | Base-mounted |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*1 | | ±0.01 % of rated speed max. (for a load fluctuation of 0 % to 100 %) |
| | | | 0% of rated speed max. (for a voltage fluctuation of ± 10 %) |
| | | | ±0.1 % of rated speed max. (for a temperature fluctuation of 25 °C ± 25 °C) |
| | Torque Control Precision (Repeatability) | | ±1 % |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20 %<br>Number of input points: 10<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• /DEC (Origin Return Deceleration Switch) signal<br>• /EXT1 to /EXT3 (External Latch Input 1 to 3) signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• /P-DET (Polarity Detection) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 6<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+)<br>The software version of the SigmaWin+ must be version 7.11 or higher. |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |

Continued on next page.

Continued from previous page.

| Item | | Specification |
|---|---|---|
| Displays/Indicators | | CHARGE, PWR, CN, L1 and L2 indicators, and two, one-digit seven-segment display |
| MECHATROLINK-III Communications | Communications Protocol | MECHATROLINK-III |
| | Station Address Settings | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | Extended Address Setting | Axis A: 00 hex, Axis B: 01 hex |
| | Raud Rate | 100 Mbps |
| | Transmission Cycle | 250 µs, 500 µs, 750 µs, 1.0 ms to 4.0 ms (multiples of 0.5 ms) |
| | Number of Transmission Bytes | 32 or 48 bytes per station<br>A DIP switch (S3) is used to select the number of transmission bytes. |
| Reference Method | Performance | Position, speed, or torque control with MECHATROLINK-III communications |
| | Reference Input | MECHATROLINK-III commands (sequence, motion, data setting, data access, monitoring, adjustment, etc.) |
| | Profile | MECHATROLINK-III standard servo profile |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1 %): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in<br>Refer to the catalog for details. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB_A1, /HWWB_A2, /HWWB_B1 and /HWBB_B2: Base block signals for Power Modules |
| | Output | EDM_A and EDM_B: Monitor the status of built-in safety circuits (fixed outputs). |
| | Applicable Standards*2 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Option Module Safety |

*1. The coefficient of speed fluctuation for load fluctuation is defined as follows:

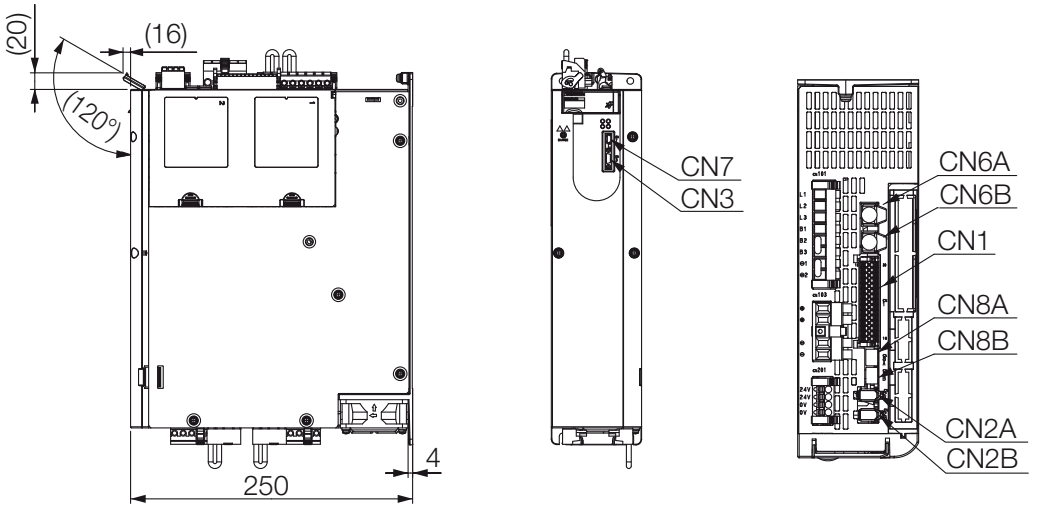
$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*2. Always perform risk assessment for the system and confirm that the safety requirements are met.

# Front cover dimensions and connector specifications

The front cover dimensions and panel connector section are the same for all models. Refer to the following figures and table.

## • Front Cover Dimensions and Connectors



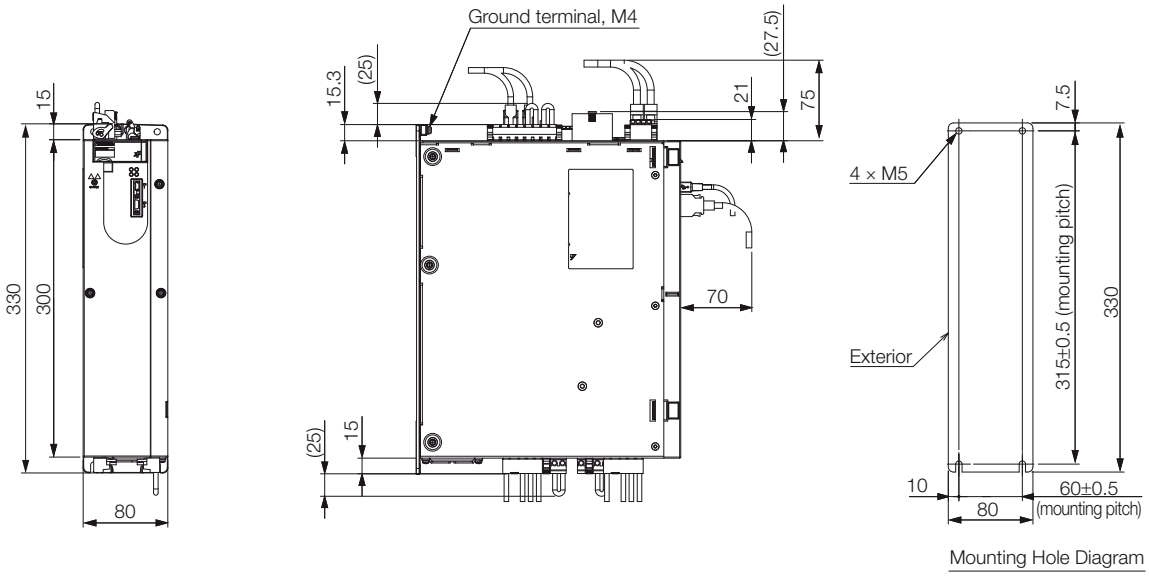

Unit: mm

## • Connector Specifications

| Connector No. | Function | Model | Yaskawa Order Code | Number of Pins | Manufacturer |
|---|---|---|---|---|---|
| CN1 | I/O Connector | DFMC1,5/15-ST-3,5-LRBK | JUSP-7CN001 | 30 | Phoenix Contact |
| CN2A/CN2B | Encoder Connector Axis A<br>Encoder Connector Axis B | - | JZSP-CMP9-1-E | 6 | Sumitomo 3M Ltd. |
| CN3 | Digital Operator | - | - | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | | - | | | |
| CN6A/CN6B | Fieldbus Connector | - | | 8 | Tyco Electronics Japan G.K. |
| CN7 | USB Connector for SigmaWin | - | - | 5 | Tyco Electronics Japan G.K. |
| CN8A | Safety Connector Kit | - | 2013595-1 | 8 | Tyco Electronics Japan G.K. |
| | Safety Jumper Connector | - | JZSP-CVH05-E | | |
| CN8B | Safety Connector Kit | - | 2013595-1 | 8 | Tyco Electronics Japan G.K. |
| | Safety Jumper Connector | - | JZSP-CVH05-E | | |
| CN101 | Main Power Connector | BLZ 7.62HP/08/180LR SN BK BX PRT | JUSP-7CN101 | 8 | Weidmüller |
| CN102A/CN102B | Motor Power Connector Axis A<br>Motor Power Connector Axis B | BLZ 7.62IT/04/180MF4 SN BK BX PRT | JUSP-7CN102 | 4 | Weidmüller |
| CN103 | DC Power Input | BVZ 7.62IT/04/180MF3 SN BK BX PRT | JUSP-7CN103 | 4 | Weidmüller |
| CN115A/CN115B | Dynamic Brake Connector Axis A<br>Dynamic Brake Connector Axis B | BLZ 7.62IT/03/180MF2 SN BK BX PRT | JUSP-7CN115 | 3 | Weidmüller |
| CN117 | Holding Brake Connector | BLF 5.08HC/04/180LR SN BK BX SO | JUSP-7CN117 | 4 | Weidmüller |
| CN201 | 24 V Control Power Input | BLF 5.08HC/04/180LR SN OR BX SO | JUSP-7CN201 | 4 | Weidmüller |

Note: The above connectors or their equivalents are used for the SERVOPACKs.

## Base-mounted SERVOPACKs



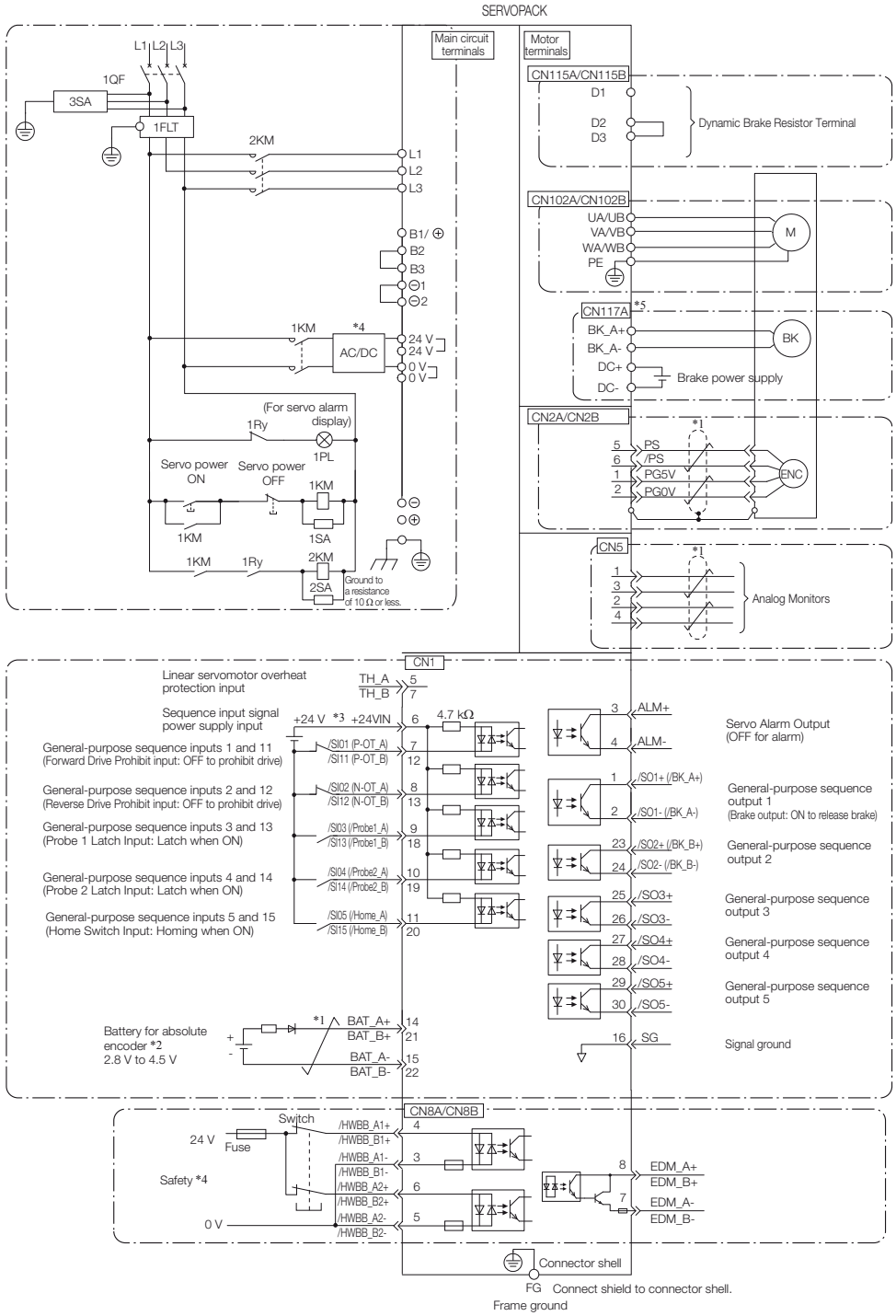

Mounting Hole Diagram

Approx. mass: 2R6D: 4.1 kg
5R4D: 4.3 kg

Unit: mm

# System configurations up to 2×1.5 kW

## SGD7W dual-axis EtherCAT reference SERVOPACKs




*1. represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.

*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.

*4. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24 VDC to the control power supply input terminals.

*5. The CN117 connector is used for SERVOPACKs with built-in Servomotor brake control. SERVOPACKs without built-in Servomotor brake control do not have the CN117 connector.

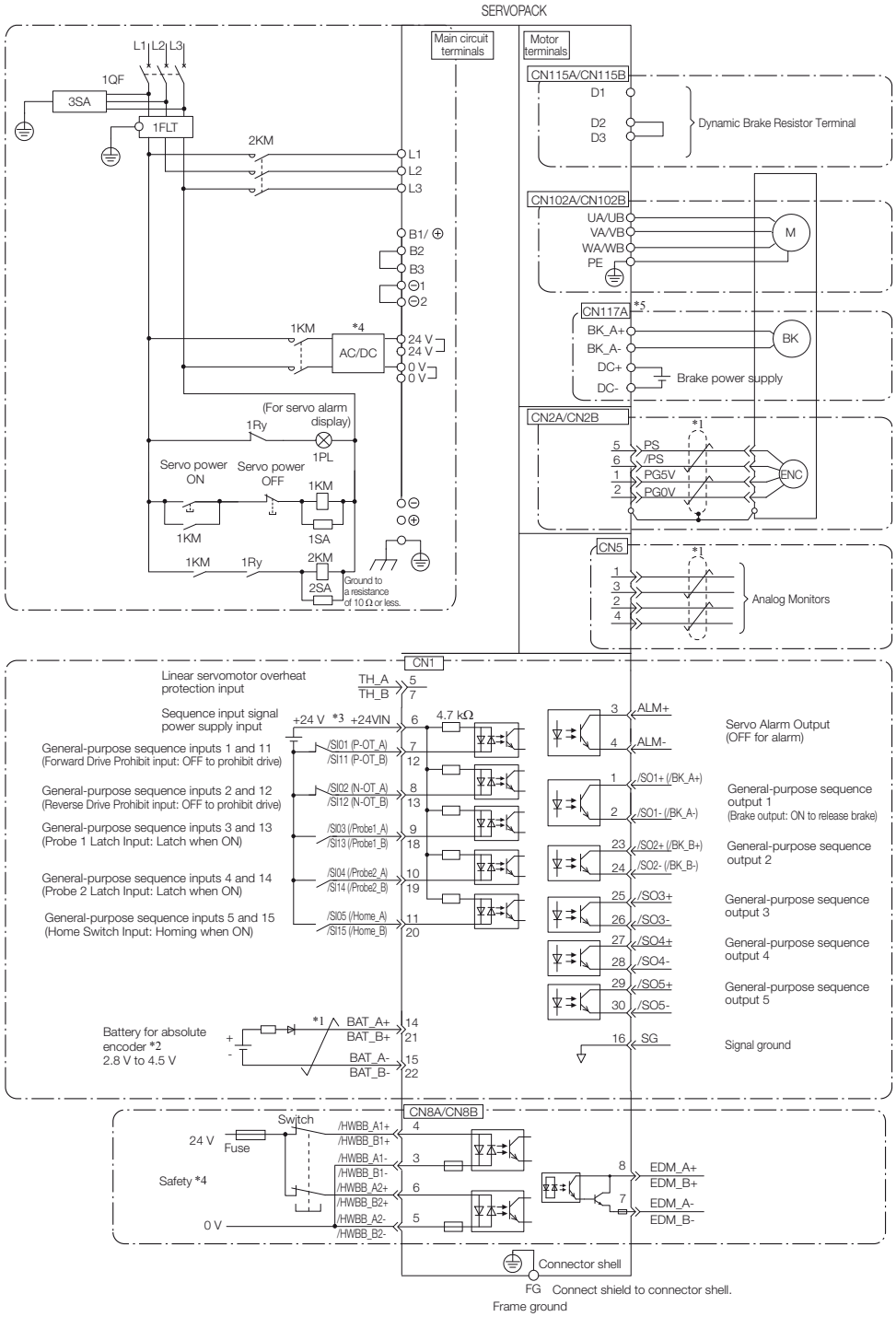
Note: 1. You can use parameter settings to change some of the I/O signal allocations.

2. If you use a 24-V brake, install a separate power supply for the 24-VDC power supply from other power supplies, such as the one for the I/O signals of the CN1 connector. If the power supply is shared, the I/O signals may malfunction.

3. Default settings are given in parentheses.

# System configurations up to 2×1.5 kW

## SGD7W dual-axis MECHATROLINK-III reference SERVOPACKs




*1. represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.

*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.

*4. Use an SELV-compliant power supply according to EN/IEC 60950-1 to input 24 VDC to the control power supply input terminals.

*5. The CN117 connector is used for SERVOPACKs with built-in Servomotor brake control. SERVOPACKs without built-in Servomotor brake control do not have the CN117 connector.

Note: 1. You can use parameter settings to change some of the I/O signal allocations.

2. If you use a 24-V brake, install a separate power supply for the 24-VDC power supply from other power supplies, such as the one for the I/O signals of the CN1 connector. If the power supply is shared, the I/O signals may malfunction.

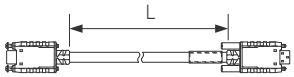
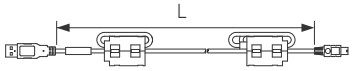
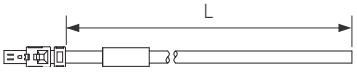
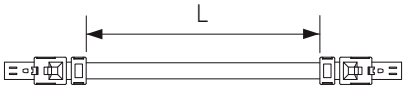
3. Default settings are given in parentheses.

# Cables for SERVOPACKs

Important

1. Use the cable specified by Yaskawa for the computer cable.
   Operation may not be dependable with any other cable.

Notes:
Refer to the manual for the following information. Cable dimensional drawings and cable connection specifications.
Order numbers and specifications of individual connectors for cables. Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual.

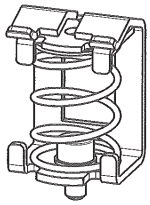
| Name | | Length (L) | Order Number | Appearance |
|---|---|---|---|---|
| Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| Digital Operator (including 1 m cable) | | 1 m | JUSP-OP05A-1-E |  |
| Digital Operator Cable | | 0.3 m | JZSP-CVS07-A3-E*2 |  |
| Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |
| Safety Function Device Cable | Cables with Connectors*1 | 1 m | JZSP-CVH03-01-E-G# |  |
| | | 3 m | JZSP-CVH03-03-E-G# | |
| | Connector Kit*2 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |
| MECHATROLINK-III<br>EtherCAT<br>PROFINET<br>Communications Cables*3 | | 0.2 m | CM3R□M0-00P2-E |  |
| | | 0.5 m | CM3R□M0-00P5-E | |
| | | 1 m | JZSP-CM3R□M0-01-E | |
| | | 3 m | JZSP-CM3R□M0-03-E | |
| | | 5 m | JZSP-CM3R□M0-05-E | |
| | | 10 m | JZSP-CM3R□M0-10-E | |
| | | 20 m | JZSP-CM3R□00-20-E | |
| | | 30 m | JZSP-CM3R□00-30-E | |
| | | 40 m | JZSP-CM3R□01-40-E | |
| | | 50 m | JZSP-CM3R□01-50-E | |

Cables are manufactured with an accuracy of one decimal place. Customized cable length possible (e.g. 07A5 for 7.5 m).

*1. When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*2. Use the connector kit when you make cables yourself.
*3. This cable is available in two variants. The order number for these cables differs at the marked □, an „R“ at this place is used for Cables with RJ45 Connectors on both ends, while an „M“ is used for Cables with RJ45 Connector on One End and IMI Connector on the other End.

# Motor connection shielding clamp

Shielding clamp mountable on Sigma-7 400 V SERVOPACKs up to 15 kW.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Order No. | Specification |
|---|---|---|
| Sigma-7 400 V up to 3.0 kW | KLBUE 4-13.5_SC |  |
| Sigma-7 400 V from 5 kW up to 7.5 kW | KLBUE 10-20_SC | |
| Sigma-7 400 V for 11 kW & 15 kW | KLBUE 15-32_SC | |

## Safety

### SGD7S-OSB01A

Advanced Safety Module FSoE
(STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SDI, SLP, SLI, SCA, SSM)

Safety over EtherCAT®

### SGD7S-OSB02A

Advanced Safety Module FSoE + I/O
(STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SDI, SLP, SLI, SLT, SMT, SCA, SSM)

Safety over EtherCAT®

### SGDV-OSA01A000FT900

Safety Module
(SBB, SBB-D, SPM-D, SLS-D)

## Feedback Modules

### SGDV-OFA01A

Feedback Option Module for Yaskawa Serial Protocol



### SGDV-OFB03A

Feedback Option Module for Pulse A quad B Encoders



### SGDV-OFB01A

Feedback Option Module for Serial and Sin/Cos Encoders



### SGDV-OFB04A

Feedback Option Module for Resolver



# Option Modules

Option Modules Advanced Safety 145
Option Module Safety 152
Option Module Feedback 156

# FSoE safety module with optional I/Os

When it comes to safety, compromises are not an option. That‘s why Yaskawa Sigma-7 servodrives easily integrate into FSoE safety concepts. Up to 16 available safety functions, 10 of them can work in parallel. This allows secure and easy control even for the most complex applications.

Sigma-7 safety modules enable high performance safe motion for your application.

## Seamless integration of safety



Sigma-7 safety modules integrate seamlessly into the SERVOPACK. Therefore, both safe and non-safe axes have the same dimensions resulting in easier planning and maximum flexibility.

# Option Modules Advanced Safety



## Option modules for advanced safety

The advanced safety modules for Sigma-7 series servo drives allow an expandability of the servo amplifier's functionality. It implements safety functions that conform to EN ISO 13849-1 up to SIL3/ PLe and are specified in the individual IEC 61800-5-2 standard. In combination with EtherCAT® Servopacks with function type FT91 these modules enable optimum safety in a machine according to industry needs.
Two different modules are available in order to cover safety related demands in the field.

| Model designation | Description |
|---|---|
| SGD7S-OSB01A | Advanced Safety Module FSoE |
| SGD7S-OSB02A | Advanced Safety Module FSoE and I/O |

Safety over EtherCAT®

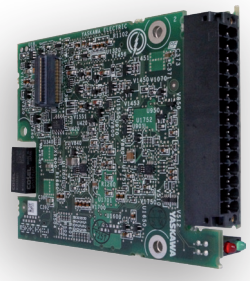
## Characteristics at a glance



Safety over EtherCAT®

**SGD7S-OSB01A**

- 14 safety functions:
  STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SSM, SDI, SLP, SSR, SLI, SCA, SLA
- 10 safety functions can work in parallel
- FSoE certified



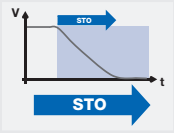
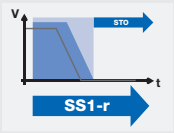
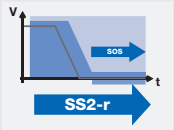
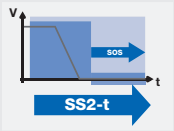
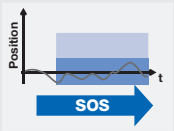
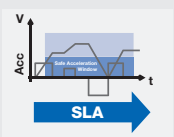
Safety over EtherCAT®

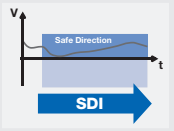
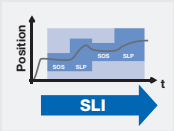
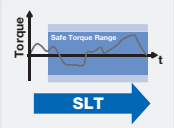
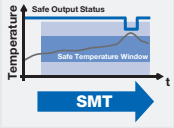
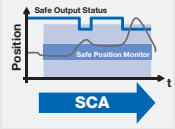
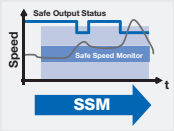
**SGD7S-OSB02A**

- 16 safety functions:
  STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SSM, SDI, SLP, SSR, SLI, SCA, SLA, SLT, SMT
- 10 safety functions can work in parallel
- I/O Board
  - 6 I/O dual channel SIL3/Ple Cat3
    - 4 safe digital input/output channels
    - 1 safe digital input
    - 1 safe analog input channel (0-10 V) / safe digital input
  - 2 I/O single channel SIL2/PLd Cat3
    - 1 analog input channel (PT1000)
    - 1 analog input channel (4-20 mA)
- FSoE certified

CE UL CERTIFIED TÜV SÜD SIL3 PLe

## Safety functions (IEC 61800-5-2)

| Type | Short | Function | Applicable Advanced Safety Modules | |
|---|---|---|---|---|
| | | | SGD7S-OSB01A | SGD7S-OSB02A |
| Safe Switch-Off (Safe BaseBlock Function) |  | Safe Torque Off<br><br>This function shuts OFF the power supply to the motor by executing the HWBB function of the SERVOPACK according to the safety request input state. The drive cannot generate any hazardous movements.<br>If STO is activated when the drive is moving, the motor will run down in an uncontrolled manner. | √ | √ |
| Safe Standstill |  | Safe Stop 1,<br>deceleration monitored and time controlled<br><br>The safety module will activate STO:<br>• if the speed limit is exceeded during deceleration<br>• after the monitoring time has elapsed | √ | √ |
| Safe Standstill |  | Safe Stop 1,<br>deceleration time controlled<br><br>The safety module will activate STO:<br>• after the monitoring time has elapsed | √ | √ |
| Safe Standstill |  | Safe Stop 2,<br>deceleration monitored and position monitored<br><br>The safety module will activate STO:<br>• if the speed limit is exceeded during deceleration<br><br>The safety module will activate SOS:<br>• after the monitoring time has elapsed (provided that no limit violation has occurred during deceleration).<br>If the position deviation exceeds the limit, the safety module will activate STO. | √ | √ |
| Safe Standstill |  | Safe Stop 2,<br>deceleration time controlled and position monitored<br><br>The safety module will activate SOS:<br>• after the monitoring time has elapsed.<br>If the position deviation exceeds the limit, the safety module will activate STO. | √ | √ |
| Safe Standstill |  | Safe Operating Stop<br><br>On safety function execution request, the safety module will switch to position monitoring.<br>If the position deviation exceeds the limit, the safety module will activate STO. | √ | √ |
| Safe Motion |  | Safely Limited Speed<br><br>On safety function execution request, the safety module starts to monitor the speed (first deceleration monitoring, then constant speed monitoring).<br>If any speed limit is violated, the safety module will activate the selected stopping method, for example STO (default). | √ | √ |
| Safe Motion |  | Safely Limited Acceleration<br><br>This function monitors the acceleration operation of the motor according to the safety request input state.<br>If the specified acceleration speed is exceeded, the selected motor stopping method will be applied, for example STO (default). | √ | √ |

| Type | Short | Function | Applicable Advanced Safety Modules | |
|---|---|---|---|---|
| | | | SGD7S-OSB01A | SGD7S-OSB02A |
| Safe Motion |  | Safe Speed Range<br><br>This function adds minimum speed monitoring to the SLS function. In other words, the maximum speed must not exceed a certain value, and the minimum speed must not drop below a certain value.<br>If either of these limits is violated, the selected motor stopping method will be applied, for example STO (default). | √ | √ |
| Safe Motion |  | Safe Direction<br><br>This function prevents the motor from moving in an invalid direction, it can only move in one (defined) direction. If the specified direction is violated, the safety module will activate STO. | √ | √ |
| Safe Positioning |  | Safely Limited Position<br><br>This function monitors the end positions of previously defined ranges. If the actual position exceeds the limits, the safety module will activate the selected stopping methos, for example STO (default). | √ | √ |
| Safe Positioning |  | Safely Limited Increment<br><br>This function monitors the movements of the drive for compliance with a defined increment. The reference position is defined when monitoring is activated.<br>If a limit value is violated, the safety module will activate STO. | √ | √ |
| Safe Motion |  | Safely Limited Torque<br><br>This function monitors the torque and compares the limit.<br>If the torque limit is violated, the safety module will activate the selected stopping method, for example STO (default). | – | √ |
| Safe Monitoring |  | Safe Motor Temperature<br><br>This function monitors the temperature and compares it to the limit values. If the temperature limit is violated, the safety module will deactivate (Low Output) the assigned safe output.<br><br>Please note that this is a monitoring function that does not activate a stopping method after a limit violation. | – | √ |
| Safe Motion |  | Safe CAM<br><br>This function provides a safe output signal to indicate whether the motor shaft position is within a specified range.<br>If the actual position exceeds the limits, the safety module will activate the configured safe output signal.<br><br>Please note that this function does not activate a stopping method after a limit violation. | √ | √ |
| Safe Monitoring |  | Safe Speed Monitor<br><br>This function provides a safe output signal to indicate whether or speed is below a specified limit. If the speed limit is violated during constant speed monitoring, the safety module will activate the configured safe output signal.<br>Please note that this is a monitoring function that does not activate a stopping method after a limit violation. | √ | √ |

## Applicable standards and functions

Compliance with Safety Standards

| Safety Standards | Applicable Standards | Products | |
|---|---|---|---|
| | | SERVOPACK with FT91 | SERVOPACK with FT91 + Advanced Safety Module |
| Safety of Machinery | EN ISO13849-1:2015 (Cat.3, PLe)<br>IEC 60204-1:2016 | √ | √ |
| Functional Safety | IEC 61508-1...3:2010<br>IEC 62061:2005/A2:2015<br>IEC 61800-5-1:2007<br>IEC 61800-5-2:2016 | √ | √ |
| EMC | IEC 61362-3-1:2017<br>EN IEC 61000-6-2:2019<br>EN IEC 61000-6-4:2019<br>IEC 61000-4-2:2008<br>IEC 61000-4-3:2006 + A1:2007 + A2:2010 | √ | √ |

# Specifications

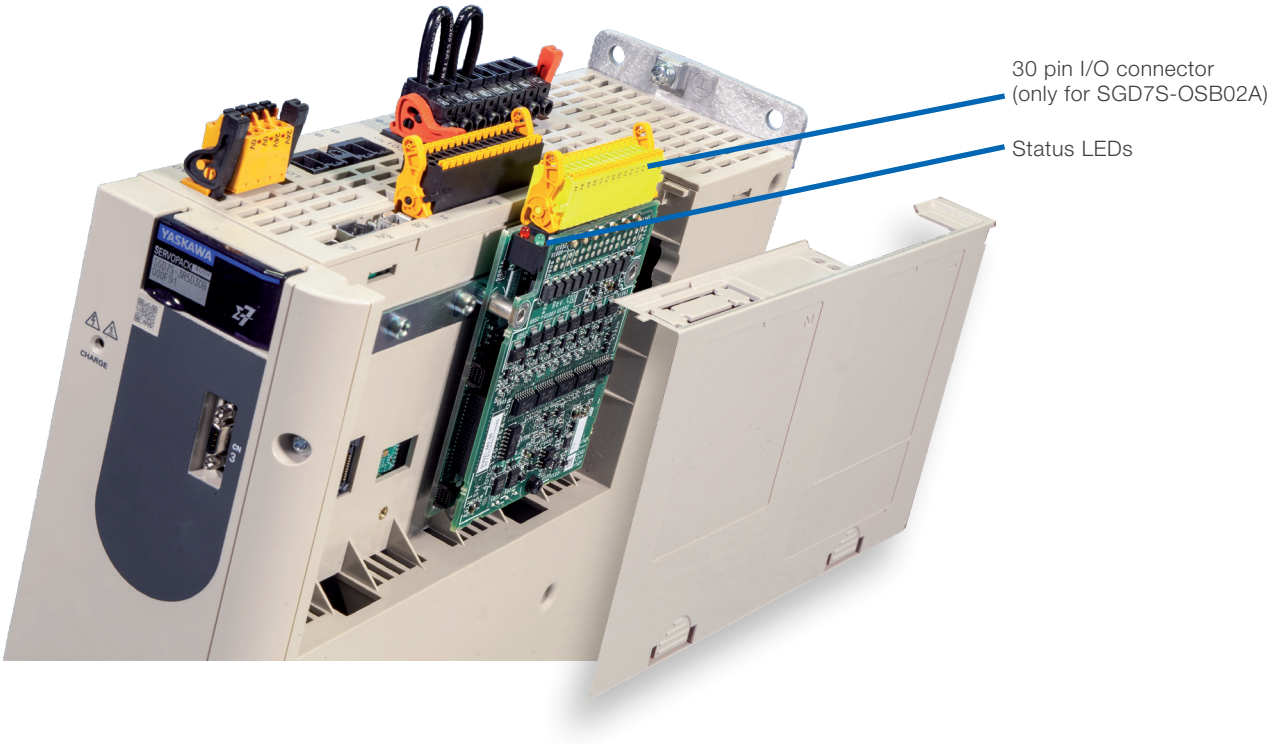
## SGD7S-OSB01A

| Items | Standards | Safety Details |
|---|---|---|
| Safety Integrity Level | IEC 61508 | Up to SIL3 |
| | IEC 62061 | Up to SILCL3 |
| Probability of Dangerous Failure per Hour | IEC 61508 | PFH = 1.3 x $10^{-9}$/h |
| | IEC 62061 | PFH = 4.53 x $10^{-9}$/h |
| Performance Level | EN ISO 13849-1 | Up to PLe (Category 3) |
| Safe Failure Fraction (Fraction of Failures which lead to a Safe Status) | IEC 61508 | SFF = 99.9 % |
| Mean Time to Failure dangerous | EN ISO 13849-1 | $MTTF_d$ = 400 years (HIGH) |
| Average Diagnostic Coverage | EN ISO 13849-1 | $DC_{avg}$ = 99.9 % (HIGH) |
| Stop Category | IEC 60204-1 | Stop Category 0/1/2 |
| Safety Function | IEC 61800-5-2 | STO / SS1-r / SS1-t / SS2-r / SS2-t / SOS / SLS /SLA / SSR / SDI / SLP / SLI / SCA / SSM |
| Mission Time | IEC 61508 | 20 years (The proof test interval is equal to the mission time.) |
| Hardware Fault Tolerance | IEC 61508 | HFT = 1 |
| Subsystem | IEC 61508 | B |

## SGD7S-OSB02A

| Items | Standards | Safety Details |
|---|---|---|
| Safety Integrity Level | IEC 61508 | Up to SIL3 |
| | IEC 62061 | Up to SILCL3 |
| Probability of Dangerous Failure per Hour | IEC 61508 | PFH = 2.493 x $10^{-8}$/h |
| | IEC 62061 | PFH = 3.09 x $10^{-8}$/h |
| Performance Level | EN ISO 13849-1 | Up to PLe (Category 3) |
| Safe Failure Fraction (Fraction of Failures which lead to a Safe Status) | IEC 61508 | SFF = 95.6 % |
| Mean Time to Failure dangerous | EN ISO 13849-1 | $MTTF_d$ = 100 years (HIGH) |
| Average Diagnostic Coverage | EN ISO 13849-1 | $DC_{avg}$ = 91.2 % (MEDIUM) |
| Stop Category | IEC 60204-1 | Stop Category 0/1/2 |
| Safety Function | IEC 61800-5-2 | STO / SS1-r / SS1-t / SS2-r / SS2-t / SOS / SLS /SLA / SSR / SDI / SLP / SLI / SLT / SMT / SCA / SSM |
| Mission Time | IEC 61508 | 20 years (The proof test interval is equal to the mission time.) |
| Hardware Fault Tolerance | IEC 61508 | HFT = 1 |
| Subsystem | IEC 61508 | B |

## View of SERVOPACK with advanced safety module installed (with open cover)




## Status display LEDs

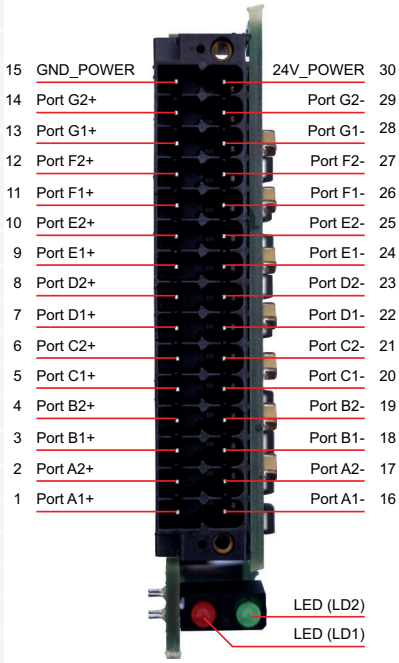
The safety module has a green LED (LD2) to signalize normal operation without disturbance and a red LED (LD1) to signalize errors.

| Red LED | Green LED | Meaning |
|---|---|---|
| OFF | OFF | No power supply |
| OFF | ON | Normal operation |
| ON | OFF | Error of the safety module according to the error codes |
| ON | ON | STO active |
| Blinking | OFF | Incorrect module exchange / Error after „pairing“ the safety module with the SERVOPACK |
| Blinking | ON | Safety function active |

## Terminal layout CN21 I/O connector for SGD7S-OSB02A

The safety module is equipped with a 30 pin connector (two parallel row arrangement) with the following pin assignment.

| Pin No. | Signal | Description |
|---|---|---|
| 1 | Port A1+ | Digital I/O |
| 2 | Port A2+ | Digital I/O |
| 3 | Port B1+ | Digital I/O |
| 4 | Port B2+ | Digital I/O |
| 5 | Port C1+ | Digital I/O |
| 6 | Port C2+ | Digital I/O |
| 7 | Port D1+ | Digital I/O |
| 8 | Port D2+ | Digital I/O |
| 9 | Port E1+ | Digital Input |
| 10 | Port E2+ | Digital Input |
| 11 | Port F1+ | Digital Input / Analog Input (0-10 V) |
| 12 | Port F2+ | Digital Input / Analog Input (0-10 V) |
| 13 | Port G1+ | Current Input (4-20 mA) |
| 14 | Port G2+ | RTD Input (PT1000) |
| 15 | GND_POWER | Ext. 24 V Power Supply |
| 16 | Port A1- | Digital I/O |
| 17 | Port A2- | Digital I/O |
| 18 | Port B1- | Digital I/O |
| 19 | Port B2- | Digital I/O |
| 20 | Port C1- | Digital I/O |
| 21 | Port C2- | Digital I/O |
| 22 | Port D1- | Digital I/O |
| 23 | Port D2- | Digital I/O |
| 24 | Port E1- | Digital Input |
| 25 | Port E2- | Digital Input |
| 26 | Port F1- | Digital Input / Analog Input (0-10 V) |
| 27 | Port F2- | Digital Input / Analog Input (0-10 V) |
| 28 | Port G1- | Current Input (4-20 mA) |
| 29 | Port G2- | RTD Input (PT1000) |
| 30 | 24V_POWER | Ext. 24 V Power Supply |




## Additional accessories

| Model designation | Description |
|---|---|
| JZSP-P7R2-8-E | Mounting rail for option modules for Sigma-7 400 V SERVOPACKs |
| JUSP-7CN21 | Safety I/O connector (for SGD7S-OSB02A) |
| SGDV-OFA01 | Feedback option module for Yaskawa encoder |
| SGDV-OFB04A | Feedback option module for resolver |
| JZSP-Z002 | 20-bit absolute encoder |
| JZSP-CVS06-02-E | USB connection cable (Programming PC - SERVOPACK) |

## Configuration Tool: Advanced Safety Module Parameter Editor

Available on the Yaskawa Europe website.

# Option Module Safety

## Sigma-5 option module safety

The Safety Module for Sigma-7 series servodrives allows an expandability of the servo amplifier's functionality. It implements safety functions that conform to EN ISO 13849-1 and are specified in the individual IEC 61800-5-2 standard. You can combine it with a Sigma-7 400 V SERVOPACK to design optimum safety in a machine system according to industry needs.

**SERVOPACKs, Option Module Safety and Mounting Rail need to be ordered separately.**

| Model designation | Description |
|---|---|
| SGDV-OSA01A000FT900 | Safety Module |

## Mounting rail for option modules

Mounting rail for option modules for Sigma-7 400 V SERVOPACKs.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Model designation | Specification |
|---|---|---|
| All Models | JZSP-P7R2-8-E |  |

## Applicable standards and functions

Compliance with Safety Standards

| Safety Standards | Applicable Standards | Products | |
|---|---|---|---|
| | | SERVOPACK | SERVOPACK + Safety Module |
| Safety of Machinery | EN ISO13849-1:2008/ AC:2009<br>EN 954-1<br>IEC 60204-1 | √ | √ |
| Functional Safety | IEC 61508 Series<br>IEC 62061<br>IEC 61800-5-2 | √ | √ |
| EMC | IEC 61326-3-1 | √ | √ |

## Support for functions defined in IEC61800-5-2

Safety functions are implemented by using the hard wire base block (HWBB) in the SERVOPACK.

| Safety Function | Description | Applicable Products | | | |
|---|---|---|---|---|---|
| | | SGD7S<br>SGD7W Axis A + B | SGD7S +<br>Safety Module | SGD7W Axis A +<br>Safety Module | SGD7W Axis B |
| Safe BaseBlock Function*<br>(SBB function) | This safety function is equivalent to an STO function. (It shuts OFF the power supply from the SERVOPACK to the motor.) | √ | √ | √ | √ |
| Safe BaseBlock with Delay Function<br>(SBB-D function) | This safety function is equivalent to an SS1 function. (It monitors the deceleration operation of the motor for the specified time and then shuts OFF the power supply from the SERVOPACK to the motor.) | — | √ | √ | — |
| Safe Position Monitor with Delay Function<br>(SPM-D function) | This safety function is equivalent to an SS2 function. (It monitors the deceleration operation of the motor for the specified time and then monitors the position after the motor stops.) | — | √ | √ | — |
| Safely Limit Speed with Delay Function<br>(SLS-D function) | This safety function is equivalent to an SLS function. (It monitors the deceleration operation of the motor for the specified time and then monitors the speed of the motor to confirm that it remains in the allowable range.) | — | √ | √ | — |

* In combination with a Option Module Safety, the selection of Safe BaseBlock Function (Safe Torque Off) is possible on SERVOPACK CN8 or Option Module Safety.

| SERVOPACK | | Safety Module | Safe Performance:<br>SERVOPACK CN8□ | Safe Performance:<br>Safety Module |
|---|---|---|---|---|
| SGD7S | | SGDV-OS01A | CN8: Not apply (*2) | Apply |
| | | SGDV-OS01A000FT900 | CN8: Apply | Apply |
| SGD7W | Axis A*1 | SGDV-OS01A | Apply | Apply |
| | Axis B*1 | - | CN8B: Apply | - |
| SGD7W | Axis A | SGDV-OS01A000FT900 | CN8A: Apply | Apply |
| | Axis B | - | CN8B: Apply | - |

*1 When the Safety Module is attached to the SGD7W, the Safety Module operates for Axis A only.
*2 A safety jumper connector should be connected for not applied CN8□.

# Specifications and ratings

## Basic specifications

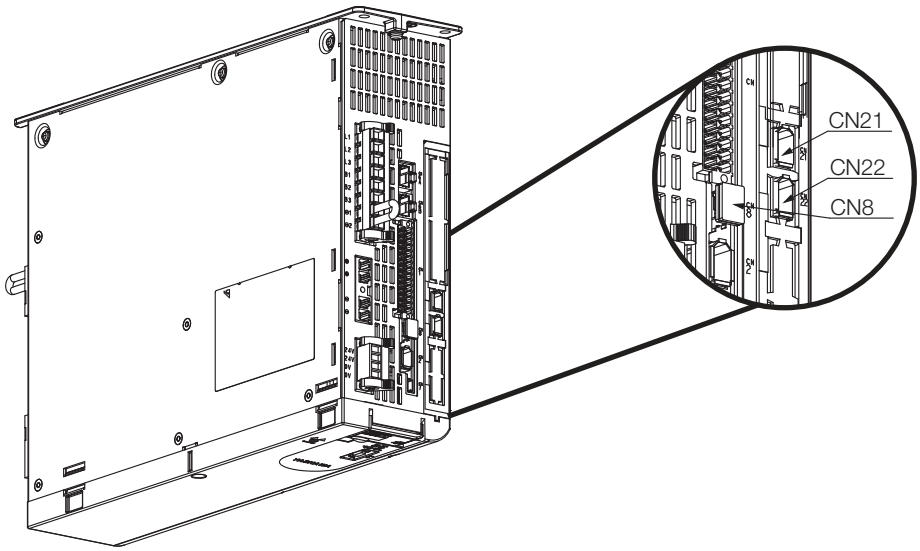
| Item | | Specification | |
|---|---|---|---|
| Placement | | Attached to the SERVOPACK | |
| Power Specification | Power Supply Method | Supplied from the control power supply of the SERVOPACK. | |
| Operating Conditions | Ambient Air Temperature | 0°C to +55°C | |
| | Storage Temperature | –20°C to +85°C | |
| | Surrounding Air Humidity / Storage Humidity | 90 % relative humidity max. | No freezing or condensation. |
| | Vibration Resistance | 4.9 m/s$^2$ | |
| | Shock Resistance | 19.6 m/s$^2$ | |
| | Protection Class / Pollution Degree | Protextion class: IP10, Pollution Degree: 2<br>An environment that satisfies the following conditions.<br>• Free of corrosive or explosive gases.<br>• Free of exposure to water, oil or chemicals.<br>• Free of dust, salts or iron dust. | |
| | Altitude | 1,000 m max. | |
| | Others | Free of static electricity, strong electromagnetic/magnetic fields, or radioactivity. | |

## Compliance with UL Standards, EU Directives, and other safety standards (in combination with SERVOPACK)

| Item | | | | Specification | |
|---|---|---|---|---|---|
| Safety Functions | Number of Functions: 2 | | | | |
| | Safety Function A (CN21) | Inputs | Number of Channels | 2 | |
| | | | Function | Safety Request Input Signal (SRI-A1, SRI-A2) | |
| | | Output | Number of Channels | 1 | |
| | | | Function | External Device Monitor Output Signal (EDM-A) | |
| | | Stopping Methods | | **Safety Functions (IEC61800-5-2)** | **Function names of Safety Module** |
| | | | | Safe Torque Off (STO) | Safe BaseBlock Function (SBB function) |
| | | | | Safe Stop 1 (SS1) | Safe BaseBlock with Delay Function (SBB-D function) |
| | | | | Safe Stop 2 (SS2) | Safe Position Monitor with Delay Function (SPM-D function) |
| | | | | Safely-Limited Speed (SLS) | Safely Limited Speed with Delay Function (SLS-D function) |
| | Safety Function B (CN22) | Inputs | Number of Channels | 2 | |
| | | | Function | Safety Request Input Signal (SRI-B1, SRI-B2) | |
| | | Output | Number of Channels | 1 | |
| | | | Function | External Device Monitor Output Signal (EDM-B) | |
| | | Stopping Methods | | **Safety Functions (IEC61800-5-2)** | **Function names of Safety Module** |
| | | | | Safe Torque Off (STO) | Safe BaseBlock Function (SBB function) |
| | | | | Safe Stop 1 (SS1) | Safe BaseBlock with Delay Function (SBB-D function) |
| | | | | Safe Stop 2 (SS2) | Safe Position Monitor with Delay Function (SPM-D function) |
| | | | | Safely-Limited Speed (SLS) | Safely Limited Speed with Delay Function (SLS-D function) |
| Others | | | | Active Mode Function | |
| Response Time | | | | 200 ms max. | |
| Safe Performance | Safety Integrity Level | | | SIL2, SILCL2 | |
| | Probability of Dangerous Failure per Hour | | | PFH 3.3 × 10$^{-7}$ [1/h] | |
| | Category | | | Cat3 | |
| | Performance Level* | | | PLd (Category 2) | |
| | Mean Time to Dangerous Failure of Each Channel | | | MTTFd: High | |
| | Average Diagnostic Coverage | | | DCave: Medium | |
| | Proof Test Interval | | | 10 years | |

* If Safe Torque Off is used on the SERVOPACK side CN8, the specification of Safe Performance changes to PLe, for specifics refer to the SERVOPACK Specifications in this catalogue.

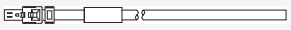
## Top view of SERVOPACK with safety module installed




| Device Label | Model | Number of Pins | Manufacturer |
|---|---|---|---|
| CN21 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| CN22 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |

Notes:
1. The above connectors or their equivalents are used for SERVOPACKs.
2. Refer to the user's manual of the Safety Module for installation standards.

## Cables for option module safety

| Name | Length | Oder No. | Specification |
|---|---|---|---|
| Cables with connectors* | 1 m | JZSP-CVH03-01-E-G# |  |
| | 3 m | JZSP-CVH03-03-E-G# | |

* When using safety functions, connect this Cable to the safety functions devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.

## Specifications for JZSP-CVH03-03-E-G#

| Pin No. | Signal | Lead Color | Marking Color |
|---|---|---|---|
| 1 | Not used | – | – |
| 2 | Not used | – | – |
| 3 | /HWBB1– | White | Black |
| 4 | /HWBB1+ | White | Red |
| 5 | /HWBB2– | Gray | Black |
| 6 | /HWBB2+ | Gray | Red |
| 7 | EDM1– | Orange | Black |
| 8 | EDM1+ | Orange | Red |

# Option Module Feedback

## Fully-closed module

The Feedback Modules for Sigma-7 series servodrives allow an expandability of the servo amplifier's functionality. With fully-closed control, an externally installed encoder is used to detect the position of the controlled machine and the machine's position information is fed back to the SERVOPACK. High-precision positioning is possible because the actual machine position is fed back directly. To perform fully-closed loop control, a Fully-Closed Module and SERVOPACK are required.

**SERVOPACKs, Option Module Feedback and Mounting Rail need to be ordered separately.**

### Fully-closed module

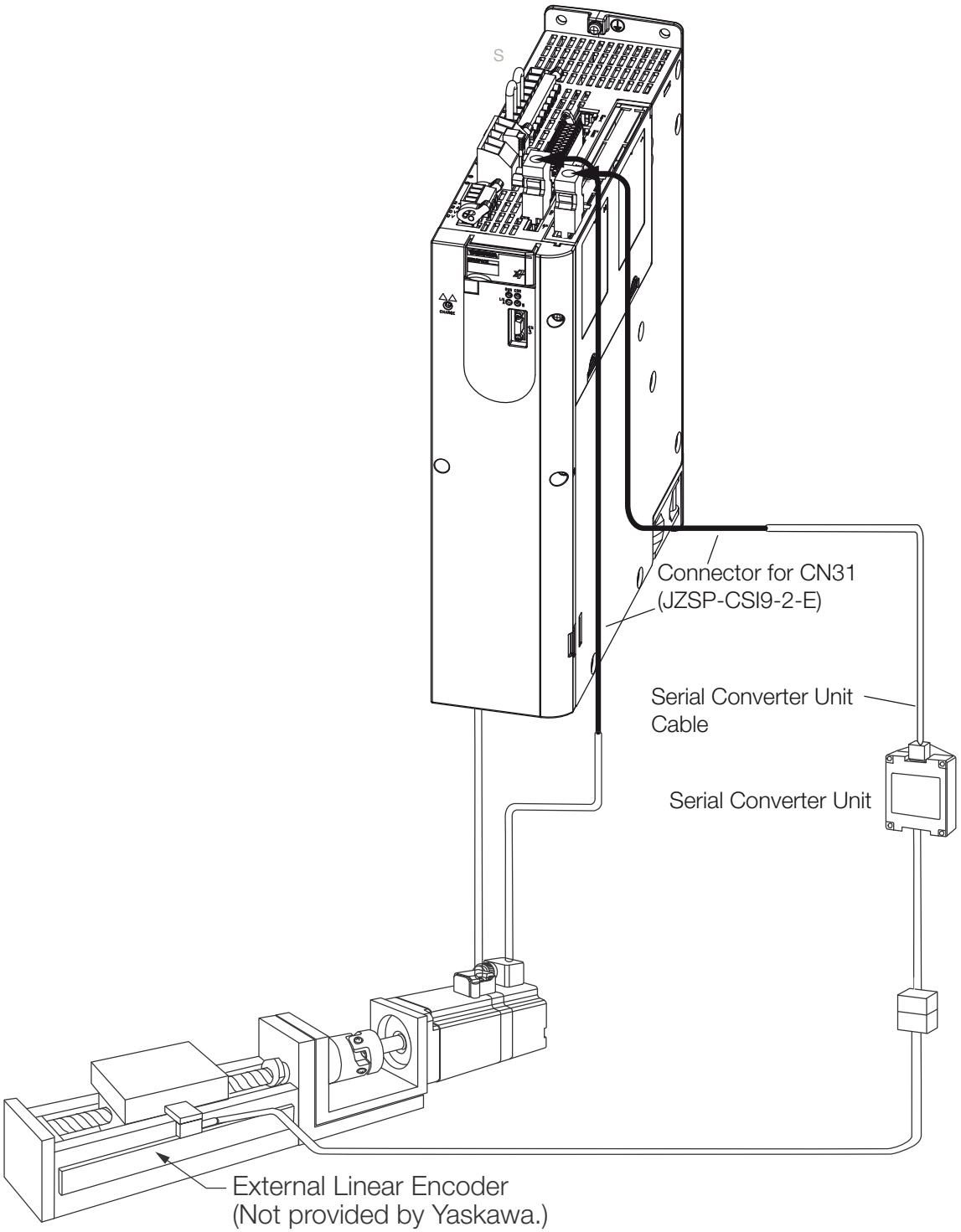
| Model designation | Description |
|---|---|
| SGDV-OFA01A | Feedback Option Module for Yaskawa Serial Protocol |
| SGDV-OFB01A | Feedback Option Module for Serial and Sin/Cos Encoders |
| SGDV-OFB03A | Feedback Option Module for Pulse A quad B Encoders |
| SGDV-OFB04A | Feedback Option Module for Resolver |

### Mounting rail for option modules

Mounting rail for option modules for Sigma-7 400 V SERVOPACKs.
Contact your Yaskawa representative for more information.

| SERVOPACK Model | Order No. | Specification |
|---|---|---|
| All Models | JZSP-P7R2-8-E |  |

## System configuration with SGDV-OFA01A

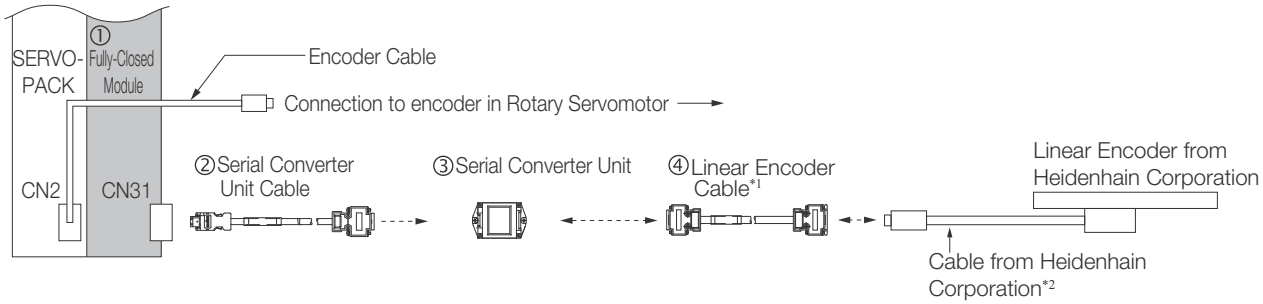



* The connected devices and cables depend on the type of external Linear Encoder that is used.
Note: Refer to the following section for the information on peripheral devices or chapter Peripheral Devices.

## Connections to linear encoder from Heidenhain Corporation

### Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a Yaskawa Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) in the Serial Converter Unit.



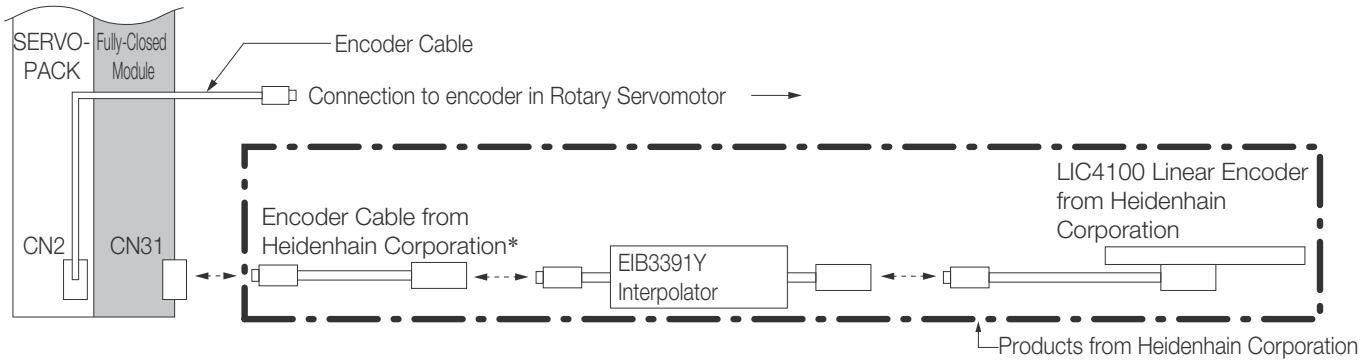

*1. When using a JZDP-J00□-□□□Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

| No. | Item | Model |
|---|---|---|
| ① | Fully-Closed Module (Purchased alone) | Fully-Closed Module*1 SGDV-OFA01A |
| ② | Serial Converter Unit Cable | JZSP-CLP70-□□*3-E |
| ③ | Serial Converter Unit*2 | JZDP-H003-000 |
| ④ | Linear Encoder Cable | JZSP-CLL30-□□*3-E |

*1 When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number. Please use the Yaskawa mounting rail JZSP-P7R2-8-E in combination with a Fully-Closed Module.
*2 Contact your Yaskawa representative for specific information.
*3 The boxes (□□) in the model number are reolaced with cable length when ordering. (1m = 01, 3m = 03, 5m = 05, 10m = 10, 15m = 15)

## Connections when using a Yaskawa serial interface for the output signals

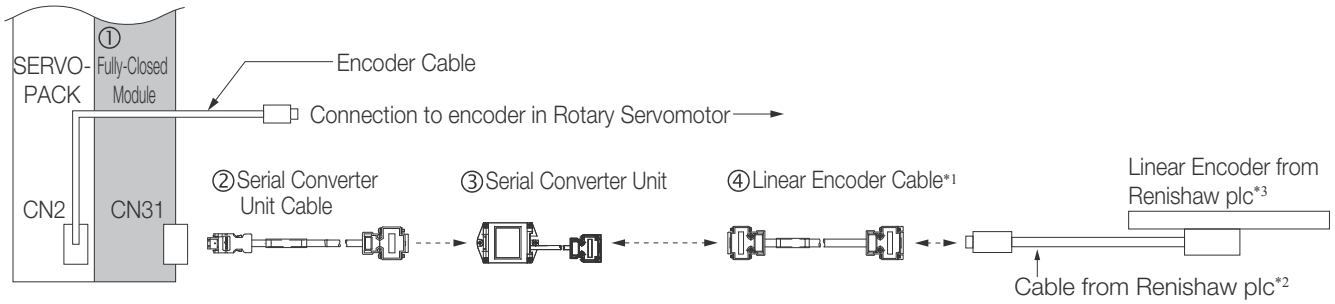
### LIC4100 Linear Encoder with EIB3391Y Interpolator




* Use an Encoder Cable from Heidenhain Corporation. Contact Heidenhain Corporation for detailed Encoder Cable specifications.

# Connections to linear encoder from Renishaw Plc

## Connections for a 1 Vp-p Analog Voltage Output Signal



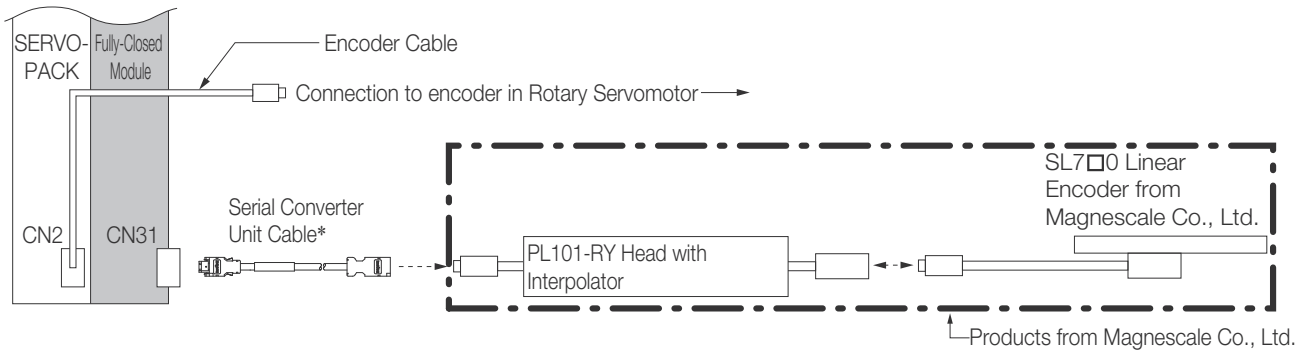

*1 When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*2 Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc.
*3 If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected. If that occurs, use the BID/DIR signal to output the origin signal only in one direction.

| No. | Item | Model |
|---|---|---|
| ① | Fully-Closed Module (Purchased alone) | Fully-Closed Module*1 SGDV-OFA01A |
| ② | Serial Converter Unit Cable | JZSP-CLP70-□□*3-E |
| ③ | Serial Converter Unit*2 | JZDP-H005-000 |
| ④ | Linear Encoder Cable | JZSP-CLL00-□□*3-E |

*1 When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number. Please use the Yaskawa mounting rail JZSP-P7R2-8-E in combination with a Fully-Closed Module.
*2 Contact your Yaskawa representative for specific information.
*3 The boxes (□□) in the model number are reolaced with cable length when ordering. (1m = 01, 3m = 03, 5m = 05, 10m = 10, 15m = 15)

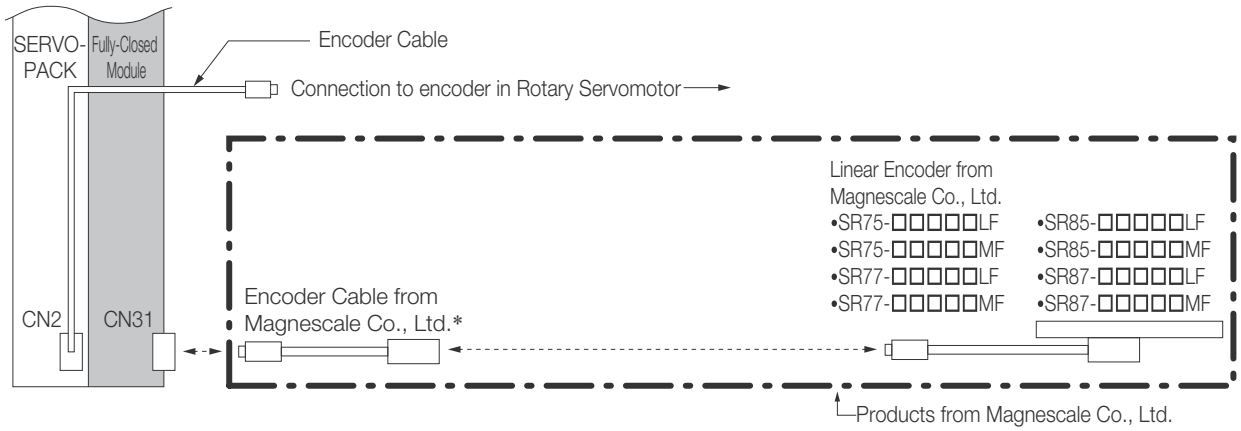
# Connections to linear encoder from Magnescale Co., Ltd.

## SL7□0 Linear Encoder and PL101-RY Sensor Head with Interpolator



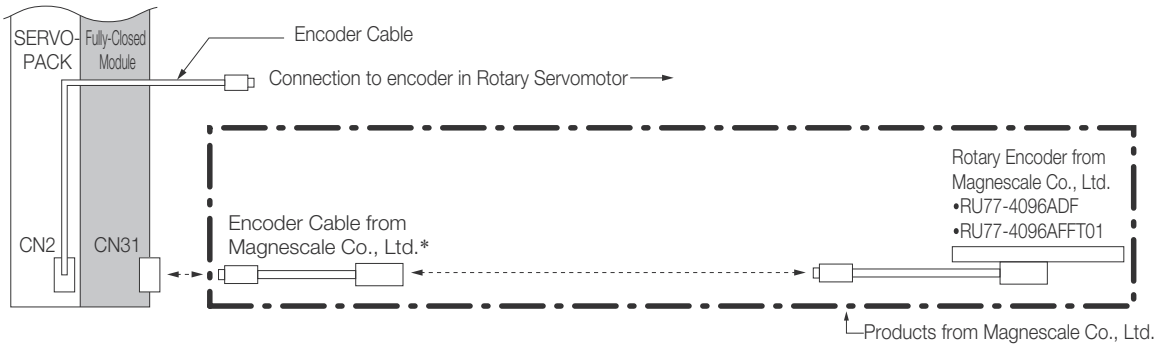

* Refer to the following section for information on cables to connect Fully-Closed Modules and Linear Encoders or chapter Serial Converter Unit Cables.

### SR-75, SR-77, SR-85, and SR-87 Linear Encoders




* To connect the SERVOPACK and Linear Encoder, use a CH33-xx□□G Cable from Magnescale Co., Ltd. (This Cable has connectors designed for use with Yaskawa products).

### RU77-4096ADF/RU77-4096AFFT01 Absolute Rotary Encoders

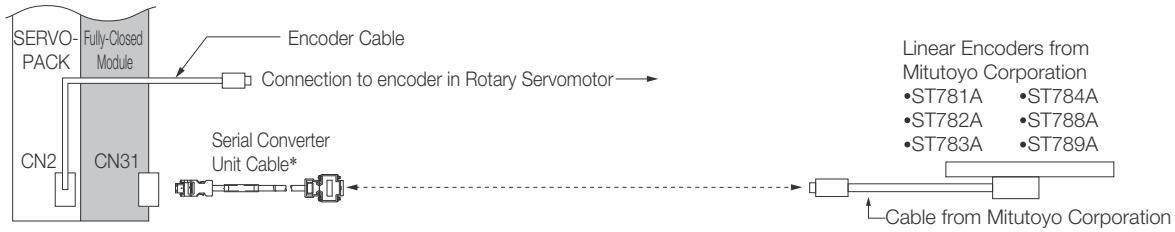



*To connect the SERVOPACK and Rotary Encoder, use a CE28-Series Extension Cable for RU77 from Magnescale Co., Ltd.

Note: The RU77 is a single-turn absolute rotary encoder.

## Connections to linear encoders from Mitutoyo Corporation

### ST78□A Linear Encoders



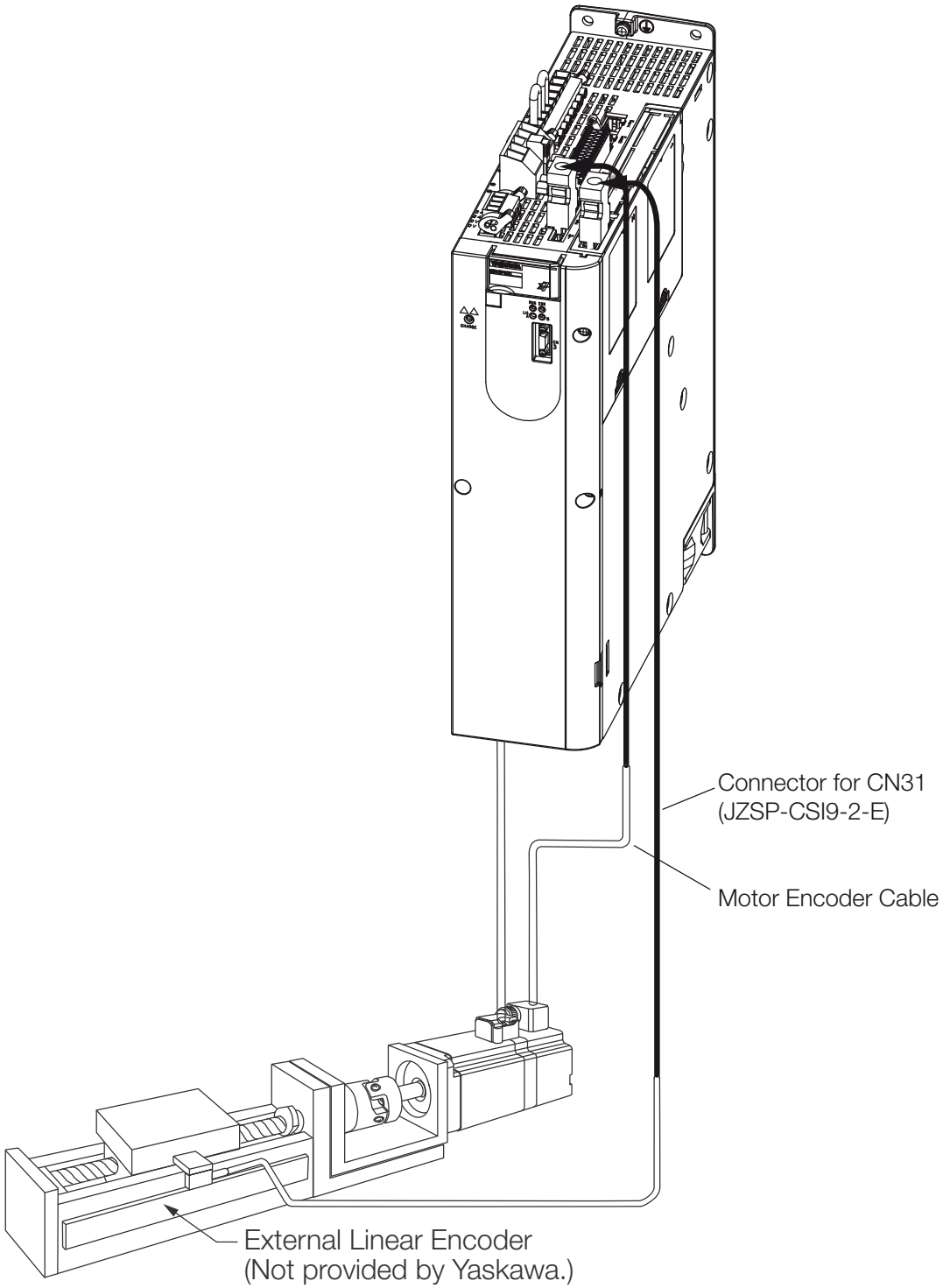

* Refer to the following section for information on cables to connect Fully-Closed Modules and Linear Encoders or chapter Serial Converter Unit Cables.

## Connectors

| Device Label | Model | Yaskawa Order No. | Number of Pins | Manufacturer |
|---|---|---|---|---|
| CN31 | 3E106-0220KV | JZSP-CMP9-1-E-G# | 6 | 3M Japan Ltd. |

Note: The above connecor or their equivalent are used for the Fully-Closed Module.

## System configuration with SGDV-OFB0□A



## Standard specifications

| Encoder Type | | Specifications | |
|---|---|---|---|
| EnDat 2.2 | Encoder Supply | Output voltage | Typ. 5 V |
| | Serial Interface (Synchronous) | Signal transfer | RS485 |
| | | Max. Baud rate | 16 MHz |
| EnDat 2.1 | Encoder Supply | Output voltage | Typ. 5 V |
| | Serial Interface (Synchronous) | Signal transfer | RS485 |
| | | Max. Baud rate | 2 MHz |
| | Sine-Cosine input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.5 to 1.25 Vss |
| | | Terminating resistor | 124 Ohm |
| | | Signal frequency | 250 kHz |
| | | Resolution | 13-bits (8192) |
| Hiperface | Encoder Supply | Output voltage | 7 to 12 V |
| | Serial Interface (Asynchronous) | Signal transfer | RS485 |
| | | Max. Baud rate | 38.4 MHz |
| | Sine-Cosine input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.5 to 1.25 Vss |
| | | Terminating resistor | 124 Ohm |
| | | Signal frequency | 250 kHz |
| | | Resolution | 13-bits (8192) |
| Sine-Cosine Encoder | Encoder Supply | Output voltage | Typ. 5 V |
| | Sine-Cosine input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.5 to 1.25 Vss |
| | | Terminating resistor | 124 Ohm |
| | | Signal frequency | 250 kHz |
| | | Resolution | 13-bits (8192) |
| | Reference input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.2 V or more |
| | | Terminating resistor | 124 Ohm |

## Option module feedback set-up for fully-closed loop control

The encoder parameters must be written into the module via the SERVOPACK using the SigmaWin+ engineering tool. Ask Yaskawa for preparation encoder parameter file for fully-closed loop.

## Procedure to download the encoder parameter via SigmaWin+ version 7.5x via Sigma-7 400 V to option module feedback

1. Install a motor, encoder and SERVOPACK.
2. In SigmaWin+ select “Parameters > Parameter edit”. Set parameter Pn002.3 = 1 or 3.
3. Start “Setup > Motor parameter scale write” in SigmaWin+.
4. Write configuration file to option module feedback.

Note: Refer to SigmaWin+ Operation manual for information on how to write parameters using SigmaWin+.

## General specification SGDV-OFB01A

| Item | | Specification |
|---|---|---|
| Applicable SERVOPACK | | All Sigma-7 Series SERVOPACKs |
| Applicable SERVOPACK Firmware Version | | Version 0023 or later |
| Placement | | Attached to the SERVOPACK |
| Power Specification | Power Supply Method | Supplied from the control power supply of the SERVOPACK. |
| Operating Conditions | Surrounding Air / Storage Temperature | 0°C to +55 °C / -20 °C to +85 °C |
| | Ambient / Storage Humidity | 90% RH or less (with no condensation) |
| | Vibration / Shock Resistance | 4.9 $m/s^2$ / 19.8 $m/s^2$ |
| | Protection Class / Pollution Degree | Protection class: IP10, Pollution degree: 2<br>An environment that satisfies the following conditions.<br>• Free of corrosive or explosive gases<br>• Free of exposure to water, oil or chemicals<br>• Free of dust, salts or iron dust |
| | Altitude | 1,000 m or less |
| | Others | Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity |
| Supported motors | | Permanent magnet, Synchronous AC rotary or linear motor |
| Max. output frequency range | | Must be lower than 500 [rev/sec].<br>Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V).<br>If UL is needed, the combination should be applied to UL on customer side. |
| Supported scales for motor driving usage | | EnDat2.1, EnDat2.2, HIPERFACE, Sin/Cos |
| Supported scales for fully-closed usage | | EnDat2.1, EnDat2.2, HIPERFACE, Sin/Cos |
| Motor pole information for motor driving | Without hall sensor signals | Sigma-5 detecting function is available.<br>In case of EnDat2.1, EnDat2.2 and HIPERFACE, the function should be carried out once (after that, recognized data will be used).<br>In other cases, the function should be carried out each boot-up. |
| | With hall sensor signals | The data is used (any functions needed for the information). |
| Unsupported devices | | Advanced option module safety: SGDV-OSA01A<br>Fully-closed option module: SGDV-OFA01A |

## General specification SGDV-OFB03A

| Item | | Specification |
|---|---|---|
| Applicable SERVOPACK | | All Sigma-7 Series SERVOPACKs |
| Applicable SERVOPACK Firmware Version | | Version 0023 or later |
| Placement | | Attached to the SERVOPACK |
| Power Specification | Power Supply Method | Supplied from the control power supply of the SERVOPACK. |
| Operating Conditions | Surrounding Air / Storage Temperature | 0°C to +55 °C / -20 °C to +85 °C |
| | Ambient / Storage Humidity | 90% RH or less (with no condensation) |
| | Vibration / Shock Resistance | 4.9 $m/s^2$ / 19.8 $m/s^2$ |
| | Protection Class / Pollution Degree | Protection class: IP10, Pollution degree: 2<br>An environment that satisfies the following conditions.<br>• Free of corrosive or explosive gases<br>• Free of exposure to water, oil or chemicals<br>• Free of dust, salts or iron dust |
| | Altitude | 1,000 m or less |
| | Others | Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity |
| Supported motors | | Permanent magnet, Synchronous AC rotary or linear motor |
| Max. output frequency range | | Must be lower than 500 [rev/sec].<br>Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V).<br>If UL is needed, the combination should be applied to UL on customer side. |
| Supported scales for motor driving usage | | A quad B |
| Supported scales for fully-closed usage | | A quad B |
| Motor pole information for motor driving | Without hall sensor signals | Sigma-5 detecting function is available.<br>In other cases, the function should be carried out each boot-up. |
| | With hall sensor signals | The data is used (any functions needed for the information). |
| Unsupported devices | | Advanced option module safety: SGDV-OSA01A<br>Fully-closed option module: SGDV-OFA01A |

## General specification SGDV-OFB04A

| Item | | Specification |
|---|---|---|
| Applicable SERVOPACK | | All Sigma-7 Series SERVOPACKS |
| Applicable SERVOPACK Firmware Version | | Version 0023 or later |
| Placement | | Attached to the SERVOPACK |
| Power Specification | Power Supply Method | Supplied from the control power supply of the SERVOPACK. |
| Operating Conditions | Surrounding Air / Storage Temperature | 0°C to +55 °C / -20 °C to +85 °C |
| | Ambient / Storage Humidity | 90% RH or less (with no condensation) |
| | Vibration / Shock Resistance | 4.9 $m/s^2$ / 19.8 $m/s^2$ |
| | Protection Class / Pollution Degree | Protection class: IP10, Pollution degree: 2<br>An environment that satisfies the following conditions.<br>• Free of corrosive or explosive gases<br>• Free of exposure to water, oil or chemicals<br>• Free of dust, salts or iron dust |
| | Altitude | 1,000 m or less |
| | Others | Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity |
| Supported motors | | Permanent magnet, Synchronous AC rotary or linear motor |
| Max. output frequency range | | Must be lower than 240 [rev/sec].<br>Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V).<br>If UL is needed, the combination should be applied to UL on customer side. |
| Motor pole information for motor driving | Incremental usage | Sigma-5 detecting function is available.<br>The function should be carried out at each boot-up. |
| | Absolute usage | The data is used (any functions needed for the information). The pole detection function should be carried out only once after the module or the motor has been replaced. |
| Unsupported devices | | Advanced option module safety: SGDV-OSA01A<br>Fully-closed option module: SGDV-OFA01A |

## Connectors

| Device Label | Function | Model | Yaskawa Order Code | Number of Pins | Manufacturer |
|---|---|---|---|---|---|
| CN31 | Connector Kit for CN1 | Case: 10326-52A0-008<br>Connector: 10126-3000PE | JZSP-CSI9-2-E | 26 | 3M Japan Ltd. |

Note: The above connecor or their equivalent are used for the Fully-Closed Module SGDV-0FB0□A.

# Periphery

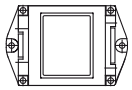
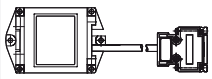
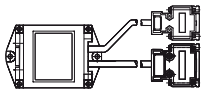
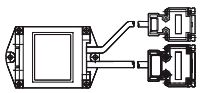
Serial Converter Units 167
Periphery 172
Software 182

# Serial Converter Units

## Model designations

JZDP - □00□ - □□□

**Serial Converter Unit Model**

| Code | Appearance | Applical Linear Encoder | Polarity Sensor | Thermal Protector |
|---|---|---|---|---|
| H003<br>J003 |  | From Heidenhain Corp. | None | None |
| H005<br>J005 |  | From Renishaw PLC | None | None |
| H006<br>J006 |  | From Heidenhain Corp. | Yes*4 | Yes |
| H008<br>J008 |  | From Renishaw PLC | Yes*4 | Yes |

**Applicable Linear Servomotor**

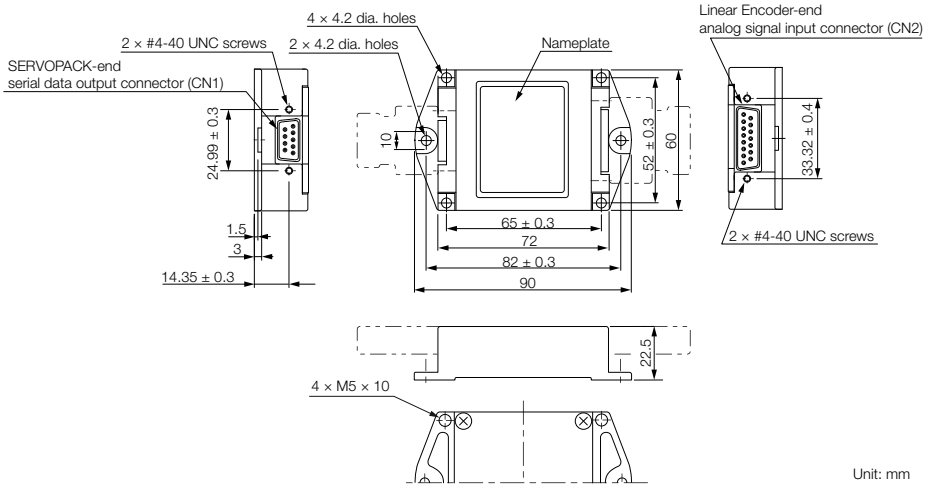
| Servomotor Model | | Code |
|---|---|---|
| SGLFW2 (Models with F-Type Iron Cores) | 30D070A | 651 |
| | 30D120A | 652 |
| | 30D230A | 653 |
| | 45D200A | 654 |
| | 45D380A | 655 |
| | 90D200A | 657 |
| | 90D380A | 658 |
| | 90D560A | 659 |
| | 1DD380A | 660 |
| | 1DD560A | 661 |

Notes:

1. Code H□□□ for 8 bit interpolation, Code J□□□ for 12 bit interpolation.
2. Refer to the catalog for detailed specifications of the Serial Converter Unit.
3. Contact your Yaskawa representative for information on the water cooling specifications of the SGLFW2.
4. Hall sensor can be optionally disabled by a Servopack parameter.

## Serial converter unit without polarity sensor cable (for linear encoder with Heidenhain Corporation connector)

### ◆ Model: JZDP-□003-□□□




Unit: mm

| Pin | Signal |
|---|---|
| 1 | + 5 V |
| 2 | Phase-S output |
| 3 | Not used |
| 4 | Not used |
| 5 | 0 V |
| 6 | /Phase-S output |
| 7 | Not used |
| 8 | Not used |
| 9 | Not used |
| Case | Shield |

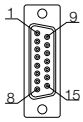
CN1
SERVOPACK-end
serial data outputs




17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

| Pin | Signal |
|---|---|
| 1 | cos input (A+) |
| 2 | 0 V |
| 3 | sin input (B+) |
| 4 | + 5 V |
| 5 | Not used |
| 6 | Not used |
| 7 | /Ref input (R-) |
| 8 | Not used |
| 9 | /cos input (A-) |
| 10 | 0 V sensor |
| 11 | /sin input (B-) |
| 12 | 5 V sensor |
| 13 | Not used |
| 14 | Ref input (R+) |
| 15 | Not used |
| Case | Shield |

CN2
Linear Encoder-end
analog signal inputs

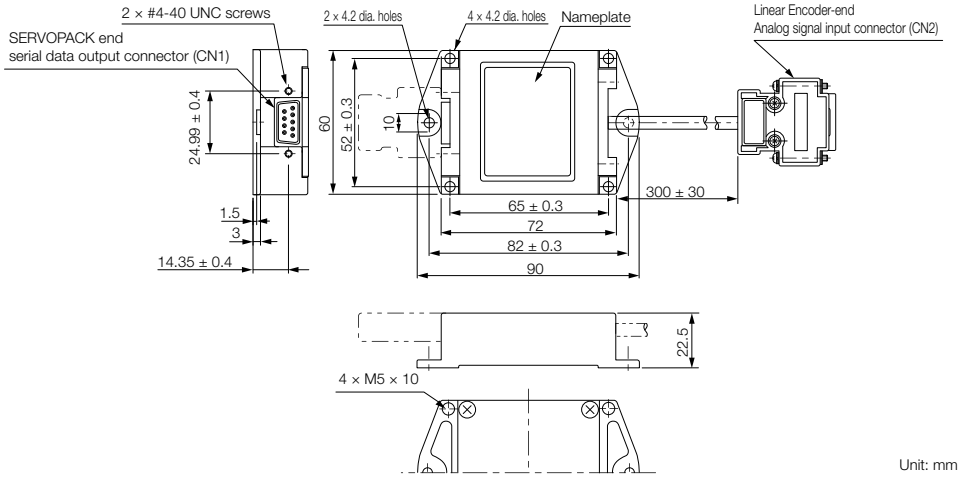



17-Series Connector:
17LE-13150-27-FA
from DDK Ltd.
(Socket)

Note:
1. Do not connect the unused pins.
2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

# Serial converter unit without polarity sensor cable (for linear encoder with Renishaw PLC connector)

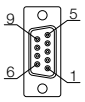
## ◆ Model: JZDP-□005-□□□




Unit: mm

| Pin | Signal |
|---|---|
| 1 | + 5 V |
| 2 | Phase-S output |
| 3 | Not used |
| 4 | Not used |
| 5 | 0 V |
| 6 | /Phase-S output |
| 7 | Not used |
| 8 | Not used |
| 9 | Not used |
| Case | Shield |

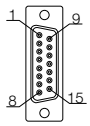
CN1
SERVOPACK-end
serial data outputs




17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

| Pin | Signal |
|---|---|
| 1 | cos input (V1-) |
| 2 | sin input (V2-) |
| 3 | Ref input (V0+) |
| 4 | + 5 V |
| 5 | 5 Vs |
| 6 | Not used |
| 7 | Not used |
| 8 | Not used |
| 9 | cos input (V1+) |
| 10 | sin input (V2+) |
| 11 | /Ref input (V0-) |
| 12 | 0 V |
| 13 | 0 Vs |
| 14 | Not used |
| 15 | Inner shield (0 V) |
| Case | Shield |

CN2
Linear Encoder-end
analog signal inputs

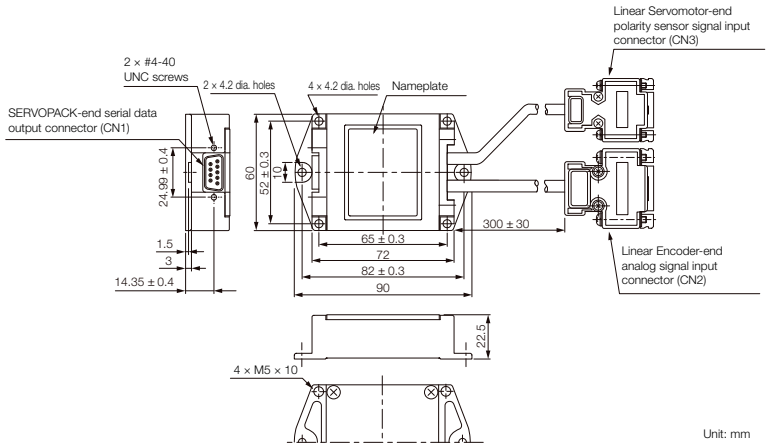



17-Series Connector:
17JE-13150-02 (D8C) A-CG
from DDK Ltd.
(Socket)

Note:
1. Do not connect the unused pins.
2. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.
3. Use the Linear Encoder connector to change the origin position specifications of the Linear Encoder.

# Serial converter unit with polarity sensor cable (for linear encoder with Heidenhain Corporation connector)

◆ Model: JZDP-□006-□□□



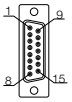

Unit: mm

CN1
SERVOPACK-end serial data outputs




17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

CN2
Linear Encoder-end analog signal inputs




17-Series Connector:
17JE-13150-02 (D8C) A-CG
from DDK Ltd.
(Socket)

CN3
Linear Servomotor-end polarity sensor signal input




17-Series Connector:
17JE-13090-02 (D8C) A-CG
from DDK Ltd.

| Pin | Signal |
|---|---|
| 1 | + 5 V |
| 2 | Phase-S output |
| 3 | Not used |
| 4 | Not used |
| 5 | 0 V |
| 6 | /Phase-S output |
| 7 | Not used |
| 8 | Not used |
| 9 | Not used |
| Case | Shield |

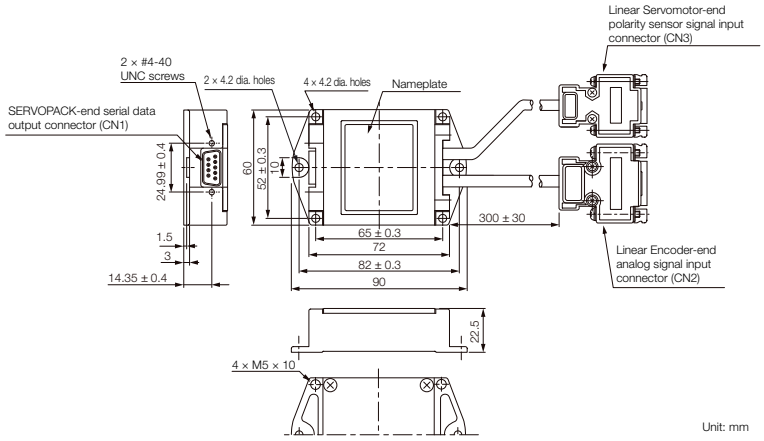
| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | cos input (A+) | 9 | /cos input (A-) |
| 2 | 0 V | 10 | 0 V sensor |
| 3 | sin input (B+) | 11 | /sin input (B-) |
| 4 | + 5 V | 12 | 5 V sensor |
| 5 | Not used | 13 | Not used |
| 6 | Not used | 14 | Ref input (R+) |
| 7 | /Ref input (R-) | 15 | Not used |
| 8 | Not used | Case | Shield |

| Pin | Signal |
|---|---|
| 1 | +5 V |
| 2 | Phase-U input |
| 3 | Phase-V input |
| 4 | Phase-W input |
| 5 | 0 V |
| 6 | Not used |
| 7 | Not used |
| 8 | Not used |
| 9 | Thermal protector input |
| Case | Shield |

Note:
1. Do not connect the unused pins.
2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.
3. The phase U, V, and W inputs are internally pulled up with 10 kΩ.

# Serial converter unit with polarity sensor cable (for linear encoder with Renishaw PLC connector)

◆ Model: JZDP-□008-□□□



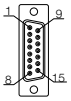

Unit: mm

CN1
SERVOPACK-end serial data outputs



17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

CN2
Linear Encoder-end analog signal inputs



17-Series Connector:
17JE-13150-02 (D8C) A-CG
from DDK Ltd.
(Socket)

CN3
Linear Servomotor-end polarity sensor signal input



17-Series Connector:
17JE-13090-02 (D8C) A-CG
from DDK Ltd.

| Pin | Signal |
|---|---|
| 1 | + 5 V |
| 2 | Phase-S output |
| 3 | Not used |
| 4 | Not used |
| 5 | 0 V |
| 6 | /Phase-S output |
| 7 | Not used |
| 8 | Not used |
| 9 | Not used |
| Case | Shield |

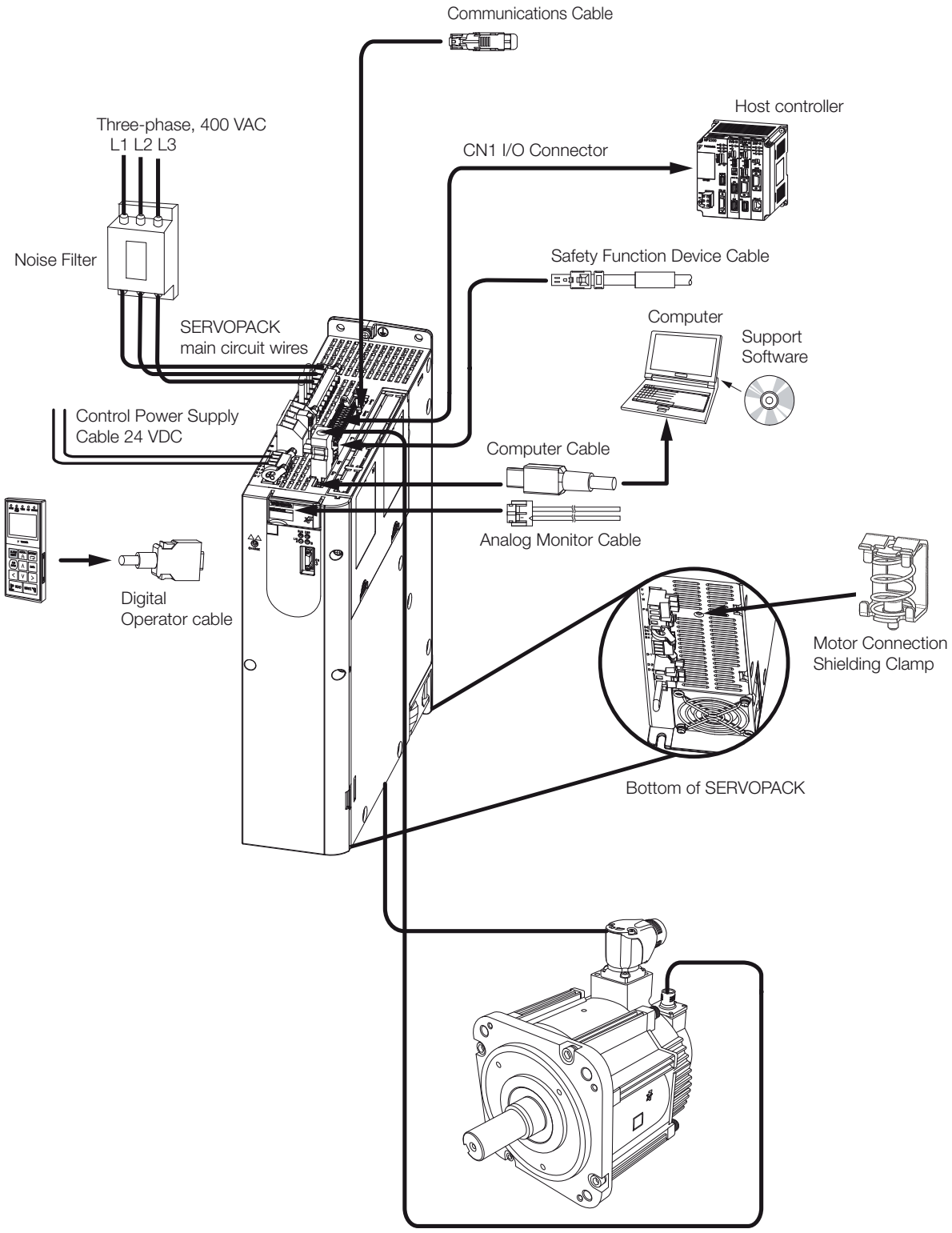
| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | /cos input (V1-) | 9 | cos input (V1+) |
| 2 | /sin input (V2-) | 10 | sin input (V2+) |
| 3 | Ref input (V0+) | 11 | /Ref input (V0-) |
| 4 | + 5 V | 12 | 0 V |
| 5 | 5 Vs | 13 | 0 Vs |
| 6 | Not used | 14 | Not used |
| 7 | Not used | 15 | Inner shield |
| 8 | Not used | Case | Shield |

| Pin | Signal |
|---|---|
| 1 | + 5 V |
| 2 | Phase-U input |
| 3 | Phase-V input |
| 4 | Phase-W input |
| 5 | 0 V |
| 6 | Not used |
| 7 | Not used |
| 8 | Not used |
| 9 | Thermal protector input |
| Case | Shield |

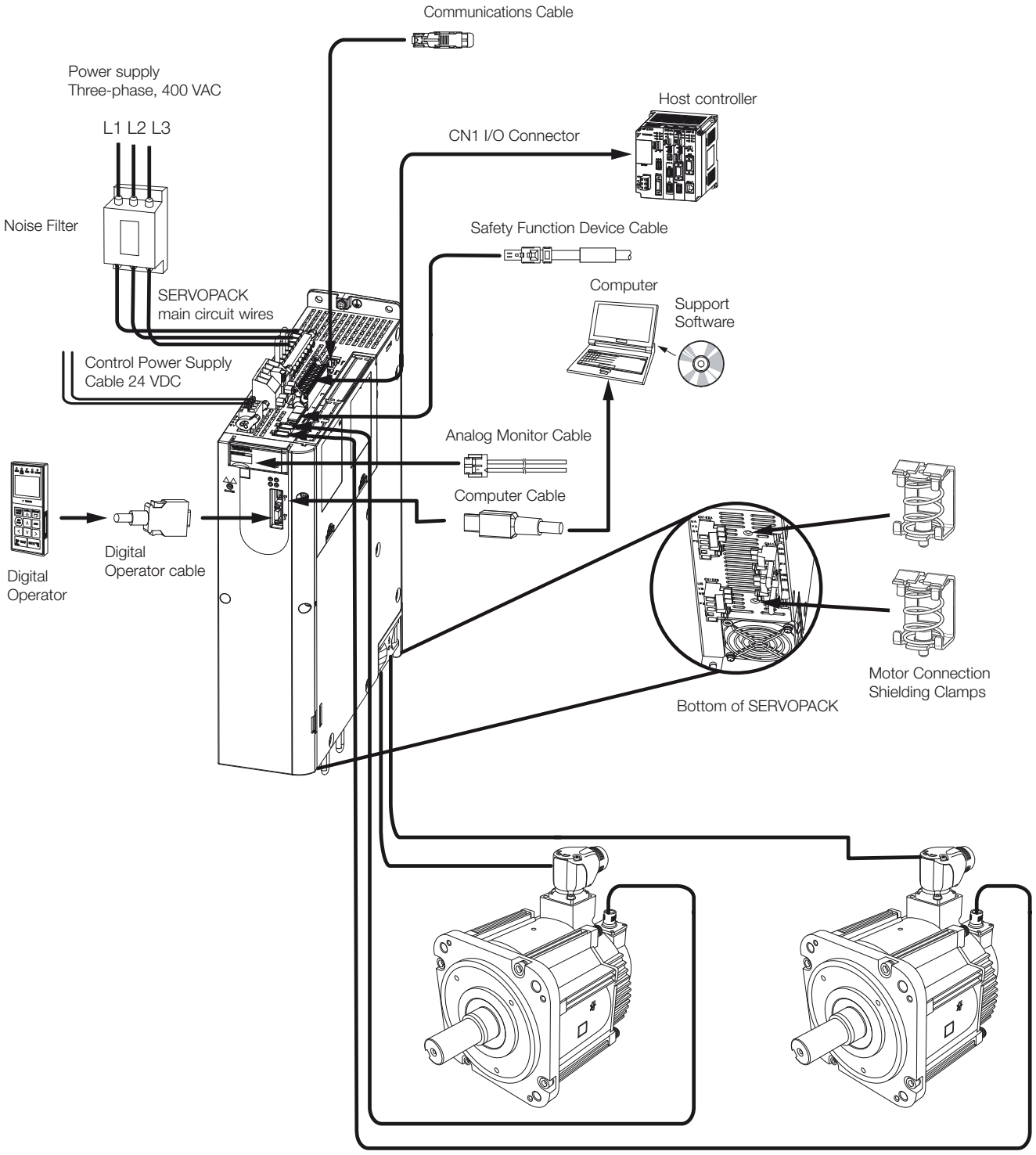
Note:
1. Do not connect the unused pins.
2. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.
3. Use the Linear Encoder connector to change the origin position specifications of the Linear Encoder.
4. The phase U, V, and W inputs are internally pulled up with 10 kΩ.

# Periphery

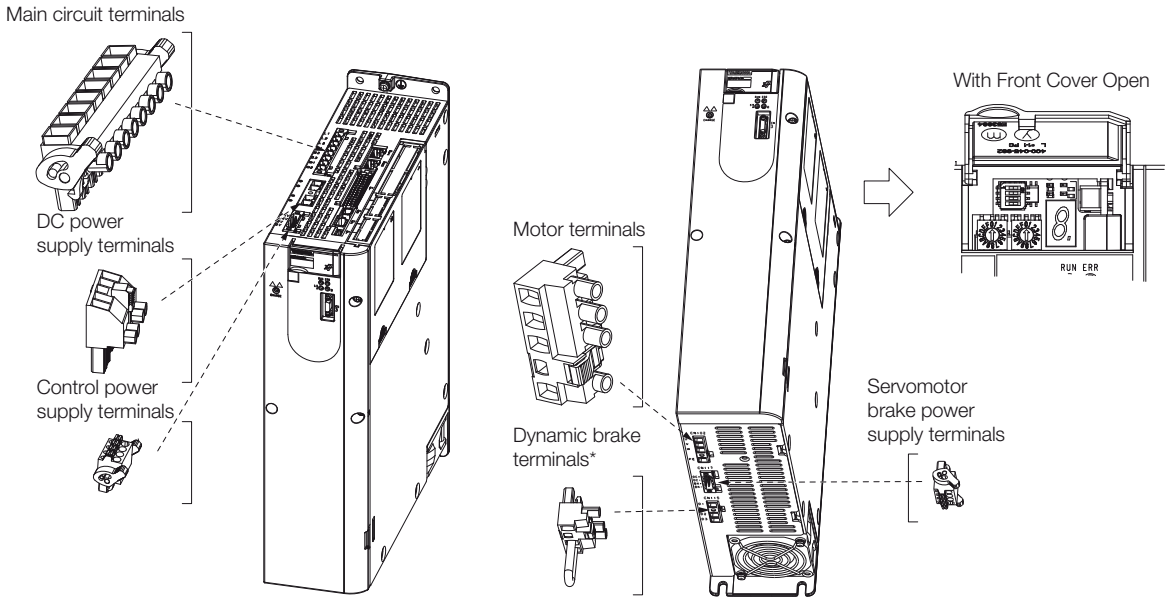
## SGD7S Single Axis



## SGD7W Dual Axis



## Top and bottom view of SERVOPACKs




* Dynamic Brake Connector only for SGD7S-1R9D up to -170D.
Brake Connector only with option SGD7-□□□D□□B026□□□.

## Peripheral device selection table

| SERVOPACK | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Main Circuit Power Supply | Maximum Applicable Motor Capacity [kW] | Model | | EMC-Filter*1 | DC Reactor*2 | Magnetic Contactor | Surge Absorber | Digital Operator |
| | | SGD7S- | SGD7W- | | | | | |
| Three phase, 400 VAC | 0.5 | 1R9D | - | FESS-4009A*3 | X5074 | SC-4-1/G | LT-C35G102WS | JUSP-OP05A-1-E |
| | 1.0 | 3R5D | - | | X5075 | | | |
| | 1.5 | 5R4D | - | | | | | |
| | 2.0 | 8R4D | - | | X5076 | SC-5-1-/G | | |
| | 3.0 | 120D | - | | | | | |
| | 5.0 | 170D | - | FESS-4015A*3 | X5077 | SC-N1/G | | |
| | 6.0 | 210D | - | FESS-4022A*3 | - | | | |
| | 7.5 | 260D | - | | - | | | |
| | 11.0 | 280D | - | FESS-4044A*3 | - | - | | |
| | 15.0 | 370D | - | | | | | |
| | 2 x 0.75 | - | 2R6D | FESS-4009A*3 | X5075 | SC-4-1/G | | |
| | 2 x 1.5 | - | 5R4D | | X5076 | SC-5-1/G | | |

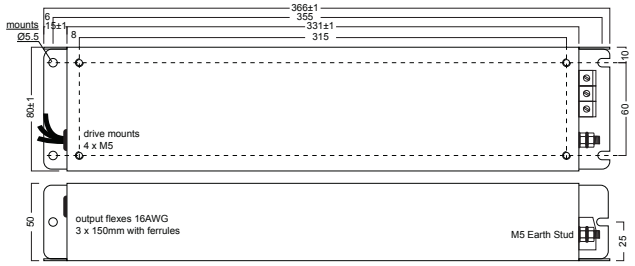
| Device | Enquires |
|---|---|
| Noise Filters | EPA GmbH |
| Surge Absorbers | Yaskawa Controls Co., Ltd. |
| DC Reactors | |
| Magnetic Contactors | Fuji Electric FA Components & Systems Co., Ltd. |

*1. Some Noise Filters have large leakage currents. The grounding conditions also affect the size of the leakage current.
If necessary, select an appropriate leakage detector or leakage breaker taking into account the grounding conditions and the leakage current from the Noise Filter.
*2. The last digit of an RoHS-compliant serial number is R. Consult with Yaskawa Controls Co., Ltd. for RoHS-compliant reactors.
*3. Can be installed separate or as footprint filter.

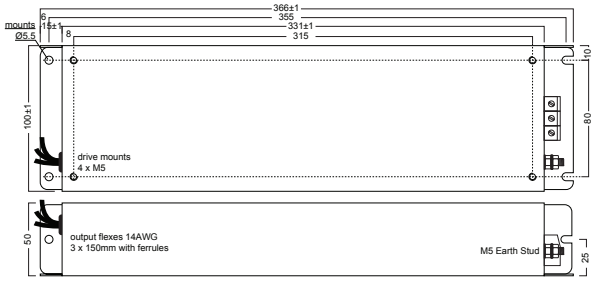
Note: 1. Consult the manufacturer for details on s.
2. Refer to the following section for information on Digital Operator Converter Cables.
3. Refer to the -7 Series AC Servo Drive Peripheral Device Selection Manual (Manual No. SIEP S800001 32) for the following information.
• Dimensional drawings, ratings, and specifications of peripheral devices.

# Dimensions of EMC-filters

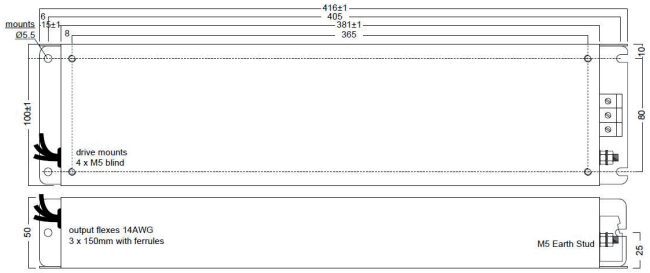
### FESS-4009A



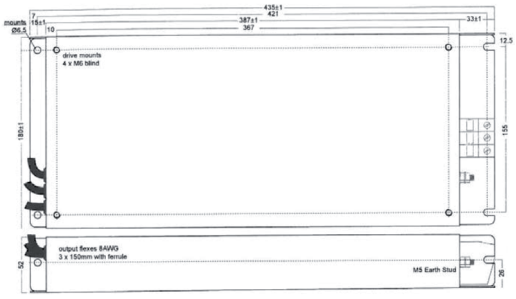

### FESS-4015A




### FESS-4022A*




### FESS-4044A*




| EMC-Filter | Leakage Current | Ambient Temperature | Measurements | Weight |
|---|---|---|---|---|
| FESS-4009A | 0.3 mA nom. (28 mA max.) | 55 °C | 366 x 80 x 50 mm | 1.3 kg |
| FESS-4015A | 0.3 mA nom. (40 mA max.) | 55 °C | 366 x 100 x 50 mm | 1.6 kg |
| FESS-4022A* | 0.3 mA nom. (40 mA max.) | 55 °C | 416 x 80 x 50 mm | 2.0 kg |
| FESS-4044A* | 0.3 mA nom (40 mA max.) | 55 °C | 435 x 180 x 50 mm | 3.2 kg |

* Available soon.

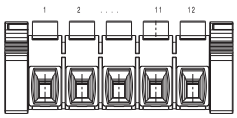
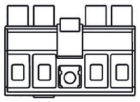
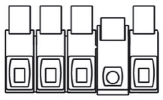
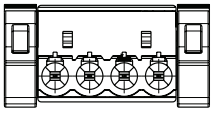
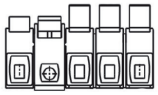
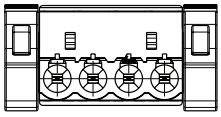
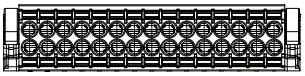
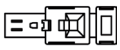
# Molded-case circuit breakers and fuses

Use a molded-case circuit breaker and fuse to protect the power supply line. They protect the power line by shutting OFF the circuit when overcurrent is detected. Select these devices based on the information in the following tables.

Notes:
To comply with the Low Voltage Directive, always connect a fuse to the input side to protect against short-circuit accidents. Select fuses or molded-case circuit breakers that are compliant with UL standards. The following tables provide the net values of the current capacity and inrush current.
Select a fuse and a molded-case circuit breaker that meet the following conditions.
- Main circuit and control circuit: No breaking at three times the current value given in the table for 5 s.
- Inrush current: No breaking at the current value given in the table for 20 ms.

| Main Circuit Power Supply | Maximum Applicable Motor Capacity [kW] | Model | | Power Supply Capacity per SERVOPACK [kVA] | Current Capacity | | Inrush Current | |
|---|---|---|---|---|---|---|---|---|
| | | SGD7S- | SGD7W- | | Main Circuit [A] | Control Power Supply [A] | Main Circuit [A0-p] | Control Power Supply [A0-p] |
| Three phase, 400 VAC | 0.5 | 1R9D | - | 1.1 | 1.4 | 1.2 | 19 | - |
| | 1.0 | 3R5D | - | 2.3 | 2.9 | | | |
| | 1.5 | 5R4D | - | 3.5 | 4.3 | | | |
| | 2.0 | 8R4D | - | 4.5 | 5.8 | | 38 | |
| | 3.0 | 120D | - | 7.1 | 8.6 | | | |
| | 5.0 | 170D | - | 11.7 | 14.5 | | | |
| | 6.0 | 210D | - | 12.4 | 17.4 | 1.4 | 68 | |
| | 7.5 | 260D | - | 14.4 | 21.7 | | | |
| | 11.0 | 280D | - | 21.9 | 31.8 | 1.7 | | |
| | 15.0 | 370D | - | 30.6 | 43.4 | | | |
| | 2 x 0.75 | - | 2R6D | 3.5 | 4.4 | 1.2 | 19 | |
| | 2 x 1.5 | - | 5R4D | 6.8 | 8.6 | | 38 | |

## Sigma-7 amplifier connectors

| SERVOPACK Model | Description | Order No. | Specification |
|---|---|---|---|
| All Models | Power Input connector (CN101) | JUSP-7CN101* (SGD7S-1R9D to -170D) |  |
| | | JUSP-7CN101-1* (SGD7S-210D to -370D) | |
| | Power DC Input connector (CN103) | JUSP-7CN103 (SGD7S-1R9D to -170D) |  |
| | | JUSP-7CN103-1 (SGD7S-210D to -370D) | |
| | Motor power connector (CN102) | JUSP-7CN102* (SGD7S-1R9D to -170D) |  |
| | | JUSP-7CN102-1* (SGD7S-210D to -370D) | |
| | 24VDC Input connector (CN201) | JUSP-7CN201* |  |
| | DB Resistor connector for external DB (CN115) | JUSP-7CN115* |  |
| | Brake power connector (CN117) | JUSP-7CN117* |  |
| | I/O connector (CN1) | JUSP-7CN001 |  |
| | Enclosed Safety Jumper Connector (CN8) | JZSP-CVH05-E* |  |

* Connectors are included by ordering Yaskawa SERVOPACKs. The other connectors can be ordered separately if necessary.

# SERVOPACK main circuit wires

This section describes the main circuit wires for SERVOPACKs.

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.14.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the ambient temperature.

## Three phase, 400 V wires for SGD7S SERVOPACKs

| Cables | Terminal Symbol | SERVOPACK Model SGD7S- | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1R9D | 3R5D | 5R4D | 8R4D | 120D | 170D | 210D | 260D | 280D | 370D |
| Main Circuit Power Cable | L1, L2, L3 | AWG 16 (or 1.5 mm²) | | | AWG 14 (or 2.5 mm²) | | AWG 12 (or 4.0 mm²) | | AWG 10 (or 6.0 mm²) | AWG 8 (or 10 mm²) | |
| Servomotor Main Circuit Cable | U, V, W | AWG 16 (or 1.5 mm²) | | | AWG 14 (or 2.5 mm²) | | AWG 12 (or 4.0 mm²) | AWG 10 (or 6.0 mm²) | | AWG 8 (or 10 mm²) | |
| Control Power Cable | 24V, 0V | AWG 16 (or 1.5 mm²) | | | | | | | | | |
| External Regenerative Resistor Cable | B1/ ⊕,B2 | AWG 16 (or 1.5 mm²) | | | | | AWG 14 (or 2.5 mm²) | AWG 12 (or 4.0 mm²) | | AWG 10 (or 6.0 mm²) | AWG 8 (or 10 mm²) |
| Ground Cable | ⏚ | AWG 16 (or 1.5 mm²) | | | AWG 14 (or 2.5 mm²) | | AWG 12 (or 4.0 mm²) | | AWG 10 (or 6.0 mm²) | AWG 8 (or 10 mm²) | |

## Three phase, 400 V wires for SGD7W SERVOPACKs

| Cables | Terminal Symbol | SERVOPACK Model SGD7W- | |
|---|---|---|---|
| | | 2R6D | 5R4D |
| Main Circuit Power Cable | L1, L2, L3 | AWG 14 (or 2.5 mm²) | |
| Servomotor Main Circuit Cable | U, V, W | AWG 16 (or 1.5 mm²) | |
| Control Power Cable | 24V, 0V | AWG 16 (or 1.5 mm²) | |
| External Regenerative Resistor Cable | B1/ ⊕,B2 | AWG 16 (or 1.5 mm²) | |
| Ground Cable | ⏚ | AWG 14 (or 2.5 mm²) | |

## Wire types

The following table shows the wire sizes and allowable currents for three bundled leads.

| HIV Specifications* | | Allowable Current at Ambient Temperatures [A] | | |
|---|---|---|---|---|
| Nominal Cross-selectional Area [mm²] | Configuration [Wires/mm²] | 30°C | 40°C | 50°C |
| 0.9 | 37/0.18 | 15 | 13 | 11 |
| 1.25 | 50/0.18 | 16 | 14 | 12 |
| 2.0 | 7/0.6 | 23 | 20 | 17 |
| 3.5 | 7/0.8 | 32 | 28 | 24 |
| 5.5 | 7/1.0 | 42 | 37 | 31 |
| 8.0 | 7/1.2 | 52 | 46 | 39 |
| 14.0 | 7/1.6 | 75 | 67 | 56 |
| 22.0 | 7/2.0 | 98 | 87 | 73 |

* This is reference data based on JIS C3317 600-V-grade heat-resistant polyvinyl chloride-insulated wires (HIV).

# Surge absorbers for holding brakes (Varistors) and diodes

## Surge absorbers for holding brakes (Varistors)

Select an appropriate Surge Absorber for the power supply voltage and current of the brake.
Surge absorbers are not provided by Yaskawa.

| Brake Power Supply Voltage | | 24 VDC | |
|---|---|---|---|
| Surge Absorber Manufacturer | | Nippon Chemi-Con Corporation | SEMITEC Corporation |
| Brake Rated Current | 1 A max. | TNR5V121K | Z5D121 |
| | 2 A max. | TNR7V121K | Z7D121 |
| | 4 A max. | TNR10V121K | Z10D121 |
| | 8 A max. | TNR14V121K | Z15D121 |

# Regenerative resistors

## Types of regenerative resistors

The following regenerative resistors can be used:
- Built-in regenerative resistors: Some models of SERVOPACKs have regenerative resistors built into them.
- External regenerative resistors: These resistors are used when the internal capacitor and built-in regenerative resistor in the SERVOPACK cannot consume all of the regenerative power.
  Use Yaskawa's SigmaSize+, an AC Servo drive capacity selection program, to determine if a regenerative resisitor is required.

Note: If you use an external regenerative resistor, you must change the setting parameter Pn600.

## Built-in regenerative resistor

The following table gives the specifications of the built-in regenerative resistors in the SERVOPACKs and the amount of regenerative power (average values) that they can process. A built-in regenerative resistor is provided as a standard feature. Install an external regenerative resistor when the built-in regenerative resistor cannot process all the regenerative power.

| SERVOPACK Model | | Built-In Regenerative Resistor | | |
|---|---|---|---|---|
| SGD7S- | SGD7W- | Resistance [Ω] | Capacity [W] | Minimum Allowable Resistance [Ω] |
| 1R9D, 3R5D | - | 75 | 70 | 75 |
| 5R4D | - | | 140 | |
| 8R4D, 120D | - | 43 | | 43 |
| 170D | - | 27 | 180 | 27 |
| - | 2R6D | 43 | 140 | 43 |
| - | 5R4D | | | |

## External regenerative resistor

| SERVOPACK Specification | | | Resistor Specification | | | |
|---|---|---|---|---|---|---|
| SERVOPACK | | Minimum Allowable External Resistance [Ω] | Model Resistor | Resistance [Ω] | Power [W] | Manufacturer |
| SGD7S- | 1R9D | 75 | RH-0520W120-UL-T | 120 | 520 | Heine |
| | 3R5D | | | | | |
| | 5R4D | | | | | |
| | 8R4D | 43 | RH-0400W045-UL-T | 45 | 400 | |
| | 120D | | | | | |
| | 170D | 27 | RH-0400W032-UL-T | 32 | | |
| | 210D | 18 | RH-4800W022-10-UL-T | 22 | 1,000 | |
| | 260D | | | | | |
| | 280D | 14.25 | | | | |
| | 370D | | | | | |
| SGD7W- | 2R6D | 43 | RH-0400W045-UL-T | 45 | 400 | |
| | 5R4D | | | | | |

## Dynamic brake resistors

| SERVOPACK Specification | | | Resistor Specification | | | |
|---|---|---|---|---|---|---|
| SERVOPACK | | Minimum Allowable External Resistance (± 5%) [Ω] | Model Resistor | Resistance [Ω] | Power [W] | Manufacturer |
| SGD7S- | 1R9D | 30 | - | - | - | - |
| | 3R5D | | - | - | - | - |
| | 5R4D | 20 | - | - | - | - |
| | 8R4D | 7.8 | - | - | - | - |
| | 120D | | - | - | - | - |
| | 170D | 6.6 | - | - | - | - |
| | 210D | No integrated Dynamic Brake circuit. | | | | |
| | 260D | | | | | |
| | 280D | | | | | |
| | 370D | | | | | |
| SGD7W- | 2R6D | 30 | - | - | - | - |
| | 5R4D | 20 | - | - | - | - |

Note:
Contact your Yaskawa representative for information on Sigma-7 400 V Dynamic Brake Resistors.

Calculate the energy that must be consumed by the resistance for one dynamic brake stop. To simplify the energy consumption calculation, assume that all the kinetic energy until the Servomotor stops is consumed by the dynamic brake resistor and use the following formula. Out of all possible operation patterns, use the one which maximizes the kinetic energy of the Servomotor.

**Rotary Servomotors**
Energy consumption of the dynamic brake resistor: $E_{DB}$ [J]
Motor moment of inertia*: $J_M$ [kgm2]
Load inertia: $J_L$ [kgm2]
Motor speed just before stopping with the dynamic brake: N [min-1]

$$E_{DB} = \frac{1}{2} \times (J_M + J_L) \times \left(\frac{2\pi}{60} \times N\right)^2$$

* For detailed information on the motor moment of inertia, refer to the catalog or Servomotor product manual.

**Linear Servomotors**
Energy consumption of the dynamic brake resistor: $E_{DB}$ [J]
Moving Coil mass*: $m_M$ [kg]
Load mass: $m_L$ [kg]
Motor speed just before stopping with the dynamic brake: v [m/s]

$$E_{DB} = \frac{1}{2} \times (m_M + m_L) \times v^2$$

* For detailed information on Moving Coil mass, refer to the catalog or Servomotor product manual.

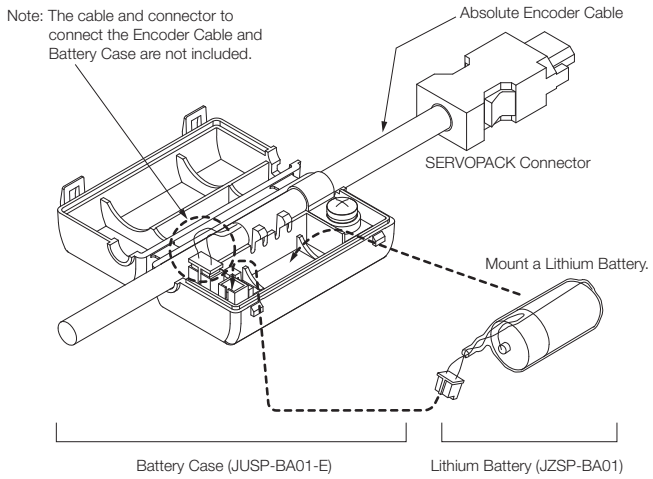
# Batteries for servomotors with absolute encoders

If you use an absolute encoder, you can use an Encoder Cable with a Battery Case connected to it to supply power and retain the absolute position data. You can also retain the absolute position data by supplying power from a battery on the host controller. The Battery Case is sold as a replacement part for the Battery Case that is included with an Absolute Encoder Cable.

| Name | Order Number | Remarks |
|---|---|---|
| Battery case (case only) | JUSP-BA01-E | The Encoder Cable and Battery are not included.<br>(This is a replacement part for a damaged Battery Case.) |
| Lithium Battery | JZSP-BA01 | This is a special battery that mounts into the Battery Case. |

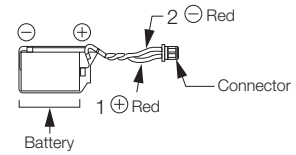
Important

1. You cannot attach the Battery Case to an Incremental Encoder Cable.
2. Install the Battery Case where the ambient temperature is between -5°C and 60°C.




## • Mounting a battery in the battery case

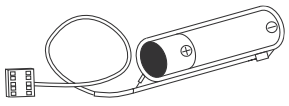
Obtain a Lithium Battery (JZSP-BA01) and mount it in the Battery Case.




ER3V (3.6 V, 1000 mAh) from Toshiba Battery Co., Ltd.

## • Connecting a battery to the host controller

Use a battery that meets the specifications of the host controller. Use an ER6VC3N Battery (3.6 V, 2,000 mAh) from Toshiba Battery Co., Ltd. or an equivalent battery.



## SigmaSize+: AC servo capacity selection program

You can use the SigmaSize+ to select Servomotors and SERVOPACKs. There are two versions of the software: A Web-based version and a stand-alone version. The software supports all standard servo products sold by Yaskawa.

## • Features

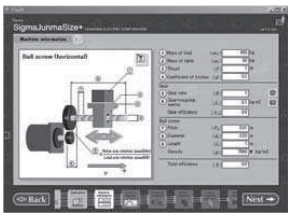
- Provides a vast amount of new product information.
- Lets you select servo products with a wizard.
- As long as you have a connection to the Internet, you can access and use the software anytime, anywhere. (Communications are encrypted for security)
- You can access and reuse previously entered data.

## • Examples of the servo selection interface

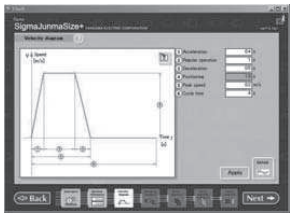
Mechanism Selection View



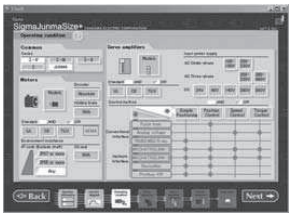
Machine Specification Entry View



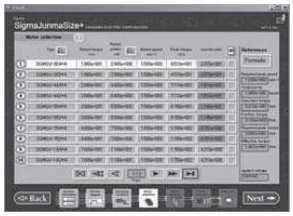
Speed Diagram Entry View



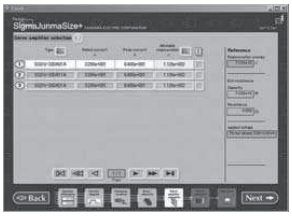
Operating Conditions Selection View



Servomotor Selection View



SERVOPACK Selection View



## • System requirements

| Item | System requirement |
|---|---|
| Browser<br>(Required for web-based version only) | Internet Explorer 5.0 SP1 or higher |
| OS | Windows XP, Windows Vista, Windows 7 (32-bit or 64-bit edition), Windows 10 (32-bit or 64-bit edition) |
| CPU | Pentium 200 MHz min. |
| Memory | 64 MB min. (96 MB or greater recommended) |
| Available Hard Disk Space | 20 MB min. |

# SigmaWin+ Version 7: AC servo drive engineering tool

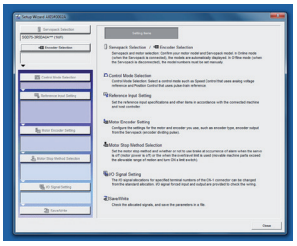
The SigmaWin+ Engineering Tool is used to set up and optimally tune Yaskawa Sigma-series Servo Drives.

## • Features

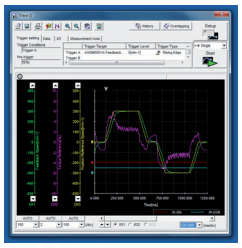
- Set parameters with a wizard.
- Display SERVOPACK data on a computer just like you would on an oscilloscope.
- Estimate moments of inertia and measure vibration frequencies.
- Display alarms and alarm diagnostics.

## • Examples of the interface

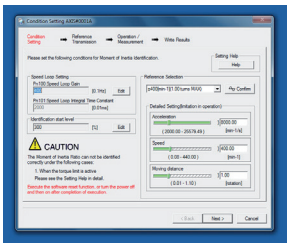
Setting Parameters with a Wizard



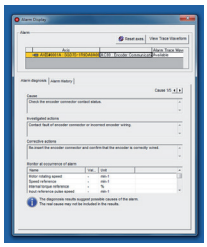
Displaying SERVOPACK Data on a Computer Just Like You Would on a Oscilloscope



Estimating Moments of Inertia and Measuring Vibration Frequencies



Displaying Alarms and Alarm Diagnostics



## • System requirements

| Item | System requirement |
|---|---|
| Supported Languages | English and Japanese |
| OS | Windows XP, Windows Vista, or Windows 7 (32-bit or 64-bit edition) |
| CPU | Pentium 200 MHz min. |
| Memory | 64 MB min. (96 MB or greater recommended) |
| Available Hard Disk Space | For Standard Setup:<br>350 MB min. (400 MB or greater recommended for installation) |

# Advanced safety module parameter editor

The advanced safety module parameter editor is required to set up and configure the advanced safety module.

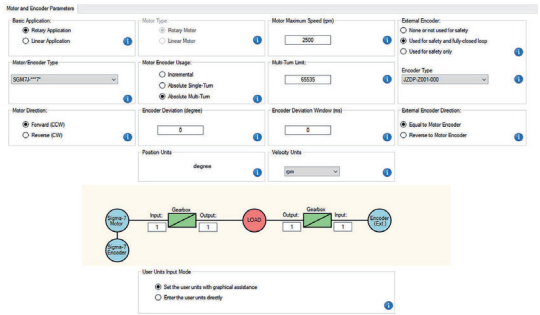
## • Features

With the TÜV certified Advanced Safety Module Parameter Editor you can configure the Advanced Safety Module. The PC configuration tool is used to create a safety project which contains the following safety settings:

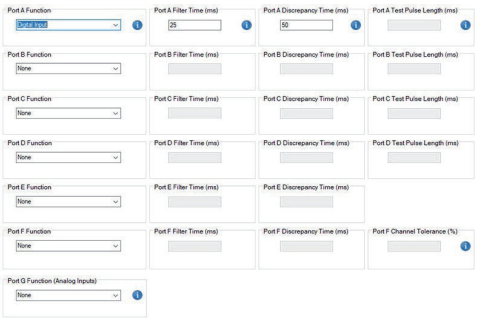
- General Device Parameters
- Motor and Encoder Parameters
- User Unit and Encoder Parameters
- I/O Configuration
- Safety Functions

## • Examples of the interface

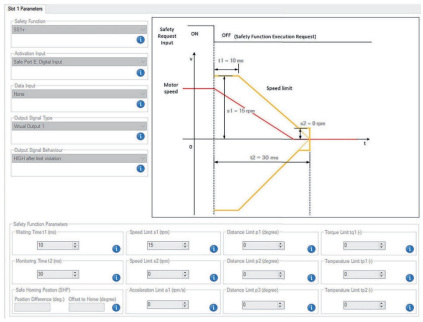
Example 1



Example 2



Example 3



## • System requirements

| Item | System requirement |
|---|---|
| Supported Languages | English and German |
| OS | Windows 10 or higher |
| Microsoft .NET Framework | 4 |
| CPU | 1 GHz or higher recommended |
| Memory | 1 GB or higher recommended |
| Available Hard Disk Space | 20 GB free disk space |
| Interfaces | USB 1.1 (2.0) for the connection from the PC to the SERVOPACK |
| Connection<br>(Interface to Sigma-7 SERVOPACK) | CmPlatform (CMIF): Installation of SigmaWin+ Version 7 is mandatory because Installation and setup of Advanced Safety Module Parameter Editor does not contain CMIF. |

# Appendix

Capacity Selection for Servomotors 187
Capacity Selection for Regenerative Resistors 194
International Standards 199
Warranty 200

# Capacity Selection for Servomotors



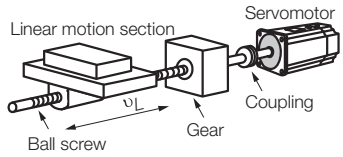
## Selecting the servomotor capacity

Use Yaskawa's SigmaSize+, an AC servo drive capacity selection program, to select Servomotor capacity. With the SigmaSize+, you can find the optimum Servomotor capacity by simply selecting and entering information according to instructions from a wizard.

If you select a Servomotor capacity with a formula, refer to the following selecation examples.

## Capacity Selection Example for a Rotary Servomotor: For Speed Control

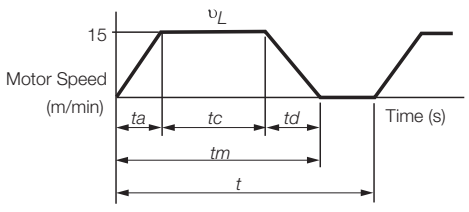
### 1. Mechanical Specifications




| Item | Code | Value |
|---|---|---|
| Load Speed | $v_L$ | 15 m/min |
| Linear Motion Section Mass | $m$ | 250 kg |
| Ball Screw Length | $\ell_B$ | 1.0 m |
| Ball Screw Diameter | $d_B$ | 0.02 m |
| Ball Screw Lead | $P_B$ | 0.01 m |
| Ball Screw Material Density | $\rho$ | $7.87 \times 10^3$ kg/m$^3$ |
| Gear Ratio | $R$ | 2 (gear ratio: 1/2) |
| External Force on Linear Motion Section | $F$ | 0 N |

| Item | Code | Value |
|---|---|---|
| Gear and Coupling Moment of Inertia | $J_G$ | $0.40 \times 10^{-4}$ kg·m$^2$ |
| Number of Feeding Operations | $n$ | 40 rotations/min |
| Feeding Distance | $\ell$ | 0.275 m |
| Feeding Time | $tm$ | 1.2 s max. |
| Friction Coefficient | $\mu$ | 0.2 |
| Mechanical Efficiency | $\eta$ | 0.9 (90%) |

### 2. Speed Diagram




$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (s)}$$

If ta = td,

$$ta = tm - \frac{60\ell}{v_L} = 1.2 - \frac{60 \times 0.275}{15} = 1.2 - 1.1 = 0.1 \text{ (s)}$$

$$tc = 1.2 - 0.1 \times 2 = 1.0 \text{ (s)}$$

### 3. Motor Speed

Load shaft speed $\quad n_L = \frac{v_L}{P_B} = \frac{15}{0.01} = 1{,}500 \text{ (min}^{-1}\text{)}$

Motor shaft speed $\quad n_M = n_L \cdot R = 1{,}500 \times 2 = 3{,}000 \text{ (min}^{-1}\text{)}$

### 4. Load Torque

$$T_L = \frac{(9.8 \cdot \mu \cdot m + F) \cdot P_B}{2\pi R \cdot \eta} = \frac{(9.8 \times 0.2 \times 250 + 0) \times 0.01}{2\pi \times 2 \times 0.9} = 0.43 \text{ (N·m)}$$

**5.** Load Moment of Inertia

Linear motion section

$$J_{L1} = m\left(\frac{P_B}{2\pi R}\right)^2 = 250 \times \left(\frac{0.01}{2\pi \times 2}\right)^2 = 1.58 \times 10^{-4}\ (\text{kg·m}^2)$$

Ball screw

$$J_B = \frac{\pi}{32}\rho \cdot \ell_B \cdot d_B^4 \cdot \frac{1}{R^2} = \frac{\pi}{32} \times 7.87 \times 10^3 \times 1.0 \times (0.02)^4 \cdot \frac{1}{2^2} = 0.31 \times 10^{-4}\ (\text{kg·m}^2)$$

Coupling $J_G = 0.40 \times 10^{-4}$ (kg m$^2$)

Load moment of inertia at motor shaft

$$J_L = J_{L1} + J_B + J_G = (1.58 + 0.31 + 0.40) \times 10^{-4} = 2.29 \times 10^{-4}\ (\text{kg·m}^2)$$

**6.** Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 3{,}000 \times 0.43}{60} = 135\ (\text{W})$$

**7.** Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 3{,}000\right)^2 \times \frac{2.29 \times 10^{-4}}{0.1} = 226\ (\text{W})$$

**8.** Servomotor Provisional Selection

① Selection Conditions

$T_L \leq$ Motor rated torque

$\frac{(Po + Pa)}{2}$ < Provisionally selected Servomotor rated output < ($Po + Pa$)

$n_M \leq$ Rated motor speed

$J_L \leq$ Allowable load moment of inertia

The following Servomotor meets the selection conditions.

SGM7J-02A Servomotor

② Specifications of the Provisionally Selected Servomotor

| Item | Value |
|---|---|
| Rated Output | 200 (W) |
| Rated Motor Speed | 3,000 (min$^{-1}$) |
| Rated Torque | 0.637 (N·m) |
| Instantaneous Maximum Torque | 2.23 (N·m) |
| Motor Moment of Inertia | $0.263 \times 10^{-4}$ (kg·m$^2$) |
| Allowable Load Moment of Inertia | $0.263 \times 10^{-4} \times 15 = 3.94 \times 10^{-4}$ (kg·m$^2$) |

**9.** Verification of the Provisionally Selected Servomotor

Verification of required acceleration torque:

$$T_P = \frac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \frac{2\pi \times 3{,}000 \times (0.263 + 2.29) \times 10^{-4}}{60 \times 0.1} + 0.43$$

$\approx$ 1.23 (N·m) < Maximum instantaneous torque...Satisfactory

Verification of required deceleration torque:

$$T_S = \frac{2\pi n_M (J_M + J_L)}{60td} - T_L = \frac{2\pi \times 3{,}000 \times (0.263 + 2.29) \times 10^{-4}}{60 \times 0.1} - 0.43$$

$\approx$ 0.37 (N·m) < Maximum instantaneous torque...Satisfactory

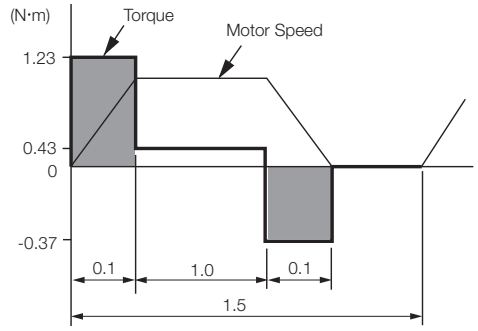
Verification of effective torque value:

$$Trms = \sqrt{\frac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(1.23)^2 \times 0.1 + (0.43)^2 \times 1.0 + (0.37)^2 \times 0.1}{1.5}}$$

$\approx$ 0.483 (N·m) < Rated torque...Satisfactory

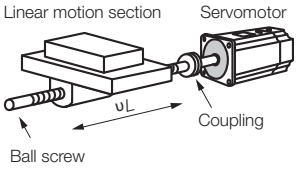
**10.** Result

It has been verified that the provisionally selected Servomotor is applicable.
The torque diagram is shown below.




# Capacity Selection Example for a Rotary Servomotor: For Position Control

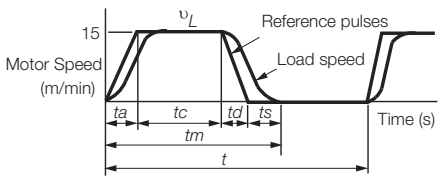
## 1. Mechanical Specifications




| Item | Code | Value |
|---|---|---|
| Load Speed | $\upsilon_L$ | 15 m/min |
| Linear Motion Section Mass | $m$ | 80 kg |
| Ball Screw Length | $\ell_B$ | 0.8 m |
| Ball Screw Diameter | $d_B$ | 0.016 m |
| Ball Screw Lead | $P_B$ | 0.005 m |
| Ball Screw Material Density | $\rho$ | 7.87 × $10^3$ kg/$m^3$ |
| External Force on Linear Motion Section | $F$ | 0 N |
| Coupling Mass | $m_C$ | 0.3 kg |

| Item | Code | Value |
|---|---|---|
| Coupling Outer Diameter | $d_C$ | 0.03 m |
| Number of Feeding Operations | $n$ | 40 rotation/min |
| Feeding Distance | $\ell$ | 0.25 m |
| Feeding Time | $tm$ | 1.2 s max. |
| Electrical Stopping Precision | $\delta$ | ±0.01 mm |
| Friction Coefficient | $\mu$ | 0.2 |
| Mechanical Efficiency | $\eta$ | 0.9 (90%) |

## 2. Speed Diagram




$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (s)}$$

If ta = td and ts = 0.1 (s),

$$ta = tm - ts - \frac{60\,\ell}{\upsilon_L} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1 \text{ (s)}$$

$$tc = 1.2 - 0.1 - 0.1 \times 2 = 0.9 \text{ (s)}$$

**3.** Motor Speed

Load shaft speed

$$n_L = \frac{\upsilon_L}{P_B} = \frac{15}{0.005} = 3{,}000\ (\text{min}^{-1})$$

Motor shaft speed Direct coupling gear ratio 1/R = 1/1

Therefore, $n_M = n_L$ R = 3,000 × 1 = 3,000 ($\text{min}^{-1}$)

**4.** Load Torque

$$T_L = \frac{(9.8\ \mu \cdot m + F) \cdot P_B}{2\pi R \cdot \eta} = \frac{(9.8 \times 0.2 \times 80 + 0) \times 0.005}{2\pi \times 1 \times 0.9} = 0.139\ (\text{N·m})$$

**5.** Load Moment of Inertia

Linear motion section

$$J_{L1} = m \left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.005}{2\pi \times 1}\right)^2 = 0.507 \times 10^{-4}\ (\text{kg·m}^2)$$

Ball screw $J_B = \frac{\pi}{32}\ \rho \cdot \ell_B \cdot d_B{}^4 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 0.8 \times (0.016)^4 = 0.405 \times 10^{-4}\ (\text{kg·m}^2)$

Coupling $Jc = \frac{1}{8}\ m_C \cdot d_C{}^2 = \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.338 \times 10^{-4}\ (\text{kg·m}^2)$

Load moment of inertia at motor shaft

$$J_L = J_{L1} + J_B + Jc = 1.25 \times 10^{-4}\ (\text{kg·m}^2)$$

**6.** Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 3{,}000 \times 0.139}{60} = 43.7\ (\text{W})$$

**7.** Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 3{,}000\right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4\ (\text{W})$$

**8.** Servomotor Provisional Selection

① Selection Conditions

$T_L \leq$ Motor rated torque

$\frac{(Po + Pa)}{2}$ < Provisionally selected Servomotor rated output < ($Po + Pa$)

$n_M \leq$ Rated motor speed

$J_L \leq$ Allowable load moment of inertia

The following Servomotor meets the selection conditions.

SGM7J-01A Servomotor

② Specifications of the Provisionally Selected Servomotor

| Item | Value |
|---|---|
| Rated Output | 200 (W) |
| Rated Motor Speed | 3,000 ($\text{min}^{-1}$) |
| Rated Torque | 0.318 (N·m) |
| Instantaneous Maximum Torque | 1.11 (N·m) |
| Motor Moment of Inertia | $0.0659 \times 10^{-4}$ ($\text{kg·m}^2$) |
| Allowable Load Moment of Inertia | $0.0659 \times 10^{-4} \times 35 = 2.31 \times 10^{-4}$ ($\text{kg·m}^2$) |
| Encoder Resolution | 24 bits (16,777,216 pulses/rev) |

**9.** Verification of the Provisionally Selected Servomotor

Verification of required acceleration torque:

$$T_P = \frac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \frac{2\pi \times 3{,}000 \times (0.0659 + 1.25) \times 10^{-4}}{60 \times 0.1} + 0.139$$

$\approx$ 0.552 (N·m) < Maximum instantaneous torque...Satisfactory

Verification of required deceleration torque:

$$T_S = \frac{2\pi n_M (J_M + J_L)}{60td} - T_L = \frac{2\pi \times 3{,}000 \times (0.0659 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139$$

$\approx$ 0.274 (N·m) < Maximum instantaneous torque...Satisfactory

Verification of effective torque value:

$$Trms = \sqrt{\frac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(0.552)^2 \times 0.1 + (0.139)^2 \times 0.9 + (0.274)^2 \times 0.1}{1.5}}$$

$\approx$ 0.192 (N·m) < Rated torque...Satisfactory

It has been verified that the provisionally selected Servomotor is applicable in terms of capacity.
Position control is considered next.

**10.** Position Detection Resolution

Position detection unit: $\Delta^{\ell}$ = 0.01 mm/pulse
The number of pulses per motor rotation must be less than the encoder resolution (pulses/rev).

$$\text{The number of pulses per revolution (pulses)} = \frac{P_B}{\Delta^{\ell}} = \frac{5 \text{ mm}}{0.01 \text{ mm}} = 500 < \text{Encoder resolution [16777216 (pulses/rev)]}$$

**11.** Reference Pulse Frequency

$$vs = \frac{1{,}000 \upsilon L}{60 \times \Delta^{\ell}} = \frac{1{,}000 \times 15}{60 \times 0.01} = 25{,}000 \text{ (pps)}$$

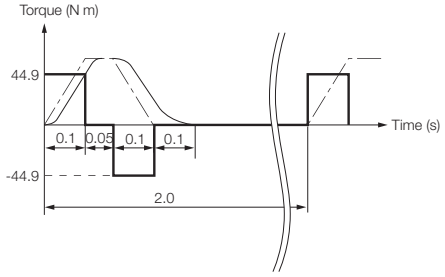
Confirm that the maximum input pulse frequency is greater than the reference pulse frequency.

Refer to the specifications in the SERVOPACK manual for the maximum input pulse frequency.

It has been verified that the provisionally selected Servomotor is applicable for position control.

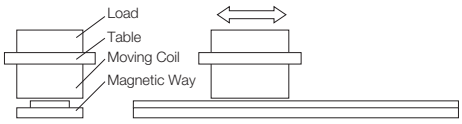
**8.** Result

It has been verified that the provisionally selected Servomotor is applicable.
The torque diagram is shown below.




## Servomotor Capacity Selection Example for Linear Servomotors

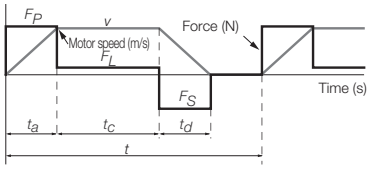
**1.** Mechanical Specifications




| Item | Code | Value |
|---|---|---|
| Load Mass | $m_W$ | 1 kg |
| Table Mass | $m_T$ | 2 kg |
| Motor Speed | $v$ | 2 m/s |
| Feeding Distance | $l$ | 0.76 m |
| Friction Coefficient | $\mu$ | 0.2 |

| Item | Code | Value |
|---|---|---|
| Acceleration Time | $t_a$ | 0.02 s |
| Constant-speed Time | $t_c$ | 0.36 s |
| Deceleration Time | $t_d$ | 0.02 s |
| Cycle Time | $t$ | 0.5 s |
| External Force on Linear Motion Section | $F$ | 0 N |

**2.** Operation Pattern




**3.** Steady-State Force (Excluding Servomotor Moving Coil)

$F_L = \{9.8 \times \mu \times (m_W + m_T)\} + F = 9.8 \times 0.2 \times (1 + 2) + 0 = 5.88$ (N)

**4.** Acceleration Force (Excluding Servomotor Moving Coil)

$$F_P = (m_W + m_T) \times \frac{v}{t_a} + F_L = (1 + 2) \times \frac{2}{0.02} + 5.88 = 305.88 \text{ (N)}$$

**5.** Provisional Selection of Linear Servomotor

① Selection Conditions

$F_P \leq$ Maximum force × 0.9

$F_s \leq$ Maximum force × 0.9

$F_{rms} \leq$ Rated force × 0.9

② Specifications of the Provisionally Selected Servomotor

| Item | Value |
|---|---|
| Maximum Force | 440 (N) |
| Rated Force | 147 (N) |
| Moving Coil Mass ($m_M$) | 0.82 (kg) |
| Servomotor Magnetic Attraction ($F_{att}$) | 0 (N) |

**6.** Verification of the Provisionally Selected Servomotor

Steady-State Force

$F_L = \mu \{9.8 \times (m_W + m_T + m_M) + F_{att}\} = 0.2 \{9.8 \times (1 + 2 + 0.82) + 0\} = 7.5$ (N)

Verification of Acceleration Force

$$F_P = (m_W + m_T + m_M) \times \frac{v}{t_a} + F_L = (1 + 2 + 0.82) \times \frac{2}{0.02} + 7.5$$

$= 389.5$ (N) ≤ Maximum force × 0.9 (= 396 N)… Satisfactory

Verification of Deceleration Force

$$F_S = (m_W + m_T + m_M) \times \frac{v}{t_a} - F_L = (1 + 2 + 0.82) \times \frac{2}{0.02} - 7.5$$

$= 374.5$ (N) ≤ Maximum force × 0.9 (= 396 N)… Satisfactory

Verification of Effective Force

$$F_{rms} = \sqrt{\frac{F_P^2 \cdot t_a + F_L^2 \cdot t_c + F_s^2 \cdot t_d}{t}} = \sqrt{\frac{389.5^2 \times 0.02 + 7.5^2 \times 0.36 + 374.5^2 \times 0.02}{0.5}}$$

$= 108.3$ (N) ≤ Rated force × 0.9 (= 132.3 N)… Satisfactory

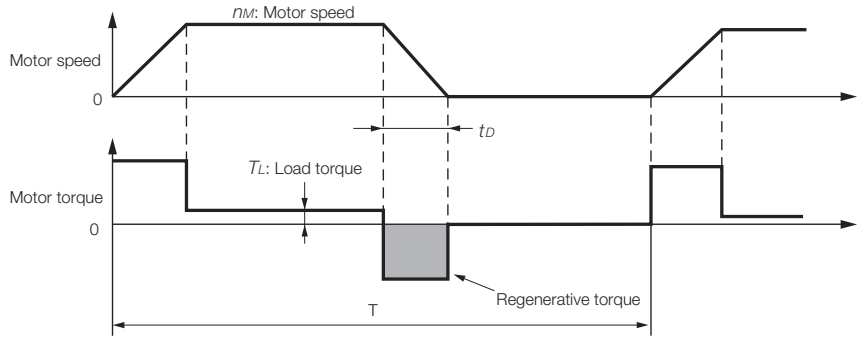
**7.** Result

It has been verified that the provisionally selected Servomotor is applicable.

# Capacity Selection for Regenerative Resistors

## Calculating the Regenerative Energy

This section shows how to calculate the regenerative resistor capacity for the acceleration/deceleration operation shown in the following figure.




### Calculation Procedure for Regenerative Resistor Capacity

| Step | Item | Code | Formula |
|---|---|---|---|
| 1 | Calculate the rotational energy of the Servomotor. | $E_S$ | $E_S = Jn_M^2/182$ |
| 2 | Calculate the energy consumed by load loss during the deceleration period | $E_L$ | $E_L = (\pi/60)\, n_M T_L t_D$<br>Note: If the load loss is unknown, calculate the value with $E_L$ set to 0. |
| 3 | Calculate the energy lost from Servomotor winding resistance. | $E_M$ | (Value calculated from the graphs in ◆*Servomotor Winding Resistance Loss*) $\times t_D$ |
| 4 | Calculate the energy that can be absorbed by the SERVOPACK. | $E_C$ | Calculate from the graphs in ◆*SERVOPACK-absorbable Energy* |
| 5 | Calculate the energy consumed by the regenerative resistor. | $E_K$ | $E_K = E_S - (E_L + E_M + E_C)$<br>$E_K = E_S - (E_L + E_M + E_C) + E_G$<br>Note: Use this formula if there will be continuous periods of regenerative operation, such as for a vertical axis. |
| 6 | Calculate the required regenerative resistor capacity (W). | $W_K$ | $W_K = E_K/(0.2 \times T)$ |

$E_G$ (joules): Energy for continuous period of regenerative operation

$E_G = (2\pi/60)\, n_{MG} T_G t_G$

$T_G$: Servomotor's generated torque in continuous period of regenerative operation (N m)

$n_{MG}$: Servomotor's motor speed for same operation period as above ($min^{-1}$)

$t_G$: Same operation period as above (s)

Note: 1. The 0.2 in the equation for calculating $W_K$ is the value when the regenerative resistor's utilized load ratio is 20%.

2. The units for the various symbols are given in the following table.

| Code | Description |
|---|---|
| $E_S$ to $E_K$ | Energy in joules (J) |
| $W_K$ | Required regenerative resistor capacity (W) |
| $J$ | $= J_M + J_L$ ($kg \cdot m^2$) |
| $n_M$ | Servomotor motor speed ($min^{-1}$) |

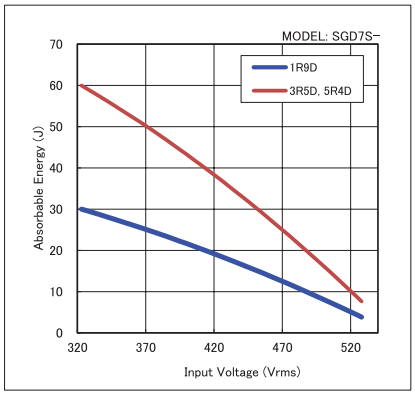
| Code | Description |
|---|---|
| $T_L$ | Load torque (N m) |
| $t_D$ | Deceleration stopping time (s) |
| T | Servomotor repeat operation cycle (s) |

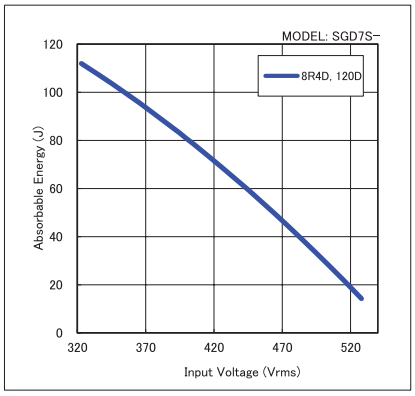
If the value of $W_K$ does not exceed the capacity of the built-in regenerative resistor of the SERVOPACK, an External Regenerative Resistor is not required. For details on the built-in regenerative resisters, refer to the SERVOPACK specifications. If the value of $W_K$ exceeds the capacity of the built-in regenerative resistor, install an External Regenerative Resistor with a capacity equal to the value for $W$ calculated above.

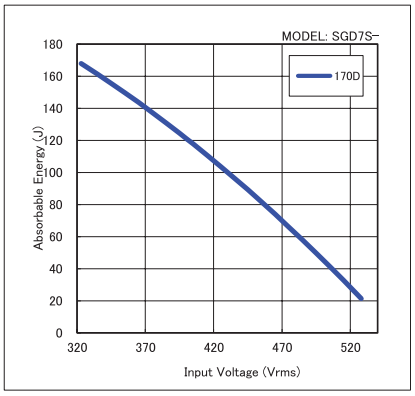
# SERVOPACK-absorbable energy

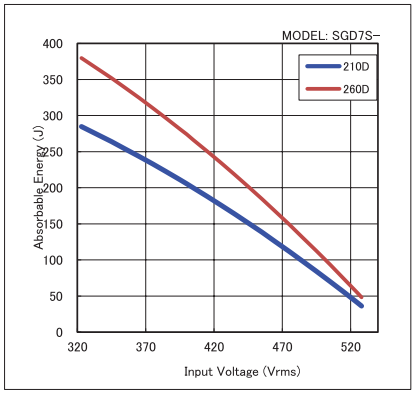
The following figures show the relationship between the SERVOPACK's input power supply voltage and its absorbable energy.

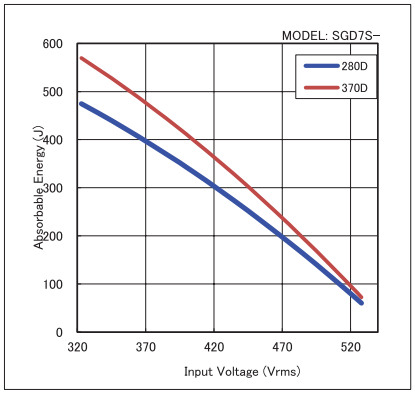
## Sigma-7S SERVOPACKs



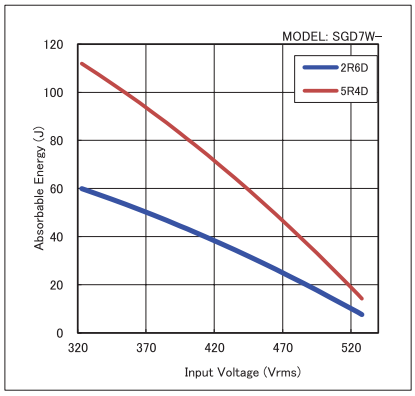



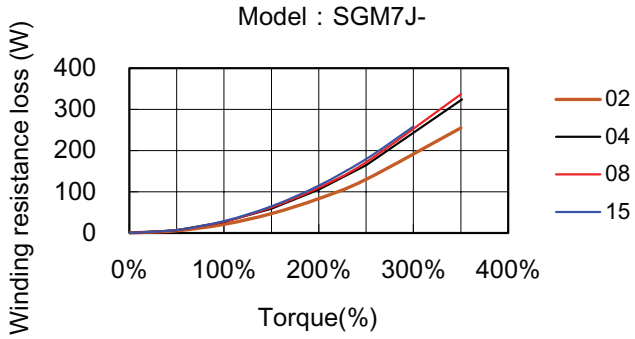

## Sigma-7W SERVOPACKs



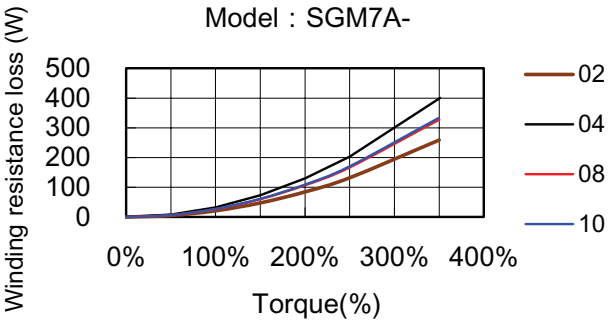
# Servomotor winding resistance loss

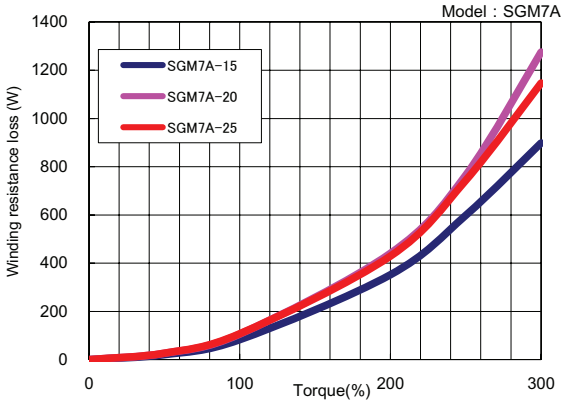
The following figures show the relationship for each Servomotor between the Servomotor's generated torque and the winding resistance loss.

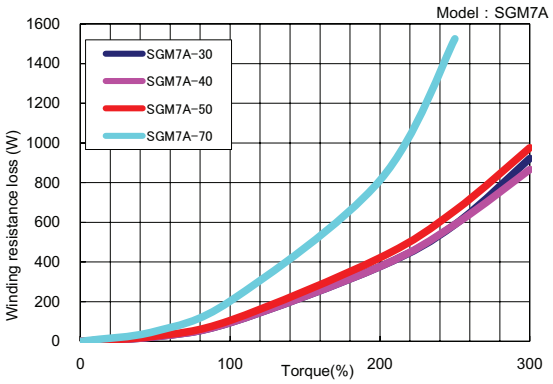
### SGM7J Rotary Servomotors




### SGM7A Rotary Servomotors

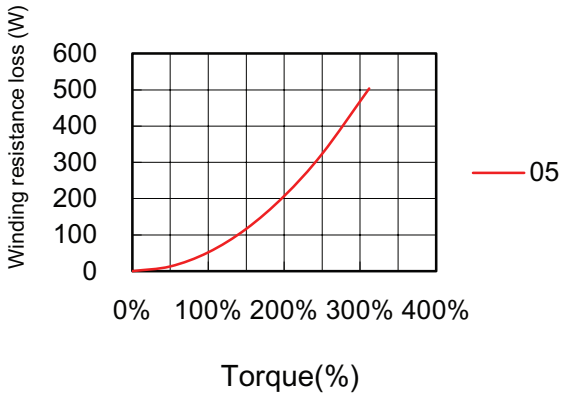


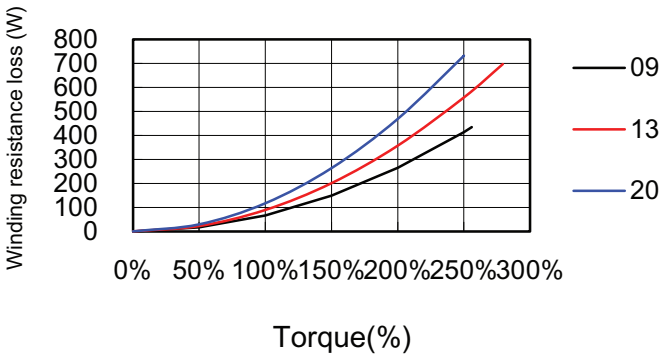



## SGM7G Rotary Servomotors

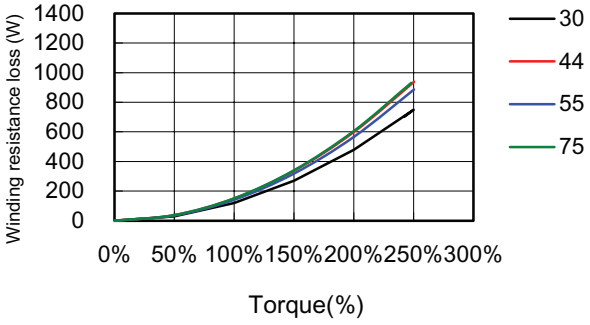
Model : SGM7G-



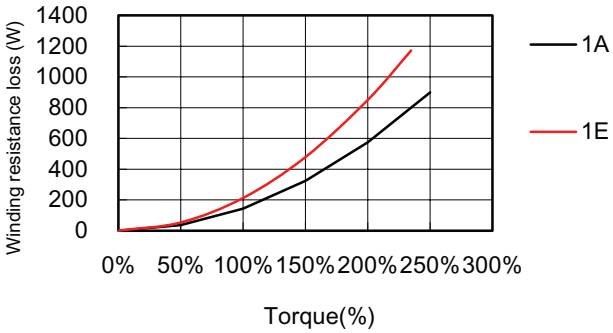

Model : SGM7G-



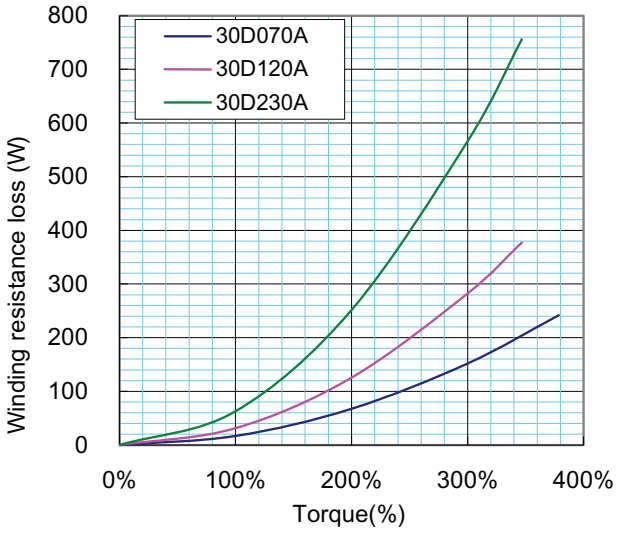

Model : SGM7G-

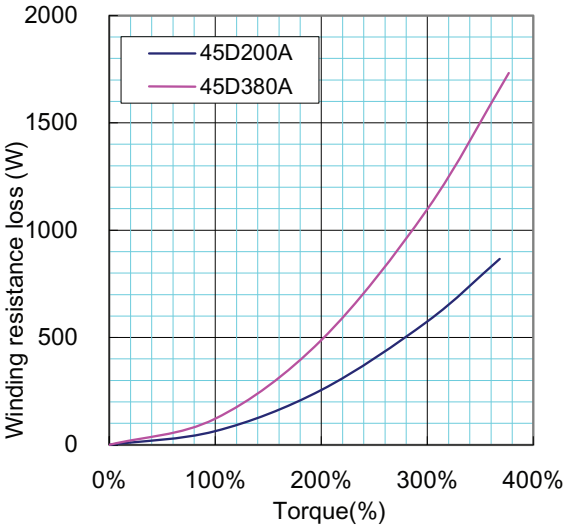


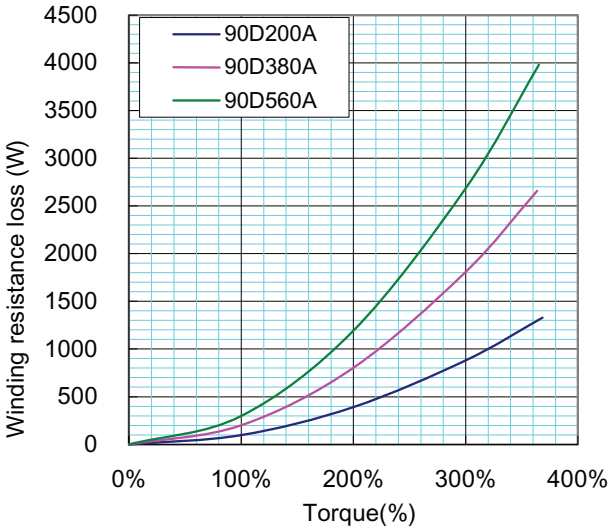

Model : SGM7G-

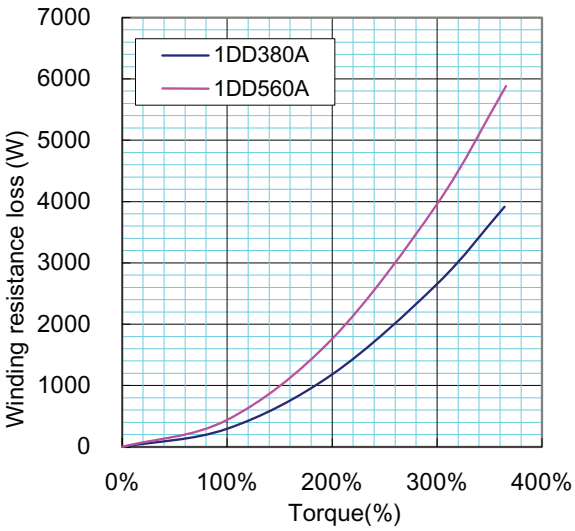


### SGLFW2 Linear Servomotors



# International Standards

| Product | | Model | UL/CSA Standards | CE Marking | KC Mark | RoHS Directive |
|---|---|---|---|---|---|---|
| SERVOPACKs | | SGD7S | • | • | • | • |
| | | SGD7W | • | • | • | • |
| Safety Option | Safety Module | SGDV-OSA01A000FT900*1 | • | • | • | • |

| Product | Model | UL/CSA Standards | CE Marking | RoHS Directive |
|---|---|---|---|---|
| Rotary Servomotors | SGM7J | • | • | • |
| | SGM7A | • | • | • |
| | SGM7G | • | • | • |
| Linear Servomotors | SGLFW2 (SGLFM2)*2 | Scheduled for 2017 | • | • |

*1. Use this model number to purchase the Option Module separately.
*2. The model numbers of the Magnetic Ways of Linear Servomotors are given in parentheses.

# Details of warranty

## Warranty period

The warranty period for a product that was purchased (hereinafter called the “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

## Warranty scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.
This warranty does not cover failures that result from any of the following causes.

- Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by Yaskawa
- Use of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
- Events for which Yaskawa is not responsible, such as natural or human-made disasters

## Limitations of liability

- Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
- Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
- The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
- Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

## Suitability for use

- It is the customer’s responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
- The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
- Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
  - » Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
  - » Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
  - » Systems, machines, and equipment that may present a risk to life or property
  - » Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
  - » Other systems that require a similar high degree of safety
- Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed
- The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product
- Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties

## Specifications change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

**YASKAWA Europe GmbH**

Philipp-Reis-Str. 6
65795 Hattersheim am Main
Germany

+49 6196 569-500
support@yaskawa.eu
www.yaskawa.eu.com

10/2026
YEU_MuC_Sigma7_400V_Cat_EN_v12

Specifications are subject to change without notice for ongoing product modifications and improvements. © YASKAWA Europe GmbH. All rights reserved.

YASKAWA