YASKAWA

Sigma-7 400V

Product Catalog

www.yaskawa.eu.com

Quick. Fast. Reliable.

The 400 V series

Amplifier

- Space saving bookstyle for side-by-side mounting
- Embedded fieldbus
  - » EtherCAT
  - » MECHATROLINK-III
- Single & dual axis amplifier
- European connectors
- Daisy-chain-connection

Motors

- Plug-and-turn connectors according to european standards (M12, M17, M23 and M40)
- Available from 200 W - 15 kW

- Connectors for power supply, EtherCAT, I/O, encoder, USB, etc.

- Connector for digital operator

- Option units for advanced safety, encoder

- Power connectors for motor, brake, braking resistor
- Metal sheet for motor cable shielding

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 200 W to 5 kW
- Linear motors iron core and ironless with a peak force 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

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 PL-e
- The safety functions SS1, SS2 and SLS are integrated by using the safety module SGDV-OSA01A000FT900

4 High Efficiency

Very low heat generation

- Optimized magnetic circuit improves motor efficiency
- Improved motor efficiency reduces heat generation by about 20 %

5 High Accuracy

Next level 24-bit absolute encoder for maximum accuracy

- Resolution of 16 million pulses per revolution for extremely precice 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 12 million servo systems in the field
- Improved machine reliability, reduced service and maintenance costs, less downtime

Servomotors

Rotary

SGM7J

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

SGM7A

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

SGM7G

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

Linear

SGLFW2

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

SERVOPACKS

Single Axis

SGD7S-□□□DA0B

EtherCAT Communication Reference

SGD7S-□□□D30B

MECHATROLINK-III Communication Reference

Dual Axis

SGD7W-□□□DA0B

EtherCAT Communication Reference

SGD7W-□□□D30B

MECHATROLINK-III Communication Reference

Option Modules

SGDV-OSA01A000FT900

Safety Module

SGDV-OF□□□A

Feedback Option/ Fully Closed Loop Module

Combination of SERVOPACKs and Option Modules

SERVOPACK Model	Option Module	
	Safety Module (SGDV-OSA01A000FT900)	Feedback Option/Fully Closed Loop Module (SGDV-OF□□□A)
Single-axis EtherCAT Communications Reference Type (SGD7S-□□□DA0B□□□F64)	O	O
Single-axis MECHATROLINK III Communications Reference Type (SGD7S-□□□D30B□□□F64)	O	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

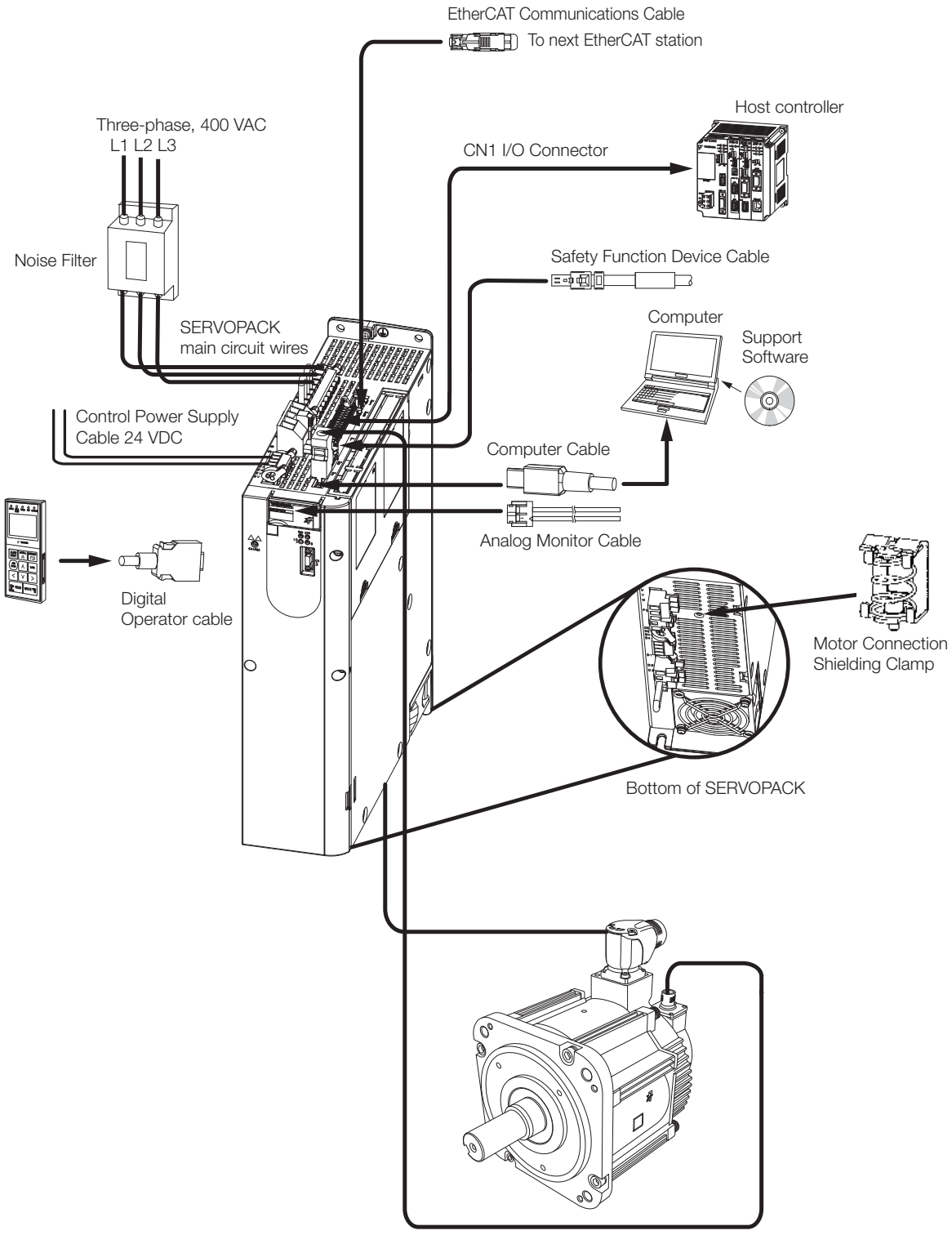
Rotary servomotor model		Rated output	SERVOPACK model	
			SGD7S-	SGD7W-
SGM7J (Medium inertia, high speed) 3,000 min^{-1}	SGM7J-02D□F	200W	1R9D	2R6D*
	SGM7J-04D□F	400W		2R6D* oder 5R4D*
	SGM7J-08D□F	750W	3R5D	2R6D oder 5R4D*
	SGM7J-15D□F	1.5kW	5R4D	5R4D
SGM7A (Low inertia, high speed) 3,000 min^{-1}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

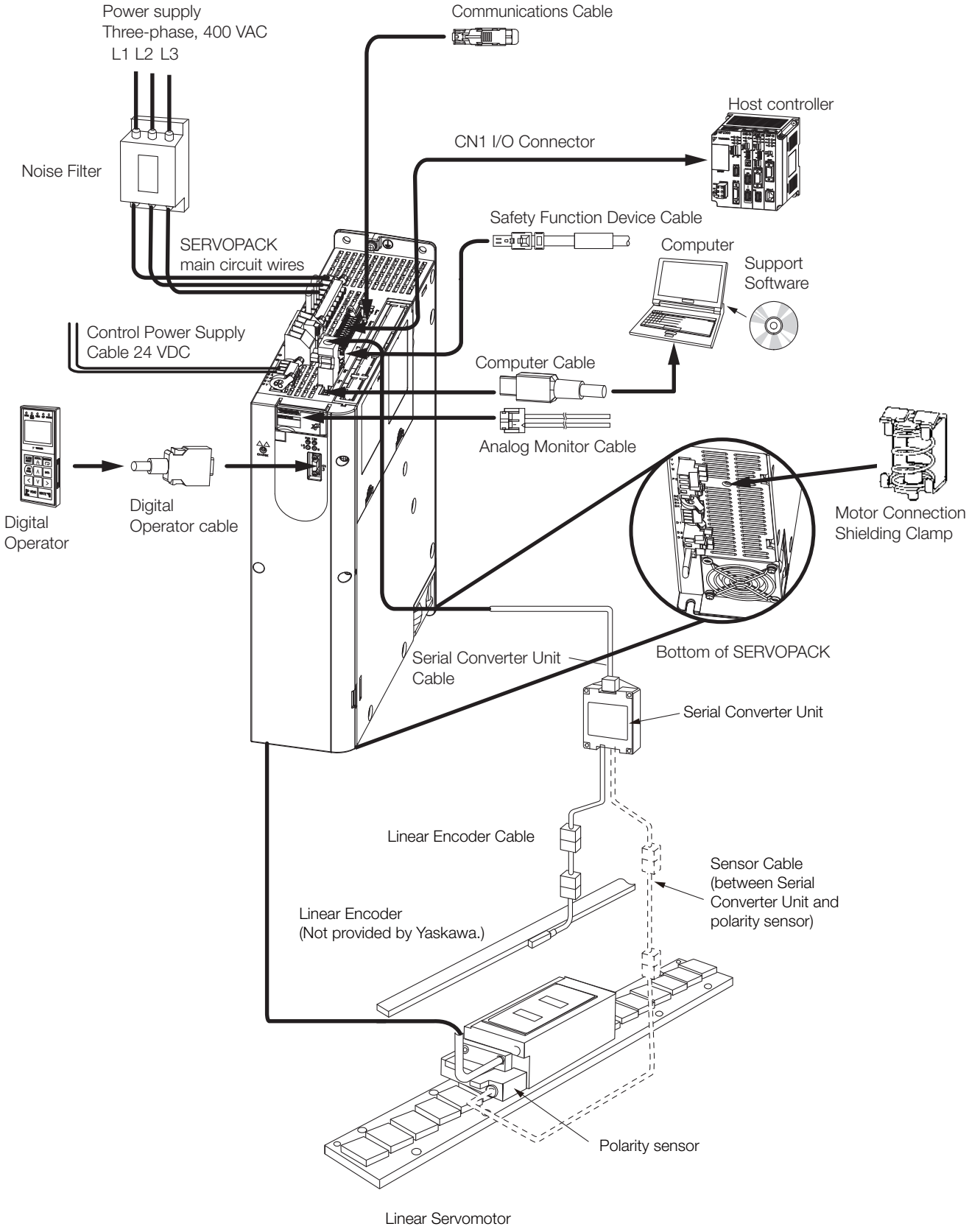
Combination of Linear Servomotors and SERVOPACKs

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

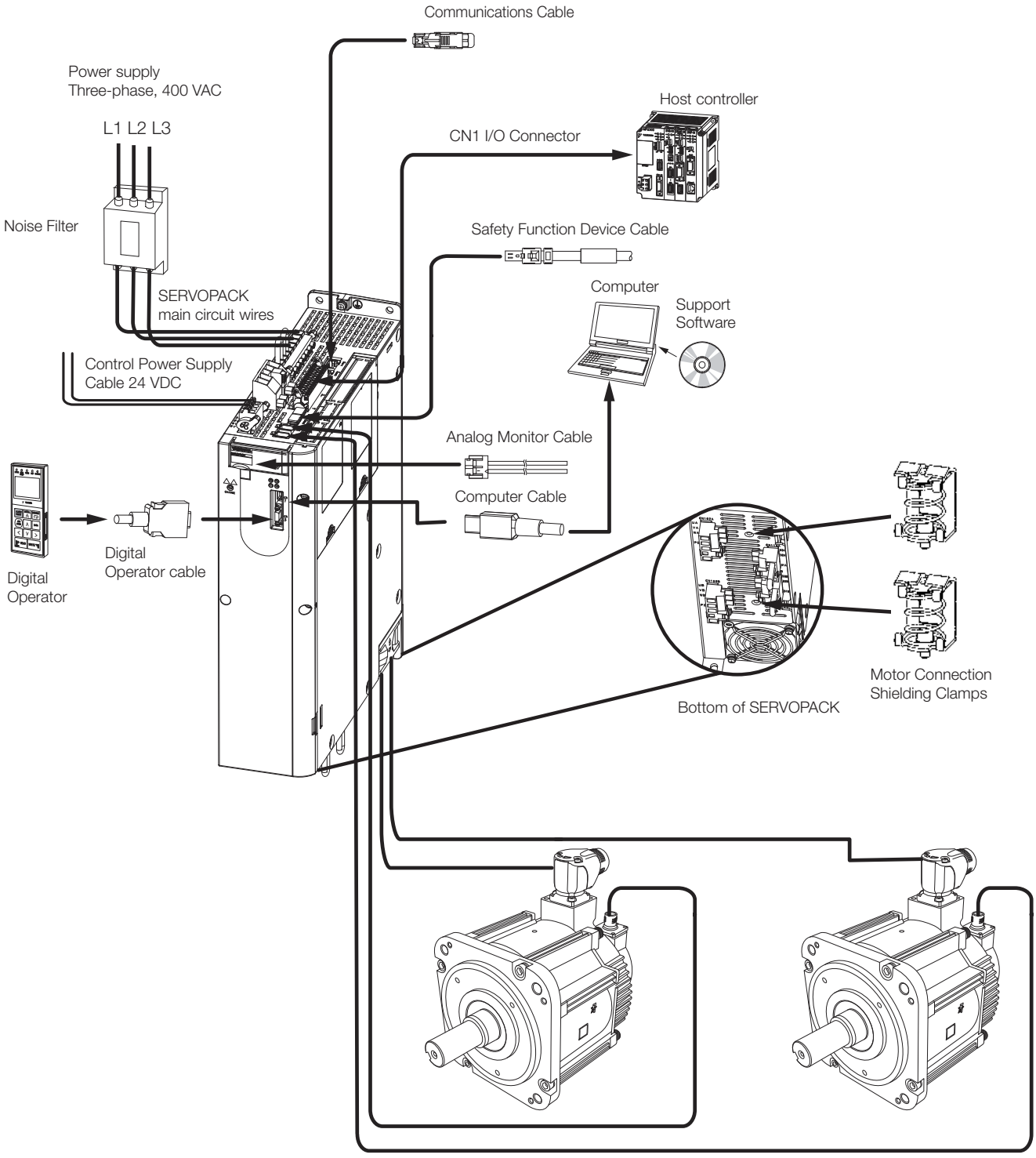
SGD7S SERVOPACK and Rotary Servomotor



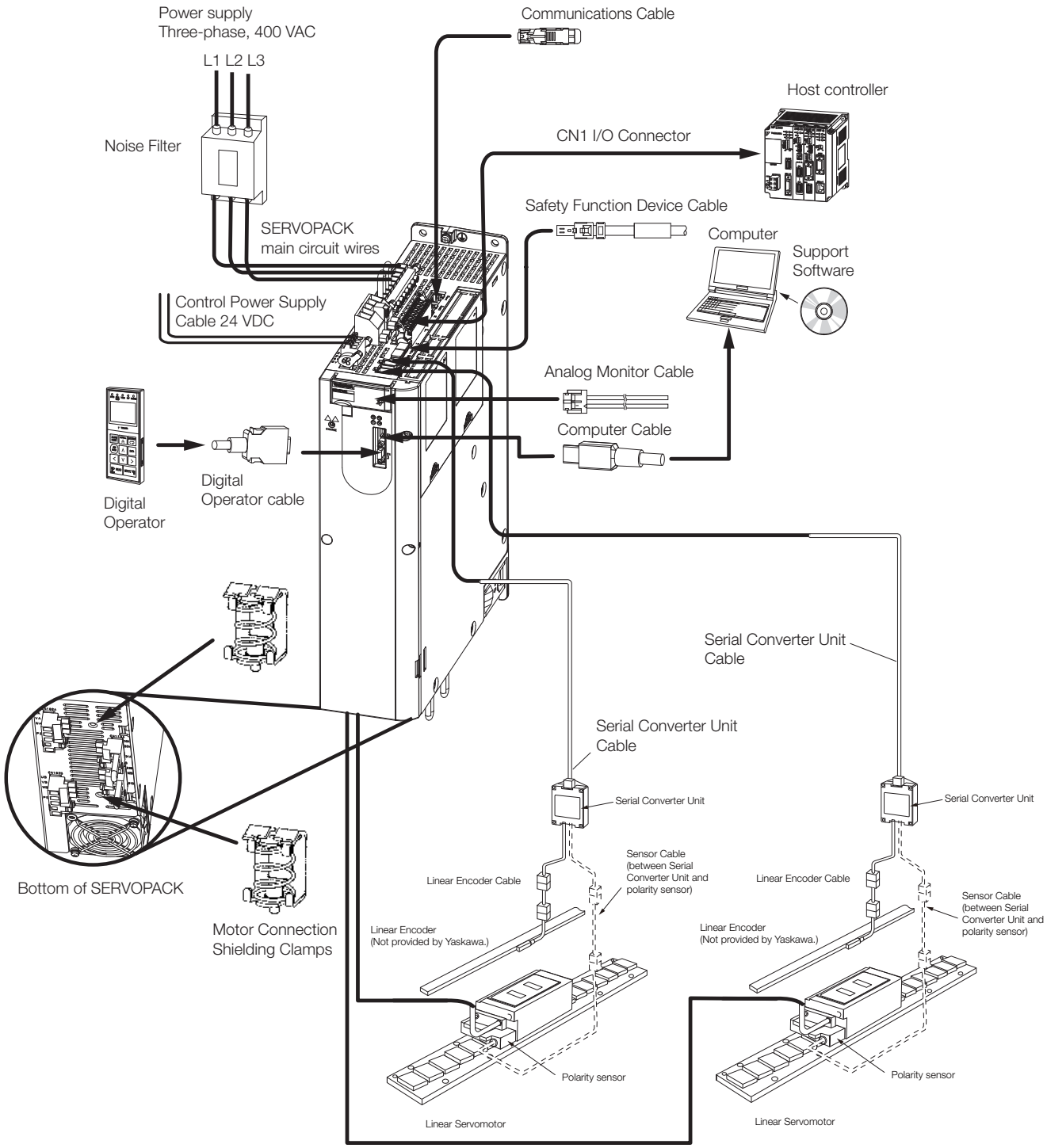
SGD7S SERVOPACK and Linear Servomotor



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
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)

Bolded options are considered standard warehouse products.

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**

Bolded options are considered standard warehouse products.

3rd digit - Power Supply Voltage

Code	Specification
D	**400 VAC**

4th digit - Serial Encoder

Code	Specification
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	With holding brake (24 VDC)
F*	**With dust seal**
H*	With dust seal and holding brake (24 VDC)

* This option is supported only for SGM7A-10 to -50 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
7	24-bit absolute
F	**24-bit incremental**

5th digit - Design Revision Order

Code	Specification
F	**Standard Model**
R*2	High-speed Model

*1 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.
*2 Available up to 4.4 kW.

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*1	Straight without key (850 W, 1.3 kW)
K*1	**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)

Bolded options are considered standard warehouse products.

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

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

7th digit - Design Revision Order

Code	Specification
B	**Standard Model**

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

Code	Specification	Applicable Models
000	**Without Options**	**All models**
026	With relay for holding brake	All models

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

Code	Specification
F64	**Zone table**

Bolded options are considered standard warehouse products.

Dual Axis Amplifier

SGD7W - 2R6 D A0 B -

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

Code	Specification
B	**Standard Model**

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

Code	Specification	Applicable Models
-	**Without Options**	**All models**
026	With relay for holding brake	All models

Bolded options are considered standard warehouse products.

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 Servo-motors:	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 Servo-motors:	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.

Catalog Name Catalog (No.)	Document Name (Document No.)	Description of Document
Sigma-7 Series Catalog AC Servo Drives Sigma-7 Series (YEU_MuC_Sigma7_400V_Cat_EN_v4)	Sigma-7 Series Product Manual	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 EtherCAT (CoE) Communications References Product Manual (SIEP S800001 80☐)	
	Sigma-7 Single Axis SERVOPACK with 400V-Input Power and MECHATROLINK III Communications References Product Manual (SIEP S800002 14☐)	
	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☐)	
	Sigma-7-Series User Manual Safety Module (SIEPC 72082906 E☐) 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	Provides detailed information on selecting, installing, and connecting the Sigma-7 Series Servomotors.
	Rotary Servomotor with 400 V-Input Power Product Manual (SIEP S800001 86☐)	
	Linear Servomotor with 400 V-Input Power Product Manual (SIEP S80001 81☐)	
	Others	Describes the operating procedures for a Digital Operator for a Sigma-7 Series Servo System.
	Digital Operator Operating Manual (SIEP S800001 33☐)	
	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.

Contents

Contents

Rotary Servomotors

SGM7J 20
SGM7A 31
SGM7G 47

Linear Servomotors

SGLF (Models with F-Type Iron Cores) 62

SERVOPACKs

SGD7S Single Axis 84
SGD7W Dual Axis 93

Option Modules

Option Module Safety 103
Option Module 107

Cables & Periphery

Cables for Rotary Servomotors 118
Cables for Linear Servomotors 122
Serial Converter Units 125
Cables and Connectors for SERVOPACKs 126
Periphery 131

Appendix

Capacity Selection for Servomotors 144
Capacity Selection for Regenerative Resistors 151
International Standards 152
Warranty 153

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	31
SGM7G	47

Model Designations

SGM7J - 02 D F F 6 1

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
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)

Bolded options are considered standard warehouse products.

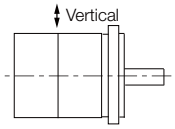
Specifications and Ratings

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. • Must be well-ventilated and free of dust and moisture. • Must facilitate inspection and cleaning. • Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*5 • 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. Storage Temperature: -20 °C to 60 °C (with no freezing) Storage Humidity: 20% to 80% relative humidity (with no condensation)			
Shock Resistance*2	Impact Acceleration Rate at Flange	490 m/s²			
	Number of Impacts	2 times			
Vibration Resistance*3	Vibration Acceleration Rate at Flange	49 m/s²			
Applicable SERVOPACKs	SGD7S-	1R9D		3R5D	5R4D

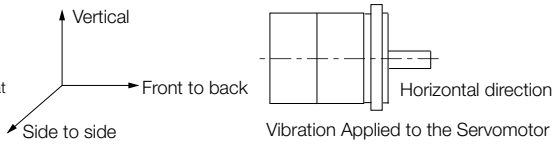
*1. A Vibration class of V15 indicates a vibration amplitude of 15 µm maximum on the Servomotor without a load at the rated motor speed.

*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		Arms	1.5	1.4	2.2	4.5
Instantaneous Maximum Current *1		Arms	5.5	5.3	8.2	14.0
Rated Motor Speed *1		min^{-1}	3000			
Maximum Motor Speed		min^{-1}	6000			
Torque Constant		Nm/Arms	0.461	0.965	1.17	1.13
Motor Moment of Inertia		$\times10^{-4}$ 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.

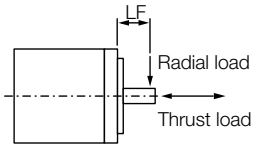
2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

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.

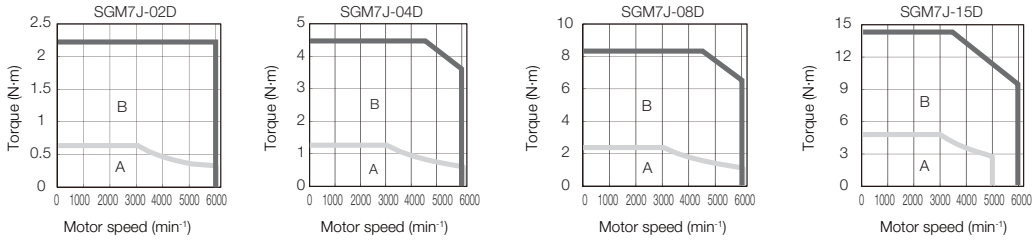
   - The holding brake cannot be used to stop the Servomotor.
   - The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
   - The 24-VDC power supply is not provided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

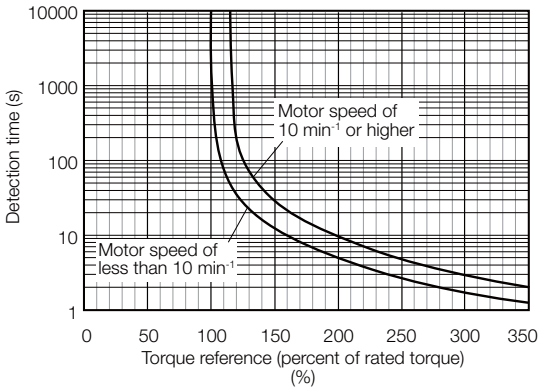


Notes:

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

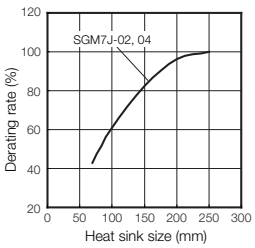
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes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

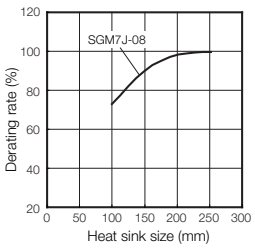
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the Servomotor Overload Protection Characteristics.

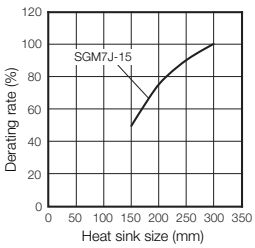
Note:
The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed.
If the average motor speed exceeds the rated motor speed, consult with your YASKAWA representative.

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.

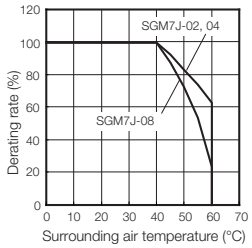
Applications Where the Surrounding Air Temperature of the Servomotor Exceeds 40°C

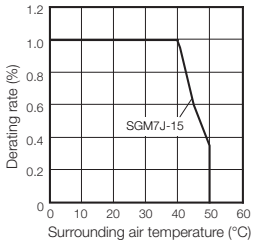
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

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.





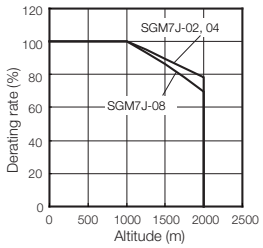
Applications Where the Altitude of the Servomotor Exceeds 1,000 m

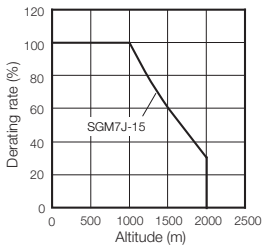
The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.

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:

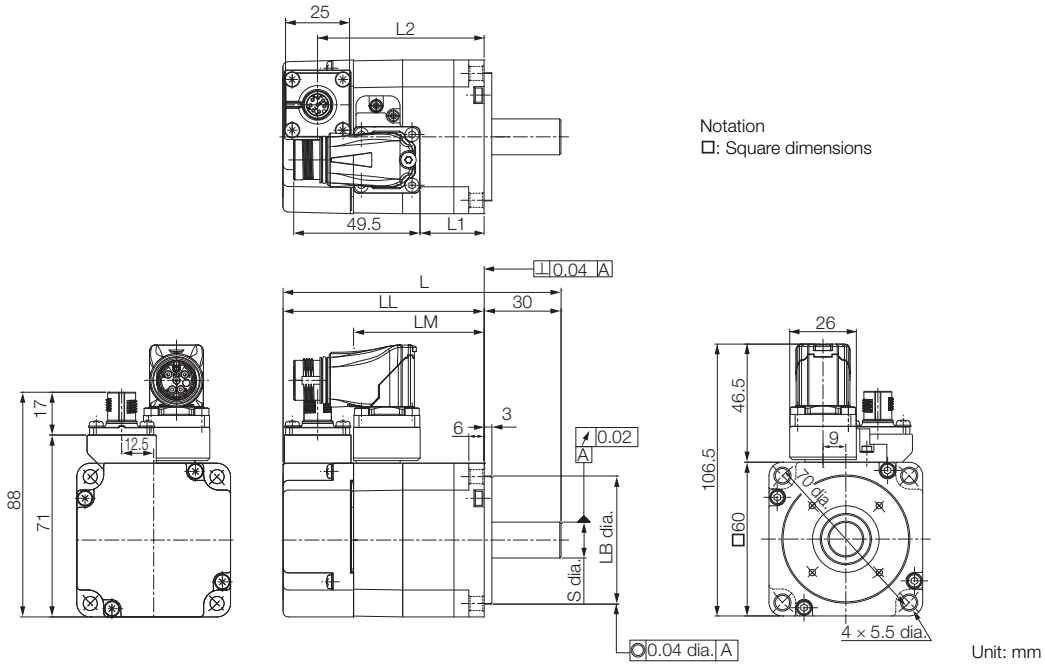
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated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





External Dimensions

SGM7J-02 and -04



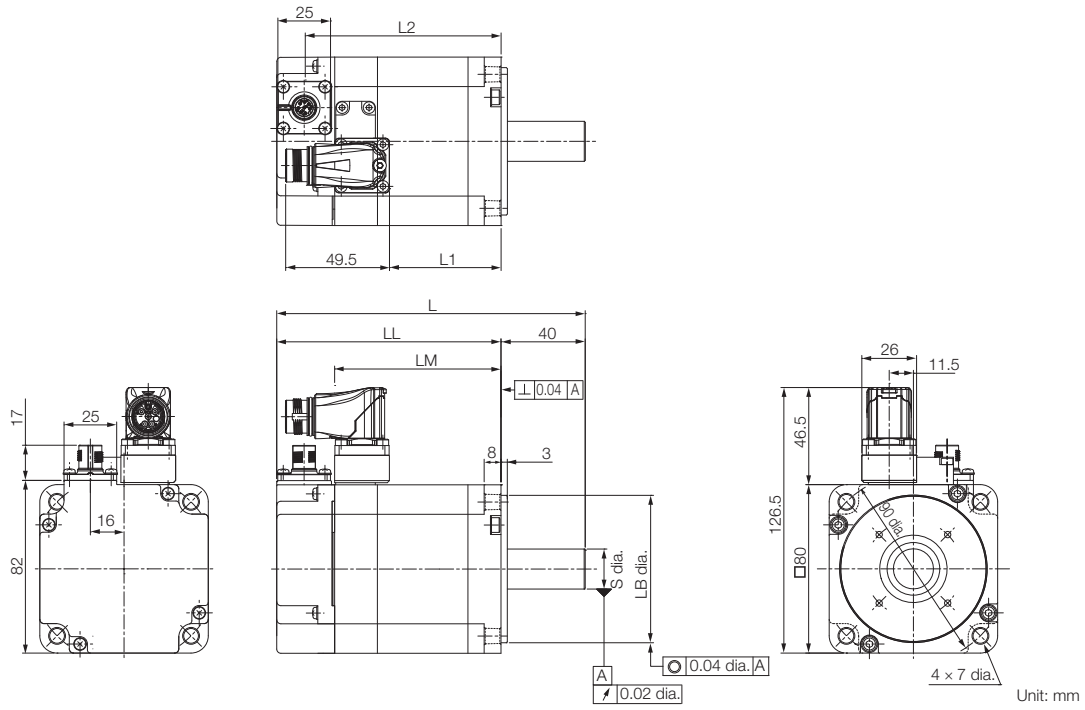
Unit: mm

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

Note:

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

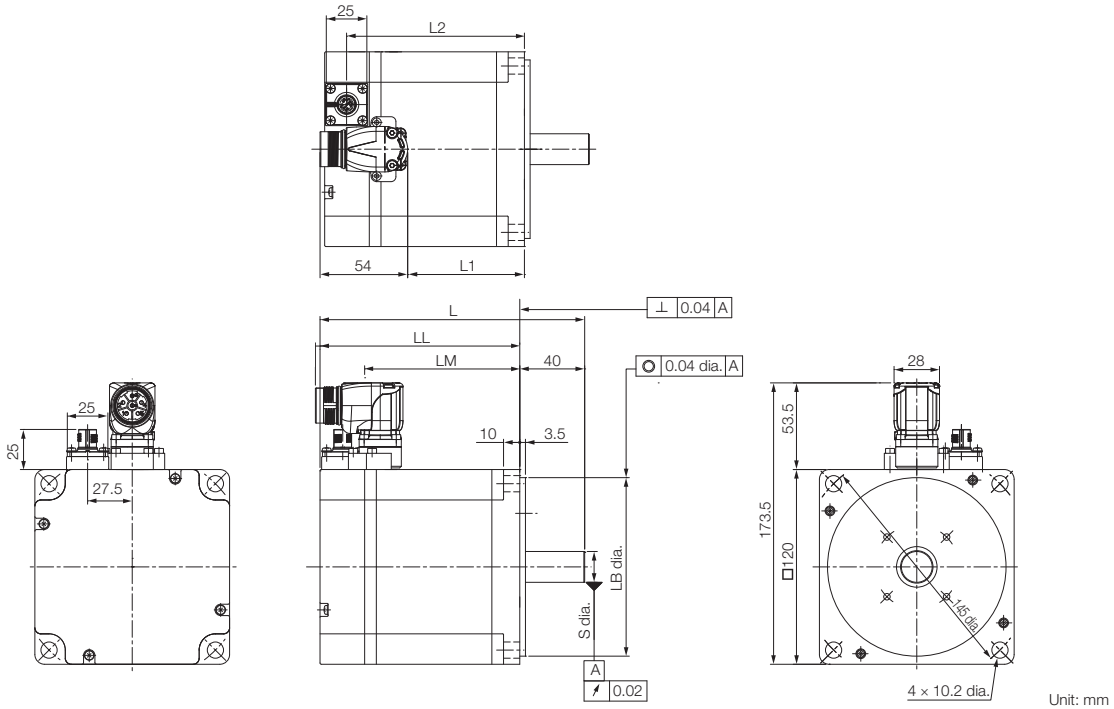


Model SGM7J-	L	LL	LM	LB	S	L1	L2	Approx. Mass [kg]
08D□F2□	146.5 (193.5)	106.5 (153.5)	79	$70^{0}_{-0.030}$	$19^{0}_{-0.013}$	53	93 (121.5)	2.3 (2.9)

Note:

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 (196.5)	123.5 (156.5)	95.6	$110^{0}_{-0.035}$	$19^{0}_{-0.013}$	72	110 (143)	6.4 (8.1)

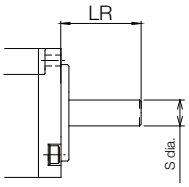
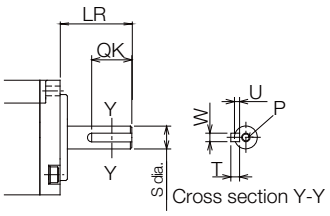
Note:

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-□□□□□□□

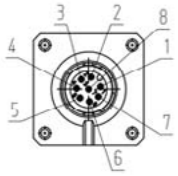
Code	Specification
2	Straight without key
6	Straight with key and tap for one location (Key slot is JIS B1301-1996 fastening type.)

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

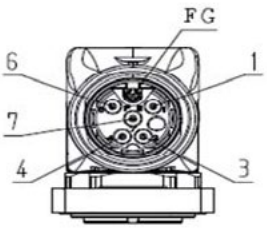


Receptacle
Size: M12
Part number: 1419959
Model: SACC-MSQ-M12MS-25-3,2 SCO
Manufacturer: Phoenix Contact

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

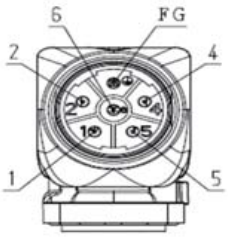


Receptacle
Size: M17
Part number: 1620448
Model: ST-5EP1N8AA500S
Manufacturer: Phoenix Contact

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

SGM7J-15

- Servomotor Connector Specifications



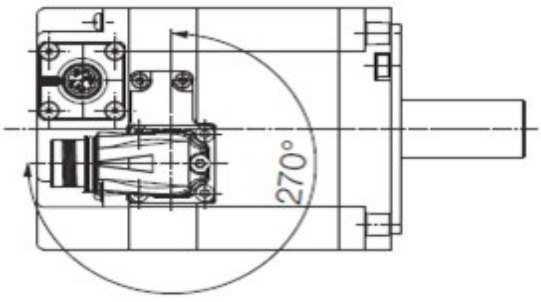
Receptacle
Size: M23
Part number: 1617905
Model: ST-5EP1N8AAD00S
Manufacturer: Phoenix Contact

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

Servomotor Connector Rotational Angle

Allowable number of rotations: 10

SGM7G-02 to -15



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**

Bolded options are considered standard warehouse products.

3rd digit - Power Supply Voltage

Code	Specification
D	**400 VAC**

4th digit - Serial Encoder

Code	Specification
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	With holding brake (24 VDC)
F*	**With dust seal**
H*	With dust seal and holding brake (24 VDC)

* This option is supported only for SGM7A-10 to -50 Servomotors.

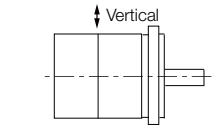
Specifications and Ratings

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. • Must be well-ventilated and free of dust and moisture. • Must facilitate inspection and cleaning. • Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*5 • 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. Storage Temperature: -20 °C to 60 °C (with no freezing) Storage Humidity: 20 % to 80 % relative humidity (with no condensation)										
Shock Resistance*2	Impact Acceleration Rate at Flange	490 m/s²										
	Number of Impacts	2 times										
Vibration Resistance*3	Vibration Acceleration Rate at Flange	49 m/s² (Models 15A to 30D: 24.5 m/s² front to back)										14.7 m/s²
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	–					

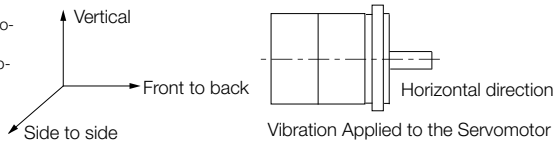
*1 A Vibration class of V15 indicates a vibration amplitude of 15 µm maximum on the Servomotor without a load at the rated motor speed.

*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		Arms	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		Arms	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/Arms	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.

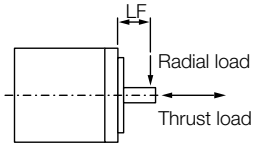
*1. For the SGM7A-02D to SGM7A-10D, these values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. For the SGM7A-15D to SGM7A-30D, these values are for operation in combination with a SERVOPACK when the temperature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

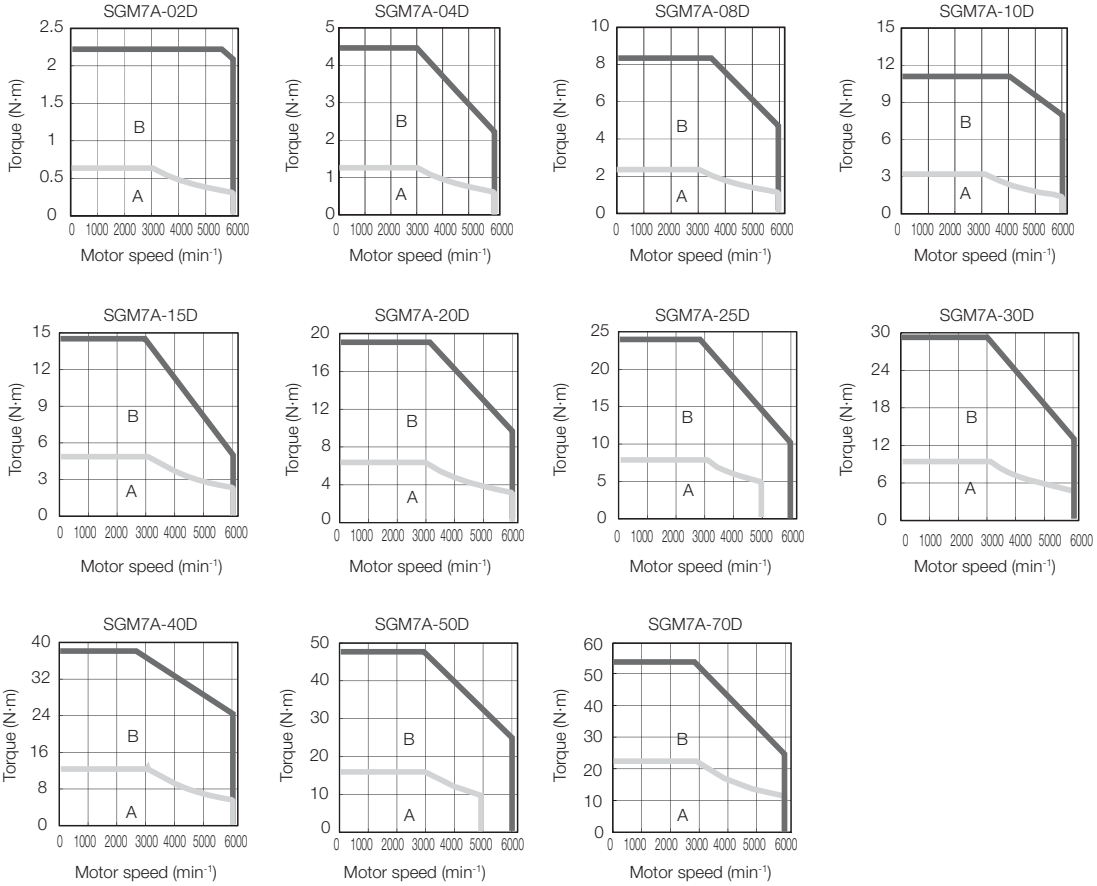
*4. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate 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

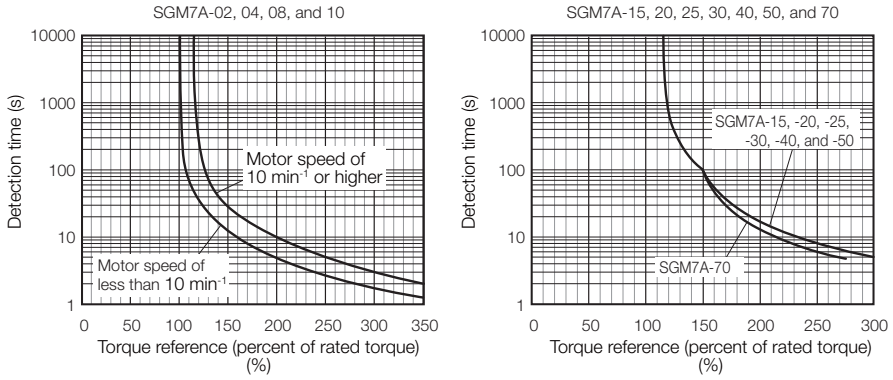


Note:

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.

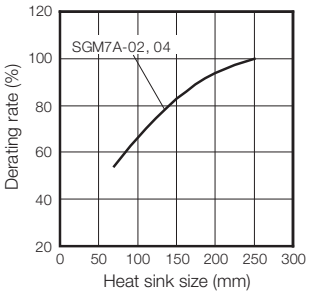
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

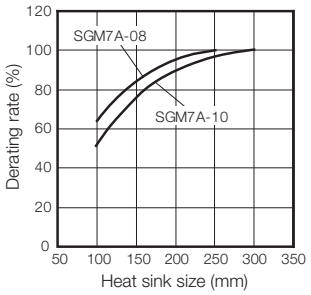
Note:

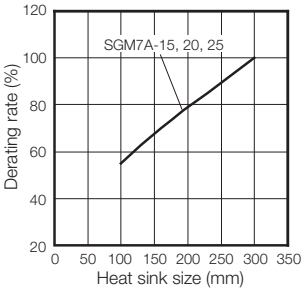
The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed.
If the average motor speed exceeds the rated motor speed, consult with your YASKAWA representative.

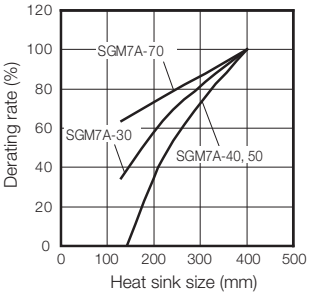
Important:

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.

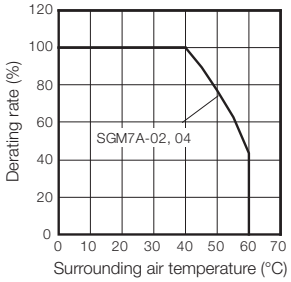
Applications Where the Surrounding Air Temperature of the Servomotor Exceeds 40°C

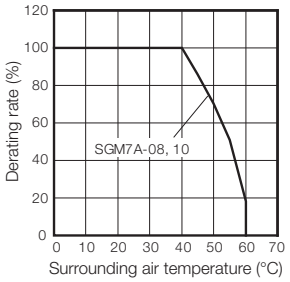
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

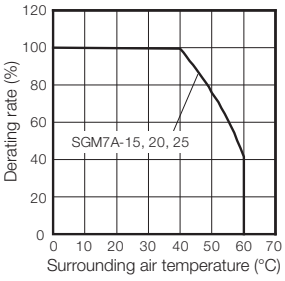
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

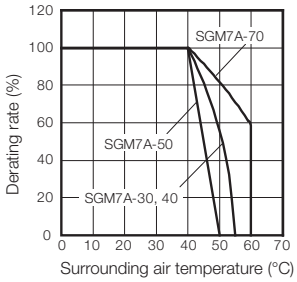
Note:

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.







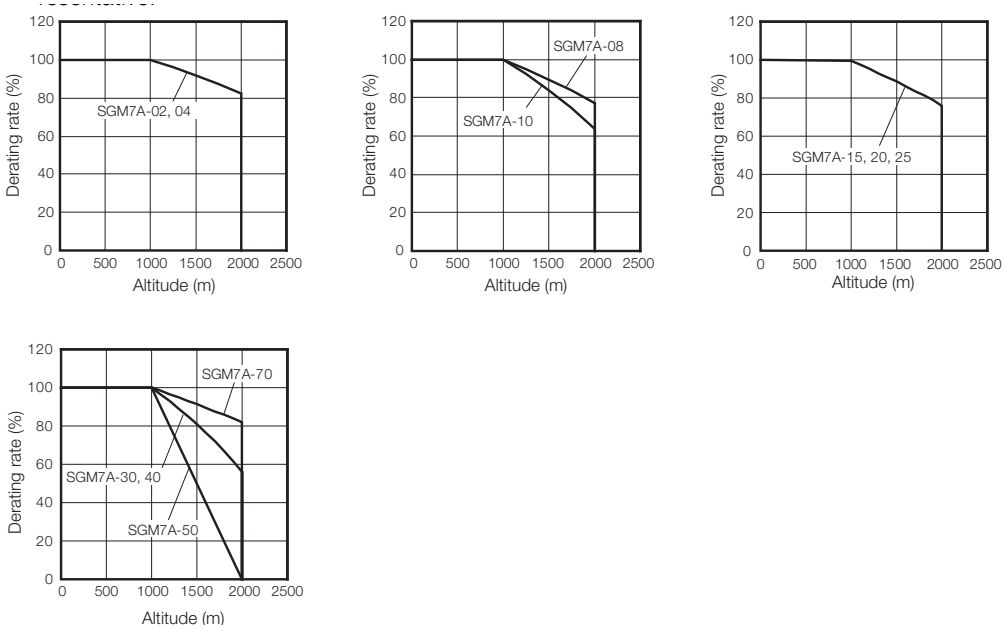


Applications Where the Altitude of the Servomotor Exceeds 1,000 m

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.

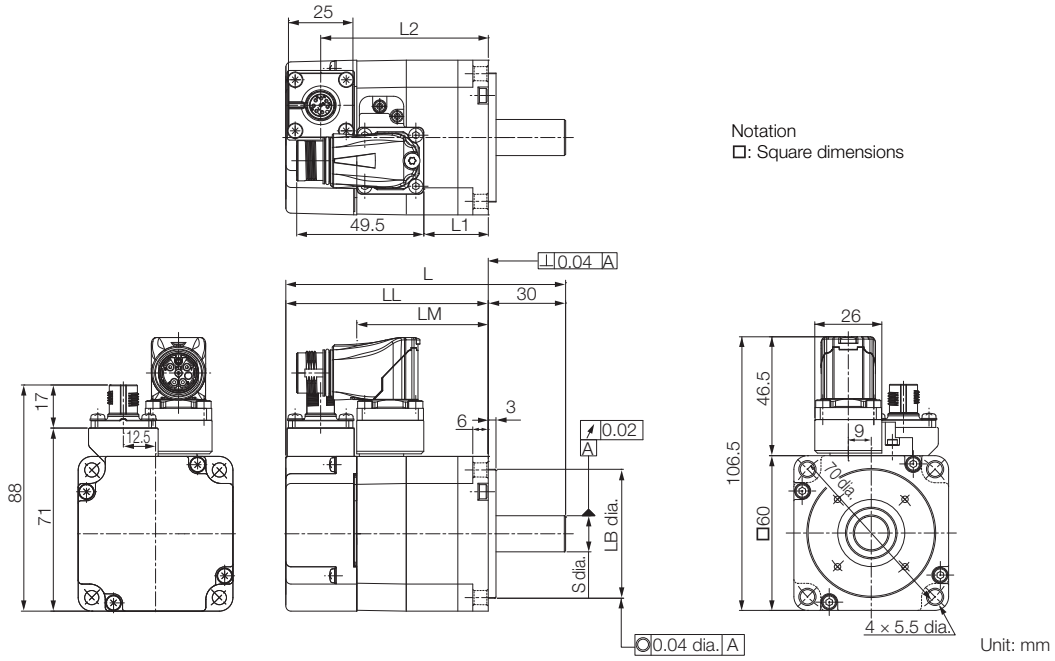
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

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 (148.5)	78.5 (118.5)	51.2	$50^{0}_{-0.025}$	$14^{0}_{-0.011}$	25	65 (105)	0.9 (1.5)
04D□F2□	125 (165)	95 (135)	67.2	$50^{0}_{-0.025}$	$14^{0}_{-0.011}$	41.5	81.5 (121.5)	1.2 (1.8)

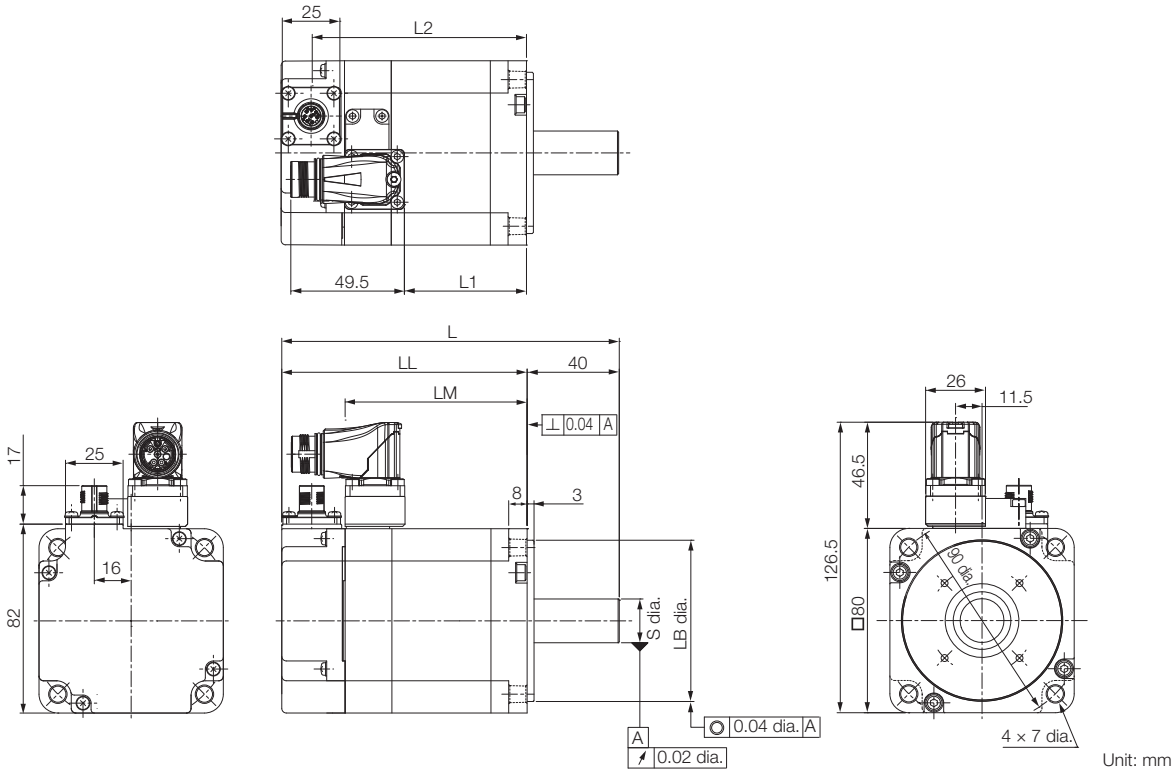
Note:

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 (193.5)	106.5 (153.5)	79	$70^{0}_{-0.030}$	$19^{0}_{-0.013}$	53	93 (140)	2.4 (3.0)

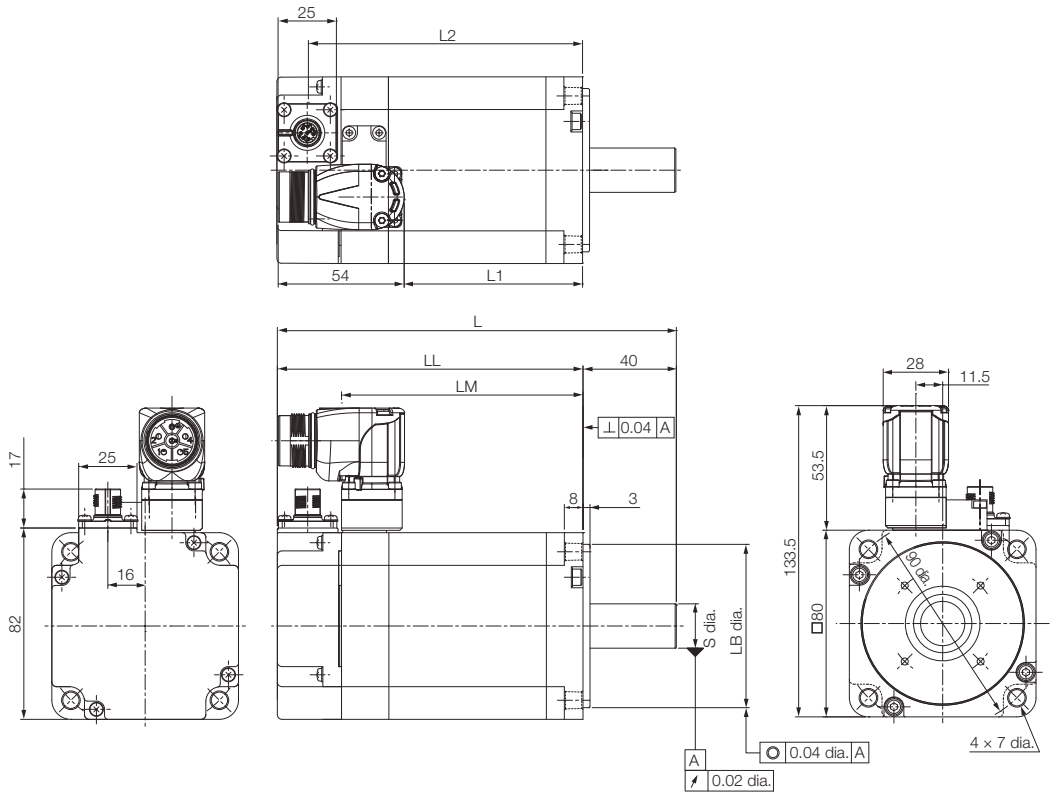
Note:

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 (218)	131 (178)	103.5	$70^{0}_{-0.030}$	$19^{0}_{-0.013}$	77	117.5 (164.5)	3.2 (3.8)

Note:

The values in parentheses are for Servomotors with Holding Brakes.

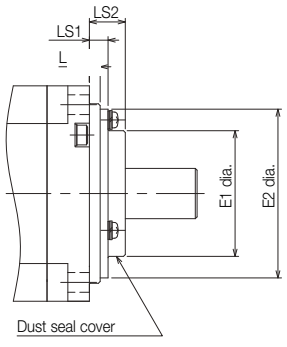
Refer to the section Shaft End Specifications for SGMA7A-02 to -10.

Refer to the section Connector Specifications.

Options

- With Dust Seal

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

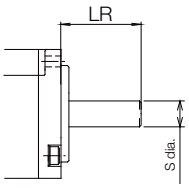
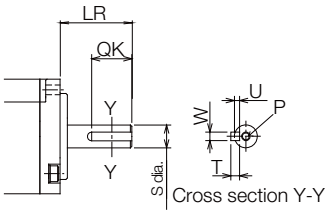


Unit: mm

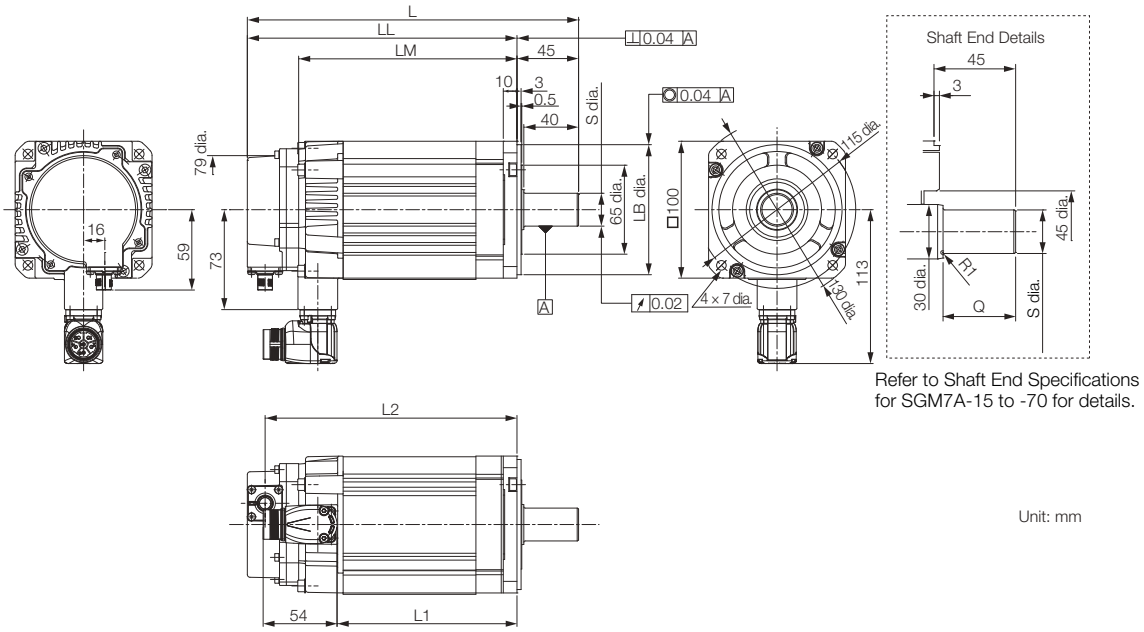
Shaft End Specifications for SGM7A-02 to -10

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



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

Unit: mm

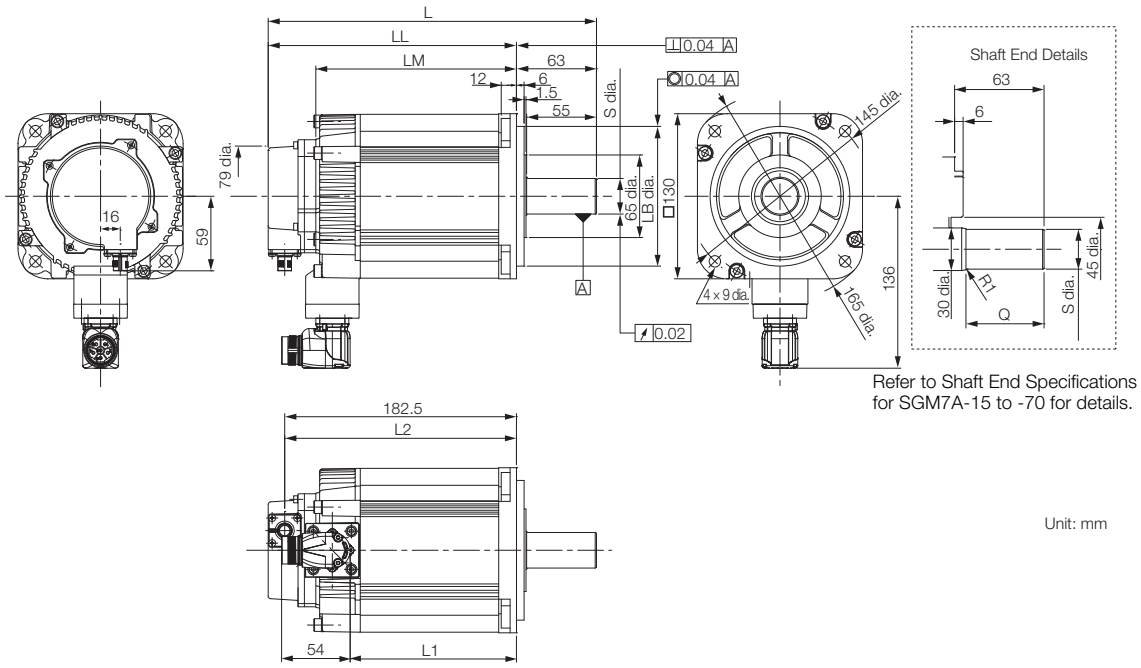
Model SGM7A-	L	LL	LM	L1	L2	LB	Shaft End Dimensions		Approx. Mass [kg]
							S	Q	
15D□F2□	204 (245)	159 (200)	121 (162)	90	145 (187)	$95^{0}_{-0.035}$	$24^{0}_{-0.013}$	40	4.7 (6.1)
20D□F2□	220 (261)	175 (216)	137 (178)	106	161 (203)	$95^{0}_{-0.035}$	$24^{0}_{-0.013}$	40	5.5 (6.9)
25D□F2□	243 (294)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

Note:

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.

Refer to the section Connector Specifications.

SGM7A-30 to -50



Unit: mm

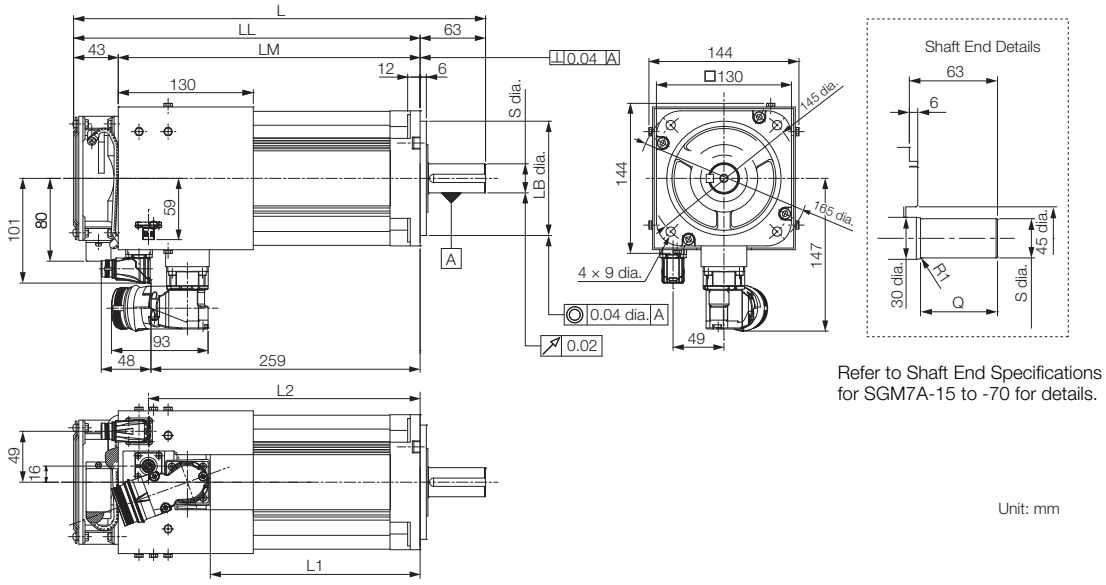
Model SGM7A-	L	LL	LM	L1	L2	LB	Shaft End Dimensions		Approx. Mass [kg]
							S	Q	
30D□F2□	259 (295)	196 (232)	158 (194)	131	183 (219)	$110^{0}_{-0.035}$	$28^{0}_{-0.013}$	55	10.6 (13.1)
40D□F2□	298 (334)	235 (271)	197 (233)	170	222 (258)	$110^{0}_{-0.035}$	$28^{0}_{-0.013}$	55	14.0 (16.5)
50D□F2□	338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

Note:

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.

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:

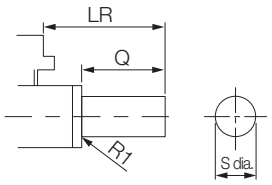
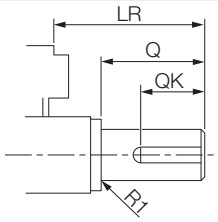
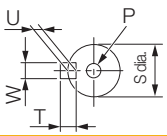
1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to Shaft End Specifications for SGM7A-15 to -70 for details.

Refer to the section Connector Specifications.

Shaft End Specifications for SGM7A-15 to -70

SGM7A-□□□□□□□

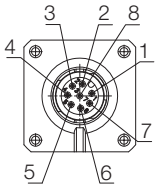
Code	Specification
2	Straight without key
6	Straight with key and tap for one location (Key slot is JIS B1301-1996 fastening type.)

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

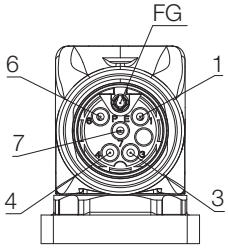


Receptacle
Size: M12
Part number: 1419959
Model: SACC-MSQ-M12MS-25-3,2 SCO
Manufacturer: Phoenix Contact

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

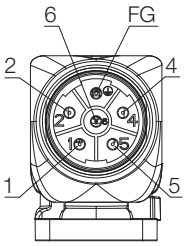


Receptacle
Size: M17
Part number: 1620448
Model: ST-5EP1N8AA500S
Manufacturer: Phoenix Contact

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

SGM7A-10 to -50

- Servomotor Connector Specifications

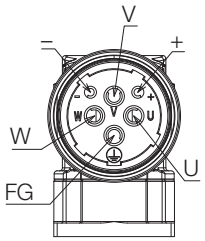


Receptacle
Size: M23
Part number: 1617905
Model: ST-5EP1N8AAD00S
Manufacturer: Phoenix Contact

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

SGM7A-70

- Servomotor Connector Specifications

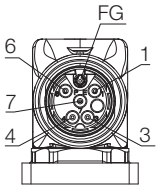


Receptacle
Size: M40
Part number: 1607927
Model: SM-5EPWN8AAD00S
Manufacturer: Phoenix Contact

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

SGM7A-70

- Fan Connector Specifications



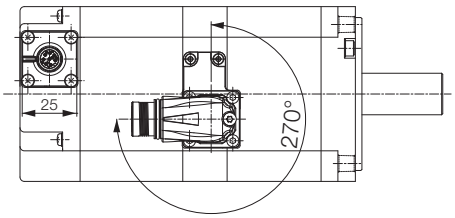
Receptacle
Size: M17
Part number: 1620448
Model: ST-5EP1N8AA500S
Manufacturer: Phoenix Contact

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

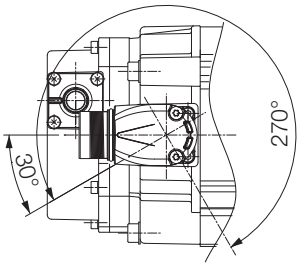
Servomotor Connector Rotational Angle

Allowable number of rotations: 10

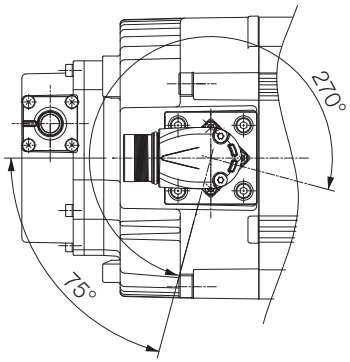
SGM7A-02 to -10



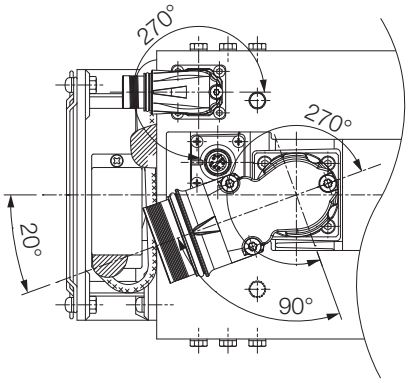
SGM7A-15 to -25



SGM7A-30 to -50



SGM7A-70



SGM7G - 05 D F F 6 F

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
7	24-bit absolute
F	**24-bit incremental**

5th digit - Design Revision Order	
Code	Specification
F	**Standard Model**
R*2	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*1	Straight without key (850 W, 1.3 kW)
K*1	**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 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.
*2 Available up to 4.4 kW.

Bolded options are considered standard warehouse products.

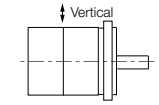
Specifications and Ratings

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. • Must be well-ventilated and free of dust and moisture. • Must facilitate inspection and cleaning. • Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*5 • 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. Storage Temperature: -20 °C to 60 °C (with no freezing) Storage Humidity: 20 % to 80% relative humidity (non-condensing)									
Shock Resistance*2	Impact Acceleration Rate at Flange		490 m/s²									
	Number of Impacts		2 times									
Vibration Resistance*3	Vibration Acceleration Rate at Flange		49 m/s² (24.5 m/s² front to back)						24.5 m/s²			
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	–							

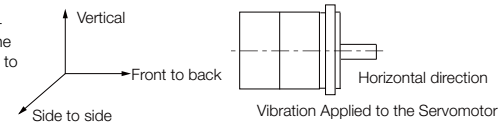
*1. A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.

*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		Arms	1.9	3.5	5.4	8.4	11.9	16	20.8	25.7	28.1	37.2
Instantaneous Maximum Current *1		Arms	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/Arms	1.71	1.72	1.78	1.50	1.70	1.93	1.80	1.92	2.76	2.86
Motor Moment of Inertia		$\times 10^{-4}$ 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.

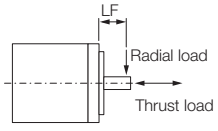
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum or steel heat sink of the dimensions given in the table.

*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		Arms	2.6	5.3	8.3	10.1	14.4	19.3
Instantaneous Maximum Current *1		Arms	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/Arms	1.13	1.12	1.09	1.27	1.36	1.58
Motor Moment of Inertia		$\times 10^{-4}$ kg m²	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.

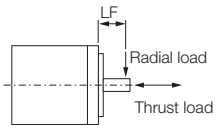
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum or steel heat sink of the dimensions given in the table.

*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.

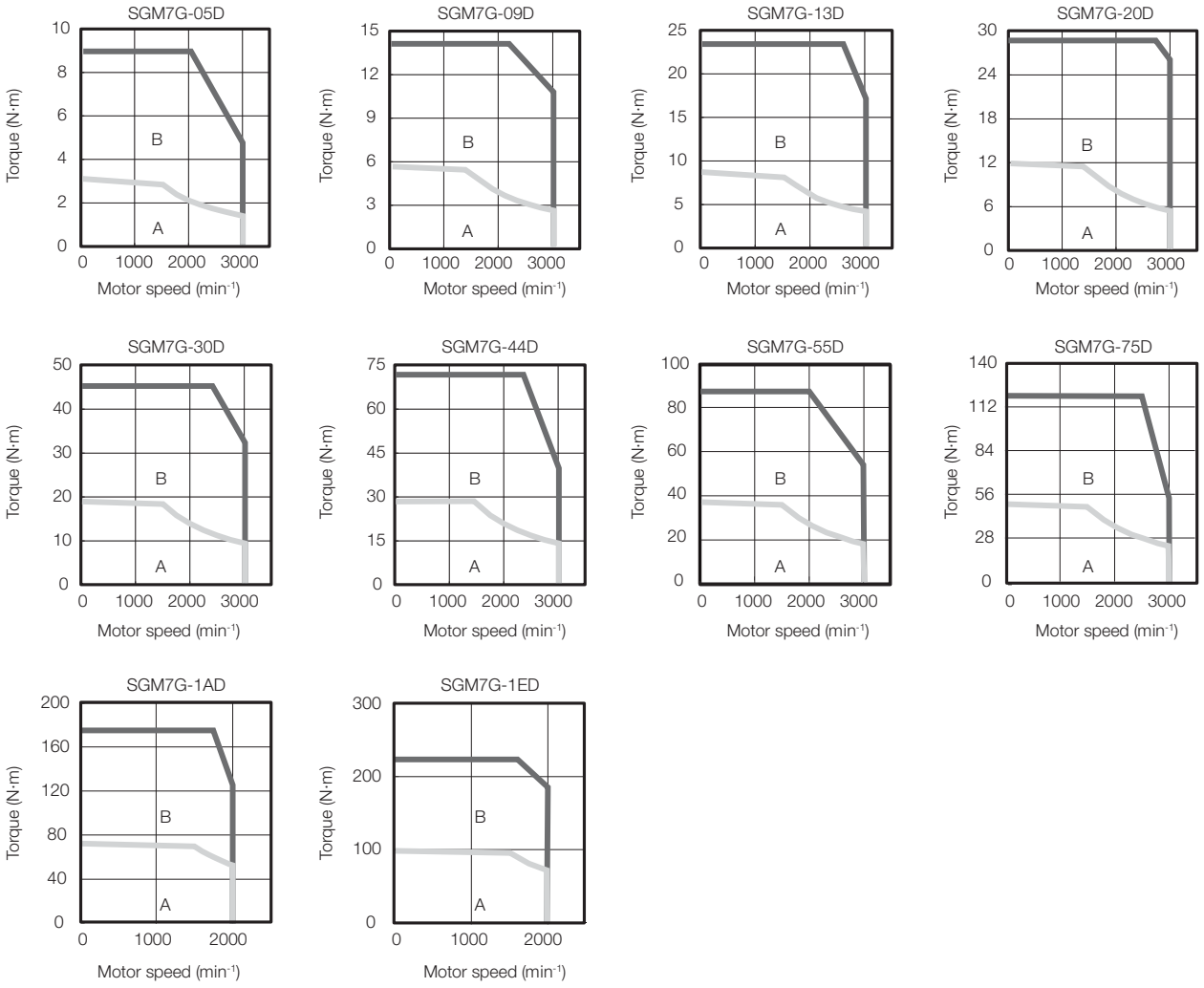
*5. The allowable shaft loads are illustrated in the following figure. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.



Motor Speed-Torque Characteristics

Standard Servomotors

A : Continuous duty zone
B : Intermittent duty zone



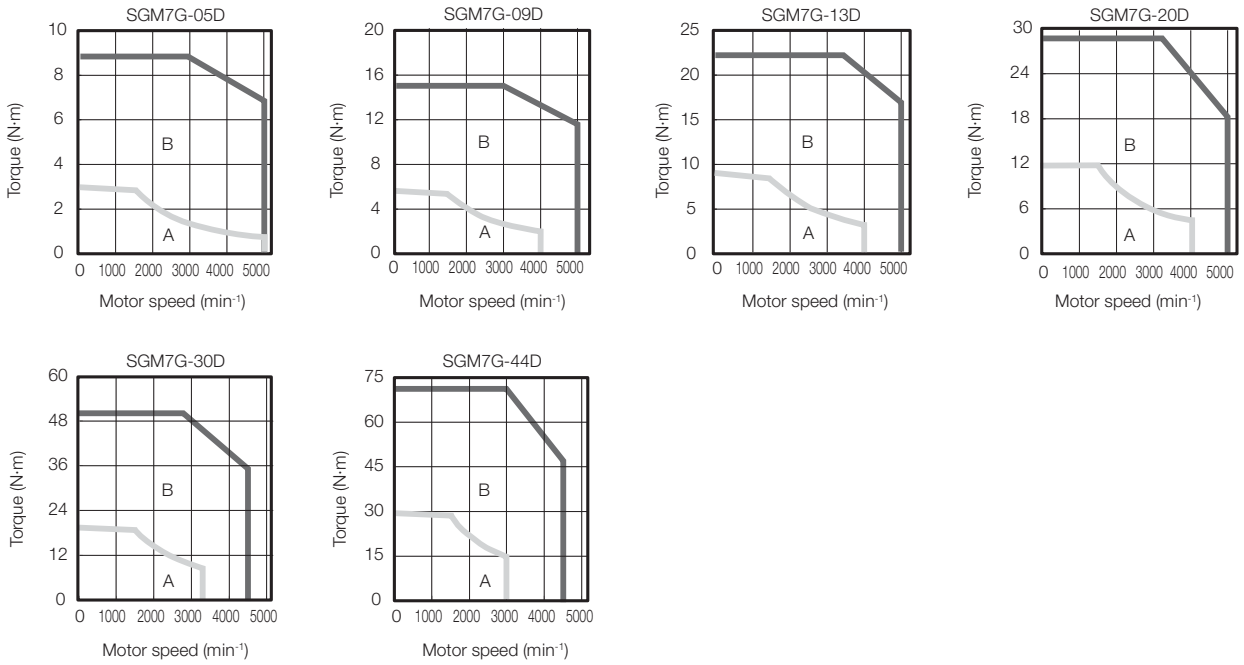
Note:

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:

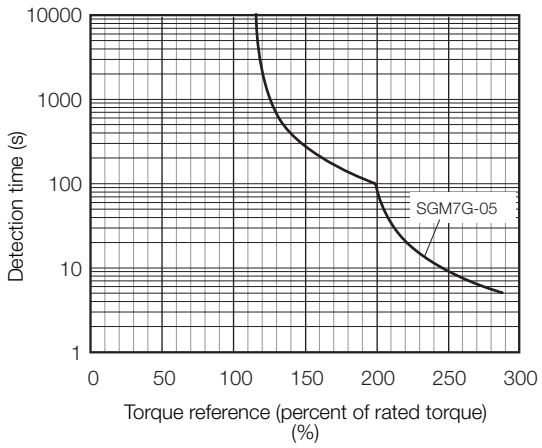
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage. The intermittent duty zone in the graphs show the characteristics 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

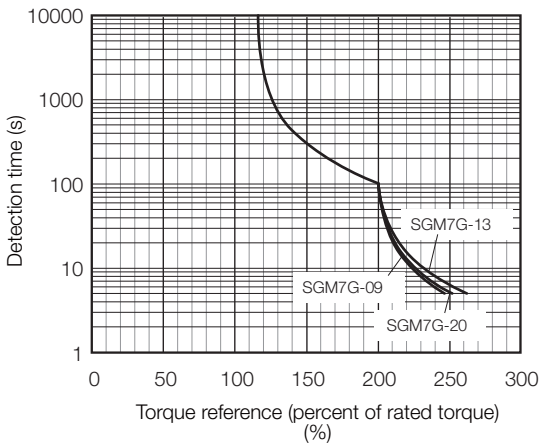
The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.

Standard Servomotors

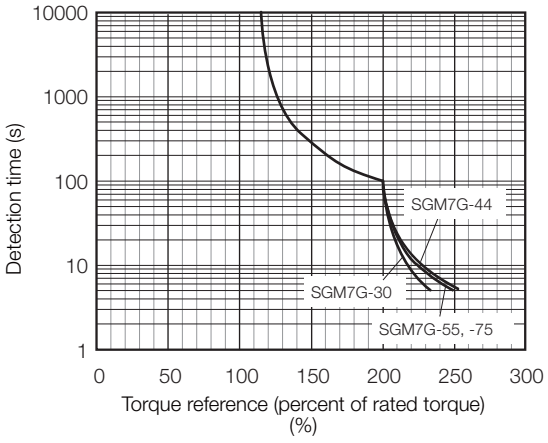
SGM7G-05



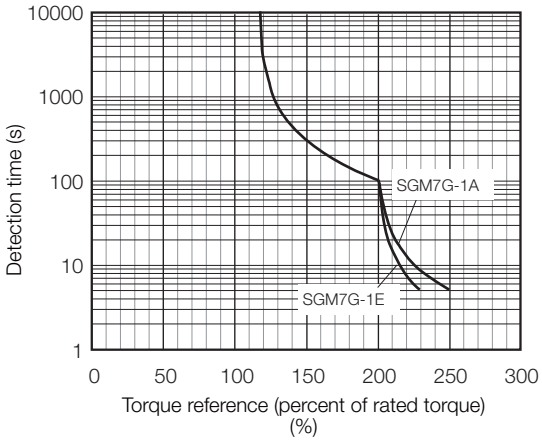
SGM7G-09, -13, and -20



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



SGM7G-1A and -1E

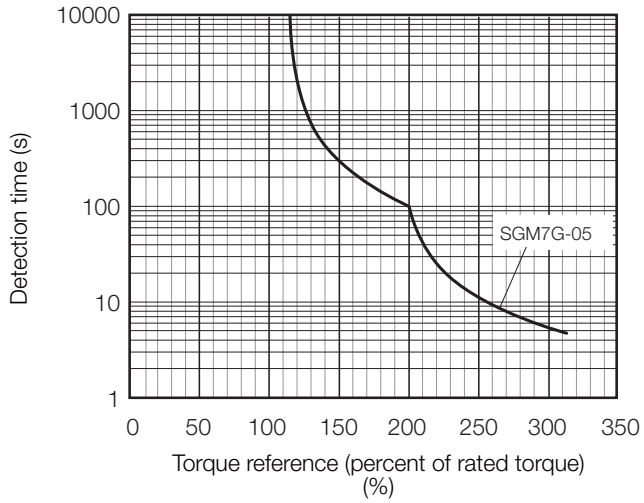


Note:

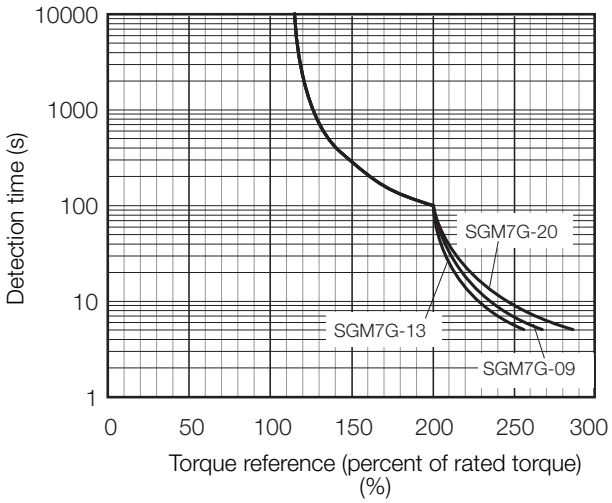
The overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Motor Speed-Torque Characteristics.

High-speed Servomotors

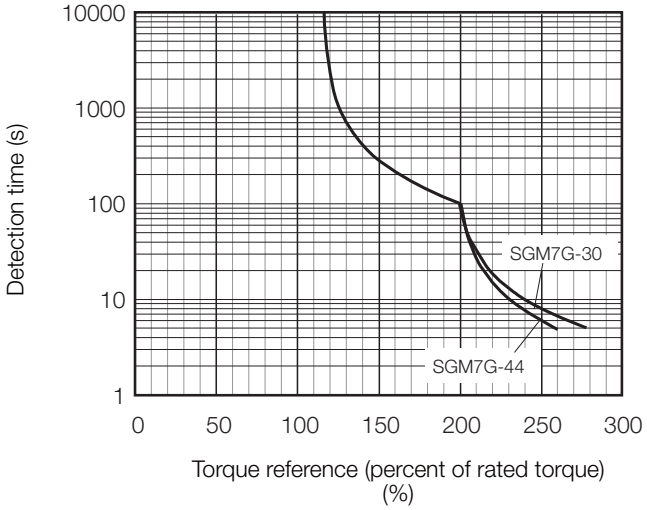
SGM7G-05



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 (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.

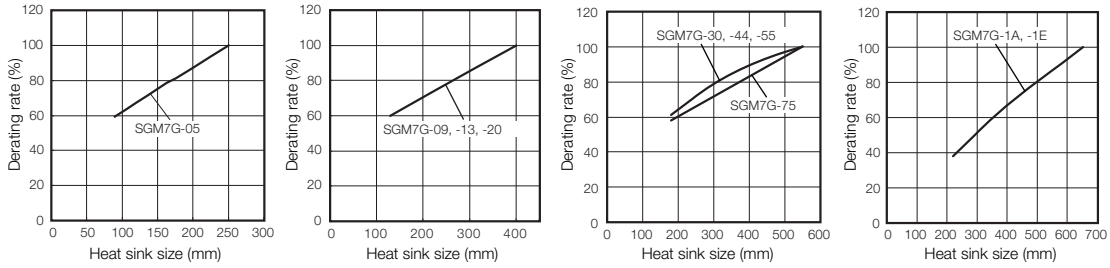
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

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.

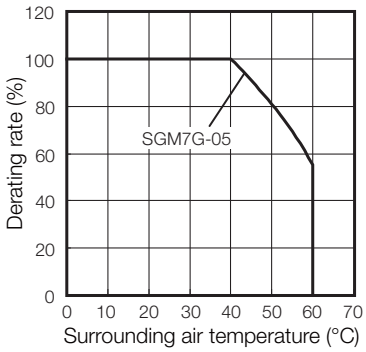
Applications Where the Surrounding Air Temperature of the Servomotor Exceeds 40°C

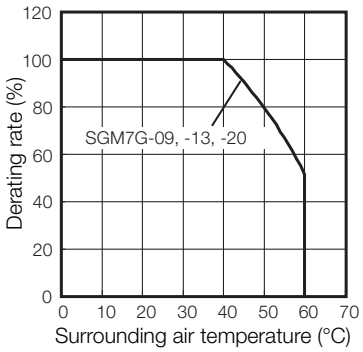
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

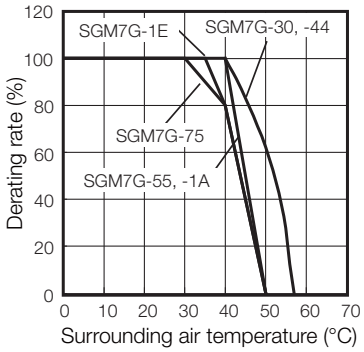
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

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.







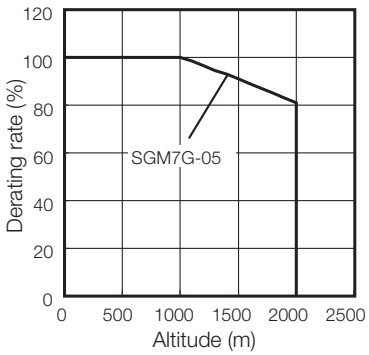
Applications Where the Altitude of the Servomotor Exceeds 1,000 m

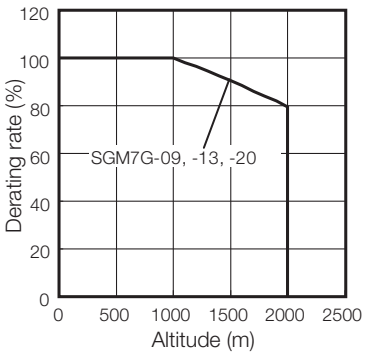
The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.

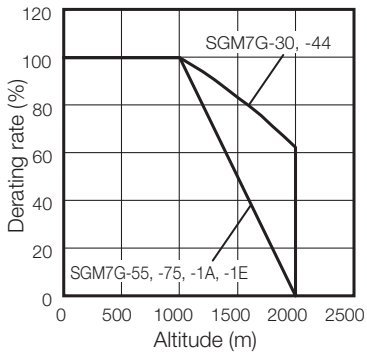
Also, change the overload warning and overload alarm detection timing in advance based on the overload detection level of the motor. Refer to the section Servomotor Overload Protection Characteristics.

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.

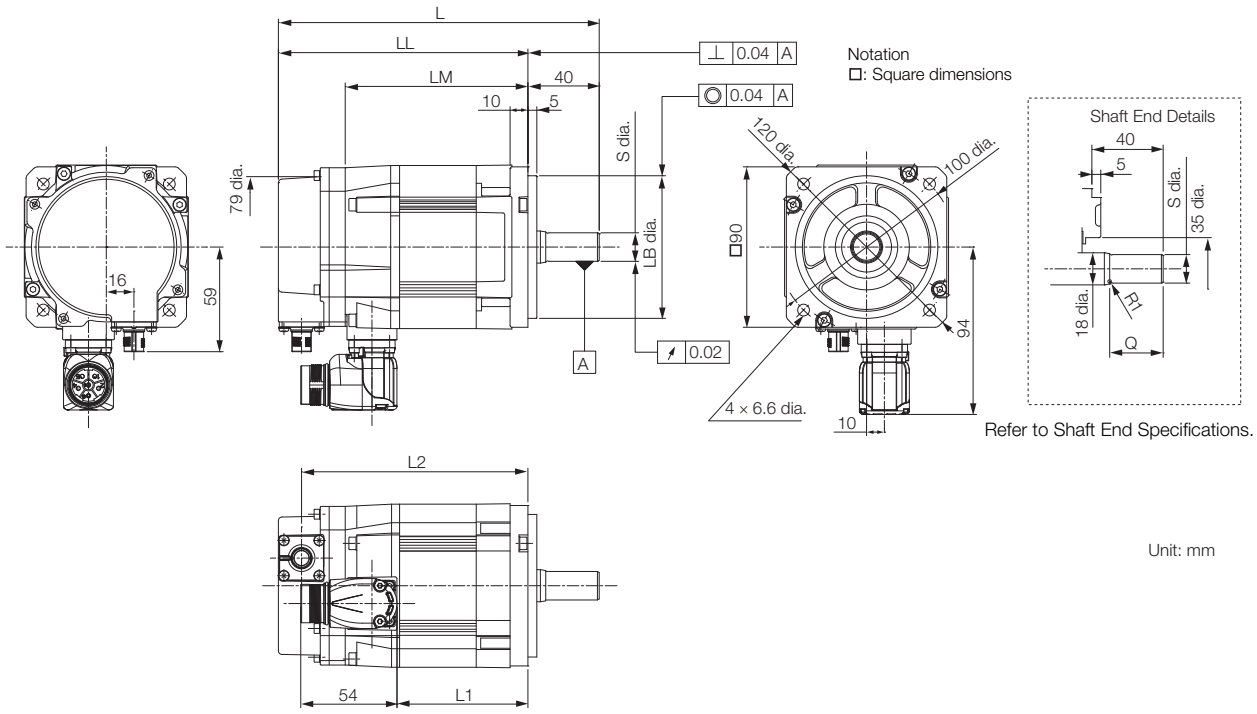






External Dimensions

SGM7G-05



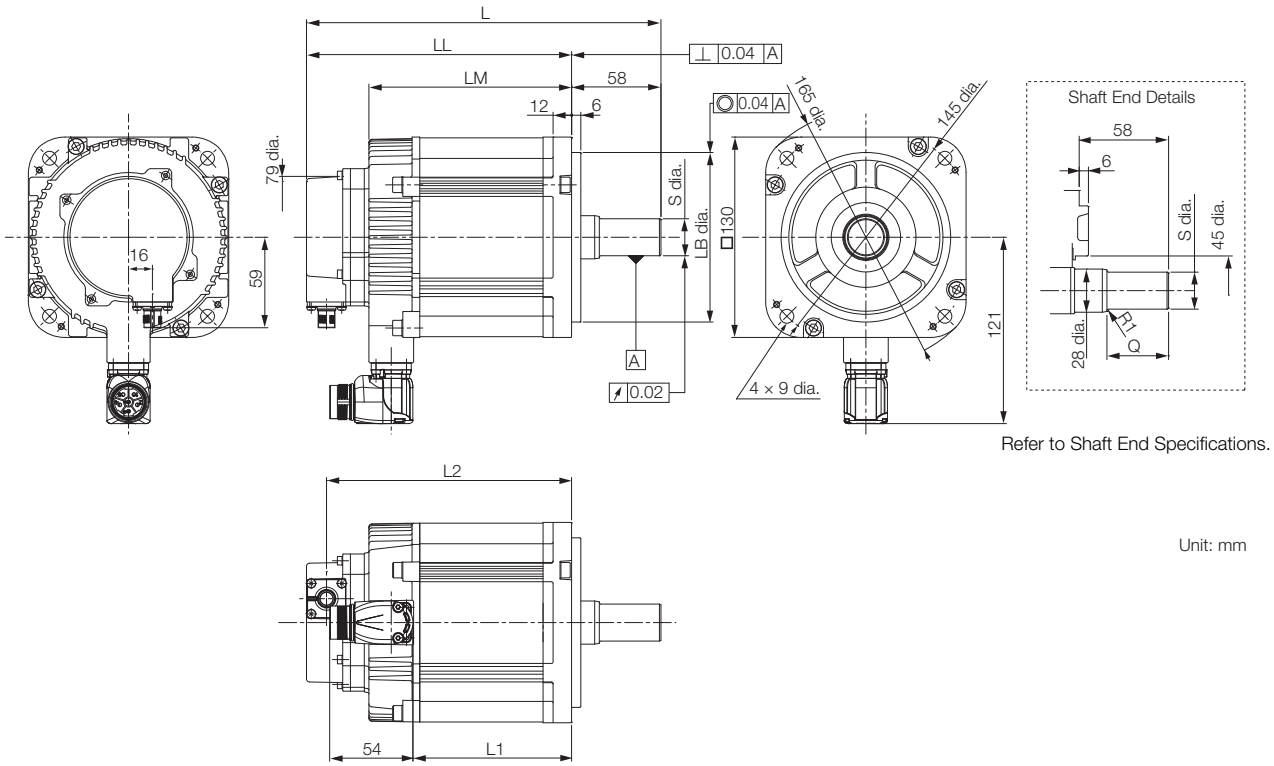
Unit: mm

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

Note:

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



Unit: mm

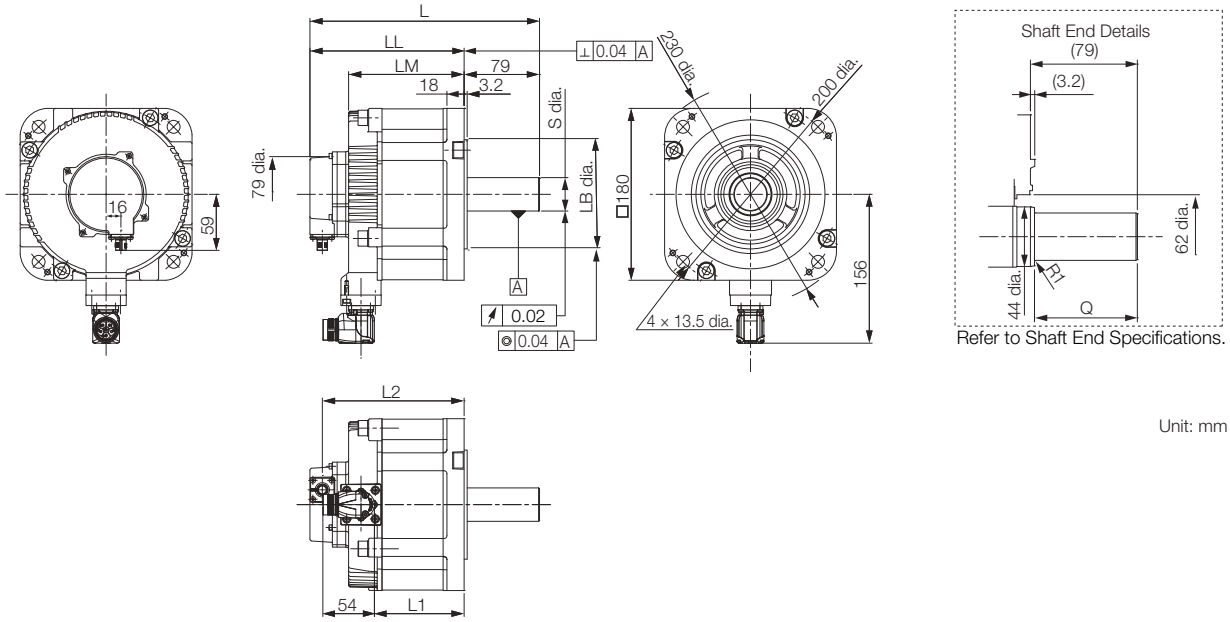
Model SGM7G-	L	LL	LM	L1	L2	LB	Shaft End Dimensions		Approx. Mass [kg]
							S	Q	
09D□FS□	197 (233)	139 (175)	101 (137)	69	125 (161)	$110^{0}_{-0.035}$	$19^{0}_{-0.013}$	40	5.6 (7.6)
13D□FS□	213 (249)	155 (191)	117 (153)	85	141 (177)	$110^{0}_{-0.035}$	$22^{0}_{-0.013}$	40	7.2 (9.1)
20D□F2□	231 (267)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

Note:

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.

Refer to the section Connector Specifications SGM7G.

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



Unit: mm

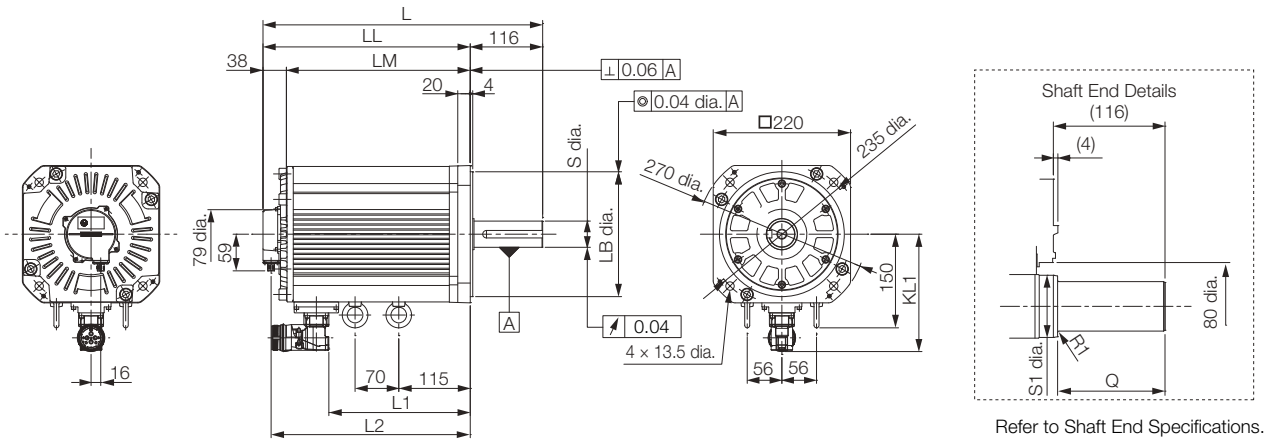
Model SGM7G-	L	LL	LM	L1	L2	LB	Shaft End Dimensions S	Shaft End Dimensions Q	Approx. Mass [kg]
30D□F2□	241 (289)	162 (210)	124 (172)	94	149 (197)	$114.3^{0}_{-0.035}$	$35^{+0.01}_{0}$	76	13.6 (19.6)
44D□F2□	265 (313)	186 (234)	148 (196)	118	173 (221)	$114.3^{0}_{-0.025}$	$35^{+0.01}_{0}$	76	18.0 (24.0)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

Note:

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.

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:

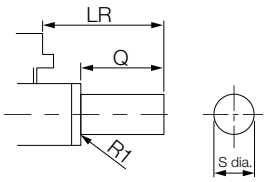
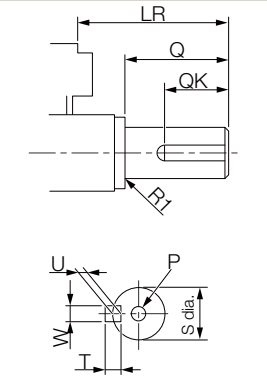
1. The values in parentheses are for Servomotors with Holding Brakes.
2. Servomotors with Dust Seals have the same dimensions.
3. Refer to the section Shaft End Specifications.

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.)

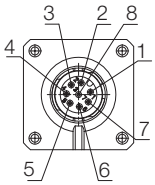
Shaft End Details		Servomotor Model SGM7G-									
		05	09	13	20	30	44	55	75	1A	1E
Code: 2 or S* (Straight without Key)											
	LR	40	58	58	58	79		113		116	
	Q	30	40	40	40	76		110			
	S	$16^{0}_{-0.011}$	$19^{0}_{-0.013}$	$22^{0}_{-0.013}$	$24^{0}_{-0.013}$	$35^{+0.01}_{0}$		$42^{0}_{-0.016}$		$42^{0}_{-0.016}$	$55^{+0.030}_{+0.011}$
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

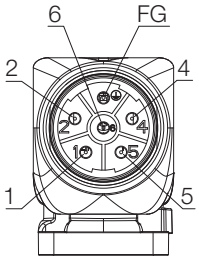
- Encoder Connector Specifications



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

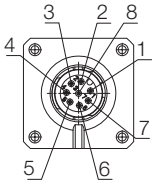


Receptacle
Size: M23
Part number: 1617905
Model: ST-5EP1N8AAD00S
Manufacturer: Phoenix Contact

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

SGM7G-55D□F to -1ED□F and SGM7G-44D□R

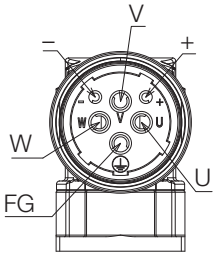
- Encoder Connector Specifications



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



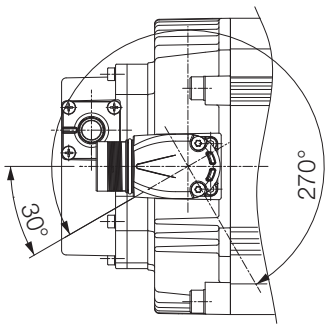
Receptacle
Size: M40
Part number: 1607927
Model: SM-5EPWN8AAD00S
Manufacturer: Phoenix Contact

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

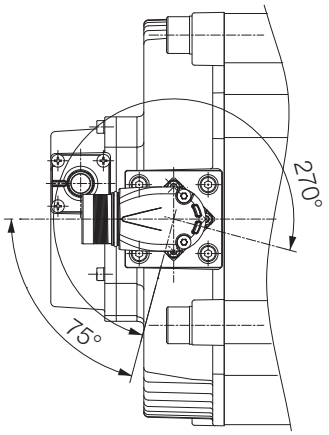
Servomotor Connector Rotational Angle

Allowable number of rotations: 10

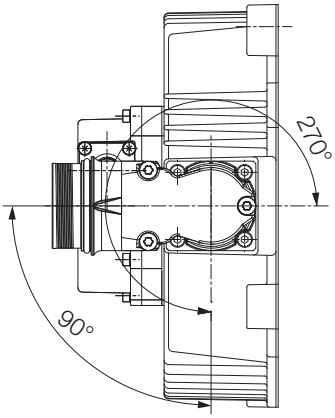
SGM7G-05D□□ to -20D□□



SGM7G-30D□□, -44D□F



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



SGLFW2

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

Linear Servomotors

SGLF (Models with F-Type Iron Cores) 62

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 Servo-motors:	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 Servo-motors:	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.

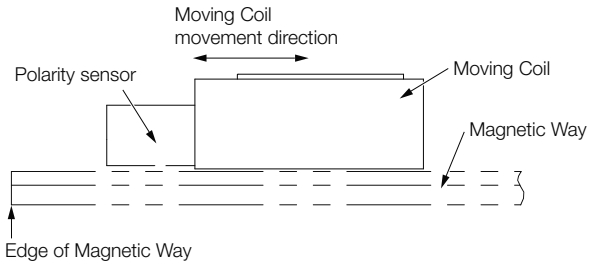
Precautions on Moving Coils with Polarity Sensors

Note:

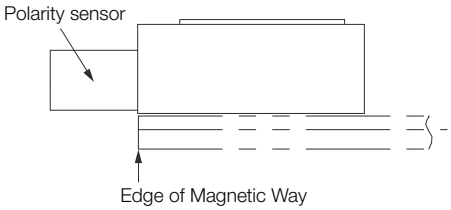
When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.

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.

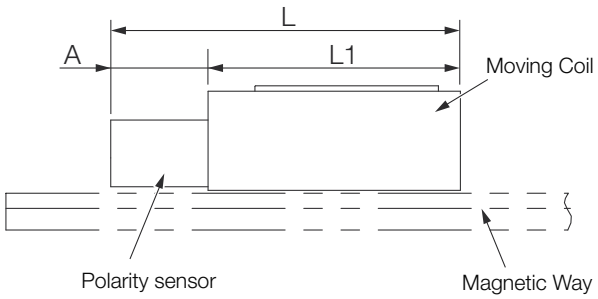
Correct Installation



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. • Must be well-ventilated and free of dust and moisture. • Must facilitate inspection and cleaning. • Must have an altitude of 1,000 m or less. • 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	Arms	1.4	1.5	1.5	2.2	4.3	
Maximum Current*1	Arms	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/Arms	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/$\sqrt{W}$	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-	1R9D	1R9D	1R9D	3R5D	5R4D	8R4D
	SGD7W-	2R6D	2R6D	2R6D	2R6D	5R4D	-

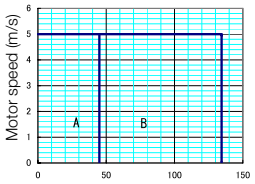
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*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

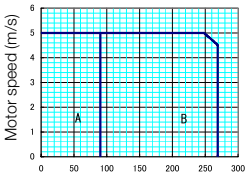
Force-Motor Speed Characteristics

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

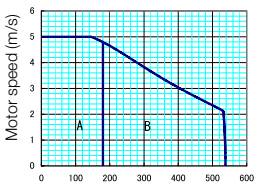
SGLFW2-30D070A



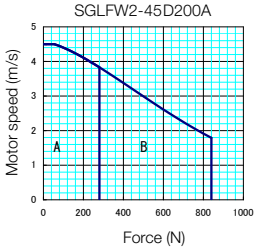
SGLFW2-30D120A



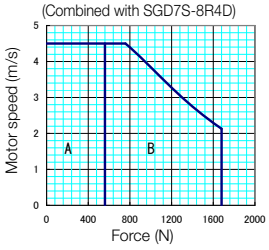
SGLFW2-30D230A



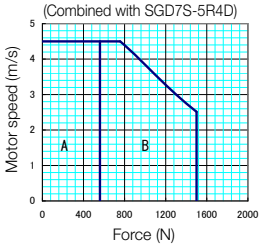
SGLFW2-45D200A



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	Arms	3.8	7.7	11.5	10.9	16.3
Maximum Current*1	Arms	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/Arms	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	$N/\sqrt{W}$	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.

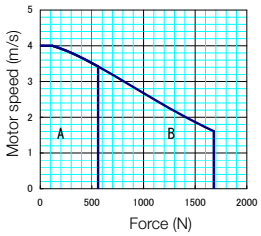
*2. The rated forces are the continuous allowable force values at a ambient air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
- Heat Sink Dimensions
  - 400 mm × 500 mm × 25 mm: SGLFW2-90D200A
  - 609 mm × 762 mm × 40 mm: SGLFW2-90D380A
  - 900 mm × 762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

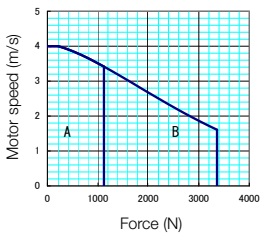
Force-Motor Speed Characteristics

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

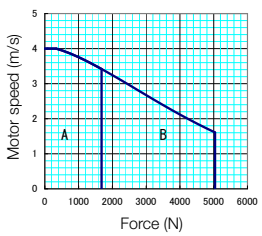
SGLFW2-90D200A



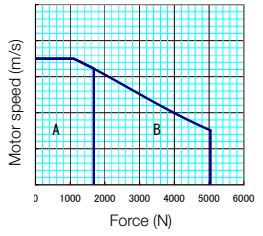
SGLFW2-90D380A



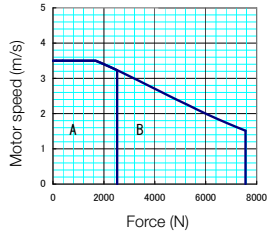
SGLFW2-90D560A



SGLFW2-1DD380A



SGLFW2-1DD560A



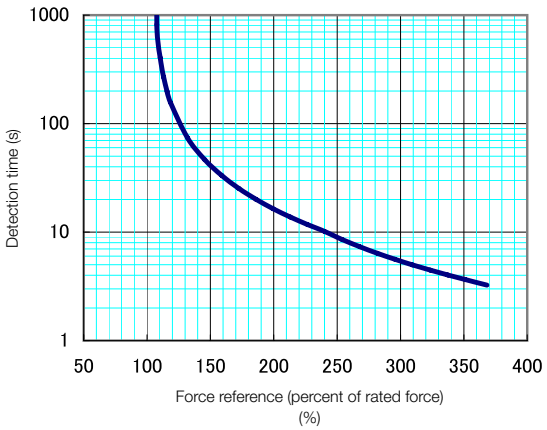
Notes:

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.

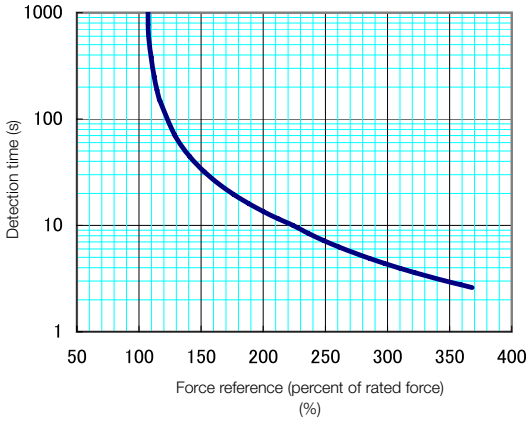
Servomotor Overload Protection Characteristics

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

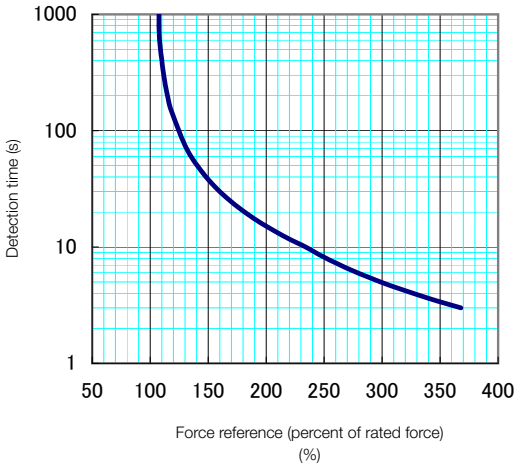
SGLFW2-30D070A



SGLFW2-30D120A and -230A



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



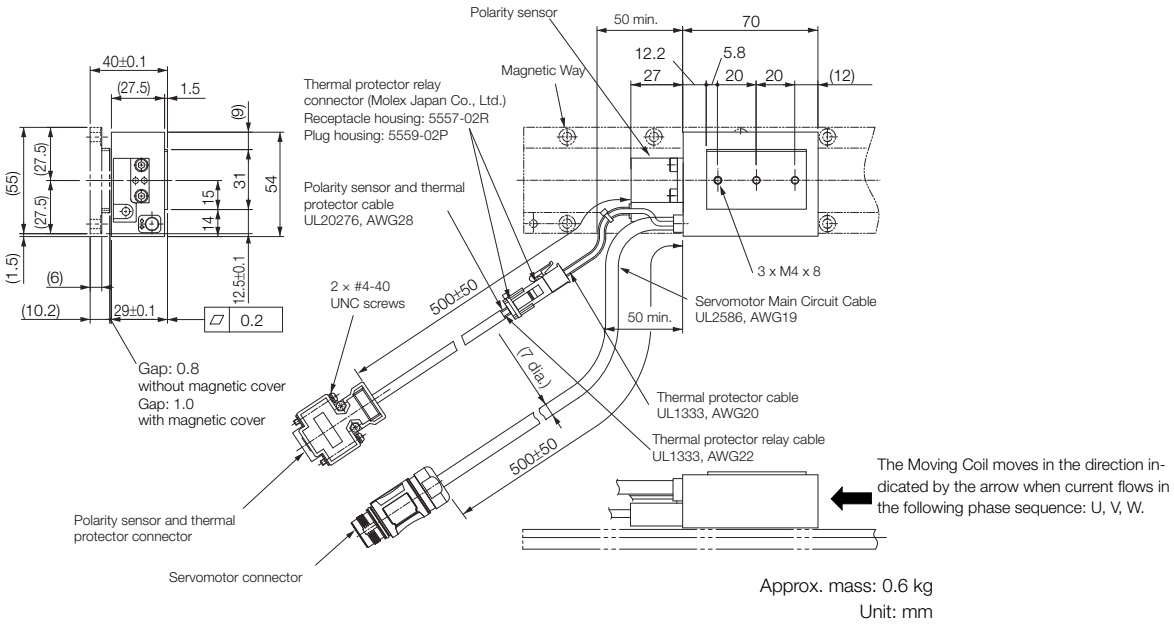
Notes:

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

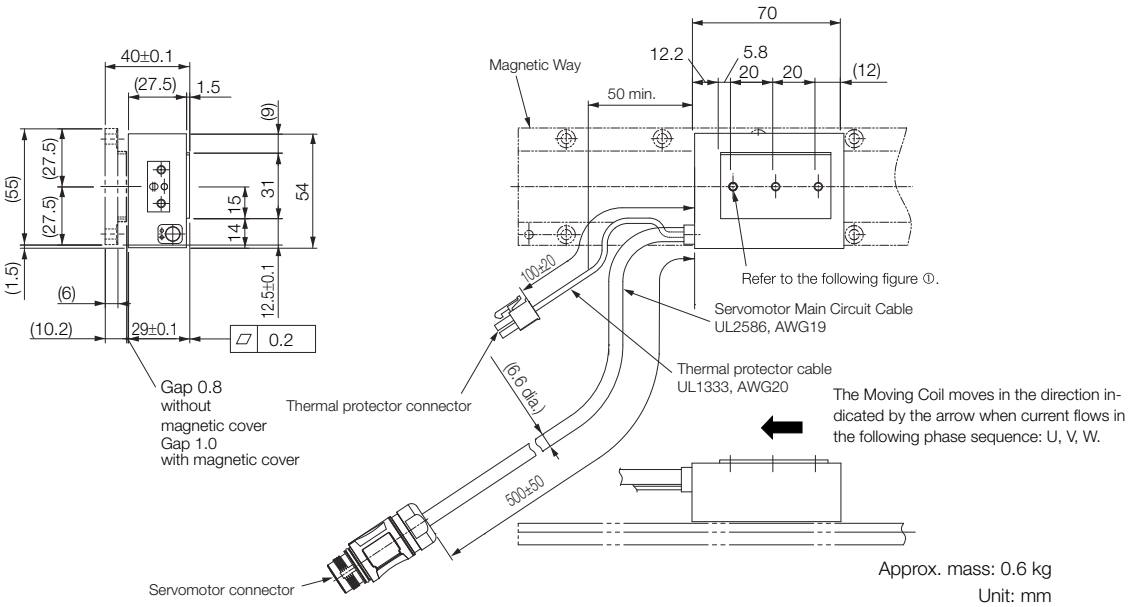
SGLFW2-30

Moving Coil with Polarity Sensor: SGLFW2-30D070AS



Approx. mass: 0.6 kg
Unit: mm

Moving Coil without Polarity Sensor: SGLFW2-30D070AT

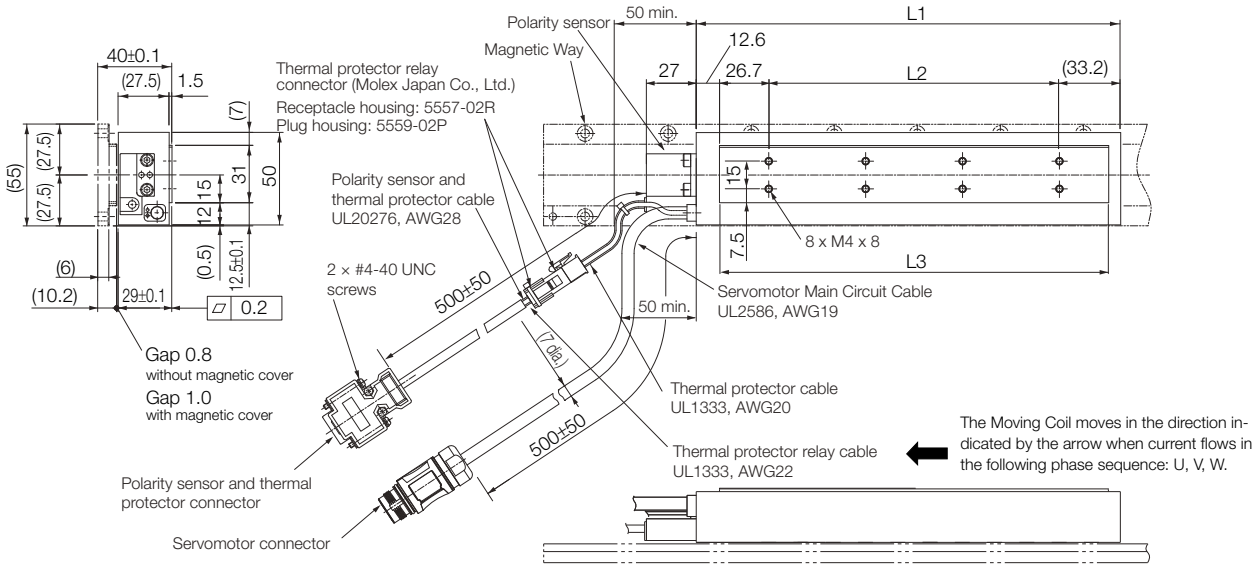


Approx. mass: 0.6 kg
Unit: mm

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

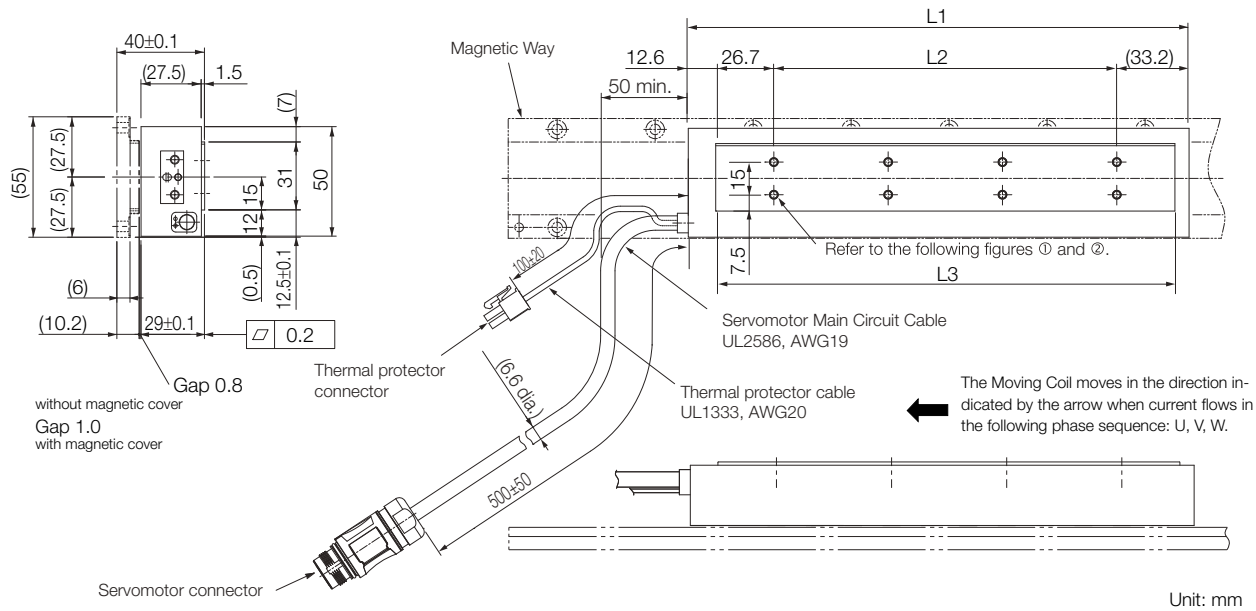
Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable or Moving Coils with Polarity Sensors: SGLFW2-30 and -45.

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



Unit: mm

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

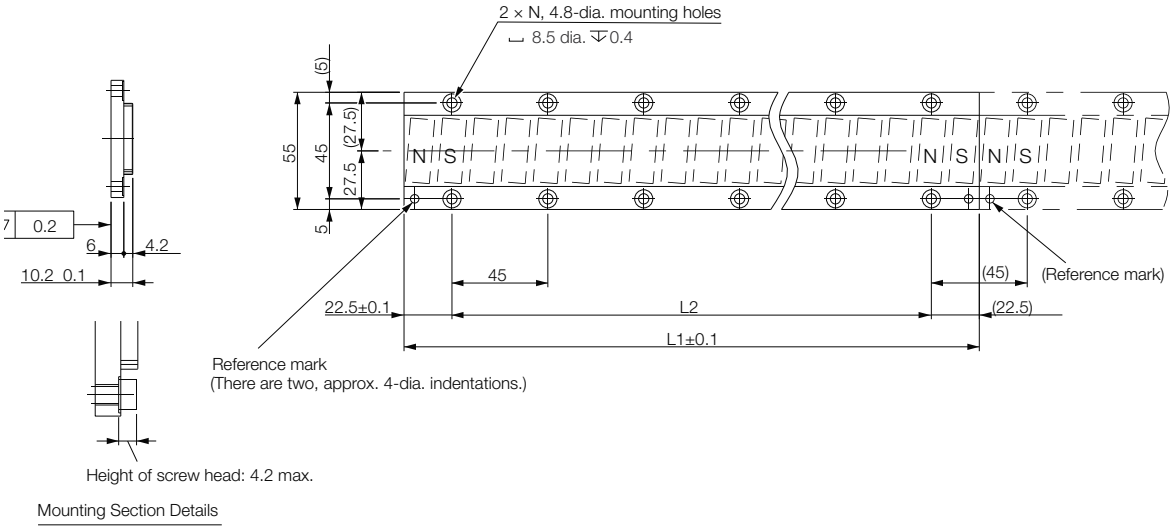


Unit: mm

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

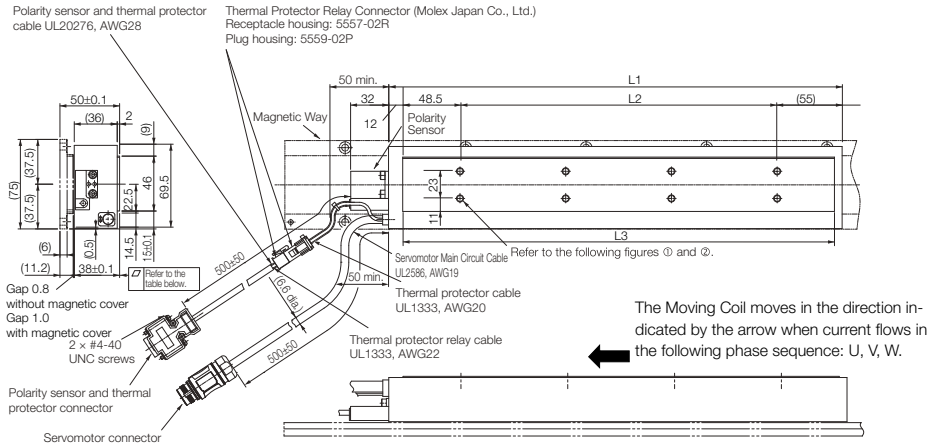
Note:

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

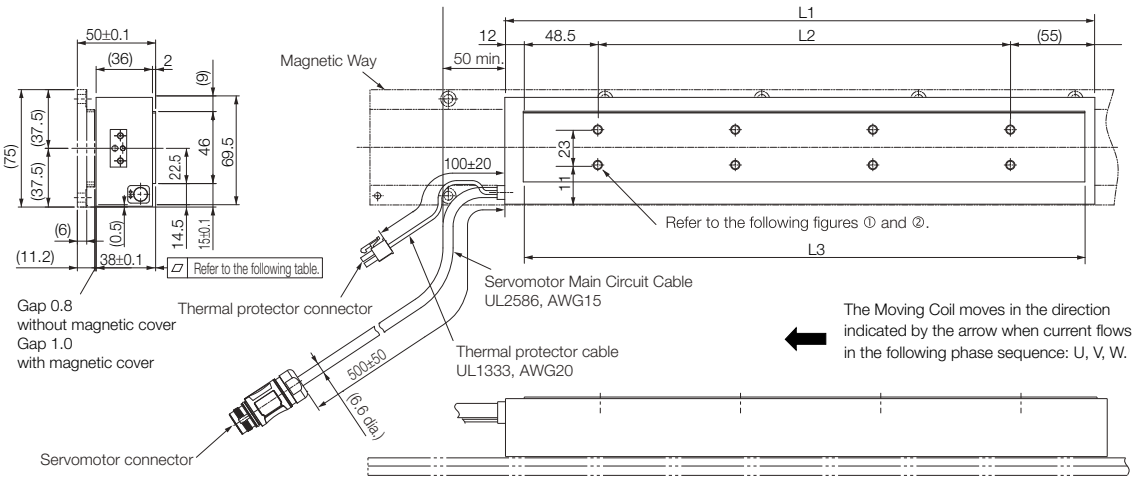


Unit: mm

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

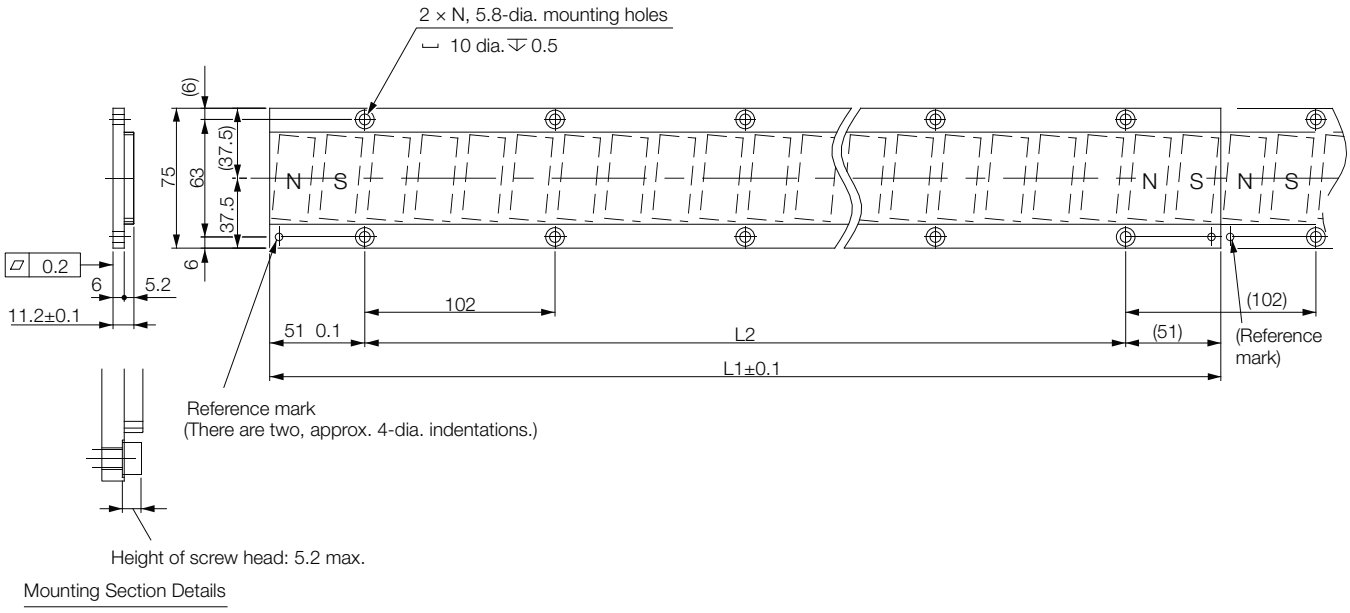


Unit: mm

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

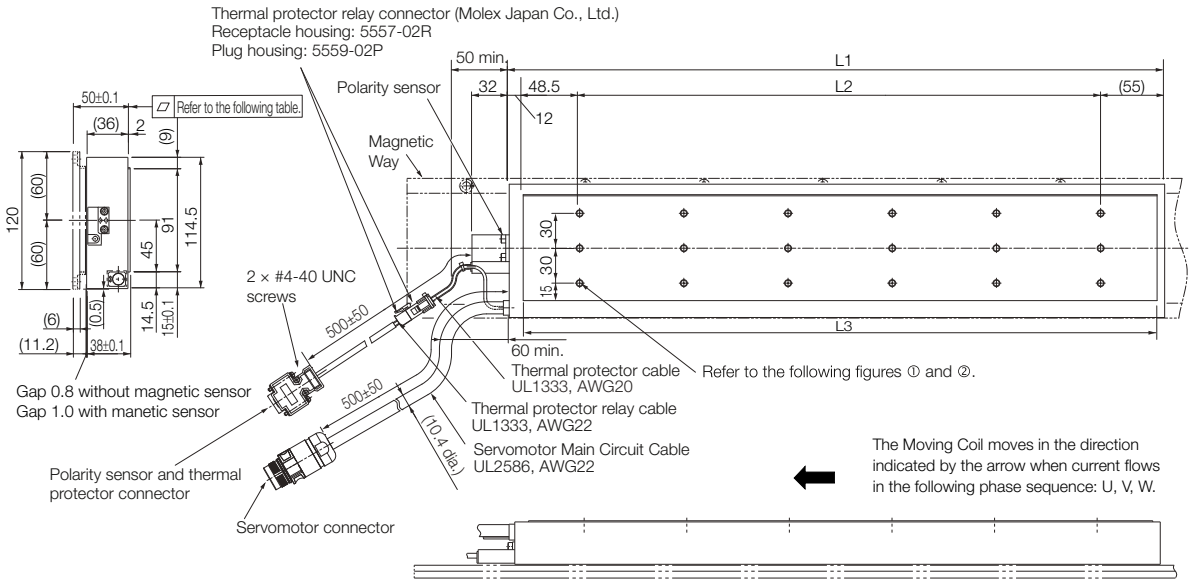
Note:

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

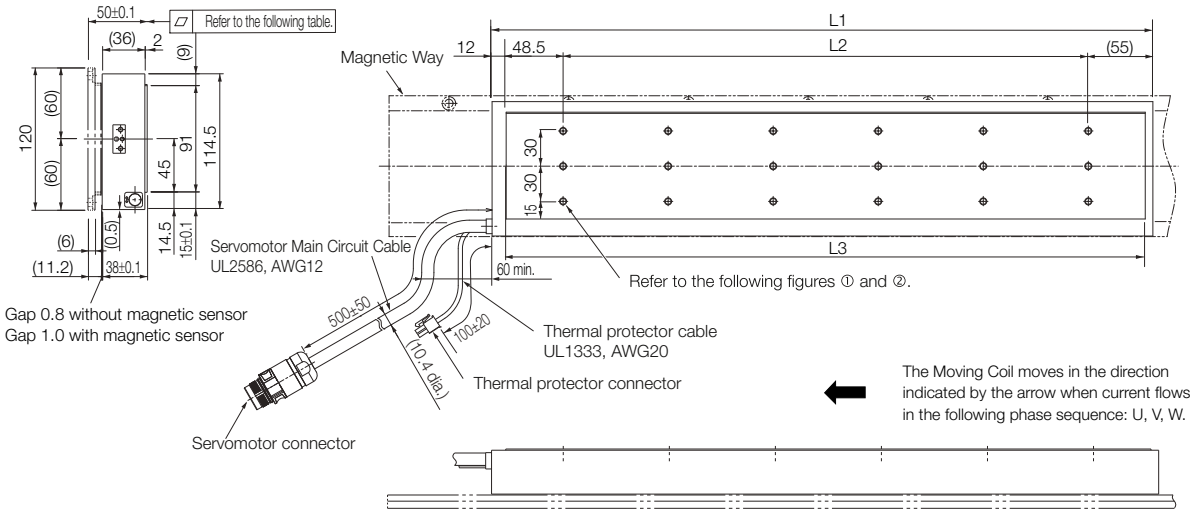


Unit: mm

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

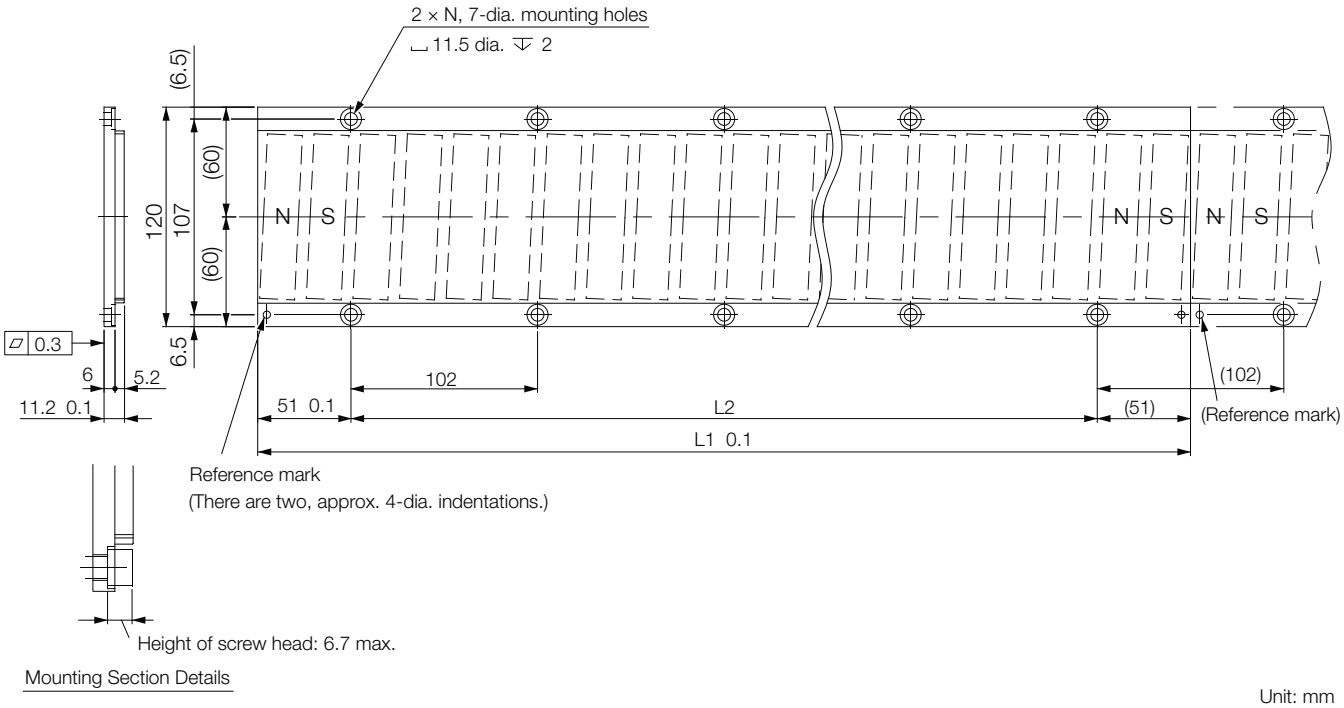


Unit: mm

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

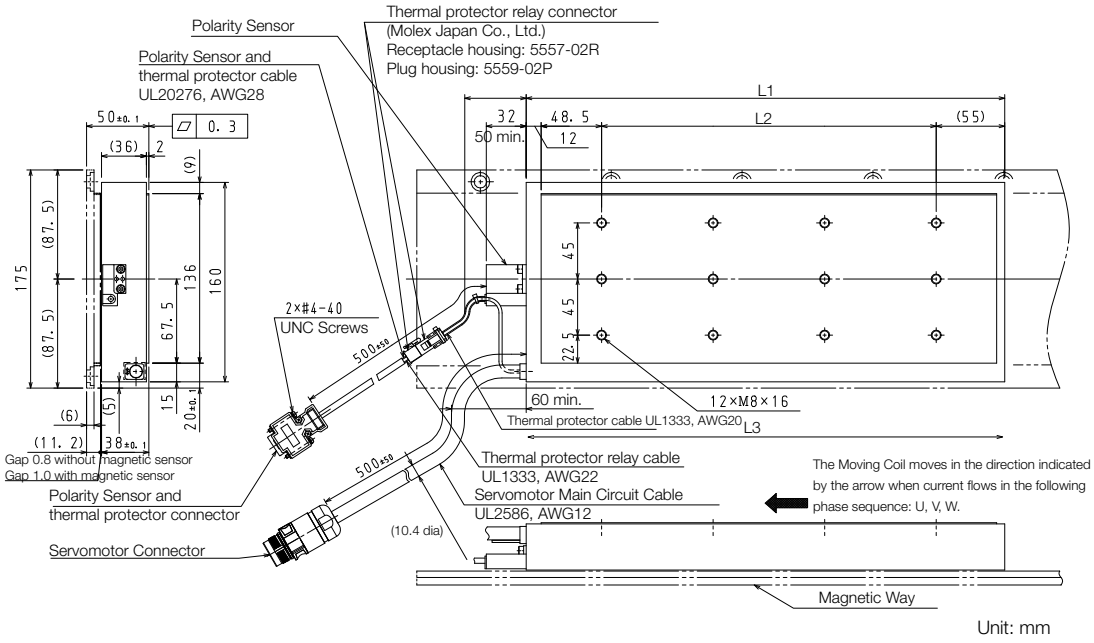
Note:

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

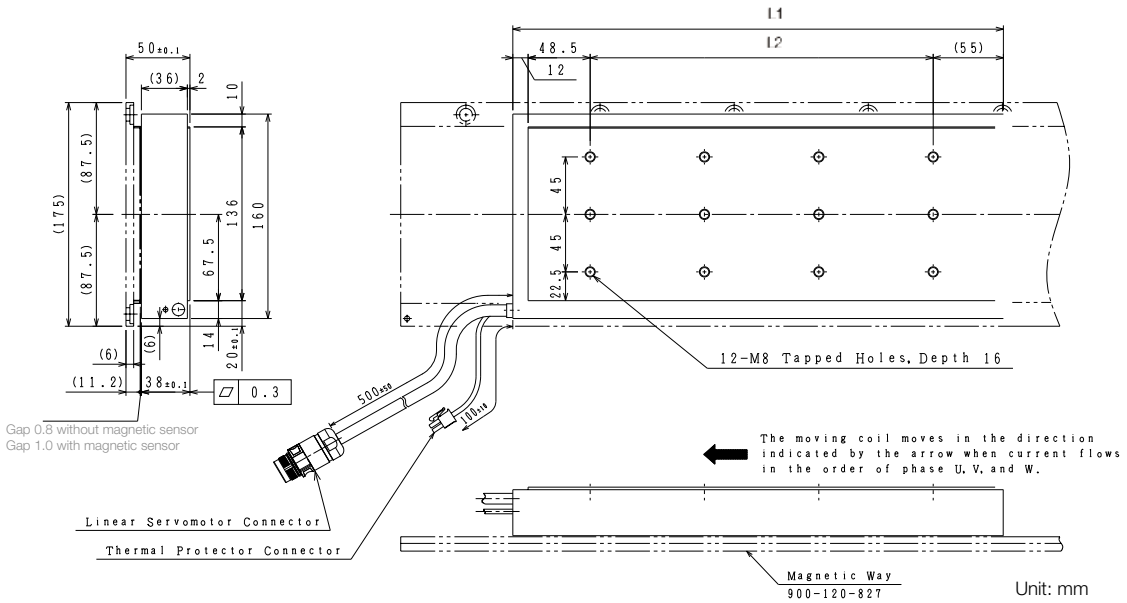
SGLFW2-1D

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



Unit: mm

Moving Coils with Polarity Sensors: SGLFW2-1DD□□□AT



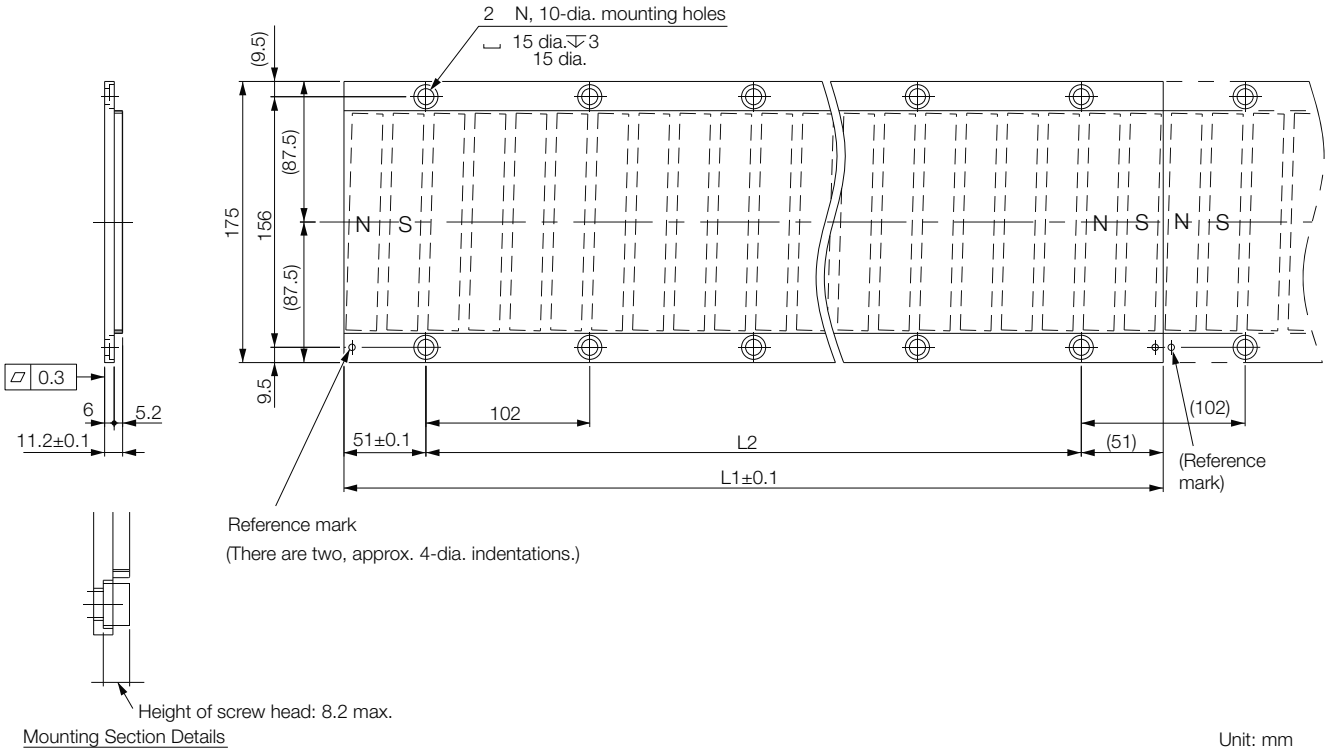
Unit: mm

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]
1DA380A□	384	268.5	365.5	0.3	14.6
1DA560A□	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:

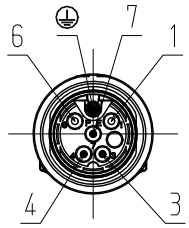
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

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

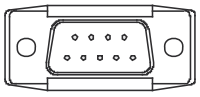
- Servomotor Connector



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.

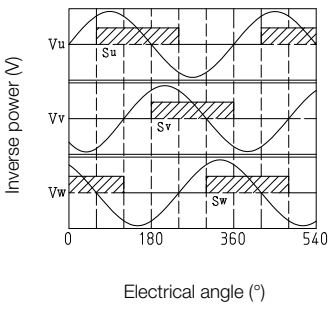
Mating Connector
Socket connector: 17JE-13090-02 (D8C) A-CG
Studs: 17L-002C or 17L-002C1

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

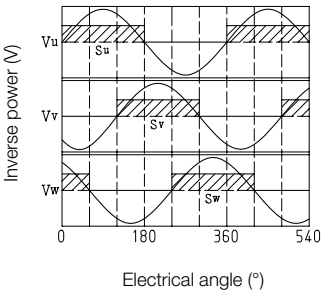
- Polarity Sensor Output Signal

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.

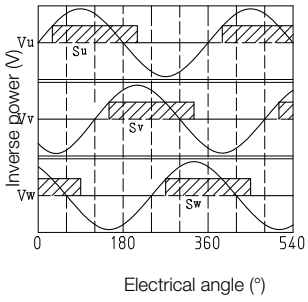
SGLFW2-30D070AS



SGLFW2-30D120AS
SGLFW2-30D230AS

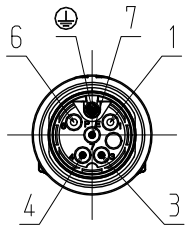


SGLFW2-45D200AS
SGLFW2-45D380AS



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

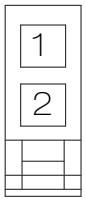
- Servomotor Connector



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



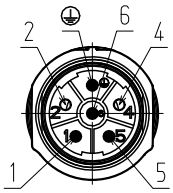
Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan Co., Ltd.

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

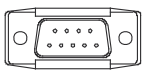
- Servomotor Connector



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



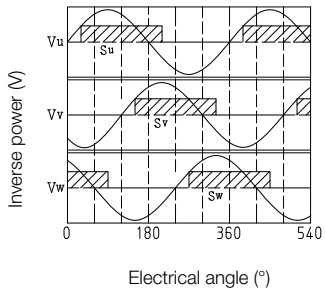
Pin connector: 17JE-23090-02 (D8C) -CG
From DDK Ltd.

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

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

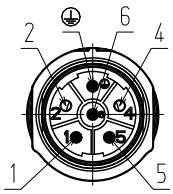
• Polarity Sensor Output Signal

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

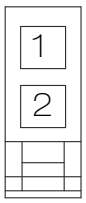
• Servomotor Connector



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

Content - SERVOPACKs

Single Axis

SGD7S-□□□DA0B
EtherCAT communication reference

SGD7S-□□□D30B
MECHATROLINK-III communication reference

Dual Axis

SGD7W-□□□DA0B
EtherCAT communication reference

SGD7W-□□□D30B
MECHATROLINK-III communication reference

SERVOPACKs

SGD7S 84
SGD7W 93

Model Designation

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

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

7th digit - Design Revision Order

Code	Specification
B	**Standard Model**

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

Code	Specification	Applicable Models
000	**Without Options**	**All models**
026	With relay for holding brake	All models

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

Code	Specification
F64	**Zone table**

Bolded options are considered standard warehouse products.

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 [Arms]			1.9	3.5	5.4	8.4	11.9	16	20.8	25.7	28.1	37.2
Instantaneous Maximum Output Current [Arms]			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 [Arms]*		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 [Arms]*		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 [Arms]			1.9	3.5	5.4	8.4	11.9	16	20.8	25.7	28.1	37.2
Instantaneous Maximum Output Current [Arms]			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 [Arms]*		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 [Arms]*		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.

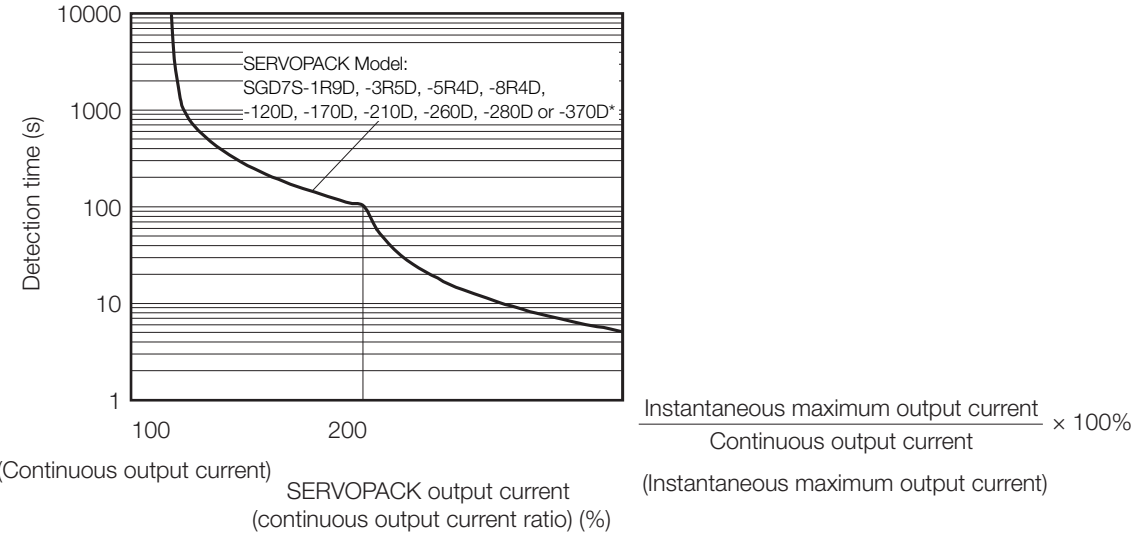
SERVOPACK Overload Protection Characteristics

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.) • 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) 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 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • 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 Number of divided output pulses: Any setting is allowed
	Linear Servomotor Overheat Protection Signal Input		Number of input points: 1 Input voltage range: 0 V to +5 V
	Sequence Input Signals	Input Signals that can be allocated	Allowable voltage range: 24 VDC ±20 % Number of input points: 7
			Input method: Sink inputs or source inputs Input Signals • P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals • /Probe1 (Probe 1 Latch Input) signal • /Probe2 (Probe 2 Latch Input) signal • /Home (Home Switch Input) signal • /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals • /SI0 and /SI3 (General-Purpose Input) signals 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 Number of output points: 1 Output signal: ALM (Servo Alarm) signal
		Output Signals that can be allocated	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 5 (A photocoupler output (isolated) is used.)
			Output Signals • /COIN (Positioning Completion) signal • /V-CMP (Speed Coincidence Detection) signal • /TGON (Rotation Detection) signal • /S-RDY (Servo Ready) signal • /CLT (Torque Limit Detection) signal • /VLT (Speed Limit Detection) signal • /BK (Brake) signal • /WARN (Warning) signal • /NEAR (Near) signal • /ZONE0 (ZONE Signal 1 Output) signal • /ZONE1 (ZONE Signal 2 Output) signal • /ZONE2 (ZONE Signal 3 Output) signal • /ZONE3 (ZONE Signal 4 Output) signal • /nZONE (nZONE Output) signal 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+) The software version of the SigmaWin+ must be version 7.11 or higher.
		Communications Standard	Conforms to USB 2.0 standard (12 Mbps).

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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 CN6B (RJ45): EtherCAT signal output connector
	Cable	Category 5, 4 shielded twisted pairs * 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. FMMU 1: Mapped in process data input (TxPDO) area. FMMU 2: Mapped to mailbox status.
	EtherCAT Commands (Data Link Layer)	APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, and FRMW (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 (TxPDO/RxPDO and remote TxPDO/RxPDO are not supported.)
	Distributed Clocks	Free-Run Mode and DC Mode (Can be switched.) 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 EtherCAT communications status: RUN x 1 EtherCAT error status: ERR x 1
CiA402 Drive Profile		• Homing Mode • Profile Position Mode • Interpolated Position Mode • Profile Velocity Mode • Profile Torque Mode • Cyclic Synchronous Position Mode • Cyclic Synchronous Velocity Mode • Cyclic Synchronous Torque Mode • Touch Probe Function • Torque Limit Function
Analog Monitor (CN5)		Number of points: 2 Output voltage range: ±10 VDC (effective linearity range: ±8 V) Resolution: 16 bits Accuracy: ±20 mV (Typ) Maximum output current: ±10 mA 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.

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.) • 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) 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 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • 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 Number of divided output pulses: Any setting is allowed.
	Linear Servomotor Overheat Protection Signal Input		Number of input points: 1 Input voltage range: 0 V to +5 V
	Sequence Input Signals	Input Signals that can be allocated	Allowable voltage range: 24 VDC ±20 % Number of input points: 7
			Input method: Sink inputs or source inputs Input Signals • /DEC (Origin Return Deceleration Switch) signal • /EXT1 to /EXT3 (External Latch Input 1 to 3) signals • P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals • /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals • /P-DET (Polarity Detection) signal 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 Number of output points: 1 Output signal: ALM (Servo Alarm) signal
		Output Signals that can be allocated	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 5 (A photocoupler output (isolated) is used.)
			Output Signals • /COIN (Positioning Completion) signal • /V-CMP (Speed Coincidence Detection) signal • /TGON (Rotation Detection) signal • /S-RDY (Servo Ready) signal • /CLT (Torque Limit Detection) signal • /VLT (Speed Limit Detection) signal • /BK (Brake) signal • /WARN (Warning) signal • /NEAR (Near) signal • /ZONE0 (ZONE Signal 1 Output) signal • /ZONE1 (ZONE Signal 2 Output) signal • /ZONE2 (ZONE Signal 3 Output) signal • /ZONE3 (ZONE Signal 4 Output) signal • /nZONE (nZONE output) signal 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+) The software version of the SigmaWin+ must be version 7.11 or higher.
		Communications Standard	Conforms to USB2.0 standard (12 Mbps).
Displays/Indicators			CHARGE, PWR, CN, L1, and L2 indicators, and one-digit seven-segment display

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Item		Specification
MECHATROLINK-III Communications	Communications Protocol	MECHATROLINK-III
	Station Address Settings	03 to EF hex (maximum number of slaves: 62) 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 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
		Number of DIP switch (S3) pins: 4
Analog Monitor (CN5)		Number of points: 2 Output voltage range: ±10 VDC (effective linearity range: ±8 V) Resolution: 16 bits Accuracy: ±20 mV (Typ) Maximum output current: ±10 mA 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

*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.

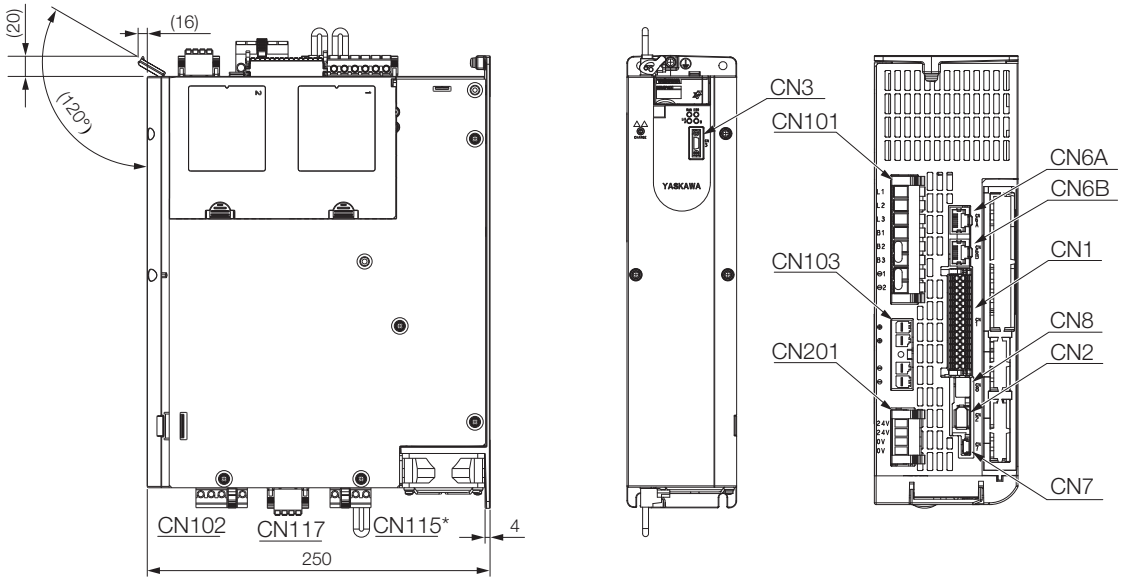
Front Cover Dimensions and Connector Specifications

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



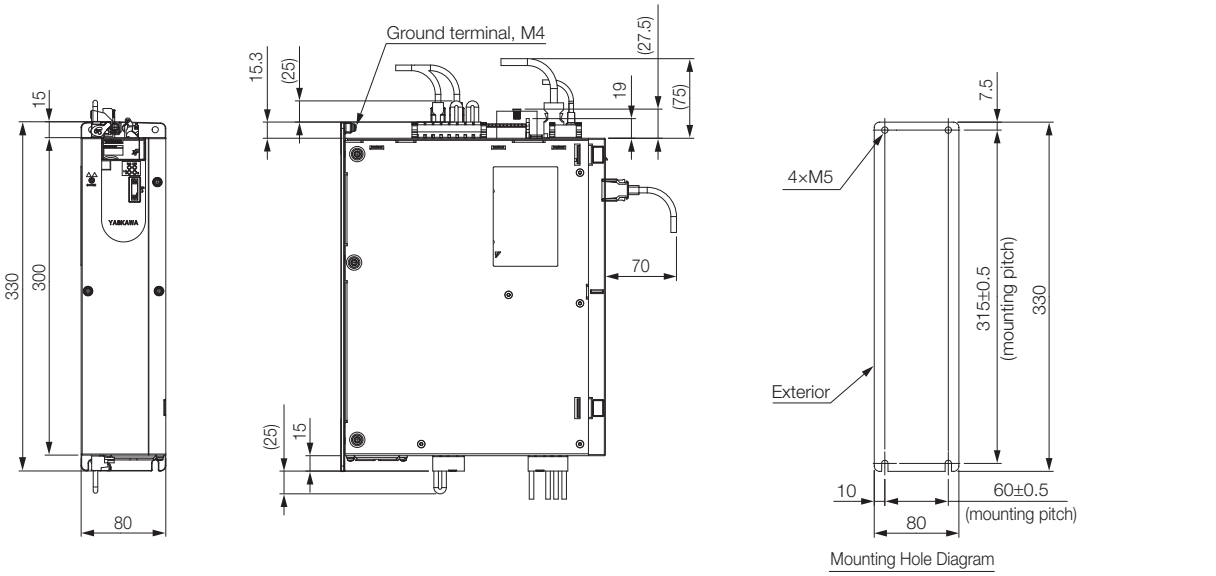
* Dynamic Brake Connector only for SGD7S-1R9D up to -170D.

• 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

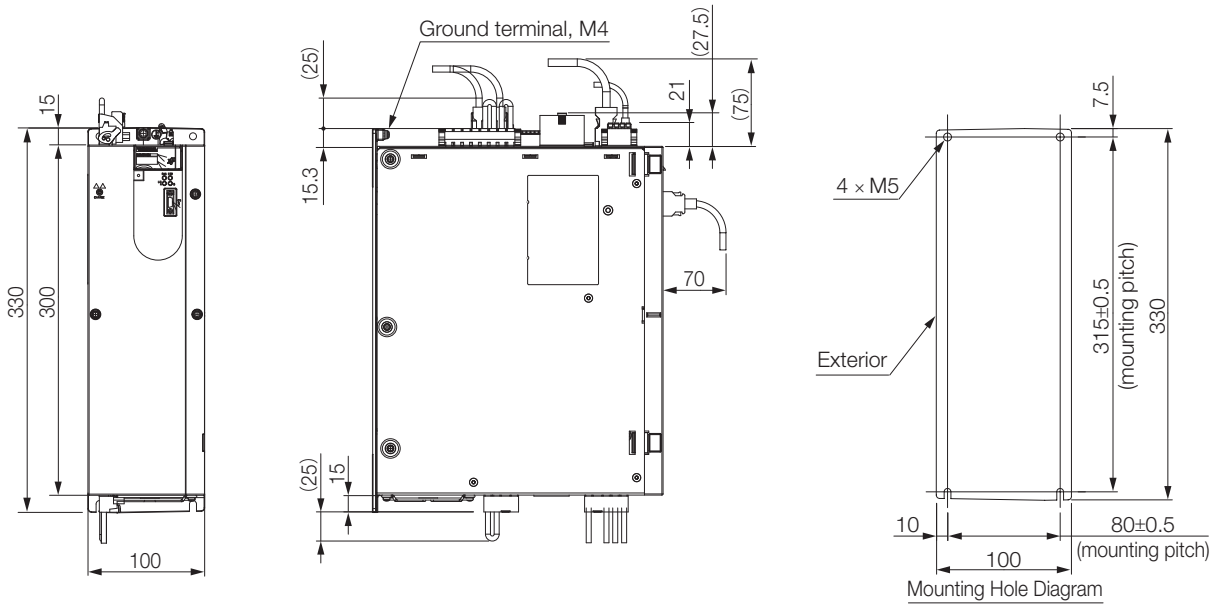
Base-mounted SERVOPACKs

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



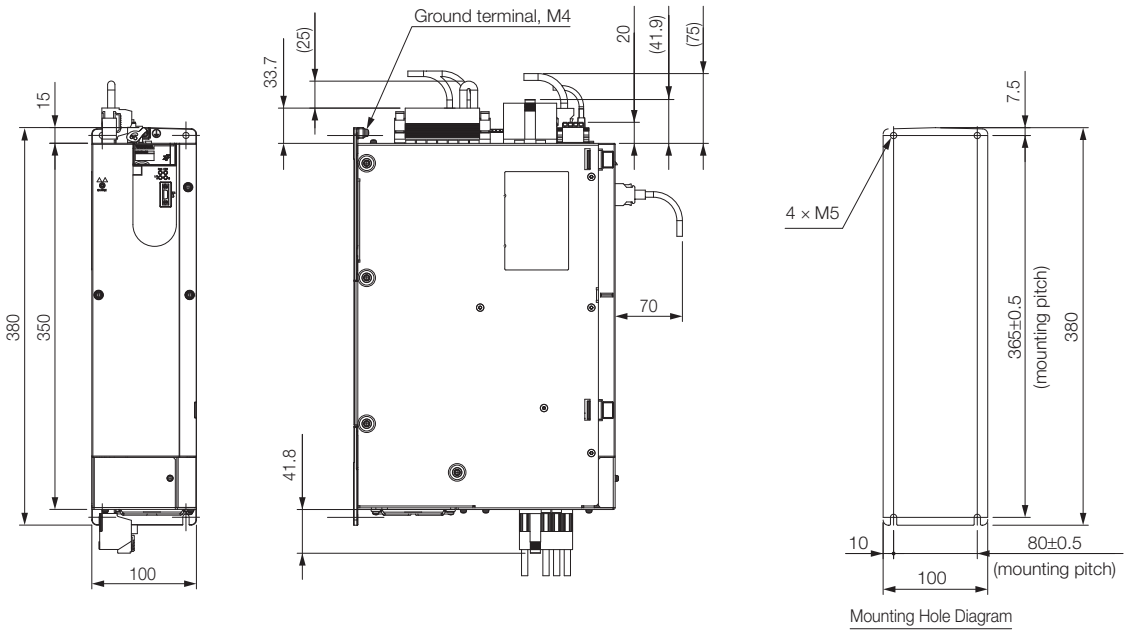
Approx. mass: SGD7S-1R9D, -3R5D, or -5R4D: 3.4 kg
SGD7S-8R4D or -120D: 3.7 kg
Unit: mm

• Three-Phase, 400 VAC: SGD7S-170D



Approx. mass: 5.5 kg
Unit: mm

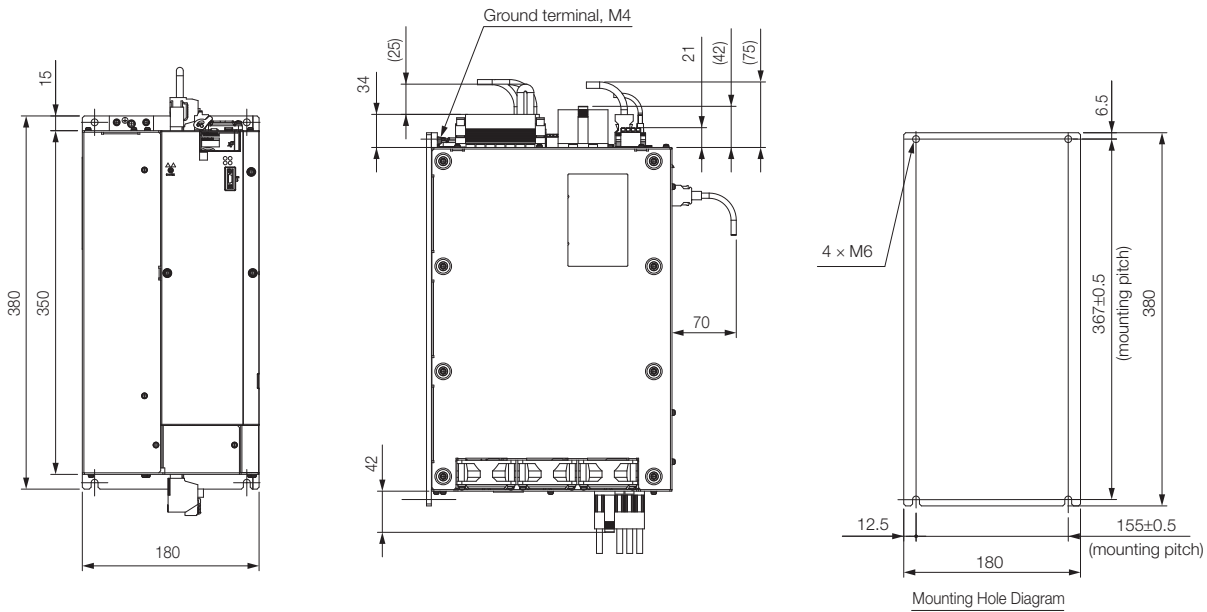
• **Three-Phase, 400 VAC: SGD7S-210D and -260D**



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

Model Designation

SGD7W - 2R6 D A0 B -

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
-	**Without Options**	**All models**
026	With relay for holding brake	All models

Bolded options are considered standard warehouse products.

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 [Arms]			2.6	5.4
Instantaneous Maximum Output Current per Axis [Arms]			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 [Arms]*		4.4	8.6
Control	Power Supply		24 V DC ±15 %	
	Input Current [Arms]*		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 [Arms]			2.6	5.4
Instantaneous Maximum Output Current per Axis [Arms]			8.5	14
Main Circuit	Power Supply		513 V DC to 648 V DC, -15 % to +10 %	
	Input Current [Arms]*		5	11
Control	Power Supply		24 V DC ±15 %	
	Input Current [Arms]*		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.

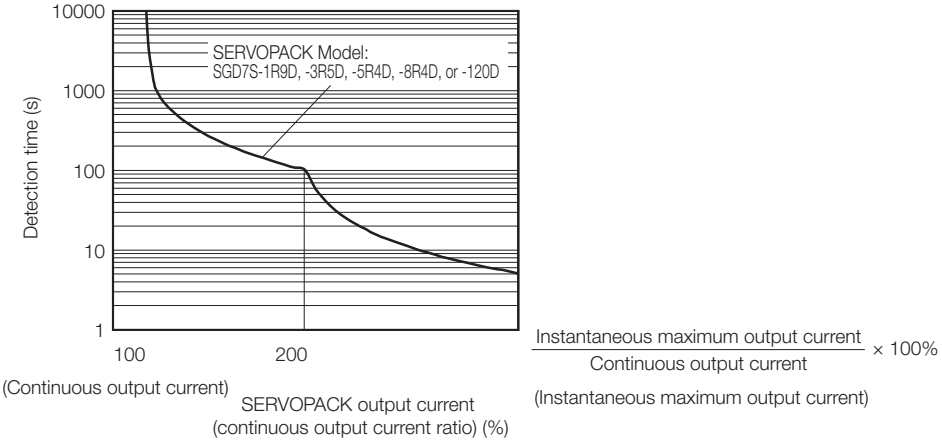
SERVOPACK Overload Protection Characteristics

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.) • 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 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • 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 Input voltage range: 0 V to +5 V
	Sequence Input Signals	Input Signals that can be allocated	Allowable voltage range: 24 VDC ±20 % Number of input points: 10
			Input method: Sink inputs or source inputs Input Signals • P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals • /Probe1 (Probe 1 Latch Input) signal • /Probe2 (Probe 2 Latch Input) signal • /Home (Home Switch Input) signal • /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals 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 Number of output points: 1 Output signal: ALM (Servo Alarm) signal
		Output Signals that can be allocated	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 6 (A photocoupler output (isolated) is used.)
			Output Signals • /COIN (Positioning Completion) signal • /V-CMP (Speed Coincidence Detection) signal • /TGON (Rotation Detection) signal • /S-RDY (Servo Ready) signal • /CLT (Torque Limit Detection) signal • /VLT (Speed Limit Detection) signal • /BK (Brake) signal • /WARN (Warning) signal • /NEAR (Near) signal 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+) The software version of the SigmaWin+ must be version 7.11 or higher.
		Communications Standard	Conforms to USB 2.0 standard (12 Mbps).

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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 CN6B (RJ45): EtherCAT signal output connector
	Cable	Category 5, 4 shielded twisted pairs 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. FMMU 1: Mapped in process data input (TxPDO) area. FMMU 2: Mapped to mailbox status.
	EtherCAT Commands (Data Link Layer)	APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, and FRMW (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 (TxPDO/RxPDO and remote TxPDO/RxPDO are not supported.)
	Distributed Clocks	Free-Run Mode and DC Mode (Can be switched.) 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 EtherCAT communications status: RUN x 1 EtherCAT error status: ERR x 1
CiA402 Drive Profile		• Homing Mode • Profile Position Mode • Interpolated Position Mode • Profile Velocity Mode • Profile Torque Mode • Cyclic Synchronous Position Mode • Cyclic Synchronous Velocity Mode • Cyclic Synchronous Torque Mode • Touch Probe Function • Torque Limit Function
Analog Monitor (CN5)		Number of points: 2 Output voltage range: ±10 VDC (effective linearity range: ±8 V) Resolution: 16 bits Accuracy: ±20 mV (Typ) Maximum output current: ±10 mA 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	/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.) • 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 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • 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 Input voltage range: 0 V to +5 V
	Sequence Input Signals	Input Signals that can be allocated	Allowable voltage range: 24 VDC ±20 % Number of input points: 10
			Input method: Sink inputs or source inputs Input Signals • /DEC (Origin Return Deceleration Switch) signal • /EXT1 to /EXT3 (External Latch Input 1 to 3) signals • P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals • /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals • /P-DET (Polarity Detection) signal 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 Number of output points: 1 Output signal: ALM (Servo Alarm) signal
		Output Signals that can be allocated	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 6 (A photocoupler output (isolated) is used.)
			Output Signals • /COIN (Positioning Completion) signal • /V-CMP (Speed Coincidence Detection) signal • /TGON (Rotation Detection) signal • /S-RDY (Servo Ready) signal • /CLT (Torque Limit Detection) signal • /VLT (Speed Limit Detection) signal • /BK (Brake) signal • /WARN (Warning) signal • /NEAR (Near) signal 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+) The software version of the SigmaWin+ must be version 7.11 or higher.
		Communications Standard	Conforms to USB 2.0 standard (12 Mbps).

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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) 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 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 Output voltage range: ±10 VDC (effective linearity range: ±8 V) Resolution: 16 bits Accuracy: ±20 mV (Typ) Maximum output current: ±10 mA 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	/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:

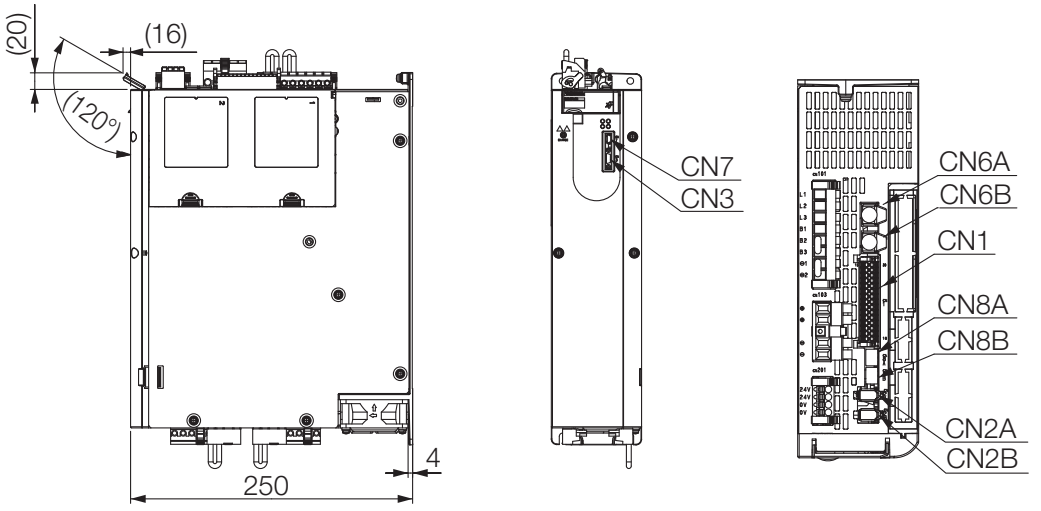
$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*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



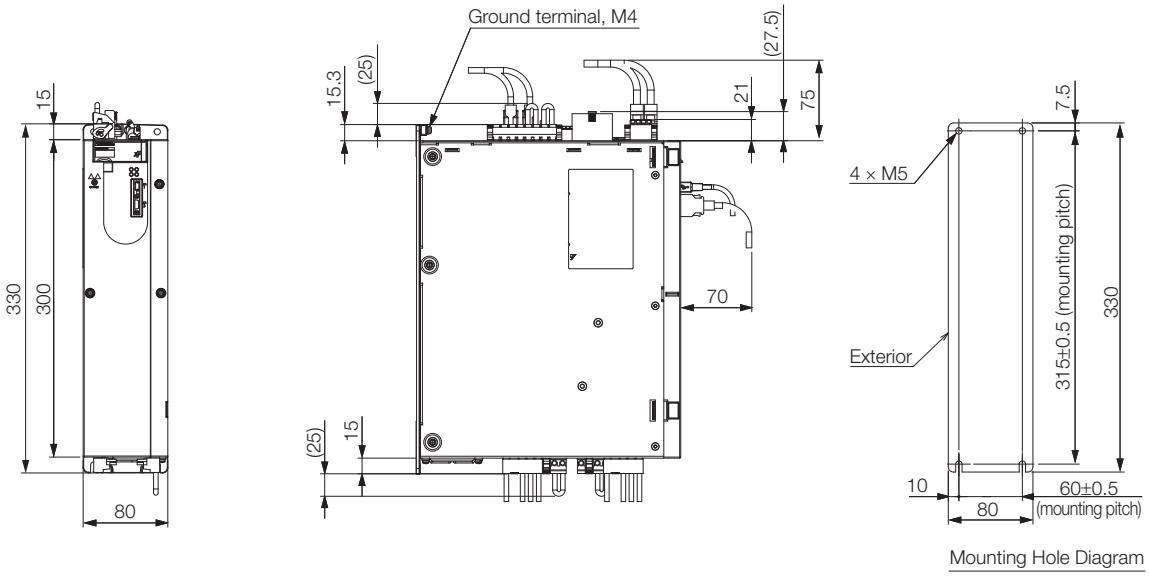
Unit: mm

• 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 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 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 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

Option Modules

Option Module Safety 103
Option Module Feedback 107

Option Module Safety

This Safety Module implements safety functions that conform to EN ISO 13849-1 (the harmonized EU Machinery Directive) and are specified in the individual IEC 61800-5-2 standard. You can combine it with a Sigma-7 400V 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. Please use the following model designations.

Option Module Safety

SGDV	-	OS	A01	A	000	FT900	
Option Module Safety		1st & 2nd	3rd ... 5th	6th	7th ... 9th	10th ... 14th	digit

1st & 2nd digit - Module Type	
Code	Module
OS	**Option Module Safety**

3rd ... 5th digit - Interface Specifications	
Code	Interface
A01	**Safety Module**

6th digit - Design Revision Order	
Code	Specification
A	**Initial Design**

7th ... 9th digit - Hardware Option	
Code	Option Specification
000	**Standard**

10th ... 14th digit - FT Specification	
Code	Specification
FT900	**FT900 Specification**

Mounting Rail for Option Cards

Mounting Rail for Option Cards for Sigma-7 400V SERVOPACKs.
Contact your YASKAWA representative for more information.

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

Bolded options are considered standard warehouse products.

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 EN 954-1 IEC 60204-1	√	√
Functional Safety	IEC 61508 Series IEC 62061 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 SGD7W Axis A + B	SGD7S + Safety Module	SGD7W Axis A + Safety Module	SGD7W Axis B
Safe BaseBlock Function* (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 (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 (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 (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: SERVOPACK CN8□	Safe Performance: 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

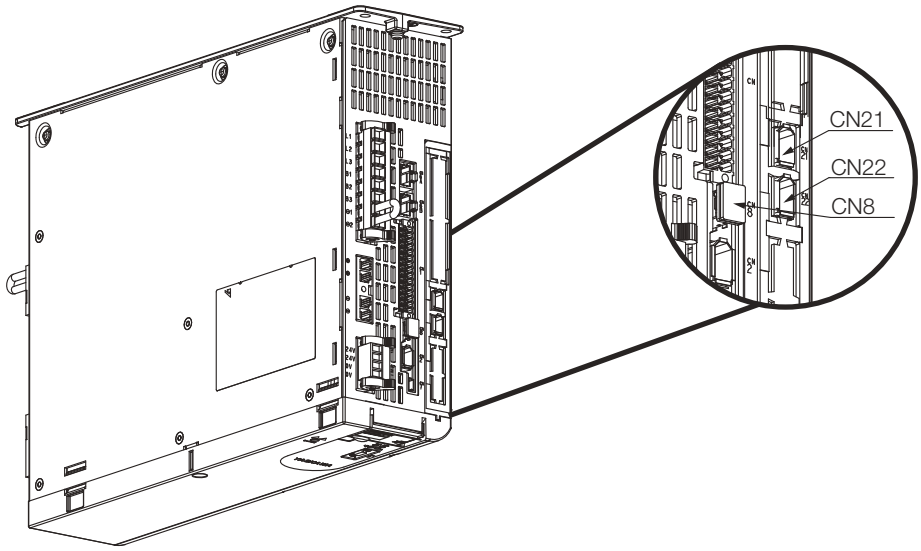
Item		Specification	
Placement		Attached to the SERVOPACK	
Power Specification	Power Supply Method	Supplied from the control power supply of the SERVOPACK.	
Operating Conditions	Ambient Air Temperature	0°C to +55°C	
	Storage Temperature	−20°C to +85°C	
	Surrounding Air Humidity / Storage Humidity	90 % 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 An environment that satisfies the following conditions. - Free of corrosive or explosive gases. - Free of exposure to water, oil or chemicals. - 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

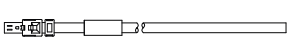


Device Label	Model	Number of Pins	Manufacturer
CN21	1981080-1	8	Tyco Electronics Japan G.K.
CN22	1981080-1	8	Tyco Electronics Japan G.K.
CN8	1981080-1	8	Tyco Electronics Japan G.K.

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

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. Please use the following model designations.

Model Designation

SGDV - OF A01 A

Option Modules | 1st & 2nd | 3rd ... 5th | 6th digit

1st & 2nd digit - Module Type	
Code	Specification
OF	**Option Module Feedback**

3rd ... 5th digit - Interface Specifications	
Code	Specification
A01	for YASKAWA Serial Protocol
B01	Serial and Sin/Cos Encoders
B03	Pulse A quad B Encoders
B04	Resolver

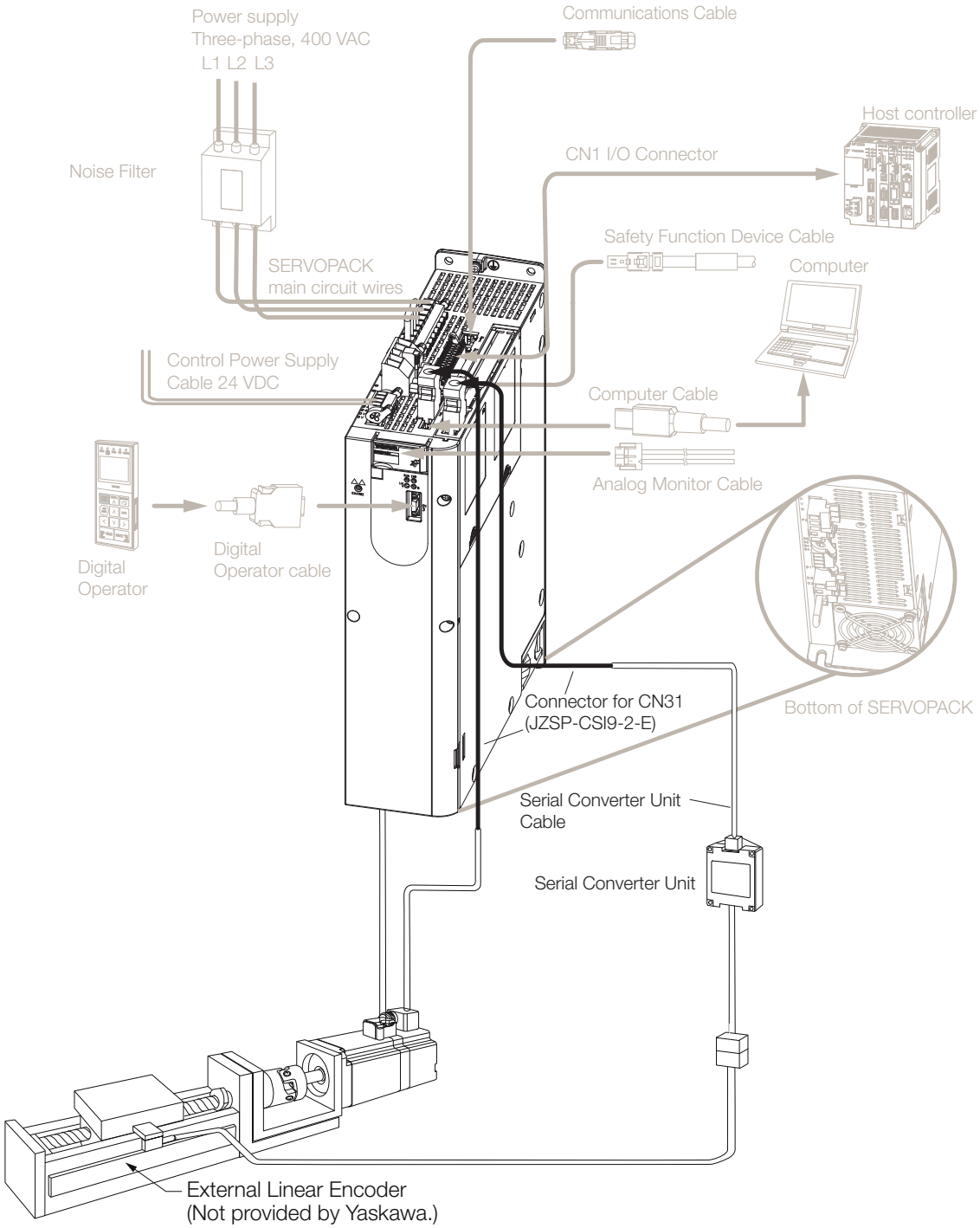
6th digit - Design Revision Order	
Code	Specification
A	**Initial Design**

Mounting Rail for Option Cards

Mounting Rail for Option Cards for Sigma-7 400V SERVOPACKs.
Contact your YASKAWA representative for more information.

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

System Configuration with SGDV-OFA01A



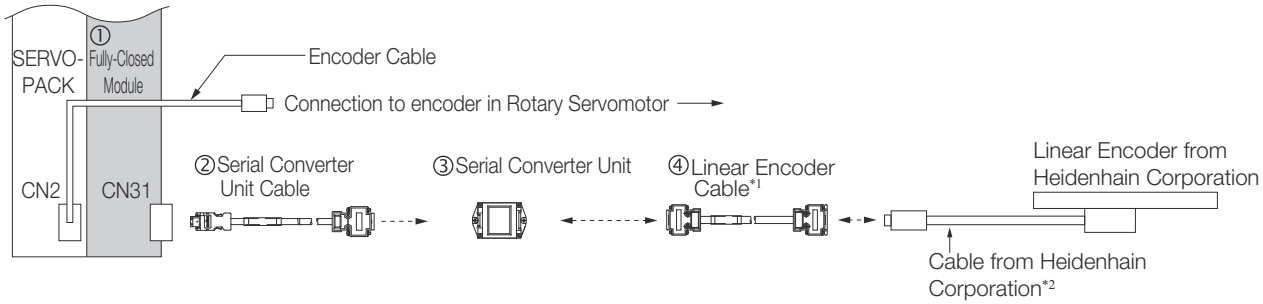
* The connected devices and cables depend on the type of external Linear Encoder that is used.

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

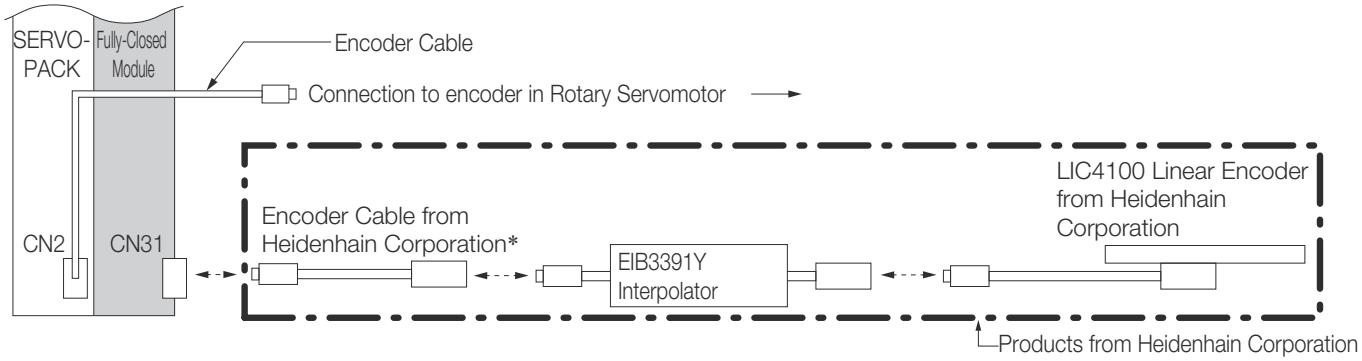
*1 When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number. Please use the YASKAWA mounting rail JZSP-P7R2-8-E in combination with a Fully-Closed Module.

*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

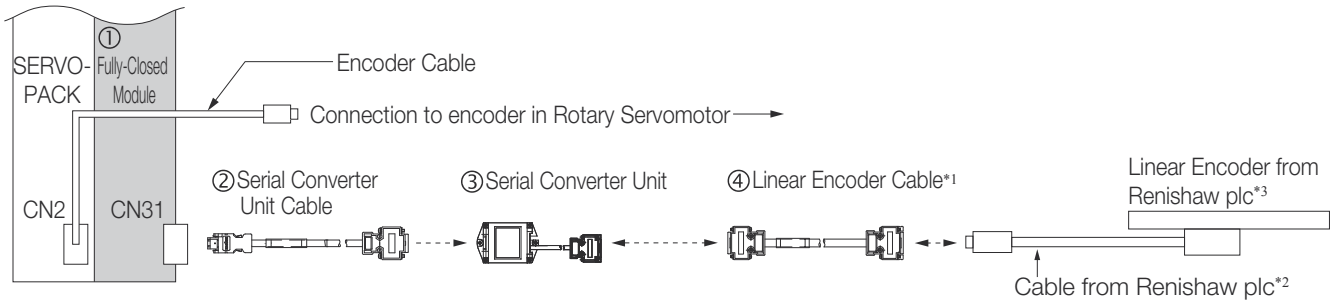
LIC4100 Linear Encoder with EIB3391Y Interpolator



* 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

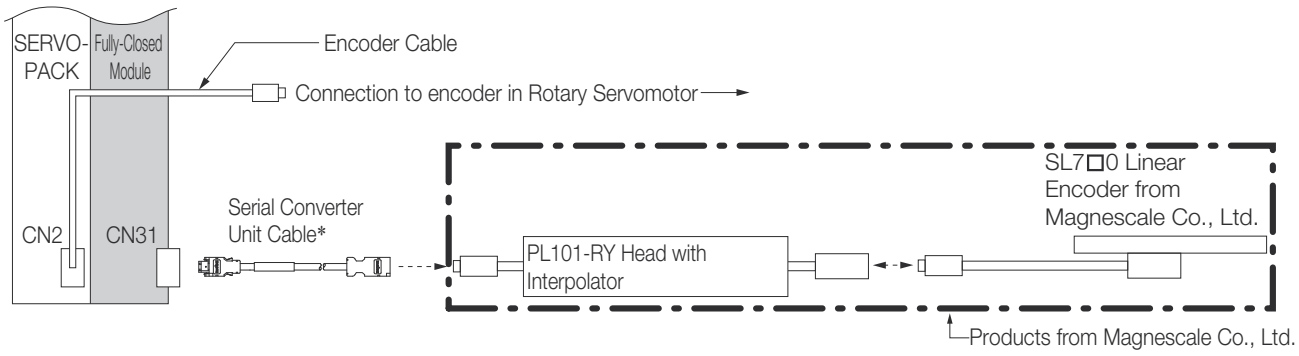
*1 When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number. Please use the YASKAWA mounting rail JZSP-P7R2-8-E in combination with a Fully-Closed Module.

*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)

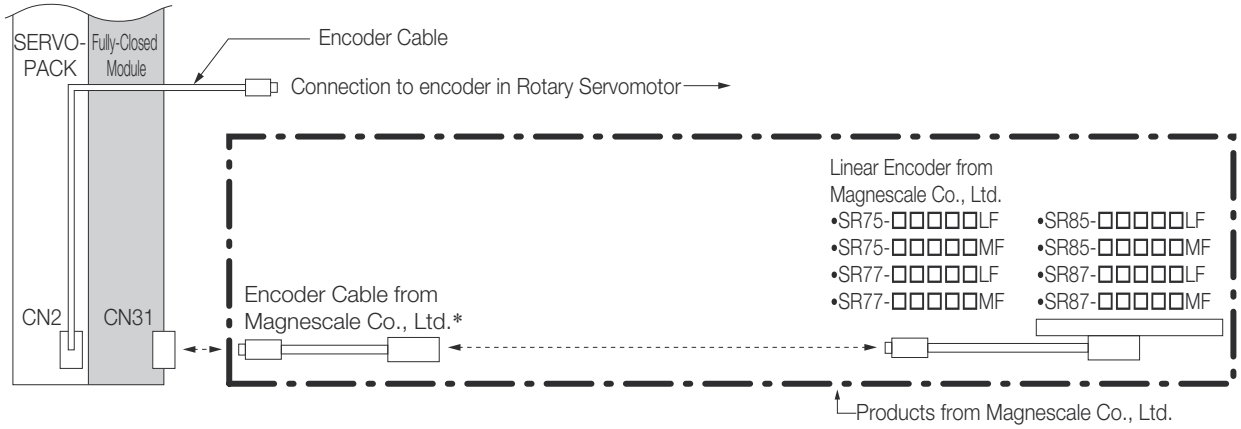
Connections to Linear Encoder from Magnescale Co., Ltd.

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



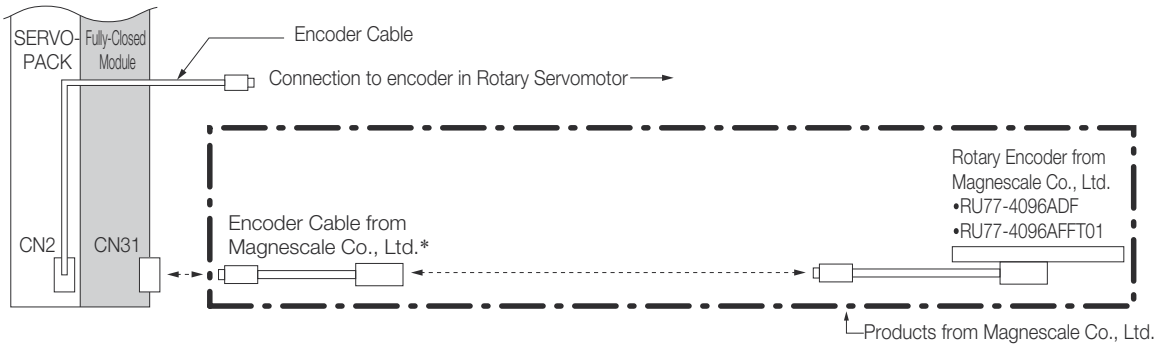
* Refer to the following section for information on cables to connect Fully-Closed Modules and Linear Encoders or chapter Serial Converter Unit Cables.

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

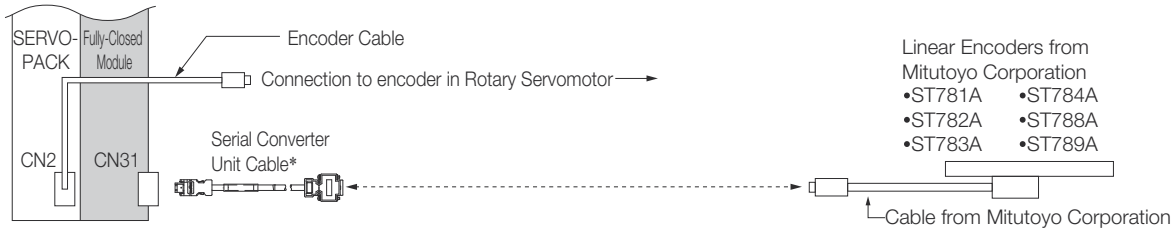


*To connect the SERVOPACK and Rotary Encoder, use a CE28-Series Extension Cable for RU77 from Magnescale Co., Ltd.

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

Connections to Linear Encoders from Mitutoyo Corporation

ST78□A Linear Encoders



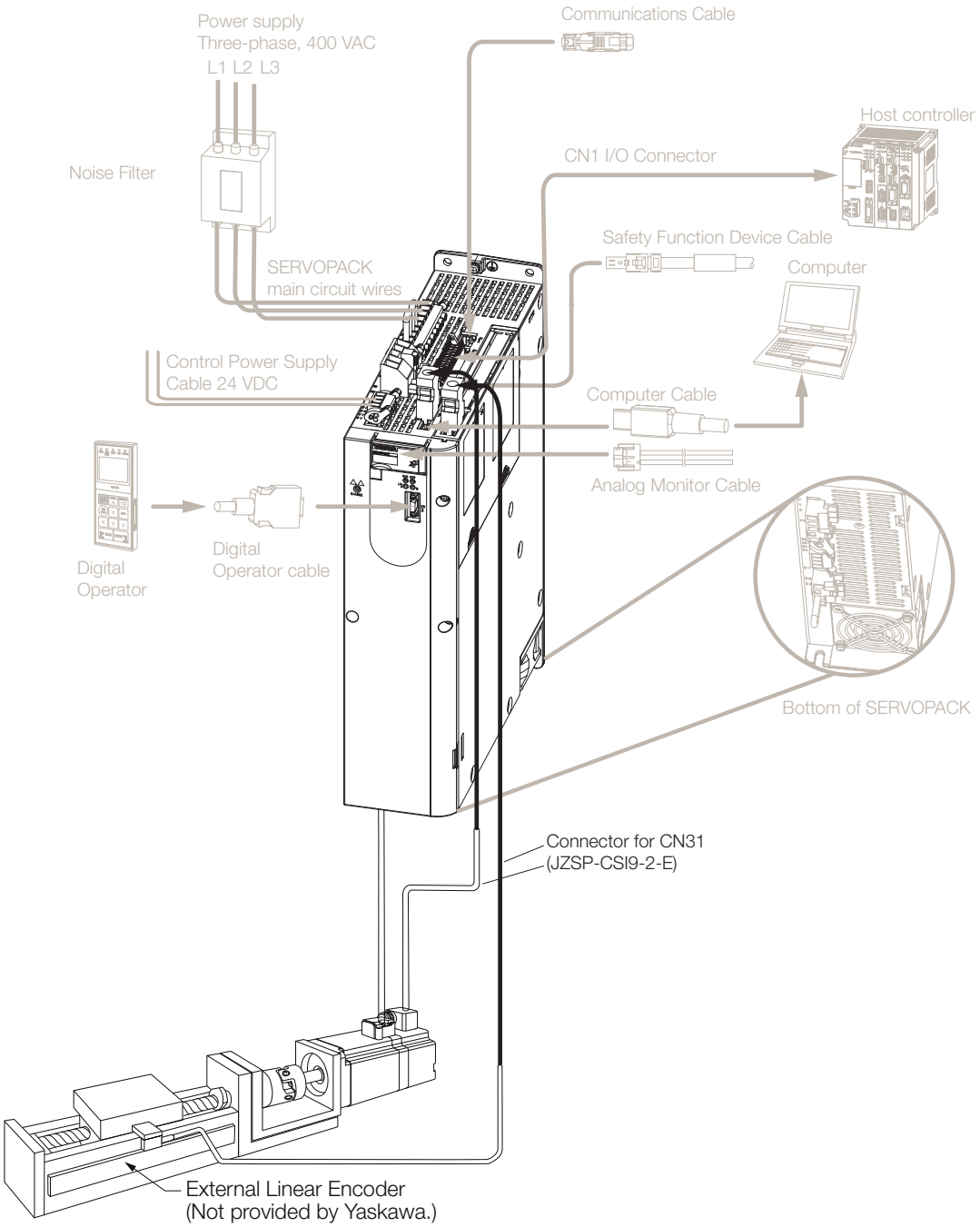
* Refer to the following section for information on cables to connect Fully-Closed Modules and Linear Encoders or chapter Serial Converter Unit Cables.

Connectors

Device Label	Model	Number of Pins	Manufacturer
CN31	3E106-0220KV	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-closepd 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 7.2x via Sigma-7 400V 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 An environment that satisfies the following conditions. • Free of corrosive or explosive gases • Free of exposure to water, oil or chemicals • 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]. Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V). 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. In case of EnDat2.1, EnDat2.2 and HIPERFACE, the function should be carried out once (after that, recognized data will be used). 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 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 An environment that satisfies the following conditions. • Free of corrosive or explosive gases • Free of exposure to water, oil or chemicals • 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]. Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V). 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. 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 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 An environment that satisfies the following conditions. • Free of corrosive or explosive gases • Free of exposure to water, oil or chemicals • 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]. Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V). 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. 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 card or the motor has been replaced.
Unsupported devices		Advanced option module safety: SGDV-OSA01A 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 Connector: 10126-3000PE	JZSP-CSI9-2-E	26	3M Japan Ltd.

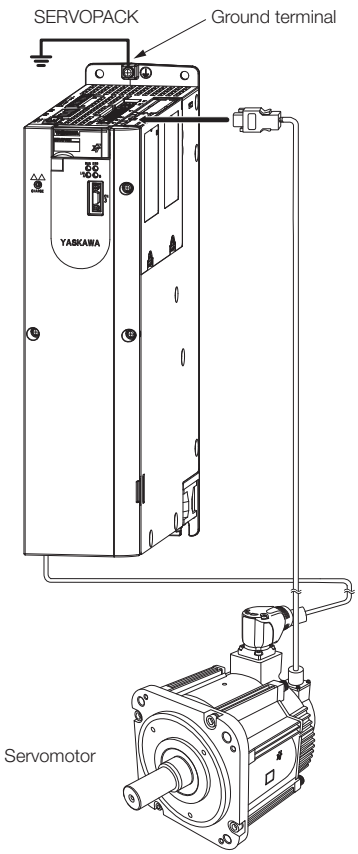
Note: The above connecor or their equivalent are used for the Fully-Closed Module SGDV-0FB0□A.

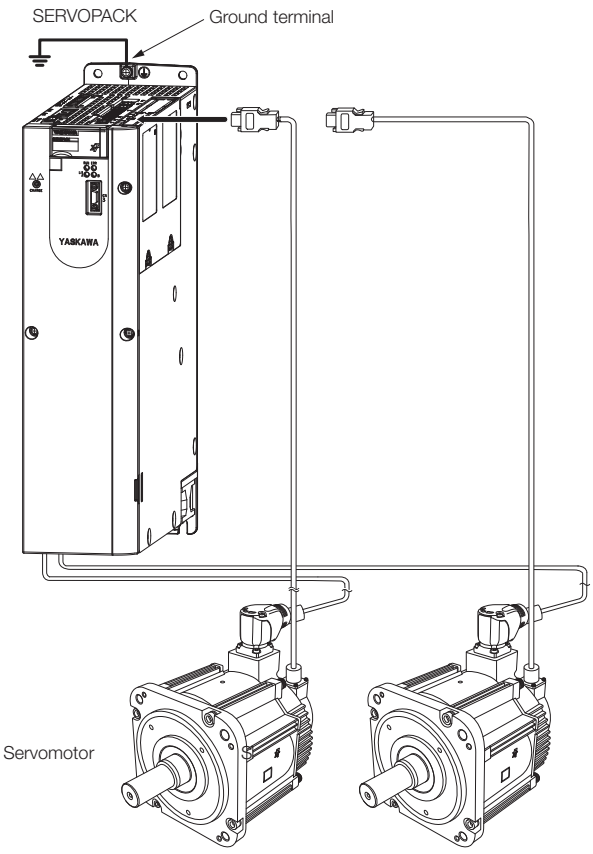
Cables & Periphery

Cables for Rotary Servomotors 118
Cables for Linear Servomotors 122
Serial Converter Units 125
Cables and Connectors for SERVOPACKs 126
Periphery 131

Cables for Rotary Servomotors

System Configurations





Notes:

1. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque speed characteristics will become smaller because the voltage drop increases.

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

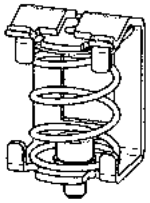
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual.

Power Cables for rotary servomotors without holding brake

Servomotor Model	Name	Cable & connector type	Length	Order No.	Specification
SGM7J-02 to -08 SGM7A-04 to -08	For Servomotors without holding brake	Flexible Power cable 4 x 1.5 mm² with M17 connector	3 m	JZSP-C7M143-03-E-G6	
			5 m	JZSP-C7M143-05-E-G6	
			10 m	JZSP-C7M143-10-E-G6	
			15 m	JZSP-C7M143-15-E-G6	
			20 m	JZSP-C7M143-20-E-G6	
SGM7J-15 SGM7A-10 to -25 SGM7G-05 to -20 SGM7G-05 to -09 High Speed		Flexible Power cable 4 x 1.5 mm² with M23 connector	3 m	JZSP-C7M144-03-E-G6	
			5 m	JZSP-C7M144-05-E-G6	
			10 m	JZSP-C7M144-10-E-G6	
			15 m	JZSP-C7M144-15-E-G6	
			20 m	JZSP-C7M144-20-E-G6	
SGM7A-30 SGM7G-30 SGM7G-13 to -20 High Speed		Flexible Power cable 4 x 2.5 mm² with M23 connector	3 m	JZSP-C7M154-03-E-G6	
			5 m	JZSP-C7M154-05-E-G6	
			10 m	JZSP-C7M154-10-E-G6	
			15 m	JZSP-C7M154-15-E-G6	
			20 m	JZSP-C7M154-20-E-G6	
SGM7A-40 to -50 SGM7G-44 SGM7G-30 High Speed		Flexible Power cable 4 x 4 mm² with M23 connector	3 m	JZSP-C7M164-03-E-G6	
			5 m	JZSP-C7M164-05-E-G6	
			10 m	JZSP-C7M164-10-E-G6	
			15 m	JZSP-C7M164-15-E-G6	
			20 m	JZSP-C7M164-20-E-G6	
SGM7A-70 SGM7G-55 to -75 SGM7G-44 High Speed		Flexible Power cable 4 x 6.0 mm² with M40 connector	3 m	JZSP-C7M175-03-E-G6	
			5 m	JZSP-C7M175-05-E-G6	
			10 m	JZSP-C7M175-10-E-G6	
			15 m	JZSP-C7M175-15-E-G6	
			20 m	JZSP-C7M175-20-E-G6	
SGM7G-1A to -1E		Flexible Power cable 4 x 10.0 mm² with M40 connector	3 m	JZSP-C7M185-03-E-G6	
			5 m	JZSP-C7M185-05-E-G6	
			10 m	JZSP-C7M185-10-E-G6	
			15 m	JZSP-C7M185-15-E-G6	
			20 m	JZSP-C7M185-20-E-G6	

Motor Connection Shielding Clamp

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

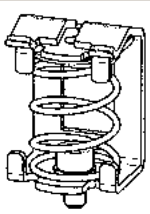
SERVOPACK Model	Order No.	Specification
Sigma-7 400 V up to 3.0 kW	KLBUE 4-13.5_SC	
Sigma-7 400 V from 5 kW up to 7.5 kW	KLBUE 10-20_SC	
Sigma-7 400 V for 11 kW & 15 kW	KLBUE 15-32_SC	

Power Cables for rotary servomotors with holding brake

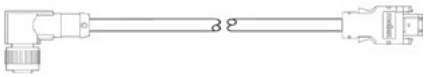
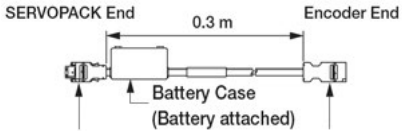
Servomotor Model	Name	Cable & connector type	Length	Order No.	Specification
SGM7J-02 to -08 SGM7A-04 to -08	For Servomotors with holding brake	Flexible Power cable 4 x 1.5 mm² & 2 x 1.5 mm² for brake with M17 connector	3 m	JZSP-C7M343-03-E-G6	
			5 m	JZSP-C7M343-05-E-G6	
			10 m	JZSP-C7M343-10-E-G6	
			15 m	JZSP-C7M343-15-E-G6	
			20 m	JZSP-C7M343-20-E-G6	
SGM7J-15 SGM7A-10 to -25 SGM7G-05 to -20 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-G6	
			5 m	JZSP-C7M344-05-E-G6	
			10 m	JZSP-C7M344-10-E-G6	
			15 m	JZSP-C7M344-15-E-G6	
			20 m	JZSP-C7M344-20-E-G6	
SGM7A-30 SGM7G-30 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-G6	
			5 m	JZSP-C7M354-05-E-G6	
			10 m	JZSP-C7M354-10-E-G6	
			15 m	JZSP-C7M354-15-E-G6	
			20 m	JZSP-C7M354-20-E-G6	
SGM7A-40 to -50 SGM7G-44 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-G6	
			5 m	JZSP-C7M364-05-E-G6	
			10 m	JZSP-C7M364-10-E-G6	
			15 m	JZSP-C7M364-15-E-G6	
			20 m	JZSP-C7M364-20-E-G6	
SGM7A-70 SGM7G-55 to -75 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-G6	
			5 m	JZSP-C7M375-05-E-G6	
			10 m	JZSP-C7M375-10-E-G6	
			15 m	JZSP-C7M375-15-E-G6	
			20 m	JZSP-C7M375-20-E-G6	
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-G6	
			5 m	JZSP-C7M385-05-E-G6	
			10 m	JZSP-C7M385-10-E-G6	
			15 m	JZSP-C7M385-15-E-G6	
			20 m	JZSP-C7M385-20-E-G6	

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	

Encoder cables for rotary servomotors

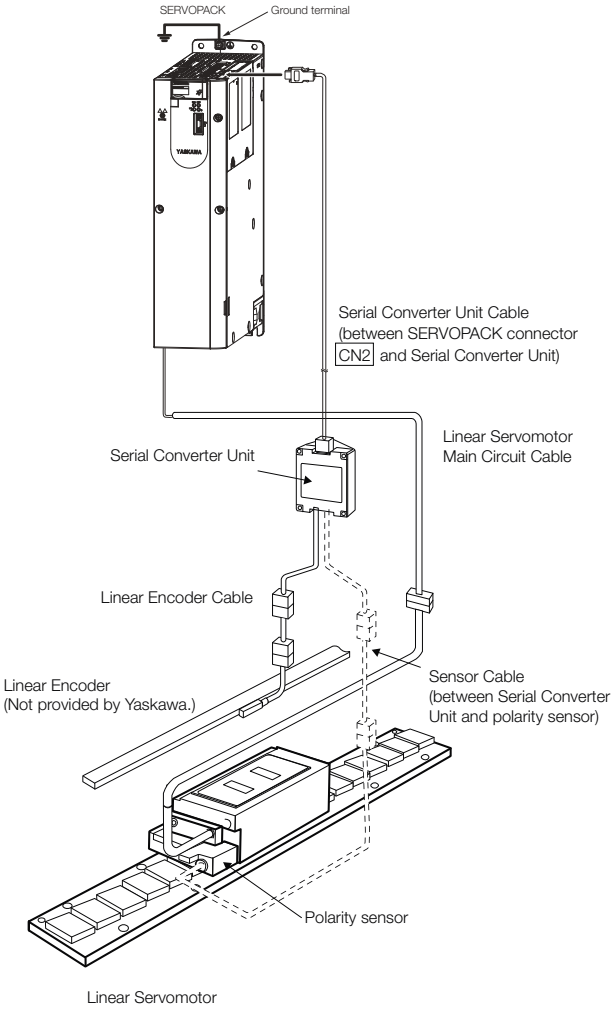
Servomotor Model	Name	Cable & connector type	Length	Sigma-7 Flexible Cable	Appearance
All 400 V motor types without absolute encoder	For servomotors with incremental encoder	Flexible Encoder cable with straight connector M12	3 m	JZSP-C7PI2M-03-E-G6	
			5 m	JZSP-C7PI2M-05-E-G6	
			10 m	JZSP-C7PI2M-10-E-G6	
			15 m	JZSP-C7PI2M-15-E-G6	
			20 m	JZSP-C7PI2M-20-E-G6	
		Flexible Encoder cable with angled connector M12	3 m	JZSP-C7PI2N-03-E-G6	
			5 m	JZSP-C7PI2N-05-E-G6	
			10 m	JZSP-C7PI2N-10-E-G6	
			15 m	JZSP-C7PI2N-15-E-G6	
			20 m	JZSP-C7PI2N-20-E-G6	
All 400 V motors with absolute encoder	For servomotors with absolute encoder	Sigma-7 Extension for Encoder cable with Connectors length 0.3m for Abs. Encoder	0.3 m	JZSP-CSP12-E-G5	

Fan cables for rotary servomotors

Servomotor Model	Name	Cable & connector type	Length	Sigma-7 Flexible Cable	Appearance

Cables for Linear Servomotors

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

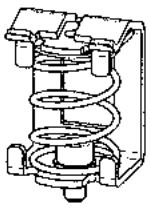
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual.

Power Cables for Linear Servomotors

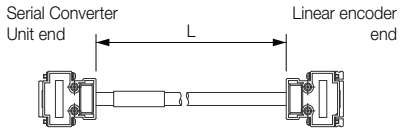
Linear Motor Model	Cable & connector type	Length	Order No.	Specification
SGLFW2-30D070 to SGLFW2-45D380	Flexible Power cable 4 x 1.5 mm² with M17 connector	3 m	JZSP-C7M143-03-E-G6	
		5 m	JZSP-C7M143-05-E-G6	
		10 m	JZSP-C7M143-10-E-G6	
		15 m	JZSP-C7M143-15-E-G6	
		20 m	JZSP-C7M143-20-E-G6	
SGLFW2-90D200 to SGLFW2-1DD380	Flexible Power cable 4 x 2.5 mm² with M23 connector	3 m	JZSP-C7M154-03-E-G6	
		5 m	JZSP-C7M154-05-E-G6	
		10 m	JZSP-C7M154-10-E-G6	
		15 m	JZSP-C7M154-15-E-G6	
		20 m	JZSP-C7M154-20-E-G6	
SGLFW2-1DD560	Flexible Power cable 4 x 4 mm² with M23 connector	3 m	JZSP-C7M164-03-E-G6	
		5 m	JZSP-C7M164-05-E-G6	
		10 m	JZSP-C7M164-10-E-G6	
		15 m	JZSP-C7M164-15-E-G6	
		20 m	JZSP-C7M164-20-E-G6	

Motor Connection Shielding Clamp

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

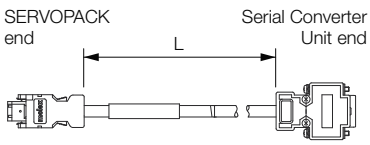
SERVOPACK Model	Order No.	Specification
Sigma-7 400 V up to 3.0 kW	KLBUE 4-13.5_SC	
Sigma-7 400 V from 5 kW up to 7.5 kW	KLBUE 10-20_SC	
Sigma-7 400 V for 11 kW & 15 kW	KLBUE 15-32_SC	

Linear Encoder Cables

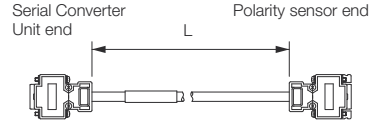
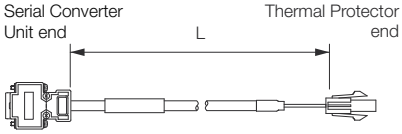
Servomotor Model	Name	Length*	Order No.	Specification
All Models	For linear encoder from Renishaw PLC	1 m	JZSP-CLL00-01-E	
		3 m	JZSP-CLL00-03-E	
		5 m	JZSP-CLL00-05-E	
		10 m	JZSP-CLL00-10-E	
		15 m	JZSP-CLL00-15-E	
	For linear encoder from Heidenhain Corporation	1 m	JZSP-CLL30-01-E	
		3 m	JZSP-CLL30-03-E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

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

Serial Converter Unit Cables

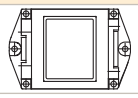
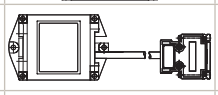
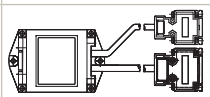
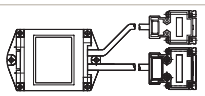
Servomotor Model	Length	Order No.	Specification
All Models	1 m	JZSP-CLP70-01-E	
	3 m	JZSP-CLP70-03-E	
	5 m	JZSP-CLP70-05-E	
	10 m	JZSP-CLP70-10-E	
	15 m	JZSP-CLP70-15-E	
	20 m	JZSP-CLP70-20-E	

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	

Model Designations

JZDP - □00□ - □□□

Serial Converter Unit Model				
Code	**Appearance**	**Applical Linear Encoder**	**Polarity Sensor**	**Thermal Protector**
H003 J003		From Heidenhain Corp.	None	None
H005 J005		From Renishaw PLC	None	None
H006 J006		From Heidenhain Corp.	Yes	Yes
H008 J008		From Renishaw PLC	Yes	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:

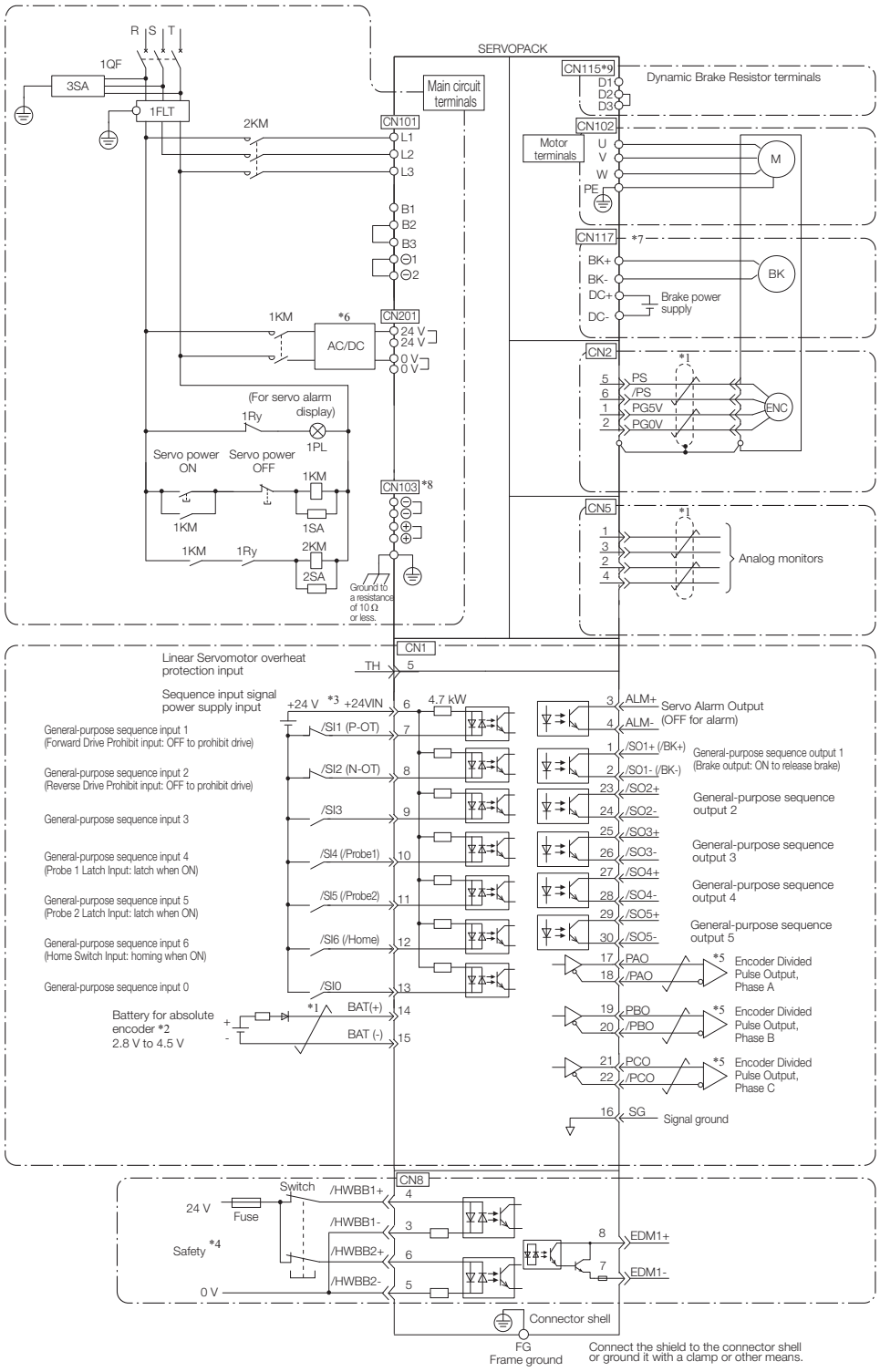
1. Code H□□□ for 8 bit interpolation, Code J□□□ for 12 bit interpolation.
2. Refer to the catalog for detailed specifications of the Serial Converter Unit.
3. Contact your YASKAWA representative for information on the water cooling specifications of the SGLFW2.

Cables and Connectors for SERVOPACKs

System Configurations

SGD7S Single-axis EtherCAT Reference SERVOPACKs

up to 6kW



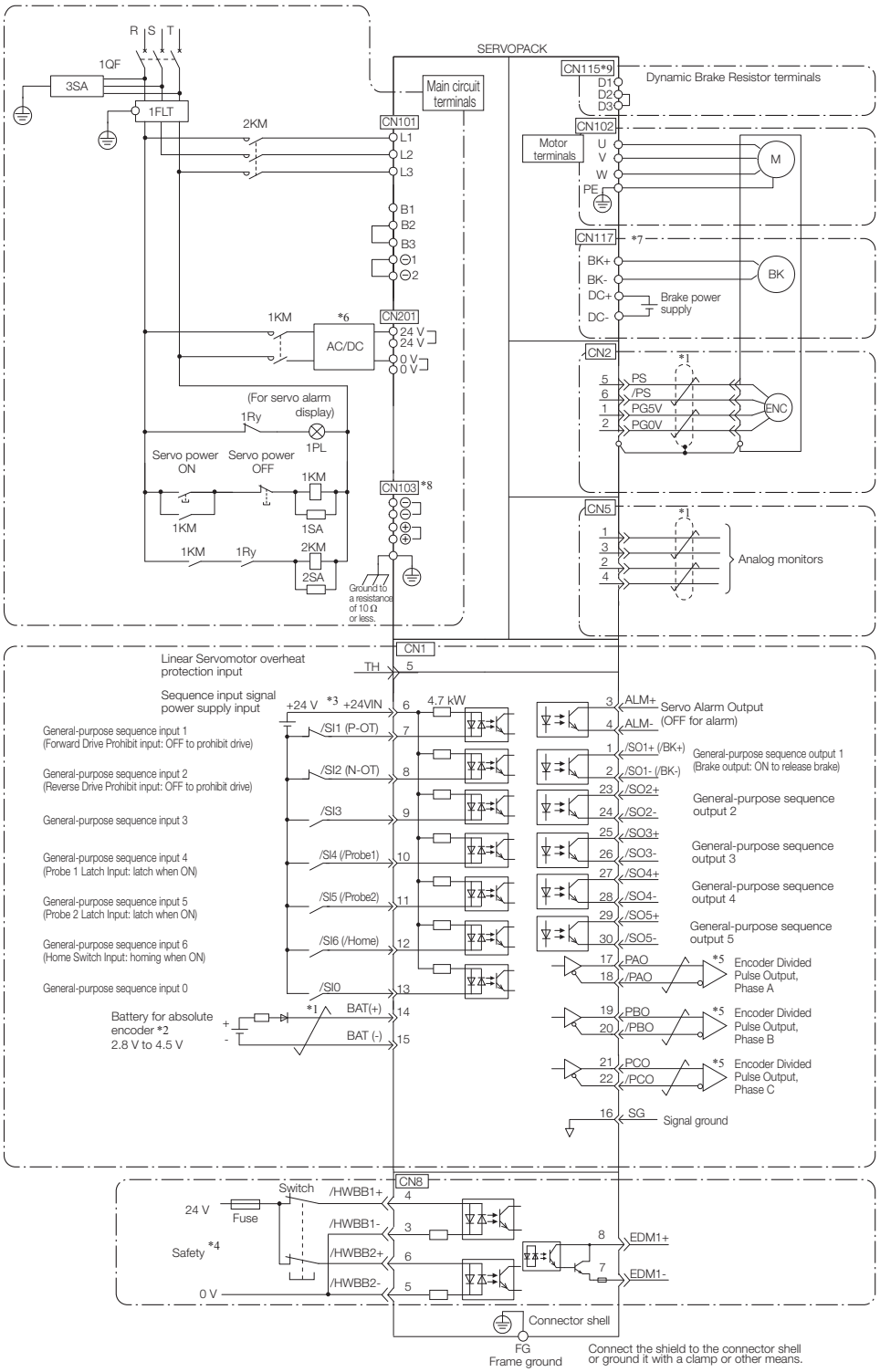
*1. represents twisted-pari wires.

*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

SGD7S Single-axis EtherCAT Reference SERVOPACKs

more than 6kW

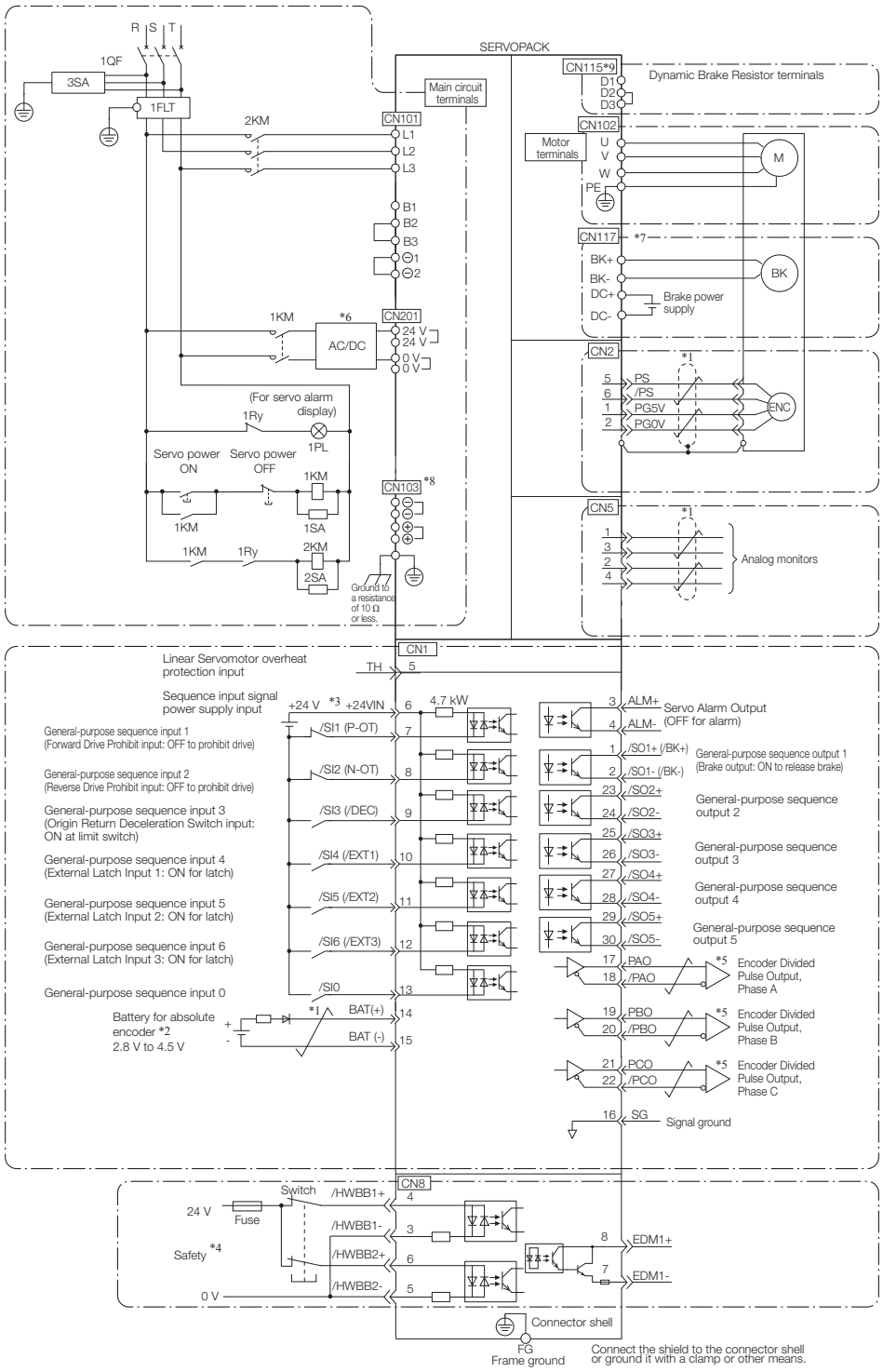


*1. represents twisted-pari wires.

*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.

SGD7S Single-axis MECHATROLINK-III Reference SERVOPACKs

up to 6kW

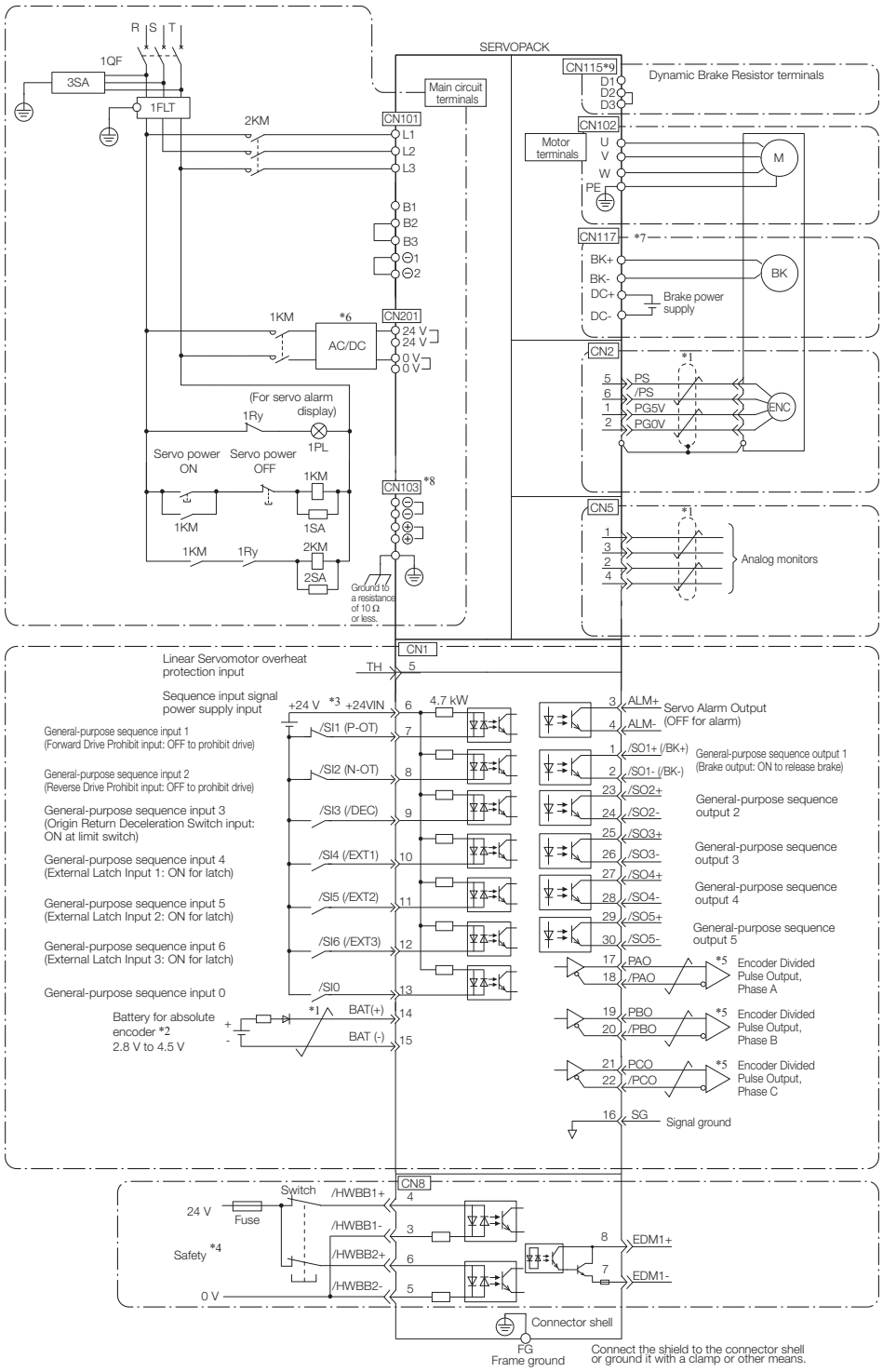


*1. ≠ represents twisted-pari wires.

*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.

SGD7S Single-axis MECHATROLINK-III Reference SERVOPACKs

more than 6kW

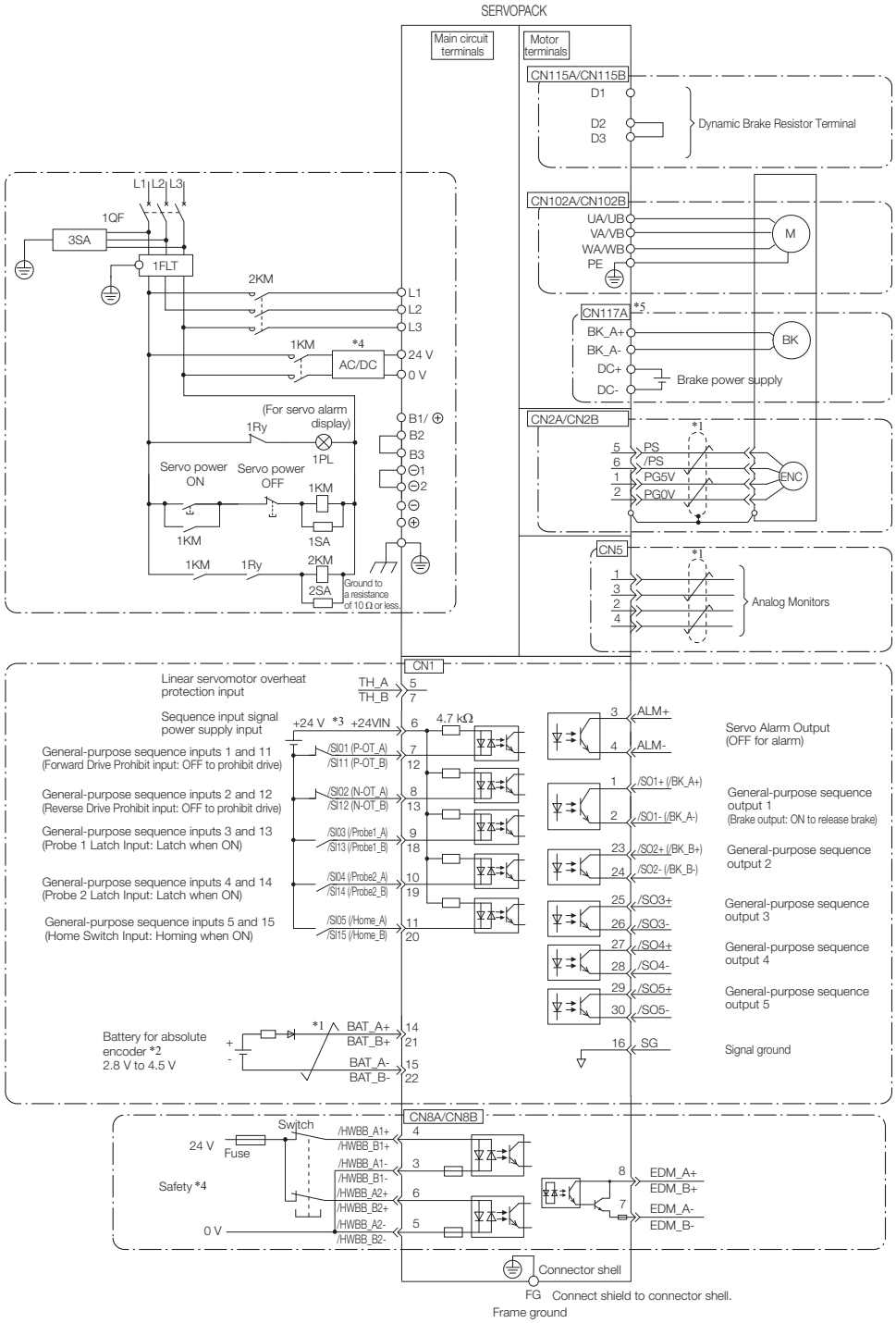


*1. represents twisted-pari wires.

*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.

SGD7W Dual-axis EtherCAT Reference SERVOPACKs

muss die Zeichnung auch angepasst werden?



*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.

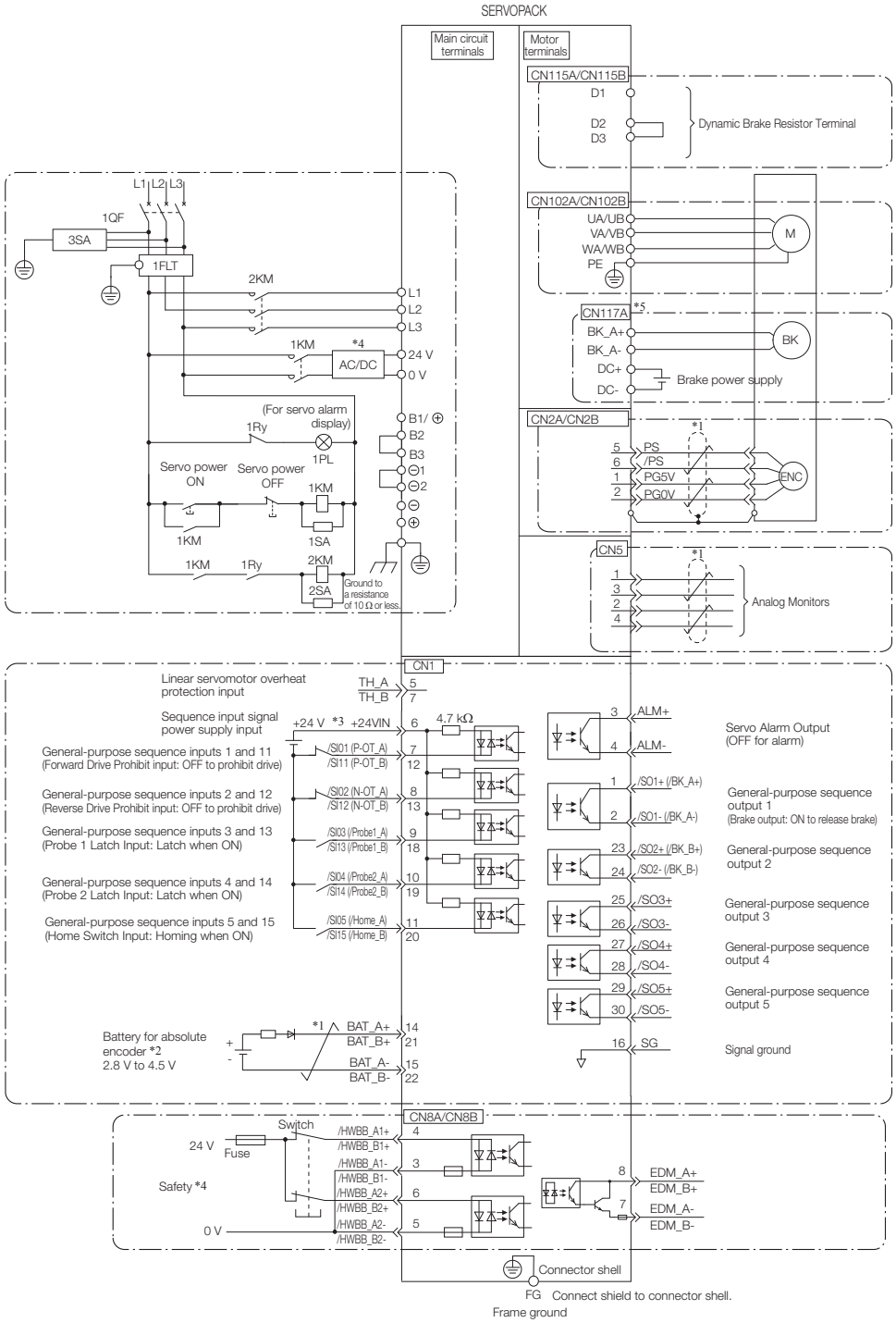
Note: 1. You can use parameter settings to change some of the I/O signal allocations.

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.

muss die Zeichnung auch angepasst werden?

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

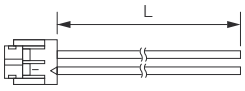
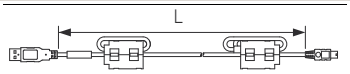
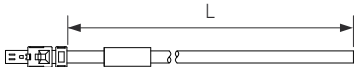
Important

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

Notes:

Refer to the following 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.

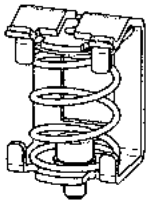
Code	Name		Length (L)	Order Number	Appearance
①	Analog Monitor Cable		1 m	JZSP-CA01-E	
②	Digital Operator (including 1 m cable)		1 m	JUSP-OP05A-1-E	
	Digital Operator Cable		0.3 m	JZSP-CVS07-A3-E*2	
③	Computer Cable		2.5 m	JZSP-CVS06-02-E	
④	Safety Function Device Cable	Cables with Connectors*1	1 m	JZSP-CVH03-01-E-G#	
			3 m	JZSP-CVH03-03-E-G#	
		Connector Kit*2		Contact Tyco Electronics Japan G.K. Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit Model number: 2013595-1	

*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.

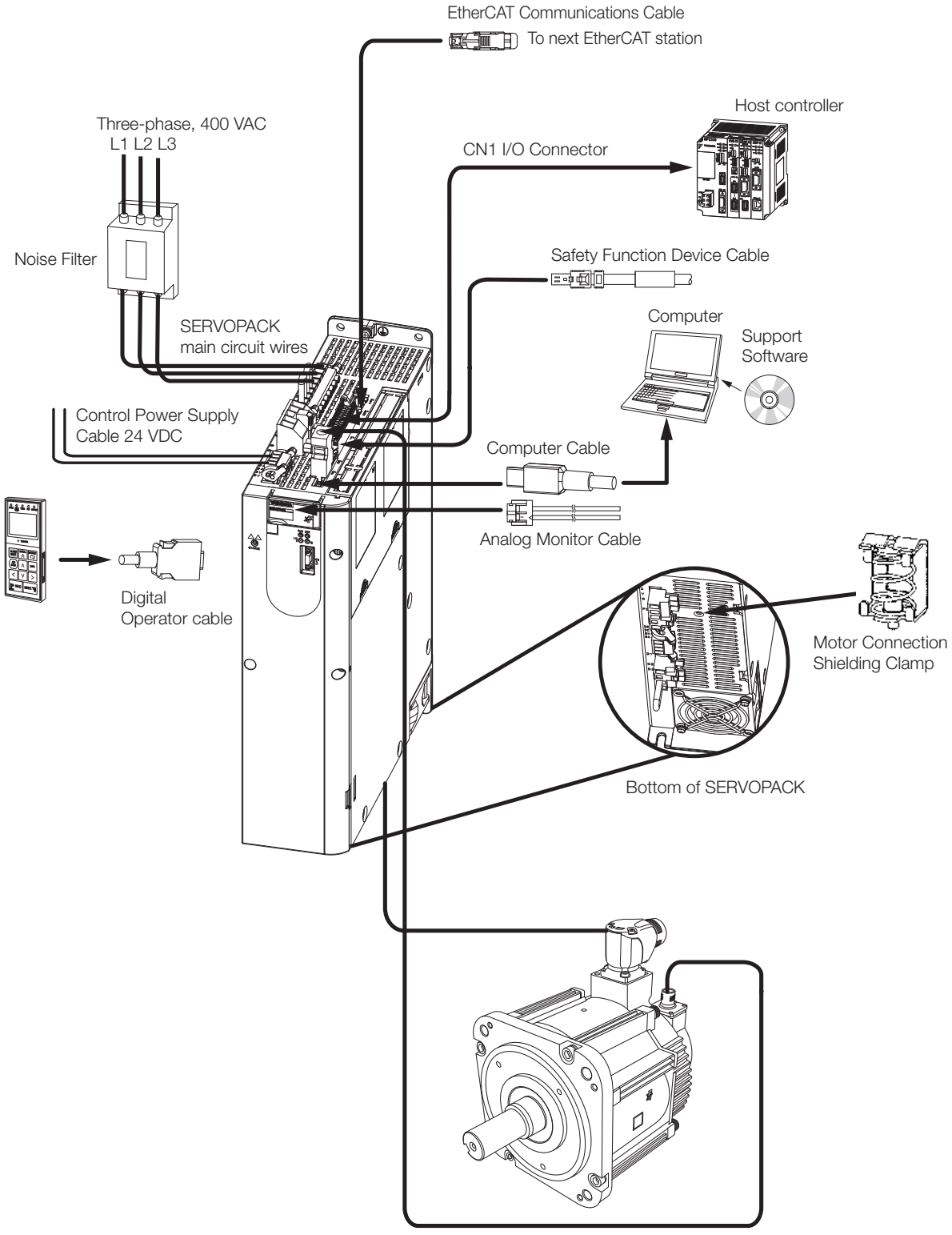
*2. Use the connector kit when you make cables yourself.

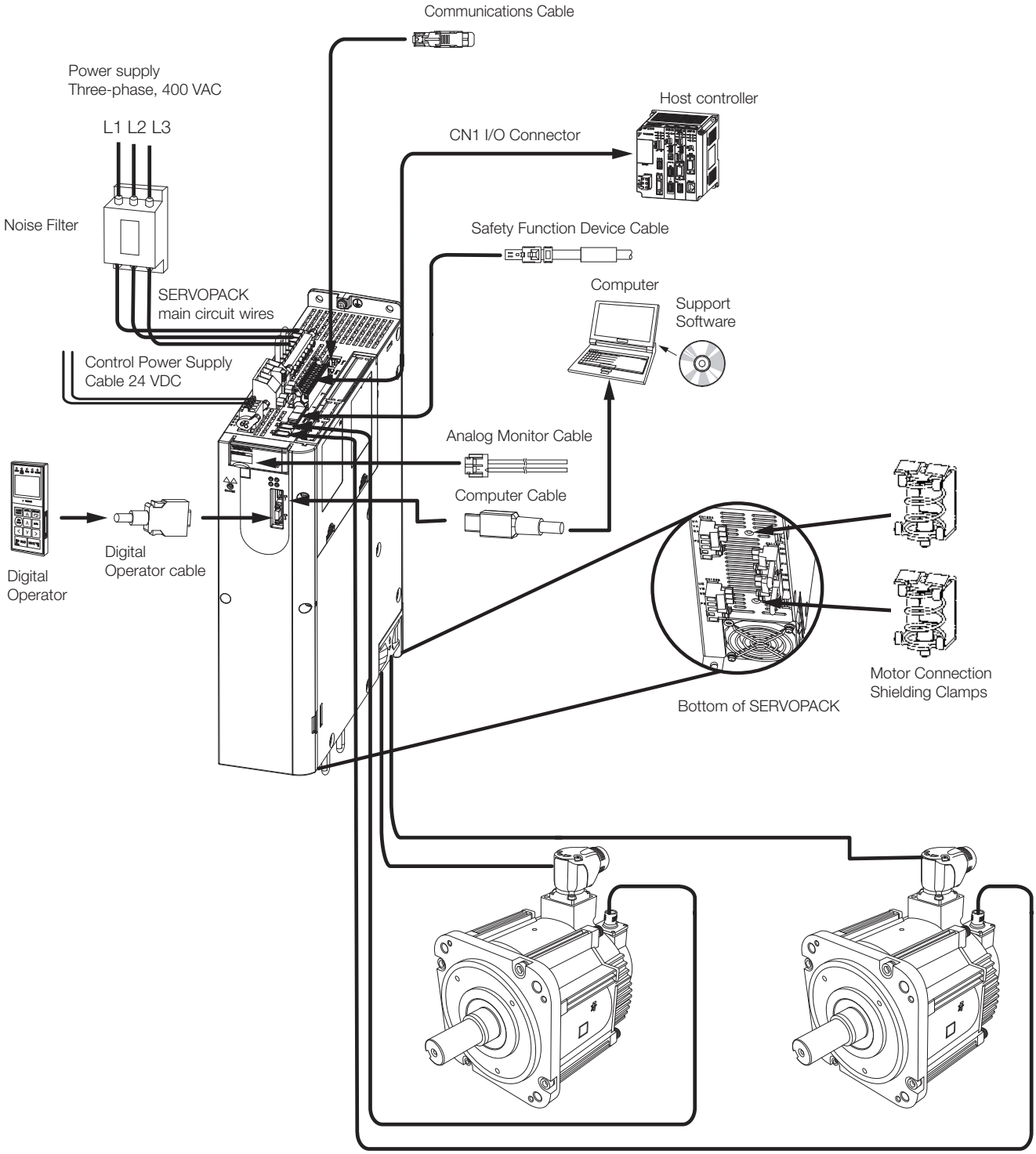
Motor Connection Shielding Clamp

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

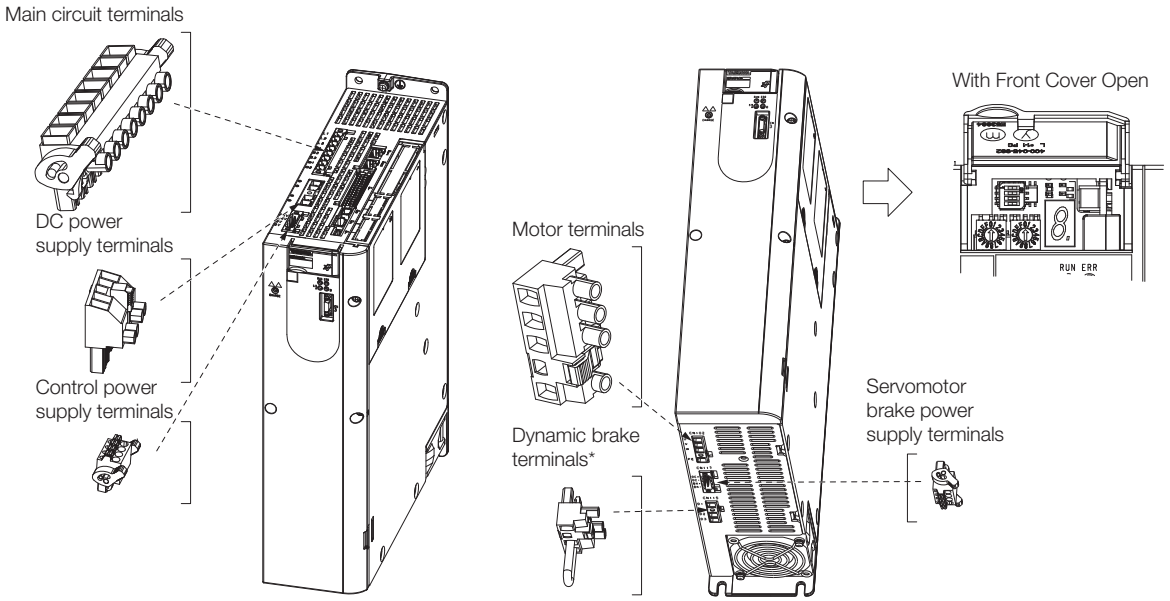
SERVOPACK Model	Order No.	Specification
Sigma-7 400 V up to 3.0 kW	KLBUE 4-13.5_SC	
Sigma-7 400 V from 5 kW up to 7.5 kW	KLBUE 10-20_SC	
Sigma-7 400 V for 11 kW & 15 kW	KLBUE 15-32_SC	

Periphery


EtherCAT Communications Cable
To next EtherCAT station
Host controller
Three-phase, 400 VAC
L1 L2 L3
CN1 I/O Connector
Noise Filter
Safety Function Device Cable
Computer
Support
Software
SERVOPACK
main circuit wires
Control Power Supply
Cable 24 VDC
Computer Cable
Analog Monitor Cable
Digital
Operator cable
Motor Connection
Shielding Clamp
Bottom of SERVOPACK


Communications Cable
Power supply
Three-phase, 400 VAC
L1 L2 L3
Host controller
CN1 I/O Connector
Noise Filter
Safety Function Device Cable
SERVOPACK
main circuit wires
Computer
Support
Software
Control Power Supply
Cable 24 VDC
Analog Monitor Cable
Computer Cable
Digital
Operator
Digital
Operator cable
Motor Connection
Shielding Clamps
Bottom of SERVOPACK

Top and Bottom View of SERVOPACKs



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

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	-			
	7.5	260D	-		-			
	11.0	280D	-	-	-	-		
	15.0	370D	-	-	-	-		
	2 x 0.75	-	2R9D	FESS-4009A*3	X5075	SC-4-1/G		
	2 x 1.5	-	5R4D		X5076	SC-5-1/G		

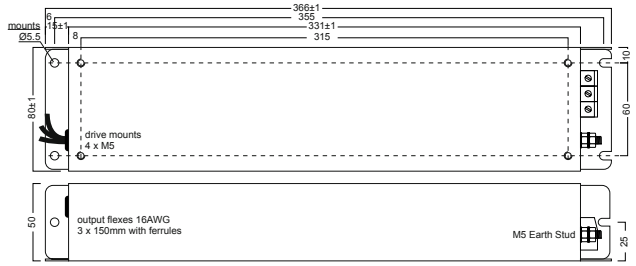
Device	Enquires
Noise Filters	EPA GmbH
Surge Absorbers	Yaskawa Controls Co., Ltd.
DC Reactors	
Magnetic Contactors	Fuji Electric FA Components & Systems Co., Ltd.

*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.

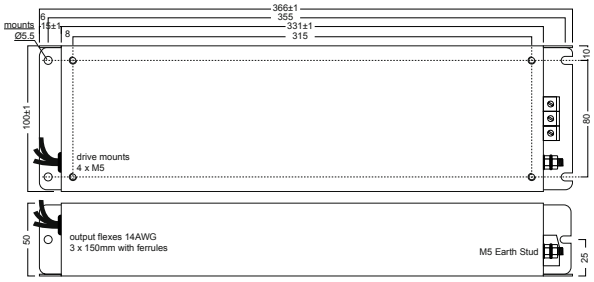
Note: 1. Consult the manufacturer for details on peripheral devices.
2. Refer to the following section for information on Digital Operator Converter Cables.
3. Refer to the -7 Series AC Servo Drive Peripheral Device Selection Manual (Manual No. SIEP S800001 32) for the following information.
• Dimensional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

Dimensions of EMC-Filters

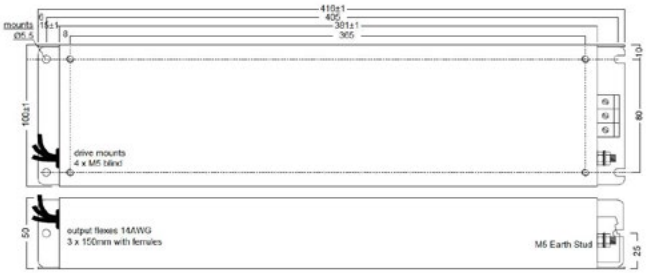
FESS-4009A



FESS-4015A



FESS-4022A



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	2.5 kg
FESS-4015A	0.3 mA nom. (40 mA max.)	55 °C	366 x 100 x 50 mm	2.5 kg
FESS-4022A	0.3 mA nom. (40 mA max.)	55 °C	416 x 80 x 50 mm	2 kg

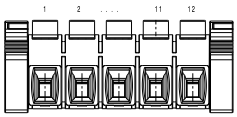
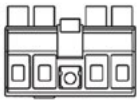
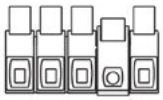
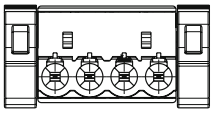
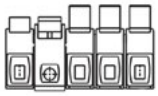
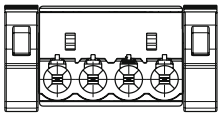
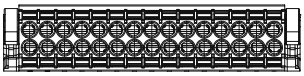
Molded-case Circuit Breakers and Fuses

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 [Arms]	Control Power Supply [Arms]	Main Circuit [A0-p]	Control Power Supply [A0-p]
Three phase, 400 V AC	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			
	7.5	260D	-	14.4	21.7			
	11.0	280D	-	21.9	31.8			
	15.0	370D	-	30.6	43.4			
	2 x 0.75	-	2R9D	3.5	4.4		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, 400V 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)				
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)				
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)					AWG 12 (or 4.0 mm²)				

Three Phase, 400V Wires for SGD7W SERVOPACKs

Cables	Terminal Symbol	SERVOPACK Model SGD7W-	
		2R9D	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 [Arms]		
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 [Ω]	Model Resistor	Resistance [Ω]	Power [W]	Manufacturer
SGD7S-	1R9D	20	-	-	-	-
	3R5D	7.5	-	-	-	-
	5R4D		-	-	-	-
	8R4D	7.8	-	-	-	-
	120D	4	-	-	-	-
	170D	3.3	-	-	-	-
	210D	No integrated Dynamic Brake circuit.				
	260D					
	280D					
	370D					
SGD7W-	2R6D	7.5	-	-	-	-
	5R4D		-	-	-	-

Note:
Contact your YASKAWA representative for information on Sigma-7 400V 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.

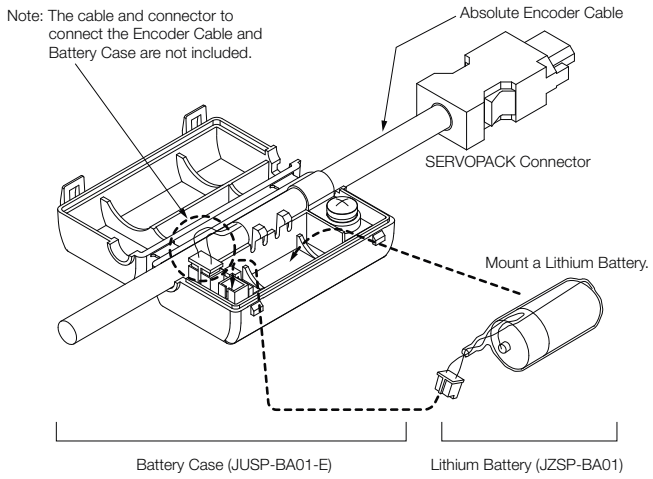
Batteries for Servomotors with Absolute Encoders

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. (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.

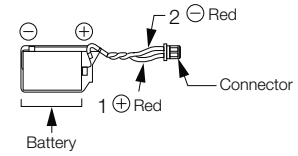
Important

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

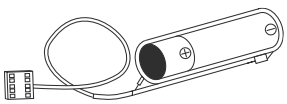
Obtain a Lithium Battery (JZSP-BA01) and mount it in the Battery Case.



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.



Software

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.

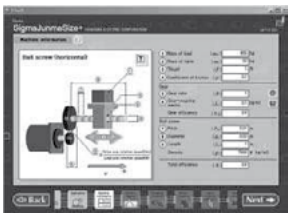
• Features

- 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

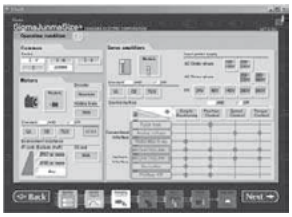
Mechanism Selection View

Machine Specification Entry View



Speed Diagram Entry View

Operating Conditions Selection View



Servomotor Selection View

SERVOPACK Selection View

• System Requirements

Item	System Requirement
Browser (Required for web-based version only)	Internet Explorer 5.0 SP1 or higher
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	20 MB min.

SigmaWin+ Version 7: AC Servo Drive Engineering Tool

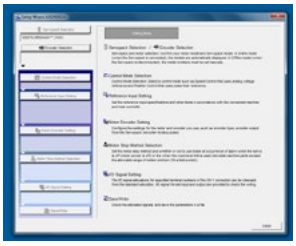
The SigmaWin+ Engineering Tool is used to set up and optimally tune Yaskawa Sigma-series Servo Drives.

Features

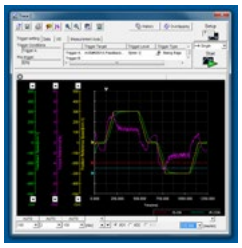
- Set parameters with a wizard.
- Display SERVOPACK data on a computer just like you would on an oscilloscope.
- Estimate moments of inertia and measure vibration frequencies.
- Display alarms and alarm diagnostics.

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: 350 MB min. (400 MB or greater recommended for installation)

Appendix

Capacity Selection for Servomotors 144
Capacity Selection for Regenerative Resistors 151
International Standards 152
Warranty 153

Capacity Selection for Servomotors

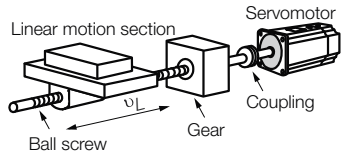
Selecting the Servomotor Capacity

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

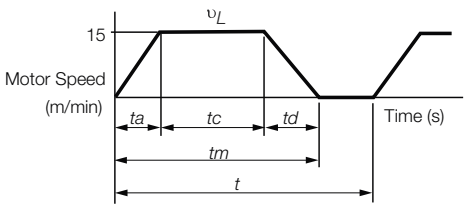
1. Mechanical Specifications



Item	Code	Value
Load Speed	υ_L	15 m/min
Linear Motion Section Mass	m	250 kg
Ball Screw Length	ℓ_B	1.0 m
Ball Screw Diameter	d_B	0.02 m
Ball Screw Lead	P_B	0.01 m
Ball Screw Material Density	ρ	7.87×10^3 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	0.40×10^{-4} kg·m^2
Number of Feeding Operations	n	40 rotations/min
Feeding Distance	ℓ	0.275 m
Feeding Time	tm	1.2 s max.
Friction Coefficient	μ	0.2
Mechanical Efficiency	η	0.9 (90%)

2. Speed Diagram



$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (s)}$$

If ta = td,

$$ta = tm - \frac{60\,\ell}{\upsilon_L} = 1.2 - \frac{60 \times 0.275}{15} = 1.2 - 1.1 = 0.1 \text{ (s)}$$

$$tc = 1.2 - 0.1 \times 2 = 1.0 \text{ (s)}$$

3. Motor Speed

Load shaft speed $\quad n_L = \dfrac{\upsilon_L}{P_B} = \dfrac{15}{0.01} = 1{,}500 \text{ (min}^{-1}\text{)}$

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	0.263×10^{-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

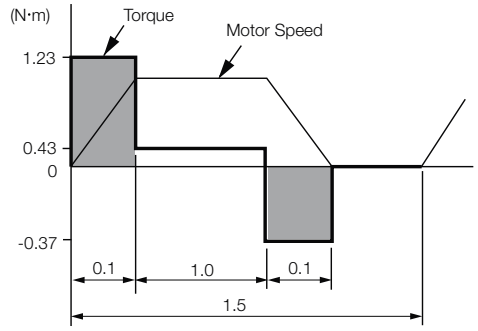
Verification of effective torque value:

$$Trms = \sqrt{\frac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(1.23)^2 \times 0.1 + (0.43)^2 \times 1.0 + (0.37)^2 \times 0.1}{1.5}}$$

$\approx$ 0.483 (N·m) < Rated torque...Satisfactory

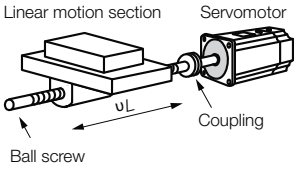
10. Result

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

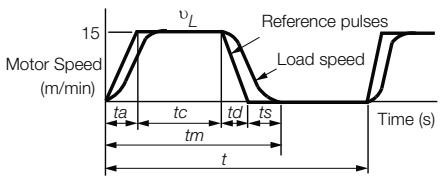
1. Mechanical Specifications



Item	Code	Value
Load Speed	υ_L	15 m/min
Linear Motion Section Mass	m	80 kg
Ball Screw Length	ℓ_B	0.8 m
Ball Screw Diameter	d_B	0.016 m
Ball Screw Lead	P_B	0.005 m
Ball Screw Material Density	ρ	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	ℓ	0.25 m
Feeding Time	tm	1.2 s max.
Electrical Stopping Precision	δ	±0.01 mm
Friction Coefficient	μ	0.2
Mechanical Efficiency	η	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 (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 (min^{-1})
Rated Torque	0.318 (N·m)
Instantaneous Maximum Torque	1.11 (N·m)
Motor Moment of Inertia	0.0659×10^{-4} (kg·m^2)
Allowable Load Moment of Inertia	$0.0659 \times 10^{-4} \times 35 = 2.31 \times 10^{-4}$ (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: Δ^{ℓ} = 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

$$vs = \frac{1{,}000 \upsilon L}{60 \times \Delta^{\ell}} = \frac{1{,}000 \times 15}{60 \times 0.01} = 25{,}000 \text{ (pps)}$$

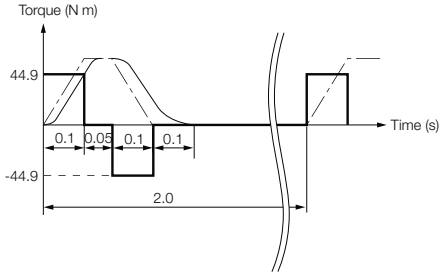
Confirm that the maximum input pulse frequency is greater than the reference pulse frequency.

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.

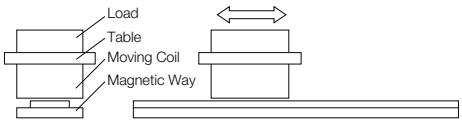
8. Result

It has been verified that the provisionally selected Servomotor is applicable.
The torque diagram is shown below.



Servomotor Capacity Selection Example for Linear Servomotors

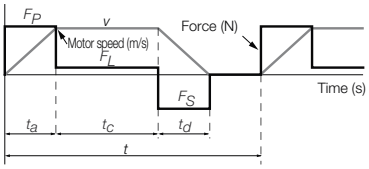
1. Mechanical Specifications



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	μ	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

$$F_{rms} = \sqrt{\frac{F_P^2 \cdot t_a + F_L^2 \cdot t_c + F_s^2 \cdot t_d}{t}} = \sqrt{\frac{389.5^2 \times 0.02 + 7.5^2 \times 0.36 + 374.5^2 \times 0.02}{0.5}}$$

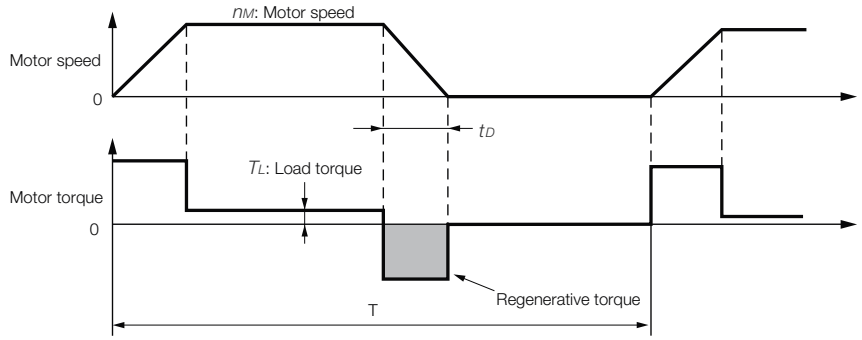
$= 108.3$ (N) ≤ Rated force × 0.9 (= 132.3 N)… Satisfactory

7. Result

It has been verified that the provisionally selected Servomotor is applicable.

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	$E_L = (\pi/60)\, n_M T_L t_D$ 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* on page 271) $\times t_D$
4	Calculate the energy that can be absorbed by the SERVOPACK.	E_C	Calculate from the graphs in ◆ *SERVOPACK-absorbable Energy* on page 270
5	Calculate the energy consumed by the regenerative resistor.	E_K	$E_K = E_S - (E_L + E_M + E_C)$ $E_K = E_S - (E_L + E_M + E_C) + E_G$ 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.

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 r eplacement 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.

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