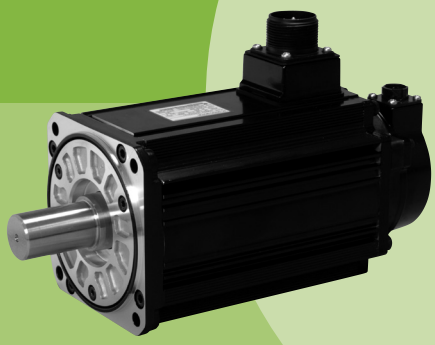
Rotary Servomotors

SGMSV



Model Designations

SGMSV - 10 A D A 2 1

Σ-V Series Servomotor SGMSV	1st+2nd digits	3rd digit	4th digit	5th digit	6th digit	7th digit

1st+2nd digits Rated Output

Code	Specifications
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*

*: Available only for 200-VAC models.

3rd digit Power Supply Voltage

Code	Specifications
A	200 VAC
D	400 VAC

4th digit Serial Encoder

Code	Specifications
3	20-bit absolute (standard)
D	20-bit incremental (standard)

5th digit Design Revision Order

Code	Specifications
A	Standard

6th digit Shaft End

Code	Specifications
2	Straight without key (standard)
6	Straight with key and tap (optional)

7th digit Options

Code	Specifications
1	Without options (not used in Europe)
F	With dust seal
H	With dust seal and holding brake (24 VDC)
E	With oil seal and holding brake (24 VDC)
S	With oil seal

Features

- Super high power
- Wide selection: 1.0 kW to 7.0 kW capacity, holding brake option
- Mounted serial encoder: 20 bits, high resolution
- Protective structure: IP67 (Not including the IP22 compliant enclosure for 7.0 kW motor)

Application Examples

- Chip mounters
- PCB drilling stations
- Machine tool feeders

Configurations of connectors for the main circuit

SGMSV-10 to -70

The connectors for these models are round. The connectors specified by Yaskawa are required. Note that the connectors vary depending on the operation environment of servomotors.
Two types of connectors are available.

- Standard connectors
  For details, refer to page 78 to 80.
- Protective structure IP67 and European Safety Standards compliant connectors
  For details, refer to page 81 and 82.

Ratings and Specifications

Time Rating: Continuous
Vibration Class: V15
Insulation Resistance: 500 VDC, 10 MΩ min.
Ambient Temperature: 0 to 40°C
Excitation: Permanent magnet
Mounting: Flange-mounted
Thermal Class: F

Withstand Voltage: 1500 VAC for one minute (200-V class)
1800 VAC for one minute (400-V class)
Enclosure: Totally enclosed, self-cooled, IP67
(except for shaft opening)
Note: IP22 for SGMSV-70 servomotors.
Ambient Humidity: 20% to 80% (no condensation)
Drive Method: Direct drive
Rotation Direction: Counterclockwise (CCW) with forward run reference when viewed from the load side

200-V Class

Servomotor Model: SGMSV-□□□		10A	15A	20A	25A	30A	40A	50A	70A
Rated Output*	kW	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.0
Rated Torque*	Nm	3.18	4.90	6.36	7.96	9.80	12.6	15.8	22.3
Instantaneous Peak Torque*	Nm	9.54	14.7	19.1	23.9	29.4	37.8	47.6	54
Rated Current*	Arms	5.7	9.3	12.1	13.8	17.9	25.4	27.6	38.3
Instantaneous Max. Current*	Arms	17	28	42	44.5	56	77	84	105
Rated Speed*	min^{-1}	3000							
Max. Speed*	min^{-1}	6000	5000						
Torque Constant	Nm/Arms	0.636	0.590	0.561	0.610	0.582	0.519	0.604	0.604
Rotor Moment of Inertia	$\times10^{-4}$ kgm^2	1.74 (1.99)	2.00 (2.25)	2.47 (2.72)	3.19 (3.44)	7.00 (9.2)	9.60 (11.8)	12.3 (14.5)	12.3
Rated Power Rate*	kW/s	58 (51)	120 (107)	164 (149)	199 (184)	137 (104)	165 (135)	203 (172)	404
Rated Angular Acceleration*	rad/s^2	18300 (16000)	24500 (21800)	25700 (23400)	25000 (23100)	14000 (10700)	13100 (10700)	12800 (10900)	18100
Applicable SERVOPACK	SGDV-□□□□	7R6A	120A	180A	200A	200A	330A	330A	550A

*: These items and torque-motor speed characteristics quoted in combination with a SERVOPACK are at an armature winding temperature of 20°C.
Notes: 1 The values in parentheses are for servomotors with holding brakes.
2 The above specifications show the values under the cooling condition when the following heat sinks are mounted on the servomotors.
SGMSV-10A/-15A/-20A/-25A : 300 mm×300 mm×12 mm (aluminum)
SGMSV-30A/-40A/-50A/-70A : 400 mm×400 mm×20 mm (aluminum)

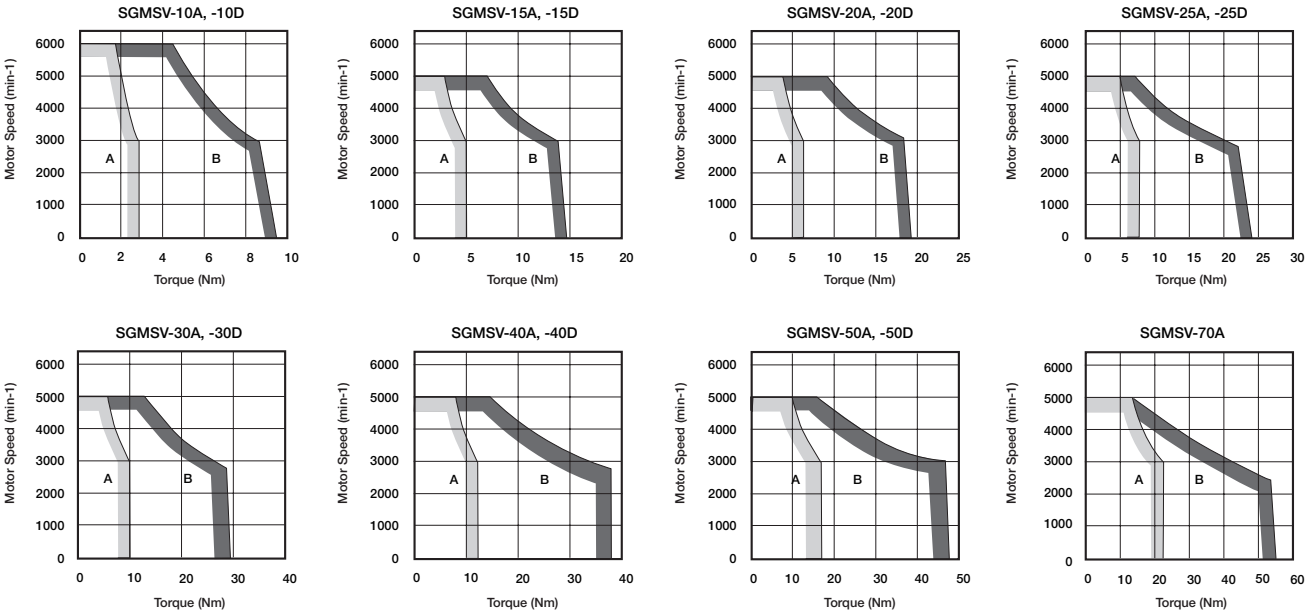
400-V Class

Servomotor Model: SGMSV-□□□		10D	15D	20D	25D	30D	40D	50D
Rated Output*	kW	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Rated Torque*	Nm	3.18	4.9	6.36	7.96	9.8	12.6	15.8
Instantaneous Peak Torque*	Nm	9.54	14.7	19.1	23.9	29.4	37.8	47.6
Rated Current*	Arms	2.8	4.7	6.1	7.4	8.9	12.5	13.8
Instantaneous Max. Current*	Arms	8.5	14	20	25	28	38	42
Rated Speed*	min^{-1}	3000						
Max. Speed*	min^{-1}	6000	5000					
Torque Constant	Nm/Arms	1.27	1.23	1.18	1.15	1.16	1.06	1.21
Rotor Moment of Inertia	$\times10^{-4}$ kgm^2	1.74 (1.99)	2.00 (2.25)	2.47 (2.72)	3.19 (3.44)	7.00 (9.2)	9.60 (11.8)	12.3 (14.5)
Rated Power Rate*	kW/s	58 (51)	120 (107)	164 (149)	199 (184)	137 (104)	165 (135)	203 (172)
Rated Angular Acceleration*	rad/s^2	18300 (16000)	24500 (21800)	25700 (23400)	25000 (23100)	14000 (10700)	13100 (10700)	12800 (10900)
Applicable SERVOPACK	SGDV-□□□□	3R5D	5R4D	8R4D	120D	120D	170D	170D

*: These items and torque-speed characteristics quoted in combination with a SERVOPACK are at an armature winding temperature of 20°C.
Notes: 1 The values in parentheses are for servomotors with holding brakes.
2 The above specifications show the values under the cooling condition when the following heat sinks are mounted on the servomotors.
SGMSV-10D/-15D/-20D/-25D: 300 mm × 300 mm × 12 mm (aluminum)
SGMSV-30D/-40D/-50D : 400 mm × 400 mm × 20 mm (aluminum)

Ratings and Specifications

● Torque-Speed Characteristics (200 V/400 V) A: Continuous Duty Zone B: Intermittent Duty Zone



Notes: 1 When the effective torque is within the rated torque, the servomotor can be used within the intermittent duty zone.
2 When the power cable length exceeds 20 m, note that the intermittent duty zone of the *Torque-Speed Characteristics* will shrink as the line-to-line voltage drops.

● Holding Brake Electrical Specifications

Servomotor Model	Servomotor Rated Output kW	Holding Brake Specifications		
		Holding Torque Nm	Rated Voltage 24 VDC	
			Capacity W	Rated Current A (at 20℃)
SGMSV-10	1.0	7.84	12	0.5
SGMSV-15	1.5	7.84	12	0.5
SGMSV-20	2.0	7.84	12	0.5
SGMSV-25	2.5	10	12	0.5
SGMSV-30	3.0	20	10	0.41
SGMSV-40	4.0	20	10	0.41
SGMSV-50	5.0	20	10	0.41

Notes: 1 The holding brake is only used to hold the load and cannot be used to stop the servomotor.
2 The holding brake open time and holding brake operation time vary depending on which discharge circuit is used. Make sure holding brake open time and holding brake operation time are correct for your servomotor.
3 A 24 VDC power supply is to be provided by customers.

Ratings and Specifications

● Allowable Load Moment of Inertia at the Motor Shaft

The rotor moment of inertia ratio is the value for a servomotor without a gear and a holding brake.

Servomotor Model	Servomotor Rated Output	Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio)
SGMSV-10 to -70	1.0 to 7.0 kW	5 times

● Load Moment of Inertia

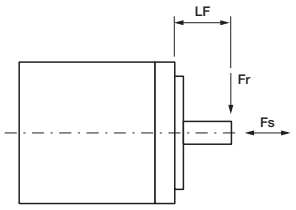
The larger the load moment of inertia, the worse the movement response.
The allowable load moment of inertia (J_L) depends on the motor capacity, as shown above. This value is provided strictly as a guideline and results may vary depending on servomotor drive conditions.
Use the AC servo drive capacity selection program SigmaJunmaSize+ to check the operation conditions. The program can be downloaded for free from our web site (http://www.yaskawa.eu.com).

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). Take one of the following steps if this occurs.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum speed.
- Install an external regenerative resistor if the alarm cannot be cleared using the steps above. Refer to *Regenerative Resistors* on page 364.

● Allowable Radial and Thrust Loads

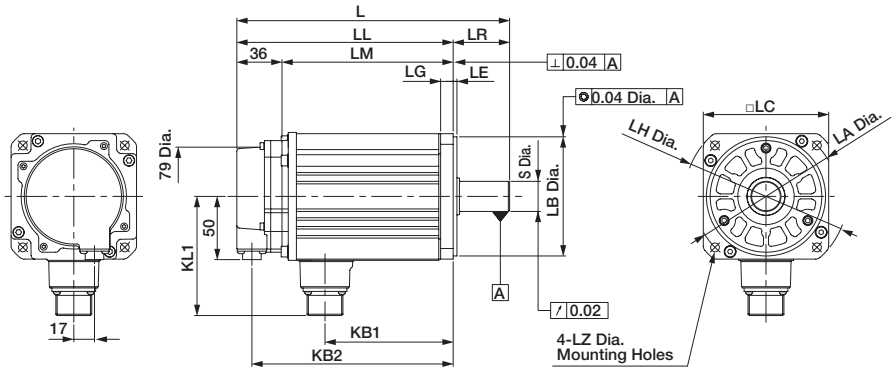
Design the mechanical system so thrust and radial loads applied to the servomotor shaft end during operation fall within the ranges shown in the table.

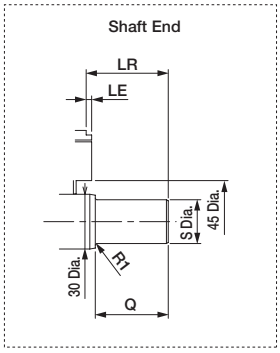
Servomotor Model		Allowable Radial Load (Fr) N	Allowable Thrust Load (Fs) N	LF mm	Reference Diagram
SGMSV-	10□□A21	686	196	45	
	15□□A21				
	20□□A21				
	25□□A21				
	30□□A21	980	392	63	
	40□□A21	1176			
	50□□A21				
	70□□A21				

External Dimensions Units: mm

● Without Holding Brakes

(1) 1.0 to 5.0 kW



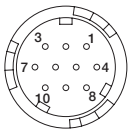


Note: For the specifications of the other shaft ends, refer to page 76.

Model SGMSV-	L	LL	LM	LR	KB1	KB2	KL1	Flange Face Dimensions								Shaft End Dimensions		Approx. Mass
								LA	LB	LC	LE	LF	LG	LH	LZ	S	Q	kg
10□□A21	192	147	111	45	76	135	96	115	$95^{\ 0}_{-0.035}$	100	3	3	10	130	7	$24^{\ 0}_{-0.013}$	40	4.1
15□□A21	202	157	121	45	86	145	96	115	$95^{\ 0}_{-0.035}$	100	3	3	10	130	7	$24^{\ 0}_{-0.013}$	40	4.6
20□□A21	218	173	137	45	102	161	96	115	$95^{\ 0}_{-0.035}$	100	3	3	10	130	7	$24^{\ 0}_{-0.013}$	40	5.4
25□□A21	241	196	160	45	125	184	96	115	$95^{\ 0}_{-0.035}$	100	3	3	10	130	7	$24^{\ 0}_{-0.013}$	40	6.8
30□□A21	259	196	160	63	124	184	114	145	$110^{\ 0}_{-0.035}$	130	6	6	12	165	9	$28^{\ 0}_{-0.013}$	55	10.5
40□□A21	296	233	197	63	161	221	114	145	$110^{\ 0}_{-0.035}$	130	6	6	12	165	9	$28^{\ 0}_{-0.013}$	55	13.5
50□□A21	336	273	237	63	201	261	114	145	$110^{\ 0}_{-0.035}$	130	6	6	12	165	9	$28^{\ 0}_{-0.013}$	55	16.5

Note: Models with oil seals are of the same configuration.

• Cable Specifications for Encoder-end Connector (20-bit Encoder)



Receptacle: CM10-R10P-D
Applicable plug (To be provided by the customer)
Plug: CM10-AP10S-□-D (L-shaped)
CM10-SP10S-□-D (Straight)
(Boxes (□) indicate a value that varies, depending on cable size.)
Manufacturer: DDK Ltd.

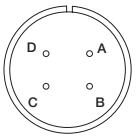
With an Absolute Encoder

1	PS	6	BAT (+)
2	/PS	7	–
3	–	8	–
4	PG 5V	9	PG 0V
5	BAT (–)	10	FG (Frame ground)

With an Incremental Encoder

1	PS	6	–
2	/PS	7	–
3	–	8	–
4	PG 5V	9	PG 0V
5	–	10	FG (Frame ground)

• Cable Specifications for Servomotor-end Connector



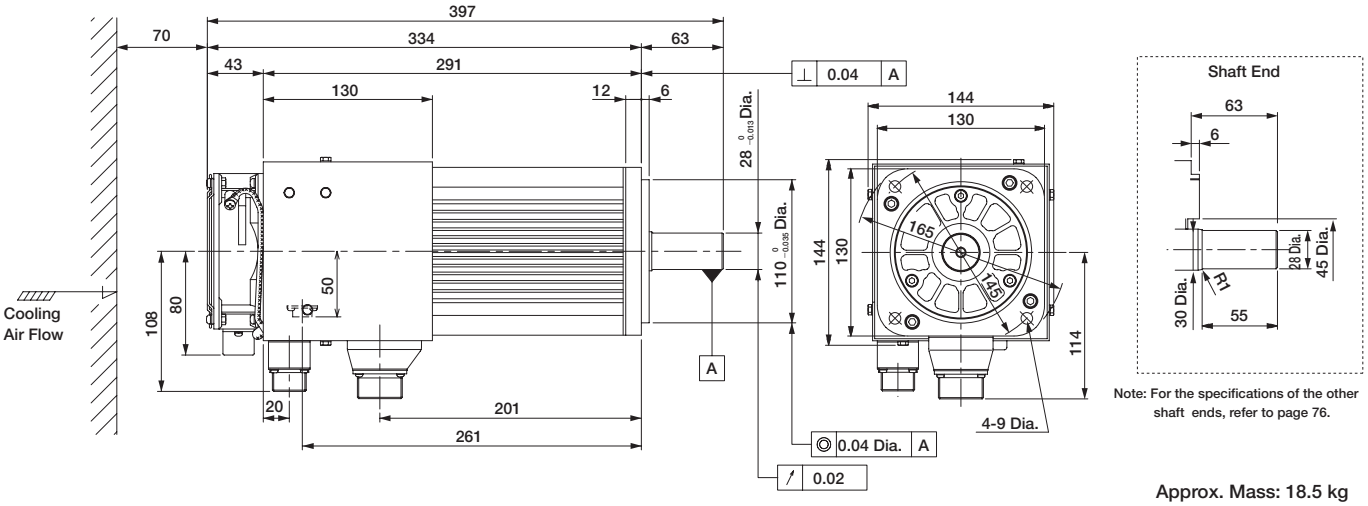
A	Phase U
B	Phase V
C	Phase W
D	FG (Frame ground)

• SGMSV-10 to -25
Manufacturer: DDK Ltd.
• SGMSV-30 to -50
Manufacturer: Japan Aviation Electronics Industry, Ltd.

External Dimensions Units: mm

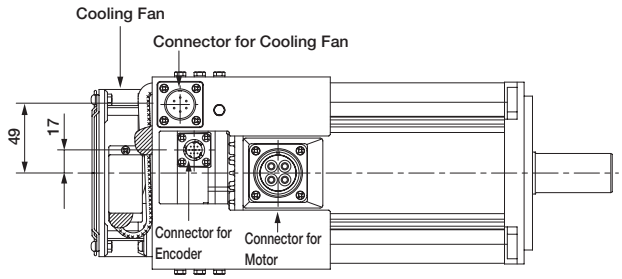
(2) 7.0 kW (only for 200 V servomotors)

Note: Leave a minimum space of 70 mm around the servomotor to allow for a sufficient amount of cooling air.



Note: For the specifications of the other shaft ends, refer to page 76.

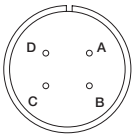
Approx. Mass: 18.5 kg



- Specifications of Cooling Fan
  Single-phase 220 V
  50/60 Hz
  17/15 W
  0.11/0.09 A

- Specifications of rotation error detector
  Contact Capacity:
  Max. allowable voltage: 350 V (AC, DC)
  Max. allowable current: 120 mA (AC, DC)
  Max. controllable power: 360 mW
  Alarm Contact:
  ON at normal fan rotation.
  OFF at 1680±100 min-1 or less.
  (OFF during 3 seconds at start-up)

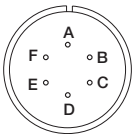
- Cable Specifications for Servomotor-end Connector



A	Phase U
B	Phase V
C	Phase W
D	FG (Frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Cable Specifications for Fan-end Connector

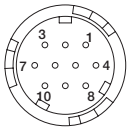


Receptacle: MS3102A14S-6P
Applicable plug
Plug: MS3108B14S-6S
Cable clamp: MS3057-6A

Note: Servomotor-end connectors (receptacles) are RoHS-compliant. Contact the respective connector manufacturers for RoHS-compliant cable-end connectors.

A	Fan motor
B	Fan motor
C	–
D	Alarm terminal
E	Alarm terminal
F	FG (Frame ground)

- Cable Specifications for Encoder-end Connector (20-bit Encoder)



Receptacle: CM10-R10P-D
Applicable plug (To be provided by the customer)
Plug: CM10-SP10S-□-D (Straight)
(Boxes (□) indicate a value that varies, depending on cable size.)
Use straight plugs to avoid interference with the fan cover.
Manufacturer : DDK Ltd.

With an Absolute Encoder

1	PS	6	BAT (+)
2	/PS	7	–
3	–	8	–
4	PG 5V	9	PG 0V
5	BAT (–)	10	FG (Frame ground)

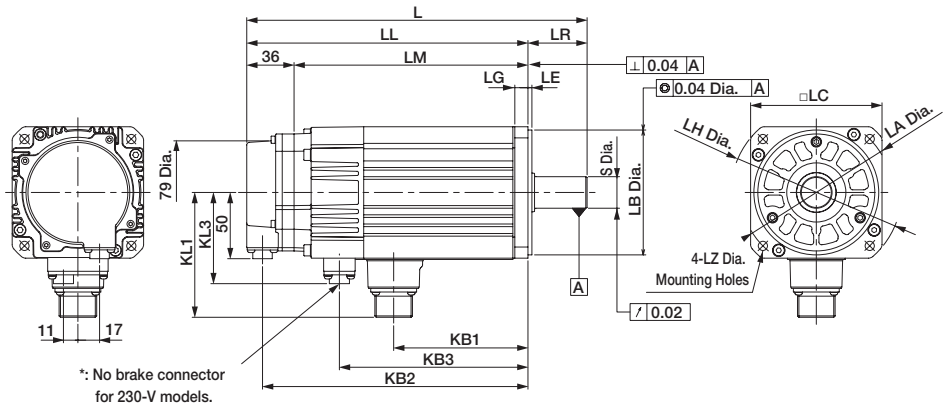
With an Incremental Encoder

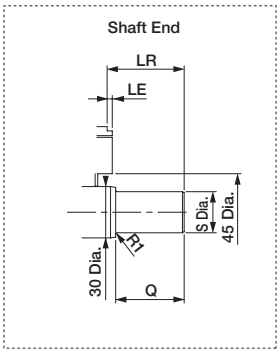
1	PS	6	–
2	/PS	7	–
3	–	8	–
4	PG 5V	9	PG 0V
5	–	10	FG (Frame ground)

External Dimensions Units: mm

●With Holding Brakes

(1) 1.0 to 5.0 kW



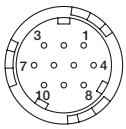


Note: For the specifications of the other shaft ends, refer to page 76.

Model SGMSV-	L	LL	LM	LR	KB1		KB2	KB3*	KL1		KL3*	Flange Face Dimensions								Shaft End Dimensions		Approx. Mass
					200V	400V		400V	200V	400V	400V	LA	LB	LC	LE	LF	LG	LH	LZ	S	Q	kg
10□□A2□	233	188	152	45	67	76	176	118	102	96	69	115	$95^{0}_{-0.035}$	100	3	3	10	130	7	$24^{0}_{-0.013}$	40	5.5
15□□A2□	243	198	162	45	77	86	186	128	102	96	69	115	$95^{0}_{-0.035}$	100	3	3	10	130	7	$24^{0}_{-0.013}$	40	6
20□□A2□	259	214	178	45	93	102	202	144	102	96	69	115	$95^{0}_{-0.035}$	100	3	3	10	130	7	$24^{0}_{-0.013}$	40	6.8
25□□A2□	292	247	211	45	116	125	225	177	102	96	69	115	$95^{0}_{-0.035}$	100	3	3	10	130	7	$24^{0}_{-0.013}$	40	8.7
30□□A2□	295	232	196	63	114	124	220	176	119	114	81	145	$110^{0}_{-0.035}$	130	6	6	12	165	9	$28^{0}_{-0.013}$	55	13
40□□A2□	332	269	233	63	151	161	257	213	119	114	81	145	$110^{0}_{-0.035}$	130	6	6	12	165	9	$28^{0}_{-0.013}$	55	16
50□□A2□	372	309	273	63	191	201	297	253	119	114	81	145	$110^{0}_{-0.035}$	130	6	6	12	165	9	$28^{0}_{-0.013}$	55	19

*: No brake connector for 200-V models (there are brake terminals on the servomotor-end connectors).
Note: Models with oil seals are of the same configuration.

• Cable Specifications for Encoder-end Connector (20-bit Encoder)



Receptacle: CM10-R10P-D
Applicable plug (To be provided by the customer)
Plug: CM10-AP10S-□-D (L-shaped)
CM10-SP10S-□-D (Straight)
(Boxes (□) indicate a value that varies, depending on cable size.)
Manufacturer: DDK Ltd.

With an Absolute Encoder

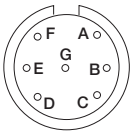
1	PS	6	BAT (+)
2	/PS	7	–
3	–	8	–
4	PG 5V	9	PG 0V
5	BAT (–)	10	FG (Frame ground)

With an Incremental Encoder

1	PS	6	–
2	/PS	7	–
3	–	8	–
4	PG 5V	9	PG 0V
5	–	10	FG (Frame ground)

200-V Class

• Cable Specifications for Servomotor-end Connector



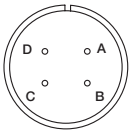
A	Phase U
B	Phase V
C	Phase W
D	FG (Frame ground)
E	Brake terminal
F	Brake terminal
G	–

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Note: No polarity for connection to the brake terminals

400-V Class

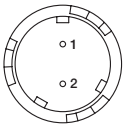
• Cable Specifications for Servomotor-end Connector



A	Phase U
B	Phase V
C	Phase W
D	FG (Frame ground)

• SGMSV-10 to -25
Manufacturer: DDK Ltd.
• SGMSV-30 to -50
Manufacturer: Japan Aviation Electronics Industry, Ltd.

• Cable Specifications for Brake-end Connector



Receptacle: CM10-R2P-D
Applicable plug (To be provided by the customer)
Plug: CM10Y-AP2S-□-D-G1 (L-shaped)
CM10-SP2S-□-D (Straight)
(Boxes (□) indicate a value that varies, depending on cable size.)
Manufacturer: DDK Ltd.

Brake terminal
Brake terminal

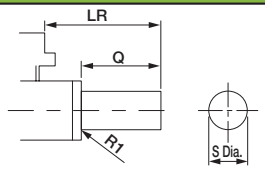
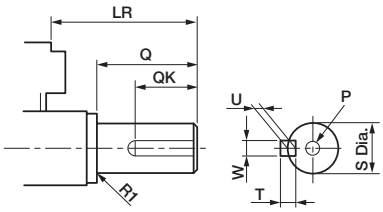
Note: No polarity for connection to the brake terminals

External Dimensions Units: mm

● Shaft End

SGMSV - □□□□□□

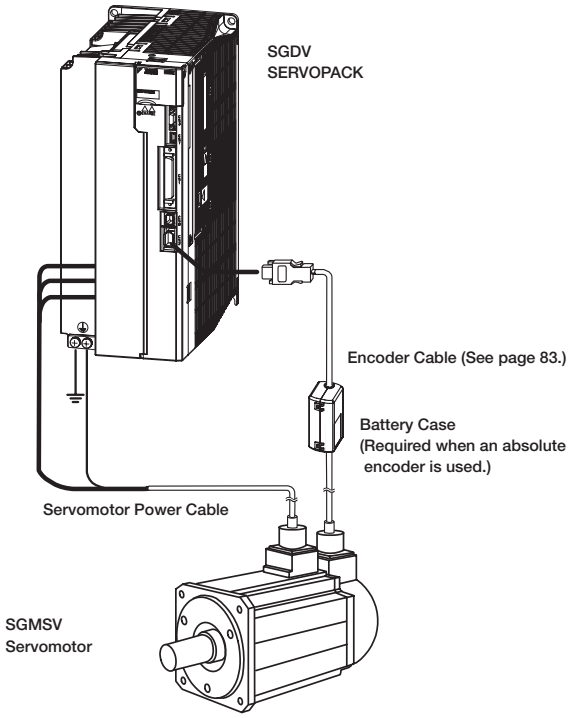
Code	Specifications	Remarks
2	Straight without key	Standard
6	Straight with key and tap for one location (Key slot is JIS B1301-1996 fastening type)	Optional

Code	Specifications	Shaft End		Model SGMSV-							
				10	15	20	25	30	40	50	70
2	Straight without Key		LR	45				63			
			Q	40				55			
			S	$24^{\ 0}_{-0.013}$				$28^{\ 0}_{-0.013}$			
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 Depth16							

Selecting Cables

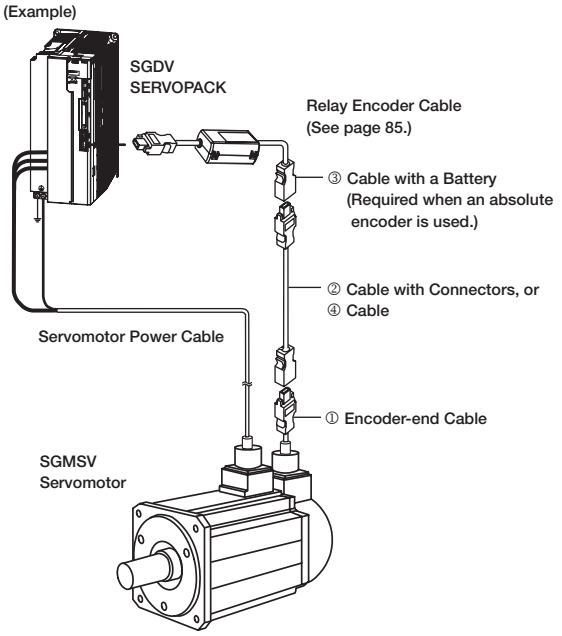
● Cables Connections

● Standard Wiring (Max. encoder cable length: 20 m)



● Encoder Cable Extension from 30 to 50 m

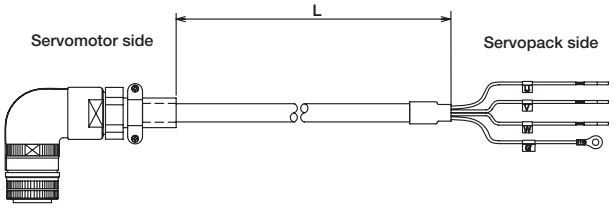
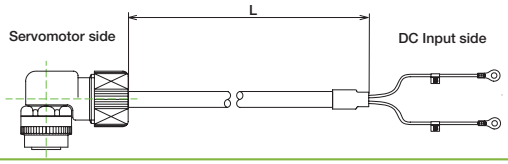
(See page 85.)



⚠ CAUTION

- Separate the servomotor power cable wiring from the I/O signal cable and encoder cable at least 30 cm, and do not bundle or run them in the same duct.
- When the power cable length exceeds 20 m, note that the intermittent duty zone of the *Torque-Speed Characteristics* will shrink as the line-to-line voltage drops.

● Servomotor Power Cable (400-V Class)

Name	Servomotor Rated Output	Length	Order No. Flexible Type	Specifications	Details
For Servomotor without Holding Brakes	1.0 kW to 1.5 kW	3 m	JZSP-CVMCA11-03-E-G#		(1)
		5 m	JZSP-CVMCA11-05-E-G#		
		10 m	JZSP-CVMCA11-10-E-G#		
		15 m	JZSP-CVMCA11-15-E-G#		
		20 m	JZSP-CVMCA11-20-E-G#		
	2.0 kW to 2.5 kW	3 m	JZSP-CVMCA12-03-E-G#		
		5 m	JZSP-CVMCA12-05-E-G#		
		10 m	JZSP-CVMCA12-10-E-G#		
		15 m	JZSP-CVMCA12-15-E-G#		
		20 m	JZSP-CVMCA12-20-E-G#		
	3.0 kW to 5.0 kW	3 m	JZSP-CVMCA13-03-E-G#		
		5 m	JZSP-CVMCA13-05-E-G#		
		10 m	JZSP-CVMCA13-10-E-G#		
		15 m	JZSP-CVMCA13-15-E-G#		
		20 m	JZSP-CVMCA13-20-E-G#		
For Servomotor with Holding Brakes	1.0 kW to 5.0 kW	3 m	JZSP-CVB12Y-03-E-G#		(2)
		5 m	JZSP-CVB12Y-05-E-G#		
		10 m	JZSP-CVB12Y-10-E-G#		
		15 m	JZSP-CVB12Y-15-E-G#		
		20 m	JZSP-CVB12Y-20-E-G#		

Note: The digit "#" of the order number represents the design revision.

Selecting Cables

● Servomotor Power Cable (200-V Class)

Customers must assemble the servomotor's power cables and attach connectors to connect the SERVOPACKs and the SGMSV servomotors.

The connectors for these models are round. The connectors specified by Yaskawa are required. Note that the connectors vary depending on the operation environment of servomotors.

Two types of connectors are available.

- Standard connectors
- Protective structure IP67 and European Safety Standards compliant connectors

Yaskawa does not specify which cables to use. Use appropriate cables for the connectors.

(1) Wiring Specifications for Servomotors

SERVOPACK-end Leads

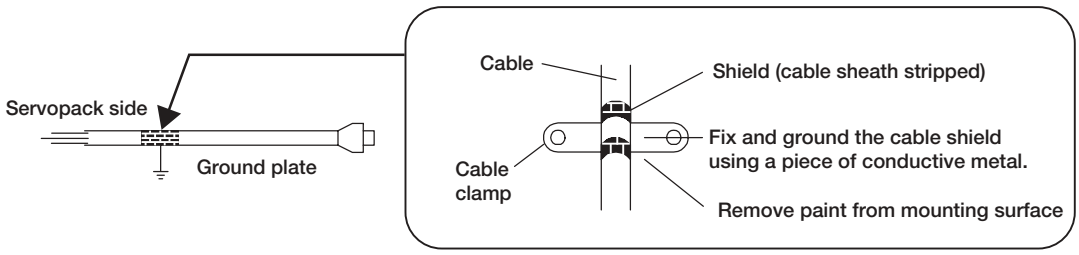
Wire Color	Signal
Green/Yellow	FG
Black 1	Phase W
Black 2	Phase V
Black 3	Phase U

Servomotor-end Connector

Signal	Pin No.
FG	1
Phase W	2
Phase V	3
Phase U	4
–	5/6
Shell	FG

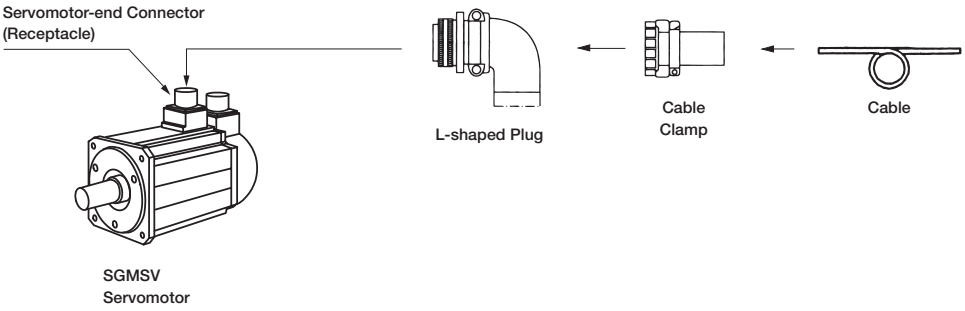
Fix shielded cable at servopack end as shown below

Shield Wire

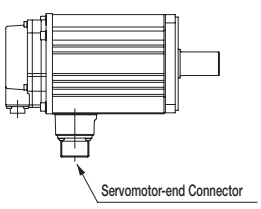


● Standard Connectors

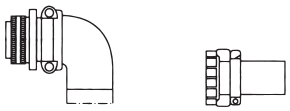
● Connector Configuration



(1) Without Holding Brakes



Servomotor-end Connector
For 1.0 to 7.0 kW



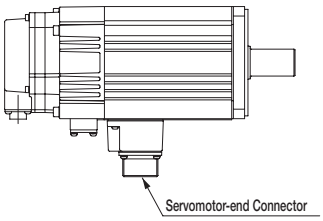
Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not provided by Yaskawa)	
		L-shaped Plug	Cable Clamp
1.0 to 2.5	CE05-2A18-10PD-D (MS3102A18-10P)	MS3108B18-10S	MS3057-10A
3.0 to 7.0	JL04HV-2E22-22PE-B-R (MS3102A22-22P)	MS3108B22-22S	MS3057-12A

Note: 1 Servomotor-end connectors (receptacles) are RoHS-compliant. Contact the respective connector manufacturers for RoHS-compliant cable-end connectors.
2 Servomotor-end connectors (receptacles) can be used with MS plugs. For the model number of the MS receptacle, refer to the receptacle number in parentheses and select the appropriate plug.

Selecting Cables

(2) With Holding Brakes (200 V)

No brake connector for 200-V models
(there are brake terminals on the servomotor-end connectors).

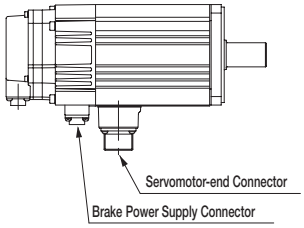


Servomotor-end Connector
For 1.0 to 5.0 kW

Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not provided by Yaskawa)	
		L-shaped Plug	Cable Clamp
1.0 to 2.5	JL04V-2E20-15PE-B-R (MS3102A20-15P)	MS3108B20-15S	MS3057-12A
3.0 to 5.0	JL04V-2E24-10PE-B-R (MS3102A24-10P)	MS3108B24-10S	MS3057-16A

Note: 1 Servomotor-end connectors (receptacles) are RoHS-compliant. Contact the respective connector manufacturers for RoHS-compliant cable-end connectors.
2 Servomotor-end connectors (receptacles) can be used with MS plugs. For the model number of the MS receptacle, refer to the receptacle number in parentheses and select the appropriate plug.

(3) With Holding Brakes (400 V)

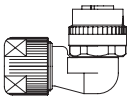


Servomotor-end Connector
For 1.0 to 5.0 kW

Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not provided by Yaskawa)	
		L-shaped Plug	Cable Clamp
1.0 to 2.5	CE05-2A18-10PD-D (MS3102A18-10P)	MS3108B18-10S	MS3057-10A
3.0 to 5.0	JL04HV-2E22-22PE-B-R (MS3102A22-22P)	MS3108B22-22S	MS3057-12A

Note: 1 Servomotor-end connectors (receptacles) are RoHS-compliant. Contact the respective connector manufacturers for RoHS-compliant cable-end connectors.
2 Servomotor-end connectors (receptacles) can be used with MS plugs. For the model number of the MS receptacle, refer to the receptacle number in parentheses and select the appropriate plug.

Brake Power Supply Connector
For 1.0 to 5.0 kW

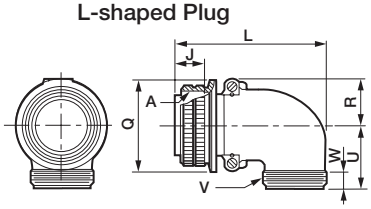


Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not provided by Yaskawa)	
		L-shaped Plug	Manufacturer
1.0 to 5.0	CM10-R2P-D	CM10Y-AP2S-M-D-G1 Applicable Cable: 6.0 dia. to 9.0 dia.	DDK Ltd.

Selecting Cables

● Cable-end Connectors

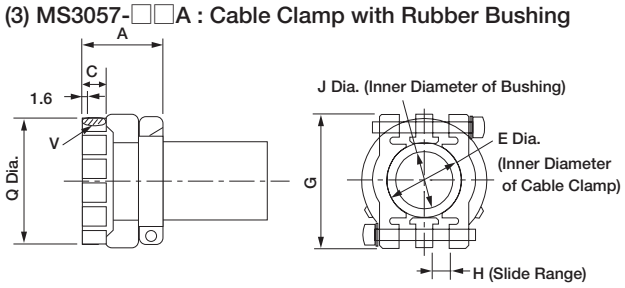
(2) MS3108B□□-□□S : L-shaped Plug



Units: mm

Shell Size	Joint Screw A	Length of Joint Portion J±0.12	Overall Length L max.	Outer Diameter of Joint Nut Q $^{+0}_{-0.38}$	R ±0.5	U ±0.5	Cable Clamp Set Screw V	Effective Screw Length W min.
18	1-1/8-18UNEF	18.26	68.27	34.13	20.5	30.2	1-20UNEF	9.53
20	1-1/4-18UNEF	18.26	76.98	37.28	22.5	33.3	1-3/16-18UNEF	9.53
22	1-3/8-18UNEF	18.26	76.98	40.48	24.1	33.3	1-3/16-18UNEF	9.53
24	1-1/2-18UNEF	18.26	86.51	43.63	25.6	36.5	1-7/16-18UNEF	9.53

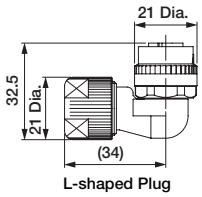
(3) MS3057-□□A : Cable Clamp with Rubber Bushing



Units: mm

Cable Clamp Type	Applicable Connector Shell Size	Overall Length A±0.7	Effective Screw Length C	E Diameter	G±0.7	H	J Diameter	Set Screw V	Outer Diameter Q±0.7 Dia.	Attached Bushing
MS3057-10A	18	23.8	10.3	15.9	31.7	3.2	14.3	1-20UNEF	30.1	AN3420-10
MS3057-12A	20 22	23.8	10.3	19	37.3	4	15.9	1-3/16-18UNEF	35.0	AN3420-12
MS3057-16A	24	26.2	10.3	23.8	42.9	4.8	19.1	1-7/16-18UNEF	42.1	AN3420-16

● Dimensional Drawings of Brake Power Supply

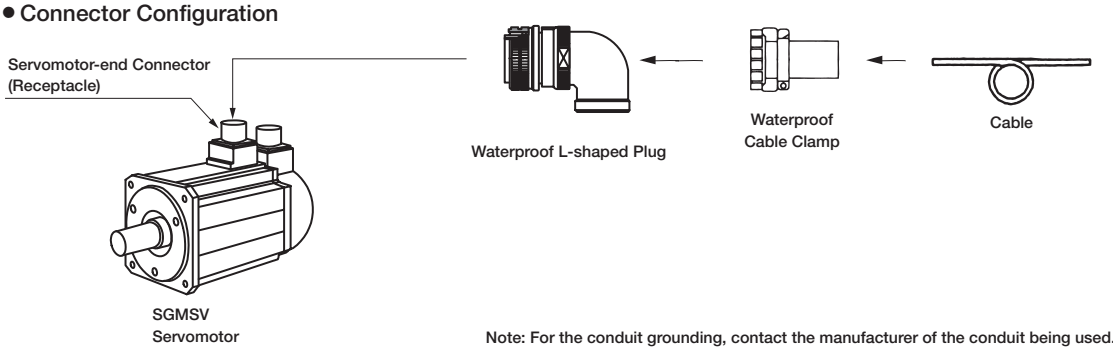


Items	Specifications
Connector Order No.	CM10- □P2S-□ -D (Cables are not included.)
Protective Structure	IP67
Manufacturer	DDK Ltd.
Instructions	L-shaped plug (CM10Y-AP2S- □ -D-G1): TC-573
Electrical Contact Order No.	Electrical contact (100 pcs in one bag) • Crimped type: CM10-#22SC(C3)(D8)-100, Wire size: AWG16 to 20, Outer diameter of sheath: 1.87 to 2.45 dia., Hand tool: 357J-50448T • Soldered type: CM10-#22SC(S2)(D8)-100, Wire size: AWG16 max. Real contact (4000 pcs on one reel) • Crimped type: CM10-#22SC(C3)(D8)-4000, Wire size: AWG 16 to 20, Outer diameter of sheath: 1.87 to 2.45 dia., Semi-automatic tool: AP-A50541T (product name for one set), AP-A50541T-1 (product name for applicator) Note: The product name of the semi-automatic tool refers to the product name of the press and applicator (crimper) as a set.

Selecting Cables

● Protective Structure IP67 and European Safety Standards Compliant Connector

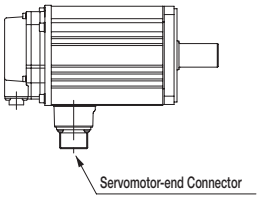
● Connector Configuration



Note: For the conduit grounding, contact the manufacturer of the conduit being used.

(1) Without Holding Brakes

Servomotor-end Connector
For 1.0 to 7.0 kW



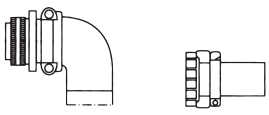
Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not Provided by Yaskawa)				
		Plug	L-shaped Plug	Cable Clamp	Applicable Cable Diameter (For Reference)	Manufacturer
1.0 to 2.5	CE05-2A18-10PD-D	CE05-6A18-10SD-D	CE05-8A18-10SD-D-BAS	CE3057-10A-1-D	10.5 dia. to 14.1 dia.	DDK Ltd.
				CE3057-10A-2-D	8.5 dia. to 11.0 dia.	
				CE3057-10A-3-D	6.5 dia. to 8.7 dia.	
3.0 to 7.0	JL04HV-2E22-22PE-B-R	JL04V-6A22-22SE-R	JL04V-8A22-22SE-EB-R or JA08A-22-22S-J1-EB-R*	JL04-2022CK (09) -R	6.5 Dia. to 9.5 Dia.	Japan Aviation Electronics Industry, Ltd.
				JL04-2022CK (12) -R	9.5 Dia. to 13.0 Dia.	
				JL04-2022CK (14) -R	12.9 Dia. to 15.9 Dia.	

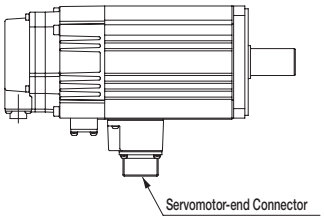
*: Not compliant with European Safety Standards, but compliant with protective structure IP67.

(2) With Holding Brakes (200 V)

No brake connector for 200-V models
(there are brake terminals on the servomotor-end connectors).

Servomotor-end Connector
For 1.0 to 5.0 kW



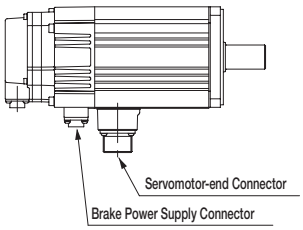


Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not Provided by Yaskawa)				
		Plug	L-shaped Plug	Cable Clamp	Applicable Cable Diameter (For Reference)	Manufacturer
1.0 to 2.5	JL04V-2E20-15PE-B-R	JL04V-6A20-15SE-R	JL04V-8A20-15SE-EB-R	JL04-2022CK (09) -R	6.5 Dia. to 9.5 Dia.	Japan Aviation Electronics Industry, Ltd.
				JL04-2022CK (12) -R	9.5 Dia. to 13.0 Dia.	
				JL04-2022CK (14) -R	12.9 Dia. to 15.9 Dia.	
3.0 to 5.0	JL04V-2E24-10PE-B-R	JL04-6A24-10SE-R	JL04V-8A24-10SE-EB-R or JA08A-24-10S-J1-EB-R*	JL04-2428CK (11) -R	9.0 Dia. to 12.0 Dia.	
				JL04-2428CK (14) -R	12.0 Dia. to 15.0 Dia.	
				JL04-2428CK (17) -R	15.0 Dia. to 18.0 Dia.	
				JL04-2428CK (20) -R	18.0 Dia. to 20.0 Dia.	

*: Not compliant with European Safety Standards, but compliant with protective structure IP67.

Selecting Cables

(3) With Holding Brakes (400 V)

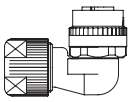


Servomotor-end Connector
For 1.0 to 5.0 kW

Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not Provided by Yaskawa)				
		Plug	L-shaped Plug	Cable Clamp	Applicable Cable Diameter (For Reference)	Manufacturer
1.0 to 2.5	CE05-2A18-10PD-D	CE05-6A18-10SD-D	CE05-8A18-10SD-D-BAS	CE3057-10A-1-D	10.5 dia. to 14.1 dia.	DDK Ltd.
				CE3057-10A-2-D	8.5 dia. to 11.0 dia.	
				CE3057-10A-3-D	6.5 dia. to 8.7 dia.	
3.0 to 5.0	JL04HV-2E22-22PE-B-R	JL04V-6A22-22SE-R	JL04V-8A22-22SE-EB-R or JA08A-22-22S-J1-EB-R*	JL04-2022CK(09)-R	6.5 Dia. to 9.5 Dia.	Japan Aviation Electronics Industry, Ltd.
				JL04-2022CK(12)-R	9.5 Dia. to 13.0 Dia.	
				JL04-2022CK(14)-R	12.9 Dia. to 15.9 Dia.	

*: Not compliant with European Safety Standards, but compliant with protective structure IP67.

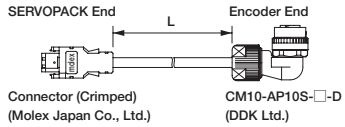
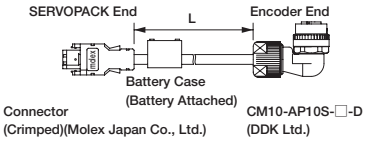
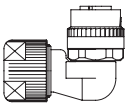
Brake Power Supply Connector
For 1.0 to 5.0 kW



Capacity kW	Servomotor-end Connector (Receptacle)	Cable-end Connector (Not provided by Yaskawa)	
		L-shaped Plug	Manufacturer
1.0 to 5.0	CM10-R2P-D	CM10Y-AP2S-M-D-G1 Applicable Cable: 6.0 dia. to 9.0 dia.	DDK Ltd.

Selecting Cables

● Encoder Cables (Max. length: 20 m)

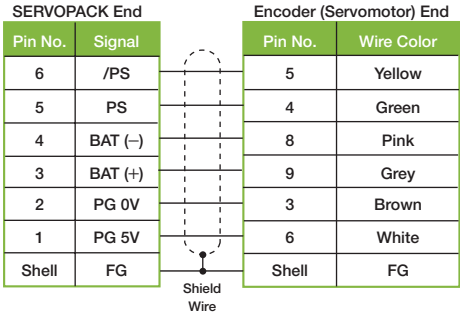
Name	Length (L)	Order No. Flexible Type	Specifications	Details
Encoder Cable with Connectors (For Incremental Encoder)	3 m	JZSP-CVP12-03-E-G#		(1)
	5 m	JZSP-CVP12-05-E-G#		
	10 m	JZSP-CVP12-10-E-G#		
	15 m	JZSP-CVP12-15-E-G#		
	20 m	JZSP-CVP12-20-E-G#		
Encoder Cable with Connectors (For Absolute Encoder, with a Battery Case)	3 m	JZSP-CVP27-03-E-G#		(2)
	5 m	JZSP-CVP27-05-E-G#		
	10 m	JZSP-CVP27-10-E-G#		
	15 m	JZSP-CVP27-15-E-G#		
	20 m	JZSP-CVP27-20-E-G#		
SERVOPACK-end Connector Kit		JZSP-CMP9-1-E	Soldered  (Molex Japan Co., Ltd.)	(3)
Encoder-end Connectors for Protective Structure IP67 L-shaped Plug		CM10-AP10S-M-D-G1 (Connector Kit including contacts)	 (DDK Ltd.)	–

Note: The digit "#" of the order number represents the design revision.

Selecting Cables

(1) Wiring Specifications for Cable with Connectors (For incremental encoder)

• Flexible Type

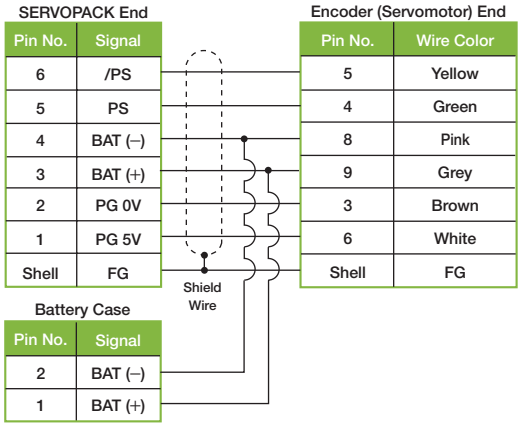


Pin No.	Signal
6	/PS
5	PS
4	BAT (–)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Pin No.	Wire Color
5	Yellow
4	Green
8	Pink
9	Grey
3	Brown
6	White
Shell	FG

(2) Wiring Specifications for Cable with Connectors (For absolute encoder, with a battery case)

• Flexible Type

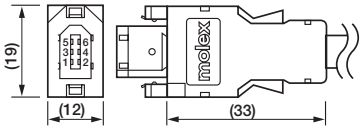


Pin No.	Signal
6	/PS
5	PS
4	BAT (–)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

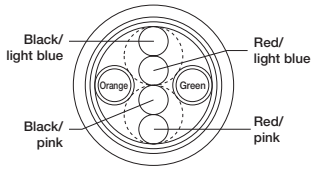
Pin No.	Wire Color
5	Yellow
4	Green
8	Pink
9	Grey
3	Brown
6	White
Shell	FG

Pin No.	Signal
2	BAT (–)
1	BAT (+)

(3) SERVOPACK-end Connector Kit Specifications

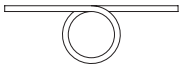
Items	Specifications
Order No.	JZSP-CMP9-1-E
Manufacturer	Molex Japan Co., Ltd.
Connector Model (For standard)	55100-0670 (soldered)
External Dimensions (Units: mm)	

(4) Cable Specifications

Items	Flexible Type
Cable Length	20 m max.
Specifications	UL20276 (Rating temperature: 80℃) AWG22×2C + AWG24×2P AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.35 dia. AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.21 dia.
Finished Dimensions	6.8 dia.
Internal Configuration and Lead Color	

Selecting Cables

● Encoder Cables (For extending from 30 to 50 m)

Name	Length	Order No.	Specifications	Details
① Encoder-end Cables (For incremental and absolute encoder)	0.3 m	JZSP-CVP01-E	SERVOPACK End — 0.3 m — Encoder End Plug Connector (Crimped) (Molex Japan Co., Ltd.) CM10-SP10S-□-D (DDK Ltd.)	(1)
		JZSP-CVP02-E	SERVOPACK End — 0.3 m — Encoder End Plug Connector (Crimped) (Molex Japan Co., Ltd.) CM10-AP10S-□-D (DDK Ltd.)	
② Cable with Connectors (For incremental and absolute encoder)	30 m	JZSP-UCMP00-30-E	SERVOPACK End — L — Encoder End Connector (Crimped) (Molex Japan Co., Ltd.) Socket Connector (Soldered) (Molex Japan Co., Ltd.)	(2)
	40 m	JZSP-UCMP00-40-E		
	50 m	JZSP-UCMP00-50-E		
③ Cable with a Battery Case (For absolute encoder*)	0.3 m	JZSP-CSP12-E	SERVOPACK End — 0.3 m — Encoder End Battery Case (Battery attached) Connector (Crimped) (Molex Japan Co., Ltd.) Socket Connector (Soldered) (Molex Japan Co., Ltd.)	(3)
④ Relay Cables	30 m	JZSP-CMP19-30-E		(4)
	40 m	JZSP-CMP19-40-E		
	50 m	JZSP-CMP19-50-E		

*: Not required when connecting a battery to the host controller.

(1) Wiring Specifications for Encoder-end Cable (For incremental and absolute encoder)

SERVOPACK End

Pin No.	Signal
6	/PS
5	PS
4	BAT (–)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (Servomotor) End

Pin No.	Wire Color
2	Light blue/white
1	Light blue
5	Orange/white
6	Orange
9	Black
4	Red
10	FG

Shield Wire

Note: The signals BAT(+) and BAT(–) are used when using an absolute encoder.

(2) Wiring Specifications for Cable with Connectors (For incremental and absolute encoder)

SERVOPACK End

Pin No.	Signal
6	/PS
5	PS
4	BAT (–)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (Servomotor) End

Pin No.	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

Shield Wire

(3) Wiring Specifications for Cable with a Battery Case (For absolute encoder)

SERVOPACK End

Pin No.	Signal
6	/PS
5	PS
4	BAT (–)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (Servomotor) End

Pin No.	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

Battery Case

Pin No.	Signal
2	BAT (–)
1	BAT (+)

Shield Wire

(4) Relay Encoder Cable Specifications

Item	Standard Type
Order No.*	JZSP-CMP19-□□-E
Cable Length	50 m max.
Specifications	UL20276 (Rating temperature: 80°C) AWG16×2C+AWG26×2P AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 dia. mm AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 dia. mm
Finished Dimensions	6.8 dia.
Internal Configuration and Lead Colors	Orange Orange /white Black Red Light Blue Light Blue /white
Yaskawa Standard Specifications (Standard Length)	Cable length: 30 m, 40 m, 50 m

*: Specify the cable length in □□ of order no.
Example: JZSP-CMP19-30-E (30 m)

Rotary Servomotor General Instructions

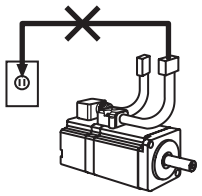
Precautions on Servomotor Installation

Servomotors can be installed either horizontally or vertically.

The service life of the servomotor will be shortened or unexpected problems will occur if the servomotor is installed incorrectly or in an inappropriate location. Always observe the following installation instructions.

⚠ CAUTION

Do not connect the servomotor directly to a commercial power line. This will damage the servomotor.
The servomotor cannot operate without the proper SERVOPACK.



(1) Installation Environment

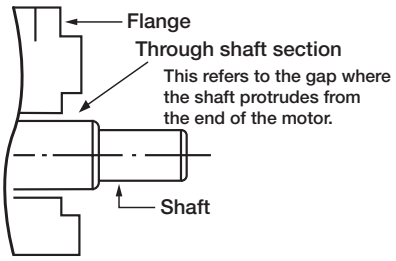
Items	Condition
Ambient Temperature	0 to 40°C (no freezing)
Ambient Humidity	20% to 80%RH (no condensation)
Installation Site	• Free of corrosive or explosive gases. • Well-ventilated and free of dust and moisture. • Facilitates inspection and cleaning. • Elevation :1,000 m max. • Free of high magnetic field
Storage Environment	Store the servomotor in the following environment if it is stored with the power cable disconnected. Ambient temperature during storage: −20 to +60°C (no freezing) Ambient humidity during storage: 20% to 80%RH (no condensation)

(2) Enclosure

The servomotor enclosure* is described table as follows.

Model	Without Gears	With Gears
SGMAV, SGMJV	IP65	IP55
SGMEV	IP55 IP67 (optional)	IP55
SGMGV	IP67	–
SGMSV	IP67	–

*: Except through shaft section. The enclosure specification can be satisfied only when using a specified cable.



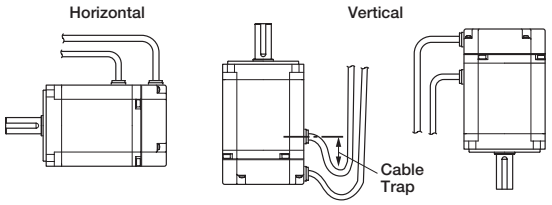
- Do not use servomotors in a location that is subject to oil. If the servomotor is used in a location that is subject to water or oil mist, order a servomotor with an oil seal to seal the through shaft section.

Precautions on Using Servomotor with Oil Seal:

- Put the oil surface under the oil seal lip.
- Use an oil seal in favorably lubricated condition.
- When using a servomotor with its shaft upward direction, be sure that oil will not stay in the oil seal lips.

(3) Orientation

- Servomotors can be installed either horizontally or vertically. When installing servomotors vertically, make cable traps to keep out water. When mounting servomotors with the shaft up, take measures with the connected machine to prevent oil from getting into the servomotors through gear boxes etc.

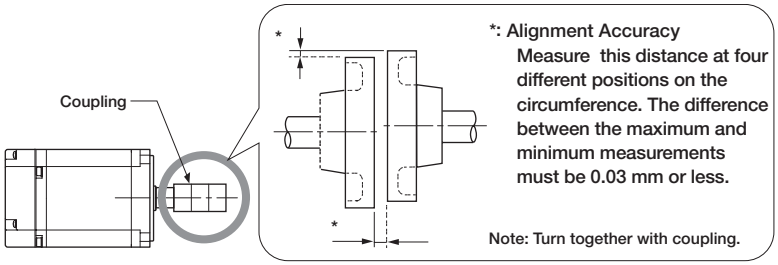


(4) Alignment

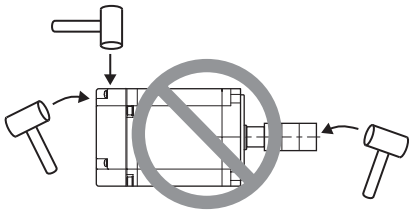
Align the shaft of the servomotor with the shaft of the equipment, and then couple the shafts.

IMPORTANT

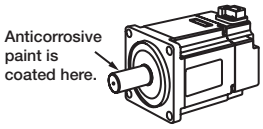
1 Install the servomotor so that alignment accuracy falls within the following range.
Vibration that will damage the bearings and encoders if the shafts are not properly aligned.



2 Do not allow any direct impact to the shafts when installing the couplings. Do not hit the area near encoders with a hammer etc., as impacts may damage the encoders.



3 Before installation, thoroughly remove the anticorrosive paint from the end of the motor shaft. Only after removing the paint can servomotors be installed on the machines.



(5) Cable Stress

- Make sure there is no bending or tension on the cables themselves, the connections, or the cable lead inlets.
  Be especially careful to wire encoder cables so that they are not subject to stress because the core wires of encoder cables and power cables are very thin at only 0.2 to 0.3 mm^2.

(6) Connectors

Observe the following precautions:

- When the connectors are connected to the motor, be sure to connect the end of motor power cables before connecting the encoder cable's end.
  If the encoder cable's end is connected, the encoder may break because of the voltage differences between FG.
- Make sure there is no foreign matters such as dust and metal chips in the connector before connecting.
- Do not apply shock to resin connectors. Otherwise, they may be damaged.
- Make sure of the pin arrangement.
- Be sure not to apply stress on the connector, when using flexible cables. The connector may be damaged by stress.
- When handling a servomotor with its cables connected, hold the servomotor or the connectors and cables will be damaged.
- Fix the cable connector to SGMJV, SGMAV, SGMEV-01/-02/-04 or SGMGV-03/-05 servomotors with screws. Refer to "Cable connections to SGMJV, SGMAV and SGMEV servomotors" or "Cable connections to SGMGV-03/-05 servomotors." Make sure that the connector is securely fixed with screws.
  If the cable connector is not secure, the requirements for the protective structure's specifications may not be met.

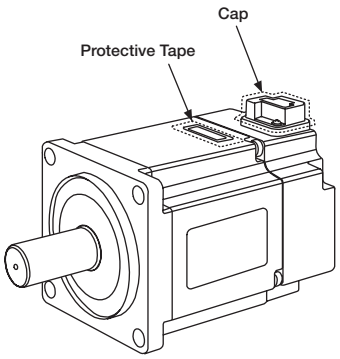
Cable Connections to SGMJV and SGMAV Servomotors

Connect the power cable and encoder cable to SGMJV or SGMAV servomotor in the following manner.

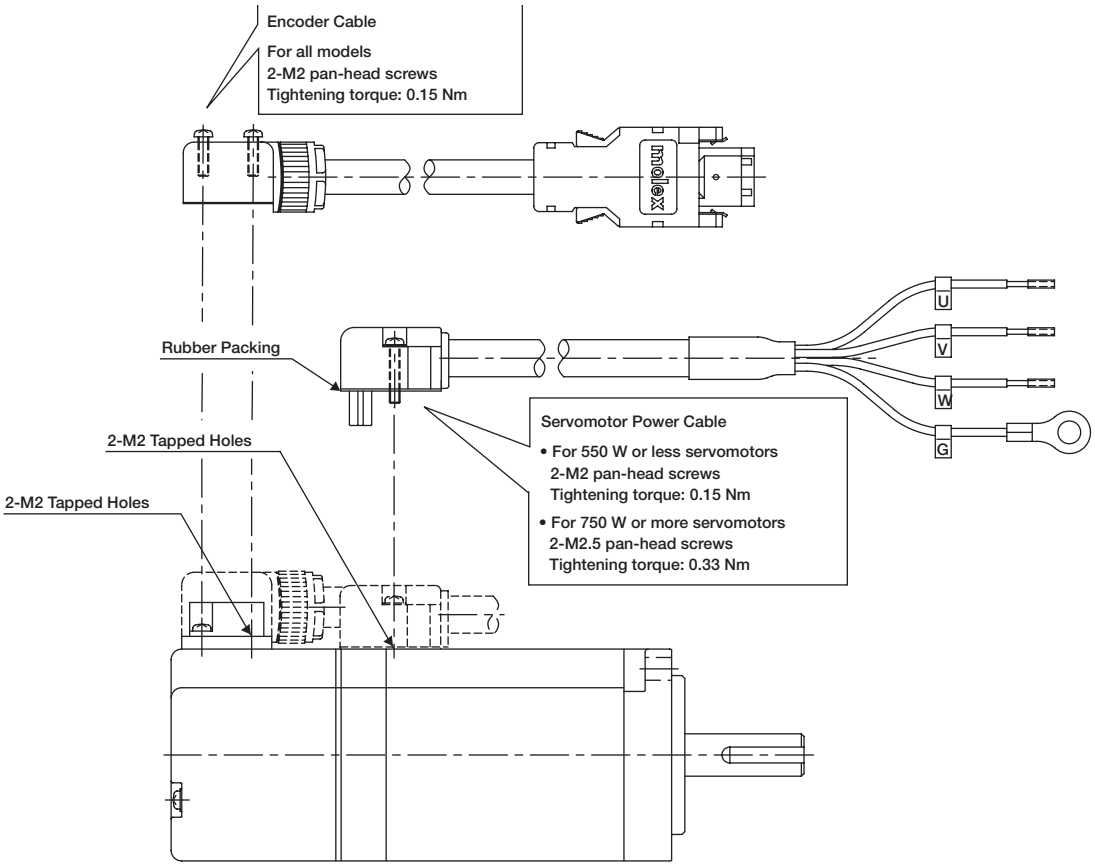
⚠ CAUTION

Do not directly touch the connector pins provided with the servomotor. Particularly, the encoder may be damaged by static electricity, etc.

STEP1 Remove the protective tape and cap from the servomotor connector.



STEP2 Mount the cable connector on the servomotor and fix it with screws as shown in the figure below.



IMPORTANT

- First, connect the servomotor to the servomotor power cable end.
- Do not remove the rubber packing. Mount the connector so that the rubber packing is seated properly.

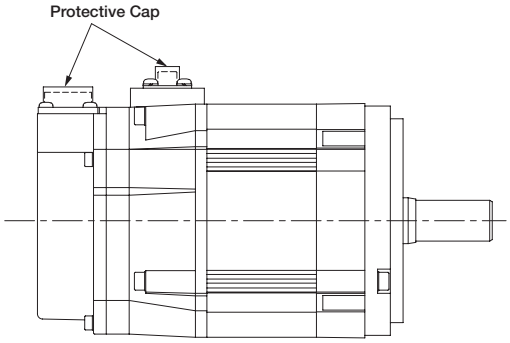
If the rubber packing is not seated properly, the requirements for the protective structure specifications may not be met.

Cable Connections to SGMGV-03/-05 Servomotors

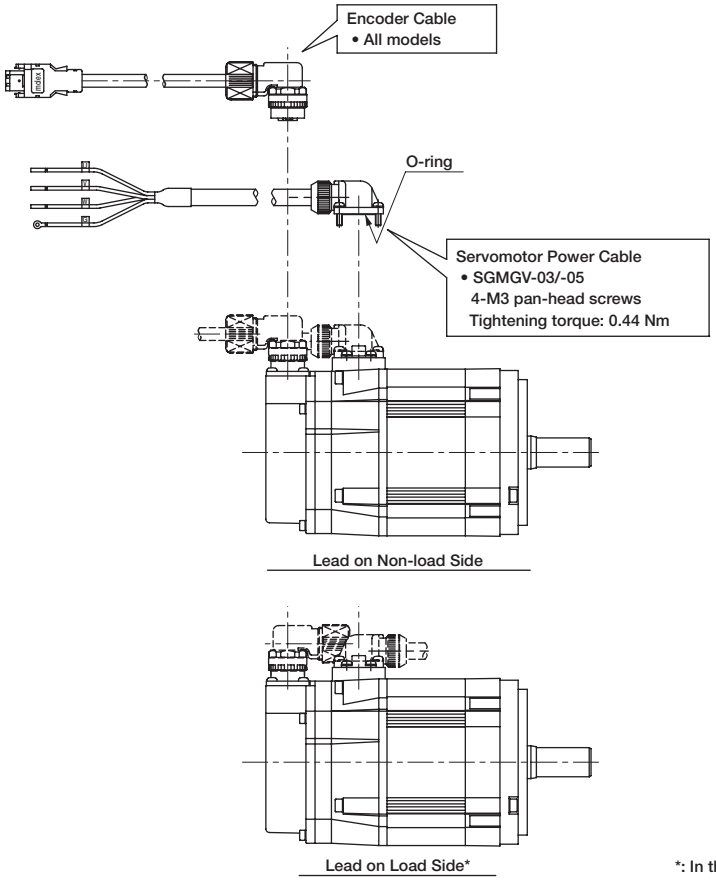
Connect the power cable and encoder cable to SGMGV-03/-05 servomotor in the following manner.

> **⚠ CAUTION**
>
> Do not directly touch the connector pins provided with the servomotor. Particularly, the encoder may be damaged by static electricity, etc.

STEP1 Remove the protective cap from the servomotor connector.



STEP2 Mount the cable connector on the servomotor and fix it with screws as shown in the figure below.



*: In this case, contact your Yaskawa representative.

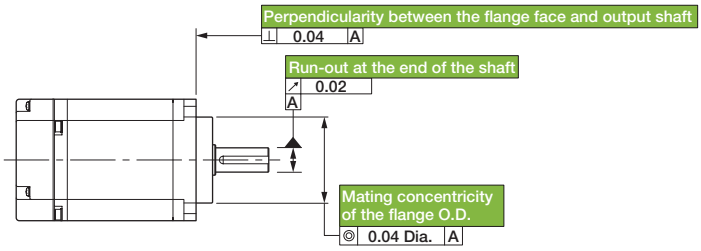
IMPORTANT

- First, connect the servomotor to the servomotor power cable end.
- Do not remove the O-ring. Mount the connector so that the O-ring is seated properly. If the O-ring is not seated properly, the requirements for the protective structure specifications may not be met.

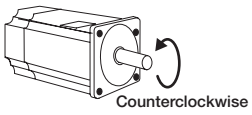
Mechanical Specifications

● Mechanical Tolerance T.I.R. (Total Indicator Reading)

The following figure shows tolerances for the servomotor's output shaft and installation area. For more details on tolerances, refer to the external dimensions of the individual servomotor.

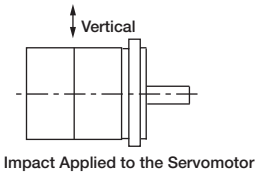


● Direction of Servomotor Rotation



Positive rotation of the servomotor without a gear is counterclockwise when viewed from the load. Refer to Ratings and Specifications for each series regarding rotation direction of the servomotor with a gear. The direction of rotation can be reversed by changing the SERVOPACK parameters.

● Shock Resistance

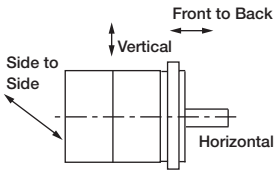


Impact Applied to the Servomotor

Mount the servomotor with the axis horizontal. The servomotor will withstand the following vertical impacts:

- Impact Acceleration: 490 m/s^2
- Impact occurrences: 2

● Vibration Resistance



Impact Applied to the Servomotor

Mount the servomotor with the axis horizontal. The servomotor will withstand the following vibration acceleration in three directions: Vertical, side to side, and front to back.

Servomotor Model	Vibration Acceleration at Flange
SGMJV, SGMAV, SGMEV	49 m/s^2
SGMGV -03 to -44, SGMSV -10 to -50	49 m/s^2 (Front to back direction: 24.5 m/s^2)
SGMGV -55 to -1E	24.5 m/s^2
SGMSV -70	14.7 m/s^2

IMPORTANT

The amount of vibration the servomotor endures will vary depending on the application. Check the vibration acceleration being applied to your servomotor for each application.

● Vibration Class

The vibration class for the servomotors at rated motor speed is V15.

(A vibration class of V15 indicates a total vibration amplitude of 15 μm maximum on the servomotor during rated rotation.)

Rotor Moment of Inertia

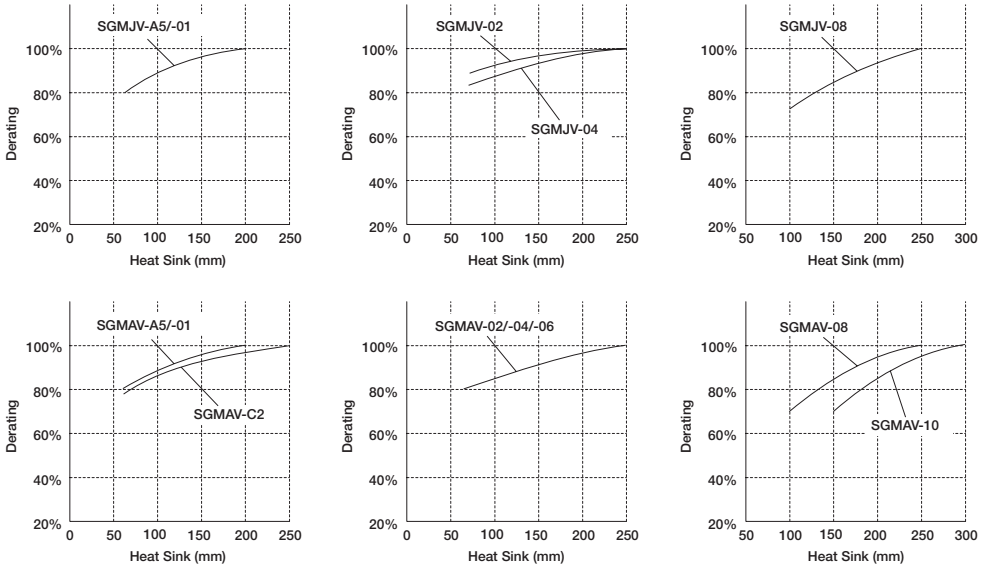
Small-capacity servomotors come in a medium inertia series "SGMJV servomotor," "SGMEV servomotor" and low inertia series "SGMAV servomotor." The rotor moment of inertia of SGMJV servomotor and SGMEV servomotor are twice as large as that of SGMAV. Select servomotors based on the specifications of your devices, such as load moment of inertia or machine rigidity.

- When the rotor moment of inertia is large:
  Servomotors are capable of corresponding to load changes because of the decrease of the moment of inertia ratio. This has the benefit of reducing settling time and speed ripple. This should also improve control stability of machines with low rigidity.
- When mounting a servomotor with a large rotor moment of inertia to a device with a small load moment of inertia:
  Acceleration/deceleration torque increases and effective load ratio increases. Check the effective load ratio when you select motor capacity.

Servomotor Heating Conditions

The motor rated specifications are continuous allowable values at an ambient temperature of 40℃ when servomotors are installed with heat sinks. When the motor is mounted on a small surface, the motor temperature may rise considerably because of the limited heat radiating abilities of the surface. See the following graph for the relation between heat sink size and derating (derating ratio).

IMPORTANT The actual temperature rise depends on how the heat sink (servomotor mounting section) is fixed on the installation surface, what material is used for the motor mounting section, and motor speed. Always check the actual motor temperature.



Holding Brake Delay Time

Holding brakes have motion delay time that varies depending on when the brake is open and when the brake is operating. The following table shows the brake delay time of each servomotor.

IMPORTANT Make sure the holding brake delay time is correct for your servomotor.

- Example, switching the holding brakes on the DC side

Model	Voltage	Brake Open Time ms	Brake Operation Time ms	Model	Voltage	Brake Open Time ms	Brake Operation Time ms
SGMAV-A5 to -04	24 V	60	100	SGMGV-55,-75,-1A	24 V	170	80
SGMAV-06 to -10		80	100	SGMGV-1E		250	80
SGMJV-A5 to -04	24 V	60	100	SGMSV-10 to -25		170	80
SGMJV-08		80	100	SGMSV-30 to -50		100	80
SGMGV-03 to -20	24 V	100	80				
SGMGV-30,-44		170	100				

Cables

● Standard Cables

Standard servomotor power cables, encoder cables, and relay cables cannot be used in cases where high flexibility is needed, as when the cables themselves move or are twisted or turned.
R15 min. or 2 times the cable diameter (whichever is greater) is recommended for the bending radius of standard cables.
Use flexible cables for flexible applications.

● Flexible Cables

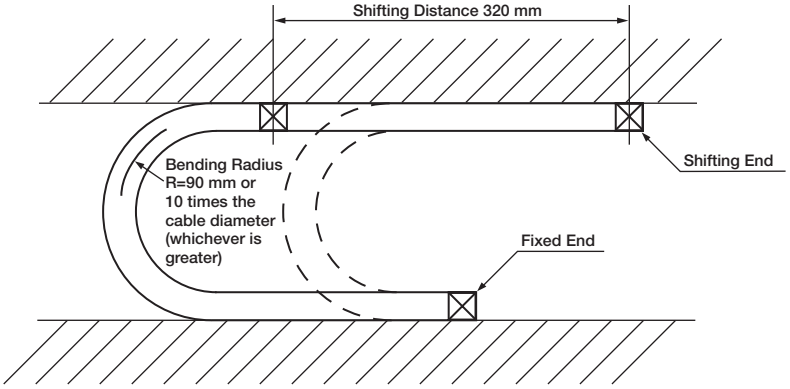
(1) Life of Flexible Cable

The flexible cable supports 10,000,000 or more operations of bending life with the recommended minimum bending radius R = 90 mm or 10 times the cable diameter (whichever is greater) under the following test conditions.

● Conditions

1 Repeat moving one end of the cable forward and backward for 320 mm using the test equipment shown in the following figure.

2 Connect the lead wires in parallel, and count the number of cable return motion times until a lead wire is disconnected. Note that one reciprocation is counted as one test.



Notes: 1 The life of flexible cable differs largely depending on the amount of mechanical shocks, mounting to the cable, and fixing methods. The life of flexible cable is limited under the specified conditions.
2 The life of flexible cable indicates the number of bending times in which lead wires are electrically conducted and by which no cracks and damages that affects the performance of cable sheathing are caused. Disconnecting the shield wire is not taken into account.

(2) Wiring Precautions

Even if the recommended bending radius R is followed in the mechanical design, incorrect wiring may cause the early disconnection. Observe the following precautions when wiring.

(a) Cable twisting

Straighten the flexible cables wiring.

Twisted cables cause the early disconnection. Check the indication on the cable surface to make sure that the cable is not twisted.

(b) Fixing method

Do not fix the moving points of the flexible cable, or stress on the fixed points may cause early disconnection. Fix the cable at the minimum number of points. Do not put stress on the servomotor-end and SERVOPACK-end connectors.

(c) Cable length

If the cable length is too long, it may result the cable sagging. If the cable length is too short, excessive tension on the fixed points will cause the early disconnection. Use a flexible cable with the optimum length.

(d) Interference between cables

Avoid interference between cables.

Interference limits the motion of flexible cable, which causes early disconnection. Keep enough distance between cables, or provide a partition when wiring.

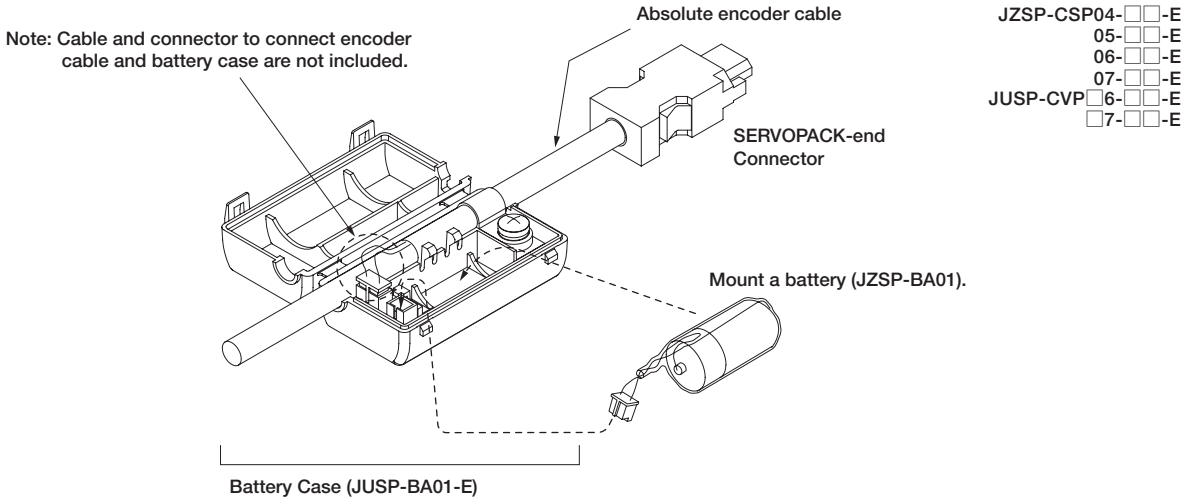
Battery Case

● Battery Case (Model: JUSP-BA01-E)

Use this battery case if your battery case needs replacing due to damage etc. This battery case cannot be used with an incremental encoder cable.

IMPORTANT

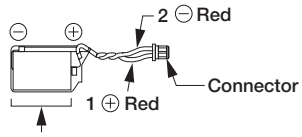
1 The battery case (JUSP-BA01-E) is not provided with a battery. A battery must be purchased separately.
2 Install the battery case where the ambient temperature is between 0°C to 55°C.



JZSP-CSP04-□□-E
05-□□-E
06-□□-E
07-□□-E
JUSP-CVP□6-□□-E
□7-□□-E

(1) Mounting a Battery in a Battery Case

Prepare a lithium battery (JZSP-BA01) and mount in a battery case.



ER3 V Lithium Battery
(3.6 V, 1000 mAh, manufactured by Toshiba Battery Co., Ltd.)

(2) Connecting a Battery to the Host Controller

Use a battery that meets the specifications of the host controller. Use an ER6VC3N (3.6 V, 2000 mAh, manufactured by Toshiba Battery Co., Ltd.) or equivalent battery.