AC Servo Drives Large Capacity Σ-V Series Product Catalog

200V : 22kW-37kW
400V : 22kW-55kW

YASKAWA™

Certified for ISO9001 and ISO14001

JQA-0422 JQA-EM0202 JQA-EM0924

Large-capacity Σ-V Series Model Designation

Servomotors

SGMVV – 2B A D B 2 N

SGMVV

Rated Output
- 2B : 22 kW
- 3Z : 30 kW
- 3G : 37 kW
- 4E : 45 kW
- 5E : 55 kW

Power Supply Voltage
- A : 200 VAC
- D : 400 VAC

Serial Encoder
- D : 20-bit incremental
- 3 : 20-bit absolute

Rated Speed
- B : 1500 min^{-1}
- D : 800 min^{-1}

Main Mechanical Structure
- 2 : Flange type, straight shaft end without key and no tap
- 6 : Flange type, straight shaft end with key and tap
- K : Foot-mounted type, straight shaft end without key and no tap
- L : Foot-mounted type, straight shaft end with key and tap

Options
- N : Without options
- 1 : With dust seal
- S : With oil seal
- B : With holding brake (90 VDC)
- C : With holding brake (24 VDC)
- D : With holding brake (90 VDC) and oil seal
- E : With holding brake (24 VDC) and oil seal
- F : With holding brake (90 VDC) and dust seal
- G : With holding brake (24 VDC) and dust seal

Note: Production range of machine application models and models with brakes for rated output

Rated Speed [min^{-1}]	Rated Output [kW]	Voltage		Optional Specifications		
		200 V	400 V	Oil Seal*, Dust Seal	With Brakes	
					Flange-mounted Type	Foot-mounted Type
1500	22	✓	✓	✓	✓	✓
	30	✓	✓	✓	✓	✓
	37	✓	✓	✓	✓	✓
	45	—	✓	✓	✓	✓
	55	—	✓	✓	—	✓
800	22	✓	✓	✓	✓	✓
	30	✓	✓	✓	—	✓
	37	✓	✓	✓	—	✓
	45	—	✓	✓	—	—

✓ : Production possible, — : Production not possible.

∗ : Servomotors with oil seals are available with flange mounting only.

SERVOPACKs

SGDV– 750 J 01 A Options*1 002 00 0

Σ-V Series
SGDV SERVOPACK

Current

Voltage	Code	Applicable Servomotor Max. Capacity kW
Three-phase 200 V	121	22
	161	30
	201	37
Three-phase 400 V	750	30
	101	37
	131	55

Power Supply Voltage*2
- H : 200 V class
- J : 400 V class

Interface

Code	Specifications
01	Analog voltage/pulse train reference (for rotary servomotors)
11	MECHATROLINK-II communications reference (for rotary servomotors)
21	MECHATROLINK-III communications reference (for rotary servomotors)

Options (parameters)
- 0 : standard

Options (software)
- 00 : standard

Options (hardware)

Code	Specifications
000	Base-mounted
001	Duct-ventilated
002	Varnished (standard)
003	Duct-ventilated and varnished

Design Revision Order
- A, B…

*1 : If the option codes are all zeros, the zeros are omitted.
*2 : DC power from the Separate converter unit
*3 : To be released soon.

Converters

SGDV– COA 3ZD A Options* 000000

Σ-V Series

Product Section

Code	Specifications
COA	Resistive regenerative converter

Power Capacity

Voltage	Code	Applicable Servomotor Max. Capacity kW
Three-phase 200 V	2BA	22
	3GA	37
Three-phase 400 V	3ZD	30
	5ED	55

Options* (hardware)

Code	Specifications
000000	Base-mounted (standard)
001000	Duct-ventilated
002000	Varnished
003000	Duct-ventilated and varnished

Design Revision Order
- A, B…

∗ : If the option codes are all zeros, the zeros are omitted.

INDEX

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
Foot-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, separately cooled, IP44
(except for shaft opening)
Ambient Humidity: 20% to 80% (no condensation)
Rotation Direction: Counterclockwise (CCW) with forward run reference when viewed from the load side

200-V Class

Servomotor Model: SGMVV-□□□□□		2BA□B	3ZA□B	3GA□B	2BA□D	3ZA□D	3GA□D
Rated Output*	kW	22	30	37	22	30	37
Rated Torque*	Nm	140	191	236	262	358	442
Stall Torque*	Nm	140	191	236	262	358	442
Instantaneous Peak Torque*	Nm	350	478	589	526	752	930
Rated Current*	A_{rms}	88	120	152	104	150	195
Instantaneous Max. Current*	A_{rms}	240	340	460	240	340	460
Rated Speed*	RPM	1500			800		
Max. Speed*	RPM	2000			1300		
Torque Constant	Nm/A_{rms}	1.72	1.72	1.68	2.73	2.50	2.34
Rotor Moment of Inertia	$\times10^{-4}$ kg-m^2	366 (451)	498 (583)	595 (665)	705 (775)	1290 (1448)	1564 (1722)
Rated Power Rate*	kW/s	536 (434)	733 (626)	933 (836)	977 (888)	996 (885)	1250 (1135)
Rated Angular Acceleration*	rad/s^2	3830 (3100)	3840 (3280)	3960 (3550)	3720 (3380)	2780 (2470)	2830 (2570)
Applicable SERVOPACK	SGDV-□□□□	121H	161H	201H	121H	161H	201H
Applicable Converter	SGDV-COA□□□□	2BAA	3GAA	3GAA	2BAA	3GAA	3GAA

* : 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.
SGMVV-2BA□B/-3ZA□B/-3GA□B/-2BA□D: 650×650×35 mm (iron)
SGMVV-3ZA□D/-3GA□D: 740×520×27 mm (iron)

400-V Class

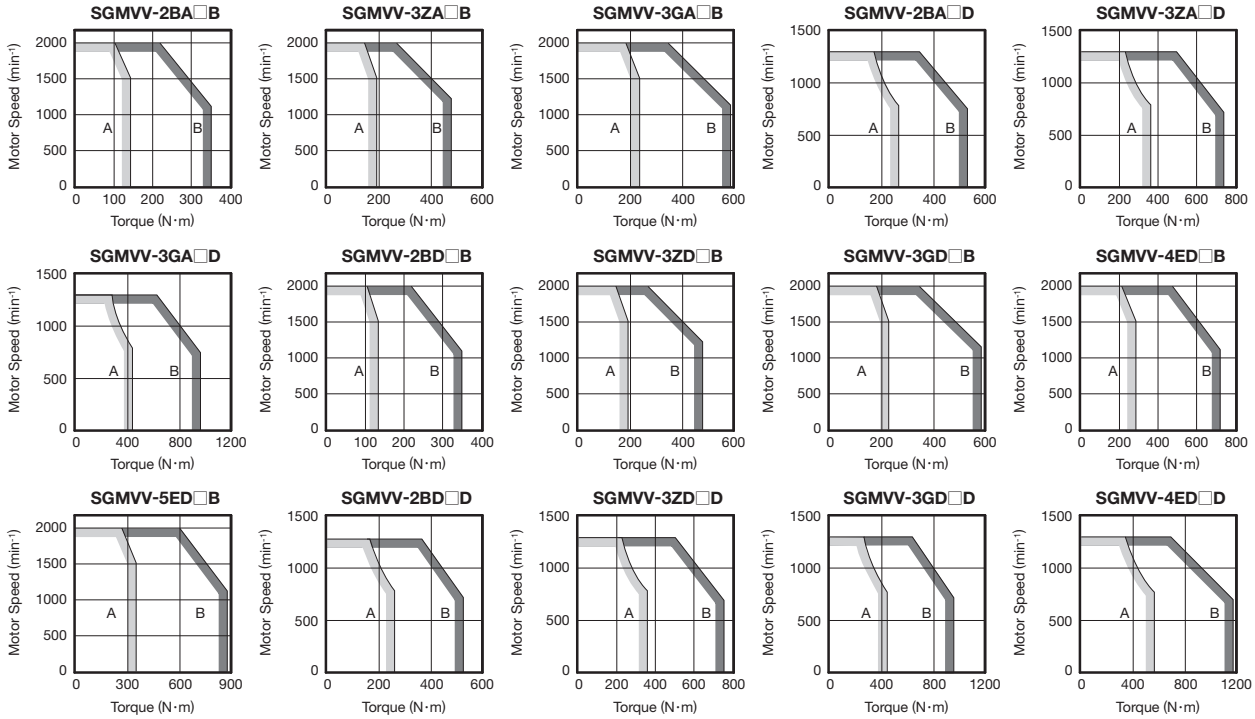
Servomotor Model: SGMVV-□□□□□		2BD□B	3ZD□B	3GD□B	4ED□B	5ED□B	2BD□D	3ZD□D	3GD□D	4ED□D
Rated Output*	kW	22	30	37	45	55	22	30	37	45
Rated Torque*	Nm	140	191	236	286	350	262	358	442	537
Stall Torque*	Nm	140	191	236	286	350	262	358	442	537
Instantaneous Peak Torque*	Nm	350	478	589	715	875	526	752	930	1182
Rated Current*	A_{rms}	44	60	76	102	117	52	75	98	110
Instantaneous Max. Current*	A_{rms}	120	170	230	280	340	120	170	230	280
Rated Speed*	RPM	1500					800			
Max. Speed*	RPM	2000					1300			
Torque Constant	Nm/A_{rms}	3.44	3.44	3.37	3.09	3.15	5.46	5.00	4.68	5.21
Rotor Moment of Inertia	$\times10^{-4}$ kg-m^2	366 (451)	498 (583)	595 (665)	1071 (1229)	1290 (1448)	705 (775)	1290 (1448)	1564 (1722)	1804
Rated Power Rate*	kW/s	536 (434)	733 (626)	935 (836)	765 (667)	949 (847)	977 (888)	996 (885)	1250 (1135)	1600
Rated Angular Acceleration*	rad/s^2	3830 (3100)	3840 (3280)	3970 (3550)	2670 (2330)	2710 (2420)	3720 (3380)	2780 (2470)	2830 (2570)	2980
Applicable SERVOPACK	SGDV-□□□□	750J	750J	101J	131J	131J	750J	750J	101J	131J
Applicable Converter	SGDV-COA□□□□	3ZDA	3ZDA	5EDA	5EDA	5EDA	3ZDA	3ZDA	5EDA	5EDA

* : 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.
SGMVV-2BD□B/-3ZD□B/-3GD□B/-2BD□D: 650×650×35 mm (iron)
SGMVV-4ED□B/-5ED□B/-3ZD□D/-3GD□D/-4ED□D: 740×520×27 mm (iron)

Ratings and Specifications

●Torque-Motor Speed Characteristics

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 main circuit cable length exceeds 20 m, note that the intermittent duty zone of the *Torque-Motor Speed Characteristics* will shrink as the line-to-line voltage drops.

●Holding Brake Electrical Specifications

Servomotor Model SGMVV-	Rated Speed RPM	Rated Output kW	Holding Brake Specifications				
			Holding Torque Nm	Rated Voltage 24 VDC		Rated Voltage 90 VDC	
				Capacity W	Rated Current A (at 20˚C)	Capacity W	Rated Current A (at 20˚C)
2B□□B	1500	22	238	54	2.24	54	0.60
3Z□□B		30	238	54	2.24	54	0.60
3G□□B		37	345	54	2.24	54	0.60
4ED□B		45	429	60	2.50	60	0.67
5ED□B		55	429	60	2.50	60	0.67
2B□□D	800	22	345	54	2.24	54	0.60
3Z□□D		30	429	60	2.50	60	0.67
3G□□D		37	573	60	2.50	60	0.67

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 not included.
4 For information on a 90-VDC power supply, refer to page 55.

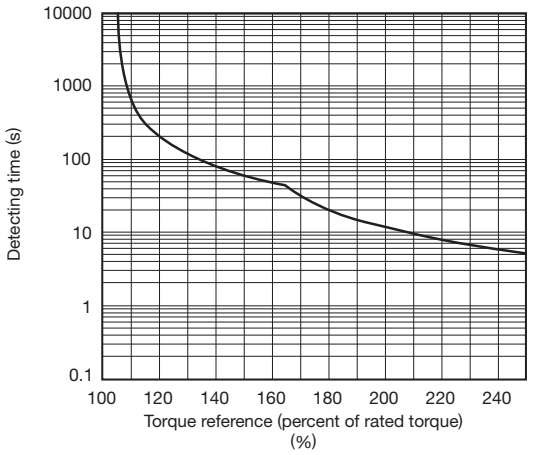
●Cooling Fan Specifications

Main Circuit Power Supply Voltage	Servomotor Model SGMVV-	Specifications		
		Frequency Hz	Rated Input W	Rated Current A
Three-phase 200 VAC	2BA□□	50	100	0.29
		60	140	0.40
	3ZA□□	50	100	0.29
		60	140	0.40
	3GA□□	50	100	0.29
		60	140	0.40
Three-phase 400 VAC	2BD□□	50	75	0.14
		60	105	0.16
	3ZD□□	50	75	0.14
		60	105	0.16
	3GD□□	50	75	0.14
		60	105	0.16
	4ED□B	50	75	0.14
		60	105	0.16
	4ED□D	50	130	0.38
		60	170	0.36
	5ED□B	50	75	0.14
		60	105	0.16

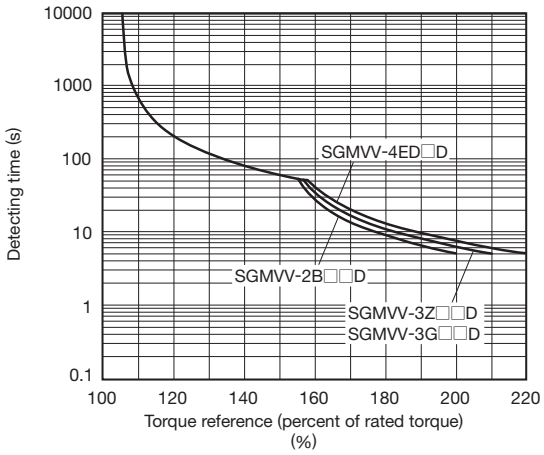
●Overload Characteristics

The overload detection level is set under hot start conditions at a servomotor ambient temperature of 40℃.

Motors with Rated Speed of 1,500 RPM



Motors with Rated Speed of 800 RPM



Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output.
Use a servomotor with effective torque within the continuous duty zone of *Torque-Motor Speed Characteristics*.

●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 SGMVV-	Servomotor Rated Output	Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio)
2B to 5E	22 to 55 kW	10 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.e-mechatronics.com/).

An overvoltage alarm (A.400) or a regeneration overload alarm (A.320) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. Take one of the following steps if this occurs.

•Reduce the torque limit.

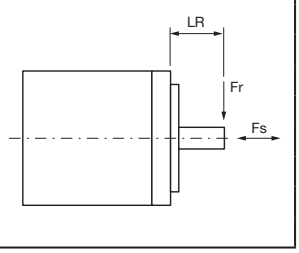
•Reduce the deceleration rate.

•Reduce the maximum speed.

If you cannot clear the alarm with the above steps, consider changing the capacity of the external regenerative resistor. Refer to *Regenerative Resistor Capacity Selection* on page 66.

●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 SGMVV-	Rated Speed RPM	Allowable Radial Load (Fr) N	Allowable Thrust Load (Fs) N	LR mm	Reference Diagram
2B□□B	1500	5880	2156	100	
3Z□□B		6272	2156	100	
3G□□B		7448	2156	100	
4ED□B		7840	2156	100	
5ED□B		8428	2156	110	
2B□□D	800	7448	2156	100	
3Z□□D		8428	2156	110	
3G□□D		8428	2156	110	
4ED□D		10100	2156	120	

Precautions on Servomotor Installation

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.

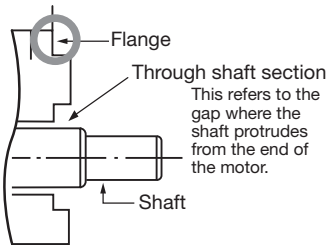
(1) Installation Environment

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 enclosure* of the servomotor is totally enclosed, separately cooled IP44.

* : 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:

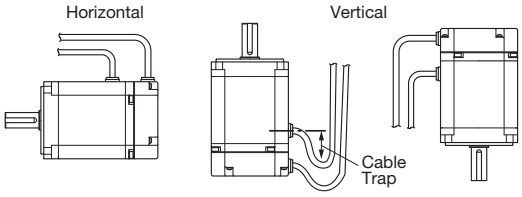
- Put the oil surface under the oil seal lip.
- Use the oil seal in favorably lubricated condition.
- When using the servomotor with its shaft upward direction, be sure that oil will not stay in the oil seal lip.

(3) Orientation

- The allowable mounting directions of the servomotor depend on the mounting method.

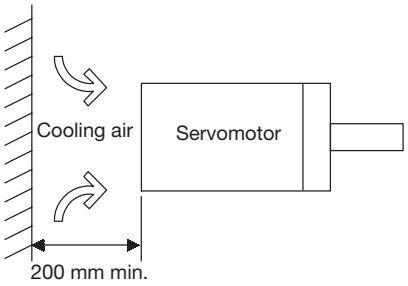
Mounting Method	Holding Brake	Allowable Mounting Directions
Flange-mounted	No	Vertical or horizontal
	Yes	Horizontal
Foot-mounted	No	
	Yes	

Note: 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.



- Servomotor Fan Installation Space

  To prevent decreasing the cooling capacity of the servomotor fan, provide a space of at least 200 mm on the air inlet side of the servomotor as shown in the figure at the right.

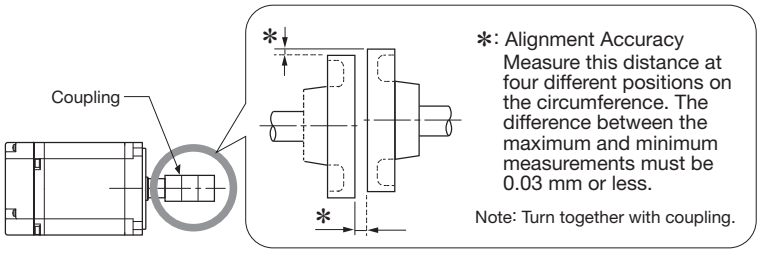


(4) Alignment

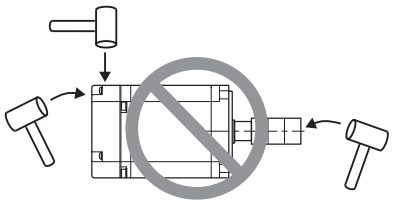
Align the shaft of the servomotor with the shaft of the equipment, and then couple the shafts.

IMPORTANT

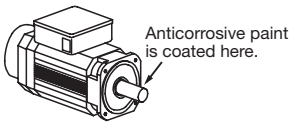
1 Install the servomotor so that alignment accuracy falls within the following range.
Vibration that will damage the bearings and encoders if the shafts are not properly aligned.



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 are very thin at only 0.2 to 0.3 mm2.

(6) Precautions on Cable Usage

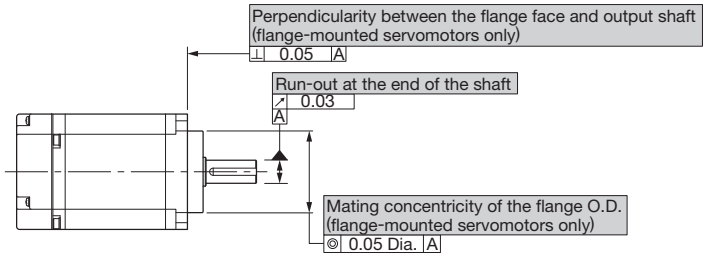
Observe the following precautions:

- When you connect the cables to the servomotor, connect the servomotor's main circuit cable first. If you connect the encoder cable first, the encoder may be damaged due to the difference in electrical potential from the FG.
- Make sure there is no foreign matters such as dust and metal chips in the connector before connecting.
- Do not apply shock to connectors. Otherwise, they may be damaged.
- Before you connect the wires, make sure that there are no mistakes in the wiring.
- Be sure not to apply stress on the connector. The connector may be damaged by stress.
- If you move the servomotor while the cables are connected, always hold onto the main body of the servomotor. If you lift the servomotor by the cables when you move it, the terminals may be damaged or the cables may be broken.

Mechanical Specifications

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

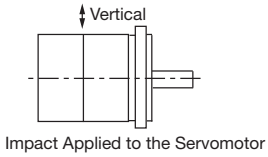
The following figure shows tolerances for the servomotor's output shaft and installation area. For more details on tolerances, refer to the external dimensions of the individual servomotor.



●Direction of Servomotor Rotation

Positive rotation of the servomotor is counterclockwise when viewed from the load. The direction of rotation can be reversed by changing the SERVOPACK parameters.

●Shock Resistance

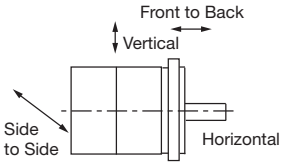


Impact Applied to the Servomotor

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.

- Vibration Acceleration: 24.5 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.)

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.

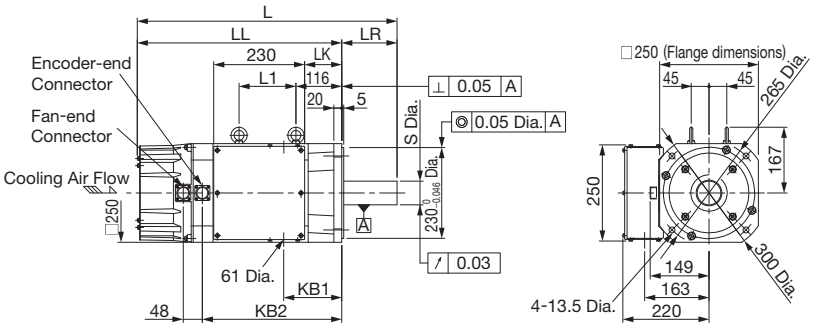
● Example, switching the holding brakes on the DC side

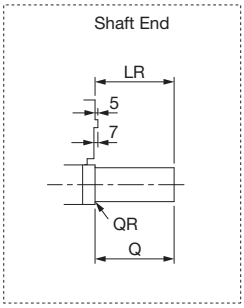
Main Circuit Power Supply Voltage	Servomotor Model SGMVV-	Rated Speed RPM	Voltage	Brake Open Time ms	Brake Operation Time ms
Three-phase 200 VAC	2BA□B	1500	24 VDC or 90 VDC	500 max.	150 max.
	3ZA□B				
	3GA□B				
	2BA□D	800			
	3ZA□D			550 max.	320 max.
	3GA□D			700 max.	320 max.
Three-phase 400 VAC	2BD□B	1500		500 max.	150 max.
	3ZD□B				
	3GD□B				
	4ED□B			550 max.	320 max.
	5ED□B				
	2BD□D	800		500 max.	150 max.
	3ZD□D			550 max.	320 max.
	3GD□D			700 max.	320 max.
	4ED□D			*	

* : An SGMVV-4ED□D servomotor is not available in a model with a holding brake.

External Dimensions Units: mm

●Flange-mounted Servomotors without Holding Brakes

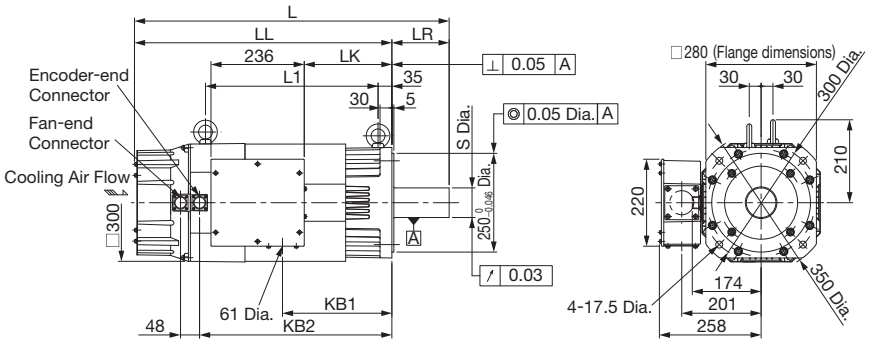


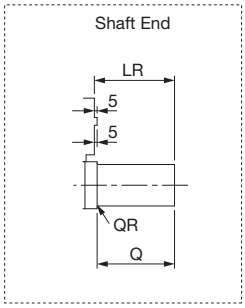


For the specifications of the other shaft ends, refer to page 19.

Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	S Dia.	Q	QR	Approx. Mass kg
2B□□B	1500	658	518	140	94	144	147	353	$60^{+0.030}_{+0.011}$	140	1.6	95
3Z□□B		704	564	140	140	190	193	399	$60^{+0.030}_{+0.011}$	140	1.6	110
3G□□B		744	604	140	180	230	233	439	$65^{+0.030}_{+0.011}$	140	1.2	120
2B□□D	800	794	654	140	230	280	283	489	$65^{+0.030}_{+0.011}$	140	1.2	135

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



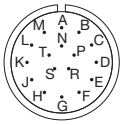


For the specifications of the other shaft ends, refer to page 19.

Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	S Dia.	Q	QR	Approx. Mass kg
4ED□B	1500	797	652	145	222	437	277	487	$75^{+0.030}_{+0.011}$	140	2.5	165
5ED□B		842	697	145	267	482	322	532	$75^{+0.030}_{+0.011}$	140	2.5	185
3Z□□D	800	842	697	145	267	482	322	532	$75^{+0.030}_{+0.011}$	140	2.5	185
3G□□D		892	747	145	317	532	372	582	$75^{+0.030}_{+0.011}$	140	2.5	205
4ED□D		973	798	175	357	572	412	622	$85^{+0.035}_{+0.013}$	170	2.5	225

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

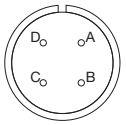
• Cable Specifications for Encoder-end Connector



Receptacle: 97F3102E20-29P
L-shaped Plug: JA08A-20-29S-J1-EB
(CE-compliant) or MS3108B20-29S
Straight Plug: JA06A-20-29S-J1-EB
(CE-compliant) or MS3106B20-29S
Cable Clamp: JL04-2022CKE (**)
(CE-compliant) or MS3057-12A

Note: 1 "**" gives the cable diameter.
2 For information on the cable models, refer to page 38.
3 To conform with CE Marking, plugs and cable clamps with CE Marking are required.

•Cable Specifications for Fan-end Connector



Receptacle: CE05-2A18-10PD-D
L-shaped Plug: CE05-8A18-10SD-D-BAS
Straight Plug: CE05-6A18-10SD-D-BSS
Cable Clamp: CE3057-10A-*(D265)
(CE-compliant) or MS3057-10A

Note: 1 "*" gives the cable diameter.
2 To conform with CE Marking, plugs and cable clamps with CE Marking are required.

A	Fan terminal (U)
B	Fan terminal (V)
C	Fan terminal (W)
D	

With an Absolute Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	BAT (-)
H	PG 5V	T	BAT (+)
J	FG (Frame ground)		

With an Incremental Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	–
H	PG 5V	T	–
J	FG (Frame ground)		

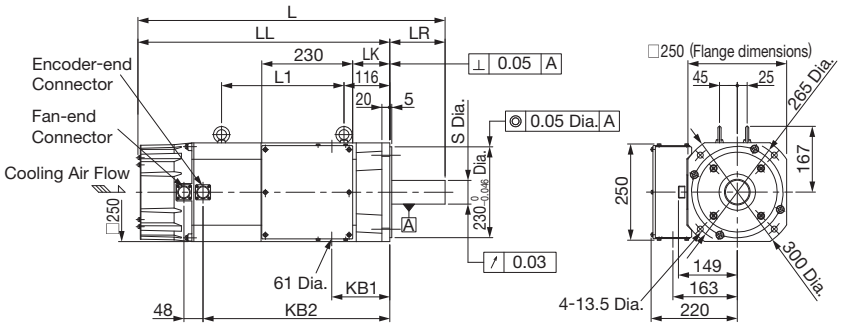
•Terminal Box Details

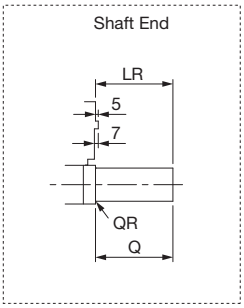
U, V, W	Motor terminals	M10
⏚	Ground terminal	M10
1, 1b	Thermostat terminals	M4

Note: Always connect a thermostat to protect the servomotor from overheating.

External Dimensions Units: mm

●Flange-mounted Servomotors with Holding Brakes

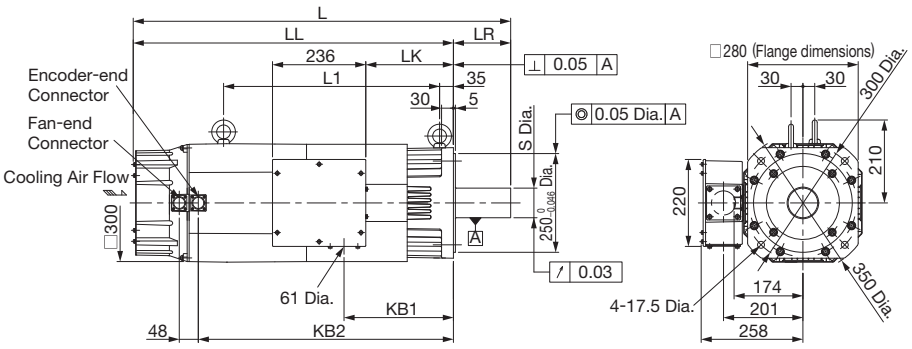


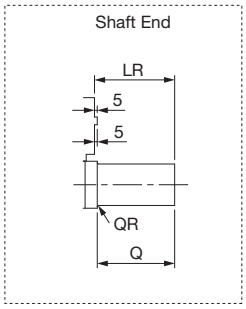


For the specifications of the other shaft ends, refer to page 19.

Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	S Dia.	Q	QR	Approx. Mass kg
2B□□B	1500	778	638	140	94	310	147	473	$60^{+0.030}_{+0.011}$	140	1.6	130
3Z□□B		824	684	140	140	356	193	519	$60^{+0.030}_{+0.011}$	140	1.6	145
3G□□B		884	744	140	180	416	233	579	$65^{+0.030}_{+0.011}$	140	1.2	155
2B□□D	800	934	794	140	230	466	283	629	$65^{+0.030}_{+0.011}$	140	1.2	170

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



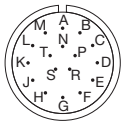


For the specifications of the other shaft ends, refer to page 19.

Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	S Dia.	Q	QR	Approx. Mass kg
4ED□B	1500	956	811	145	222	547	277	646	$75^{+0.030}_{+0.011}$	140	2.5	215

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

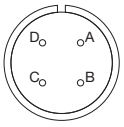
• Cable Specifications for Encoder-end Connector



Receptacle: 97F3102E20-29P
L-shaped Plug: JA08A-20-29S-J1-EB
(CE-compliant) or MS3108B20-29S
Straight Plug: JA06A-20-29S-J1-EB
(CE-compliant) or MS3106B20-29S
Cable Clamp: JL04-2022CKE (**)
(CE-compliant) or MS3057-12A

Note: 1 "**" gives the cable diameter.
2 For information on the cable models, refer to page 38.
3 To conform with CE Marking, plugs and cable clamps with CE Marking are required.

•Cable Specifications for Fan-end Connector



Receptacle: CE05-2A18-10PD-D
L-shaped Plug: CE05-8A18-10SD-D-BAS
Straight Plug: CE05-6A18-10SD-D-BSS
Cable Clamp: CE3057-10A-*(D265)
(CE-compliant) or MS3057-10A

Note: 1 "*" gives the cable diameter.
2 To conform with CE Marking, plugs and cable clamps with CE Marking are required.

A	Fan terminal (U)
B	Fan terminal (V)
C	Fan terminal (W)
D	

With an Absolute Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	BAT (-)
H	PG 5V	T	BAT (+)
J	FG (Frame ground)		

With an Incremental Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	–
H	PG 5V	T	–
J	FG (Frame ground)		

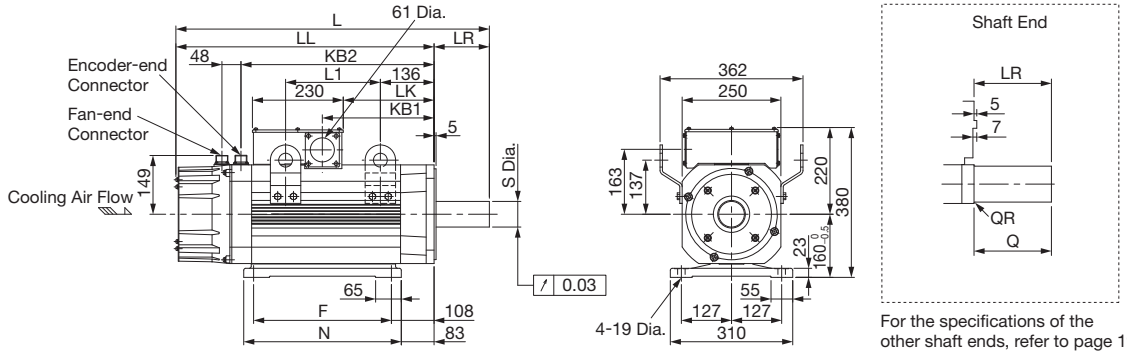
•Terminal Box Details

U, V, W	Motor terminals	M10
⏚	Ground terminal	M10
1, 1b	Thermostat terminals	M4
A, B	Brake terminals	M4

Note: Always connect a thermostat to protect the servomotor from overheating.

External Dimensions Units: mm

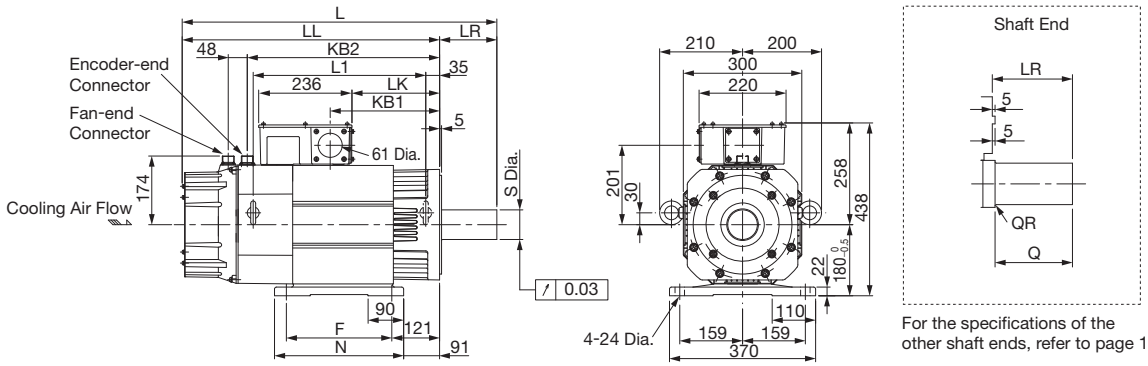
●Foot-mounted Servomotors without Holding Brakes



For the specifications of the other shaft ends, refer to page 19.

Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	F	N	S Dia.	Q	QR	Approx. Mass kg
2B□□B	1500	658	518	140	94	104	147	353	210	260	$60^{+0.030}_{+0.011}$	140	1.6	110
3Z□□B		704	564	140	140	150	193	399	241	291	$60^{+0.030}_{+0.011}$	140	1.6	125
3G□□B		744	604	140	180	190	233	439	279	329	$65^{+0.030}_{+0.011}$	140	1.2	140
2B□□D	800	794	654	140	230	240	283	489	349	399	$65^{+0.030}_{+0.011}$	140	1.2	155

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

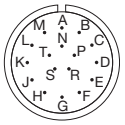


For the specifications of the other shaft ends, refer to page 19.

Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	F	N	S Dia.	Q	QR	Approx. Mass kg
4ED□B	1500	797	652	145	222	437	277	487	267	327	$75^{+0.030}_{+0.011}$	140	2.5	180
5ED□B		842	697	145	267	482	322	532	311	371	$75^{+0.030}_{+0.011}$	140	2.5	205
3Z□□D	800	842	697	145	267	482	322	532	311	371	$75^{+0.030}_{+0.011}$	140	2.5	205
3G□□D		892	747	145	317	532	372	582	349	409	$75^{+0.030}_{+0.011}$	140	2.5	230
4ED□D		973	798	175	357	572	412	622	368	428	$85^{+0.035}_{+0.013}$	170	2.5	250

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

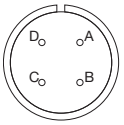
• Cable Specifications for Encoder-end Connector



Receptacle: 97F3102E20-29P
L-shaped Plug: JA08A-20-29S-J1-EB
(CE-compliant) or MS3108B20-29S
Straight Plug: JA06A-20-29S-J1-EB
(CE-compliant) or MS3106B20-29S
Cable Clamp: JL04-2022CKE (**)
(CE-compliant) or MS3057-12A

Note: 1 "**" gives the cable diameter.
2 For information on the cable models, refer to page 38.
3 To conform with CE Marking, plugs and cable clamps with CE Marking are required.

•Cable Specifications for Fan-end Connector



Receptacle: CE05-2A18-10PD-D
L-shaped Plug: CE05-8A18-10SD-D-BAS
Straight Plug: CE05-6A18-10SD-D-BSS
Cable Clamp: CE3057-10A-*(D265)
(CE-compliant) or MS3057-10A

Note: 1 "*" gives the cable diameter.
2 To conform with CE Marking, plugs and cable clamps with CE Marking are required.

A	Fan terminal (U)
B	Fan terminal (V)
C	Fan terminal (W)
D	

With an Absolute Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	BAT (-)
H	PG 5V	T	BAT (+)
J	FG (Frame ground)		

With an Incremental Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	–
H	PG 5V	T	–
J	FG (Frame ground)		

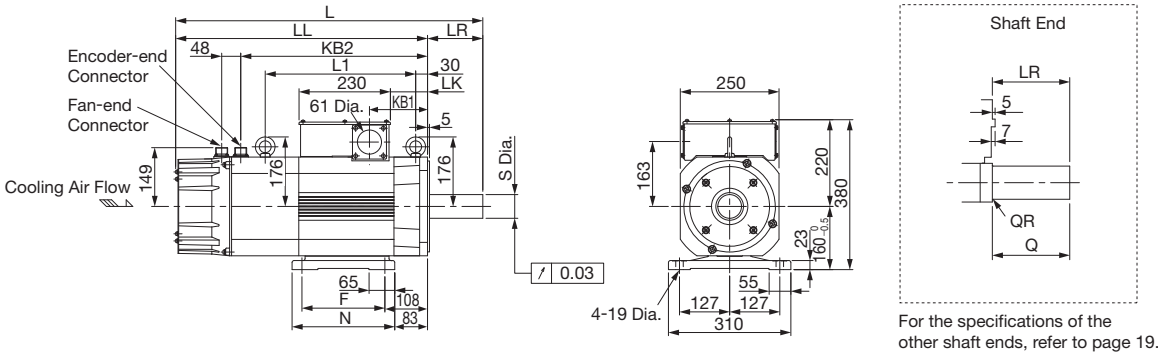
•Terminal Box Details

U, V, W	Motor terminals	M10
⏚	Ground terminal	M10
1, 1b	Thermostat terminals	M4

Note: Always connect a thermostat to protect the servomotor from overheating.

External Dimensions Units: mm

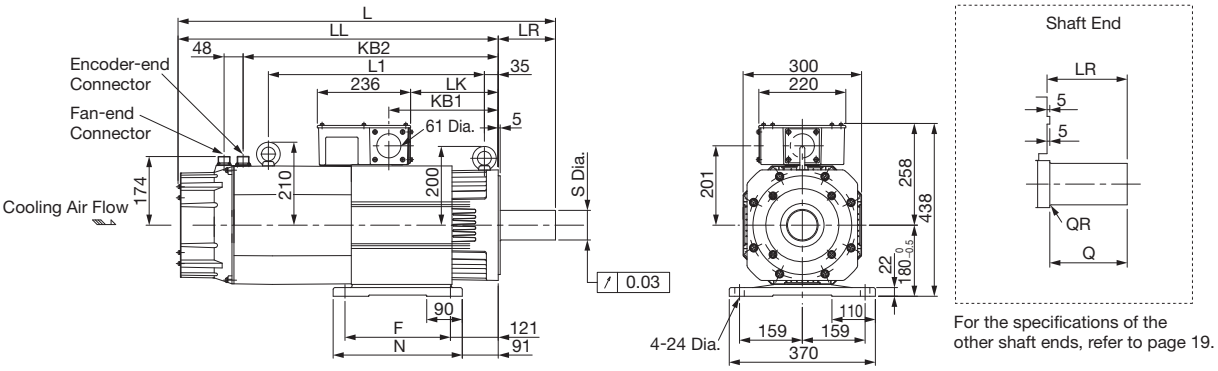
●Foot-mounted Servomotors with Holding Brakes



For the specifications of the other shaft ends, refer to page 19.

Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	F	N	S Dia.	Q	QR	Approx. Mass kg
2B□□B	1500	778	638	140	94	381	147	473	210	260	$60^{+0.030}_{+0.011}$	140	1.6	145
3Z□□B		824	684	140	140	427	193	519	241	291	$60^{+0.030}_{+0.011}$	140	1.6	160
3G□□B		884	744	140	180	487	233	579	279	329	$65^{+0.030}_{+0.011}$	140	1.2	175
2B□□D	800	934	794	140	230	537	283	629	349	399	$65^{+0.030}_{+0.011}$	140	1.2	190

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



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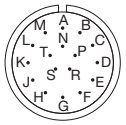
Servomotor Model SGMVV-	Rated Speed RPM	L	LL	LR	LK	L1	KB1	KB2	F	N	S Dia.	Q	QR	Approx. Mass kg
4ED□B	1500	956	811	145	222	547	277	646	267	327	$75^{+0.030}_{+0.011}$	140	2.5	235
5ED□B		1001	856	145	267	592	322	691	311	371	$75^{+0.030}_{+0.011}$	140	2.5	260
3Z□□D	800	1001	856	145	267	592	322	691	311	371	$75^{+0.030}_{+0.011}$	140	2.5	260
3G□□D		1051	906	145	317	642	372	741	349	409	$75^{+0.030}_{+0.011}$	140	2.5	285

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

• Cable Specifications for Encoder-end Connector



Receptacle: 97F3102E20-29P
L-shaped Plug: JA08A-20-29S-J1-EB
(CE-compliant) or MS3108B20-29S
Straight Plug: JA06A-20-29S-J1-EB
(CE-compliant) or MS3106B20-29S
Cable Clamp: JL04-2022CKE (**)
(CE-compliant) or MS3057-12A

Note: 1 "**" gives the cable diameter.
2 For information on the cable models, refer to page 38.
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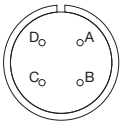
•Cable Specifications for Fan-end Connector



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L-shaped Plug: CE05-8A18-10SD-D-BAS
Straight Plug: CE05-6A18-10SD-D-BSS
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A	Fan terminal (U)
B	Fan terminal (V)
C	Fan terminal (W)
D	

With an Absolute Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	BAT (-)
H	PG 5V	T	BAT (+)
J	FG (Frame ground)		

With an Incremental Encoder

A	–	K	–
B	–	L	–
C	PS	M	–
D	/PS	N	–
E	–	P	–
F	–	R	–
G	PG 0V	S	–
H	PG 5V	T	–
J	FG (Frame ground)		

•Terminal Box Details

U, V, W	Motor terminals	M10
⏚	Ground terminal	M10
1, 1b	Thermostat terminals	M4
A, B	Brake terminals	M4

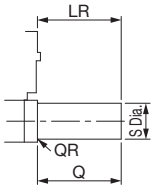
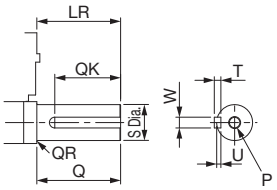
Note: Always connect a thermostat to protect the servomotor from overheating.

External Dimensions Units: mm

●Shaft End

SGMVV - □□□□□□□

Code	Specifications	Remarks
2	Flange-mounted with straight shaft end (without key and no tap)	Standard
6	Flange-mounted with straight shaft end (with key and tap)	Optional
K	Foot-mounted with straight shaft end (without key and no tap)	Standard
L	Foot-mounted with straight shaft end (with key and tap)	Optional

Code	Specifications	Shaft End		Servomotor Model SGMVV-								
				2BA□B	3ZA□B	3GA□B	–	–	2BA□D	3ZA□D	3GA□D	–
				2BD□B	3ZD□B	3GD□B	4ED□B	5ED□B	2BD□D	3ZD□D	3GD□D	4ED□D
2□K	Straight without Key		LR	140	140	140	145	145	140	145	145	175
			Q	140	140	140	140	140	140	140	140	170
			QR	1.6	1.6	1.2	2.5	2.5	1.2	2.5	2.5	2.5
			S	$60^{+0.030}_{+0.011}$	$60^{+0.030}_{+0.011}$	$65^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$65^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$85^{+0.035}_{+0.013}$
6□L	Straight with Key and Tap		LR	140	140	140	145	145	140	145	145	175
			Q	140	140	140	140	140	140	140	140	170
			QR	1.6	1.6	1.2	2.5	2.5	1.2	2.5	2.5	2.5
			QK	110	110	110	110	110	110	110	110	140
			S	$60^{+0.030}_{+0.011}$	$60^{+0.030}_{+0.011}$	$65^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$65^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$75^{+0.030}_{+0.011}$	$85^{+0.035}_{+0.013}$
			W	18	18	18	20	20	18	20	20	22
			T	11	11	11	12	12	11	12	12	14
			U	7	7	7	7.5	7.5	7	7.5	7.5	9
			P	M20 Screw, Depth40								

Ratings

Three-phase 200 V

SERVOPACK Model: SGDV-□□□□		121H	161H	201H
Applicable Servomotor Max.Capacity kW		22	30	37
Continuous Output Current A_{rms}		116	160	200
Max. Output Current A_{rms}		240	340	460
Input Power	Main Circuit P/N	270 to 310 VDC		
	Control Circuit	24 VDC ±15%		

Three-phase 400 V

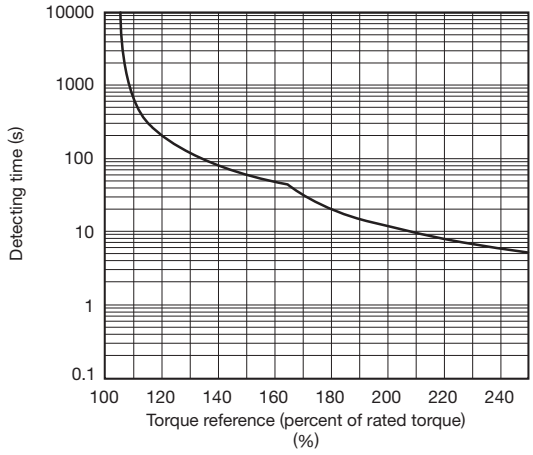
SERVOPACK Model: SGDV-□□□□		750J	101J	131J
Applicable Servomotor Max.Capacity kW		30	37	55
Continuous Output Current A_{rms}		75	98	130
Max. Output Current A_{rms}		170	230	340
Input Power	Main Circuit P/N	520 to 650 VDC		
	Control Circuit	24 VDC ±15%		

Note: Refer to page 1 for combinations with converters.

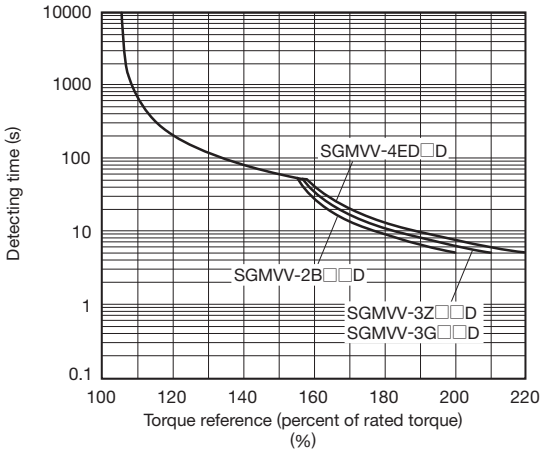
●SERVOPACK Overload Characteristics

The overload detection level is set under hot start conditions at a servomotor ambient temperature of 40°C.

Motors with Rated Speed of 1,500 RPM



Motors with Rated Speed of 800 RPM



Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output.
Use a servomotor with effective torque within the continuous duty zone of *Torque-Motor Speed Characteristics*.

Specifications

Items			Specifications	
Control Method			IGBT PWM control, sine-wave driven	
Feedback			Serial encoder: 20-bit (incremental/absolute encoder)	
Operating Conditions	Ambient Temperature		0 to +55˚C	
	Storage Temperature		−20 to +85˚C	
	Ambient Humidity		90%RH or less	With no freezing or condensation
	Storage Humidity		90%RH or less	
	Vibration Resistance		4.9 m/s^2	
	Shock Resistance		19.6 m/s^2	
	Protection Class		IP10	An environment that satisfies the following conditions. • Free of corrosive or flammable gases • Free of exposure to water, oil, or chemicals •Free of dust, salts, or iron dust
	Pollution Degree		2	
	Altitude		1000 m or less	
	Others		Do not use SERVOPACKs in the following locations: •Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Overvoltage Category			III	
Applicable Standards			UL508C (E147823) EN50178, EN55011/A2 group1 classA, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Mounting			Standard: Base-mounted Optional: Duct-ventilated	
Performance	Speed Control Range		1:5000 (The lower limit of the speed control range must be lower than the point at which the rated torque does not cause the servomotor to stop.)	
	Speed Regulation*1	Load Fluctuation	0% to 100% load: ±0.01% max. (at rated speed)	
		Voltage Fluctuation	Rated voltage: ±10% : 0% (at rated speed)	
		Temperature Fluctuation	25±25˚C : ±0.1% max. (at rated speed)	
	Torque Control Tolerance (Repeatability)		±1%	
	Soft Start Time Setting		0 to 10 s (can be set individually for acceleration and deceleration.)	
Communications	RS-422A Communications	Interface	Digital operator (JUSP-OP05A-1-E), personal computer (can be connected with SigmaWin+)	
		1:N communications	RS-422A port: N=15 max. available	
		Axis address setting	Set by parameters	
	USB Communications	Interface	Personal computer (can be connected with SigmaWin+.)	
		Communications Standard	Compliant with USB1.1 standard (12 Mbps)	
Display			CHARGE indicator	
Analog Monitor			Number of points: 2 Output voltage: ±10 VDC (linearity effective range ±8 V) Resolution: 16 bit Accuracy: ±20 mV (Typ) Max. output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)	
Dynamic Brake (DB)			An external Dynamic Brake Unit is required. For information on the recommended Dynamic Brake Unit, refer to *Dynamic Brake Unit* on page 55.	
Regenerative Processing			An external regenerative resistor is required. For information on the recommended regenerative resistor, refer to *Regenerative Resistor* on page 53.	
Overtravelling (OT) Prevention			Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error, etc.	
Utility Functions			Gain adjustment, alarm history, JOG operation, origin search, etc.	
Safety Functions		Input	/HWBB1, /HWBB2: Baseblock signal for power module	
		Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
		Applicable Standards*2	EN954 category 3, IEC61508 SIL2	
Option Module			Fully-closed Module, Safety Module	

*1 : Speed regulation is defined as follows:

$$\text{Speed regulation} = \frac{\text{No-load motor speed} - \text{Total load motor speed}}{\text{Rated motor speed}} \times 100\%$$

The motor speed may change due to voltage fluctuation or temperature fluctuation.
The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature fluctuations.

*2 : Perform risk assessment for the system and confirm that the safety requirements for the standards are fulfilled before using the HWBB function.

Specifications

Items				Specifications	
I/O Signal	Encoder Output Pulses			Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input	Fixed Input		SEN signal	
		Input Signals which can be allocated	Number of Channels	7 channels	
			Functions	•Servo ON (/S-ON) •Proportional control (/P-CON) •Forward run prohibited (P-OT), reverse run prohibited (N-OT) •Alarm reset (/ALM-RST) •Forward external torque limit (/P-CL), reverse external torque limit (/N-CL) •Internal set speed control (/SPD-D, /SPD-A, /SPD-B) Positive and negative logic can be changed.	•Control selection (/C-SEL) •Zero clamping (/ZCLAMP) •Reference pulse inhibit (/INHIBIT) •Gain selection (/G-SEL) •Reference pulse input multiplication switching (/PSEL) •DB answer (/DBANS)
	Sequence Output	Fixed Output		Servo alarm (ALM), alarm code (ALO1, ALO2, ALO3) outputs	
		Output Signals which can be allocated	Number of Channels	3 channels	
			Functions	•Positioning completion (/COIN) •Speed coincidence detection (/V-CMP) •Rotation detection (/TGON) •Servo ready (/S-RDY) •Torque limit detection (/CLT) •Speed limit detection (/VLT) Positive and negative logic can be changed.	•Brake (/BK) •Warning (/WARN) •Near (/NEAR) •Reference pulse input multiplication switching (/PSELA)
Panel Operator		Display Unit		Five 7-segment LEDs	
		Switch		Four push switches	
Torque Control	Input Signals	Reference Voltage		•Max. input voltage: ±12 V (forward torque reference with positive reference) •Factory setting: 3 VDC at rated torque (Input gain setting can be changed.)	
		Input Impedance		About 14 kΩ	
		Circuit Time Constant		16 μs	
Speed Control	Soft Start Time Setting			0 to 10 s (can be set individually for acceleration and deceleration.)	
	Input Signals	Reference Voltage		•Max. input voltage: ±12 V (forward speed reference with positive reference) •Factory setting: 6 VDC at rated speed (Input gain setting can be changed.)	
		Input Impedance		About 14 kΩ	
		Circuit Time Constant		30 μs	
	Internal Set Speed Control	Rotation Direction Selection		With P control signal	
		Speed Selection		With forward/reverse external torque limit signal (speed 1 to 3 selection). Servomotor stops or another control method is used when both are OFF.	
Position Control	Feedforward Compensation			0 to 100%	
	Positioning Completed Width Setting			0 to 1073741824 reference units	
	Input Signals	Reference Pulse	Type	Select one of them: Sign + pulse train, CW + CCW pulse train, or two-phase pulse train with 90°phase differential	
			Form	For line driver, open collector	
			Max. Input Pulse Frequency*	Line driver Sign + pulse train, CW + CCW pulse train: 4 Mpps Two-phase pulse train with 90°phase differential:1 Mpps Open Collector Sign + pulse train, CW + CCW pulse train: 200 kpps Two-phase pulse train with 90°phase differential: 200 kpps	
			Reference Pulse Input Multiplication Switching	1 to 100 times	
		Clear Signal		Position error clear For line driver, open collector	

* : If the maximum reference frequency exceeds 1 Mpps, use a shielded cable for I/O signals and ground both ends of the shield.
Connect the shield at the SERVOPACK to the connector shell.

Power Supply Capacities and Power Losses

The following table shows SERVOPACK's power supply capacities and power losses at the rated output.

Main Circuit Power Supply Voltage	Applicable Servomotor Max. Capacity kW	Combination of SERVOPACK and Converter		Power Supply Capacity for Each SERVOPACK-Converter Set kVA	Output Current A_{rms}	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
		SERVOPACK Model SGDV-	Converter Model SGDV-COA						
Three-phase 200 V	22	121H	2BAA	38	116	1200	(480) *1	120	1320
	30	161H	3GAA	52	160	1540	(960) *2	120	1660
	37	201H	3GAA	64	200	1540	(960) *3	120	1660
Three-phase 400 V	30	750J	3ZDA	52	76	1020	(720) *4	96	1116
	37	101J	5EDA	64	98	1240	(960) *5	96	1336
	55	131J	5EDA	95	130	1590	(1440) *6	96	1686

*1:For the optional JUSP-RA08-E regenerative resistor.
*2:For the optional JUSP-RA09-E regenerative resistor.
*3:For the optional JUSP-RA11-E regenerative resistor.
*4:For the optional JUSP-RA13-E regenerative resistor.
*5:For the optional JUSP-RA14-E regenerative resistor.
*6:For the optional JUSP-RA16-E regenerative resistor.

Ratings

Three-phase 200 V

SERVOPACK Model: SGDV-□□□□		121H	161H	201H
Applicable Servomotor Max.Capacity kW		22	30	37
Continuous Output Current A_{rms}		116	160	200
Max. Output Current A_{rms}		240	340	460
Input Power	Main Circuit P/N	270 to 310 VDC		
	Control Circuit	24 VDC ±15%		

Three-phase 400 V

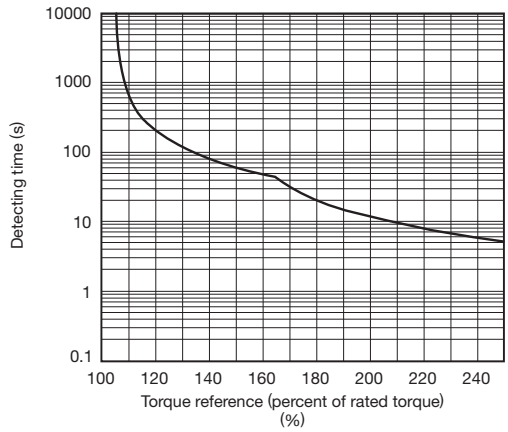
SERVOPACK Model: SGDV-□□□□		750J	101J	131J
Applicable Servomotor Max.Capacity kW		30	37	55
Continuous Output Current A_{rms}		75	98	130
Max. Output Current A_{rms}		170	230	340
Input Power	Main Circuit P/N	520 to 650 VDC		
	Control Circuit	24 VDC ±15%		

Note: Refer to page 1 for combinations with converters.

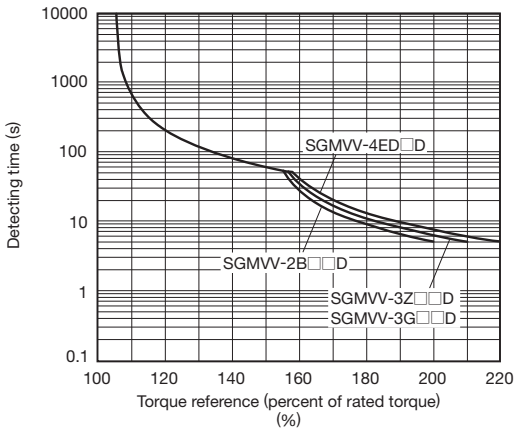
●SERVOPACK Overload Characteristics

The overload detection level is set under hot start conditions at a servomotor ambient temperature of 40° C.

Motors with Rated Speed of 1,500 RPM



Motors with Rated Speed of 800 RPM



Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output.
Use a servomotor with effective torque within the continuous duty zone of *Torque-Motor Speed Characteristics*.

Specifications

Items			Specifications	
Control Method			IGBT PWM control, sine-wave driven	
Feedback			Serial encoder: 20-bit (incremental/absolute encoder)	
Operating Conditions	Ambient Temperature		0 to +55°C	
	Storage Temperature		−20 to +85°C	
	Ambient Humidity		90%RH or less	With no freezing or condensation
	Storage Humidity		90%RH or less	
	Vibration Resistance		4.9 m/s^2	
	Shock Resistance		19.6 m/s^2	
	Protection Class		IP10	An environment that satisfies the following conditions. • Free of corrosive or flammable gases • Free of exposure to water, oil, or chemicals •Free of dust, salts, or iron dust
	Pollution Degree		2	
	Altitude		1000 m or less	
	Others		Do not use SERVOPACKs in the following locations: •Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Overvoltage Category			III	
Applicable Standards			UL508C (E147823) EN50178, EN55011/A2 group1 classA, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Mounting			Standard: Base-mounted Optional: Duct-ventilated	
Performance	Speed Control Range		1:5000 (The lower limit of the speed control range must be lower than the point at which the rated torque does not cause the servomotor to stop.)	
	Speed Regulation*1	Load Fluctuation	0% to 100% load: ±0.01% max. (at rated speed)	
		Voltage Fluctuation	Rated voltage: ±10% : 0% (at rated speed)	
		Temperature Fluctuation	25±25°C : ±0.1% max. (at rated speed)	
	Torque Control Tolerance (Repeatability)		±1%	
	Soft Start Time Setting		0 to 10 s (can be set individually for acceleration and deceleration.)	
Communications	RS-422A Communications	Interface	Digital operator (JUSP-OP05A-1-E), personal computer (can be connected with SigmaWin+)	
		1:N communications	RS-422A port: N=15 max. available	
		Axis address setting	Set by parameters	
	USB Communications	Interface	Personal computer (can be connected with SigmaWin+.)	
		Communications Standard	Compliant with USB1.1 standard (12 Mbps)	
Display			Panel display (seven-segment), CHARGE, POWER, and COM indicators	
Analog Monitor			Number of points: 2 Output voltage: ±10 VDC (linearity effective range ±8 V) Resolution: 16 bit Accuracy: ±20 mV (Typ) Max. output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)	
Dynamic Brake (DB)			An external Dynamic Brake Unit is required. For information on the recommended Dynamic Brake Unit, refer to *Dynamic Brake Unit* on page 55.	
Regenerative Processing			An external regenerative resistor is required. For information on the recommended regenerative resistor, refer to *Regenerative Resistor* on page 53.	
Overtravelling (OT) Prevention			Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error, etc.	
Utility Functions			Gain adjustment, alarm history, JOG operation, origin search, etc.	
Safety Functions		Input	/HWBB1, /HWBB2: Baseblock signal for power module	
		Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
		Applicable Standards*2	EN954 category 3, IEC61508 SIL2	
Option Module			Fully-closed Module, Safety Module	

*1 : Speed regulation is defined as follows:

$$\text{Speed regulation} = \frac{\text{No-load motor speed} - \text{Total load motor speed}}{\text{Rated motor speed}} \times 100\%$$

The motor speed may change due to voltage fluctuation or temperature fluctuation.
The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature fluctuations.

*2 : Perform risk assessment for the system and confirm that the safety requirements for the standards are fulfilled before using the HWBB function.

Specifications

Items			Specifications		
I/O Signal	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.		
	Sequence Input	Input Signals which can be allocated	Number of Channels	7 channels	
			Function	•Homing deceleration switch signal (/DEC) •Forward run prohibited (P-OT), reverse run prohibited (N-OT) •External latch signals (/EXT 1 to 3) Positive and negative logic can be changed.	•Forward external torque limit (/P-CL), reverse external torque limit (/N-CL) •DB answer (/DBANS)
	Sequence Output	Fixed Output	Servo alarm (ALM)		
		Output Signals which can be allocated	Number of Channels	3 channels	
			Function	•Positioning completion (/COIN) •Speed coincidence detection (/V-CMP) •Rotation detection (/TGON) •Servo ready (/S-RDY) •Torque limit detection (/CLT) Positive and negative logic can be changed.	•Speed limit detection (/VLT) •Brake (/BK) •Warning (/WARN) •Near (/NEAR)
MECHATROLINK-II Communications Setting Switches			Rotary Switch (SW1)	Position: 16 positions	
			DIP Switch (SW2)	Number of pins: Four pins	
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-II		MECHATROLINK-I
		Transmission Speed	10 Mbps		4 Mbps
		Transmission Cycle	250μs, 0.5 to 4.0 ms (multiple of 0.5 ms)		2 ms
		Number of Words for Link Transmission	Can be switched between 17-bytes/station and 32-bytes/station.		17-bytes/station
		Station Address	41H to 5FH (max. number of slaves: 30)		
Command Method		Performance	Position control, speed control, and torque control through MECHATROLINK communications		
		Command Input	MECHATROLINK commands (for sequence, motion, data setting/reference, monitoring, adjustment, and other commands.)		

Power Supply Capacities and Power Losses

The following table shows SERVOPACK's power supply capacities and power losses at the rated output.

Main Circuit Power Supply Voltage	Applicable Servomotor Max. Capacity kW	Combination of SERVOPACK and Converter		Power Supply Capacity for Each SERVOPACK-Converter Set kVA	Output Current A_{rms}	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
		SERVOPACK Model SGDV-	Converter Model SGDV-COA						
Three-phase 200 V	22	121H	2BAA	38	116	1200	(480) *1	120	1320
	30	161H	3GAA	52	160	1540	(960) *2	120	1660
	37	201H	3GAA	64	200	1540	(960) *3	120	1660
Three-phase 400 V	30	750J	3ZDA	52	76	1020	(720) *4	96	1116
	37	101J	5EDA	64	98	1240	(960) *5	96	1336
	55	131J	5EDA	95	130	1590	(1440) *6	96	1686

*1:For the optional JUSP-RA08-E regenerative resistor.
*2:For the optional JUSP-RA09-E regenerative resistor.
*3:For the optional JUSP-RA11-E regenerative resistor.
*4:For the optional JUSP-RA13-E regenerative resistor.
*5:For the optional JUSP-RA14-E regenerative resistor.
*6:For the optional JUSP-RA16-E regenerative resistor.

Ratings

Three-phase 200 V

SERVOPACK Model: SGDV-□□□□		121H	161H	201H
Applicable Servomotor Max. Capacity	kW	22	30	37
Continuous Output Current	A_{rms}	116	160	200
Max. Output Current	A_{rms}	240	340	460
Input Power	Main Circuit P/N	270 to 310 VDC		
	Control Circuit	24 VDC ±15%		

Three-phase 400 V

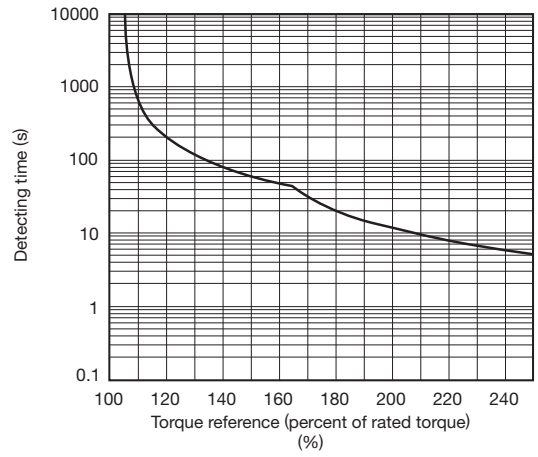
SERVOPACK Model: SGDV-□□□□		750J	101J	131J
Applicable Servomotor Max. Capacity	kW	30	37	55
Continuous Output Current	A_{rms}	75	98	130
Max. Output Current	A_{rms}	170	230	340
Input Power	Main Circuit P/N	520 to 650 VDC		
	Control Circuit	24 VDC ±15%		

Note: Refer to page 1 for combinations with converters.

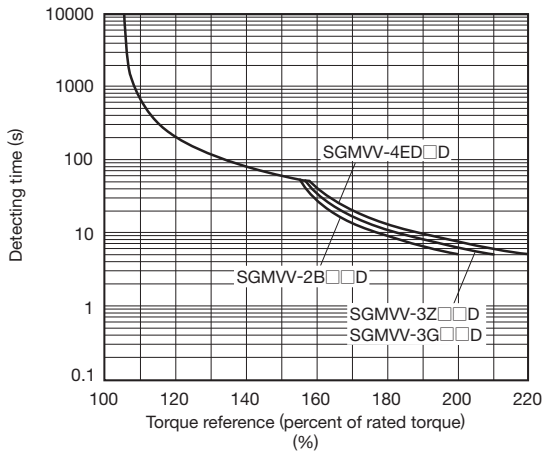
●SERVOPACK Overload Characteristics

The overload detection level is set under hot start conditions at a servomotor ambient temperature of 40° C.

Motors with Rated Speed of 1,500 RPM



Motors with Rated Speed of 800 RPM



Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output.
Use a servomotor with effective torque within the continuous duty zone of *Torque-Motor Speed Characteristics*.

Specifications

Items			Specifications	
Control Method			IGBT PWM control, sine-wave driven	
Feedback			Serial encoder: 20-bit (incremental/absolute encoder)	
Operating Conditions	Ambient Temperature		0 to +55˚C	
	Storage Temperature		−20 to +85˚C	
	Ambient Humidity		90%RH or less	With no freezing or condensation
	Storage Humidity		90%RH or less	
	Vibration Resistance		4.9 m/s^2	
	Shock Resistance		19.6 m/s^2	
	Protection Class		IP10	An environment that satisfies the following conditions. •Free of corrosive or flammable gases •Free of exposure to water, oil, or chemicals •Free of dust, salts, or iron dust
	Pollution Degree		2	
	Altitude		1000 m or less	
	Others		Do not use SERVOPACKs in the following locations: •Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Overvoltage Category			III	
Applicable Standards			UL508C (E147823) EN50178, EN55011/A2 group1 classA, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Mounting			Standard: Base-mounted Optional: Duct-ventilated	
Performance	Speed Control Range		1:5000 (The lower limit of the speed control range must be lower than the point at which the rated torque does not cause the servomotor to stop.)	
	Speed Regulation*1	Load Fluctuation	0% to 100% load: ±0.01% max. (at rated speed)	
		Voltage Fluctuation	Rated voltage: ±10% : 0% (at rated speed)	
		Temperature Fluctuation	25±25˚C : ±0.1% max. (at rated speed)	
	Torque Control Tolerance (Repeatability)		±1%	
	Soft Start Time Setting		0 to 10 s (can be set individually for acceleration and deceleration.)	
Communications	RS-422A Communications	Interface	Digital operator (JUSP-OP05A-1-E), personal computer (can be connected with SigmaWin+)	
		1:N communications	RS-422A port: N=15 max. available	
		Axis address setting	Set by parameters	
	USB Communications	Interface	Personal computer (can be connected with SigmaWin+.)	
		Communications Standard	Compliant with USB1.1 standard (12 Mbps)	
Display			Panel display (seven-segment), CHARGE, CN, L1, and L2 indicators	
Analog Monitor			Number of points: 2 Output voltage: ±10 VDC (linearity effective range ±8 V) Resolution: 16 bit Accuracy: ±20 mV (Typ) Max. output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)	
Dynamic Brake (DB)			An external Dynamic Brake Unit is required. For information on the recommended Dynamic Brake Unit, refer to *Dynamic Brake Unit* on page 55.	
Regenerative Processing			An external regenerative resistor is required. For information on the recommended regenerative resistor, refer to *Regenerative Resistor* on page 53.	
Overtravelling (OT) Prevention			Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error, etc.	
Utility Functions			Gain adjustment, alarm history, JOG operation, origin search, etc.	
Safety Functions		Input	/HWBB1, /HWBB2: Baseblock signal for power module	
		Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
		Applicable Standards*2	EN954 category 3, IEC61508 SIL2	
Option Module			Fully-closed Module, Sefety Module	

*1 : Speed regulation is defined as follows:

$$\text{Speed regulation} = \frac{\text{No-load motor speed} - \text{Total load motor speed}}{\text{Rated motor speed}} \times 100\%$$

The motor speed may change due to voltage fluctuation or temperature fluctuation.
The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature fluctuations.

*2 : Perform risk assessment for the system and confirm that the safety requirements for the standards are fulfilled before using the HWBB function.

Specifications

Items			Specifications	
I/O Signal	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input	Input Signals which can be allocated	Number of Channels	7 channels
			Function	•Homing deceleration switch signal (/DEC) •Forward run prohibited (P-OT), reverse run prohibited (N-OT) •External latch signals (/EXT 1 to 3) •Forward external torque limit (/P-CL), reverse external torque limit (/N-CL) •DB answer (/DBANS) Positive and negative logic can be changed.
	Sequence Output	Fixed Output	Servo alarm (ALM)	
		Output Signals which can be allocated	Number of Channels	3 channels
			Function	•Positioning completion (/COIN) •Speed coincidence detection (/V-CMP) •Rotation detection (/TGON) •Servo ready (/S-RDY) •Torque limit detection (/CLT) •Speed limit detection (/VLT) •Brake (/BK) •Warning (/WARN) •Near (/NEAR) Positive and negative logic can be changed.
MECHATROLINK-III Communications Setting Switches			Rotary switches (S1 and S2)	Positions: 16 positions × 2 switches
			DIP Switch (S3)	Number of pins: Four pins
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-III	
		Transmission Speed	100 Mbps	
		Transmission Cycle	125 μs, 250 μs, 500 μs,750 μs, 1 ms to 4 ms (multiple of 0.5 ms)	
		Number of Words for Link Transmission	Can be switched between 16-bytes/station, 32-bytes/station and 48-bytes/station.	
		Station Address	03H to EFH (max. number of slaves: 62)	
Command Method		Performance	Position control, speed control, and torque control through MECHATROLINK communications	
		Command Input	MECHATROLINK commands (for sequence, motion, data setting/reference, monitoring, adjustment, and other commands.)	
		Profile	MECHATROLINK-III standard servo profile MECHATROLINK-II compatible profile	

Power Supply Capacities and Power Losses

The following table shows SERVOPACK's power supply capacities and power losses at the rated output.

Main Circuit Power Supply Voltage	Applicable Servomotor Max. Capacity kW	Combination of SERVOPACK and Converter		Power Supply Capacity for Each SERVOPACK-Converter Set kVA	Output Current A_{rms}	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
		SERVOPACK Model SGDV-	Converter Model SGDV-COA						
Three-phase 200 V	22	121H	2BAA	38	116	1200	(480) *1	120	1320
	30	161H	3GAA	52	160	1540	(960) *2	120	1660
	37	201H	3GAA	64	200	1540	(960) *3	120	1660
Three-phase 400 V	30	750J	3ZDA	52	76	1020	(720) *4	96	1116
	37	101J	5EDA	64	98	1240	(960) *5	96	1336
	55	131J	5EDA	95	130	1590	(1440) *6	96	1686

*1:For the optional JUSP-RA08-E regenerative resistor.
*2:For the optional JUSP-RA09-E regenerative resistor.
*3:For the optional JUSP-RA11-E regenerative resistor.
*4:For the optional JUSP-RA13-E regenerative resistor.
*5:For the optional JUSP-RA14-E regenerative resistor.
*6:For the optional JUSP-RA16-E regenerative resistor.

External Dimensions Units: mm

●Dimensional Drawings

All drawings on the following pages show the exterior of the analog voltage/pulse train reference SERVOPACK as examples. The external appearance and connectors depend on the SERVOPACK model.

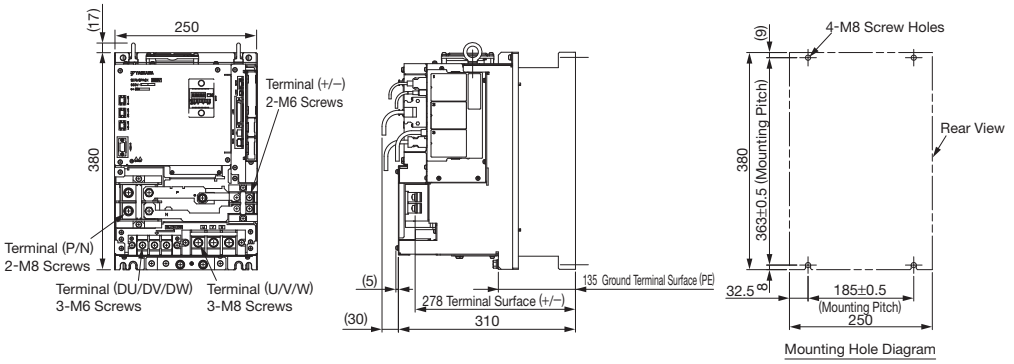
Connector

Port	Model	Pin	Manufacturer
CN1	10250-52A2PL	50	Sumitomo 3M Ltd.
CN2	53984-0671	6	Molex Japan Co., Ltd.
CN3	HDR-EC14LFDTN-SLE-PLUS	14	Honda Tsushin Kogyo Co., Ltd.
CN5*1	–	4	–
CN6A, CN6B*2	1903815-1	8	Tyco Electronics Japan G.K.
CN6A, CN6B*3	1981386-1	8	Tyco Electronics Japan G.K.
CN7	MNC23-5K5H00	5	ADVANCED-CONNECTEK INC□
CN8	1981080-1	8	Tyco Electronics Japan G.K.
CN103, CN104*1	–	3	–
CN115*1	–	3	–
CN901*1	–	9	–

*1 : Connect the special cables.
*2 : For MECHATROLINK-II Communications Reference SERVOPACKs
*3 : For MECHATROLINK-III Communications Reference SERVOPACKs
Note: The connectors above or their equivalents are used for SERVOPACKs.

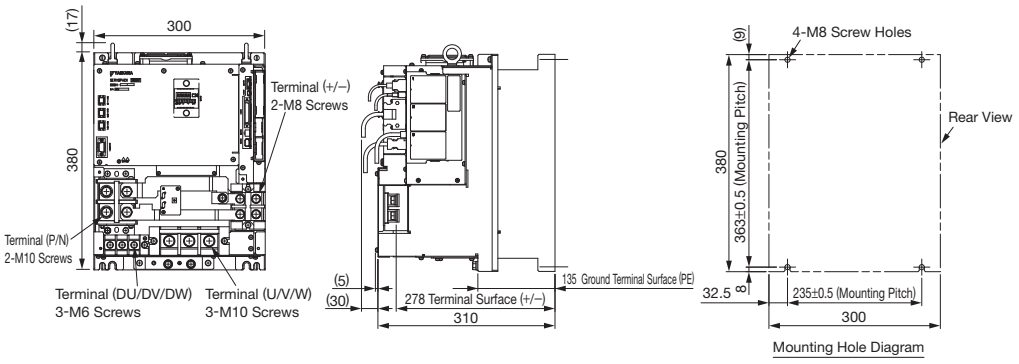
●Base-Mounted Model

(1) Three-phase 200 VAC, 22 kW and 30 kW (Model: SGDV-121H, -161H)
Three-phase 400 VAC, 30 kW and 37 kW (Model: SGDV-750J, -101J)



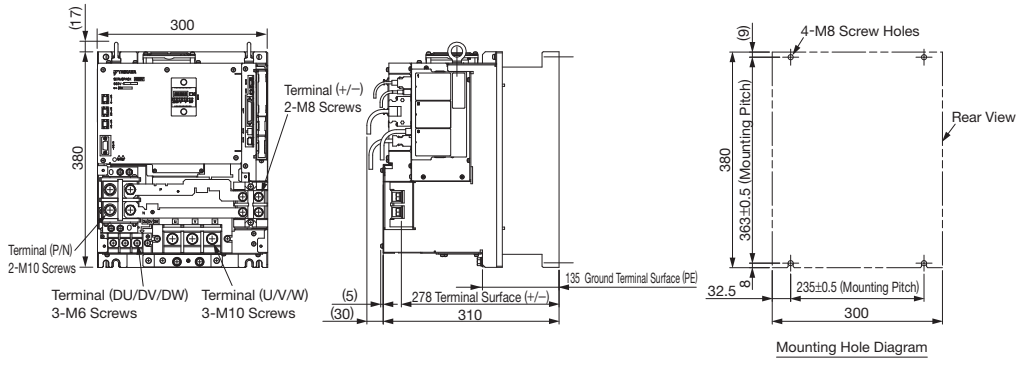
Approx. Mass: 22.5 kg

(2) Three-phase 200 VAC, 37 kW (Model: SGDV-201H)



Approx. Mass: 29.3 kg

(3) Three-phase 400 VAC, 55 kW (Model: SGDV-131J)

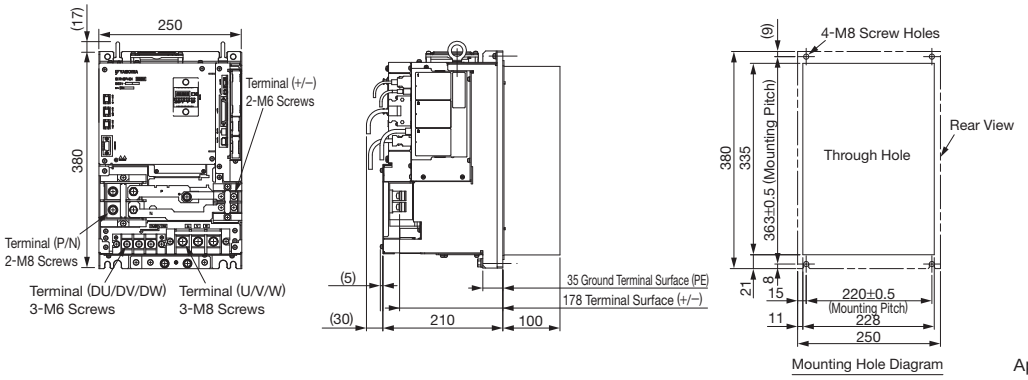


Approx. Mass: 25.7 kg

External Dimensions Units: mm

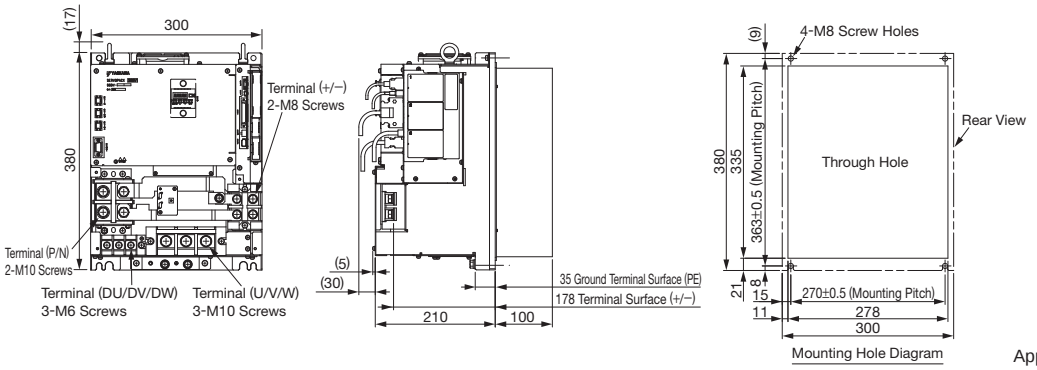
●Duct-ventilated Model

(1) Three-phase 200 VAC, 22 kW and 30 kW (Model: SGDV-121H, -161H)



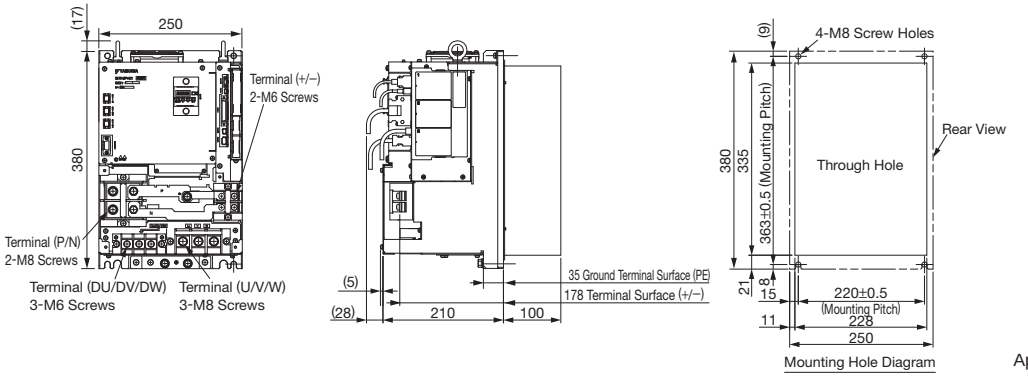
Approx. Mass: 22.3 kg

(2) Three-phase 200 VAC, 37 kW (Model: SGDV-201H)



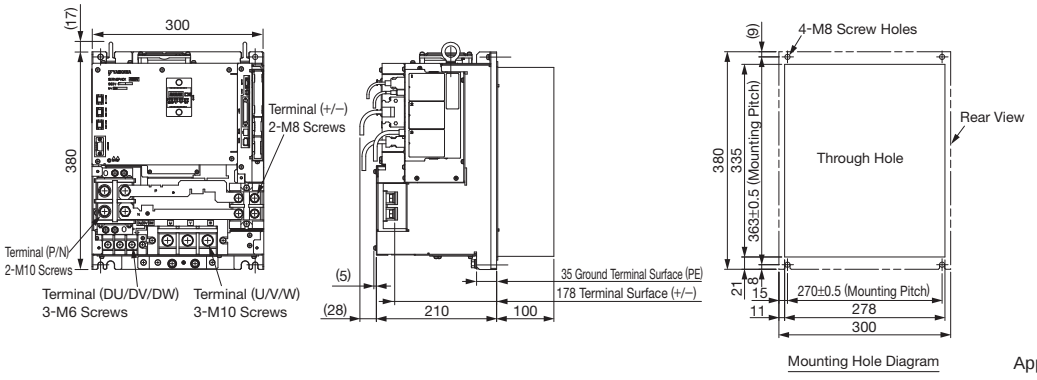
Approx. Mass: 29.0 kg

(3) Three-phase 400 VAC, 30 kW and 37 kW (Model: SGDV-750J, -101J)



Approx. Mass: 22.3 kg

(4) Three-phase 400 VAC, 55 kW (Model: SGDV-131J)



Approx. Mass: 25.4 kg

Same for all Models

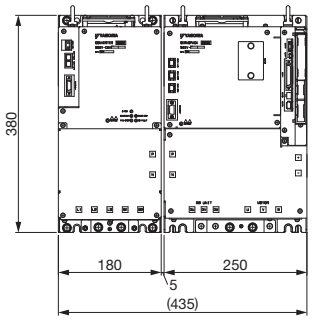
External Dimensions Units: mm

●Combinations of SERVOPACKs and Converters

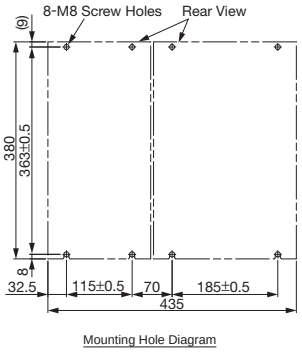
Note: The following figures show the SERVOPACKs and converters for 200-VAC models. The dimensions of the 400-VAC models are the same.

(1) Three-phase 200 VAC, 22 kW (22-kW converter and SERVOPACK)
Three-phase 400 VAC, 30 kW (30-kW converter and SERVOPACK)

Converters: SGDV-COA2BAA, SGDV-COA3ZDA
SERVOPACKs: SGDV-121H, SGDV-750J

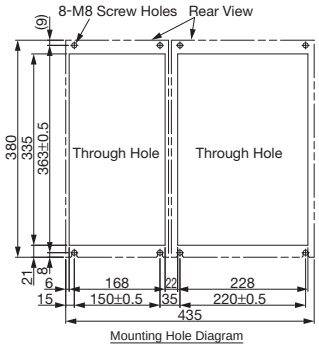


•Base-Mounted Model



Mounting Hole Diagram

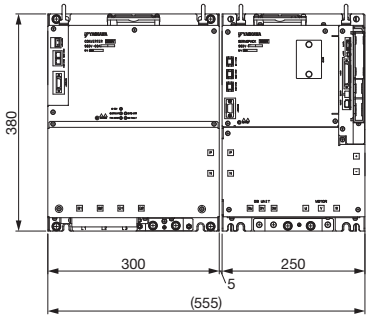
•Duct-ventilated Model



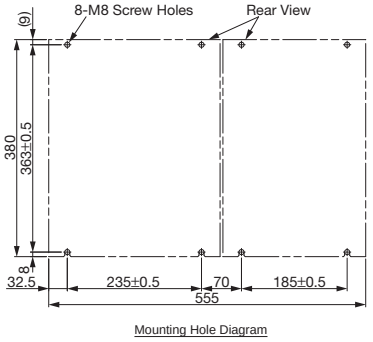
Mounting Hole Diagram

(2) Three-phase 200 VAC, 30 kW (37-kW converter and 30-kW SERVOPACK)
Three-phase 400 VAC, 37 kW (55-kW converter and 37-kW SERVOPACK)

Converters: SGDV-COA3GAA□, SGDV-COA5EDA
SERVOPACKs: SGDV-161H□, SGDV-101J

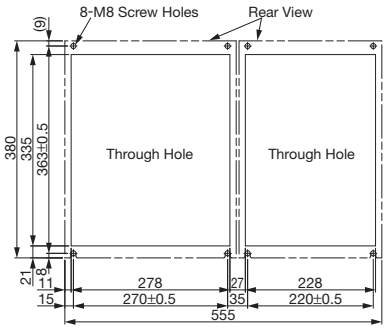


•Base-Mounted Model



Mounting Hole Diagram

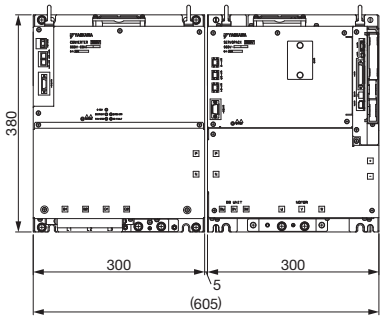
•Duct-ventilated Model



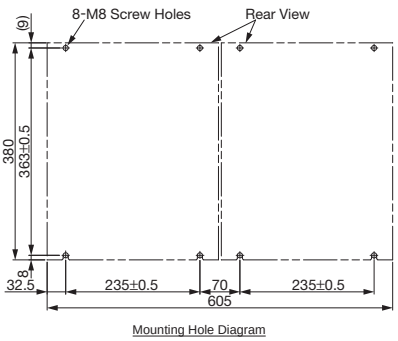
Mounting Hole Diagram

(3) Three-phase 200 VAC, 37 kW (37-kW converter and SERVOPACK)
Three-phase 400 VAC, 55 kW (55-kW converter and SERVOPACK)

Converters: SGDV-COA3GAA□, SGDV-COA5EDA
SERVOPACKs: SGDV-201H□, SGDV-131J

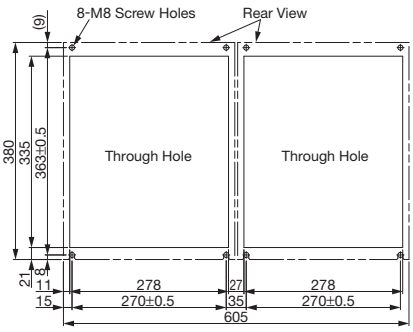


•Base-Mounted Model



Mounting Hole Diagram

•Duct-ventilated Model



Mounting Hole Diagram

Converters

Ratings and Specifications

Main Circuit Power Supply Voltage		Three-phase 200 VAC		Three-phase 400 VAC	
Converter Model: SGDV-COA□□□□		2BAA	3GAA	3ZDA	5EDA
Input Power	Main Circuit	Three-phase 200 to 230 VAC +10% to -15% 50/60 Hz		Three-phase 380 to 480 VAC +10% to -15% 50/60 Hz	
	Control Circuit	Single-phase 200 to 230 VAC +10% to -15% 50/60 Hz		24 VDC ±15%	
Output Power	Main Circuit P/N	270 to 310 VDC		520 to 650 VDC	
	Control Circuit	24 VDC ±15%		24 VDC ±15%	
Regenerative Processing		An external regenerative resistor is required. For information on the recommended regenerative resistor, refer to *Regenerative Resistor* on page 53.			
Rectification Method		Three-phase full-wave rectification			
Operating Conditions	Ambient Temperature	0 to +55°C			
	Storage Temperature	-20 to +85°C			
	Operating/storage humidity	90%RH or less (no condensation)			
	Vibration/Shock Resistance	4.9 m/s², 19.6 m/s²,			
	Altitude	1000 m or less			
Mounting		Standard: Base-mounted Optional: Duct-ventilated			
I/O Signals (SERVOPACK Interface)		SERVOPACK control I/O signals			
Display		CHARGE indicator			
Protective Functions		Protection for lost power phase, main circuit voltage error, overvoltage, undervoltage, blown fuse, heat sink overheat, stopped fan, etc.			
Utility Functions		Rapid discharge function			

Note: Refer to page 1 for combinations with SERVOPACKs.

External Dimensions Units: mm

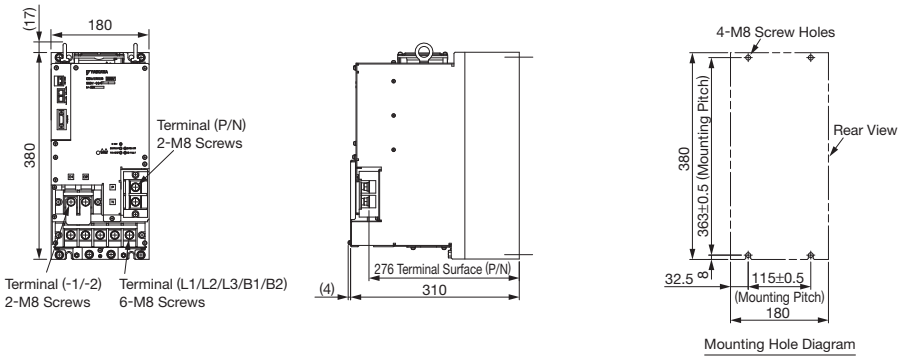
Connector

Port	Model	Pin	Manufacturer
CN101	231-202/026-000	2	WAGO Company of Japan, Ltd
CN103, CN104*	–	3	–
CN901*	–	20	–

* : Connect the special cables.

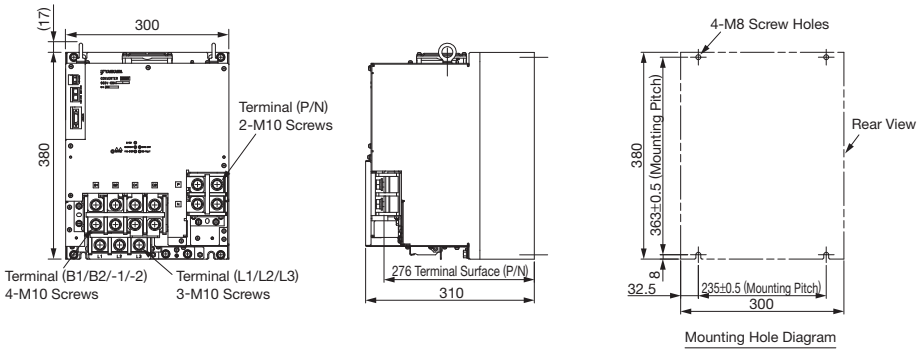
●Base-Mounted Model

(1) Three-phase 200 VAC (Model: SGDV-COA2BAA)



Approx. Mass: 20.0 kg

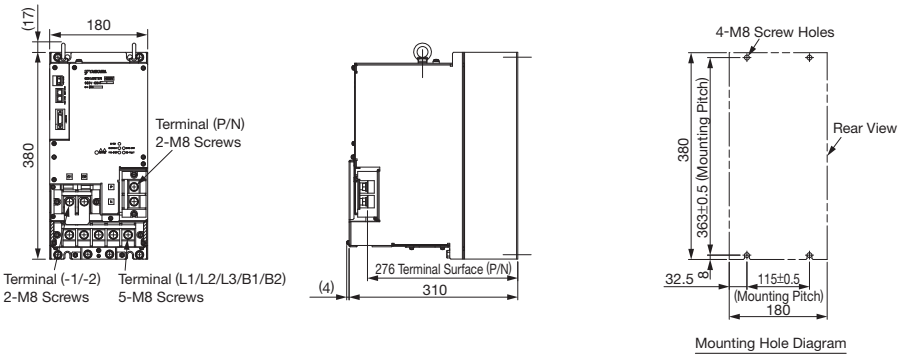
(2) Three-phase 200 VAC (Model: SGDV-COA3GAA)



Approx. Mass: 30.2 kg

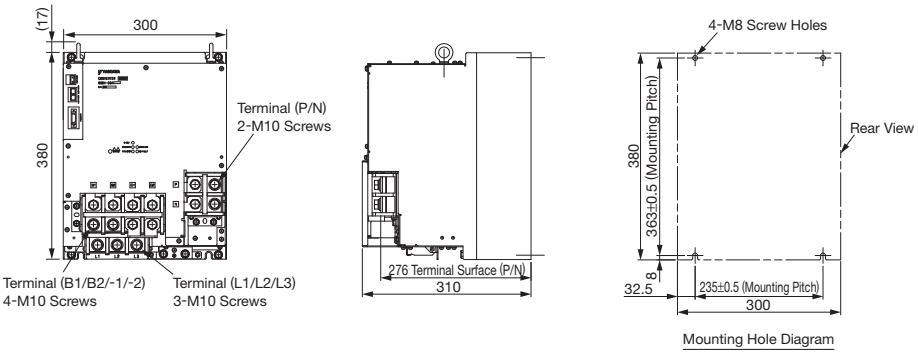
External Dimensions Units: mm

(3) Three-phase 400 VAC (Model: SGDV-COA3ZDA)



Approx. Mass: 20.5 kg

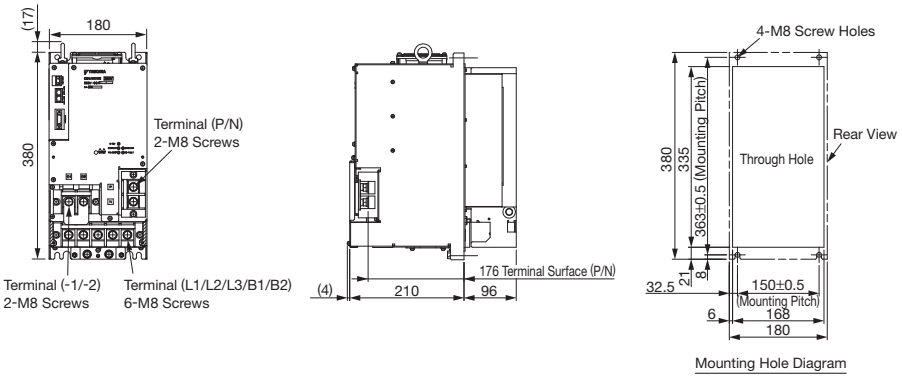
(4) Three-phase 400 VAC (Model: SGDV-COA5EDA)



Approx. Mass: 32.8 kg

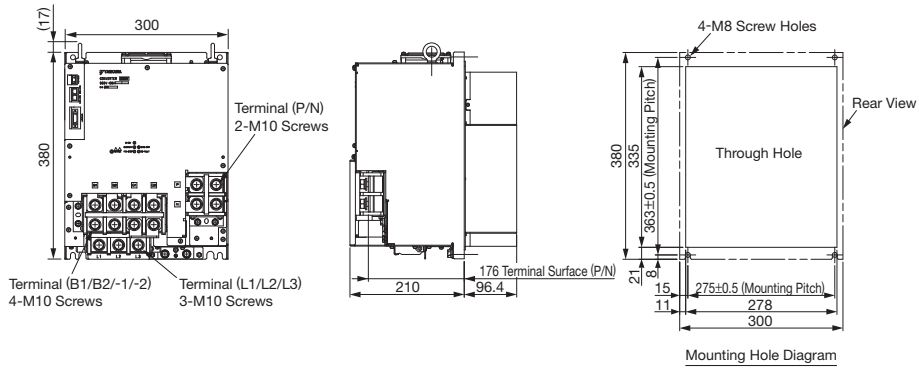
●Duct-ventilated Model

(1) Three-phase 200 VAC (Model: SGDV-COA2BAA)



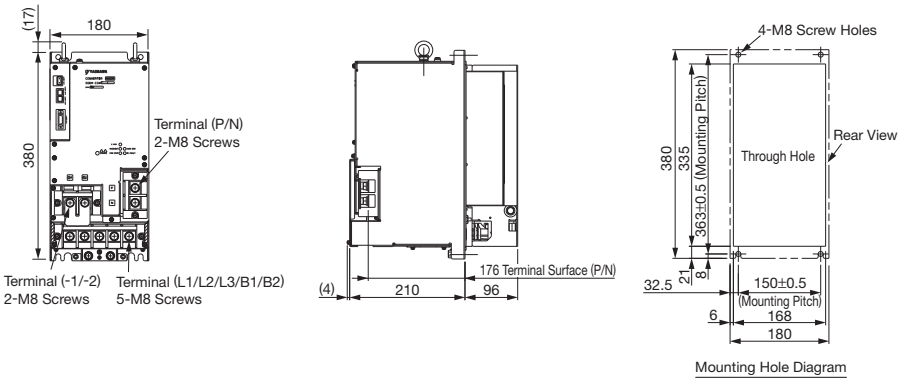
Approx. Mass: 17.2 kg

(2) Three-phase 200 VAC (Model: SGDV-COA3GAA)



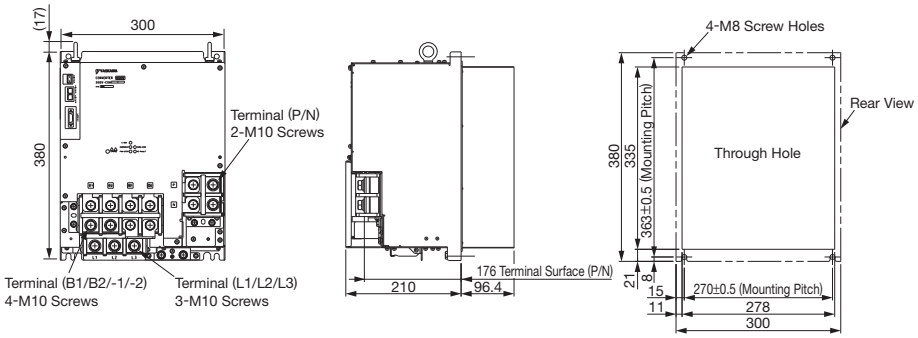
Approx. Mass: 26.4 kg

(3) Three-phase 400 VAC (Model: SGDV-COA3ZDA)



Approx. Mass: 17.7 kg

(4) Three-phase 400 VAC (Model: SGDV-COA5EDA)

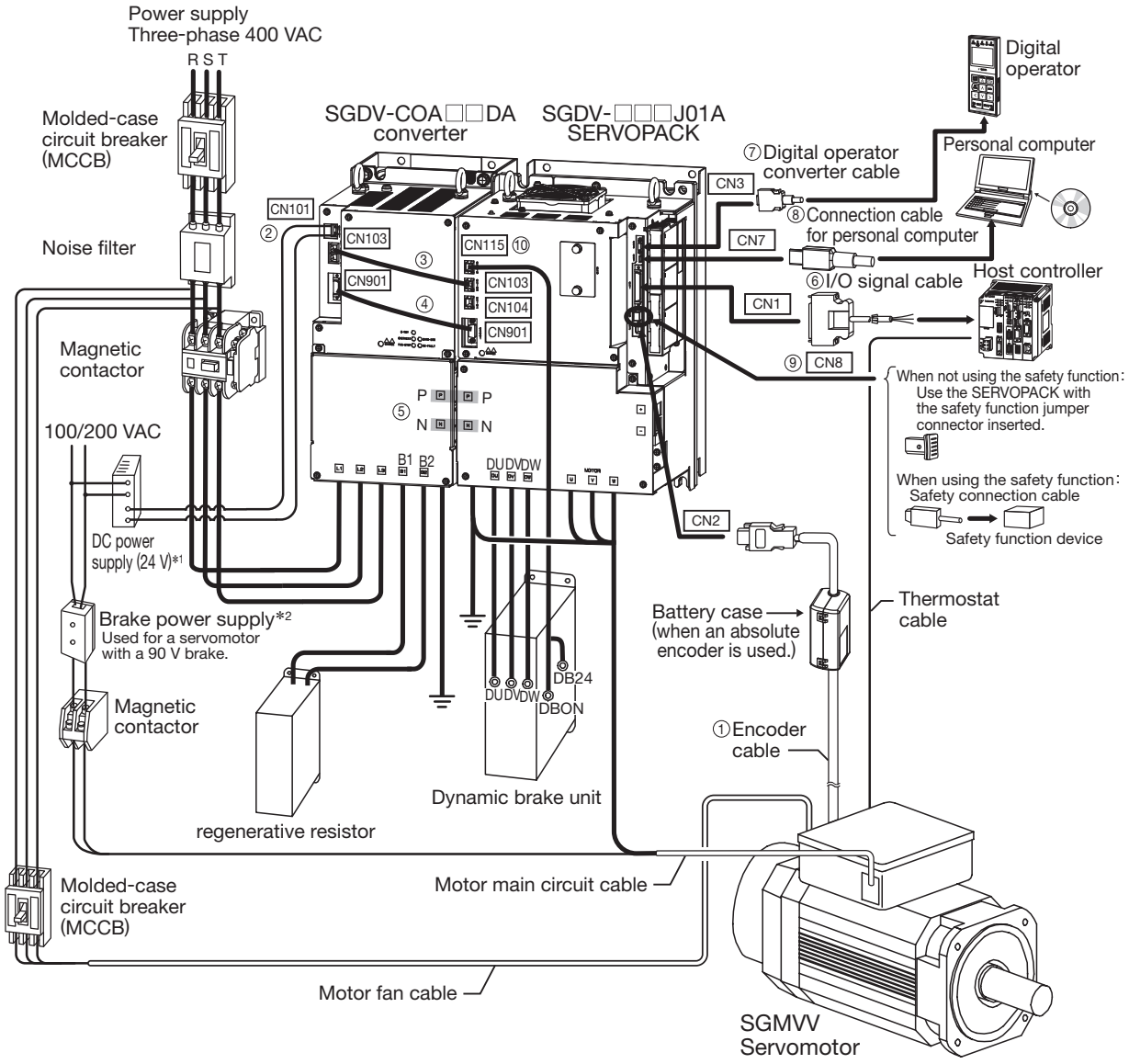


Approx. Mass: 29.0 kg

Selecting Cables

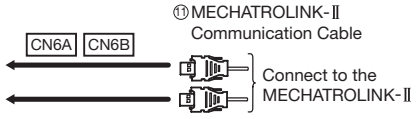
System Configuration

A system configuration for a three-phase main circuit power supply voltage of 400 VAC is shown in the following figure.

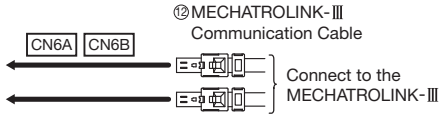


*1 : You must provide the 24-VDC power supply. Use a 24-VDC power supply with double insulation or reinforced insulation.
*2 : Use a 24-VDC power supply (not included).
If using a 90-VDC power supply for a brake, however, use one of the following power supplies.
•For 200-V input voltage: LPSE-2H01-E
•For 100-V input voltage: LPDE-1H01-E
For details, contact your Yaskawa representative or a Yaskawa sales department.
Note: Yaskawa does not provide the following cables.
• Motor main circuit cable (between SERVOPACK and servomotor)
• Motor fan cable (between power supply and servomotor)
• Regenerative resistor cable (between converter and regenerative resistor)
• Dynamic brake unit cable (between DU, DV, and DW terminals on SERVOPACK and DU, DV, and DW terminals on dynamic brake unit)

● When Using MECHATROLINK-II Communications References

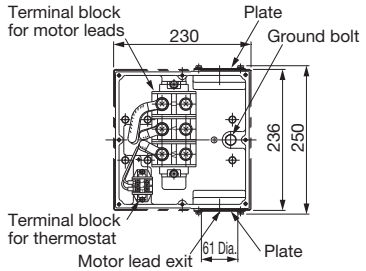


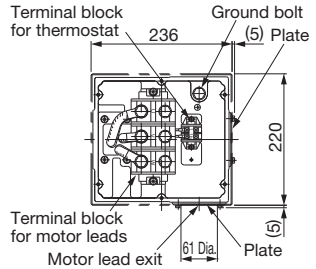
● When Using MECHATROLINK-III Communications References

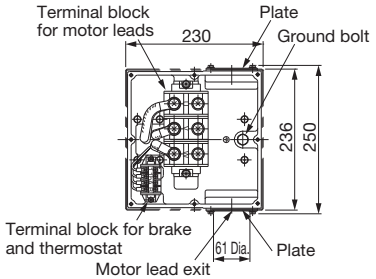


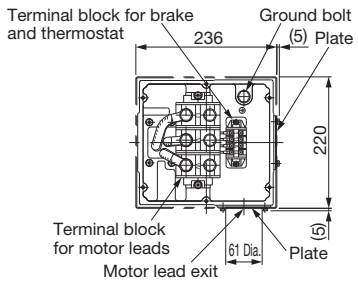
●Motor Main Circuit Cable

Yaskawa does not provide the cables. Check the terminal screw sizes on the motor's terminal box and *SERVOPACK Main Circuit Wire on page 47* and obtain suitable materials.

<table>
<tr><th>Servomotor Model
SGMVV-</th><th>2B□□B
3Z□□B
3G□□B</th><th>2B□□D</th><th>4ED□B
5ED□B</th><th>3Z□□D
3G□□D
4ED□D</th></tr>
<tr><td>Part locations inside terminal box on model without brake
(Units: mm)</td><td colspan="2"> 

<table>
<tr><th>Symbol</th><th>Terminal</th><th>Terminal Screw</th></tr>
<tr><td>U,V,W</td><td>Motor</td><td>M10</td></tr>
<tr><td>⏚</td><td>Ground</td><td>M10</td></tr>
<tr><td>1,1b</td><td>Thermostat</td><td>M4</td></tr>
</table></td><td colspan="2"> 

<table>
<tr><th>Symbol</th><th>Terminal</th><th>Terminal Screw</th></tr>
<tr><td>U,V,W</td><td>Motor</td><td>M10</td></tr>
<tr><td>⏚</td><td>Ground</td><td>M10</td></tr>
<tr><td>1,1b</td><td>Thermostat</td><td>M4</td></tr>
</table></td></tr>
<tr><td>Part locations inside terminal box on model with brake
(Units: mm)</td><td colspan="2"> 

<table>
<tr><th>Symbol</th><th>Terminal</th><th>Terminal Screw</th></tr>
<tr><td>U,V,W</td><td>Motor</td><td>M10</td></tr>
<tr><td>⏚</td><td>Ground</td><td>M10</td></tr>
<tr><td>1,1b</td><td>Thermostat</td><td>M4</td></tr>
<tr><td>A,B</td><td>Brake</td><td>M4</td></tr>
</table></td><td colspan="2"> 

<table>
<tr><th>Symbol</th><th>Terminal</th><th>Terminal Screw</th></tr>
<tr><td>U,V,W</td><td>Motor</td><td>M10</td></tr>
<tr><td>⏚</td><td>Ground</td><td>M10</td></tr>
<tr><td>1,1b</td><td>Thermostat</td><td>M4</td></tr>
<tr><td>A,B</td><td>Brake</td><td>M4</td></tr>
</table></td></tr>
</table>

●Motor Fan Cable

Yaskawa does not specify the cables. Use appropriate cables for the connectors. 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.

Notes: 1 To conform with CE Marking, plugs and cable clamps with CE Marking are required.
2 For the specifications of the cooling fan, refer to page 5.

• Standard connectors

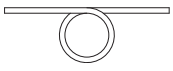
Servomotor-end Connector (Receptacle)	Cable-end Connectors (Not provided by Yaskawa)		
	Straight Plug	L-shaped Plug	Cable Clamp
CE05-2A18-10PD-D (MS3102A18-10P)	MS3106B18-10S	MS3108B18-10S	MS3057-10A

Notes: 1 Servomotor-end connectors (receptacles) are RoHS-compliant. Contact the respective connector manufacturers for RoHS-compliant cable-end connectors (not provided by Yaskawa).
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.

• Protective Structure IP67 and European Safety Standards Compliant Connectors

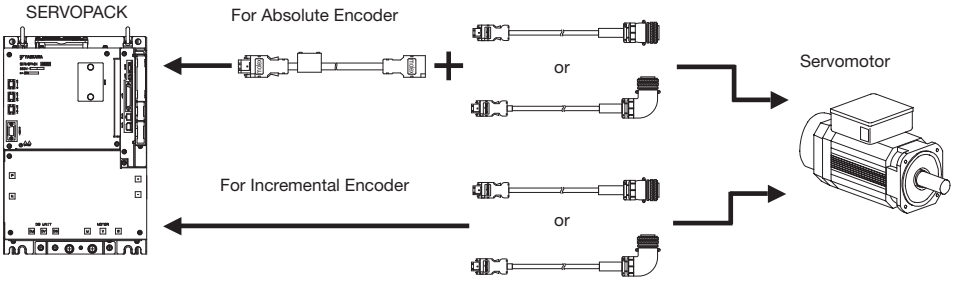
Servomotor-end Connector (Receptacle)	Cable-end Connectors (Not provided by Yaskawa)				
	Straight Plug	L-shaped Plug	Cable Clamp	Applicable Cable Diameter (For Reference)	Manufacturer
CE05-2A18-10PD-D	CE05-6A18-10SD-D-BSS	CE05-8A18-10SD-D-BAS	CE3057-10A-1-D	10.5 dia. to 14.1 dia.	DDK Ltd.
			CE3057-10A-2-D	8.5 dia. to 11.0 dia.	
			CE3057-10A-3-D	6.5 dia. to 8.7 dia.	

●Encoder Cables (Max. length: 20 m)

No.	Name	Length	Type		Specifications	Details
			Standard Type	Flexible Type*		
①	Encoder Cables with Connectors (For Incremental Encoder, Straight Plug)	3 m	JZSP-CMP01-03-E	JZSP-CMP11-03-E	SERVOPACK End — L — Encoder End Connector (Crimped) (Molex Japan Co., Ltd.) MS3106B20-29S (DDK Ltd.) Cable clamp model: MS3057-12A	(1)
		5 m	JZSP-CMP01-05-E	JZSP-CMP11-05-E		
		10 m	JZSP-CMP01-10-E	JZSP-CMP11-10-E		
		15 m	JZSP-CMP01-15-E	JZSP-CMP11-15-E		
		20 m	JZSP-CMP01-20-E	JZSP-CMP11-20-E		
	Encoder Cables with Connectors (For Incremental Encoder, L-shaped Plug)	3 m	JZSP-CMP02-03-E	JZSP-CMP12-03-E	SERVOPACK End — L — Encoder End Connector (Crimped) (Molex Japan Co., Ltd.) MS3108B20-29S (DDK Ltd.) Cable clamp model: MS3057-12A	
		5 m	JZSP-CMP02-05-E	JZSP-CMP12-05-E		
		10 m	JZSP-CMP02-10-E	JZSP-CMP12-10-E		
		15 m	JZSP-CMP02-15-E	JZSP-CMP12-15-E		
		20 m	JZSP-CMP02-20-E	JZSP-CMP12-20-E		
	Encoder Cables with Connectors (For Absolute Encoder, with a Battery Case, Straight Plug)	3 m	JZSP-CSP06-03-E	JZSP-CSP26-03-E	SERVOPACK End — L — Encoder End Connector (Crimped) (Molex Japan Co., Ltd.) Battery Case (Battery Attached) MS3106B20-29S (DDK Ltd.) Cable clamp model: MS3057-12A	(2)
		5 m	JZSP-CSP06-05-E	JZSP-CSP26-05-E		
		10 m	JZSP-CSP06-10-E	JZSP-CSP26-10-E		
		15 m	JZSP-CSP06-15-E	JZSP-CSP26-15-E		
		20 m	JZSP-CSP06-20-E	JZSP-CSP26-20-E		
	Encoder Cables with Connectors (For Absolute Encoder, with a Battery Case, L-shaped Plug)	3 m	JZSP-CSP07-03-E	JZSP-CSP27-03-E	SERVOPACK End — L — Encoder End Connector (Crimped) (Molex Japan Co., Ltd.) Battery Case (Battery Attached) MS3108B20-29S (DDK Ltd.) Cable clamp model: MS3057-12A	
		5 m	JZSP-CSP07-05-E	JZSP-CSP27-05-E		
		10 m	JZSP-CSP07-10-E	JZSP-CSP27-10-E		
		15 m	JZSP-CSP07-15-E	JZSP-CSP27-15-E		
		20 m	JZSP-CSP07-20-E	JZSP-CSP27-20-E		
	SERVOPACK-end Connector Kit		JZSP-CMP9-1-E		Soldered  (Molex Japan Co., Ltd.)	(3)
	Standard Encoder-end Connectors (Servomotor Connector: MS3102A20-29P)		MS3106B20-29S		Straight Plug 	-
			MS3108B20-29S		L-shaped Plug 	
			MS3057-12A		Cable Clamp 	
	Encoder-end Connectors for Protective Structure IP67 (Servomotor Connector: 97F3102E20-29P)		JA06A-20-29S-J1-EB		Straight Plug 	
			JA08A-20-29S-J1-EB		L-shaped Plug 	
			JL04-2022CKE (09) Diameter: 6.5 dia. to 9.5 dia.		Cable Clamp 	
			JL04-2022CKE (12) Diameter: 9.5 dia. to 13 dia.			
			JL04-2022CKE (14) Diameter: 12.9 dia. to 15.9 dia.			
	Cables	5 m	JZSP-CMP09-05-E	JZSP-CSP39-05-E		(4)
		10 m	JZSP-CMP09-10-E	JZSP-CSP39-10-E		
		15 m	JZSP-CMP09-15-E	JZSP-CSP39-15-E		
		20 m	JZSP-CMP09-20-E	JZSP-CSP39-20-E		

* Use flexible cables for movable sections such as robot arms.

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



No.	Name	Length	Type	Specifications	Details
①	Encoder Cables with Connectors (For Incremental and Absolute Encoder, Straight Plug)	30 m	JZSP-UCMP01-30-E	SERVOPACK End — L — Encoder End Connector (Crimped) (Molex Japan Co., Ltd.) MS3106B20-29S (DDK Ltd.) Cable clamp model: MS3057-12A	(5)
		40 m	JZSP-UCMP01-40-E		
		50 m	JZSP-UCMP01-50-E		
	Encoder Cable with Connectors (For Incremental and Absolute Encoder, L-shaped Plug)	30 m	JZSP-UCMP02-30-E	SERVOPACK End — L — Encoder End Connector (Crimped) (Molex Japan Co., Ltd.) MS3108B20-29S (DDK Ltd.) Cable clamp model: MS3057-12A	
		40 m	JZSP-UCMP02-40-E		
		50 m	JZSP-UCMP02-50-E		
	Encoder Cable with a Battery Case (Required when an absolute encoder is used.*)	0.3 m	JZSP-CSP12-E	SERVOPACK End — 0.3 m — Encoder End Battery Case (Battery Attached) Connector (Crimped) (Molex Japan Co., Ltd.) Socket Contact (Soldered) (Molex Japan Co., Ltd.)	(6)
	Standard Encoder-end Connectors (Servomotor Connector: MS3102A20-29P)		MS3106B20-29S	Straight Plug	-
			MS3108B20-29S	L-shaped Plug	
			MS3057-12A	Cable Clamp	
	Encoder-end Connectors for Protective Structure IP67 and European Safety Standards Compliant (Servomotor Connector: 97F3102E20-29P)		JA06A-20-29S-J1-EB	Straight Plug	
			JA08A-20-29S-J1-EB	L-shaped Plug	
			JL04-2022CKE (09) Diameter: 6.5 dia. to 9.5 dia.	Cable Clamp	
			JL04-2022CKE (12) Diameter: 9.5 dia. to 13 dia.		
			JL04-2022CKE (14) Diameter: 12.9 dia. to 15.9 dia.		
	Extension Cables	30 m	JZSP-CMP19-30-E		(7)
		40 m	JZSP-CMP19-40-E		
		50 m	JZSP-CMP19-50-E		

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

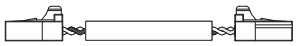
●Connectors for Control Power Cables

No.	Name	Length	Type	Specifications	Details
②	CN101 Connector	-	Contact the WAGO Company of Japan., Ltd. Model: 231-202/026-000		-
	Push Button	-	Contact the WAGO Company of Japan., Ltd. Model: 231-131		-

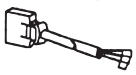
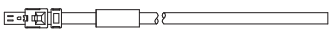
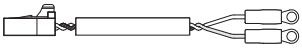
Note: The converter includes the connectors and the push buttons.

Selecting Cables

●Connection Cables between SERVOPACK and Converter (Same for All Models)

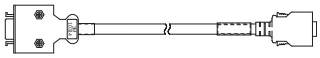
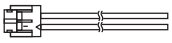
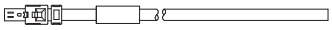
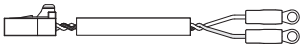
No.	Name	Length	Type	Specifications	Details
③	CN103 CN104 Control Power Cable between SERVOPACK and Converter (24 V)	0.4 m	JZSP-CVG00-A4-E		(8)
④	CN901 I/O Signal Cable between SERVOPACK and Converter	0.4 m	JZSP-CVI02-A4-E		(9)
⑤	Busbars Note: The busbars are included with the converter. The busbars connect the P and N terminals between the SERVOPACK and converter.	-	JZSP-CVB02-02-E	• For SGDV-COA2BAA • For SGDV-COA3ZDA 	-
		-	JZSP-CVB02-01-E	• For SGDV-COA3GAA • For SGDV-COA5EDA 	

●Analog Voltage/Pulse Train Reference SERVOPACKs

No.	Name		Length	Type	Specifications	Details
⑥	CN1 I/O Signal Cables	Connector Kit		JZSP-CSI9-1-E	Soldered 	(10)
		Connector Terminal Converter Units	0.5 m	JUSP-TA50PG-E	Terminal Block and Connection Cable 	(11)
			1 m	JUSP-TA50PG-1-E		
			2 m	JUSP-TA50PG-2-E		
		Cables with Loose Wires at One End	1 m	JZSP-CSI01-1-E	Cable with Loose Wires at Peripheral Devices 	(12)
			2 m	JZSP-CSI01-2-E		
			3 m	JZSP-CSI01-3-E		
⑦	CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 	(13)
		Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 	(14)
⑧	CN7 Connection Cables for Personal Computer*2		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 	(16)
–	CN5 Cable for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 	(17)
⑨	CN8 Cables for Safety Function Device	Cables with Connector*3	1 m	JZSP-CVH03-01-E	SERVOPACK End 	(18)
			3 m	JZSP-CVH03-03-E		
		Connector Kit*4		Contact Tyco Electronics Japan G.K. Product name: INDUSTRIAL MINI I/O D-SHAPE TYPE1 PLUG CONNECTOR KIT Model: 2013595-1		
⑩	CN115 Dynamic Brake Unit Connection Cables		1.5 m	JZSP-CVD00-1A5-E	SERVOPACK End 	(19)
			3 m	JZSP-CVD00-03-E		

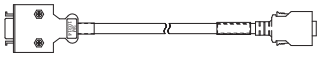
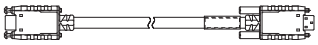
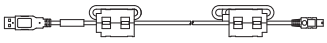
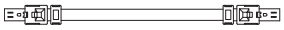
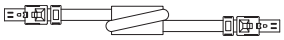
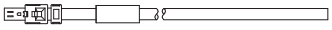
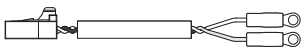
*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-V series SERVOPACKs.
*2 : For connection to a personal computer, use a cable specified by Yaskawa. If not, operation cannot be guaranteed.
*3 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*4 : Use the connector kit when you make cables yourself.

●MECHATROLINK-III Communications Reference SERVOPACKs

No.	Name		Length	Type	Specifications	Details
⑥	CN1 I/O Signal Cables	Connector Kit		JZSP-CSI9-1-E	Soldered 	(10)
		Connector Terminal Converter Units	0.5 m	JUSP-TA50PG-E	Terminal Block and Connection Cable 	(11)
			1 m	JUSP-TA50PG-1-E		
			2 m	JUSP-TA50PG-2-E		
		Cables with Loose wire at One End	1 m	JZSP-CSI01-1-E	Cable with Loose Wires at Peripheral Devices 	(12)
			2 m	JZSP-CSI01-2-E		
			3 m	JZSP-CSI01-3-E		
⑦	CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 	(13)
		Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 	(14)
⑧	CN7 Connection Cables for Personal Computer*2		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 	(16)
⑪	CN6A CN6B MECHATROLINK-Ⅱ Communication Cables*3	Cables with Connectors at Both Ends	0.5 m to 50 m	JEPMC-W6002-□□-E		(20)
		Cables with Connectors at Both Ends (with Ferrite Core)	0.5 m to 50 m	JEPMC-W6003-□□-E		(21)
		Terminator		JEPMC-W6022-E		(22)
–	CN5 Cable for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 	(17)
⑨	CN8 Cable for Safety Function Device	Cables with Connector*4	1 m	JZSP-CVH03-01-E	SERVOPACK End 	(18)
			3 m	JZSP-CVH03-03-E		
		Connector kit*5		Contact Tyco Electronics Japan G.K. Product name: INDUSTRIAL MINI I/O D-SHAPE TYPE1 PLUG CONNECTOR KIT Model: 2013595-1		
⑩	CN115 Dynamic Brake Unit Connection Cables		1.5 m	JZSP-CVD00-1A5-E	SERVOPACK End 	(19)
			3 m	JZSP-CVD00-03-E		

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : For connection to a personal computer, use a cable specified by Yaskawa. If not, operation cannot be guaranteed.
*3 : Use a MECHATROLINK-III communications cable specified by Yaskawa. When using other cables, noise resistance may be reduced, and operation cannot be guaranteed.
*4 : 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.
*5 : Use the connector kit when you make cables yourself.

●MECHATROLINK-III Communications Reference SERVOPACKs

No.	Name		Length	Type	Specifications	Details
⑥	CN1 I/O Signal Cables	Connector Kit		JZSP-CSI9-1-E	Soldered 	(10)
		Connector Terminal Converter Units	0.5 m	JUSP-TA50PG-E	Terminal Block and Connection Cable 	(11)
			1 m	JUSP-TA50PG-1-E		
			2 m	JUSP-TA50PG-2-E		
		Cables with Loose wire at One End	1 m	JZSP-CSI01-1-1-E	Cable with Loose Wires at Peripheral Devices 	(12)
			2 m	JZSP-CSI01-2-E		
			3 m	JZSP-CSI01-3-E		
⑦	CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 	(13)
		Digital Operator Converter Cables	0.3 m	JZSP-CVS05-A3-E*1	Cable with Connectors at Both Ends 	(14)
				JZSP-CVS07-A3-E*2	With Lock Screws 	(15)
⑧	CN7 Connection Cables for Personal Computer*3		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 	(16)
⑫	CN6A CN6B MECHATROLINK-III Communication Cables*4	Cables with Connectors at Both Ends	0.2 m to 50 m	JEPMC-W6012-□□-E		(23)
		Cables with Connectors at Both Ends (With Ferrite Core)	10 m to 50 m	JEPMC-W6013-□□-E		(24)
		Cables with Loose Wire at One End	0.5 m to 50 m	JEPMC-W6014-□□-E		(25)
–	CN5 Cable for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 	(17)
⑨	CN8 Cables for Safety Function Device	Cables with Connector*5	1 m	JZSP-CVH03-01-E	SERVOPACK End 	(18)
			3 m	JZSP-CVH03-03-E		
		Connector kit*6		Contact Tyco Electronics Japan G.K. Product name: INDUSTRIAL MINI I/O D-SHAPE TYPE1 PLUG CONNECTOR KIT Model: 2013595-1		
⑩	CN115 Dynamic Brake Unit Connection Cables		1.5 m	JZSP-CVD00-1A5-E	SERVOPACK End 	(19)
			3 m	JZSP-CVD00-03-E		

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-V series SERVOPACKs.
*2 : A converter cable is required when connecting the digital operator cable while using MECHATROLINK-Ⅲ Communications SERVOPACK.
*3 : For connection to a personal computer, use a cable specified by Yaskawa. If not, operation cannot be guaranteed.
*4 : Use a MECHATROLINK-Ⅲ communications cable specified by Yaskawa. When using other cables, noise resistance may be reduced, and operation cannot be guaranteed.
*5 : 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.
*6 : Use the connector kit when you make cables yourself.

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

SERVOPACK End			Encoder (Servomotor) End		
Pin No.	Signal		Pin No.	Wire Color: Standard Type	Wire Color: Flexible Type
5	PS		C	Light blue	Red/light blue
6	/PS		D	Light blue/white	Black/light blue
2	PG 0V		G	Black	Green
1	PG 5V		H	Red	Orange
4	BAT (–)		S	Orange/white	Black/pink
3	BAT (+)		T	Orange	Red/pink
Shell	FG	Shield Wire	J	FG	FG

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

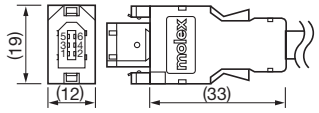
(2) Wiring Specifications for Encoder Cable with Connectors (For absolute encoder, with a battery case)

SERVOPACK End			Encoder (Servomotor) End		
Pin No.	Signal		Pin No.	Wire Color: Standard Type	Wire Color: Flexible Type
5	PS		C	Light blue	Red/pink
6	/PS		D	Light blue/white	Black/pink
2	PG 0V		G	Black	Green
1	PG 5V		H	Red	Orange
4	BAT (–)		S	Orange/white	Black/light blue
3	BAT (+)		T	Orange	Red/light blue
Shell	FG	Shield Wire	J	FG	FG

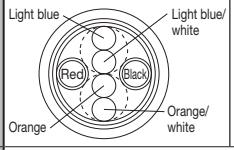
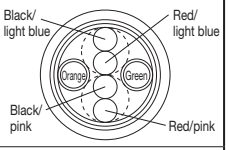
Battery Case

Pin No.	Signal
2	BAT (–)
1	BAT (+)

(3) SERVOPACK-end Connector Kit Specifications

Type	JZSP-CMP9-1-E
Manufacturer	Molex Japan Co., Ltd.
Connector Model (For standard)	55100-0670 (soldered)
External Dimensions (Units: mm)	

(4) Cable Specifications

Items	Standard Type	Flexible Type
Type*	JZSP-CMP09-□□-E	JZSP-CSP39-□□-E
Cable Length	20 m max.	
Specifications	UL20276 (Rating temperature: 80˚C) AWG22×2C+AWG24×2P AWG22 (0.33 mm2) Outer diameter of insulating sheath: 1.15 dia. AWG24 (0.20 mm2) Outer diameter of insulating sheath: 1.09 dia.	UL20276 (Rating temperature: 80˚C) 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	6.5 dia.	6.8 dia.
Internal Configuration and Lead Color		
Yaskawa Standards Specifications (Standard Length)	Cable length: 5 m, 10 m, 15 m, 20 m	

*: Specify the cable length in □□.
Example: JZSP-CMP09-05-E (5 m)

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

SERVOPACK End			Encoder (Servomotor) End		
Pin No.	Signal		Pin No.	Wire Color: Standard Type	Wire Color: Flexible Type
5	PS		C	Light blue	Red/light blue
6	/PS		D	Light blue/white	Black/light blue
2	PG 0V		G	Black	Green
1	PG 5V		H	Red	Orange
4	BAT (–)		S	Orange/white	Black/pink
3	BAT (+)		T	Orange	Red/pink
Shell	FG	Shield Wire	J	FG	FG

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

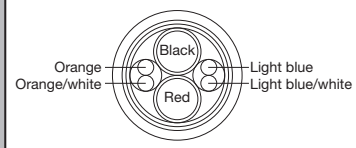
(6) Wiring Specifications for Encoder Cable with a Battery Case (For absolute encoder)

SERVOPACK End			Encoder (Servomotor) End	
Pin No.	Signal		Pin No.	Wire Color
6	/PS		6	Light blue/white
5	PS		5	Light blue
4	BAT (–)		4	Orange/white
3	BAT (+)		3	Orange
2	PG 0V		2	Black
1	PG 5V		1	Red
Shell	FG	Shield Wire	Shell	FG

Battery Case

Pin No.	Signal
2	BAT (–)
1	BAT (+)

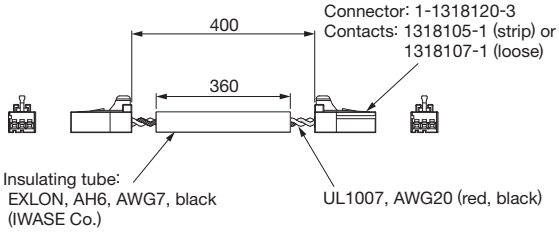
(7) Cable Specifications

Type*	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. AWG26 (0.13 mm2) Outer diameter of insulating sheath: 0.91 dia.
Finished Dimensions	6.8 dia.
Internal Configuration and Lead Colors	
Yaskawa Standard Specifications (Standard Length)	Cable length: 30 m, 40 m, 50 m

*: Specify the cable length in □□.
Example: JZSP-CMP19-30-E (30 m)

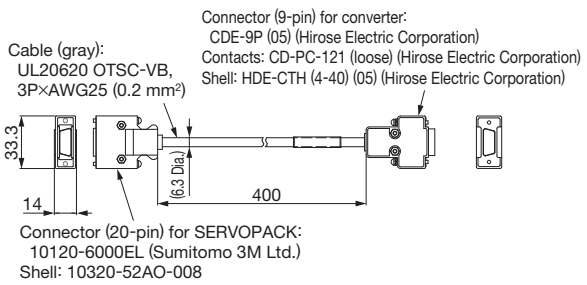
(8) Control Power Cable between SERVOPACK and Converter (24 V) for CN103/CN104 (Model: JZSP-CVG00-A4-E)

• External Dimensions (Units: mm)



(9) I/O Signal Cable between SERVOPACK and Converter for CN901 (Model: JZSP-CVI02-A4-E)

• External Dimensions (Units: mm)



(10) Connector Kit for CN1

Use the following connector and cable to assemble the cable. The CN1 connector kit includes one case and one connector.

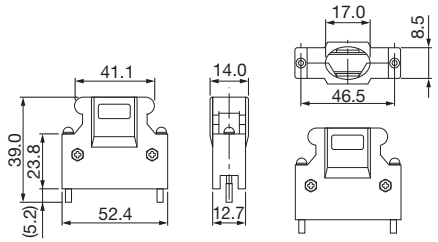
Connector Kit Model	Case		Connector	
	Model	Qty	Model	Qty
JZSP-CSI9-1-E	10350-52Z0-008*	1 set	10150-3000PE* (Soldered)	1

* : Manufactured by Sumitomo 3M Ltd.

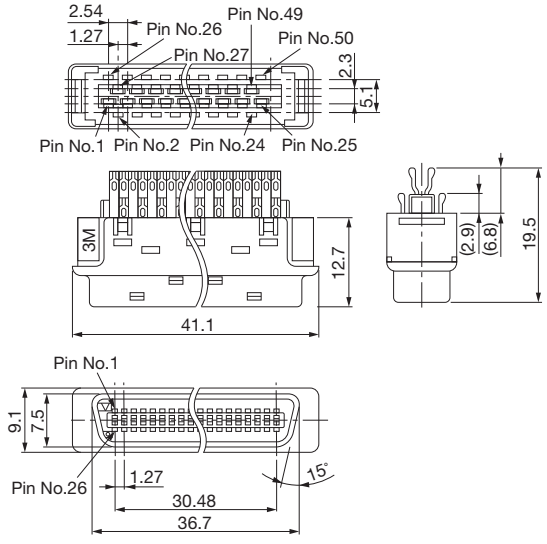
• Cable Size

Item	Specifications
Cable	Use twisted-pair or twisted-pair shielded wire.
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 dia. max.

• External Dimensions of Case (Units: mm)

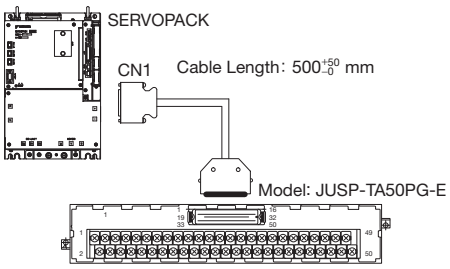


• External Dimensions of Connector (Units: mm)

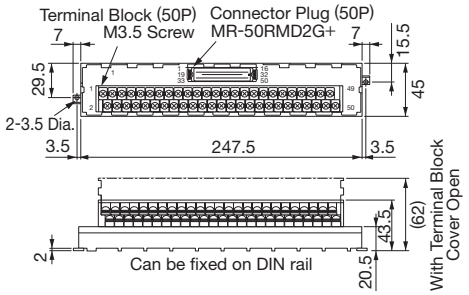


(11) Connector Terminal Converter Unit for CN1

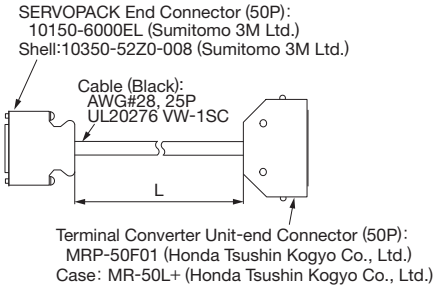
• Configurations



• External Dimensions of Terminal Block (Units: mm)



• External Dimensions of Cable (Units: mm)

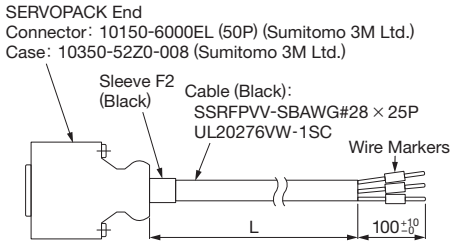


Note: The pin numbers in the SERVOPACK connector and the pin numbers in the terminal block are the same. If assembling cables, refer to ●*Cable with Loose Wires at One End for CN1 Connection Diagram of JZSP-CSI01-□-E Cable* on the next page.

Model	Cable Length (L)
JUSP-TA50PG-E	0.5 m
JUSP-TA50PG-1-E	1 m
JUSP-TA50PG-2-E	2 m

(12) Cable with Loose Wires at One End for CN1

• External Dimensions (Units: mm)



Model	Cable Length (L)
JZSP-CSI01-1-E	1 m
JZSP-CSI01-2-E	2 m
JZSP-CSI01-3-E	3 m

●Cable with Loose Wires at One End for CN1

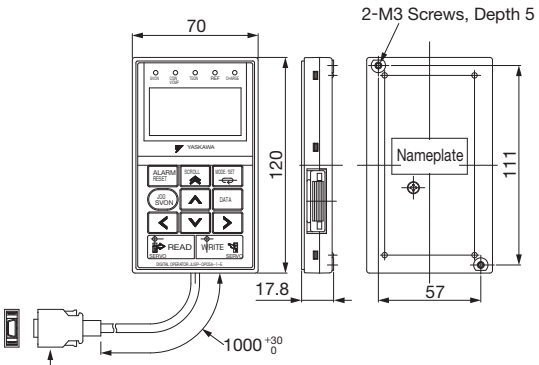
Connection Diagram of JZSP-CSI01-□-E Cable

SERVOPACK End					Host Controller End
Pin No.	Signal	Wire Color	Marking		Lead Marker
			Color	Dots	
1	SG	Orange	Red	1	1
3	PL1	Orange	Black	1	3
2	SG	Gray	Red	1	2
4	SEN	Gray	Black	1	4
5	V-REF	White	Red	1	5
6	SG	White	Black	1	6
7	PULS	Yellow	Red	1	7
8	/PULS	Yellow	Black	1	8
9	T-REF	Pink	Red	1	9
10	SG	Pink	Black	1	10
11	SIGN	Orange	Red	2	11
12	/SIGN	Orange	Black	2	12
13	PL2	Gray	Red	2	13
14	/CLR	White	Red	2	14
15	CLR	White	Black	2	15
16	–	Gray	Black	2	16
17	–	Yellow	Red	2	17
18	PL3	Yellow	Black	2	18
19	PCO	Pink	Red	2	19
20	/PCO	Pink	Black	2	20
21	BAT (+)	Orange	Red	3	21
22	BAT (–)	Orange	Black	3	22
23	–	Gray	Red	3	23
24	–	Gray	Black	3	24
25	/V-CMP+	White	Red	3	25
26	/V-CMP–	White	Black	3	26
27	/TGON+	Yellow	Red	3	27
28	/TGON–	Yellow	Black	3	28
29	/S-RDY+	Pink	Red	3	29
30	/S-RDY–	Pink	Black	3	30
31	ALM+	Orange	Red	4	31
32	ALM–	Orange	Black	4	32
33	PAO	Gray	Red	4	33
34	/PAO	Gray	Black	4	34
35	PBO	White	Red	4	35
36	/PBO	White	Black	4	36
37	ALO1	Yellow	Red	4	37
38	ALO2	Yellow	Black	4	38
39	ALO3	Pink	Red	4	39
40	/S-ON	Pink	Black	4	40
41	/P-CON	Orange	Red	5	41
42	P-OT	Orange	Black	5	42
43	N-OT	Gray	Red	5	43
44	/ALM-RST	Gray	Black	5	44
45	/P-CL	White	Red	5	45
46	/N-CL	White	Black	5	46
47	+24V-IN	Yellow	Red	5	47
48	–	Pink	Red	5	48
49	–	Pink	Black	5	49
50	–	Yellow	Black	5	50
Case	Shield				

: Represents twisted-pair wires.

(13) Digital Operator (Model: JUSP-OP05A-1-E)

(Units: mm)

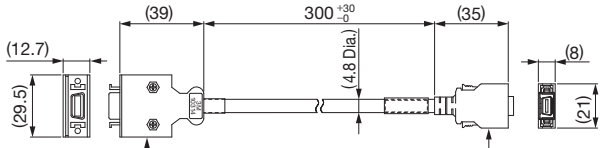


Connector: HDR-E14MAG1+ (Honda Tsushin Kogyo Co., Ltd.)
Case: HDR-E14LPA5 (Honda Tsushin Kogyo Co., Ltd.)

(14) Digital Operator Converter Cable for CN3 (Model: JZSP-CVS05-A3-E)

□□A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.

• External Dimensions (Units: mm)



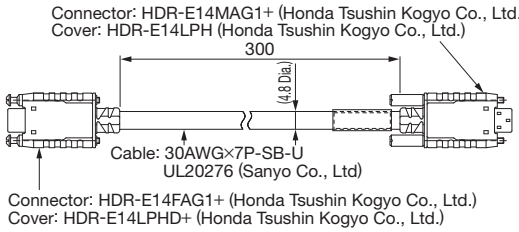
Connector (14-pole): 10214-6202PL (Sumitomo 3M Ltd.)
Cover: FA458036 (Yasco Components Co., Ltd.)

Connector (14-pole): HDR-E14MAG1+ (Honda Tsushin Kogyo Co., Ltd.)
Cover: HDR-E14LPA5 (Honda Tsushin Kogyo Co., Ltd.)

(15) Digital Operator Converter Cable for CN3 (Model: JZSP-CVS07-A3-E)

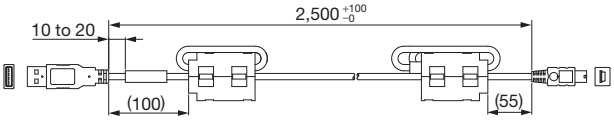
□A converter cable is required when connecting the digital operator cable while using MECHATROLINK-Ⅲ Communications SERVOPACK.

• External Dimensions (Units: mm)



(16) Connection Cable for Personal Computer for CN7
(Model: JZSP-CVS06-02-E)

• External Dimensions (Units: mm)

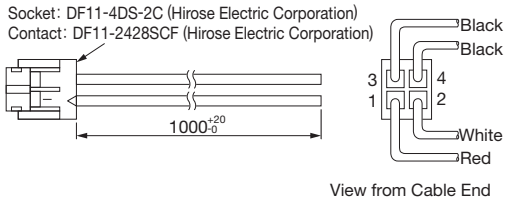


IMPORTANT

For connection to a personal computer, use a cable specified by Yaskawa. If not, operation cannot be guaranteed.

(17) Cable for Analog Monitor for CN5
(Model: JZSP-CA01-E)

• External Dimensions (Units: mm)



View from Cable End

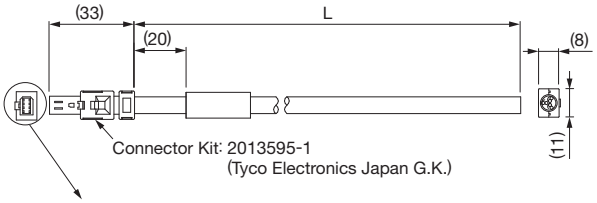
• Specifications

Pin No.	Cable Color	Signal	Standard Settings
1	Red	Analog Monitor 2	Motor speed: 1V/1000 min-1
2	White	Analog Monitor 1	Torque reference: 1V/100□ rated torque
3, 4	Black (2 cables)	GND (0V)	–

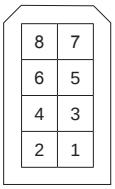
Note: The specifications above are factory settings. Monitor specifications can be changed by changing parameters Pn006 and Pn007.

(18) Cable for Safety Function Device for CN8
(Model: JZSP-CVH03-□□-E)
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.

• External Dimensions (Units: mm)



Pin Layout



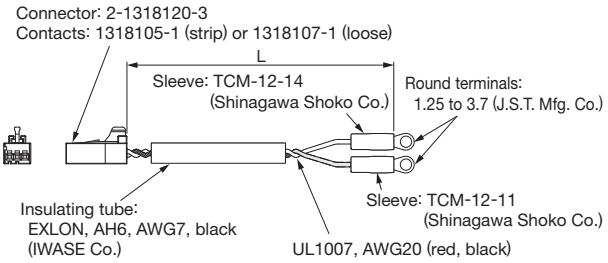
Model	Cable Length (L)
JZSP-CVH03-01-E	1 m
JZSP-CVH03-03-E	3 m

• Specifications

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

(19) Dynamic Brake Unit Connection Cable for CN115
(Model: JZSP-CVD00-□□-E)

• External Dimensions (Units: mm)



Model	Cable Length (L)
JZSP-CVD00-01-E	1000 +30 −0
JZSP-CVD00-1A5-E	1500 +50 −0

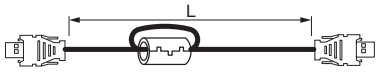
(20) MECHATROLINK-II Communication Cable for CN6A/CN6B
(Model: JEPMC-W6002-□□-E)

• External Dimensions (Units: mm)

Model	Cable Length (L)
JEPMC-W6002-A5-E	0.5 m
JEPMC-W6002-01-E	1 m
JEPMC-W6002-03-E	3 m
JEPMC-W6002-05-E	5 m
JEPMC-W6002-10-E	10 m
JEPMC-W6002-20-E	20 m
JEPMC-W6002-30-E	30 m
JEPMC-W6002-40-E	40 m
JEPMC-W6002-50-E	50 m

(21) MECHATROLINK-II Communication Cable with Ferrite Core for CN6A/CN6B
(Model: JEPMC-W6003-□□-E)

• External Dimensions (Units: mm)



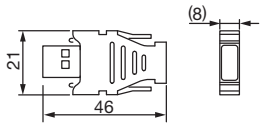
Model	Cable Length (L)
JEPMC-W6003-A5-E	0.5 m
JEPMC-W6003-01-E	1 m
JEPMC-W6003-03-E	3 m
JEPMC-W6003-05-E	5 m
JEPMC-W6003-10-E	10 m
JEPMC-W6003-20-E	20 m
JEPMC-W6003-30-E	30 m
JEPMC-W6003-40-E	40 m
JEPMC-W6003-50-E	50 m

IMPORTANT

Use a MECHATROLINK-II communications cable specified by Yaskawa. When using other cables, noise resistance may be reduced, and operation cannot be guaranteed.

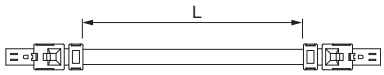
(22) MECHATROLINK-Ⅱ CommunicationTerminator for CN6A/CN6B
(Model: JEPMC-W6022-E)

• External Dimensions (Units: mm)



(23) MECHATROLINK-III Communication Cable for CN6A/CN6B
(Model: JEPMC-W6012-□□-E)

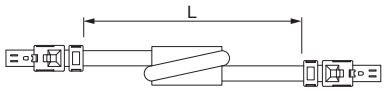
• External Dimensions (Units: mm)



Model	Cable Length (L)
JEPMC-W6012-A2-E	0.2 m
JEPMC-W6012-A5-E	0.5 m
JEPMC-W6012-01-E	1 m
JEPMC-W6012-02-E	2 m
JEPMC-W6012-03-E	3 m
JEPMC-W6012-04-E	4 m
JEPMC-W6012-05-E	5 m
JEPMC-W6012-10-E	10 m
JEPMC-W6012-20-E	20 m
JEPMC-W6012-30-E	30 m
JEPMC-W6012-50-E	50 m

(24) MECHATROLINK-III Communication Cable with Ferrite Core for CN6A/CN6B
(Model: JEPMC-W6013-□□-E)

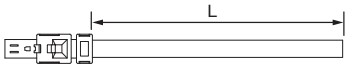
• External Dimensions (Units: mm)



Model	Cable Length (L)
JEPMC-W6013-10-E	10 m
JEPMC-W6013-20-E	20 m
JEPMC-W6013-30-E	30 m
JEPMC-W6013-50-E	50 m

(25) MECHATROLINK-III Communication Cable with Loose Wire at One End for CN6A/CN6B
(Model: JEPMC-W6014-□□-E)

• External Dimensions (Units: mm)



Model	Cable Length (L)
JEPMC-W6014-A5-E	0.5 m
JEPMC-W6014-01-E	1 m
JEPMC-W6014-03-E	3 m
JEPMC-W6014-05-E	5 m
JEPMC-W6014-10-E	10 m
JEPMC-W6014-30-E	30 m
JEPMC-W6014-50-E	50 m

IMPORTANT

Use a MECHATROLINK-Ⅲ communications cable specified by Yaskawa. When using other cables, noise resistance may be reduced, and operation cannot be guaranteed.

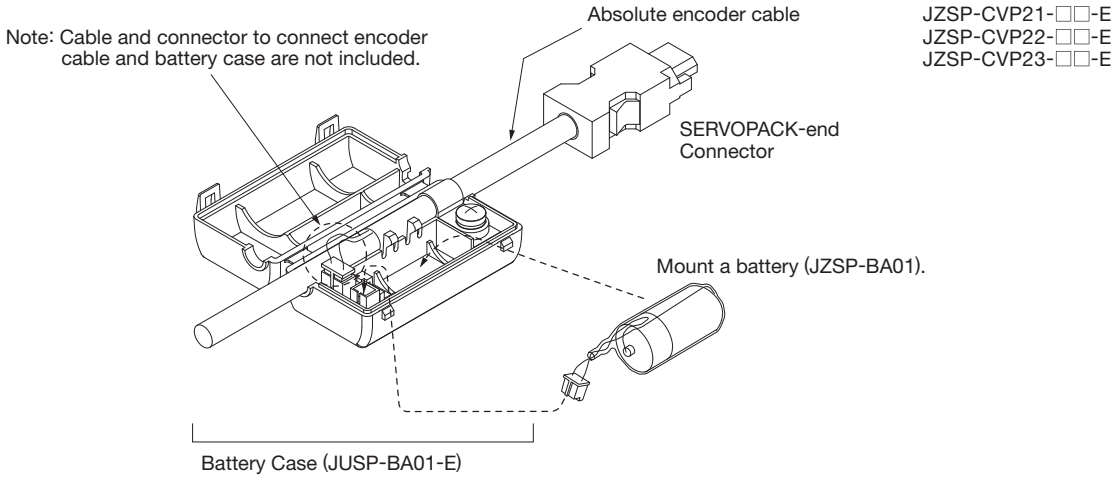
Battery Case

●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.

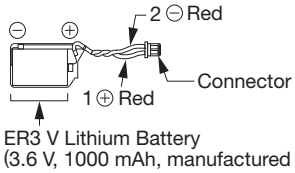
IMPORTANT

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.



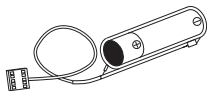
(1) Mounting a Battery in a Battery Case

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



(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.



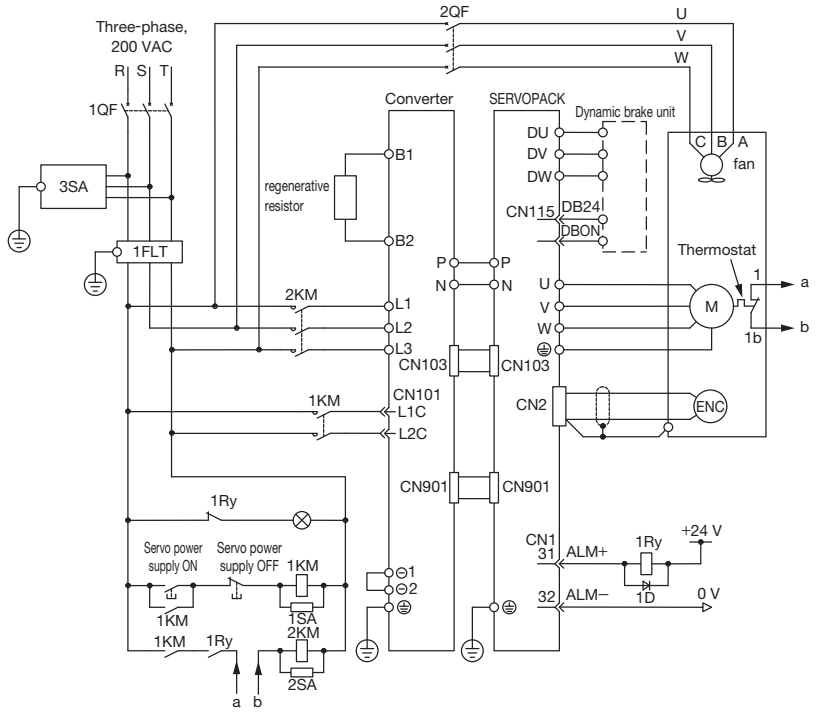
●Typical Main Circuit Wiring Examples

This section shows examples of the typical wiring for the main circuit.

WARNING

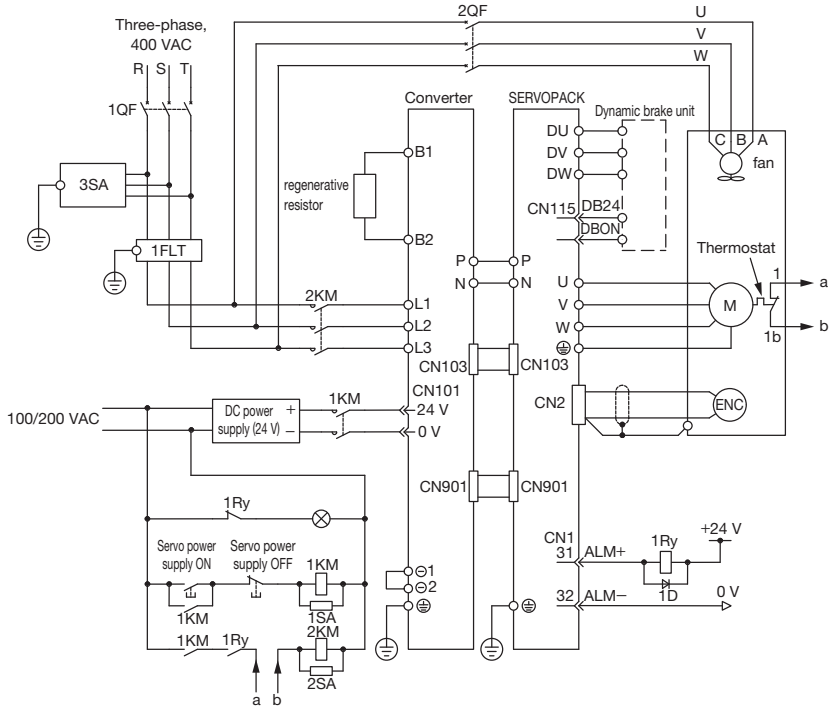
Even after turning OFF the power, high residual voltage may still remain in the SERVOPACK and converter. To prevent electric shock, do not touch the power terminals while charge indicator is still ON. When the voltage is discharged, the charge indicator will turn OFF. Make sure the charge indicator is OFF before starting wiring or inspection.

●Three-phase 200 V



1QF : Molded-case circuit breaker
2QF : Molded-case circuit breaker
1FLT : Noise filter
1KM : Magnetic contactor (for control power supply)
2KM : Magnetic contactor (for main power supply)
1Ry : Relay
1PL : Indicator lamp
1SA : Surge absorber
2SA : Surge absorber
3SA : Surge absorber
1D : Flywheel diode

●Three-phase 400 V



1QF : Molded-case circuit breaker
2QF : Molded-case circuit breaker
1FLT : Noise filter
1KM : Magnetic contactor (for control power supply)
2KM : Magnetic contactor (for main power supply)
1Ry : Relay
1PL : Indicator lamp
1SA : Surge absorber
2SA : Surge absorber
3SA : Surge absorber
1D : Flywheel diode

●General Precautions for Wiring

IMPORTANT

- Use a molded-case circuit breaker (1QF) or fuse to protect the Main Circuit.
  The SERVOPACK and converter connect directly to a commercial power supply; they are not isolated by a transformer or other device. Always use a molded-case circuit breaker (1QF) or fuse to protect the servo system from accidents involving different power system voltages or other accidents.
- Install a ground fault detector.
  The SERVOPACK and converter do not have a built-in protective circuit for grounding. To configure a safer system, install a ground fault detector against overloads and short-circuiting, or install a ground fault detector combined with a molded-case circuit breaker.
- Do not turn the power ON and OFF more than necessary.
  - Do not use a SERVOPACK or converter for applications that require the power to turn ON and OFF frequently. Such applications will cause elements in the SERVOPACK or converter to deteriorate.
  - As a guideline, at least one hour should be allowed between the power being turned ON and OFF once actual operation has been started.

To ensure safe, stable application of the servo system, observe the following precautions when wiring.

- Use the specified connection cables. For details, contact your Yaskawa representative and the sales department. Design and arrange the system so that each cable will be as short as possible.
- Use shielded twisted-pair cables or screened unshielded twisted-pair cables for I/O signal cables and encoder cables.
- Use the busbars that are included with the converter and connect the P and N terminals on the SERVOPACK and converter securely.
- The maximum cable length is 3 m for I/O signal cables, 50 m for connection cables for servomotor main circuit, and 50 m for encoder cables, and 10 m for 24-V control power supply cables to 400-V converters.

Observe the following precautions when wiring the ground.

- Ground SERVOPACKs and converters with a 200-V input to 100 Ω or less. Ground SERVOPACKs and converters with a 400-V input to 10 Ω or less.
- Be sure to ground at only one point.
- Ground the servomotor directly if the servomotor is insulated from the machine.

The signal cable conductors are as thin as 0.2 mm^2 or 0.3 mm^2. Do not impose excessive bending force or tension.

SERVOPACK Main Circuit Wire

●Three-phase, 200 V

Combination of SERVOPACK and Converter		Terminal Symbols	Screw Size for Terminals	HIV Wire Size in mm2 (AWG)	Crimp Terminal Model (Made by J.S.T. Mfg Co., Ltd.)*
SGDV-121H	SERVOPACK	P, N	M8	Bus bar attached to the converter	–
		U, V, W	M8	60 (2/0)	R60-8
		DU, DV, DW	M6	5.5 (10)	R5.5-6
		⏚	M8	60 (2/0)	R60-8
SGDV-COA2BAA	Converter	P, N	M8	Bus bar attached to the converter	–
		L1, L2, L3	M8	38 (1)	R38-8
		⊖1, ⊖2	M8	38 (1)	R38-8
		CN101 (200 VAC)	– (Connector)	1.25 (16)	–
		B1, B2	M8	8 (8)	R8-8
		⏚	M8	38 (1)	R38-8
SGDV-161H	SERVOPACK	P, N	M8	Bus bar attached to the converter	–
		U, V, W	M8	100 (4/0)	CB100-S8
		DU, DV, DW	M6	5.5 (10)	R5.5-6
		⏚	M8	100 (4/0)	100-8
SGDV-COA3GAA	Converter	P, N	M10	Bus bar attached to the converter	–
		L1, L2, L3	M10	60 (2/0)	R60-10
		⊖1, ⊖2	M10	60 (2/0)	R60-10
		CN101 (200 VAC)	– (Connector)	1.25 (16)	–
		B1, B2	M10	14 (6)	R14-10
		⏚	M8	60 (2/0)	R60-8
SGDV-201H	SERVOPACK	P, N	M10	Bus bar attached to the converter	–
		U, V, W	M10	100 (4/0)	R100-10
		DU, DV, DW	M6	5.5 (10)	R5.5-6
		⏚	M8	100 (4/0)	100-8
SGDV-COA3GAA	Converter	P, N	M10	Bus bar attached to the converter	–
		L1, L2, L3	M10	100 (4/0)	R100-10
		⊖1, ⊖2	M10	100 (4/0)	R100-10
		CN101 (200 VAC)	– (Connector)	1.25 (16)	–
		B1, B2	M10	14 (6)	R14-10
		⏚	M8	100 (4/0)	100-8

* : Use the crimp terminals that are recommended by Yaskawa or an equivalent. The tools required for using crimp terminals are shown on the next page.

●Three-phase, 400 V

Combination of SERVOPACK and Converter		Terminal Symbols	Screw Size for Terminals	HIV Wire Size in mm2 (AWG)	Crimp Terminal Model (Made by J.S.T. Mfg Co., Ltd.)*
SGDV-750J	SERVOPACK	P, N	M8	Bus bar attached to the converter	–
		U, V, W	M8	22 (4)	R22-8
		DU, DV, DW	M6	3.5 (12)	3.5-6
		⏚	M8	22 (4)	R22-8
SGDV-COA3ZDA	Converter	P, N	M8	Bus bar attached to the converter	–
		L1, L2, L3	M8	22 (4)	R22-8
		⊖1, ⊖2	M8	22 (4)	R22-8
		CN101 (24 V, 0 V)	– (Connector)	1.25 (16)	–
		B1, B2	M8	8 (8)	R8-8
		⏚	M8	22 (4)	R22-8
SGDV-101J	SERVOPACK	P, N	M8	Bus bar attached to the converter	–
		U, V, W	M8	38 (1)	R38-8
		DU, DV, DW	M6	3.5 (12)	3.5-6
		⏚	M8	38 (1)	R38-8
SGDV-COA5EDA	Converter	P, N	M10	Bus bar attached to the converter	–
		L1, L2, L3	M10	38 (1)	R38-10
		⊖1, ⊖2	M10	38 (1)	R38-10
		CN101 (24 V, 0 V)	– (Connector)	1.25 (16)	–
		B1, B2	M10	8 (8)	R8-10
		⏚	M8	38 (1)	R38-8
SGDV-131J	SERVOPACK	P, N	M10	Bus bar attached to the converter	–
		U, V, W	M10	60 (2/0)	R60-10
		DU, DV, DW	M6	3.5 (12)	3.5-6
		⏚	M8	60 (2/0)	R60-8
SGDV-COA5EDA	Converter	P, N	M10	Bus bar attached to the converter	–
		L1, L2, L3	M10	60 (2/0)	R60-10
		⊖1, ⊖2	M10	60 (2/0)	R60-10
		CN101 (24 V, 0 V)	– (Connector)	1.25 (16)	–
		B1, B2	M10	14 (6)	R14-10
		⏚	M8	60 (2/0)	R60-8

* : Use the crimp terminals that are recommended by Yaskawa or an equivalent. The tools required for using crimp terminals are shown on the next page.

● Tools for Crimp Terminals

Model	Tools by J.S.T. Mfg Co., Ltd.		
	Body	Head	Dies
3.5-6	YHT-2210	–	–
R5.5-6			
R8-8	YHT-8S	–	–
R8-10	YPT-150-1	–	TD-221, TD-211
R14-10	YPT-150-1 YF-1	– YET-150-1	TD-222, TD-211
R22-8			TD-223, TD-212
R38-8 R38-10			TD-224, TD-212
R60-8 R60-10			TD-225, TD-213
100-8 R100-10 CB100-S8			TD-228, TD-214

●Wire Type

Wire Type		Allowable Conductor Temperature
Code	Name	℃
IV	600 V polyvinyl chloride insulated wire	60
HIV	600 V grade heat-resistant polyvinyl chloride insulated wire	75

The following table shows the wire sizes and allowable currents for three wires. Use wires with specifications equal to or less than those shown in the table.

● 600 V grade heat-resistant polyvinyl chloride insulated wire (HIV)

Nominal Cross Section Area mm2	AWG Size	Configuration Number of Wires/ mm	Conductive Resistance Ω/km	Allowable Current at Surrounding Air Temperature A		
				30℃	40℃	50℃
0.5	(20)	19/0.18	39.5	6.6	5.6	4.5
0.75	(19)	30/0.18	26	8.8	7	5.5
0.9	(18)	37/0.18	24.4	9	7.7	6
1.25	(16)	50/0.18	15.6	12	11	8.5
2	(14)	7/0.6	9.53	23	20	16
3.5	(12)	7/0.8	5.41	33	29	24
5.5	(10)	7/1.0	3.47	43	38	31
8	(8)	7/1.2	2.41	55	49	40
14	(6)	7/1.6	1.35	79	70	57
22	(4)	7/2.0	0.85	91	81	66
38	(1)	7/2.6	0.49	124	110	93
60	(2/0)	19/2.0	0.3	170	150	127
100	(4/0)	19/2.6	0.18	240	212	179

Note: The values in the table are for reference only.

IMPORTANT

1 The specified wire sizes are for use when the three lead cables are bundled and when the rated electric current is applied with a surrounding air temperature of 40℃.
2 Use a wire with a minimum withstand voltage of 600 V for the main circuit.
3 If cables are bundled in PVC or metal ducts, take into account the reduction of the allowable current.
4 Use a heat-resistant wire under high surrounding air or panel temperatures, where polyvinyl chloride insulated wires will rapidly deteriorate.

Molded-case Circuit Breaker and Fuse Capacity

●Recommendations

Main Circuit Power Supply	Applicable Servomotor Max. Capacity kW	Combination of SERVOPACK and Converter		Power Supply Capacity for Each SERVOPACK-Converter Set kVA	Current Capacity		Inrush Current		Rated Voltage	
		SERVOPACK Model SGDV-	Converter Model SGDV-COA		Main Circuit Arms	Control Circuit Arms	Main Circuit A0-p	Control Circuit A0-p	Fuse V	Circuit Breaker V
Three-phase 200 V	22	121H	2BAA	38	127	1.2*1	163	16	250	240
	30	161H	3GAA	52	174	1.2*1	163	16		
	37	201H	3GAA	64	214	1.2*1	163	16		
Three-phase 400 V	30	750J	3ZDA	52	87	4*2	170	–	600	480
	37	101J	5EDA	64	107	4*2	170	–		
	55	131J	5EDA	95	159	4*2	170	–		

*1 : Input voltage of 200 VAC
*2 : Input voltage of 24 VDC

Notes: 1 The values in the above table are for a combination of one SERVOPACK and one converter. If using more than one SERVOPACK or more than one converter, find the total value for the combination to be used.

2 The rated input current is the net value for the rated load. When selecting the molded-case circuit breaker and fuse capacity, find the capacity by derating as specified below.
Breaking characteristic (25℃): 5 s min. at 300%

3 To comply with the low voltage directive, connect a fuse to the input side. Select the fuse or molded-case circuit breaker for the input side from among models that are compliant with UL standards.
The table above also provides the net values of current capacity and inrush current. Select a fuse and a molded-case circuit breaker which meet the breaking characteristics shown below.
- Main circuit, control circuit: No breaking at three-times the current values of the table for 5 s.
- Inrush current: No breaking at the same current values of the table for 20 ms.

4 In accordance with UL standards, the following restrictions apply.

Noise Filters

●Noise Filter Selection

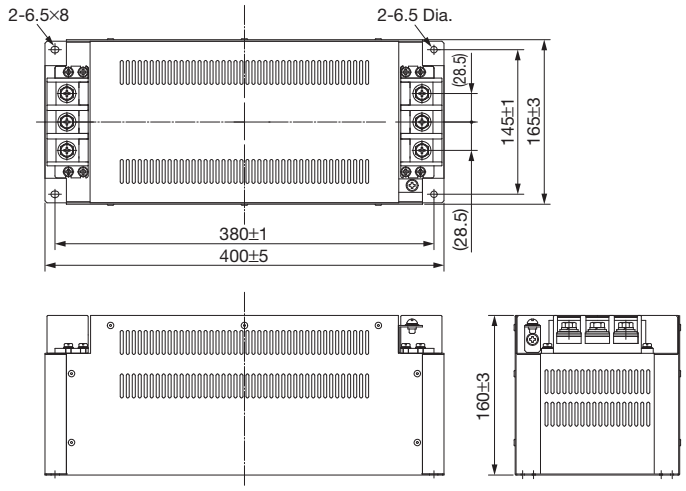
Main Circuit Power Supply	Combination of SERVOPACK and Converter		Recommended Noise Filter		
	SERVOPACK Model SGDV-	Converter Model SGDV-COA	Model	Specifications	Leakage Current
Three-phase 200 V	121H	2BAA	HF3150C-UQB	Three-phase, 480 VAC, 150 A	10 mA 400 VAC/50 Hz
	161H	3GAA	HF3200C-UQB	Three-phase, 480 VAC, 200 A	
	201H	3GAA	HF3250C-UQB	Three-phase, 480 VAC, 250 A	
Three-phase 400 V	750J	3ZDA	HF3150C-UQB	Three-phase, 480 VAC, 150 A	10 mA 400 VAC/50 Hz
	101J	5EDA	HF3150C-UQB	Three-phase, 480 VAC, 150 A	
	131J	5EDA	HF3200C-UQB	Three-phase, 480 VAC, 200 A	

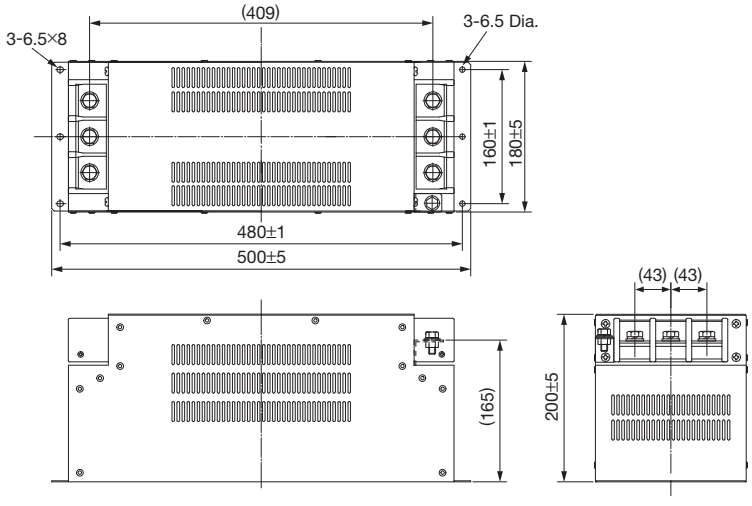
IMPORTANT

Some noise filters have large amounts of leakage current. The grounding measures taken also affect the extent of the leakage current. If necessary, select an appropriate leakage current detector or leakage current breaker taking into account the grounding measures that are used and leakage current from the noise filter. Contact the manufacturer of the noise filter for details.

●External Dimensions (Units: mm)

HF Noise Filters (Soshin Electric Co.)

Model	HF3150C-UQB
Dimensional Drawings	

Model	HF3200C-UQB HF3250C-UQB
Dimensional Drawings	

●Holding Brake Power Supply Unit

IMPORTANT

- We recommend opening or closing the circuit for the holding brake's power supply so that switching will occur on the AC side of the holding brake power supply unit. This will reduce brake operation time compared to switching on the DC side.
- When switching on the DC side, install an extra surge absorber (varistor) on the brake side apart from the surge absorber built in the brake circuit to prevent damage to the brake coil from surge voltage.
- Holding brake power supply units for 24 VDC are not provided by Yaskawa. Please obtain these from other manufacturers. Do not connect holding brake power supply units for different output voltages to SERVOPACKs. Overcurrent may result in burning.

● Model

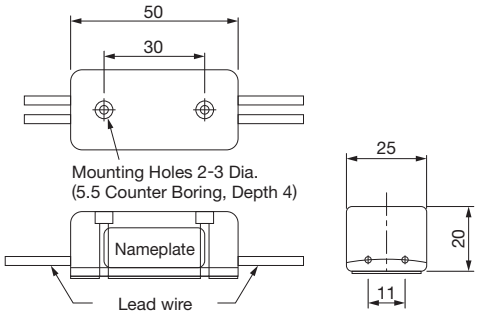
200 V input: LPSE-2H01-E
100 V input: LPDE-1H01-E

● Specifications

Rated output voltage: 90 VDC
Maximum output current: DC 1.0 A
Lead wire length: 500 mm each
Maximum ambient temperature: 60˚C
Lead wires: Color coded (refer to the table below)

AC input		Brake end
100 V	200 V	
Blue/white	Yellow/white	Red/black

● External Dimensions (Units: mm)

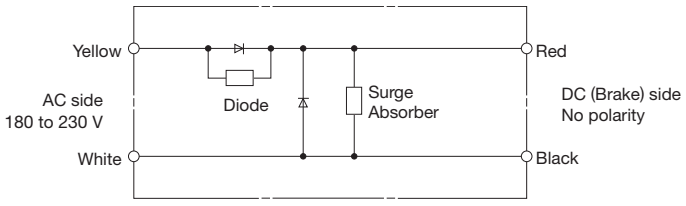


● Internal Circuits

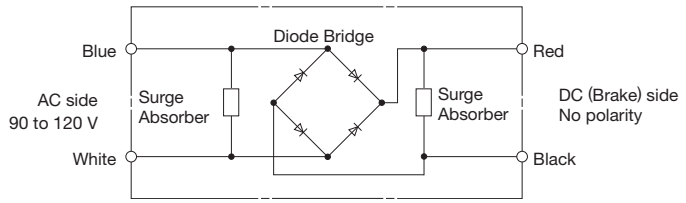
We recommend opening or closing the circuit for the holding brake's power supply so that switching will occur on the AC side of the holding brake power supply unit. This will reduce brake operation time compared to switching on the DC side. When switching on the DC side, install an extra surge absorber (varistor) on the brake side apart from the surge absorber built in the brake circuit to prevent damage to the brake coil from surge voltage. For more information on surge absorbers (varistors) and circuit designs, refer to *Surge Absorbers (Varistors)* on page 52.

<Surge Absorber Selection>
When using the LPSE-2H01-E, select a Z10D471 surge absorber made by SEMITEC Corp.
When using the LPDE-1H01-E, select a Z10D271 surge absorber made by SEMITEC Corp.

Brake Power Supply for 200 VAC
Internal Circuit for Model: LPSE-2H01-E



Brake Power Supply for 100 VAC
Internal Circuit for Model: LPDE-1H01-E



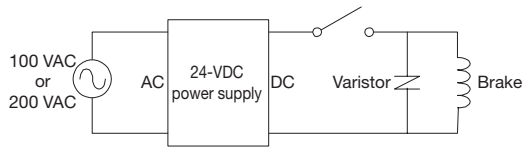
Surge Absorbers for Holding Brakes, Diodes, and Open/Close Relays

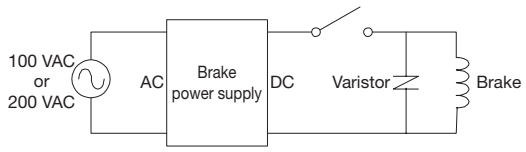
●Surge absorbers (Varistors)

Select an appropriate surge absorber for the power voltage and the current of the brake to be used. Refer to the following diagrams for the circuit designs of surge absorbers. Surge absorbers are not included.

Brake Power Supply Voltage		24 VDC		90 VDC			
Surge Absorber Manufacturer		Nippon Chemi-Con	SEMITEC	Nippon Chemi-Con	SEMITEC	Nippon Chemi-Con	SEMITEC
Brake Rated Current	1 A max.	TNR5V121K	Z5D121	TNR7V271K	Z7D271	TNR7V471K	Z7D471
	2 A max.	TNR7V121K	Z7D121	TNR10V271K	Z10D271	TNR10V471K	Z10D471
	4 A max.	TNR10V121K	Z10D121	-	-	-	-
	8 A max.	TNR14V121K	Z15D121	-	-	-	-
Brake Power Supply		A 24-VDC power supply (not included.)		A 90-VDC power supply (not included) or a LPDE-1H01-E (full-wave rectification)		LPSE-2H01-E (half-wave rectification)	

Note: Surge absorbers do not have any polarity.
The ambient temperature range for surge absorbers is –20˚C to 60˚C. The element is selected with the condition that it is switched ON and OFF 10 times or less per minute.
The information in the table is just a reference and combinations of these products with brakes do not guarantee the braking characteristics. When selecting surge absorbers for your application, consider the product life and test all operations, including brake timing before use.



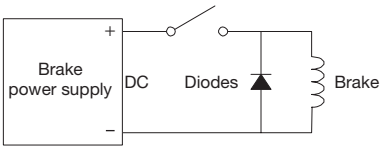


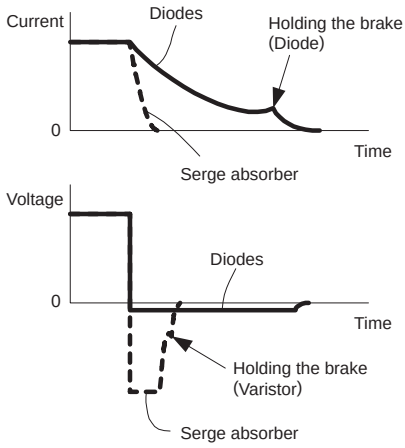
●Diodes

Diodes can be used to suppress back surge that occurs when a relay contact opens. Note that when diodes are used, more time is required to brake than when surge absorbers are used. Select diodes with a rated current greater than that of the brakes and with the recommended withstand voltage shown in the following table. Diodes are not included.

Brake Power Supply Voltage	Withstand Voltage
24 VDC	100 to 200 V
90 VDC (Full-wave rectification)	400 to 600 V
90 VDC (Half-wave rectification)	800 V min.

Note: Diodes have polarities. Refer to the following diagram when connecting diodes.
When selecting diodes for your application, consider the product life and conduct tests such as operation tests before use.





●Open/close relays for brakes

Select an open/close relay that can be used at the voltage and current of the brake used. When using a SSR (solid state relay) which is a semiconductor relay, use diodes to absorb any back surge. Open/close relays are not included.

Regenerative Resistor

●Regenerative Power and Regenerative Resistance

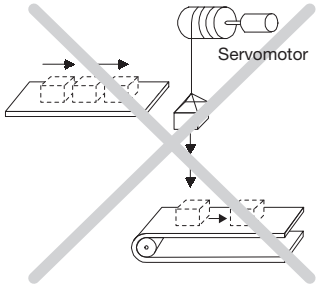
The rotational energy of driven machine such as servomotor is returned to the SERVOPACK. This is called regenerative power. The regenerative power is absorbed by charging the smoothing capacitor, but when the chargeable energy is exceeded, the regenerative power is further consumed by the regenerative resistor.

The servomotor is driven in regeneration state in the following circumstances:

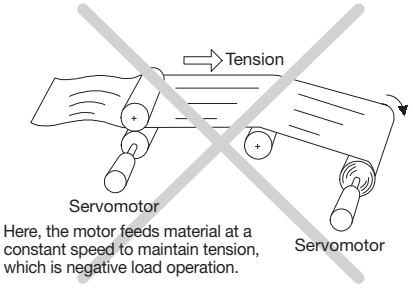
- While decelerating to a stop during acceleration and deceleration operation.
- Continuous operation on the vertical axis.
- During continuous operation with the servomotor rotated from the load side (negative load).

Continuous operation in which the force of the load causes the servomotor to rotate is call negative load operation. Do not perform negative load operation. The following figures show typical examples of negative load operation.

● Lowering Objects with the Motor without a Counterweight



● Feeding Material with the Motor



IMPORTANT

- Do not perform negative load operation. During negative load operation, regenerative braking is applied continuously by the SERVOPACK. The regenerative energy of the load may exceed the allowable range and damage the SERVOPACK.
- The regenerative brake capacity of the SGDV SERVOPACKs is rated for short-term operation approximately equivalent to the time it takes to decelerate to a stop.

You must connect a regenerative resistor. Use the SigmaJunmaSize+AC for servo drive capacity selection program to calculate the capacity. If you use a Yaskawa regenerative resistor, refer to (1) Using a Regenerative Resistor from Yaskawa. If you use a regenerative resistor from another company, refer to (2) Using a Regenerative Resistor from Another Company.

●Recommendations

(1) Using a Regenerative Resistor from Yaskawa

The SERVOPACKs and the converters do not have built-in regenerative resistors. If you use a regenerative resistor from Yaskawa, select it according to the combinations specified by Yaskawa in the following table. You must obtain the regenerative resistor separately.

Main Circuit Power Supply Voltage	SERVOPACK Model SGDV-	Converter Model SGDV-COA	Model of Applicable regenerative resistor	Resistance Ω	Capacity W	Specifications
Three-phase 200 V	121H	2BAA	JUSP-RA08-E	2.4	2400	Four 0.6-Ω (600-W) resistors connected in series
	161H	3GAA	JUSP-RA09-E	1.8	4800	Two sets of four 0.9-Ω (600-W) resistors connected in series are connected in parallel.
	201H	3GAA	JUSP-RA11-E	1.6	4800	Eight 0.2-Ω (600-W) resistors connected in series
Three-phase 400 V	750J	3ZDA	JUSP-RA13-E	6.7	3600	Three sets of two 10-Ω (600-W) resistors connected in series are connected in parallel.
	101J	5EDA	JUSP-RA14-E	5	4800	Four sets of two 10-Ω (600-W) resistors connected in series are connected in parallel.
	131J	5EDA	JUSP-RA16-E	3.8	7200	Four sets of three 5-Ω (600-W) resistors connected in series are connected in parallel.

Notes: 1 If you use any combination of regenerative resistor, SERVOPACK, and converter that is not specified by Yaskawa, always set the resistive capacity in the Pn600 parameter (Regenerative Resistor Capacity) in the SERVOPACK. If you use a combination that is specified by Yaskawa, leave the setting of the Pn600 parameter in the SERVOPACK at the default setting.
2 For detailed specification on regenerative resistors, contact your Yaskawa representative or a Yaskawa sales department.
3 If there will be continuous operation in regenerative mode, such as for a vertical axis, calculate the required capacity (W) of the regenerative resistor. Refer to *Regenerative Resistor Capacity Selection* on page 62.

(2) Using a Regenerative Resistor from Another Company

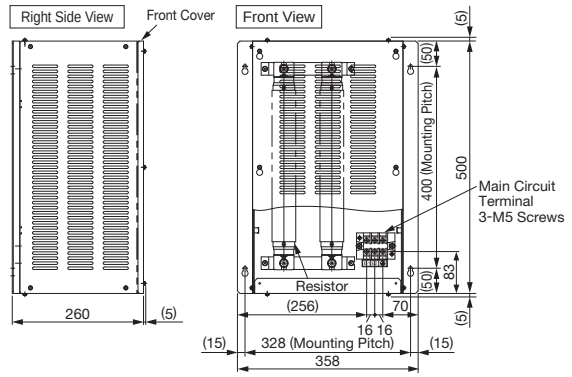
If you use a regenerative resistor from another company, contact your Yaskawa representative or a Yaskawa sales department.

Main Circuit Power Supply Voltage	SERVOPACK Model SGDV-	Converter Model SGDV-COA	Minimum Allowable Resistance Ω
Three-phase 200 V	121H	2BAA	1.33
	161H	3GAA	1.0
	201H	3GAA	1.0
Three-phase 400 V	750J	3ZDA	2.0
	101J	5EDA	2.0
	131J	5EDA	2.0

Notes: 1 If you use a regenerative resistor from another company, we recommend a regenerative resistor with a thermal switch for safety.
2 If you use a regenerative resistor from another company, always set the resistive capacity in the Pn600 parameter (Regenerative Resistor Capacity) in the SERVOPACK. For details, refer to *3.7.3 Setting the Regenerative Resistor Capacity* in the Users Manual, Design and Maintenance (manual No.: SIEP S800000 88).

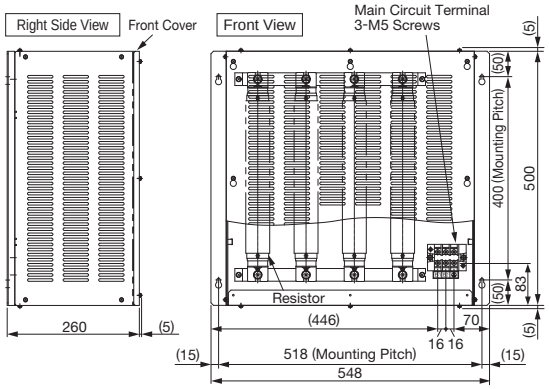
●External Dimensions (Units: mm)

(1) JUSP-RA08-E



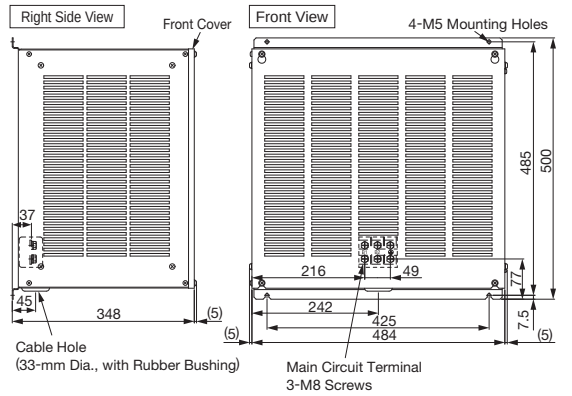
Approx. Mass: 14.0 kg

(2) JUSP-RA09-E



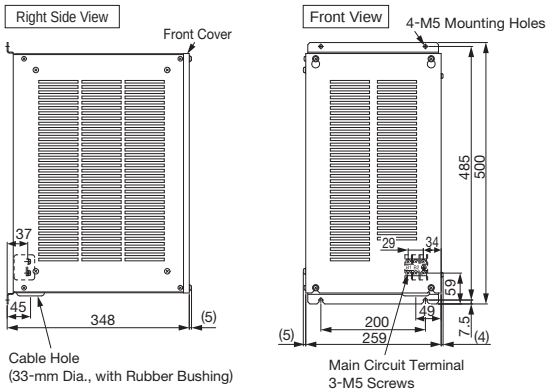
Approx. Mass: 21.0 kg

(3) JUSP-RA11-E



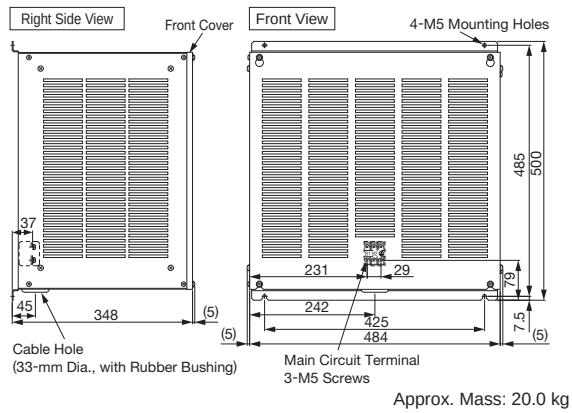
Approx. Mass: 20.5 kg

(4) JUSP-RA13-E



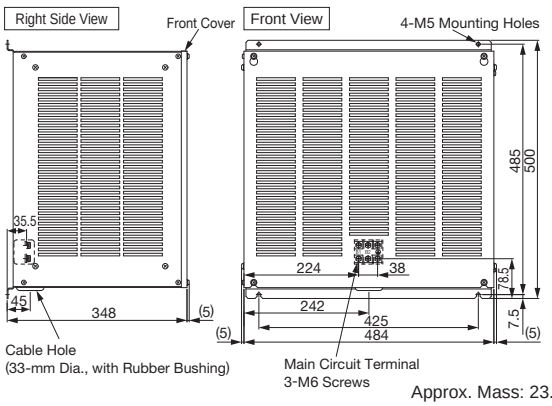
Approx. Mass: 14.0 kg

(5) JUSP-RA14-E



Approx. Mass: 20.0 kg

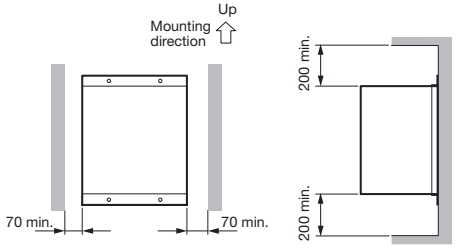
(6) JUSP-RA16-E



Approx. Mass: 23.5 kg

●Installation Standards

Observe the following installation standards when you use a Yaskawa regenerative resistor. Provide at least 70 mm on each side of the unit and at least 200 mm at both the top and bottom of the unit to enable fan and natural convection cooling.



Note: If you use a regenerative resistor from another company, install it according to the manufacturer's specifications.

●Dynamic Brake Unit Selection

To use the dynamic brake (DB), externally connect a dynamic brake unit or dynamic brake resistor to the SERVOPACK to process the dynamic braking energy. If you use a dynamic brake resistor from Yaskawa, use the following table to select it. You must obtain the dynamic brake unit separately.

Note: Refer to page 40 for a cable to connect the dynamic brake unit or dynamic brake contactor to CN115 on the SERVOPACK.

(1) Using a Dynamic Brake Unit from Yaskawa

Main Circuit Power Supply Voltage	SERVOPACK Model SGDV-	Dynamic Brake Unit Model	Resistance Specifications (Star Wiring人)	Dynamic Brake Contactor and Surge Absorption Unit
Three-phase 200 V	121H, 161H, 201H	JUSP-DB02-E	180 W, 0.3 Ω ×3 (Star Wiring人)	Built into dynamic brake unit.
Three-phase 400 V	750J, 101J	JUSP-DB04-E	180 W, 0.8 Ω ×3 (Star Wiring人)	Built into dynamic brake unit.
	131J	JUSP-DB06-E	300 W, 0.8 Ω ×3 (Star Wiring人)	Built into dynamic brake unit.

(2) Using a Dynamic Brake Unit from Another Company

To order a dynamic brake unit, contact the manufacturer directly.

Main Circuit Power Supply Voltage	Model	Manufacturer	Required Resistance
Three-phase 200 V	GR series	Japan Resistor Mfg. Co., Ltd.	0.3 Ω or greater
Three-phase 400 V			0.8 Ω or greater

Use the following dynamic brake contactors and surge absorption units.

Main Circuit Power Supply Voltage	SERVOPACK Model	Name		Model	Manufacturer
Three-phase 200 V	SGDV-□□□H	Contactor		SC-4-1/G Coil: 24 VDC	Fuji Electric Co., Ltd.
		Main circuit surge absorption unit*	Head-on type	SZ-ZM1	
			Side-on type	SZ-ZM2	
		Coil surge absorption unit		SZ-Z4	
Three-phase 400 V	SGDV-□□□J	Contactor		SC-4-1/G Coil: 24 VDC	Fuji Electric Co., Ltd.
		Main circuit surge absorption unit*	Head-on type	SZ-ZM1	
			Side-on type	SZ-ZM2	
		Coil surge absorption unit		SZ-Z4	

* : Use either a head-on or side-on main circuit surge absorption unit.

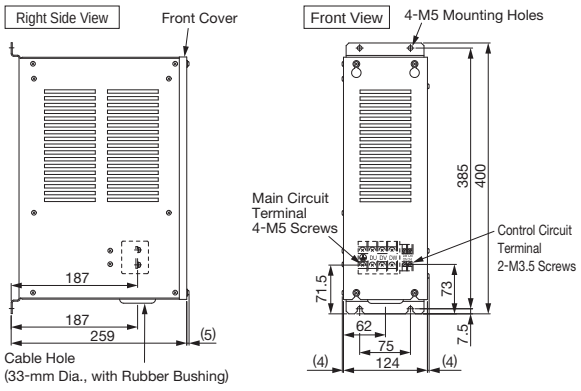
Notes: 1 The dynamic brake answer function on a Yaskawa dynamic brake unit cannot be used because there are no auxiliary contacts on the contactor. The dynamic brake answer function would allow you to use auxiliary contacts on the contactor in the dynamic brake circuit with the dynamic brake answer signal (/DBANS) to detect welding or failure to operation. To use the dynamic brake answer function, select a contactor that has auxiliary contacts. For details, refer to the User's Manual, Design and Maintenance for your SERVOPACK.

2 The settings of the SERVOPACK parameters depend on the following conditions. For details, refer to the User's Manual, Design and Maintenance for your SERVOPACK.

- Whether you connect a dynamic brake unit.
- Whether the dynamic brake unit is from Yaskawa or from another company

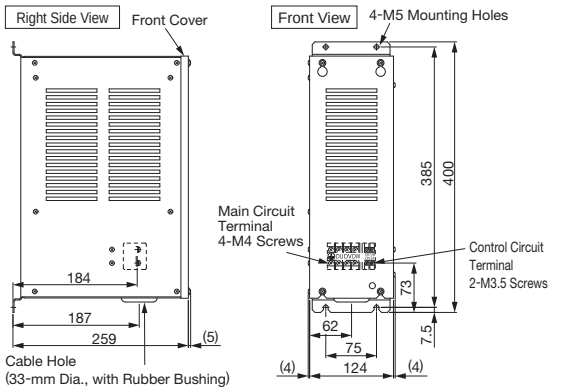
●External Dimensions (Units: mm)

(1) JUSP-DB02-E



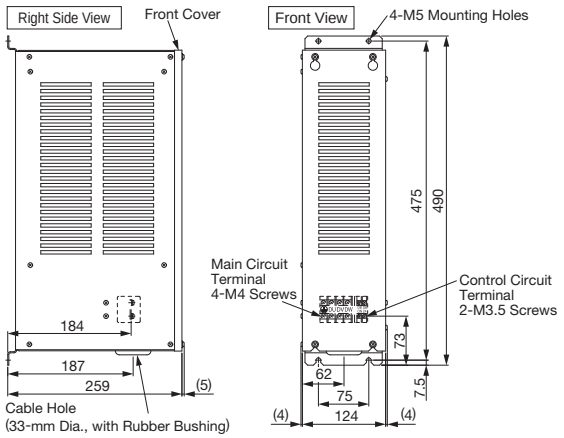
Approx. Mass: 6.0 kg

(2) JUSP-DB04-E



Approx. Mass: 6.0 kg

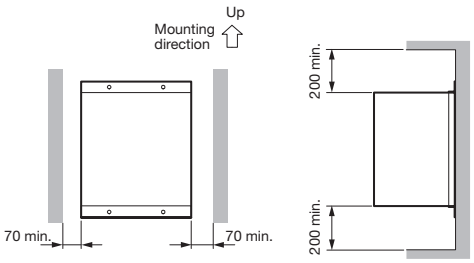
(3) JUSP-DB06-E



Approx. Mass: 7.0 kg

●Installation Standards

Observe the following installation standards when you use a Yaskawa dynamic brake unit. Provide at least 70 mm on each side of the unit and at least 200 mm at both the top and bottom of the unit to enable fan and natural convection cooling.

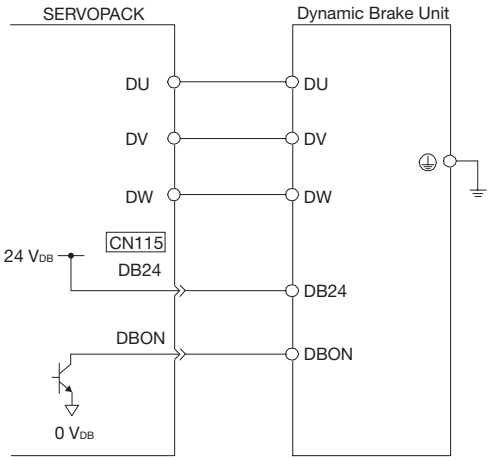


Note: If you use a dynamic brake unit from another company, install it according to the manufacturer's specifications.

●Connections

(1) Using a Dynamic Brake Unit from Yaskawa

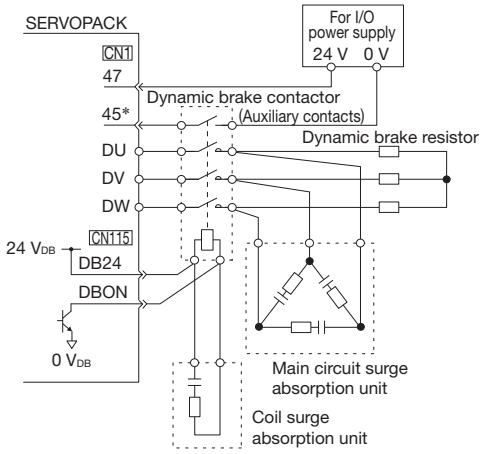
A dynamic brake contactor is built into a Yaskawa dynamic brake unit. The connections are shown in the following figure.



Note: The dynamic brake answer function cannot be used because there are no auxiliary contacts on the contactor.

(2) Using a Dynamic Brake Unit from Another Company

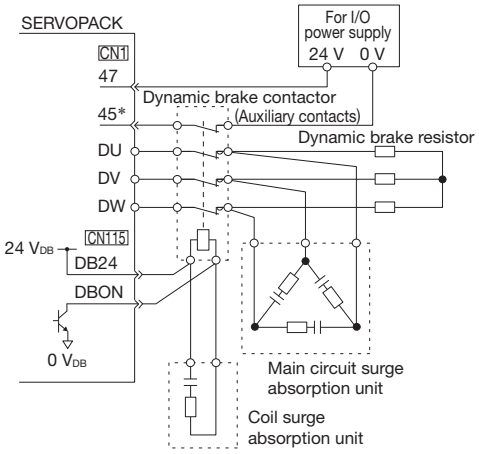
- Using NO Contacts for the Dynamic Brake Contactor



* : The above figure is for using a dynamic brake contactor with NO contacts. The dynamic brake answer signal (a signal from NO auxiliary contacts) is input to CN1-45. To indicate an error if the input signal to CN1-45 turns OFF (open) while the dynamic brake is activated, the Pn515 parameter in the SERVOPACK must be set to n.□E□□. If the dynamic brake answer signal is not used, Pn515 is set to n.□8□□ (default setting).

Notes: 1 If you assign more than one signal to the same input circuit, OR logic will be used and any of the input signals will cause the circuit to operate. This may result in unexpected operation.
2 The maximum current for DB24 and DBON is 300 mA.

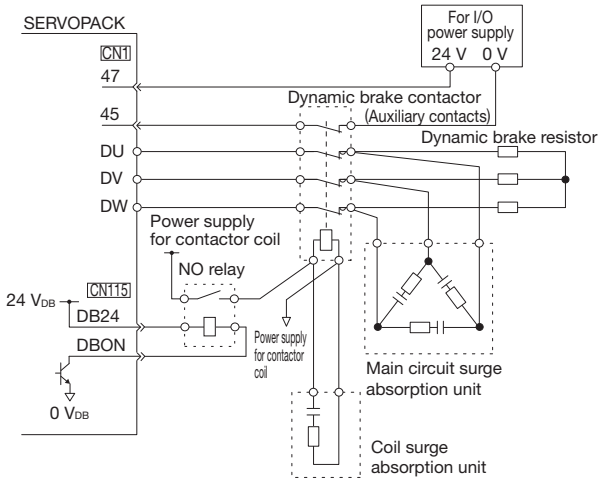
- Using NC Contacts for the Dynamic Brake Contactor



* : The above figure is for using a dynamic brake contactor with NC contacts. The dynamic brake answer signal (a signal from NC auxiliary contacts) is input to CN1-45. To indicate an error if the input signal to CN1-45 turns OFF (open) while the dynamic brake is activated, the Pn515 parameter in the SERVOPACK must be set to n.□E□□. If the dynamic brake answer signal is not used, Pn515 is set to n.□8□□ (default setting).

Notes: 1 If you assign more than one signal to the same input circuit, OR logic will be used and any of the input signals will cause the circuit to operate. This may result in unexpected operation.
2 The maximum current for DB24 and DBON is 300 mA.

- If the coil current of NC dynamic brake contactors is 300 mA or higher, obtain an NO relay that can switch the contactor coil current and voltage and a power supply for the contactor coil.

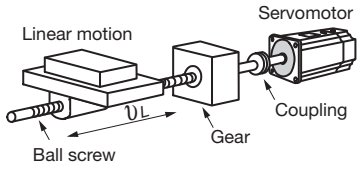


Servomotor Capacity Selection Examples

Use the AC servo drive capacity selection program SigmaJunmaSize+ to select servomotor capacity.
The program can be downloaded for free from our web site (http://www.e-mechatronics.com/).

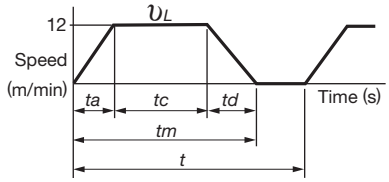
●Selection Example for Speed Control

Mechanical Specifications



- Load speed: $\upsilon_L = 12$ m/min
- Linear motion section mass: $m = 750$ kg
- Ball screw length: $\ell_B = 2.0$ m
- Ball screw diameter: $d_B = 0.1$ m
- Ball screw lead: $P_B = 0.012$ m
- Ball screw material density: $\rho = 7.87 \times 103$ kg/m^3
- Gear ratio: 1/2 (R = 2)
- Gear + coupling moment of inertia : $J_G = 12 \times 10^{-4}$ kg-m^2
- Feeding times: $n = 10$ times/min
- Feeding distance: $\ell = 0.21$ m
- Feeding time: $tm = 2.2$ s
- Friction coefficient: $\mu = 0.2$
- Mechanical efficiency: $\eta = 0.9$ (90%)

(1) Speed Diagram



$$t = \frac{60}{n} = \frac{60}{10} = 6.0 \text{ (s)}$$

where $ta = td$

$$\begin{cases} (ta + tc) \times \dfrac{\upsilon_L}{60} = \ell \text{ (m)} \\ (2ta + tc) = tm \end{cases}$$

$$\therefore ta = 0.1 \text{ (s)}$$

$$tc = 2.2 - 2 \times 0.1 = 2.0 \text{ (s)}$$

(2) Rotation Speed

- Load axis rotation speed $n_L = \dfrac{\upsilon_L}{P_B} = \dfrac{12}{0.012} = 1000 \text{ (min}^{-1}\text{)}$
- Motor shaft rotation speed Gear ratio 1/R = 1/2 (R=2)

  Therefore, $n_M = n_L \cdot R = 1000 \times 2 = 2000$ (RPM)

(3) Load torque

$$T_L = \frac{9.8\mu \cdot m \cdot P_B}{2\pi R \cdot \eta} = \frac{9.8 \times 0.2 \times 750 \times 0.012}{2\pi \times 2 \times 0.9} = 1.56 \text{ (N·m)}$$

(4) Load Moment of Inertia

- Linear motion section $J_{L1} = m \left(\dfrac{P_B}{2\pi R}\right)^2 = 750 \times \left(\dfrac{0.012}{2\pi \times 2}\right)^2 = 6.84 \times 10^{-4} \text{ (kg·m}^2\text{)}$
- Ball screw $J_B = \dfrac{\pi}{32} \rho \cdot \ell_B \cdot d_B{}^4 \cdot \dfrac{1}{R^2} = \dfrac{\pi}{32} \times 7.87 \times 10^3 \times 2.0 \times (0.1)^4 \cdot \dfrac{1}{2^2} = 386.32 \times 10^{-4} \text{ (kg·m}^2\text{)}$
- Coupling $J_G = 12 \times 10^{-4}$ (kg-m^2)
- Load moment of inertia at motor shaft $J_L = J_{L1} + J_B + J_G = (6.84 + 386.32 + 12) \times 10^{-4} = 405.16 \times 10^{-4}$ (kg-m^2)

(5) Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 2000 \times 1.56}{60} = 327 \text{ (W)}$$

(6) Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 2000\right)^2 \times \frac{405.16 \times 10^{-4}}{0.1} = 17772 \text{ (W)}$$

(7) Servomotor Provisional Selection

(a) Selecting Conditions

- $T_L \leq$ Motor rated torque
- $\dfrac{(P_O+P_a)}{2} <$ Provisionally selected servomotor rated output $< (P_O+P_a)$
- $n_M \leq$ Motor rated speed
- $J_L \leq$ Allowable load moment of inertia

The followings satisfy the conditions.

- Servomotor SGMVV-2BD□B

(b) Specifications of the Provisionally Selected Servomotor

- Rated output : 22000 (W)
- Rated motor speed : 1500 (RPM)
- Rated torque : 140 (Nm)
- Instantaneous peak torque : 350 (Nm)
- Servomotor moment of inertia : 366×10^{-4} (kg-m^2)
- Allowable load moment of inertia : $366 \times 10^{-4} \times 10 = 3660 \times 10^{-4}$ (kg-m^2)

(8) Verification on the Provisionally Selected Servomotor

- Required acceleration torque: $T_P = \dfrac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \dfrac{2\pi \times 2000 \times (366 + 405.16) \times 10^{-4}}{60 \times 0.1} + 1.56$

  $\fallingdotseq 163$ (Nm) < Instantaneous peak torque…Satisfactory

- Required deceleration torque: $T_S = \dfrac{2\pi n_M (J_M + J_L)}{60td} - T_L = \dfrac{2\pi \times 2000 \times (366 + 405.16) \times 10^{-4}}{60 \times 0.1} - 1.56$

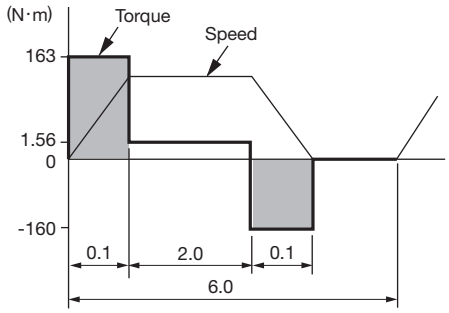
  $\fallingdotseq 160$ (Nm) < Instantaneous peak torque…Satisfactory

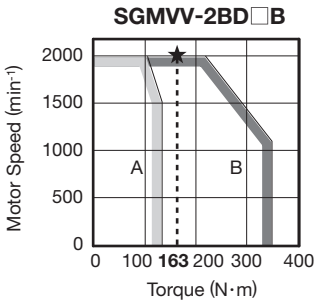
- Torque effective value: $Trms = \sqrt{\dfrac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\dfrac{(325)^2 \times 0.1 + (1.56)^2 \times 2.0 + (321)^2 \times 0.1}{6}}$

  $\fallingdotseq 29.5$ (Nm) < Rated torque…Satisfactory

(9) Result

The provisionally selected servomotor is confirmed to be applicable.
The torque diagram is shown below.





Servomotor Capacity Selection Examples

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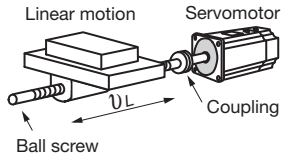
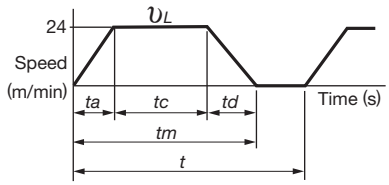
●Selection Example for Position Control

Mechanical Specifications



- Load speed: $\upsilon_L = 24$ m/min
- Linear motion section mass: $m = 500$ kg
- Ball screw length: $\ell_B = 2.0$ m
- Ball screw diameter: $d_B = 0.1$ m
- Ball screw lead: $P_B = 0.012$ m
- Ball screw material density: $\rho = 7.87 \times 103$ kg/m^3
- Coupling mass: $m_C = 5.0$ kg
- Coupling outer diameter: $d_C = 0.12$ m
- Positioning times: $n = 10$ times/min
- Positioning distance: $\ell = 0.88$ m
- Positioning time: $tm = 2.4$ s
- Electrical stop accuracy: $\delta = \pm 0.01$ mm
- Friction coefficient: $\mu = 0.2$
- Mechanical efficiency: $\eta = 0.9$ (90%)

(1) Speed Diagram



$$t = \frac{60}{n} = \frac{60}{10} = 6.0 \text{ (s)}$$

where $ta = td$

$$\begin{cases} (ta + tc) \times \dfrac{\upsilon_L}{60} = \ell \text{ (m)} \\ (2ta + tc) = tm \end{cases}$$

$$\therefore ta = 0.2 \text{ (s)}$$

$$tc = 2.4 - 2 \times 0.2 = 2.0 \text{ (s)}$$

(2) Rotation Speed

- Load axis rotation speed $n_L = \dfrac{\upsilon_L}{P_B} = \dfrac{24}{0.012} = 2000$ (min^{-1})
- Motor shaft rotation speed with direct coupling: Gear ratio 1/R = 1/1

  Therefore, $n_M = n_L \cdot R = 2000 \times 1 = 2000$ (RPM)

(3) Load Torque

$$T_L = \frac{9.8\mu \cdot m \cdot P_B}{2\pi R \cdot \eta} = \frac{9.8 \times 0.2 \times 500 \times 0.012}{2\pi \times 1 \times 0.9} = 2.08 \text{ (N·m)}$$

(4) Load Moment of Inertia

- Linear motion section: $J_{L1} = m \left(\dfrac{P_B}{2\pi R}\right)^2 = 500 \times \left(\dfrac{0.012}{2\pi \times 1}\right)^2 = 18.24 \times 10^{-4}$ (kg·m^2)
- Ball screw: $J_B = \dfrac{\pi}{32} \rho \cdot \ell_B \cdot d_B{}^4 = \dfrac{\pi}{32} \times 7.87 \times 10^3 \times 2.0 \times (0.1)^4 = 1545.27 \times 10^{-4}$ (kg·m^2)
- Coupling: $Jc = \dfrac{1}{8} m_C \cdot d_C{}^2 = \dfrac{1}{8} \times 5.0 \times (0.12)^2 = 90 \times 10^{-4}$ (kg·m^2)
- Load moment of inertia at the motor shaft: $J_L = J_{L1} + J_B + Jc = 1653.51 \times 10^{-4}$ (kg·m^2)

(5) Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 2000 \times 2.08}{60} \fallingdotseq 436 \text{ (W)}$$

(6) Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 2000\right)^2 \times \frac{1653.51 \times 10^{-4}}{0.2} \fallingdotseq 36266 \text{ (W)}$$

(7) Provisionally Servomotor Selection

(a) Selecting Conditions

- T_L ≤Motor rated torque
- $\frac{(P_O+P_a)}{2} <$ Provisionally selected servomotor rated output $< (P_O+P_a)$
- n_M ≤Motor rated speed
- J_L ≤Allowable load moment of inertia

The followings satisfy the conditions.

- Servomotor SGMVV-3ZA□B

(b) Specifications of Servomotor

• Rated output	: 30000 (W)
• Rated motor speed	: 1500 (RPM)
• Rated torque	: 191 (N m)
• Instantaneous peak torque	: 478 (N m)
• Servomotor rotor moment of inertia	: 498×10^{-4} (kg - m^2)
• Allowable load moment of inertia	: $498\times10^{-4}\times10 = 4980\times10^{-4}$ (kg - m^2)
• Encoder resolution	: 20 bit (1048576P/rev)

(8) Verification on Provisionally Selected Servomotor

- Required acceleration torque: $T_P = \frac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \frac{2\pi \times 2000 \times (498 + 1653.51) \times 10^{-4}}{60 \times 0.2} + 2.08$

  $\fallingdotseq 227$ (N m) < Instantaneous peak torque…Satisfactory

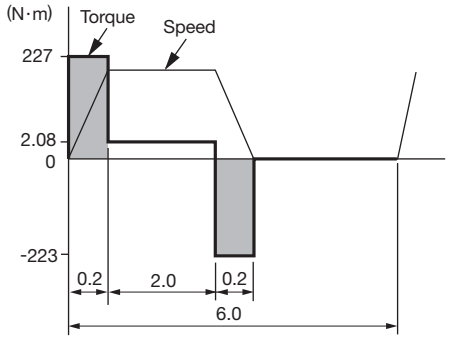
- Required deceleration torque: $T_S = \frac{2\pi n_M (J_M + J_L)}{60td} - T_L = \frac{2\pi \times 2000 \times (498 + 1653.51) \times 10^{-4}}{60 \times 0.2} - 2.08$

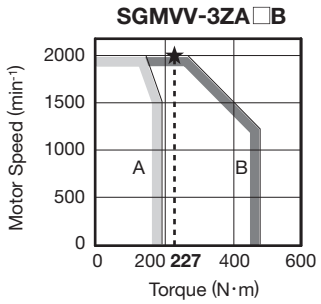
  $\fallingdotseq 223$ (N m) < Instantaneous peak torque…Satisfactory

- Torque effective value: $Trms = \sqrt{\frac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(452.69)^2 \times 0.2 + (2.08)^2 \times 2.0 + (448.53)^2 \times 0.2}{6.0}}$

  $\fallingdotseq 58.2$ (N m) < Rated torque…Satisfactory

The above confirms that the provisionally selected servomotor is sufficient. The torque diagram is shown below. In the next step, their performance in position control are checked.





Servomotor Capacity Selection Examples

(9) Position Detection Resolution

Position detection unit uses a $\Delta\ell = 0.01$ mm/pulse.
The number of pulses per motor rotation must be less than resolution of the encoder (P/rev).

$$\text{The number of pulses per revolution (pulse)} = \frac{PB}{\Delta\ell} = \frac{12\text{ mm}}{0.01\text{ mm}} = 1200 < \text{encoder resolution [1048576 (P/rev)]}$$

(10) Reference Pulse Frequency

$$vs = \frac{1000\upsilon_L}{60 \times \Delta\ell} = \frac{1000 \times 12}{60 \times 0.01} = 20{,}000\ (\text{pps})$$

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

* Refer to *1.4.3 Speed/Position/Torque Control* in the User's Manual, Design and Maintenance (Manual No.: SIEP S800000 88) for the maximum input pulse frequency.

The above results confirm that the selected servomotor is applicable for the position control.

Regenerative Resistor Capacity Selection

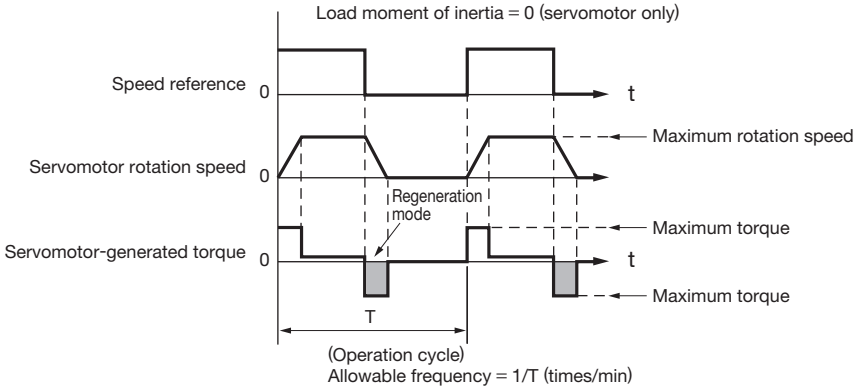
(1) Simple Calculation

The following table summarized the allowable frequencies of regenerative operation for individual servomotors.
Conditions:

- The combination of the SERVOPACK, converter, and regenerative resistor is recommended by Yaskawa. (Refer to page 53.)
- Acceleration and deceleration are repeated for an operation cycle from 0 to the maximum speed to 0 (RPM).

Main Circuit Power Supply Voltage	Servomotor Model	Allowable Frequencies in Regenerative Mode (time/min)				
		2B	3Z	3G	4E	5E
Three-phase 200 V	SGMVV-□□A□B	35	52	44	-	-
	SGMVV-□□A□D	44	48	39	-	-
Three-phase 400 V	SGMVV-□□D□B	53	39	44	36	30
	SGMVV-□□D□D	66	36	39	51	-

Operating Conditions for Allowable Regenerative Frequency Calculation



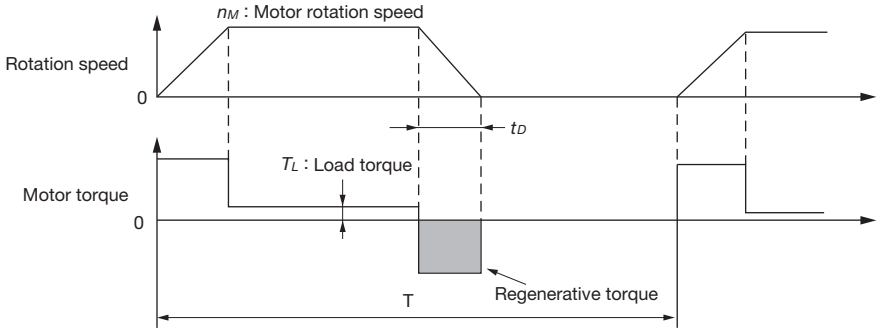
Use the following equation to calculate the allowable frequency for regeneration mode operation

$$\text{Allowable frequency} = \frac{\text{Allowable frequency for Servomotor only}}{(1+n)} \times \left(\frac{\text{Max. rotation speed}}{\text{Rotation speed}}\right)^2 (\text{time/min})$$

- $n = J_L / J_M$
- J_M : Servomotor rotor moment of inertia (kg• m2)
- J_L : Load converted to shaft moment of inertia (kg• m2)

(2) Calculating the Regenerative Energy

This section shows the procedure for calculating the regenerative resistor capacity when acceleration and deceleration operation is as shown in the following diagram.



● How to Calculate the Capacity

Step	Item	Symbol	Equation
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	$E_L = (\pi/60)\, n_M T_L t_D$
3	Calculate the energy lost from servomotor winding resistance.	E_M	(Value calculated from *(4) Servomotor Winding Resistance Loss* diagrams) × t_D
4	Calculate the SERVOPACK energy that can be absorbed.	E_C	Calculate from *(3) Absorbable Energy of the SERVOPACK and Converter.*
5	Calculate the energy consumed by the regenerative resistor.	E_K	$E_K = E_S - (E_L + E_M + E_C)$
6	Calculate the required regenerative resistor capacity (W).	W_K	$W_K = E_K/(0.2 \times T)$

Notes: 1 The "0.2" in the equation for calculating Wk is the value for when the regenerative resistor's utilized load ratio is 20%.

2 The units for the various symbols are as follows:

E_S to E_K : Energy joules (J)
W_K : Required capacity of regenerative resistor (W)
J : ($=J_M+J_L$) (kg• m2)
n_M : Servomotor rotation speed (RPM)
T_L : Load torque (Nm)
t_D : Deceleration stopping time (s)
T : Servomotor repeat operation period (s)

3 If the loss in the load system in step 2 is not known, use an E_L of 0 in the calculation.

If the result of the above calculation shows that the regenerative power that is actually required is larger than the maximum capacity of the regenerative resistor that is a Yaskawa option, you must obtain an external regenerative resistor. If there will be a continuous period of operation in regenerative mode, such as for a vertical axis, add the following items to the above calculation procedure to calculate the required capacity (W) of the regenerative resistor.

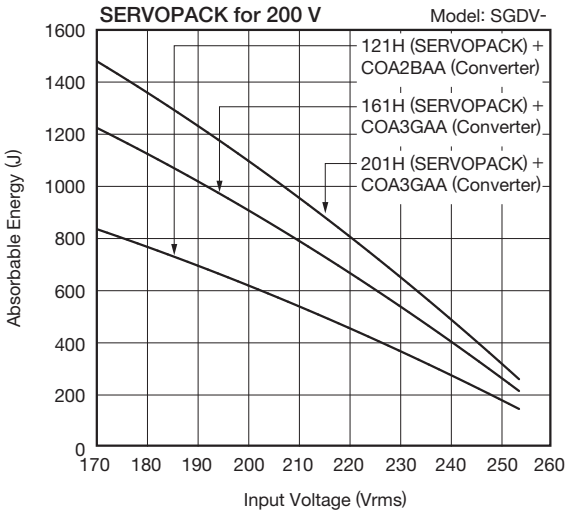
- Energy for continuous regeneration mode operation period: E_G (joules)
- Energy consumed by regenerative resistor: $E_K = E_S - (E_L + E_M + E_C) + E_G$
- Required capacity of regenerative resistor: $W_K = E_K / (0.2 \times T)$

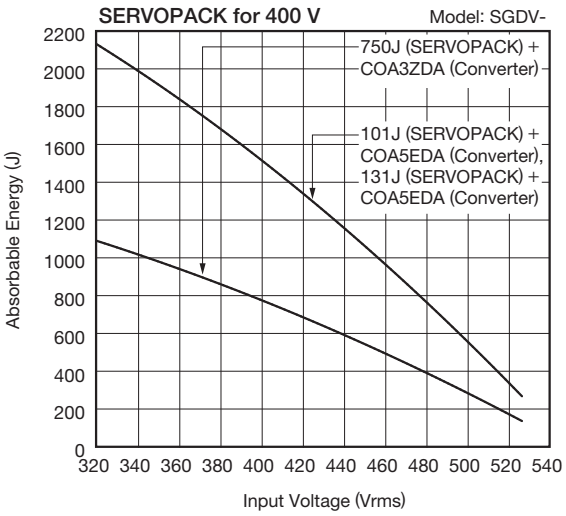
Here, $E_G = (2\pi/60)\, n_{MG} T_G t_G$

- T_G : Servomotor's generated torque in continuous regeneration mode operation period (Nm)
- n_{MG} : Servomotor rotation speed for same operation period as above (RPM)
- t_G : Same operation period as above (s)

(3) Absorbable Energy of the SERVOPACK and Converter

The following diagrams show the relationship between the input power supply voltage and the absorbable energy.

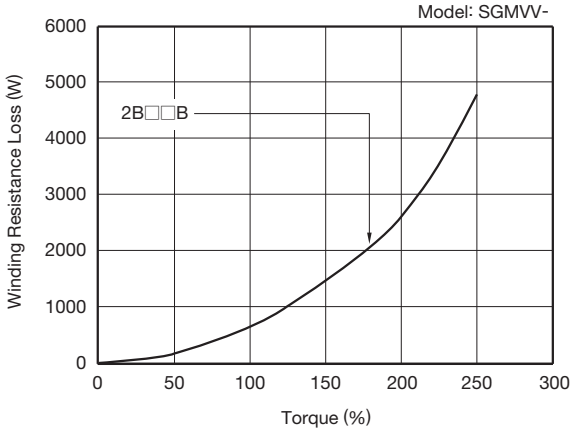


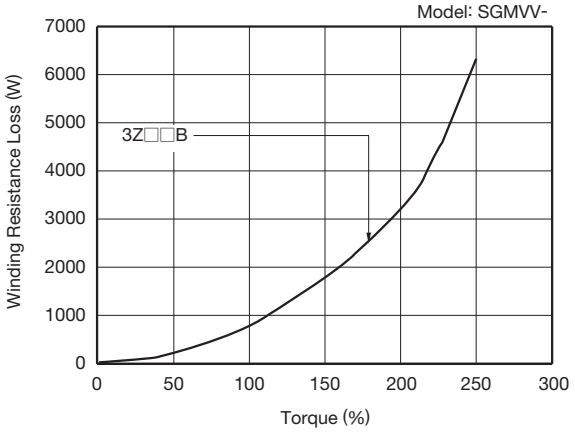


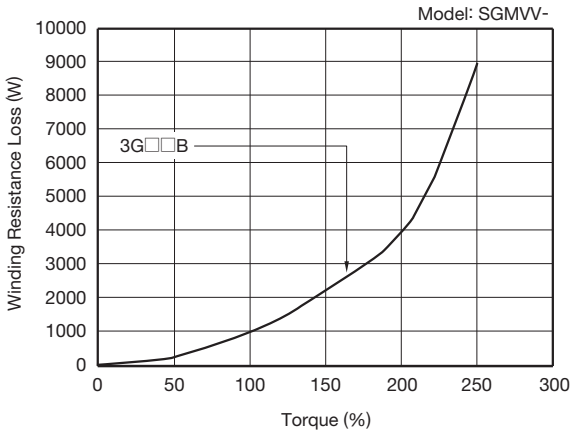
(4) Servomotor Winding Resistance Loss

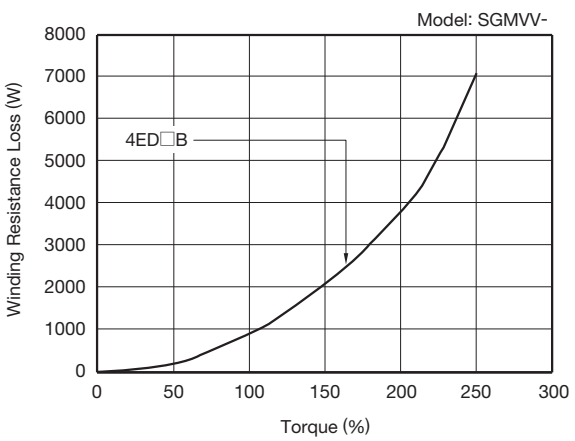
The following diagrams show the relationship, for each servomotor, between the servomotor's generated torque and the winding resistance loss.

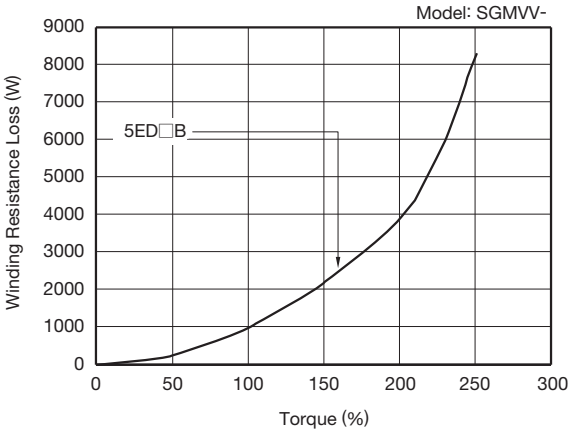
SGMVV Servomotors

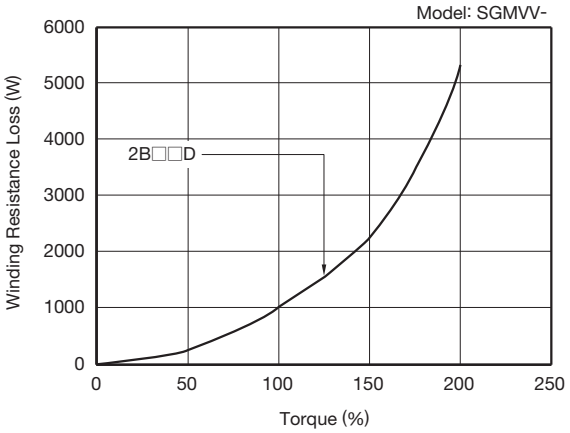


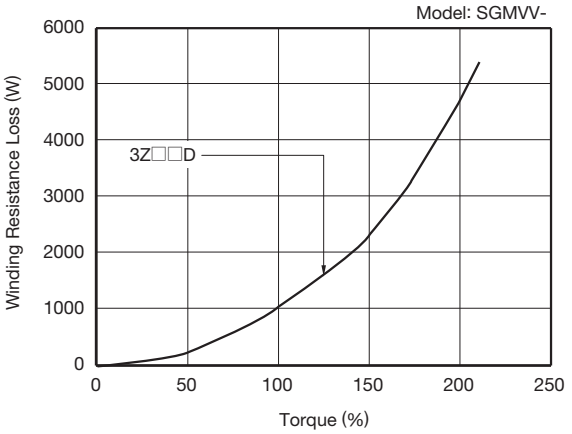


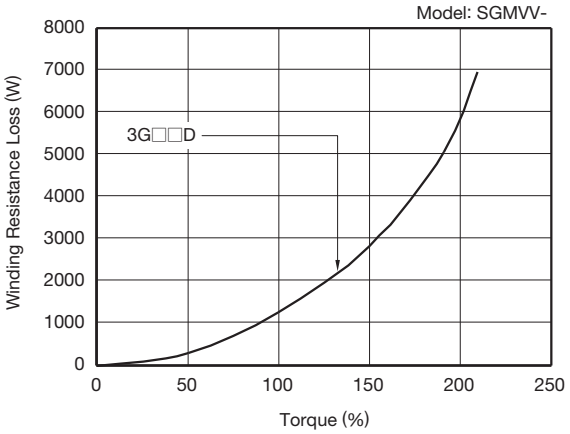


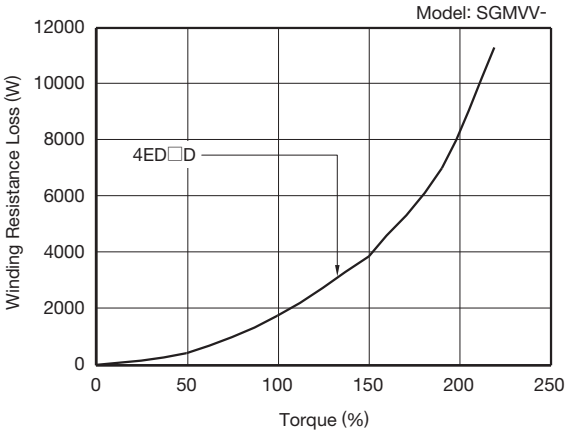



Model: SGMVV-
5ED□B
Winding Resistance Loss (W)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
50
100
150
200
250
300
Torque (%)


Model: SGMVV-
2B□□D
Winding Resistance Loss (W)
6000
5000
4000
3000
2000
1000
0
0
50
100
150
200
250
Torque (%)


Model: SGMVV-
3Z□□D
Winding Resistance Loss (W)
6000
5000
4000
3000
2000
1000
0
0
50
100
150
200
250
Torque (%)


Model: SGMVV-
3G□□D
Winding Resistance Loss (W)
8000
7000
6000
5000
4000
3000
2000
1000
0
0
50
100
150
200
250
Torque (%)


Model: SGMVV-
4ED□D
Winding Resistance Loss (W)
12000
10000
8000
6000
4000
2000
0
0
50
100
150
200
250
Torque (%)

International Standards

	Series	UL Standards	CE Mark	KC Mark	RoHS Directives	Safety Standards
SERVOPACK	SGDV	•	•	•	•	•

	Series	UL Standards	CE Mark	RoHS Directives
Servomotors	SGMVV	•	•	•

"It's Personal" means each Yaskawa associate is committed to providing you with a great experience every time you deal with us.

We train our people, we treat our customers, we design, engineer and manufacture our products in ways that say everything we do matters. And, when your job is to make sure that everything that matters is done well, you take that pretty personally.

We commit to that at Yaskawa. We can make it happen. Because to us, our relationship with you is personal.

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Yaskawa America, Inc.
Drives & Motion Division

2121 Norman Drive South
Waukegan, IL 60085
Tel: 1-800-YASKAWA (927-5292) • Fax: 1-847-887-7310
MotionSupport@yaskawa.com • www.yaskawa.com

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