



Wiring Main Circuit and Peripheral Devices

Wiring Main Circuit

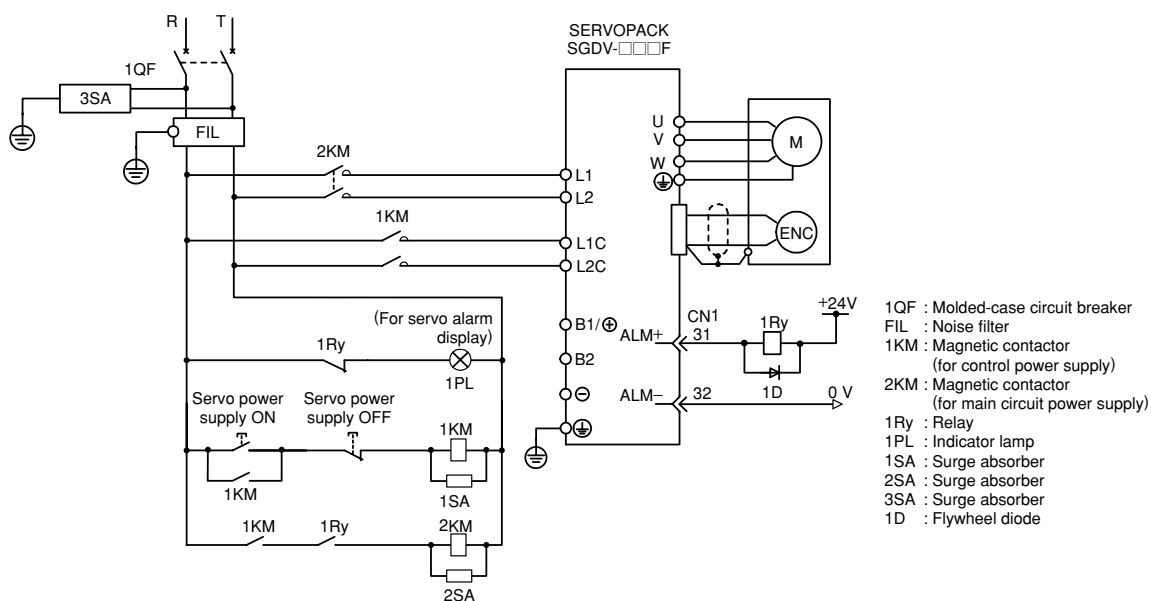
● Typical Main Circuit Wiring Examples

This section describes the typical main circuit wiring examples.

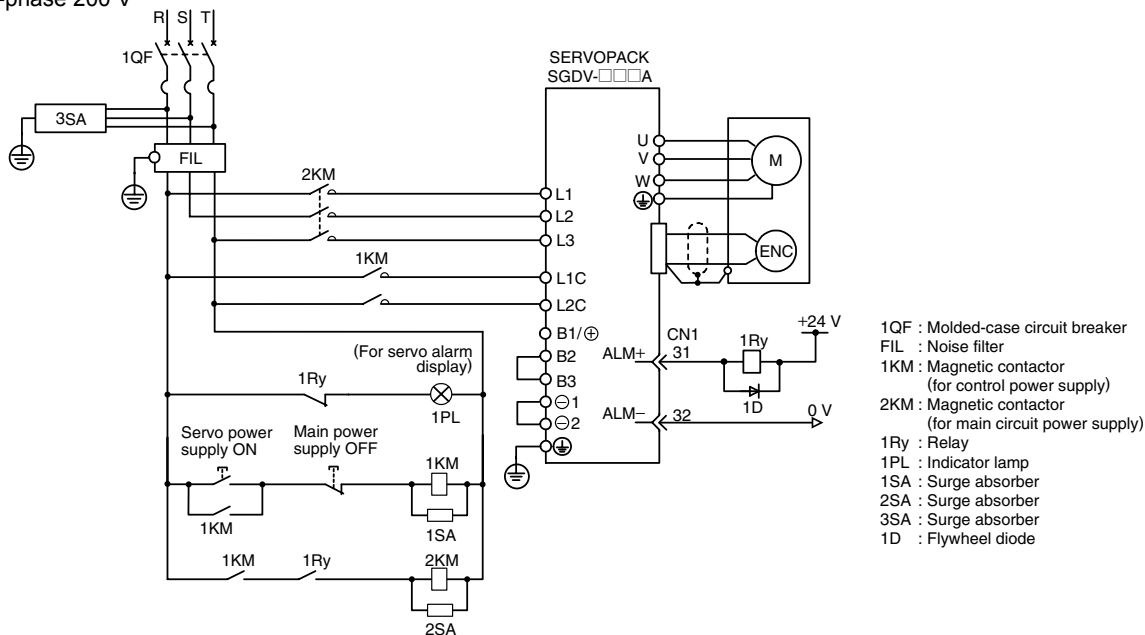
⚠ WARNING

After turning OFF the power, do not touch the power terminals while charge indicator is still ON. High residual voltage may still remain in the SERVOPACK. When the voltage is discharged, the charge indicator will turn OFF. Make sure the charge indicator is OFF before starting wiring or inspection.

● Single-phase 100 V



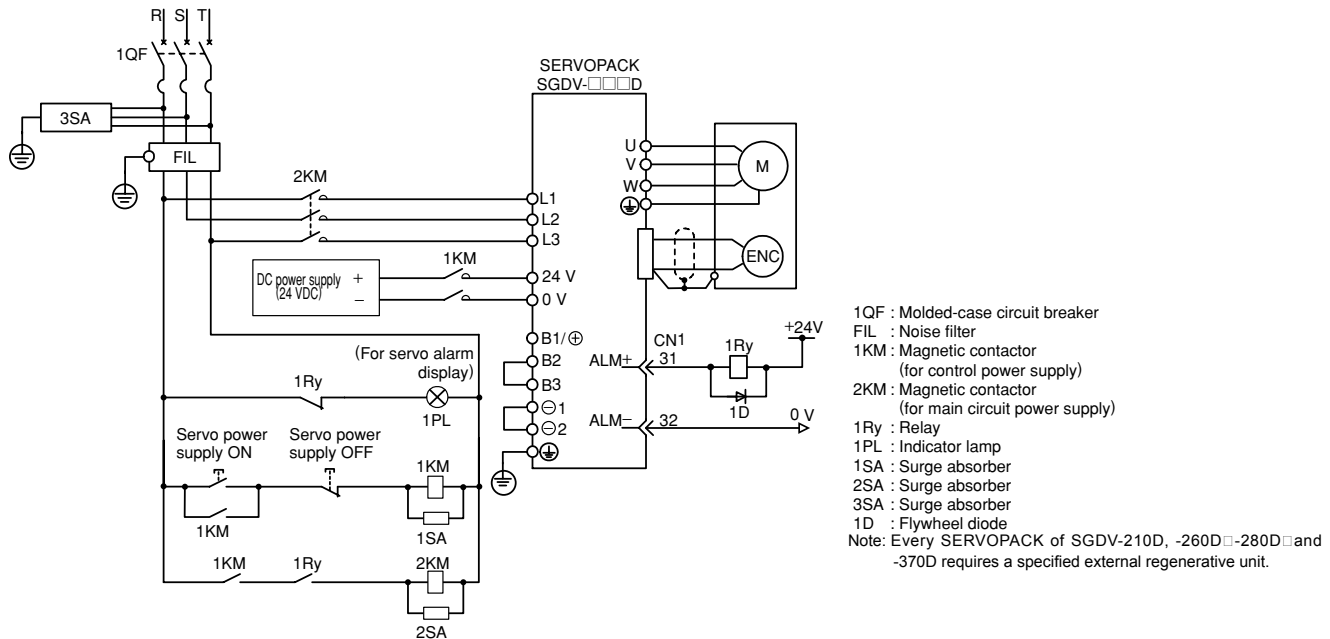
● Three-phase 200 V



Note: Every SERVOPACK of SGD V-470A, -550A, -590A and -780A requires a specified external regenerative unit.

Wiring Main Circuit

- Three-phase 400 V



● General Precautions for Wiring

IMPORTANT

- Use a molded-case circuit breaker (QF) or fuse to protect the Main Circuit.
The SERVOPACK connects directly to a commercial power supply; it is not isolated by a transformer or other device.
Always use a molded-case circuit breaker (QF) or fuse to protect the servo system from accidents involving different power system voltages or other accidents.
- Install a ground fault detector.
The SERVOPACK does 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 power ON and OFF frequently.
The power supply in the SERVOPACK contains a capacitor, which causes a high charging current to flow when power is turned ON. Frequently turning power ON and OFF will cause the main circuit elements in the SERVOPACK to deteriorate.

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

Observe the following precautions when wiring the main circuit.

- Use shielded twisted-pair wires or shielded multi-core twisted-pair wires for signal lines and encoder lines.
- The maximum wiring length is 3 m for signal lines and 50 m for encoder lines.

Observe the following precautions when wiring the ground.

- Use a cable as thick as possible (at least 2.0 mm²)
- Ground the 100-V and the 200-V SERVOPACK to a resistance of 100 Ω or less. Ground the 400-V SERVOPACK to a resistance of 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 or 0.3 mm. Do not impose excessive bending force or tension.

● Precautions When Using the SERVOPACK with a DC Power Input

When using the SERVOPACK with a DC power input, refer to 3.1.5 Precautions When using the SERVOPACK with a DC power input on "AC Servodrive Σ -V Series USER'S MANUAL Design and Maintenance." (manual no. SIEP S800000 45)

Wiring Main Circuit

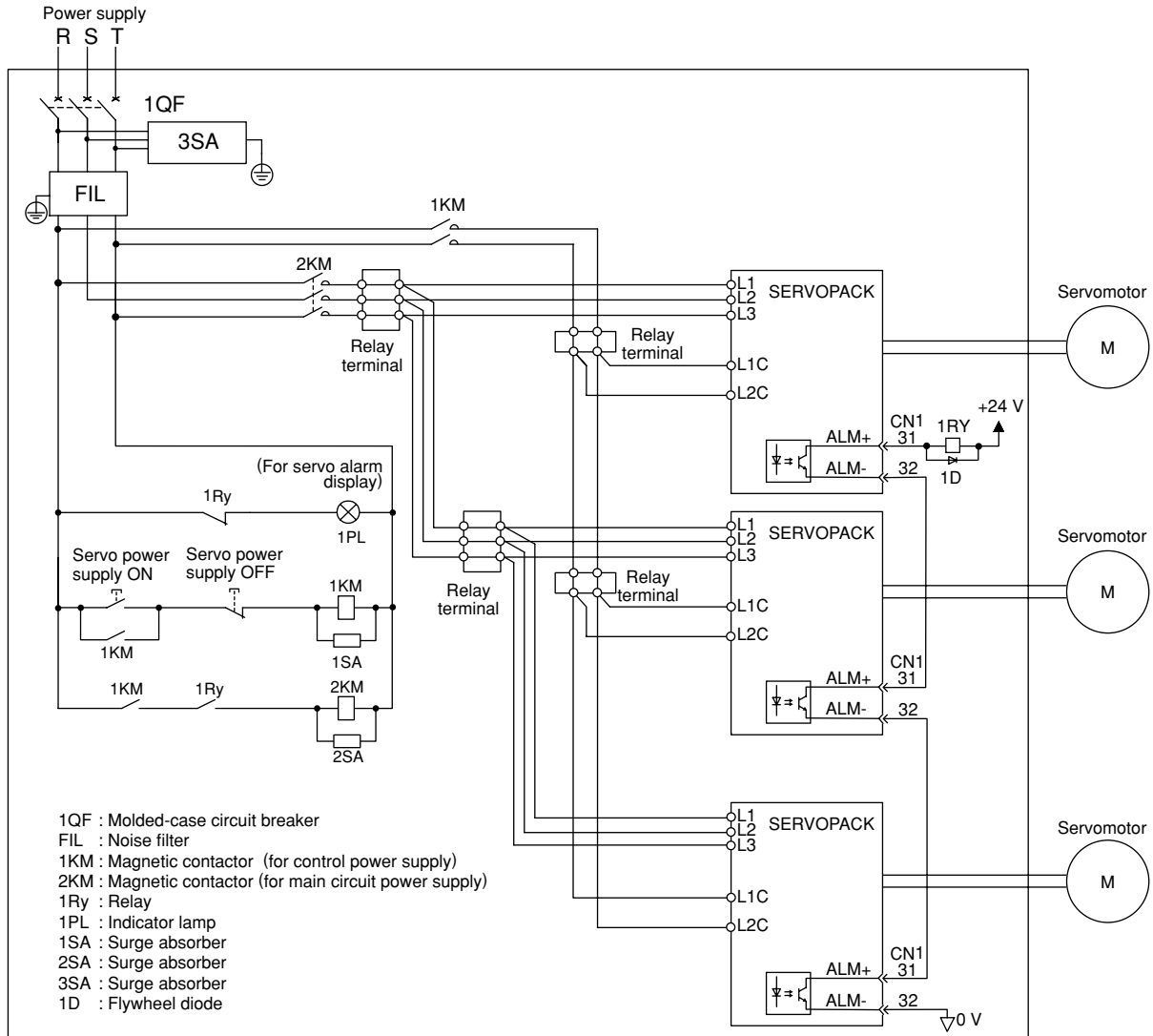
● Precautions When Using More Than One SERVOPACK

This section shows an example of the wiring when more than one SERVOPACK is used and the precautions.

● Wiring Example

Connect the alarm output (ALM) terminals for the three SERVOPACKs in series to enable alarm detection relay 1RY to operate.

When a SERVOPACK alarm is activated, the ALM output signal transistor is turned OFF.



● Precautions

Multiple servos can share a single molded-case circuit breaker (QF) or noise filter. Always select a QF or noise filter that has enough capacity for the total power capacity (load conditions) of those servos.

SERVOPACK Main Circuit Wire

● Single-phase, 100 V

Cables	Terminal Symbol	SERVOPACK Model SGD-V-			
		R70F	R90F	2R1F	2R8F
Main Circuit Power Cable	L1, L2	HIV1.25		HIV2.0	
Servomotor Main Circuit Cable	U, V, W	HIV1.25			
Control Power Cable	L1C, L2C	HIV1.25			
External Regenerative Resistor Cable	B1(⊕), B2	HIV1.25			
Ground Cable	⊖	HIV2.0 min.			

● Three-phase, 200 V

Cables	Terminal Symbol	SERVOPACK Model SGD-V-														
		R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Main Circuit Power Cable	L1, L2, L3	HIV1.25			HIV2.0				HIV3.5		HIV5.5	HIV8	HIV14	HIV22		
Servomotor Main Circuit Cable	U, V, W	HIV1.25			HIV2.0				HIV3.5	HIV5.5	HIV8.0	HIV14		HIV22		
Control Power Cable	L1C, L2C	HIV1.25														
External Regenerative Resistor Cable	B1(⊕), B2	HIV1.25						HIV2.0	HIV3.5	HIV5.5	HIV8		HIV22			
Ground Cable	⊖	HIV2.0 min.														

● Three-phase, 400 V

Cables	Terminal Symbol	SERVOPACK Model SGD-V-										
		1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D	
Main Circuit Power Cable	L1, L2, L3	HIV1.25			HIV2.0		HIV3.5		HIV5.5	HIV8	HIV14	
Servomotor Main Circuit Cable	U, V, W	HIV1.25			HIV2.0		HIV3.5	HIV5.5		HIV8	HIV14	
Control Power Cable	24V, 0V	HIV1.25										
External Regenerative Resistor Cable	B1(⊕), B2	HIV1.25					HIV2.0	HIV3.5		HIV5.5	HIV8	
Ground Cable	⊖	HIV2.0 min.										

● Wire Type

Wire Type		Allowable Conductor Temperature °C
Code	Name	
PVC	Polyvinyl chloride insulated wire	—
IV	600 V polyvinyl chloride insulated wire	60
HIV	600 V grade heat-resistant polyvinyl chloride insulated wire	75

● HIV Conversion Chart

HIV	Cross-Sectional Area (mm ²) *1	AWG
HIV 1.25	1.25	16
HIV 2.0	2.0	14
HIV 3.5	3.5	12
HIV 5.5	5.5	10
HIV 8.0	8.0	8
HIV 14	14	6
HIV 22	22	4

*1 Cross-sectional area applies to solid wires

SERVOPACK Main Circuit Wire

The following table shows the size and allowable currents for the wires. Use a wire whose specifications meet or are less than the values in the table.

● 600 V grade heat-resistant polyvinyl chloride insulated wires

Nominal Cross Section Diameter mm ²	AWG size	Allowable Current at Ambient Temperatures A		
		30°C	40°C	50°C
0.5	20	6.6	5.6	4.5
0.75	–	8.8	7.0	5.5
0.9	18	9.0	7.7	6.0
1.25	17 to 16	12.0	11.0	8.5
2.0	14	23	20	16
3.5	12 to 11	33	29	24
5.5	10 to 9	43	38	31
8.0	8	55	49	40
14.0	6 to 5	79	70	57
22.0	4 to 3	91	81	66

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

IMPORTANT

- 1 Wire sizes are selected for three cables per bundle at 40°C ambient temperature with the rated current.
- 2 Use a wire with a minimum withstand voltage of 600 V for the main circuit.
- 3 If wires are bundled in PVC or metal ducts, take into account the reduction of the allowable current.
- 4 Use a heat-resistant wire under high ambient or panel temperatures, where polyvinyl chloride insulated wires will rapidly deteriorate.

Molded-case Circuit Breaker and Fuse Capacity

Main Circuit Power Supply	Applicable Servomotor Max. Capacity kW	SERVOPACK Model SGDV-	Power Supply Capacity per SERVOPACK kVA	Current Capacity		Inrush Current	
				Main Circuit A_{rms}	Control Circuit A_{rms}	Main Circuit A_{0-p}	Control Circuit A_{0-p}
Single-phase 100 V	0.05	R70F	0.2	1.5	0.38	16.5	35
	0.1	R90F	0.3	2.5			
	0.2	2R1F	0.7	5			
	0.4	2R8F	1.4	10			
Three-phase 200 V	0.05	R70A	0.2	1.0	0.2	33	70
	0.1	R90A	0.3	1.0			
	0.2	1R6A	0.6	2.0			
	0.4	2R8A	1	3.0			
	0.5	3R8A	1.4	3.0			
	0.75	5R5A	1.6	6.0			
	1.0	7R6A	2.3	6.0	0.25	33	
	1.5	120A	3.2	7.3			
	2.0	180A	4	9.7			
	3.0	200A	5.9	15			
	5.0	330A	7.5	25			
	6.0	470A	10.7	29			
	7.5	550A	14.6	37			
	11	590A	21.7	54			0.45
15	780A	29.6	73				
Three-phase 400 V	0.5	1R9D	1.1	1.4	1.2	17	-
	1.0	3R5D	2.3	2.9			
	1.5	5R4D	3.5	4.3			
	2.0	8R4D	4.5	5.8	1.4	34	
	3.0	120D	7.1	8.6			
	5.0	170D	11.7	14.5			
	6.0	210D	12.4	17.4			
	7.5	260D	14.4	21.7	1.5	34	
	11	280D	21.9	31.8			
	15	370D	30.6	43.4	1.7	68	

Notes: 1 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.

2 In accordance with UL standards, the following restrictions apply. Install fuses or circuit breakers listed in accordance with the guidelines of NEC.

SERVOPACK SGDV-	Restrictions
180A,200A	Available rated current for molded-case circuit breaker: 40 A or less
330A	<ul style="list-style-type: none"> · Available rated current for non-time delay fuse: 70 A or less · Available rated current for time delay fuse: 40 A or less · Do not use single wires.
470A, 550A	<ul style="list-style-type: none"> · Available rated current for molded-case circuit breaker: 60A or less · Available rated current for non-time delay fuse: 60 A or less
590A, 780A	<ul style="list-style-type: none"> · Available rated current for molded-case circuit breaker: 100 A or less · Available rated current for non-time delay fuse or time delay fuse: 100 A or less (Available rated current for class J non-time delay or faster fuse: 125 A or less)
210D, 260D	<ul style="list-style-type: none"> · Available rated current for molded-case circuit breaker: 60 A or less · Available rated current for non-time delay fuse: 60 A or less · Available rated current for time delay fuse: 35 A or less
280D, 370D	<ul style="list-style-type: none"> · Available rated current for molded-case circuit breaker: 80 A or less · Available rated current for non-time delay fuse: 125 A or less · Available rated current for time delay fuse: 75 A or less

Noise Filters

● Noise Filter Selection

Main Circuit Power Supply	SERVOPACK Model SGDV-	Recommended Noise Filter			Details
		Model	Specifications	Leakage Current	
Single-phase 100 V	R70F,R90F	FN2070-6/07	Single-phase 250V 6A	0.734 mA 230VAC/50Hz	(1)
	2R1F	FN2070-10/07	Single-phase 250V 10A		
	2R8F	FN2070-16/07	Single-phase 250V 16A		
Single-phase 200 V	R70A, R90A, 1R6A	FN2070-6/07	Single-phase 250V 6A	0.734 mA 230VAC/50Hz	
	2R8A	FN2070-10/07	Single-phase 250V 10A		
	5R5A	FN2070-16/07	Single-phase 250V 16A		
	120A	FN350-30/33	Single-phase 250V 30A	5.4 mA 230VAC/50Hz	
Three-phase 200 V	R70A,R90A,1R6A 2R8A,3R8A	FN258L-7/07	Three-phase 480V 7A	0.5 mA 440VAC/50Hz	(2)
	5R5A,7R6A	FN258L-16/07	Three-phase 480V 16A	0.8 mA 440VAC/50Hz	
	120A,180A	HF3020C-UQC	Three-phase 480V 20A	10 mA 440VAC/50Hz	
	200A	HF3030C-UQC	Three-phase 480V 30A		
	330A, 470A	HF3050C-UQC	Three-phase 480V 50A		
	550A	HF3060C-UQC	Three-phase 480V 60A	(3)	
	590A, 780A	HF3100C-UQB	Three-phase 480V 100A		
Three- phase 400 V	1R9D,3R5D,5R4D	FN258L-7/07	Three-phase 480V 7A	0.8 mA 440VAC/50Hz	(2)
	8R4D,120D	FN258L-16/07	Three-phase 480V 16A	160 mA 440VAC/50Hz	(3)
	170D	FMAC-0934-5010	Three-phase 480V 35A	10 mA 440VAC/50Hz	(2)
	210D, 260D	HF3050C-UQC	Three-phase 480V 50A	440VAC/50Hz	(3)
	280D, 370D	HF3080C-UQB	Three-phase 480V 80A		

Note: RoHS-compliant models are not available. Contact the manufactures when in need of an RoHS-compliant model.

IMPORTANT

Some noise filters have large leakage currents. 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

Noise Filters

- External Dimensions (Units: mm)
- (1) FN Type (by Schaffner EMC, Inc.)

Model		FN2070-6/07	FN2070-10/07	FN2070-16/07
Dimensional Drawings				
		Connection Lead P/N/E 		
External Dimensions	Code	Dimensions		
	A	113.5±1	156±1	119±0.5
	B	57.5±1		85.5±1
	C	45.4±1.2		57.6±1
	D	94±1	130.5±1	98.5±1
	F	103±0.3	143±0.3	109±0.3
	J	25±0.2		40±0.2
	K	8.4±0.5		8.6±0.5
	L	32.4±0.5		-
	M	4.4±0.1	5.3±0.1	4.4±0.1
	N	6±0.1		7.4±0.1
	P	0.9±0.1		1.2±0.1
	Q	-		66±0.3
R	-		51±0.2	
S	38±0.5		-	

Model	FN350-30/33
Dimensional Drawings	

Noise Filters

(2) FN Type and HF Type

Model	FN Type [by Schaffner EMC, Inc.]		HF Type [by SOSHIN ELECTRIC CO., LTD.]		
	FN258L-7/07	FN258L-16/07	HF3020C-UQC HF3030C-UQC	HF3050C-UQC HF3060C-UQC	
Dimensional Drawings					
External Dimensions mm	Code	Dimensions		Dimensions	
	A	225±1	305±1	236	256
	B	126±0.8	142±0.8	221	241
	C	50±0.6	55±0.6	206	226
	D	225±0.8	275±0.8	184	204
	E	240±0.5	290±0.5	105	115
	F	25±0.3	30±0.3	90	100
	G	6.5±0.2		76	86
	H	300±10		122	127
	J	1±0.1		5.5×7 Dia.	5.5×7 Dia.
	K	-		M5	M5
	L	9±1		M5	M5
	M	-		16	16
	N	-		13	13
O	M5		51.4	51.4	
P	AWG16	AWG14	13	13	
Q	-		61.1	61.1	

(3) HF Type and FS Type

Model	HF Type [by SOSHIN ELECTRIC CO., LTD.]	FMAC Type [by Schurter, Inc.]
	HF3080C-UQB HF3100C-UQB	FMAC-0934-5010
External Dimensions mm		

Surge Absorber

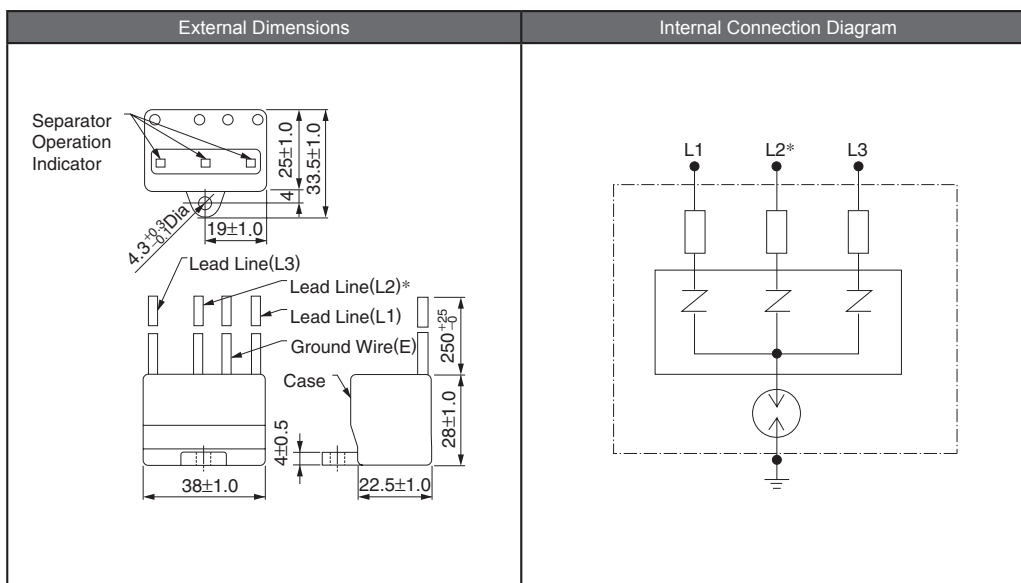
● Surge Absorber Selection

The surge absorber (for lightning surge) absorbs lightning surge and prevents faulty operation in or damage to electronic circuits.

Main Circuit Power Supply	SERVOPACK Model SGDV-	Recommended Surge Absorber
Single-phase 100 V	□□□F	LT-C12G801WS
Three-phase 200 V	□□□A	LT-C32G801WS
Three-phase 400 V	□□□D	LT-C35G102WS

● External Dimensions (Units: mm)

Model: LT-C32G801WS, LT-C35G102WS, LT-C12G801WS [by SOSHIN ELECTRIC CO., LTD.]



*: No L2 is on the LT-C12G801WS surge absorber.

Magnetic Contactors

● Magnetic Contactor Selection

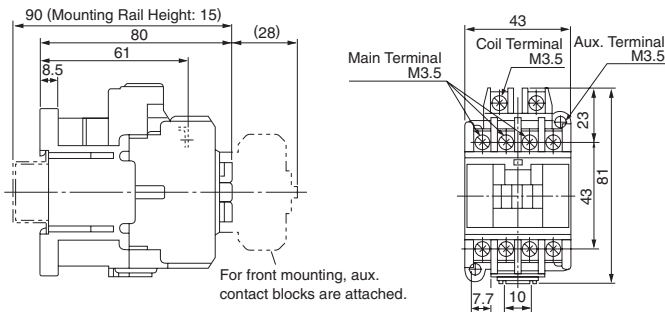
A magnetic contactor is required to make the AC power to SERVOPACK ON/OFF sequence externally. Be sure to attach a surge absorber (for switching surge) (surge absorber unit etc.) to the excitation coil of the magnetic contactor.

Main Circuit Power Supply	SERVOPACK Model SGDV-	Magnetic Contactor	
		Model	Specifications
Single-phase 100 V	R70F,R90F,2R1F	SC-03	(RoHS)
	2R8F	SC-4-1	(RoHS)
Three-phase 200 V	R70A,R90A,1R6A,2R8A,3R8A	SC-03	(RoHS)
	5R5A,7R6A,120A	SC-4-1	(RoHS)
	180A,200A	SC-5-1	(RoHS)
	330A, 470A	SC-N1	(RoHS)
	550A	SC-N2	(RoHS)
	590A	SC-N2S	(RoHS)
Three-phase 400 V	780A	SC-N3	(RoHS)
	1R9D,3R5D,5R4D	SC-4-1/G	Coil 24 VDC (RoHS)
	8R4D,120D	SC-5-1/G	Coil 24 VDC (RoHS)
	170D, 260D	SC-N1/G	Coil 24 VDC (RoHS)
	280D, 370D	SC-N2S/G	Coil 24 VDC (RoHS)

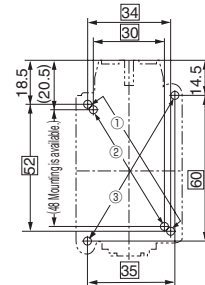
Note: Contact Fuji Electric FA Components & Systems Co., Ltd.

● External Dimensions (Units: mm)

· SC-03



Mounting Hole Dimensions



Aux. Contact	Structure
1a	
1b	

● Mounting methods : The following methods ①, ②, ③ are available.

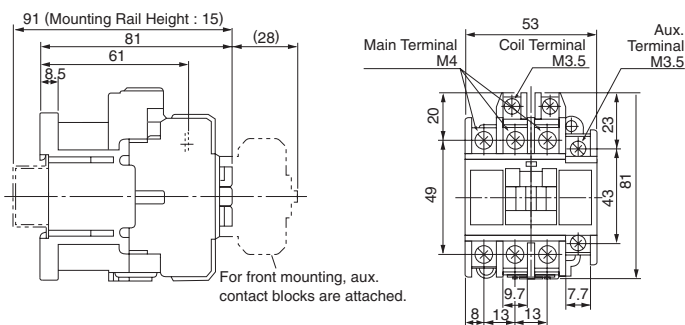
- ① ...34 × (48 to) 52
- ② ...30 × 48
- ③ ...35 × 60

● Mounting screw : 2-M4

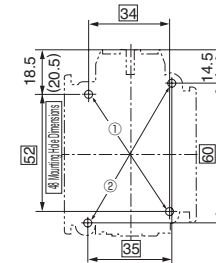
Use the two mounting holes on the diagonal line to mount a contactor.

Approx. Mass : 0.32 kg

· SC-4-1



Mounting Hole Dimensions



Aux. Contact	Structure
1a	
1b	

● Mounting methods : The following methods ①, w are available.

- ① ...34 × (48 to) 52
- w ...35 × 60

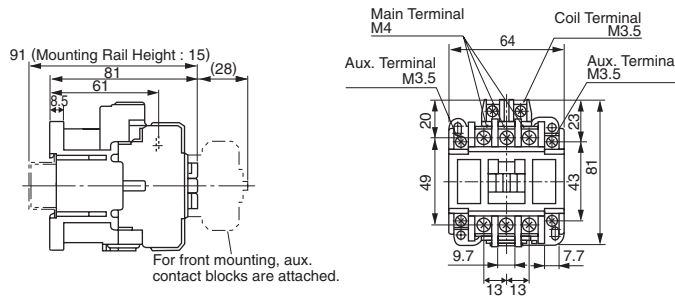
● Mounting screw : 2-M4

Use the two mounting holes on the diagonal line to mount a contactor.

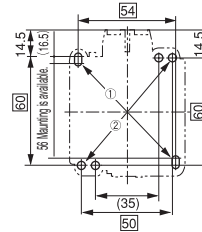
Approx. Mass : 0.36 kg

Magnetic Contactor

· SC-5-1



Mounting Hole Dimensions



Aux. Contact	Structure
2a	
1a1b	
2b	

• Mounting methods : The following methods ①, ② are available.

①...54 × (56 to) 60

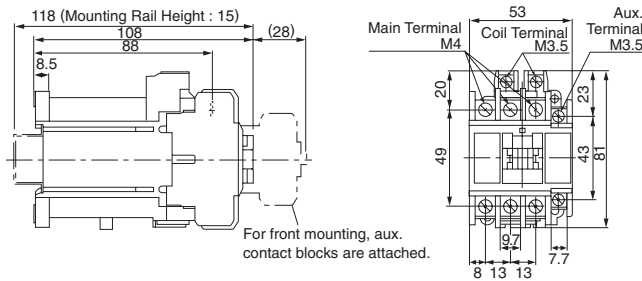
②...50 × 60

• Mounting screw : 2-M4

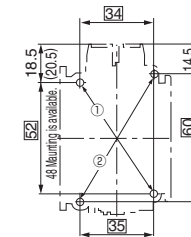
Use the two mounting holes on the diagonal line to mount a contactor.

Approx. Mass: 0.38 kg

· SC-4-1/G



Mounting Hole Dimensions



Aux. Contact	Structure
1a	
1b	

• Mounting methods : The following methods ①, ② are available.

①...34 × (48 to) 52

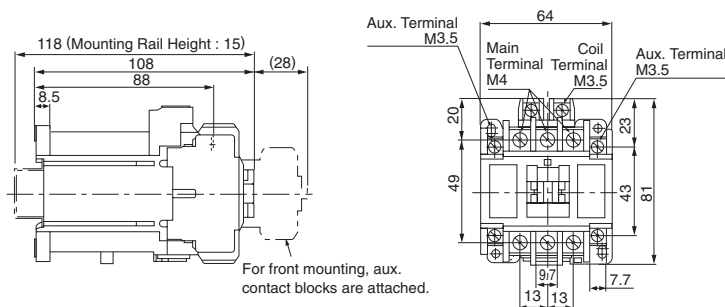
②...35 × 60

• Mounting screw : 2-M4

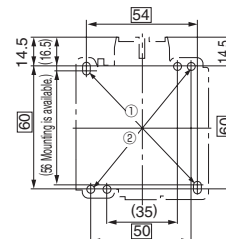
Use the two mounting holes on the diagonal line to mount a contactor.

Approx. Mass : 0.6 kg

· SC-5-1/G



Mounting Hole Dimensions



Aux. Contact	Structure
2a	
1a1b	
2b	

• Mounting methods : The following methods ①, ② are available.

①...54 × (56 to) 60

②...50 × 60

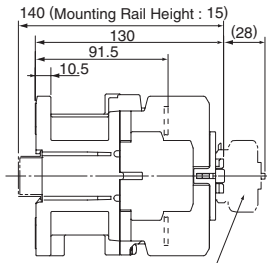
• Mounting screw : 2-M4

Use the two mounting holes on the diagonal line to mount a contactor.

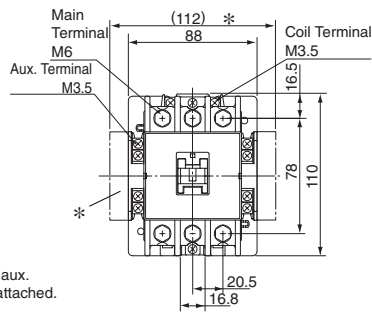
Approx. Mass : 0.62 kg

Magnetic Contactor

SC-N2S/G

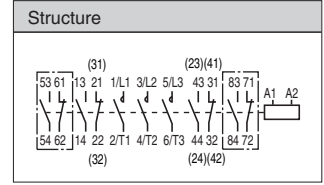
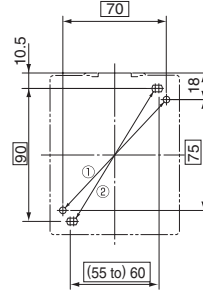


For front mounting, aux. contact blocks are attached.



*: For two side mounting, aux. contact blocks are attached.

Mounting Hole Dimensions



Approx. Mass: 1.4 kg

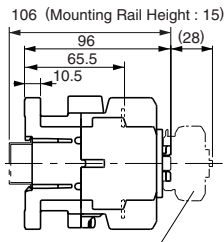
● Mounting methods : The following methods ①, ② are available.

①...70 × 75 ②... (55 to) 65 × 90

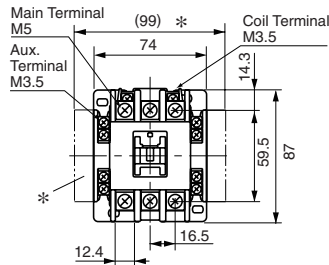
● Mounting screw : 2-M4

Use the two mounting holes on the diagonal line to mount a contactor.

SC-N1, SC-N2

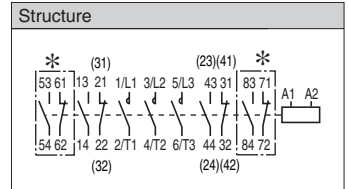
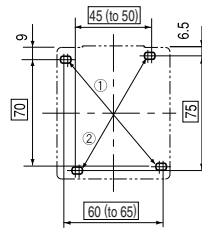


For front mounting, aux. contact blocks are attached.



*: For two side mounting, aux. contact blocks attached.

Mounting Hole Dimensions



*: These contacts are used if the auxiliary contacts consist of four normally open (NO) and four normally close (NC) contacts.

Note: The terminals of the auxiliary contacts are numbered differently than conventional terminals. The numbers in parentheses use the conventional method.

Approx. Mass: 0.59 kg

● Mounting methods :

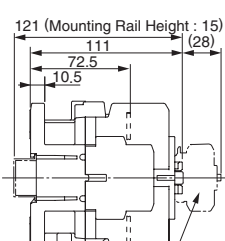
The following methods ①, ② are available.

①...70 × 75 ②... (55 to) 65 × 90

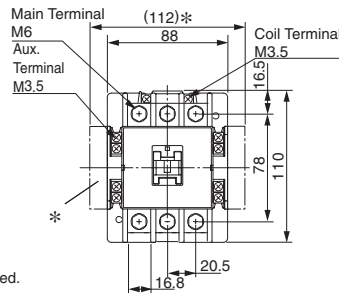
● Mounting screw : 2-M4

Use the two mounting holes on the diagonal line to mount a contactor.

SC-N2S, SC-N3

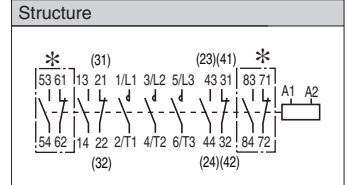
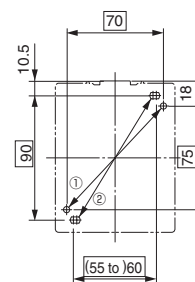


For front mounting, aux. contact blocks are attached.



*: For two side mounting, aux. contact blocks attached.

Mounting Hole Dimensions



*: These contacts are used if the auxiliary contacts consist of four normally open (NO) and four normally close (NC) contacts.

Note: The terminals of the auxiliary contacts are numbered differently than conventional terminals. The numbers in parentheses use the conventional method.

Approx. Mass: 1.1 kg

● Mounting methods :

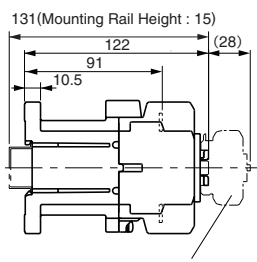
The following methods ①, ② are available.

①...70 × 75 ②... (55 to) 60 × 90

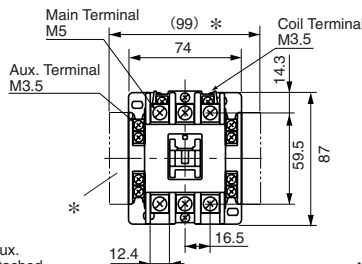
● Mounting screw : 2-M4

Use the two mounting holes on the diagonal line to mount a contactor.

SC-N1/G

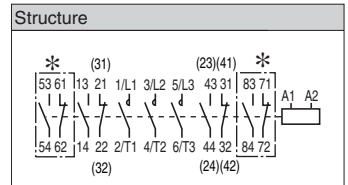
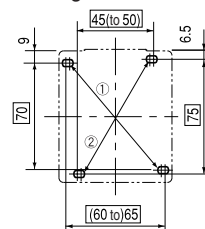


For front mounting, aux. contact blocks are attached.



*: For two side mounting, aux. contact blocks attached.

Mounting Hole Dimensions



*: These contacts are used if the auxiliary contacts consist of four normally open (NO) and four normally close (NC) contacts.

Note: The terminals of the auxiliary contacts are numbered differently than conventional terminals. The numbers in parentheses use the conventional method.

Approx. Mass: 0.82 kg

● Mounting methods :

The following methods ①, ② are available

①... (60 to) 65 × 70 ②... 45 (to 50) × 70

● Mounting screw : 2-M4

Use the two mounting holes on the diagonal line to mount a contactor.

AC/DC Reactors

● Selection

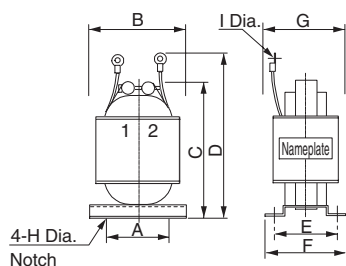
If power supply harmonic suppression is needed, connect a DC reactor between the three-phase 200 V or three-phase 400 V SERVOPACK main circuit terminals ⊖1 and ⊖2. Also, connect an AC reactor to single-phase 100 V SERVOPACK main circuit terminal L1 in series.

Select AD/DC reactors according to the SERVOPACK ratings.

Main Circuit Power Supply	SERVOPACK SGD V-	AC/DC Reactor Model	Inductance mH	Rated Current A
Single-phase 100 V	R70F	X5053	20.0	2.0
	R90F			
	2R1F	X5054	5.0	3.0
	2R8F	X5056	2.0	5.0
Three-phase 200 V	R70A	X5061	2.0	4.8
	R90A			
	1R6A			
	2R8A			
	3R8A			
	5R5A			
	7R6A			
	120A	X5060	1.5	8.8
	180A			
	200A	X5059	1.0	14.0
	330A	X5068	0.47	26.8
	470A	-	-	-
550A				
590A				
780A				
Three-phase 400 V	1R9D	X5074	4.7	1.5
	3R5D	X5075	3.3	4.5
	5R4D			
	8R4D	X5076	2.2	8.6
	120D			
	170D	X5077	1.5	14.1
	210D	-	-	-
	260D			
	280D			
370D				

Note: RoHS-compliant models are not available. The last digit of an RoHS-compliant model number is R. Contact the manufacturers when selecting an RoHS-compliant model.

● External Dimensions (Units: mm)



AC/DC Reactor Model	External Dimensions									Approx. Mass kg
	A	B	C	D	E	F	G	H Dia.	I Dia.	
X5053	35	52	90	105	35	45	50	4	4.3	0.6
X5054	35	52	80	95	30	40	45	4	4.5	0.4
X5056	35	52	80	95	30	40	45	4	4.3	0.4
X5059	50	74	125	140	35	45	60	5	5.3	1.1
X5060	40	59	105	140	35	45	60	5	5.3	1.1
X5061	35	52	80	95	35	45	50	4	4.3	0.5
X5068	50	74	125	155	53	66	75	5	6.4	1.9
X5074	30	47	70	85	28	38	45	4	4.3	0.3
X5075	40	59	100	120	40	50	55	4	4.3	0.9
X5076	50	74	125	140	35	45	60	5	4.3	1.1
X5077	50	74	125	155	53	66	75	5	5.3	1.9

Holding Brake Power Supply Unit

● 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 DC side of the holding brake power supply unit. This will reduce brake operation time compared to switching on the AC side.
- When switching on the DC side, install an extra surge absorber (for lightning surge) apart from the surge absorber (for lightning surge) built in the brake circuit near the brake coil, in order 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

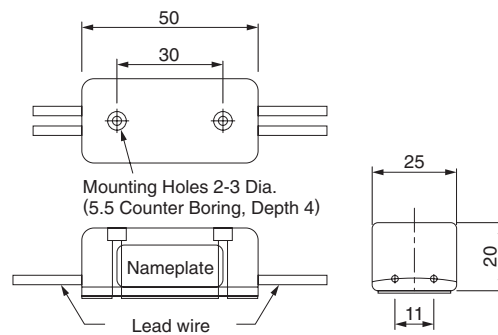
200 V input: LPSE-2H01-E
100 V input: LPDE-1H01-E

● 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)

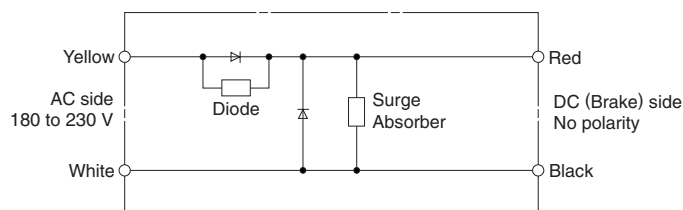


● Internal Circuits

We recommend opening or closing the circuit for the holding brake's power supply so that switching will occur on the DC side of the holding brake power supply unit. This will reduce brake operation time compared to switching on the AC side. When switching on the DC side, install an extra surge absorber apart from the surge absorber built in the brake circuit near the brake coil, in order to prevent damage to the brake coil from surge voltage.

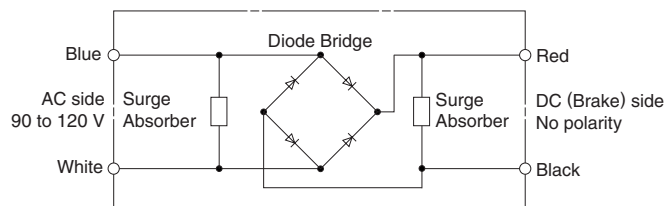
Brake Power Supply for 200 VAC

Internal Circuit for Model: LPSE-2H01-E



Brake Power Supply for 100 VAC

Internal Circuit for Model: LPDE-1H01-E



Regenerative Resistors

● 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.

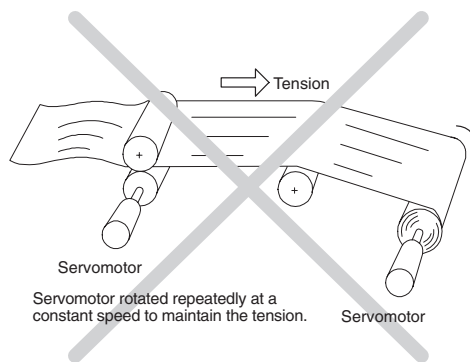
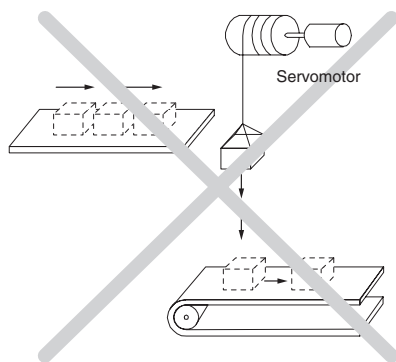
The servomotor is driven in regeneration state in the following circumstances:

- 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).

A servomotor may not be operated with an overhanging load, which tends to continuously rotate the motor. following figures show a typical example of such a load.

● DO NOT use the servomotor with the Vertical Axis Motor Drive without Counterweight

● DO NOT use the servomotor with the Feeding Motor Drive



IMPORTANT

- Never operate servomotors with an overhanging load. Doing so will cause the SERVOPACKs' regenerative brake to be applied continuously and the regenerative energy of the load may exceed the allowable range causing damage to the SERVOPACK.
- The regenerative brake capacity of the SGD V SERVOPACKs is rated for short-term operation approximately equivalent to the time it takes to decelerate to a stop.

External regenerative resistors are sometimes required by the AC servo drive capacity selection program SigmaJunmaSize+. When using an external regenerative resistor, parameter Pn600 must be set.

For details, refer to 3.6.2 Setting Regenerative Resistor Capacity on “ Σ -V Series User's Manual Design and Maintenance.” (manual no. SIEP S800000 45)

● Regenerative Resistor Selection

Select regenerative resistors in the following manner. External resistors are to be provided by users.

Voltage	SERVOPACK Model SGD V-	Built-in Regenerative Resistor	Necessity of External Regenerative Resistors	Necessity of External Regenerative Resistors
Single-phase 100 V	□□□F	None	Basically Not Required	No built-in regenerative resistor is provided, however, normally an external regenerative resistor is not required. Install external regenerative resistors when the smoothing capacitor in SERVOPACK cannot process all the regenerative power.
Three-phase 200 V	R70A, R90A, 1R6A, 2R8A	Standard Equipment ^{*1}	Basically Not Required	A built-in regenerative resistor is provided as standard. Install external regenerative resistors when the built-in regenerative resistor cannot process all the regenerative power.
	3R8A, 5R5A, 7R6A 120A, 180A, 200A, 330A			
Three-phase 400 V	470A, 550A 590A, 780A	None	Required ^{*2}	No built-in regenerative resistor is provided, so the external regenerative resistor is required. If the external resistor is not connected with the SERVOPACK, the alarm 300 is detected as a regeneration error alarm.
	1R9D, 3R5D, 5R4D 8R4D, 120D, 170D	Standard Equipment ^{*1}	Basically Not Required	A built-in regenerative resistor is provided as standard. Install external regenerative resistors when the built-in regenerative resistor cannot process all the regenerative power.
Three-phase 400 V	210D, 260D, 280D, 370D	None	Required ^{*2}	No built-in regenerative resistor is provided, so the external regenerative resistor is required. If the external resistor is not connected with the SERVOPACK, the alarm 300 is detected as a regeneration error alarm.

*1: For specifications of built-in regenerative resistors, refer to the next page.

*2: Regenerative resistor units are available.

Regenerative Resistors

● Specifications of Built-in Regenerative Resistor

The following table shows the specifications of the SERVOPACK's built-in resistor and the amount of regenerative power (average values) that it can process.

Applicable SERVOPACK SGDV-	Specifications of Built-in Resistor		Regenerative Power Processed by Built-in Resistor ¹ W	Minimum Allowable Resistance Ω	
	Resistance Ω	Capacity W			
Single-phase 100 V	□□□F	-	-	40	
Three-phase 200 V	R70A, R90A, 1R6A, 2R8A	-	-	40	
	3R8A, 5R5A, 7R6A	50	40	8	
	120A	20	50	10	
	180A, 200A	12	80	16	
	330A	8	180	36	
	470A	(6.25) ²	(880) ²	(180) ²	5.8
	550A, 590A, 780A	(3.13) ³	(1760) ³	(350) ³	2.9
Three-phase 400 V	1R9D, 3R5D, 5R4D	108	70	14	
	8R4D, 120D	45	140	28	
	170D	32	180	36	
	210D, 260D	(18) ⁴	(880) ⁴	(180) ⁴	18
	280D, 370D	(14.25) ⁵	(1760) ⁵	(350) ⁵	14.25

*1: The average regenerative power that can be handled is 20% of the rated capacity of the regenerative resistor built into the SERVOPACK.

*2: For the optional JUSP-RA04-E regenerative resistor unit.

*3: For the optional JUSP-RA05-E regenerative resistor unit.

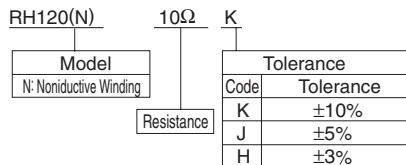
*4: For the optional JUSP-RA18-E regenerative resistor unit.

*5: For the optional JUSP-RA19-E regenerative resistor unit.

● References for External Resistor (by Iwaki Musen Kenkyusho Co., Ltd.)

Model	Specifications
RH120	70 W, 1 to 100 Ω
RH150	90 W, 1 to 100 Ω
RH220□	120 W, 1 to 100 Ω
RH300C	200 W, 1 to 10 kΩ
RH500	300 W, 1 to 30 Ω

Notes: 1 Contact the manufacturers when in need of an RoHS-compliant model.
2 When using an external regenerative resistor, parameter Pn600 must be set.
For details, refer to 3.6.2 Setting Regenerative Resistor Capacity on “J-V Series User's Manual Design and Maintenance.” (manual no. SIEP S800000 45)



● Specifications

Resistance Tolerance	K : ±10% J : ±5% H : ±3%
Temperature Resistance Characteristics	±400PPM / °C (20 Ω max.), ±260PPM / °C (20 Ω min.)
Withstand Voltage	2000 VAC / min. ΔR: ± (0.1%+0.05 Ω)
Insulation Resistance	500 VDC, 20 MΩ min.
Short-time Overload	When 10 times of rated power is applied for five seconds, ΔR: ± (2%+0.05 Ω)
Life	1000 hours of repeating the operation ON for 90 minutes and OFF for 30 minutes, ΔR: ± (5%+0.05 Ω)
Heat Resistance	Not ignite after having applied 10 times of rated power for one minute
Operating temperature	-25°C to +150°C

● External Dimensions (Units: mm)

RH120, 150, 220	RH220B																																												
<table border="1"> <thead> <tr> <th>Model</th> <th>Rated Power</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>RH120</td> <td>70 W</td> <td>1Ω to 100Ω</td> </tr> <tr> <td>RH150</td> <td>90 W</td> <td>1Ω to 100Ω</td> </tr> <tr> <td>RH220</td> <td>120 W</td> <td>1Ω to 100Ω</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Dimensions</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>RH120</td> <td>182</td> <td>150</td> <td>172</td> <td>16</td> <td>42</td> <td>22</td> <td>20</td> </tr> <tr> <td>RH150</td> <td>212</td> <td>180</td> <td>202</td> <td>16</td> <td>44</td> <td>24</td> <td>30</td> </tr> <tr> <td>RH220</td> <td>230</td> <td>200</td> <td>220</td> <td>15</td> <td>60</td> <td>24</td> <td>20</td> </tr> </tbody> </table>	Model	Rated Power	Resistance	RH120	70 W	1Ω to 100Ω	RH150	90 W	1Ω to 100Ω	RH220	120 W	1Ω to 100Ω	Dimensions	A	B	C	D	E	F	G	RH120	182	150	172	16	42	22	20	RH150	212	180	202	16	44	24	30	RH220	230	200	220	15	60	24	20	<p>Lead wire length : L = 500 Rated power : 120 W Resistance : 1 Ω to 100 Ω</p>
Model	Rated Power	Resistance																																											
RH120	70 W	1Ω to 100Ω																																											
RH150	90 W	1Ω to 100Ω																																											
RH220	120 W	1Ω to 100Ω																																											
Dimensions	A	B	C	D	E	F	G																																						
RH120	182	150	172	16	42	22	20																																						
RH150	212	180	202	16	44	24	30																																						
RH220	230	200	220	15	60	24	20																																						
<p>Lead wire length : L = 300 Rated power : 200 W Resistance : 1 Ω to 10 kΩ</p>	<p>Lead wire length : L = 450 Rated power : 300 W Resistance : 1 Ω to 30 Ω</p>																																												

External Regenerative Resistor

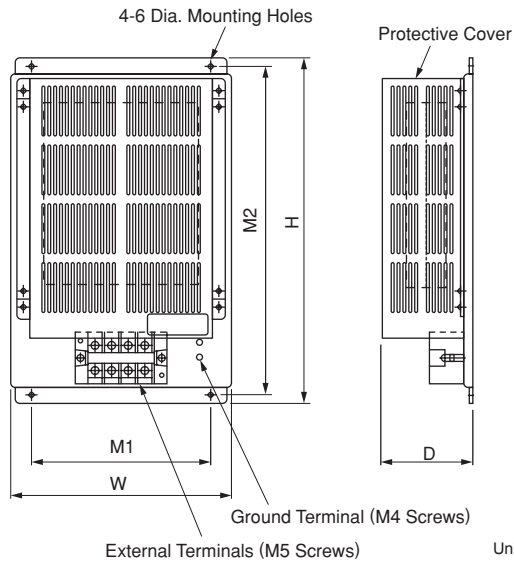
● Regenerative Resistor Unit

SERVOPACK Model SGD V-	Regenerative Resistor Unit Model	Specifications	Allowable Power Loss
470A	JUSP-RA04-E	6.25 Ω , 880 W	180 W
550A, 590A, 780A	JUSP-RA05-E	3.13 Ω , 1760 W	350 W
210D, 260D	JUSP-RA18-E	18 Ω , 880 W	180 W
280D, 370D	JUSP-RA19-E	14.25 Ω , 1760 W	350 W

Note: Only when using the regenerative resistors above, parameter Pn600 does not need to be set.

● External Dimensions

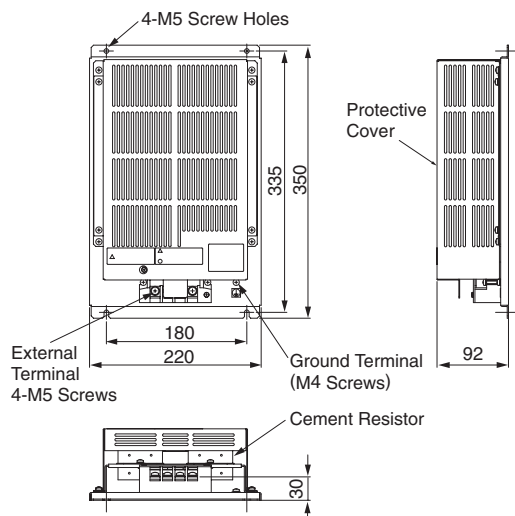
(1) JUSP-RA04-E, -RA05-E



Units: mm

Model	W	H	D	M1	M2	Approx. Mass
JUSP-RA04-E	220	350	92	180	335	4 kg
JUSP-RA05-E	300	350	95	250	335	7 kg

(2) JUSP-RA18-E



(3) JUSP-RA19-E

