

# Analog Voltage/Pulse Train Reference Type SERVOPACKs

## SGDV-□□□□01

(For Rotary Servomotors)

## SGDV-□□□□05

(For Linear Servomotors)



### Model Designations

SGDV - R70 A 01 B 002000

Σ-V Series  
SGDV SERVOPACK

Current

Voltage

Options

Code	Specifications
002000	Base-mounted, varnish(standard)
008000	Single-phase, 200VAC Input (model: SGD-120A01A008000)

Cooling Method

Code	Specifications
A	Fan-Cooling
B	Fanless Cooling

Interface

Code	Specifications
F	100 VAC
A	200 VAC
D	400 VAC

Code	Specifications
01	Analog voltage/pulse train reference type (for rotary servomotors)
05	Analog voltage/pulse train reference type (for linear servomotors)

Code	100 V (Single Phase)		Code	200 V (Three Phase)		Code	400 V (Three Phase)	
	Applicable Servomotor Max. Capacity kW			Applicable Servomotor Max. Capacity kW			Applicable Servomotor Max. Capacity kW	
R70	0.05		R70*	0.05		1R9	0.5	
R90	0.1		R90*	0.1		3R5	1.0	
2R1	0.2		1R6*	0.2		5R4	1.5	
2R8	0.4		2R8*	0.4		8R4	2.0	
			3R8	0.5		120	3.0	
			5R5*	0.75		170	5.0	
			7R6	1.0		210	6.0	
			120**	1.5		260	7.5	
			180	2.0		280	11	
			200	3.0		370	15	
			330	5.0				
			470	6.0				
			550	7.5				
			590	11				
			780	15				

NOTE: Shaded items are non-stock.

\* These amplifiers can be powered with single or three-phase.

\*\* SGD-120A□1A008000, a special version of the 1.5kW amplifier can be used for single-phase operation.

# Features

- Unprecedented ease-of-use through cutting-edge technology
  - New tuning-less function means no adjustment needed.
  - Impressive load regulation with strengthened vibration suppression function.
- Slashed setup time
  - Setup wizard function and wiring conformation function of engineering tool SigmaWin+ allows easy setup just by watching the monitor.
- High response characteristics at 1 kHz min.
  - New advanced autotuning.
  - Reduced positioning time through model following control, and smooth machine control enabled by vibration suppression function.

## Ratings

### Single-phase 100 V

SERVOPACK Model	SGDV-□□□□	R70F	R90F	2R1F	2R8F
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4
Continuous Output Current	$A_{rms}$	0.66	0.91	2.1	2.8
Max. Output Current	$A_{rms}$	2.1	2.9	6.5	9.3
Main Circuit (Single Phase)	100 to 115 VAC+10% to -15% 50/60 Hz				
Control Circuit (Single Phase)	100 to 115 VAC+10% to -15% 50/60 Hz				

### Single-phase 200 V

SERVOPACK Model	SGDV-□□□□	R70A	R90A	1R6A	2R8A	5R5A	120
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.75	1.5
Continuous Output Current	$A_{rms}$	0.66	0.91	1.6	2.8	5.5	11.6
Max. Output Current	$A_{rms}$	2.1	2.9	6.5	9.3	16.9	28
Main Circuit (Single Phase)	220 to 230 VAC +10% to -15% 50/60 Hz						
Control Circuit (Single Phase)	220 to 230 VAC +10% to -15% 50/60 Hz						

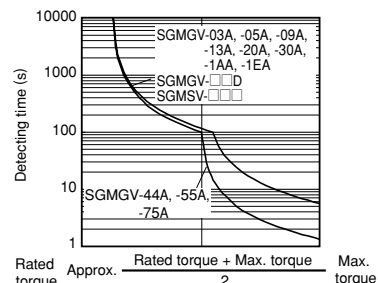
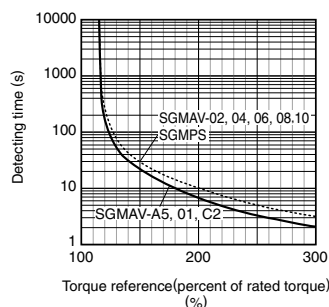
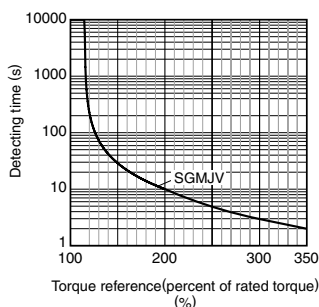
### Three-phase 200 V

SERVOPACK Model	SGDV-□□□□	R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	$A_{rms}$	0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9	46.9	54.7	58.6	78
Max. Output Current	$A_{rms}$	2.1	2.9	6.5	9.3	11	16.9	17	28	42	56	84	110	130	140	170
Main Circuit	Three-phase 200 to 230 VAC+10% to -15% 50/60 Hz															
Control Circuit	Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz															

### Three-phase 400 V

SERVOPACK Model	SGDV-□□□□	1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D
Applicable Servomotor Max. Capacity	kW	0.5	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	$A_{rms}$	1.9	3.5	5.4	8.4	11.9	16.5	20.8	25.4	28.1	37.2
Max. Output Current	$A_{rms}$	5.5	8.5	14	20	28	42	55	65	70	85
Main Circuit	Three-phase 380 to 480 VAC+10% to -15% 50/60 Hz										
Control Circuit	24 VDC ±15%										

### ●SERVOPACK Overload Characteristics



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	
Input Power Supply	Main Circuit	100 V	Single-phase 100 to 115 VAC + 10% to - 15% 50/60 Hz
		200 V	Three-phase 200 to 230 VAC + 10% to - 15% 50/60 Hz
		400 V	Three-phase 380 to 480 VAC + 10% to - 15% 50/60 Hz
	Control Circuit	100 V	Single-phase 100 to 115 VAC + 10% to - 15% 50/60 Hz
		200 V	Single-phase 200 to 230 VAC + 10% to - 15% 50/60 Hz
400 V		24 VDC ± 15%	
Control Method		For 100 V, for 200 V, for 400 V, single-phase or three-phase full-wave rectification IGBT PWM control, sine-wave driven	
Feedback	Rotary Servomotors	Serial encoder: 13-bit (incremental encoder) : 17-bit (incremental/absolute encoder) : 20-bit (incremental/absolute encoder)	
	Linear Servomotors	Serial converter or serial data	
Operating Conditions	Surrounding/Storage Temperature	Surrounding temperature: 0 to + 55°C, storage temperature: - 20 to + 85°C	
	Ambient/Storage Humidity	90%RH or less (no condensation)	
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s <sup>2</sup> , Shock resistance: 19.6 m/s <sup>2</sup>	
	Protection class/Pollution degree	Protection class: IP 1X, pollution degree: 2 Do not use SERVOPACKs in the following locations: · Locations subject to corrosive or flammable gasses · Locations subject to exposure to water, oil, or chemicals · Locations subject to dust, including iron dust, and salts	
	Others	Do not use SERVOPACKs in the following locations: · Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Elevation		1000 m or less	
Compliant Standards		UL 508C EN50178, EN55011 class A group 1, EN61800-3, EN61800-5-1	
Configuration		Base-mounted (Rack-mounting available as an option for some models. 6 kW or more models are duct-ventilated.)	
Performance	Speed Control Range		1:5000 (The lowest speed of the speed control range is the speed at which the servomotor will not stop with a rated torque load.)
	Speed Regulation*	Load Regulation	0% to 100% load: ± 0.01% max. (at rated speed)
		Voltage Regulation	Rated voltage: ± 10% : 0% (at rated speed)
		Temperature Regulation	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.)	
I/O Signals	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.
Communications	RS-422A Communications	Interface	Digital operator, RS-422A port of personal computers etc.
		1:N communications	RS-422A port: N= 15 max. available
		Axis address setting	Set by parameters
	USB Communications	Function	Status display, parameter settings, adjustment functions, utility functions, parameter copy functions
		Interface	Personal computers (application: engineering tool SigmaWin+)
USB Communications	1:N communications	Compliant with USB1.1 standard	
	Function	Status display, parameter settings, adjustment functions, utility functions, parameter copy functions, waveform trace	
Display	Power Charge		CHARGE for main circuit power supply input confirmation One LED (orange)
Analog Monitor		Analog monitor connector built in for monitoring speed, torque and other reference signals. Number of points: 2	
Protective Functions		Overcurrent, Overvoltage, low voltage, overload, regeneration error	
Utility Functions		Alarm history, JOG operation, origin search, etc.	
Regenerative Processing		100 VAC model: External regenerative resistor (optional) 200 VAC SGD-V-R70A, -R90A, -1R6A, -2R8A: External regenerative resistor (optional) 200 VAC SGD-V-470A, -550A, -590A, -780A: External regenerative resistor unit (optional) 200 VAC models other than shown above: Built-in regenerative resistor 400 VAC SGD-V-210D, -260D, -280D, -370D: External regenerative resistor unit (optional) 400 VAC models other than shown above: Built-in regenerative resistor	
Safety Functions	Input	/HWBB1, /HWBB2: Hard wire base block signal	
	Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
	Compliant Standards	EN954 category 3 Stop category 0, IEC61508 SIL 2	
Option Card Function	Feedback	Serial encoder communications input for fully-closed loop control	

\*: 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 variations or temperature variation. The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature variations.

## Specifications

### ● Rotary Servomotors

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	The signal allocation and positive/negative logic can be modified. Servo On (/S-ON), proportional control (/P-CON), alarm reset (/ALM-RST), forward run prohibited (P-OT), reverse run prohibited (/N-OT), forward torque limit (/P-CL), reverse torque limit(/N-CL), internal set speed selection (/SPD-D, / SPD-A, /SPD-B), control selection (/C-SEL), zero clamping (/ZCLAMP), reference pulse inhibit (/INHIBIT), gain selection (/G-SEL)
	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	The signal allocation and positive/negative logic can be modified. Positioning completion (/COIN), speed coincidence detection (/V-CMP), servomotor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), speed limit detection (/VLT), brake interlock (/BK), warning (/WRAN), near (/NEAR)
Panel Operator		Display	7-segment 5-digit LED (Red)	
		Switch	Push switch: 4 channels	
Torque Control	Analog Input	Reference Voltage	±3 VDC (Variable setting range: ±1 to 10 VDC) at rated torque, max. input voltage: ±12 V	
		Input Impedance	About 14 kΩ min.	
		Circuit Time Constant	16 μs	
Speed Control	Analog Input	Reference Voltage	±6 VDC (variable setting range: ±2 to 10 VDC) at rated speed, max. input voltage: ±12 V	
		Input Impedance	About 14 kΩ min.	
		Circuit Time Constant	30 μs	
	Internal Set Speed Control	Rotation Direction Selection	Switches the direction by /P-CON (/SPD-D)	
		Speed Selection	Speed 1 to 3 selection	
Function	Soft Start Setting	0 to 10 s (can be set individually for acceleration and deceleration.)		
Position Control	Reference Pulse	Type	Sign + pulse train, 90°phase difference 2-phase pulse (phase A + phase B), or CCW + CW pulse train	
		Form	Non-insulated line driver (+5 V level), open collector	
		Max. Input Pulse Frequency*	Sign+ Pulse train : 4 Mpps CW+ CCW pulse train : 4 Mpps 90° phase difference 2-phase pulse × 1 multiplier : 1 Mpps (before multiplier) × 2 multiplier : 1 Mpps (before multiplier) × 4 multiplier : 1 Mpps (before multiplier) Open collector : 200 kpps	
	Clear Signal	Function	Clears error pulse by external signals.	
		Form	Applicable to 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.

# Specifications

## ● Linear Servomotors

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
			Functions	The signal allocation and positive/negative logic can be modified. Servo ON (/S-ON), proportional control (/P-CON), alarm reset (/ALM-RST), forward run prohibited (P-OT), reverse run prohibited (N-OT), forward external force limit (/P-CL), reverse external force limit (/N-CL), internal set speed selection (/SPD-D, /SPD-A, /SPD-B), control selection (/C-SEL), zero clamping (/ZCLAMP), reference pulse inhibit (/INHIBIT), gain selection (/G-SEL), polarity detection (P-DET)
	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		The signal allocation and positive / negative logic can be modified. Positioning completion (/COIN), speed coincidence detection (/V/CMP), servomotor movement detection (/TGON), servo ready (/S-RDY), force limit detection (/CLT), speed limit detection (/VLT), brake interlock (/BK), warning (/WARN), near (/NEAR)	
Panel Operator		Display	7-segment 5-digit LED (Red)	
		Switch	Push switch: 4 channels	
Force Control	Analog Input	Reference Voltage	$\pm 3$ VDC (variable setting range: $\pm 1$ to 10 VDC), max. input voltage: $\pm 12$ V	
		Input Impedance	About 14 k $\Omega$ min.	
		Circuit Time Constant	16 $\mu$ s	
Speed Control	Analog Input	Reference Voltage	$\pm 6$ VDC (variable setting range: $\pm 2$ to 10 VDC) at rated speed, max. input voltage: $\pm 12$ V	
		Input Impedance	About 14 k $\Omega$ min.	
		Circuit Time Constant	30 $\mu$ s	
	Internal Set Speed Control	Movement Direction Selection	/P-CON (/SPD-D) signal	
		Speed Selection	Speed 1 to 3 selection	
Function	Soft Start Setting	0 to 10 s (can be set individually for acceleration and deceleration.)		
Position Control	Reference Pulse	Type	Sign+ pulse train, 90° phase difference 2-phase pulse (phase A+phase B), or CCW+ CW pulse train	
		Form	Non-insulated line driver (+5 V level), open collector	
		Max. Input Pulse Frequency*	Sign+ Pulse train	: 4 Mpps
			CW+ CCW pulse train	: 4 Mpps
	90° phase difference 2-phase pulse			
	Clear Signal	Function	Clears error pulse by external signals.	
Form		Applicable to 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	Applicable Servomotor Max. Capacity kW	SERVOPACK Model SGDv-	Power Supply Capacity kVA	Output Current A	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
Signal-phase 100 V	0.05	R70F	0.2	0.66	5.4	—	17	22.4
	0.1	R90F	0.3	0.91	7.8			24.8
	0.2	2R1F	0.7	2.1	14.4			31.4
	0.4	2R8F	1.4	2.8	25.6			42.6
Single-phase 200 V	0.05	R70A	0.2	0.66	5.2	—	17	22.2
	0.1	R90A	0.3	0.91	7.4			24.4
	0.2	1R6A	0.7	1.6	13.7			30.7
	0.4	2R8A	1.2	2.8	24.9			41.9
	0.75	5R5A	1.9	5.5	52.7	8	77.7	
	1.5	120A	4	11.6	68.2	10	22	100.2
Three-phase 200 V	0.05	R70A	0.2	0.66	5.1	—	17	22.1
	0.1	R90A	0.3	0.91	7.3			24.3
	0.2	1R6A	0.6	1.6	13.5			30.5
	0.4	2R8A	1	2.8	24.0			41.0
	0.5	3R8A	1.4	3.8	20.1	8	45.1	
	0.75	5R5A	1.6	5.5	43.8		68.8	
	1.0	7R6A	2.3	7.6	53.6	10	78.6	
	1.5	120A	3.2	11.6	65.8		97.8	
	2.0	180A	4	18.5	111.9	16	22	149.9
	3.0	200A	5.9	19.6	113.8		161.4	
	5.0	330A	7.5	32.9	263.7	36	27	326.7
	6.0	470A	10.7	46.9	279.4	(180) <sup>1</sup>	33	312.4
	7.5	550A	14.6	54.7	357.8	(350) <sup>2</sup>		390.8
	11	590A	21.7	58.6	431.7		479.7	
15	780A	29.6	78	599.0	48		647.0	
Three-phase 400 V	0.5	1R9D	1.1	1.9	24.6	14	21	59.6
	1.0	3R5D	2.3	3.5	46.1			81.1
	1.5	5R4D	3.5	5.4	71.3			106.3
	2.0	8R4D	4.5	8.4	77.9	28	25	130.9
	3.0	120D	7.1	11.9	108.7			161.7
	5.0	170D	11.7	16.5	161.1	36	24	221.1
	6.0	210D	12.4	20.8	172.7	(180) <sup>3</sup>	27	199.7
	7.5	260D	14.4	25.7	218.6			245.6
	11	280D	21.9	28.1	294.6	(350) <sup>4</sup>	30	324.6
15	370D	30.6	37.2	403.8	433.8			

\*1: For the optional JUSP-RA04-E regenerative resistor unit.

\*2: For the optional JUSP-RA05-E regenerative resistor unit.

\*3: For the optional JUSP-RA18-E regenerative resistor unit.

\*4: For the optional JUSP-RA19-E regenerative resistor unit.

Notes: 1 SGDv-R70F, -R90F, -2R1F, -2R8F, -R70A, -R90A, -1R6A, and -2R8A SERVOPACKs do not have built-in regenerative resistors.

If the regenerative energy exceeds the specified value, connect an external regenerative resistor (optional).

2 SGDv-470A, -550A, -590A, -780A, -210D, -260D, -280D, -370D SERVOPACKs do not have built-in regenerative resistors.

Be sure to connect a regenerative resistor unit (optional) or an external regenerative resistor (optional).

3 Regenerative resistor power losses are allowable losses. Take the following action if this value is exceeded.

· Remove the lead or short bar that is short-circuiting the SERVOPACK main circuit terminal B2 and B3.

(SGDv-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, or 400-V class SERVOPACKs.)

· Install an external regenerative resistor (optional).

# MECHATROLINK-II Communications Reference Type SERVOPACKs



# SGDV-□□□□11

(For Rotary Servomotors)

# SGDV-□□□□15

(For Linear Servomotors)

## Model Designations

SGDV - R70 A 01 B 002000

Σ-V Series  
SGDV SERVOPACK

Current

Voltage

Options

Code	Specifications
002000	Base-mounted, varnish(standard)
008000	Single-phase, 200VAC Input (model: SGD-120A01A008000)

Cooling Method

Code	Specifications
A	Fan-Cooling
B	Fanless Cooling

Interface

Code	Specifications
F	100 VAC
A	200 VAC
D	400 VAC

Code	Specifications
11	MECHATROLINK-II communications Reference Type (for rotary servomotors)
15	MECHATROLINK-II communications Reference Type (for linear servomotors)

Code	100 V (Single Phase)		Code	200 V (Three Phase)		Code	400 V (Three Phase)	
	Applicable Servomotor Max. Capacity kW			Applicable Servomotor Max. Capacity kW			Applicable Servomotor Max. Capacity kW	
R70	0.05		R70*	0.05		1R9	0.5	
R90	0.1		R90*	0.1		3R5	1.0	
2R1	0.2		1R6*	0.2		5R4	1.5	
2R8	0.4		2R8*	0.4		8R4	2.0	
			3R8	0.5		120	3.0	
			5R5*	0.75		170	5.0	
			7R6	1.0		210	6.0	
			120**	1.5		260	7.5	
			180	2.0		280	11	
			200	3.0		370	15	
			330	5.0				
			470	6.0				
			550	7.5				
			590	11				
			780	15				

NOTE: Shaded items are non-stock.

\* These amplifiers can be powered with single or three-phase.

\*\* SGD-120A□1A008000, a special version of the 1.5kW amplifier can be used for single-phase operation.

# Features

## ● Real-time communications

MECHATROLINK-II communications enable high-speed control for 30 stations at a maximum transmission speed of 10 Mbps in a transmission cycle from 250  $\mu$ s to 4 ms (user setting). Such a high transmission speed allows real-time transmission of various data required for control.

## ● Cost savings

Thirty stations can be connected to a single MECHATROLINK-II transmission line, so wiring costs and time are greatly reduced. Also, only one signal connector is required on the host controller. And, the all-digital network eliminates the need for conversion from digital to analog for speed/torque references and for a pulse generator to generate position references.

## ● High-precision motion control

The SGD V SERVOPACK when connected to the host controller in the MECHATROLINK-II network provides not only torque, position, and speed control but also synchronized phase control that requires advanced control technology. The control mode can be changed online so that the machine can move smoothly in complex motions with great efficiency.

# Ratings

## Single-phase 100 V

SERVOPACK Model	SGDV-□□□□	R70F	R90F	2R1F	2R8F
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4
Continuous Output Current	A <sub>rms</sub>	0.66	0.91	2.1	2.8
Max. Output Current	A <sub>rms</sub>	2.1	2.9	6.5	9.3
Main Circuit (Single Phase)		100 to 115 VAC+10% to -15% 50/60 Hz			
Control Circuit (Single Phase)		100 to 115 VAC+10% to -15% 50/60 Hz			

## Single-phase 200 V

SERVOPACK Model	SGDV-□□□□	R70A	R90A	1R6A	2R8A	5R5A	120
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.75	1.5
Continuous Output Current	A <sub>rms</sub>	0.66	0.91	1.6	2.8	5.5	11.6
Max. Output Current	A <sub>rms</sub>	2.1	2.9	6.5	9.3	16.9	28
Main Circuit (Single Phase)		220 to 230 VAC+10% to -15% 50/60 Hz					
Control Circuit (Single Phase)		220 to 230 VAC+10% to -15% 50/60 Hz					

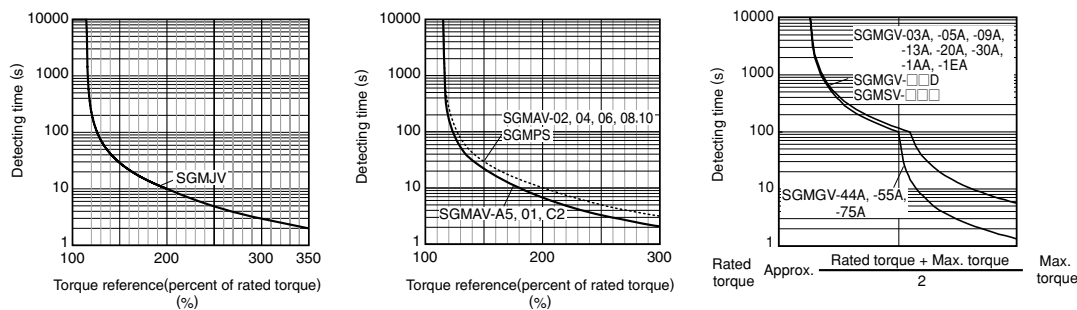
## Three-phase 200 V

SERVOPACK Model	SGDV-□□□□	R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	A <sub>rms</sub>	0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9	46.9	54.7	58.6	78
Max. Output Current	A <sub>rms</sub>	2.1	2.9	6.5	9.3	11	16.9	17	28	42	56	84	110	130	140	170
Main Circuit		Three-phase 200 to 230 VAC+10% to -15% 50/60 Hz														
Control Circuit		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz														

## Three-phase 400 V

SERVOPACK Model	SGDV-□□□□	1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D
Applicable Servomotor Max. Capacity	kW	0.5	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	A <sub>rms</sub>	1.9	3.5	5.4	8.4	11.9	16.5	20.8	25.4	28.1	37.2
Max. Output Current	A <sub>rms</sub>	5.5	8.5	14	20	28	42	55	65	70	85
Main Circuit		Three-phase 380 to 480 VAC+10% to -15% 50/60 Hz									
Control Circuit		24 VDC $\pm$ 15%									

## ● SERVOPACK Overload Characteristics



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
Input Power Supply	Main Circuit	100 V	Single-phase 100 to 115 VAC + 10% to - 15% 50/60 Hz
		200 V	Three-phase 200 to 230 VAC + 10% to - 15% 50/60 Hz
		400 V	Three-phase 380 to 480 VAC + 10% to - 15% 50/60 Hz
	Control Circuit	100 V	Single-phase 100 to 115 VAC + 10% to - 15% 50/60 Hz
		200 V	Single-phase 200 to 230 VAC + 10% to - 15% 50/60 Hz
400 V		24 VDC ± 15%	
Control Method			For 100 V, for 200 V, for 400 V, single-phase or three-phase full-wave rectification IGBT PWM control, sine-wave driven
Feedback	Rotary Servomotors		Serial encoder: 13-bit (incremental encoder) : 17-bit (incremental/absolute encoder) : 20-bit (incremental/absolute encoder)
	Linear Servomotors		Serial converter or serial data
Operating Conditions	Surrounding/Storage Temperature		Surrounding temperature: 0 to +55°C, storage temperature: -20 to +85°C
	Ambient/Storage Humidity		90%RH or less (no condensation)
	Vibration/Shock Resistance		Vibration resistance: 4.9 m/s <sup>2</sup> , Shock resistance: 19.8 m/s <sup>2</sup>
	Protection class/Pollution degree		Protection class: IP 1X, pollution degree: 2 Do not use SERVOPACKs in the following locations: ·Locations subject to corrosive or flammable gases ·Locations subject to exposure to water, oil, or chemicals ·Locations subject to dust, including iron dust, and salts
	Others		Do not use SERVOPACKs in the following locations: ·Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity
Elevation			1000 m or less
Compliant Standards			UL 508C EN50178, EN55011 class A group 1, EN61800-3, EN61800-5-1
Configuration			Base-mounted (Rack-mounting available as an option for some models. 6 kW or more models are duct-ventilated.)
Performance	Speed Control Range		1:5000 (The lowest speed of the speed control range is the speed at which the servomotor will not stop with a rated torque load.)
	Speed Regulation*	Load Regulation	0% to 100% load: ±0.01% max. (at rated speed)
		Voltage Regulation	Rated voltage: ±10% : 0% (at rated speed)
		Temperature Regulation	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.)	
I/O Signals	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.
Communications	RS-422A Communications	Interface	Digital operator, RS-422A port of personal computers etc.
		1:N communications	RS-422A port: N= 15 max. available
		Axis address setting	Set by parameters
	USB Communications	Function	Status display, parameter settings, adjustment functions, utility functions
		Interface	Personal computers (application: engineering tool SigmaWin+)
1:N communications		Compliant with USB1.1 standard	
Function		Status display, parameter settings, adjustment functions, utility functions	
Display	Power Charge		CHARGE for main circuit power supply input confirmation One LED (orange)
Analog Monitor			Analog monitor connector built in for monitoring speed, torque and other reference signals. Number of points: 2
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error
Utility Functions			Alarm history, JOG operation, origin search, etc.
Regenerative Processing			100 VAC model: External regenerative resistor (optional) 200 VAC SGDVR-R70A, -R90A, -1R6A, -2R8A: External regenerative resistor (optional) 200 VAC SGDVR-470A, -550A, -590A, -780A: External regenerative resistor unit (optional) 200 VAC models other than shown above: Built-in regenerative resistor 400 VAC SGDVR-210D, -260D, -280D, -370D: External regenerative resistor unit (optional) 400 VAC models other than shown above: Built-in regenerative resistor
Safety Functions	Input		/HWBB1, /HWBB2: Hard wire base block signal
	Output		EDM1: Status monitor (fixed output) of built-in safety circuit
	Compliant Standards		EN954 category 3 Stop category 0, IEC61508 SIL 2
Option Card Function	Feedback		Serial encoder communications input for fully-closed loop control

\*: 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 variations or temperature variation. The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature variations.

## Specifications

### ● Rotary Servomotors

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	Number of Channels	7 channels		
		Function	Signal allocations and positive/negative logics can be modified. Homing deceleration switch signal (/DEC), external latch signal (/EXT1 to 3), forward run prohibited (P-OT), reverse run prohibited (N-OT), forward current limit (/P-CL), reverse current limit (/N-CL)		
	Sequence Output	Fixed Output	Servo alarm (ALM)		
		Output Signals which can be allocated	<table border="1"> <tr> <td>Number of Channels</td> <td>3 channels</td> </tr> <tr> <td>Function</td> <td>Signal allocations and positive/negative logics can be modified. Positioning completion (/COIN), speed coincidence detection (/V-CMP), servomotor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), speed limit detection (/VLT), brake interlock (/BK), warning (/WARN), NEAR (/NEAR)</td> </tr> </table>	Number of Channels	3 channels
Number of Channels	3 channels				
Function	Signal allocations and positive/negative logics can be modified. Positioning completion (/COIN), speed coincidence detection (/V-CMP), servomotor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), speed limit detection (/VLT), brake interlock (/BK), warning (/WARN), NEAR (/NEAR)				
Panel Operator		Display	7-segment 1-digit LED (red)		
		Switch	Rotary switch: 16 positions, DIP switch: 4 poles		
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-II		
		Transmission Speed	10 Mbps		
		Transmission Cycle	250 $\mu$ s, 0.5 to 4.0 ms (multiple of 0.5 ms)		
		Number of Words for Link Transmission	Can be switched between 17-bytes /station and 32-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, monitor, adjustment, and other commands.)		

### ● Linear Servomotors

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	Number of Channels	7 channels		
		Function	Signal allocations and positive/negative logics can be modified. Homing deceleration switch signal (/DEC), external latch signal (/EXT1 to 3), forward run prohibited (P-OT), reverse run prohibited (N-OT), forward current limit (/P-CL), reverse current limit (/N-CL)		
	Sequence Output	Fixed Output	Servo alarm (ALM)		
		Output Signals which can be allocated	<table border="1"> <tr> <td>Number of Channels</td> <td>3 channels</td> </tr> <tr> <td>Function</td> <td>Signal allocations and positive/negative logics can be modified. Positioning completion (/COIN), speed coincidence detection (/V-CMP), servomotor movement detection (/TGON), servo ready (/S-RDY), force limit detection (/CLT), speed limit detection (/VLT), brake interlock (/BK), warning (/WARN), NEAR (/NEAR)</td> </tr> </table>	Number of Channels	3 channels
Number of Channels	3 channels				
Function	Signal allocations and positive/negative logics can be modified. Positioning completion (/COIN), speed coincidence detection (/V-CMP), servomotor movement detection (/TGON), servo ready (/S-RDY), force limit detection (/CLT), speed limit detection (/VLT), brake interlock (/BK), warning (/WARN), NEAR (/NEAR)				
Panel Operator		Display	7-segment 1-digit LED (red)		
		Switch	Rotary switch: 16 positions, piano switch: 4 poles		
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-II		
		Transmission Speed	10 Mbps		
		Transmission Cycle	250 $\mu$ s, 0.5 to 4.0 ms (multiple of 0.5 ms)		
		Number of Words for Link Transmission	Can be switched between 17-bytes /station and 32-bytes / station.		
		Station Address	41H to 5FH (max. number of slaves: 30)		
Command Method		Performance	Position control, speed control, and force control through MECHATROLINK-II communications		
		Command Input	MECHATROLINK commands and MECHATROLINK-II commands (for sequence, motion, data setting/reference, monitor, adjustment, and other commands.)		

# MECHATROLINK-III Communications Reference Type SERVOPACKs

## SGDV-□□□□21 (For Rotary Servomotors)

## SGDV-□□□□25 (For Linear Servomotors)



### Model Designations

SGDV - R70 A 01 B 002000

Σ-V Series  
SGDV SERVOPACK

Current

Voltage

Options

Code	Specifications
002000	Base-mounted, varnish(standard)
008000	Single-phase, 200VAC Input (model: SGD V-120A01A008000)

Cooling Method

Code	Specifications
A	Fan-Cooling
B	Fanless Cooling

Interface

Code	Specifications
F	100 VAC
A	200 VAC
D	400 VAC

Code	Specifications
21	MECHATROLINK-III communications Reference Type (for rotary servomotors)
25	MECHATROLINK-III communications Reference Type (for linear servomotors)

Code	100 V (Single Phase)		Code	200 V (Three Phase)		Code	400 V (Three Phase)	
	Applicable Servomotor Max. Capacity kW			Applicable Servomotor Max. Capacity kW			Applicable Servomotor Max. Capacity kW	
R70	0.05		R70*	0.05		1R9	0.5	
R90	0.1		R90*	0.1		3R5	1.0	
2R1	0.2		1R6*	0.2		5R4	1.5	
2R8	0.4		2R8*	0.4		8R4	2.0	
			3R8	0.5		120	3.0	
			5R5*	0.75		170	5.0	
			7R6	1.0		210	6.0	
			120**	1.5		260	7.5	
			180	2.0		280	11	
			200	3.0		370	15	
			330	5.0				
			470	6.0				
			550	7.5				
			590	11				
			780	15				

NOTE: Shaded items are non-stock.

\* These amplifiers can be powered with single or three-phase.

\*\* SGD V-120A□1A008000, a special version of the 1.5kW amplifier can be used for single-phase operation.

# Features

## ● Real-time communications

MECHATROLINK-III communications enable high-speed control for 62 stations at a transmission speed of 100 Mbps in a transmission cycle from 125  $\mu$ s to 4 ms (user setting). Such a high transmission speed allows real-time transmission of various data required for control.

## ● Cost savings

The 62 stations can be connected to a single MECHATROLINK-III transmission line, so wiring costs and time are greatly reduced. Also, only one signal connector is required on the host controller. And, the all-digital network eliminates the need for conversion from digital to analog for speed/torque references and for a pulse generator to generate position references.

## ● High-precision motion control

The SGD V SERVOPACK when connected to the host controller in the MECHATROLINK-III network provides not only torque, position, and speed control but also synchronized phase control that requires advanced control technology. The control mode can be changed online so that the machine can move smoothly in complex motions with great efficiency.

# Ratings

## Single-phase 100 V

SERVOPACK Model: SGD V-□□□□		R70F	R90F	2R1F	2R8F
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4
Continuous Output Current	Arms	0.66	0.91	2.1	2.8
Max. Output Current	Arms	2.1	2.9	6.5	9.3
Main Circuit		Single-phase 100 to 115 VAC+10% to -15% 50/60 Hz			
Control Circuit		Single-phase 100 to 115 VAC+10% to -15% 50/60 Hz			

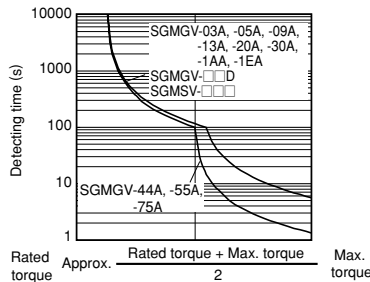
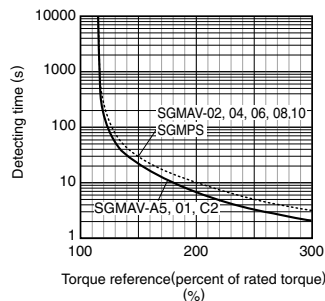
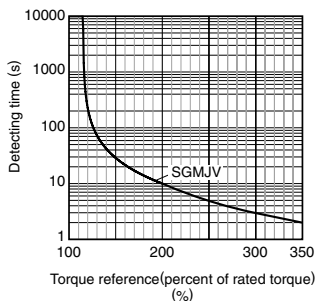
## Three-phase 200 V

SERVOPACK Model: SGD V-□□□□		R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9	46.9	54.7	58.6	78
Max. Output Current	Arms	2.1	2.9	5.8	9.3	11	16.9	17	28	42	56	84	110	130	140	170
Main Circuit		Three-phase 200 to 230 VAC+10% to -15% 50/60 Hz														
Control Circuit		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz														

## Three-phase 400 V

SERVOPACK Model: SGD V-□□□□		1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D
Applicable Servomotor Max. Capacity	kW	0.5	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	1.9	3.5	5.4	8.4	11.9	16.5	20.8	25.4	28.1	37.2
Max. Output Current	Arms	5.5	8.5	14	20	28	42	55	65	70	85
Main Circuit		Three-phase 380 to 480 VAC+10% to -15% 50/60 Hz									
Control Circuit		24 VDC $\pm$ 15%									

## ● SERVOPACK Overload Characteristics



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	Rotary Servomotors	Serial encoder: 13-bit (incremental encoder) : 17-bit (incremental/absolute encoder) : 20-bit (incremental/absolute encoder)	
	With Linear Servomotors	Serial converter unit or linear scale	
Operating Conditions	Surrounding Air/Storage Temperature	Surrounding air temperature: 0 to +55°C, Storage temperature: -20 to +85°C	
	Ambient/Storage Humidity	90%RH or less (no condensation)	
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s <sup>2</sup> , Shock resistance: 19.6 m/s <sup>2</sup>	
	Protection Class/Pollution Degree	Protection class: IP10, pollution degree: 2 Do not use SERVOPACKs in the following locations: • Locations subject to corrosive or flammable gasses • Locations subject to exposure to water, oil, or chemicals • Locations subject to dust, including iron dust, and salts	
	Others	Do not use SERVOPACKs in the following locations: • Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
	Altitude	1000 m or less	
Applicable Standards (Pending)		UL508C EN50178, EN55011/A2 group1 classA, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Configuration		Standard: Base-mounted Optional: Rack-mounted, Duct-ventilated	
Performance	Speed Control Range		
	Speed Regulation <sup>*1</sup>	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)		Activated when a servo alarm or overtravelling (OT) occurs, or when the power supply for the main circuit or servomotor is OFF.	
Protective Functions		Overcurrent, Overvoltage, low voltage, overload, regeneration error, etc.	
Utility Functions		Gain adjustment, alarm history, JOG operation, origin search, etc.	
Regenerative Processing		100 VAC model: External regenerative resistor (optional) 200 VAC SGD V-R70A, -R90A, -1R6A, -2R8A: External regenerative resistor (optional) 200 VAC SGD V-470A, -550A, -590A, -780A: External regenerative resistor unit (optional) 200 VAC models other than shown above: Built-in regenerative resistor 400 VAC SGD V-210D, -260D, -280D, -370D: External regenerative resistor unit (optional) 400 VAC models other than shown above: Built-in regenerative resistor	
Overtravelling (OT) Prevention		Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Safety Functions	Input	/HWBB1, /HWBB2: Baseblock signal for power module	
	Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
	Applicable Standards (Pending) <sup>*2</sup>	EN954 category 3, IEC61508 SIL2	
Option Module		Fully-closed option 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

### ● Rotary Servomotors

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
	Input Signals which can be allocated		Number of Channels
		Function	Signal allocations and positive/negative logics can be modified. Homing deceleration switch signal (/DEC), external latch signal (/EXT1 to 3), forward run prohibited (P-OT), reverse run prohibited (N-OT), forward current limit (/P-CL), reverse current limit (/N-CL)
	Sequence Output		Fixed Output
		Output Signals which can be allocated	Number of Channels
Function	Signal allocations and positive/negative logics can be modified. Positioning completion (/COIN), speed coincidence detection (/V-CMP), servomotor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), speed limit detection (/VLT), brake (/BK), warning (/WARN), NEAR (/NEAR)		
	Panel Operator	Display	7-segment 1-digit LED (red), LED for MECHATROLINK Communications (green)×3
Switch		Rotary switch: 16 positions×2, DIP switch: 4 poles	
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 (increments 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, monitor, adjustment, and other commands.)	

### ● Linear Servomotors

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
	Input Signals which can be allocated		Number of Channels
		Function	Signal allocations and positive/negative logics can be modified. Homing deceleration switch signal (/DEC), external latch signal (/EXT1 to 3), forward run prohibited (P-OT), reverse run prohibited (N-OT), forward current limit (/P-CL), reverse current limit (/N-CL)
	Sequence Output		Fixed Output
		Output Signals which can be allocated	Number of Channels
Function	Signal allocations and positive/negative logics can be modified. Positioning completion (/COIN), speed coincidence detection (/V-CMP), servomotor movement detection (/TGON), servo ready (/S-RDY), force limit detection (/CLT), speed limit detection (/VLT), brake (/BK), warning (/WARN), NEAR (/NEAR)		
	Panel Operator	Display	7-segment 1-digit LED (red), LED for MECHATROLINK Communications (green)×3
Switch		Rotary switch: 16 positions×2, DIP switch: 4 poles	
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 (increments 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 force control through MECHATROLINK communications	
	Command Input	MECHATROLINK commands (for sequence, motion, data setting/reference, monitor, 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	Applicable Servomotor Max. Capacity kW	SERVOPACK Model SGD V-	Power Supply Capacity kVA	Output Current Arms	Main Circuit Power Loss W	Regenerative Resistor Power Loss	Control Circuit Power Loss	Total Power Loss
						W	W	W
Signal-phase 100 V	0.05	R70F	0.2	0.66	5.4	—	17	22.4
	0.1	R90F	0.3	0.91	7.8			24.8
	0.2	2R1F	0.7	2.1	14.4			31.4
	0.4	2R8F	1.4	2.8	25.6			42.6
Single-phase 200 V	0.05	R70A	0.2	0.66	5.2	—	17	22.2
	0.1	R90A	0.3	0.91	7.4			24.4
	0.2	1R6A	0.7	1.6	13.7			30.7
	0.4	2R8A	1.2	2.8	24.9			41.9
	0.75	5R5A	1.9	5.5	52.7	8	77.7	
	1.5	120A	4	11.6	68.2	10	22	100.2
Three-phase 200 V	0.05	R70A	0.2	0.66	5.1	—	17	22.1
	0.1	R90A	0.3	0.91	7.3			24.3
	0.2	1R6A	0.6	1.6	13.5			30.5
	0.4	2R8A	1	2.8	24.0			41.0
	0.5	3R8A	1.4	3.8	20.1	8	17	45.1
	0.75	5R5A	1.6	5.5	43.8			68.8
	1.0	7R6A	2.3	7.6	53.6	10	17	78.6
	1.5	120A	3.2	11.6	65.8			97.8
	2.0	180A	4	18.5	111.9	16	22	149.9
	3.0	200A	5.9	19.6	113.8			161.4
	5.0	330A	7.5	32.9	263.7	36	27	326.7
	6.0	470A	10.7	46.9	279.4			(180) <sup>11</sup>
	7.5	550A	14.6	54.7	357.8	(350) <sup>12</sup>	48	390.8
	11	590A	21.7	58.6	431.7			479.7
15	780A	29.6	78	599.0	14	21	647.0	
0.5	1R9D	1.1	1.9	24.6			59.6	
Three-phase 400 V	1.0	3R5D	2.3	3.5	46.1	14	21	81.1
	1.5	5R4D	3.5	5.4	71.3			106.3
	2.0	8R4D	4.5	8.4	77.9			130.9
	3.0	120D	7.1	11.9	108.7	28	25	161.7
	5.0	170D	11.7	16.5	161.1			221.1
	6.0	210D	12.4	20.8	172.7	(180) <sup>13</sup>	27	199.7
	7.5	260D	14.4	25.7	218.6			245.6
	11	280D	21.9	28.1	294.6	(350) <sup>14</sup>	30	324.6
	15	370D	30.6	37.2	403.8			433.8

\*1: For the optional JUSP-RA04-E regenerative resistor unit.

\*2: For the optional JUSP-RA05-E regenerative resistor unit.

\*3: For the optional JUSP-RA18-E regenerative resistor unit

\*4: For the optional JUSP-RA19-E regenerative resistor unit.

Notes: 1 SGD V-R70F, -R90F, -2R1F, -2R8F, -R70A, -R90A, -1R6A, and -2R8A SERVOPACKS do not have built-in regenerative resistors.

If the regenerative energy exceeds the specified value, connect an external regenerative resistor (optional).

2 SGD V-470A, -550A, -590A, -780A, -210D, -260D, -280D, -370D SERVOPACKS do not have built-in regenerative resistors.

Be sure to connect a regenerative resistor unit (optional) or an external regenerative resistor (optional).

3 Regenerative resistor power losses are allowable losses. Take the following action if this value is exceeded.

- Remove the lead or short bar that is short-circuiting the SERVOPACK main circuit terminal B2 and B3.

(SGDV-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, or 400-V class SERVOPACKS.)

- Install an external regenerative resistor (optional).