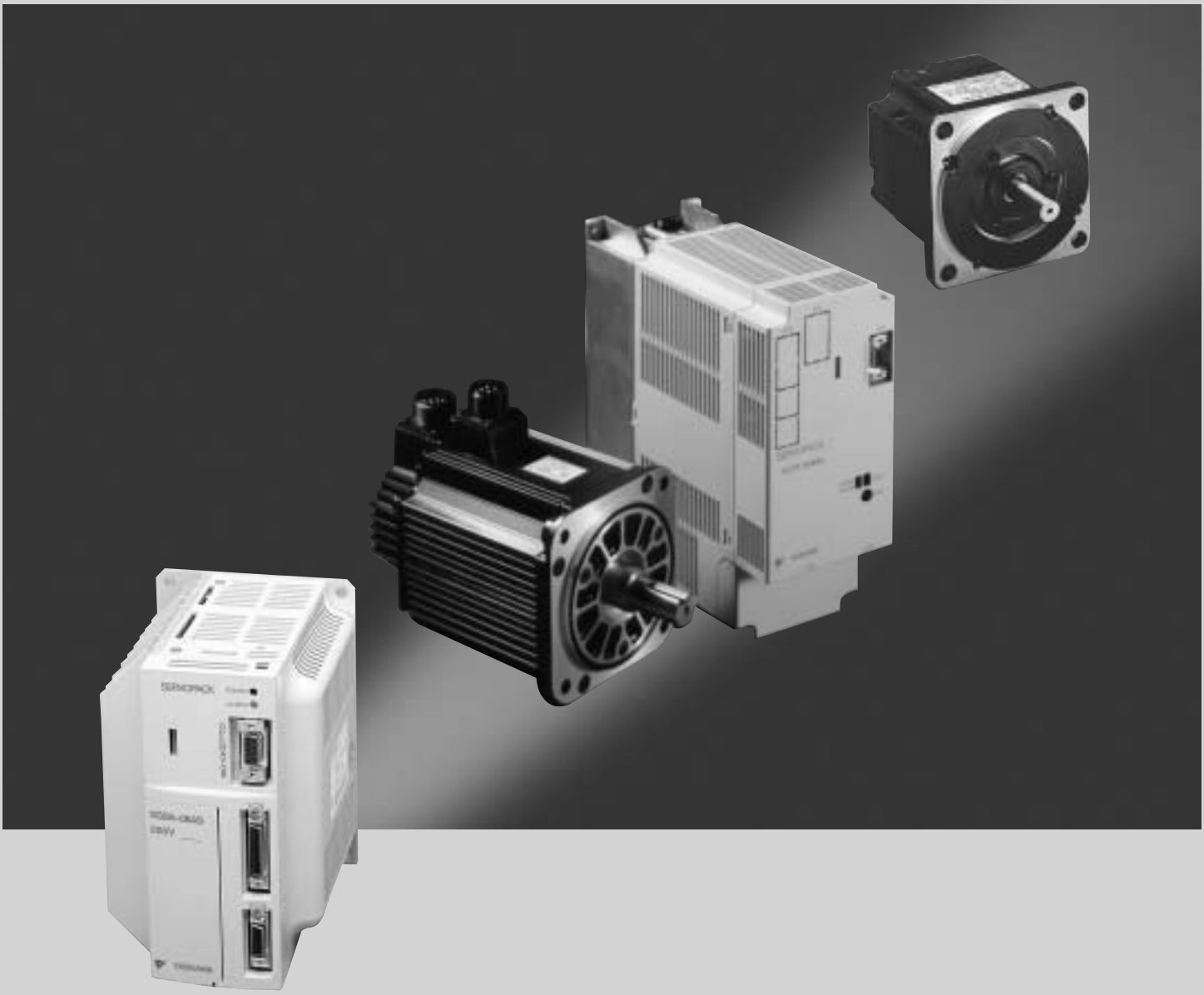
YASKAWA

A World of Automation Solutions™



Sigma Servo System Product Catalog

Sigma Servo System

Yaskawa's Sigma Servo System is the Leading Edge of Motion Control Technology.

In 1960 Yaskawa introduced the Minertia Motor, the first high performance low inertia servo design. Since that breakthrough more than 35 years ago, Yaskawa has remained on the leading edge of motion control technology. Yaskawa Research and Engineering teams have consistently led the way with motion control solutions for the world of automation.

Yaskawa's latest innovation is the Sigma Servo System, a compact, high performance combination of brushless servomotors matched with flexible, all digital amplifiers to obtain the utmost in system performance.

The Sigma Servo System family of products provide higher torque to inertia, higher torque per length and higher torque per dollar than previous generation of brushless servos systems. The Sigma all digital design offers an extremely flexible hardware platform which can be user customized via software executed features and functions for a multitude of applications.

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Sigma Servo System Lineup

SGM Sigma Servomotor System

SGMP Sigma Servomotor System

SGDA Sigma Servo Amplifier

SGMG Sigma Servomotor

SGMS Sigma Servomotor

SGDB Sigma Servo Amplifier

SMC-2000 Motion Controller

Appendix

Line-up

ENCODER

Select the most suitable encoder for feedback.

(Options available)

Incremental encoder 2048PPR	Standard
Absolute encoder 12 bits/rev (1024PPR)	Option

Since the frequency dividing function is built into the Sigma amplifier, any number of pulses can be set up for optional position control feedback.

BRAKE

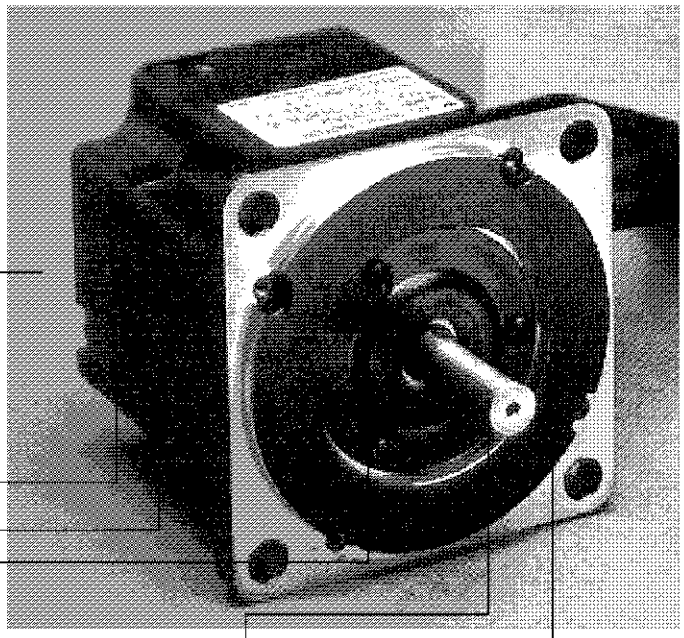
Failsafe magnetic brake for holding when power is OFF.

(Options available)

Without brake	Standard
With brake	Standard

When "with brake" type is applied, the power supply for the brake is required as an option.

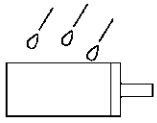
SGM/SGMP Sigma Series Servomotor



DRIP-PROOF PROVISION

(Options available)

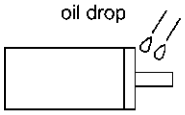
Without drip-proof provision	Standard SGM: IP42
With drip-proof provision	SGMP: IP55



SHAFT SEAL

(Options available)

Without shaft seal	Standard
With shaft seal	Option



SHAFT SPECIFICATIONS

(Options available)

Straight with keyway	Standard
Straight without keyway	Option

WITH GEAR

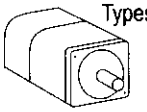
Gear ratio

1	1/5
2	1/10
3	1/25
4	1/50

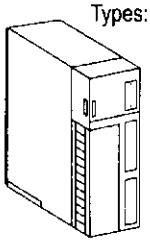
COMBINATIONS OF SGM/SGMP SERVOMOTOR AND SGDA SERVO AMPLIFIER

(Rated speed: 3000 RPM, 4500 maximum RPM)

30W

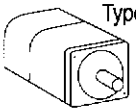


Types: SGM-A3U□
SGM-A3L□

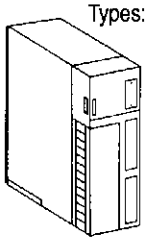


Types: SGDA-A3A□
SGDA-A3B□

50W

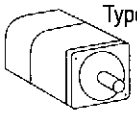


Types: SGM-A5U□
SGM-A5L□

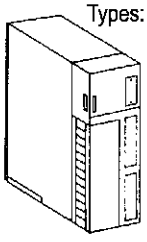


Types: SGDA-A5A□
SGDA-A5B□

100W

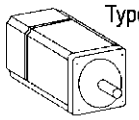


Types: SGM-01U□
SGM-01L□
SGMP-01U□
SGMP-01L□

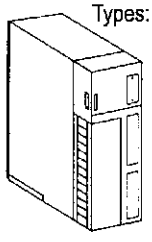


Types: SGDA-01A□
SGDA-01B□

200W

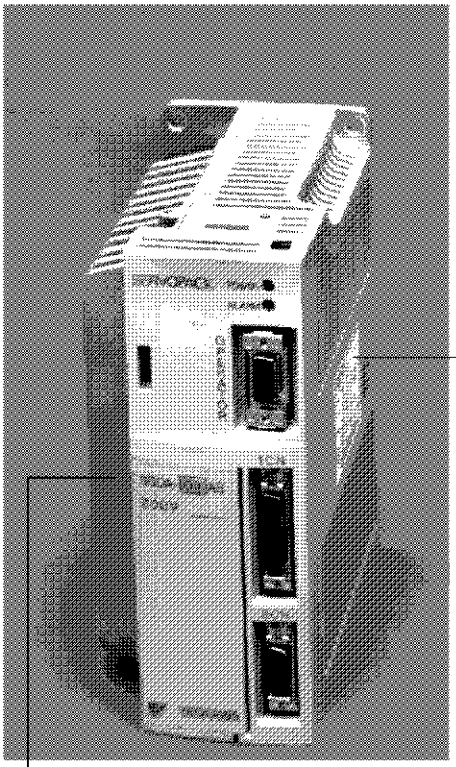


Types: SGM-02U□
SGM-02L□
SGMP-02U□
SGMP-02L□



Types: SGDA-02A□
SGDA-02B□

SGDA Sigma Series Servo Amplifier



POWER SUPPLY VOLTAGE

Select 2 types of power supplies according to the power available.

(Options available)

Single-phase 200VAC class Single-phase 200 ~ 230VAC +10 ~ -15%, 50/60Hz	Standard
Single-phase 100VAC class Single-phase 100 ~ 115VAC +10 ~ -15%, 50/60Hz (For 100V class, type selection range is 300W or less)	Standard

Also select SGM Servomotors depending on the power.

ACCEPTS INDUSTRY STANDARD INTERFACES

Select from the following 3 types of command reference forms according to the command reference form from host controllers to the SGDA Servo Amplifier.

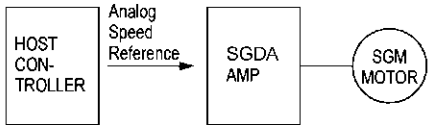
(Options available)

Speed reference input Torque reference input	Standard
Pulse train input	Standard

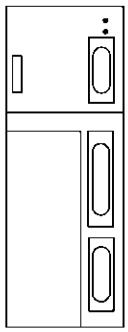
Note:
SGDA Servo Amplifiers shown in the table accept either analog (speed or torque) commands or digital (position) commands. The command reference cannot be changed by user constant.

- Speed Reference Input

Gives speed reference by analog voltage.



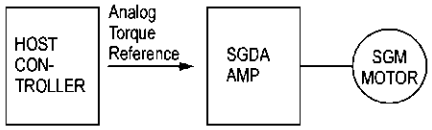
For speed/torque control



Can be changed by user constant setting or external input.

- Torque Reference Input

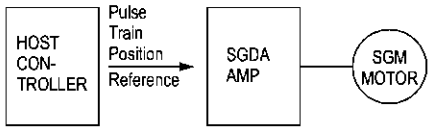
Gives torque reference by analog voltage.

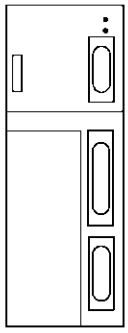


For position control

- Pulse Train Input

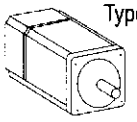
Gives position reference by pulse train. The same reference form as that of a stepping motor.



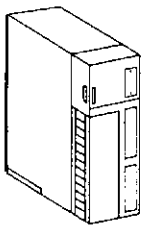


300W

Types: SGM-03LM
SGMP-03LM

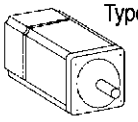


Types: SGDA-03BM

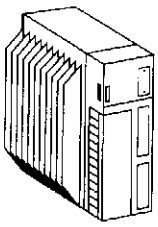


400W

Types: SGM-04UM
SGMP-04UM

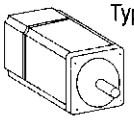


Types: SGDA-04AM

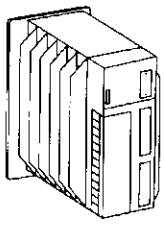


750W

Types: SGM-08UM
SGMP-08UM



Types: SGDA-08AM



Line-up

ENCODER

Select the most suitable encoder for feedback.

(Options available)

Incremental encoder 8192PPR	Standard
Absolute encoder 15 bits/rev (8192PPR)	Option

Since the frequency dividing function is built into the Sigma amplifier, any number of pulses can be set up for optional position control feedback.

BRAKE

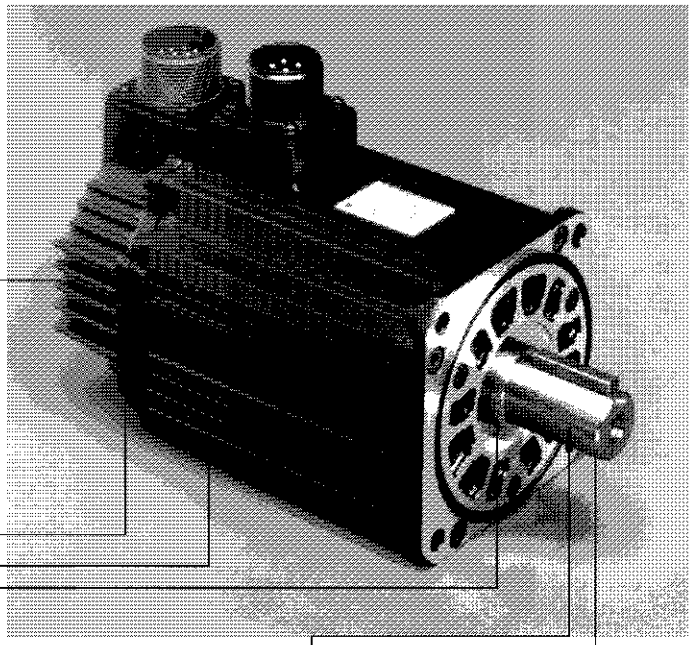
Failsafe magnetic brake for holding when power is OFF.

(Options available)

Without brake	Standard
With brake	Standard

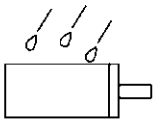
When "with brake" type is applied, a power supply for the brake is required.

SGMG/SGMS Sigma Series Servomotor



DRIP-PROOF PROVISION

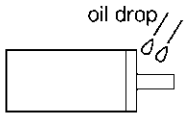
Protection: IP67 (excluding shaft)	Standard



SHAFT SEAL

(Options available)

Without shaft seal	Standard
With shaft seal (IP67)	Option



SHAFT SPECIFICATIONS

(Options available)

Straight with keyway	Standard

Straight with keyway

WITH GEAR

Gear ratio

1	1/5
2	1/10
3	1/25
4	1/50

COMBINATIONS OF SGMG SERVOMOTOR AND SGDB SERVO AMPLIFIER

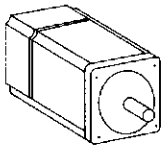
(Rated speed: 1500 RPM, 3000 maximum RPM)

0.45kW
Motor: SGMG-05AM
Amp.: SGDB-05ADG

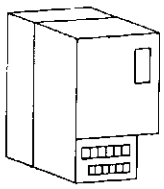
0.85kW
Motor: SGMG-09AM
Amp.: SGDB-10ADG

4.4kW
Motor: SGMG-44AM
Amp.: SGDB-44ADG

5.5kW
Motor: SGMG-55AM
Amp.: SGDB-60ADG



2.9kW
Motor: SGMG-30AM
Amp.: SGDB-30ADG



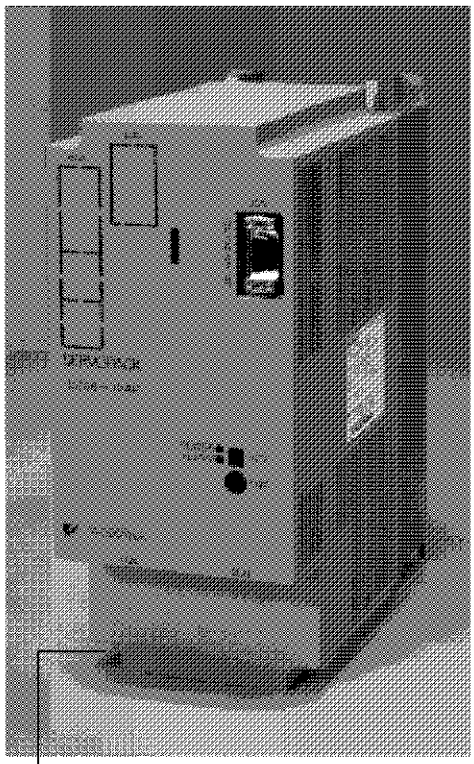
1.3kW
Motor: SGMG-13AM
Amp.: SGDB-15ADG

1.8kW
Motor: SGMG-20AM
Amp.: SGDB-20ADG

7.5kW
Motor: SGMG-75AM
Amp.: SGDB-75ADG

11kW
Motor: SGMG-1AAM
Amp.: SGDB-1AADG

SGDB Sigma Series Servo Amplifier



ACCEPTS INDUSTRY STANDARD INTERFACES

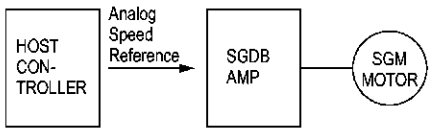
Select from the following 3 types of command reference forms according to the command reference form from host controllers to the SGDB Servo Amplifier.

(Options available)

Speed reference input	Select by setting user parameters or external input.
Torque reference input	
Pulse train input	

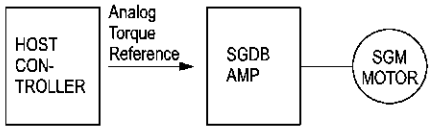
- Speed Reference Input

  Gives speed reference by analog voltage.



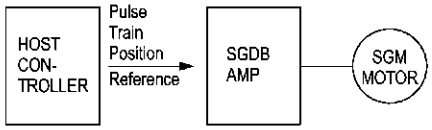
- Torque Reference Input

  Gives torque reference by analog voltage.

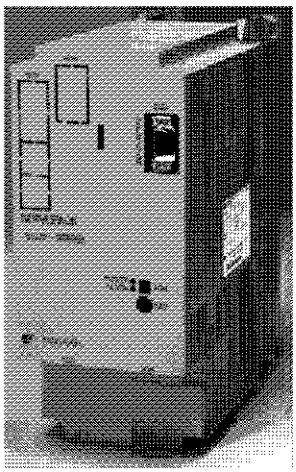


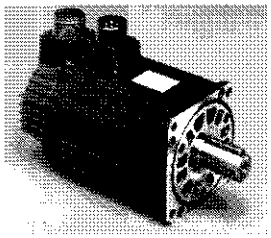
- Pulse Train Input

  Gives position reference by pulse train. The same reference form as that of a stepper motor.



For speed/torque position control





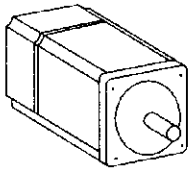
POWER SUPPLY VOLTAGE

Three-phase 200VAC Specifications
Three-phase 200 ~ 230VAC
+10 ~ -15%, 50/60Hz

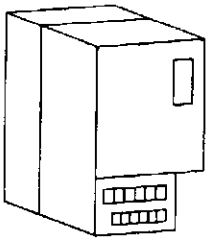
COMBINATIONS OF SGMS SERVOMOTOR AND SGDB SERVO AMPLIFIER

(Rated speed: 3000 RPM, 4500 maximum RPM)

1.0kW
Motor: SGMS-10A□
Amp.: SGDB-10ADG



1.5kW
Motor: SGMS-15A□
Amp.: SGDB-15ADG



2.0kW
Motor: SGMS-20A□
Amp.: SGDB-20ADG

3.0kW
Motor: SGMS-30A□
Amp.: SGDB-30ADG

4.0kW
Motor: SGMS-40A□
Amp.: SGDB-40ADG

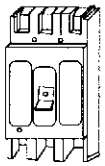
5.0kW
Motor: SGMS-50A□
Amp.: SGDB-50ADG

Peripheral Devices

SIGMA

The following diagram shows the typical configuration of Sigma series AC Servo Systems.

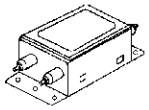
MOLDED-CASE CIRCUIT BREAKER (MCCB)



Protects the power supply line.

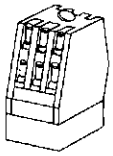
NOISE FILTER

Mounted to prevent external electrical noise from the power supply line.



TYPES: LF-205A (For SGDA-A3A, A5A01A, 02A, A3B, A5B, 01B)
LF-210 ((For SGDA-04A, 02B)
LF-220 (For SGDA-03B, 08A)

MAGNETIC CONTACTOR

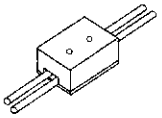


Servo power supply ON/OFF

Note: When applied, make sure to provide a coil surge suppressor.

BRAKING POWER SUPPLY *

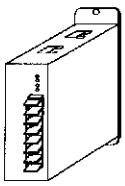
Types: LPSE-2H01 (200V input)
LPDE-1H01 (100V input)



Mounted when fail safe/holding brake is provided with SGM servomotor.

REGENERATIVE UNIT

Type: JUSP-RG08



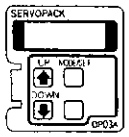
Note: Not required when load inertia is within the allowable range.

POWER SUPPLY
SINGLE-PHASE 200VAC OR
SINGLE-PHASE 100VAC

DIGITAL OPERATOR

The following functions are performed. Three types of digital operators are available.

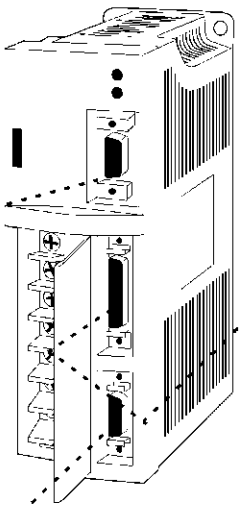
- User constants setting
- Run command
- Status display
- Alarm display



MOUNT TYPE (JUSP-OP03A)
Mounted directly on the SGDA Servo Amplifier

BRAKE POWER ON/OFF RELAY

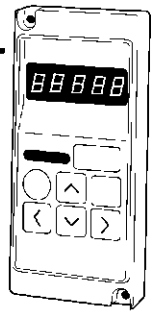
Sigma Series
SGDA Servo Amplifier



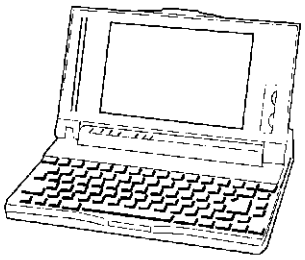
R
T
P
N
U
V
W

CONNECTOR

* For 90VDC brakes (i.e. motors for CE requirements only)



PERSONAL COMPUTER



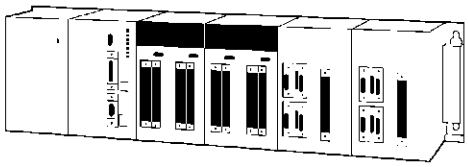
HAND HELD TYPE
(JUSP-OP02A-1)

Cable (1m, 3.3ft) is provided.

PLC CONTROLLER

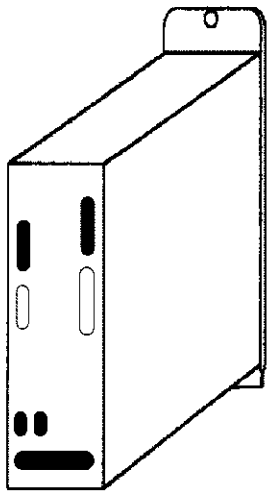
SGDA & SGDB Servo Amplifiers are compatible with most PLC motion controllers and indexers.

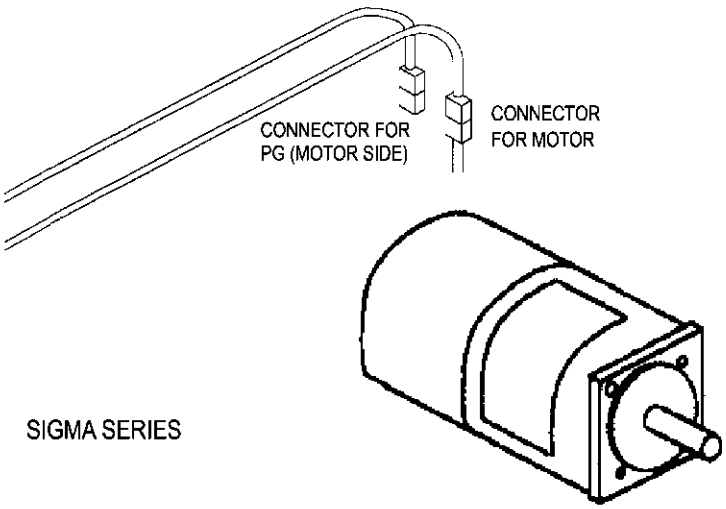
For command, analog input or pulse-train input is applied.



MOTION CONTROLLER

SMC-2000 Single/Multi-axis motion controller comes with Y-Term Windows®-based software for programming, setup and trouble-shooting.





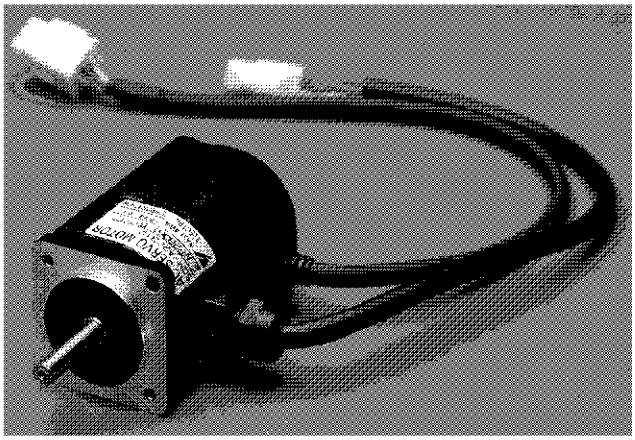
SIGMA SERIES

NOTES

Super High Power Rate Series

SGM Servomotors - With Incremental / Absolute Encoder

Rated Output : 30W, 50W, 100W,
200W, 300W, 400W,
750W



For Additional Information	Page(s)
SGM Ratings & Specifications	12
SGM Speed/Torque Curves	13
SGM Dimensions	14 - 21
SGM Selection/Ordering Information	22 - 26
SGM Optional CE Selection	27 - 31
SGDA Ratings & Specifications	71 - 72
SGDA Dimensions	73 - 74

Design Features

1. **Compact**
   - Small sized motor
     Six frame sizes: up to 1,010 oz. in. peak torque.
     Smaller installation space for more compact machine designs.
2. **High Speed**
   - High power rating
     High power is achieved by minimizing the inertia of the motor.
     This increases the acceleration/deceleration rate and reduces positioning time.
   - Maximum rotation speed of 4500 rpm
     Increases maximum rotation speed and shortens positioning time.
   - Rated speed of 3000 rpm
3. **Encoders**
   - 2048 PPR incremental encoder standard
   - 1024 PPR absolute encoder (option)
4. **Enclosure**
   - Totally enclosed, self-cooled IP42 (not including shaft)
5. **Application Emphasis**
   - Compact, high torque to inertia ratio
   - Chip mounters
   - PCB drilling machines
   - Robots
   - Conveyors
   - Packaging
6. **Low Noise**
   - Adopting the IGBT power element eliminates irritating “metallic” sounds.
7. **Certified International Standards**
   - UL Recognized (File #: E165827), CE compliance (option)

Servomotor Ratings and Specifications

Time Rating: Continuous
Insulation: Class B
Vibration: 15μm or less
Withstand Voltage: 1500VAC
Insulation Resistance: 500VDC 10MΩ or more

Enclosure: Totally-enclosed, self-cooled
Ambient Temperature: 0 to 40°C
Ambient Humidity: 20 to 80% (non-condensing)
Rated Rotation Speed: 3000 rpm
Max. Rotation Speed: 4500 rpm

Excitation: Permanent magnet
Drive Method: Direct drive
Mounting: Flange-mounted
Applicable Encoder: Incremental encoder 2048PPR, Absolute encoder 12-bit 1024PPR

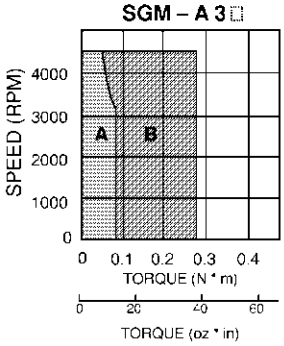
Applied Voltage	MOTORS: SGM-	Rated Output	Rated Torque		Instantaneous Peak Torque		Continuous Output Current *3	Maximum Output Current *3	Rated Angular Acceleration	Rated Power Rating *1
		W	N • m	oz • in	N • m	oz • in	A (rms)	A (rms)	rad/s^2	KW/s
200VAC	A3□	30 (0.04)	0.095	13.5	0.29	40.5	0.42	1.3	45200	4.36
	A5□	50 (0.07)	0.159	22.6	0.48	67.7	0.6	1.9	61200	9.63
	01□	100 (0.13)	0.318	45.1	0.96	135	0.87	2.8	79500	25.4
	02□	200 (0.27)	0.637	90.1	1.91	270	2.0	6.0	51800	32.8
	04□	400 (0.53)	1.27	181	3.82	542	2.6	8.0	66600	84.6
	08□	750 (1.01)	2.39	338	7.1	1010	4.4	13.9	35600	85.1
100VAC	A3□	30 (0.04)	0.095	13.5	0.29	40.5	0.63	2.0	45200	4.36
	A5□	50 (0.07)	0.159	22.6	0.48	67.7	0.9	2.9	61200	9.63
	01□	100 (0.13)	0.318	45.1	0.96	135	2.2	7.1	79500	25.4
	02□	200 (0.27)	0.637	90.1	1.91	270	2.7	8.4	51800	32.8
	03□	300 (0.40)	0.95	135	3.72	527	3.7	14.8	49700	47.3

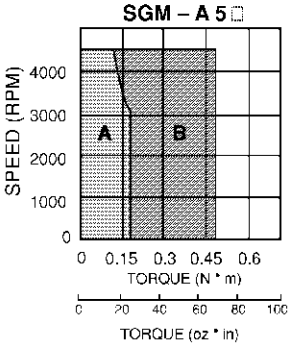
Applied Voltage	MOTORS: SGM-	Moment of Inertia (JM) *1								Allowable Load Inertia	
		Incremental Encoder w/o Brake		Incremental Encoder w/Brake		Absolute Encoder w/o Brake		Absolute Encoder w/Brake		*1	*2
		(GD^{2}M/4) kg • m^2	oz • in • s^2	(GD^{2}M/4) kg • m^2	oz • in • s^2	(GD^{2}M/4) kg • m^2	oz • in • s^2	(GD^{2}M/4) kg • m^2	oz • in • s^2	(=GD^{2}L/4) kg • m^2	(=GD^{2}L/4) oz • in • s^2
200VAC	A3□	0.021×10^{-4}	0.288×10^{-3}	0.030×10^{-4}	0.408×10^{-3}	0.046×10^{-4}	0.640×10^{-3}	0.055×10^{-4}	0.760×10^{-3}	0.63×10^{-4}	8.8×10^{-3}
	A5□	0.026×10^{-4}	0.368×10^{-3}	0.035×10^{-4}	0.488×10^{-3}	0.051×10^{-4}	0.720×10^{-3}	0.060×10^{-4}	0.840×10^{-3}	0.78×10^{-4}	11.0×10^{-3}
	01□	0.040×10^{-4}	0.576×10^{-3}	0.049×10^{-4}	0.696×10^{-3}	0.065×10^{-4}	0.928×10^{-3}	0.074×10^{-4}	1.05×10^{-3}	1.20×10^{-4}	17.0×10^{-3}
	02□	0.123×10^{-4}	1.74×10^{-3}	0.181×10^{-4}	2.56×10^{-3}	0.148×10^{-4}	2.09×10^{-3}	0.206×10^{-4}	2.91×10^{-3}	3.69×10^{-4}	52.2×10^{-3}
	04□	0.191×10^{-4}	2.71×10^{-3}	0.249×10^{-4}	3.53×10^{-3}	0.216×10^{-4}	3.06×10^{-3}	0.274×10^{-4}	3.88×10^{-3}	3.82×10^{-4}	54.1×10^{-3}
	08□	0.671×10^{-4}	9.52×10^{-3}	0.811×10^{-4}	11.5×10^{-3}	0.696×10^{-4}	9.87×10^{-3}	0.836×10^{-4}	11.9×10^{-3}	13.4×10^{-4}	189×10^{-3}
100VAC	A3□	0.021×10^{-4}	0.288×10^{-3}	0.030×10^{-4}	0.408×10^{-3}	0.046×10^{-4}	0.640×10^{-3}	0.055×10^{-4}	0.760×10^{-3}	0.63×10^{-4}	8.8×10^{-3}
	A5□	0.026×10^{-4}	0.368×10^{-3}	0.035×10^{-4}	0.488×10^{-3}	0.051×10^{-4}	0.720×10^{-3}	0.060×10^{-4}	0.840×10^{-3}	0.78×10^{-4}	11.0×10^{-3}
	01□	0.040×10^{-4}	0.576×10^{-3}	0.049×10^{-4}	0.696×10^{-3}	0.065×10^{-4}	0.928×10^{-3}	0.074×10^{-4}	1.05×10^{-3}	1.20×10^{-4}	17.0×10^{-3}
	02□	0.123×10^{-4}	1.74×10^{-3}	0.181×10^{-4}	2.56×10^{-3}	0.148×10^{-4}	0.209×10^{-3}	0.206×10^{-4}	2.91×10^{-3}	3.69×10^{-4}	52.2×10^{-3}
	03□	0.191×10^{-4}	2.71×10^{-3}	0.249×10^{-4}	3.53×10^{-3}	0.216×10^{-4}	3.06×10^{-3}	0.274×10^{-4}	3.88×10^{-3}	5.73×10^{-4}	81.1×10^{-3}

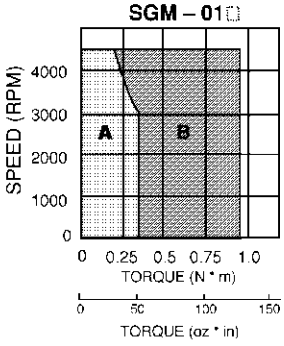
*1 Values show the types with incremental encoder without brake. When "with absolute encoder and brake" type is applied, values may be varied.
*2 JL (allowable load inertia) shows the range requiring no exterior regenerative unit. When these values are exceeded, application may be restricted or a regenerative unit may be required.
*3 Values when SERVOMOTOR is combined with SGDA Servo Amplifier.

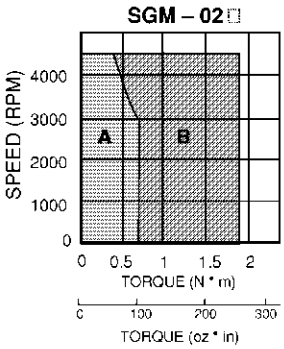
Speed / Torque Curves

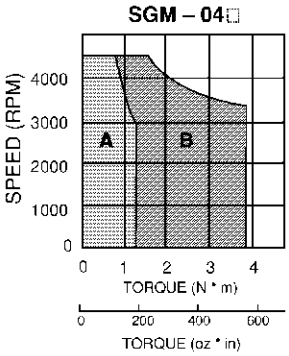
200V

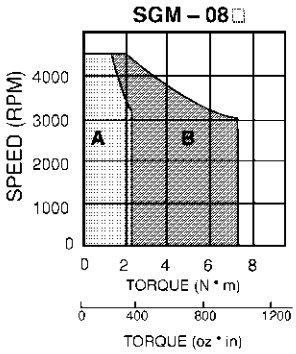




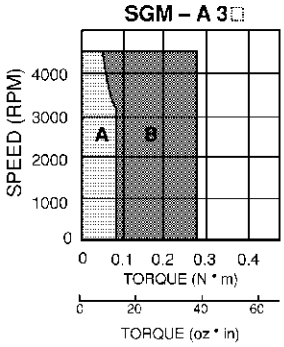


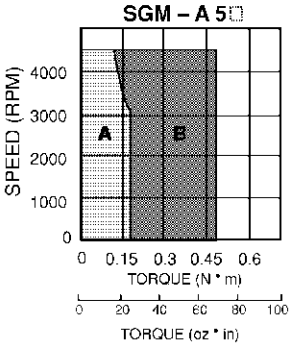


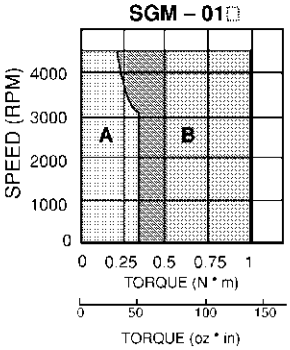


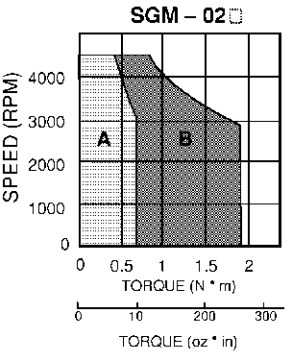


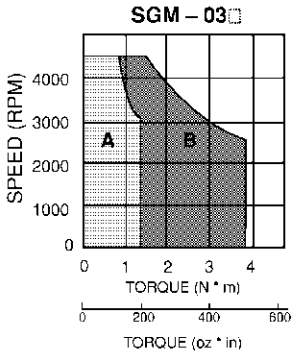
100V











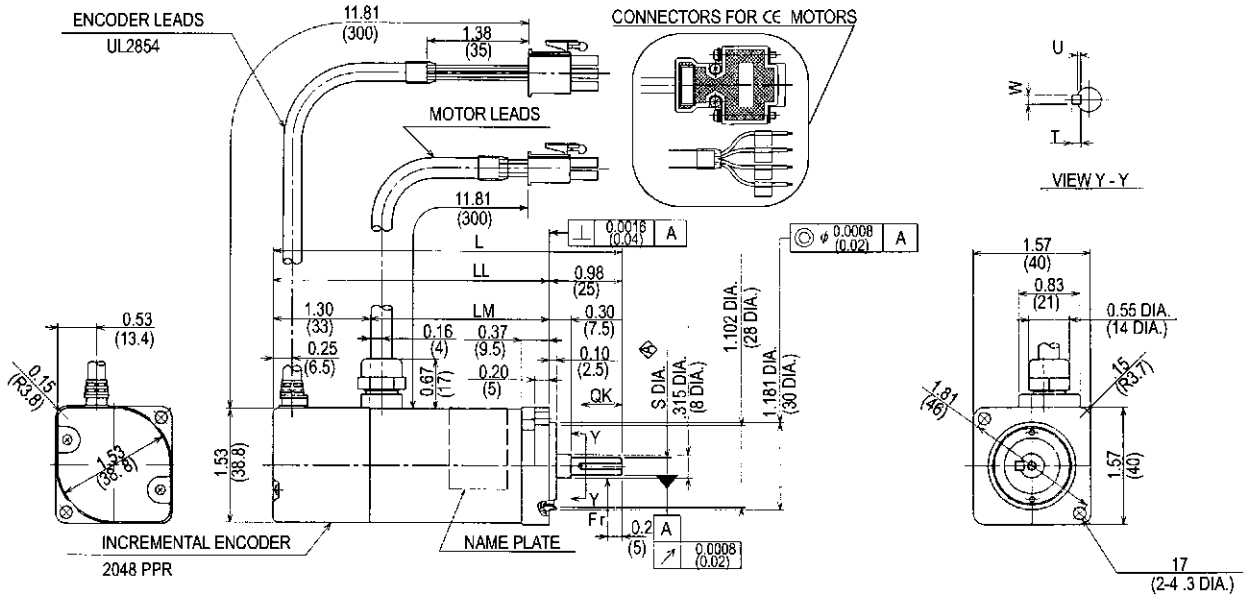
A : CONTINUOUS DUTY ZONE

B : INTERMITTENT DUTY ZONE

Dimensions in inches (mm)

(1) 2048 PPR Incremental Encoder, without Brake

- **30W (0.04HP), 50W (0.07HP), 100W (0.13HP)**

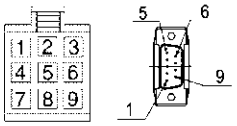


Type SGM-	L	LL	LM	S	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
A3□3B2L	3.72 (94.5)	2.74 (69.5)	1.44 (36.5)	0.24 (6)	Without Keyway				30 (0.04)	0.66 (0.3)	15 (68)	12 (54)
A3□3B4L					0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)				
A5□3B2L	4.02 (102)	3.03 (77)	1.73 (44)	0.24 (6)	Without Keyway				50 (0.07)	0.88 (0.4)	15 (68)	12 (54)
A5□3B4L					0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)				
01□3B2L	4.7 (119.5)	3.72 (94.5)	2.42 (61.5)	8 (0.31)	Without Keyway							
01□3B4L					0.55 (14)	0.07 (1.8)	0.12 (3)	0.12 (3)	100 (0.13)	1.10 (0.5)	17 (78)	12 (54)

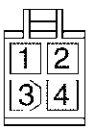
*Tolerance (S)

Dimensions	mm	6.8
	in	0.24, 0.31
Tolerance	mm	0 to -0.008
	in	0 to -0.0003

Connector Specifications



Plug: 172169-1 (Made by AMP)
Pin: 170359-1 or 170363-1
CE connector: 17JE-23090-02 (D8A)
(Made by DDK Ltd)

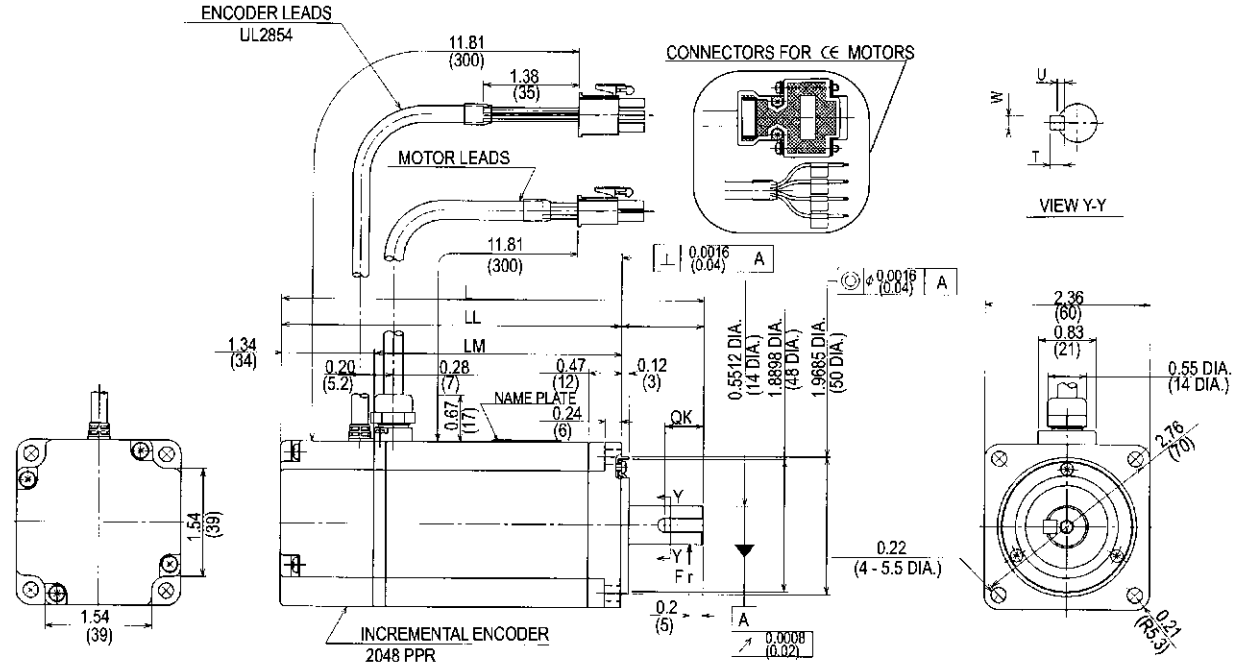


Plug: 172167-1 (Made by AMP)
Pin: 170359-1 or 170363-1

Incremental Encoder Connection		
1	Channel A Output	Blue
2	Channel $\overline{A}$ Ouput	Blue/Black
3	Channel B Output	Yellow
4	Channel $\overline{B}$ Output	Yellow/Black
5	Channel C Output	Green
6	Channel $\overline{C}$ Output	Green/Black
7	0V (Power Supply)	Grey
8	+5V (Power Supply)	Red
9	FG (Frame Ground)	Orange

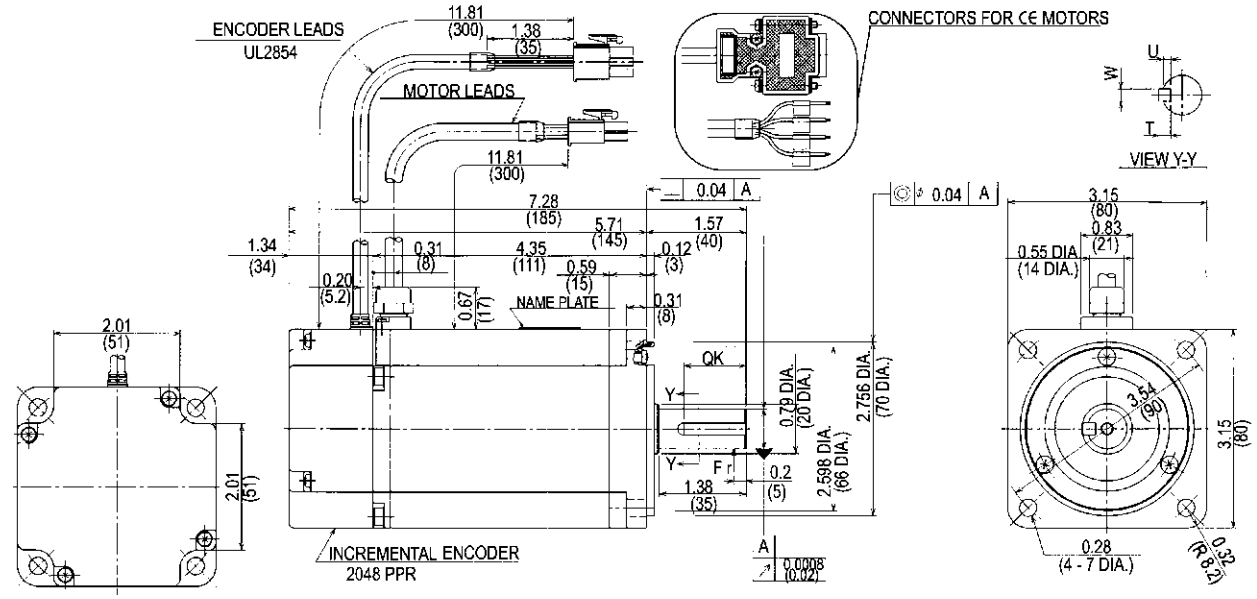
Motor Connection		
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG (Frame Ground)	Green

- **200W (0.27HP), 300W (0.4HP), 400W (0.53HP)**



Type SGM-	L	LL	LM	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
02□3B2L	4.98	3.8	2.46	Without Keyway				200	2.43	55 (245)	17 (74)
02□3B4L	(126.5)	(96.5)	(62.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.27)	(1.1)		
03□3B2L	6.08	4.9	3.56	Without Keyway				300	3.75	55 (245)	17 (74)
03□3B4L	(154.5)	(124.5)	(90.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.40)	(1.7)		
04□3B2L	6.08	4.9	3.56	Without Keyway				400	3.75	55 (245)	17 (74)
04□3B4L	(154.5)	(124.5)	(90.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.53)	(1.7)		

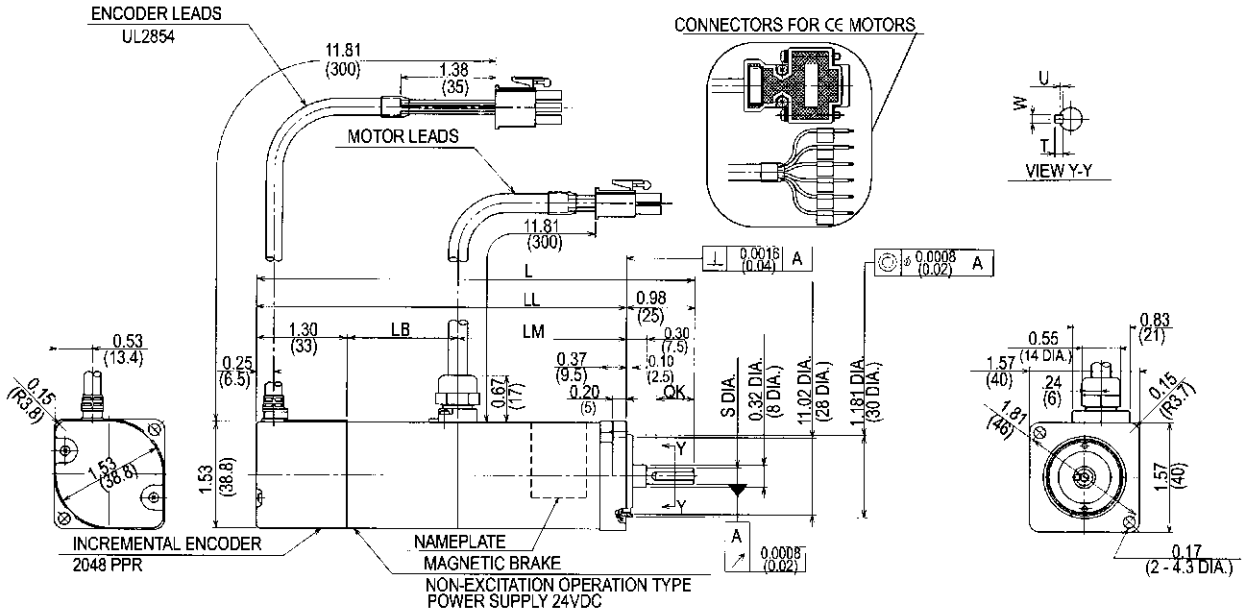
- **750W (1.01HP)**



Type SGM-	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
08□3B2L	Without Keyway				750	7.5	88 (392)	33 (147)
08□3B4L	0.98 (25)	0.12 (3)	0.2 (5)	0.2 (5)	(1.01)	(3.4)		

(2) 2048 PPR Incremental Encoder, with Brake

- **30W (0.04HP), 50W (0.07HP), 100W (0.13HP)**

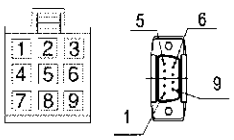


Type SGM-	L	LL	LM	LB	S	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
A3□3B2CL	4.96 (126)	3.98 (101)	1.44 (36.5)	1.24 (31.5)	0.24 (6)	Without Keyway				30 (0.04)	1.32 (0.6)	15 (68)	12 (54)
A3□3B4CL						0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)				
A5□3B2CL	5.26 (133.5)	4.27 (108.5)	1.73 (44.0)	1.24 (31.5)	0.24 (6)	Without Keyway				50 (0.07)	1.54 (0.7)	15 (68)	12 (54)
A5□3B4CL						0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)				
01□3B2CL	6.3 (160)	5.31 (135)	2.42 (61.5)	1.59 (40.5)	0.32 (8)	Without Keyway				100 (0.13)	1.76 (0.8)	18 (78)	12 (54)
01□3B4CL						0.55 (14)	0.07 (1.8)	0.12 (3)	0.12 (3)				

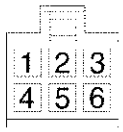
*Tolerance (S)

Dimensions	mm	6.8
	in	0.24, 0.31
Tolerance	mm	0 to -0.008
	in	0 to -0.0003

Connector Specifications



Plug: 172169-1 (Made by AMP)
Pin: 170359-1 or 170363-1
CE connector: 17JE-23090-02 (D8A)
(Made by DDK Ltd)

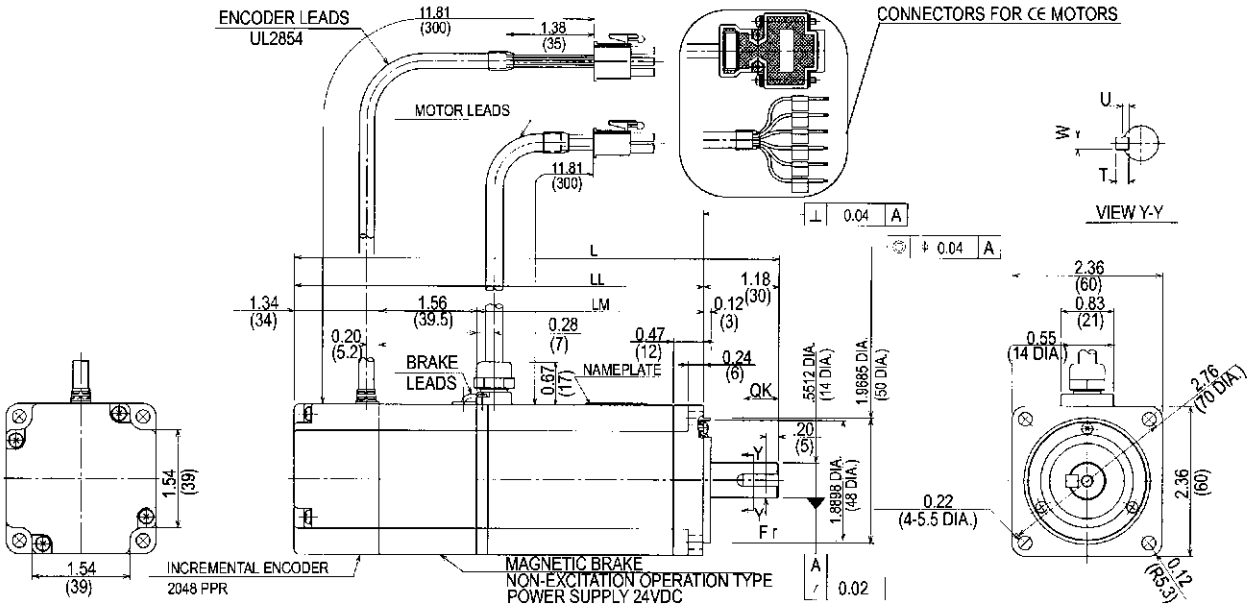


Plug: 172168-1 (Made by AMP)
Pin: 170359-1 or 170363-1

Incremental Encoder Connection		
1	Channel A Output	Blue
2	Channel $\overline{A}$ Ouput	Blue/Black
3	Channel B Output	Yellow
4	Channel $\overline{B}$ Output	Yellow/Black
5	Channel C Output	Green
6	Channel $\overline{C}$ Output	Green/Black
7	0V (Power Supply)	Grey
8	+5V (Power Supply)	Red
9	FG (Frame Ground)	Orange

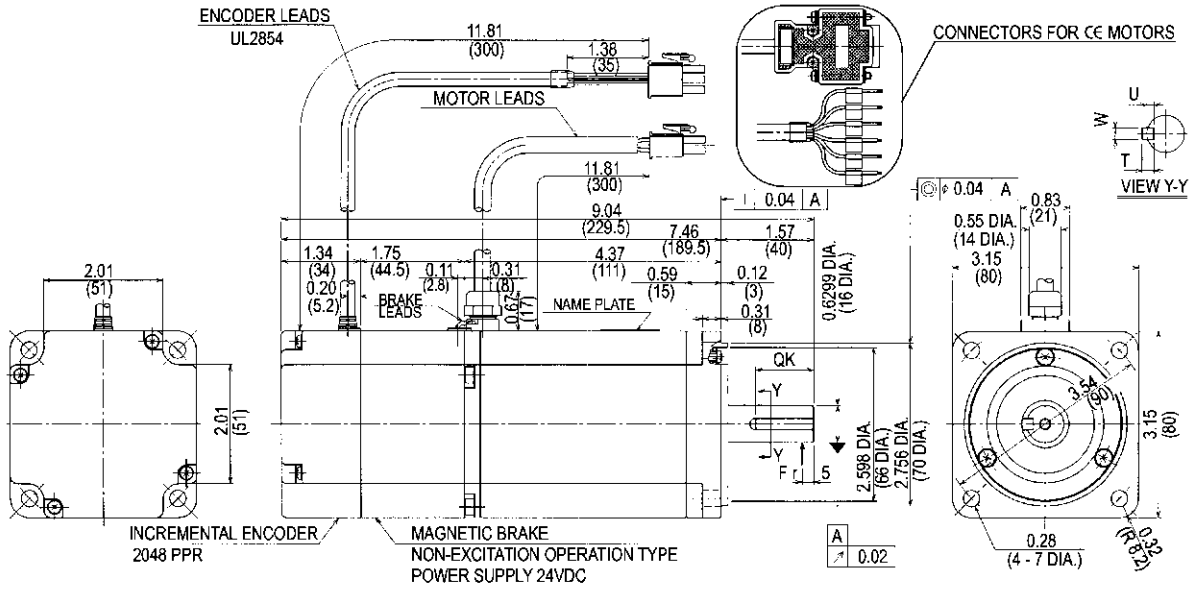
Motor Connection		
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG (Frame Ground)	Green
5	Brake Terminal	Red
6	Brake Terminal	Black

- **200W (0.53HP), 300W (0.40HP), 400W (0.27HP)**



Type SGM-	L	LL	LM	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
02□3B2CL	6.54	5.35	2.46	Without Keyway				200	3.53	55 (245)	17 (74)
02□3B4CL	(166)	(136)	(62.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.27)	(1.6)		
03□3B2CL	7.64	6.46	3.56	Without Keyway				400	4.85	55 (245)	17 (74)
03□3B4CL	(194)	(164)	(90.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.40)	(2.2)		
04□3B2CL	7.64	6.46	3.56	Without Keyway				400	4.85	55 (245)	17 (74)
04□3B4CL	(194)	(164)	(90.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.53)	(2.2)		

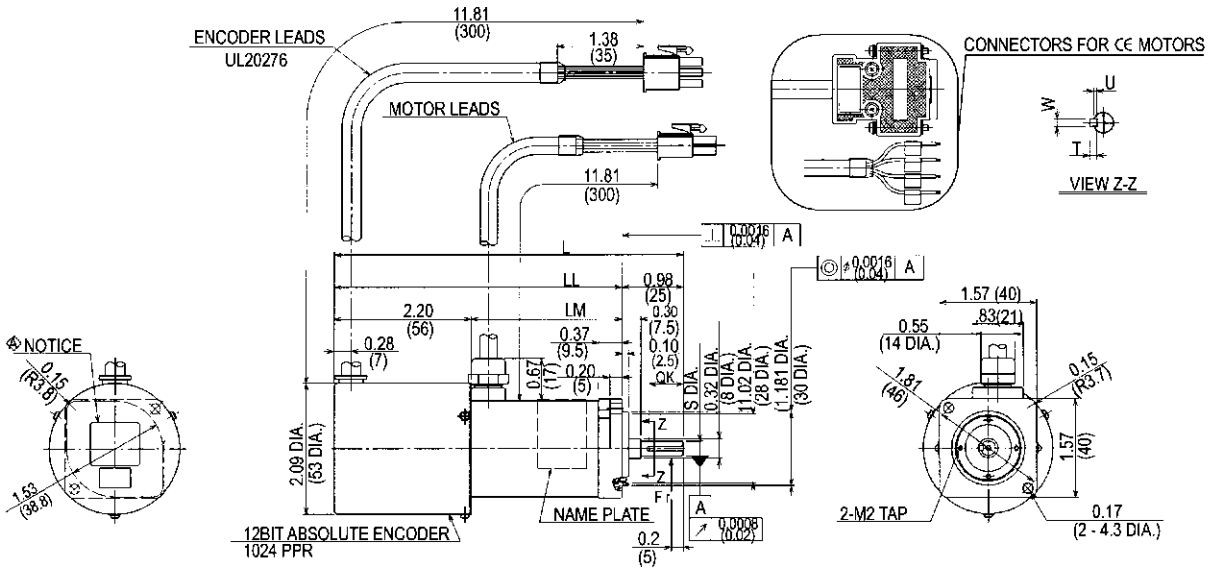
- **750W (1.01HP)**



Type SGM-	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
08□3B2CL	Without Keyway				750	9.48	88 (392)	33 (147)
08□3B4CL	0.98 (25)	0.12 (3)	0.2 (5)	0.2 (5)	(1.01)	(4.3)		

(3) 1024 PPR Absolute Encoder (12 bit), without Brake

- **30W (0.04HP), 50W (0.07HP), 100W (0.13HP)**

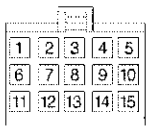


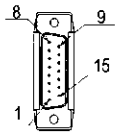
Type SGM-	L	LL	LM	S	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
A3□WB2L	4.63 (117.5)	3.64 (92.5)	1.44 (36.5)	0.24 (6)	Without Keyway				30 (0.04)	0.99 (0.45)	15.3 (68)	12.1 (54)
A3□WB4L					0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)				
A5□WB2L	4.92 (125)	3.94 (100)	1.73 (44)	0.24 (6)	Without Keyway				50 (0.07)	1.21 (0.55)	15 (68)	12.1 (54)
A5□WB4L					0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)				
01□WB4L	5.61 (142.5)	4.63 (117.5)	2.42 (61.5)	0.31 (8)	Without Keyway				100 (0.13)	1.21 (0.65)	17.5 (78)	12.1 (54)
01□WB4L					0.55 (14)	0.07 (1.8)	0.12 (3)	0.12 (3)				

*Tolerance (S)

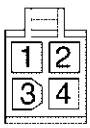
Dimensions	mm	6.8
	in	0.24, 0.31
Tolerance	mm	0 to -0.008
	in	0 to -0.0003

Connector Specifications





Plug: 172171-1 (Made by AMP)
Pin: 170359-1 or 170363-1
CE Connector: 17JE-23150-02 (D8A)



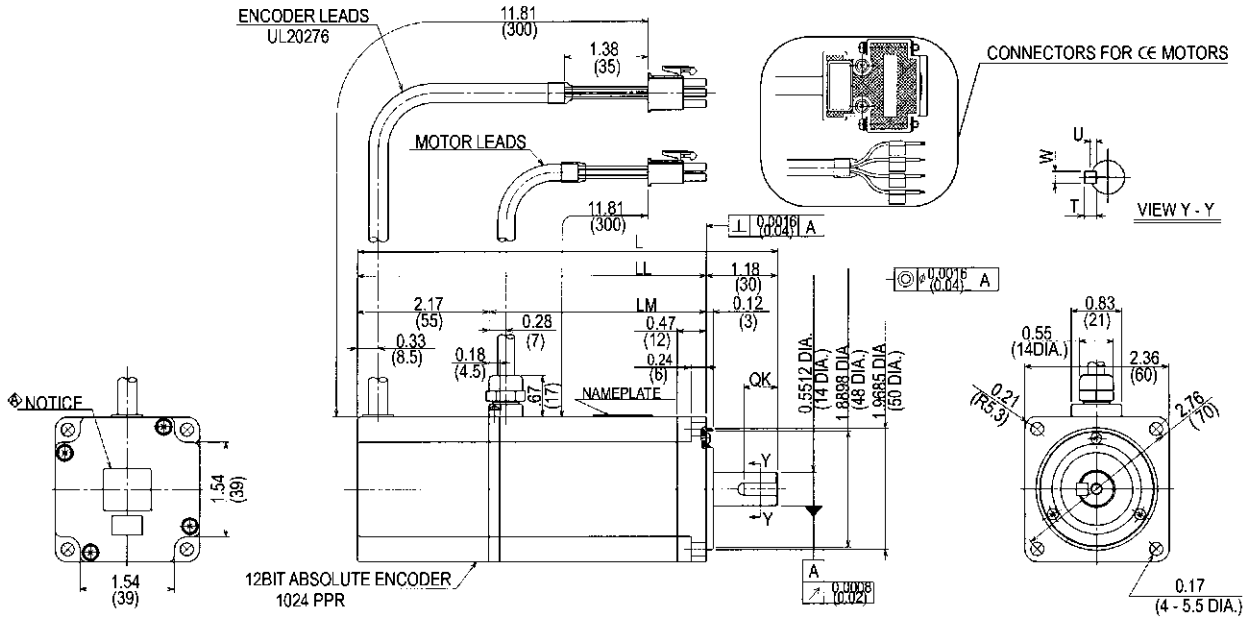
Plug: 172167-1 (Made by AMP)
Pin: 170359-1 or 170363-1

	Absolute Encoder Connection		
1	Channel A Output	Blue
2	Channel $\bar{A}$ Ouput	White/Blue
3	Channel B Output	Yellow
4	Channel $\bar{B}$ Output	White/Blue
5	Channel C Output	Green
6	Channel $\bar{C}$ Output	White/Green
7	0V (Power Supply)	Black
8	+5V (Power Supply)	Red
9	FG (Frame Ground)	Green/Yellow
10	Channel S Output	Purple
11	Channel $\bar{S}$ Output	White/Purple
* 12	(Capacitor)	(Grey)
13	Reset	White/Grey
14	0V (Battery)	White/Orange
15	3.6V (Battery)	Orange

* Do not use this terminal since this is used for the capacitor discharge terminal at shipment.

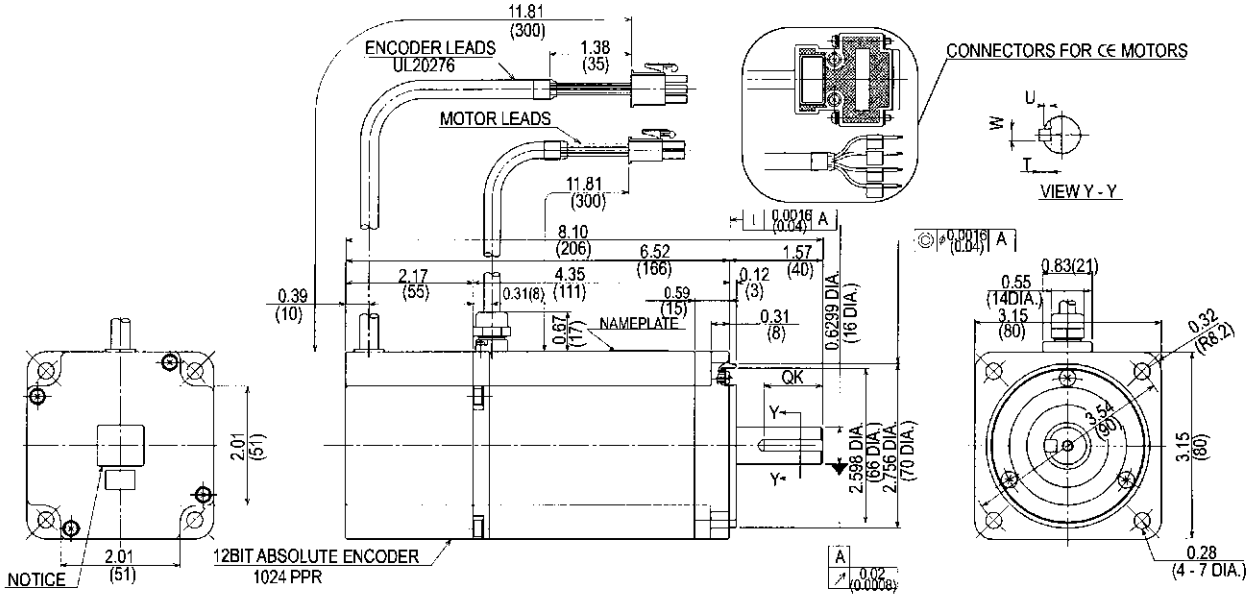
	Motor Connection	
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG (Frame Ground)	Green

- **200W (0.27HP), 300W (0.40HP), 400W (0.53HP)**



Type SGM-	L	LL	LM	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
02□WB2L	5.81	4.63	2.46	Without Keyway				200	2.65	55 (245)	16.6 (74)
02□WB4L	(147.5)	(117.5)	(62.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.27)	(1.2)		
03□WB2L	6.91	5.73	3.56	Without Keyway				300	3.97	55 (245)	16.6 (74)
03□WB4L	(175.5)	(145.5)	(90.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.40)	(1.8)		
04□WB2L	6.91	5.73	3.56	Without Keyway				400	3.97	55 (245)	16.6 (74)
04□WB4L	(175.5)	(145.5)	(90.5)	0.55 (14)	0.12 (3)	0.2 (5)	0.2 (5)	(0.53)	(1.8)		

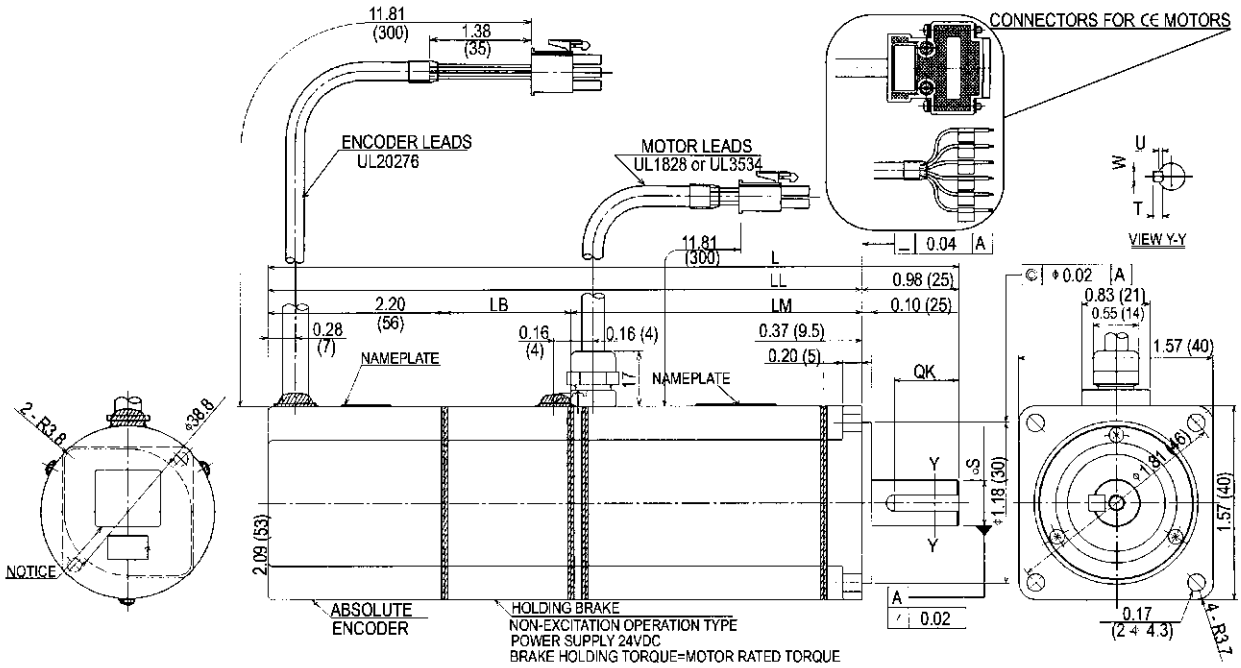
- **750W (1.01HP)**



Type SGM-	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
08□WB2L	Without Keyway				750	7.72	77 (343)	22 (98)
08□WB4L	0.98 (25)	0.12 (3)	0.2 (5)	0.2 (5)	(1.01)	(3.5)		

(4) 1024 PPR Absolute Encoder (12 bit), with Brake

- **30W (0.04HP), 50W (0.07HP), 100W (0.13HP)**

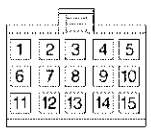


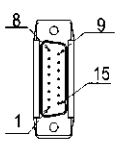
Type SGM-	L	LL	LM	LB	QK	U	W	T	S	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
A3□WB2CL	5.89 (149.5)	4.9 (124.5)	1.26 (32)	1.12 (28.5)	Without Keyway				0.24 (6)	30 (0.04)	1.65 (0.75)	11 (49)	4 (19)
A3□WB4CL					0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)					
A5□WB2CL	6.18 (157)	5.2 (132)	1.56 (39.5)	1.12 (28.5)	Without Keyway				0.24 (6)	50 (0.07)	1.87 (0.85)	15 (68)	4 (19)
A5□WB4CL					0.55 (14)	0.05 (1.2)	0.08 (2)	0.08 (2)					
01□WB2CL	7.22 (183.5)	6.24 (158.5)	2.24 (57)	1.48 (37.5)	Without Keyway				0.31 (8)	100 (0.13)	2.09 (0.95)	15 (68)	4 (19)
01□WB4CL					0.55 (14)	0.07 (1.8)	0.12 (3)	0.12 (3)					

*Tolerance (S)

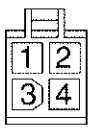
Dimensions	mm	6.8
	in	0.24, 0.31
Tolerance	mm	0 to -0.008
	in	0 to -0.0003

Connector Specifications





Plug: 172171-1 (Made by AMP)
Pin: 170359-1 or 170363-1
CE Connector: 17JE-23150-02 (D8A)



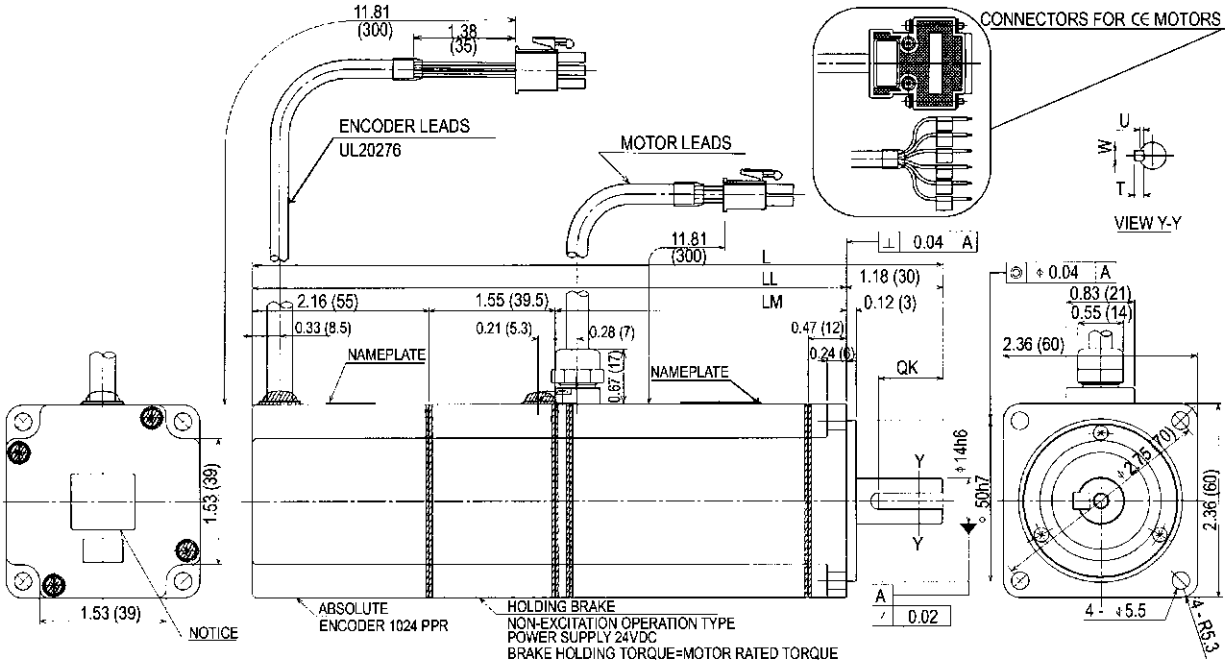
Plug: 172168-1 (Made by AMP)
Pin: 170359-1 or 170363-1

Absolute Encoder Connection		
1	Channel A Output	Blue
2	Channel $\bar{A}$ Ouput	White/Blue
3	Channel B Output	Yellow
4	Channel $\bar{B}$ Output	White/Blue
5	Channel C Output	Green
6	Channel $\bar{C}$ Output	White/Green
7	0V (Power Supply)	Black
8	+5V (Power Supply)	Red
9	FG (Frame Ground)	Green/Yellow
10	Channel S Output	Purple
11	Channel $\bar{S}$ Output	White/Purple
* 12	(Capacitor)	(Grey)
13	Reset	White/Grey
14	0V (Battery)	White/Orange
15	3.6V (Battery)	Orange

* Do not use this terminal since this is used for the capacitor discharge terminal at shipment.

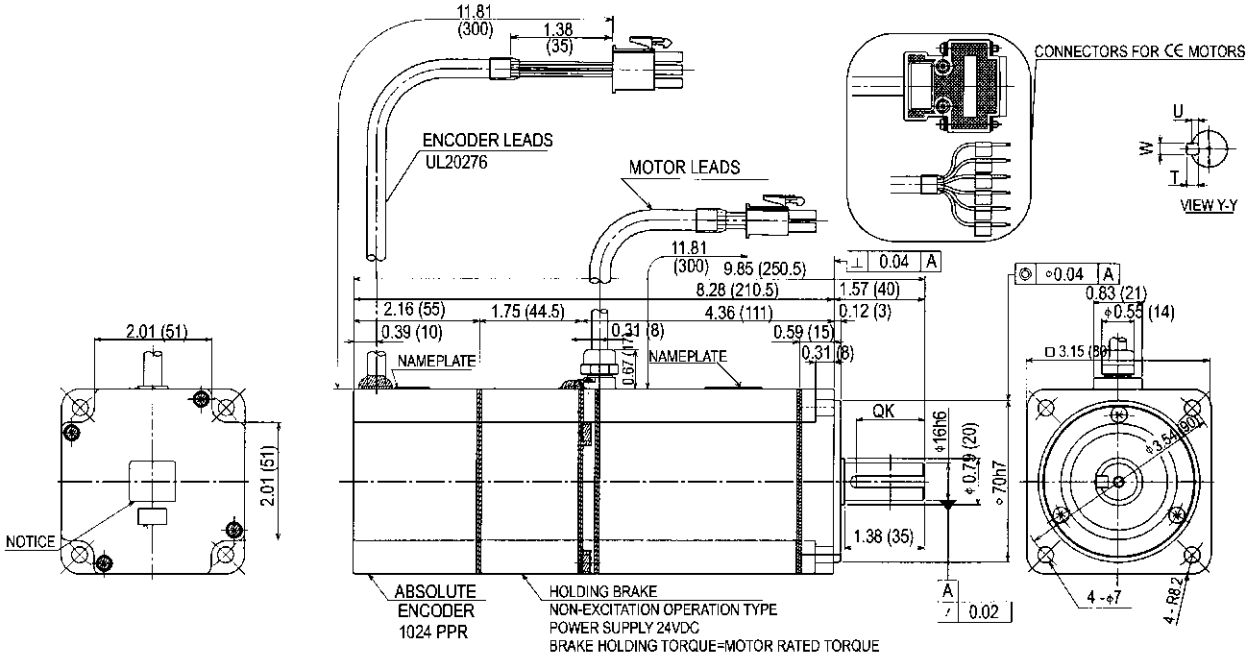
Motor Connection		
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG (Frame Ground)	Green
5	Brake Terminal	Red
6	Brake Terminal	Black

- **200W (0.27HP), 300W (0.40HP), 400W (0.53HP)**



Type SGM-	L	LL	LM	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
02□WB2CL	7.36	6.18	2.46	Without Keyway				200	3.75	55 (245)	16.6 (74)
02□WB4CL	(187)	(157)	(62.5)	0.79 (20)	0.12 (3)	0.2 (5)	0.2 (5)	(0.27)	(1.7)		
03□WB2CL	8.46	7.28	3.56	Without Keyway				300	5.07	55 (245)	16.6 (74)
03□WB4CL	(215)	(185)	(90.5)	0.79 (20)	0.12 (3)	0.2 (5)	0.2 (5)	(0.40)	(2.3)		
04□WB2CL	8.46	7.28	3.56	Without Keyway				400	5.07	55 (245)	16.6 (74)
04□WB4CL	(215)	(185)	(90.5)	0.79 (20)	0.12 (3)	0.2 (5)	0.2 (5)	(0.53)	(2.3)		

- **750W (1.01HP)**

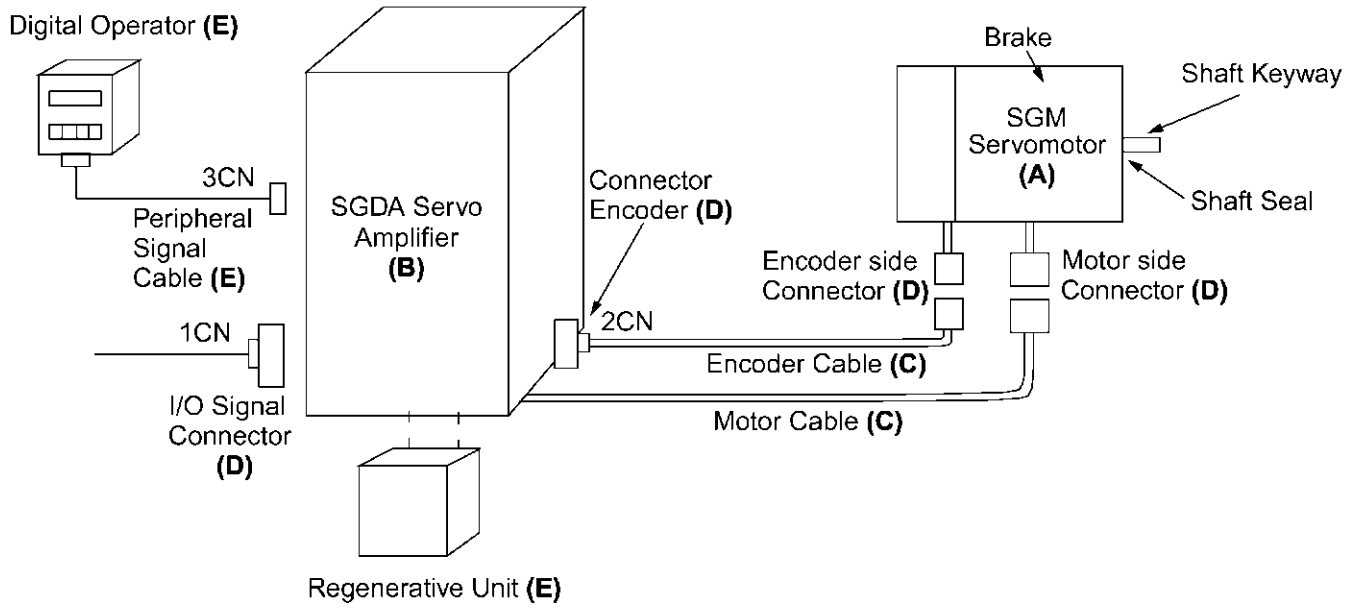


Type SGM-	QK	U	W	T	Output W (HP)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
08□WB2CL	Without Keyway				750	9.92	88 (392)	33 (147)
08□WB4CL	1.18 (30)	0.12 (3)	0.2 (5)	0.2 (5)	(1.01)	(4.5)		

Selecting Your SGM Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGM - 01 U 3 B 4 L

Sigma Servomotor Type

Rated Output
- A3: 30W (0.04HP)
- A5: 50W (0.07HP)
- 01: 100W (0.13HP)
- 02: 200W (0.25HP)
- 03: 300W (0.4HP)
- 04: 400W (0.5HP)
- 08: 750W (1HP)

Power Supply
- U: 200V UL Recognized
- L: 100V UL Recognized

Accessories
- L: Standard
- CL: Standard with 24VDC Brake
- SL: Standard with Shaft Seal
- EL: Standard with Brake & Shaft Seal

Shaft Specifications
- 4: Straight Shaft with Keyway
- 2: Straight Shaft without Keyway

Revision Level

Encoder Specifications
- 3: 2048PPR Incremental Encoder
- W: 1024PPR Absolute Encoder

Note: **Bold** items are Stock Products usually available from inventory. Contact your Yaskawa representative for delivery on all other items. Model number designation is provided for reference only.

Servomotor & Amplifier Selection

Use the table below to select the recommended SGM Sigma Servomotor and Amplifier.

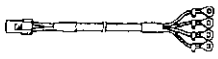
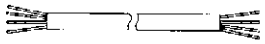
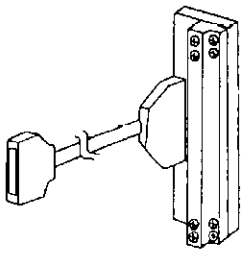
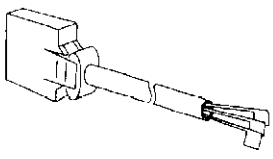
Description	Peak Torque (oz. in.)	Rated Torque (oz. in.)	Motor Inertia ($oz.in.sec^2 \times 10^{-3}$)	Motor MODEL # (A)	Amplifier MODEL # (B)*			Motor & Amplifier Item Class
					Analog Input SGDA-	Digital Input SGDA-	Analog/Digital Input SGDB-	
200V 1-Phase, 2048 PPR Incremental Encoder, Straight Shaft with Keyway	40.5	13.5	0.288	SGM-A3U3B4L	A3AS	A3AP	–	Non-Stock
			0.416	SGM-A3U3B4CL				
	67.7	22.6	0.368	SGM-A5U3B4L	A5AS	A5AP	–	
			0.496	SGM-A5U3B4CL				
	135	45.1	0.567	SGM-01U3B4L	01AS	01AP	–	Stock
			0.688	SGM-01U3B4CL				
	270	90.1	1.74	SGM-02U3B4L	02AS	02AP	–	
			2.58	SGM-02U3B4CL				
	542	181	2.7	SGM-04U3B4L	04AS	04AP	05ADG	
			3.52	SGM-04U3B4CL				
	1010	338	9.52	SGM-08U3B4L	08AS	08AP	10ADG	
			11.5	SGM-08U3B4CL				
100V 1-Phase, 2048 PPR Incremental Encoder, Straight Shaft without Keyway	40.5	13.5	0.288	SGM-A3L3B2L	A3BS	A3BP	–	Non-Stock
			0.416	SGM-A3L3B2CL				
	67.7	22.6	0.368	SGM-A5L3B2L	A5BS	A5BP	–	
			0.496	SGM-A5L3B2CL				
100V 1-Phase, 2048 PPR Incremental Encoder, Straight Shaft with Keyway	135	45.1	0.567	SGM-01L3B4L	01BS	01BP	–	Stock
			0.688	SGM-01L3B4CL				
	270	90.1	1.74	SGM-02L3B4L	02BS	02BP	–	
			2.58	SGM-02L3B4CL				
	542	181	2.7	SGM-03L3B4L	03BS	03BP	–	
			3.52	SGM-03L3B4CL				

Notes: 24VDC brakes for SGM Sigma servomotors are standard. Contact a local source for 24VDC power supplies.
Motor power and encoder cables are factory pre-wired with approximately 13" lead length with amplifier mating connectors.
Use the tables on the following page to specify mating connectors or pre-wired cables available in various lengths.
For technical information, request manual number TSE-S800-15 from your Yaskawa representative.

* For more detailed SGDA amplifier specifications and dimensions, refer to page 69.

Pre-wired Cable Selection

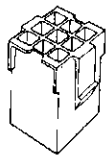
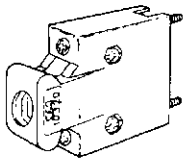
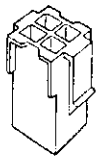
Use the table below to select Pre-wired Cables for your SGM Sigma Servomotor.

Cable Description **(C)**		Motor Size (kW)	Part Number	Comments	Item Class
Power Cable without Brake		All	DP9320081-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (standard) 4: 15 meters 5: 20 meters	Stock *
Power Cable with Brake			DP9320083-□		
Encoder Cable (incremental)			DP9320089-□		
Encoder Cable (absolute)			DP9320088-□		Limited Stock
Encoder Cable Only for Solder Connections			DP8409123	Up to 70 feet; for use with mating connector.	Stock
Encoder Cable Only for Solder Connections			DP8409179	Over 70 feet; splice cable to accommodate connector.	Stock
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA36P	35 mm din rail mountable; the cable length is 0.5 meters.	Non-Stock
Input/Output 1CN Cable with Pigtail Leads			DE9404859-□	Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	Stock *

* Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

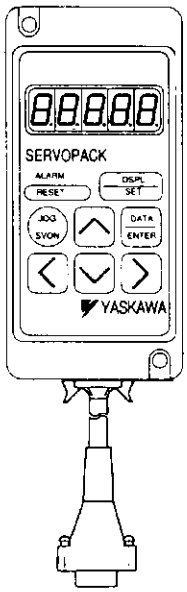
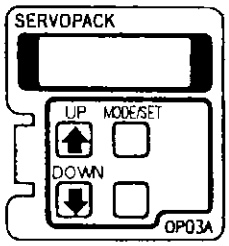
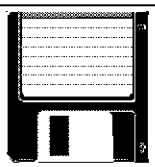
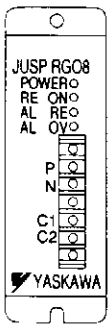
Connector Selection

Use the table below to select Mating Connectors or Kits for your SGM Sigma Servomotor.

Connector Description **(D)**		Motor Size (kW)	Part Number	Comments	Item Class
Motor (without Brake) and Incremental Encoder		All	DP9420006-1	These connector kits include mating connectors for motor power and motor encoder, and the amplifier 2CN encoder mating connector.	Stock
Motor (with Brake) and Incremental Encoder			DP9420006-2		
Motor (without Brake) and Absolute Encoder			DP9420006-3		
Motor (with Brake) and Absolute Encoder			DP9420006-4		Limited Stock
1CN Mating Connector			DP9420007	–	Stock

Peripheral Device Selection

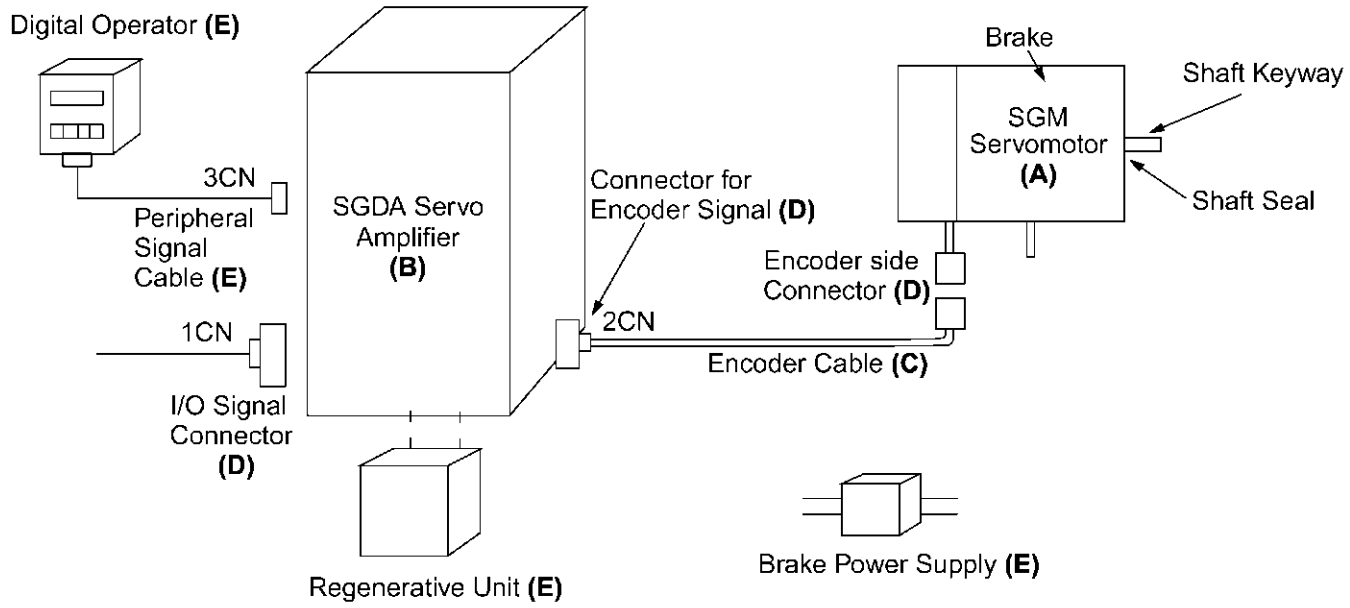
Use the table below to select Peripheral Devices for your SGM Sigma Servomotor.

Component Description **(E)**		Part Number	Comments	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	
Regenerative Unit		JUSP-RG08	60W capacity	
NEMA Flange Adapter		SGM-N23	For 30, 50 and 100W SGM only to NEMA 23 mounting standard	Limited Stock

Selecting Your SGM Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGM - 01 V 3 1 4 B

Sigma Servomotor Type

Rated Output
- A3: 30W (0.04HP)
- A5: 50W (0.07HP)
- 01: 100W (0.13HP)
- 02: 200W (0.25HP)
- 03: 300W (0.4HP)
- 04: 400W (0.5HP)
- 08: 750W (1HP)

Power Supply
- V: 200V CE Specification
- W: 100V CE Specification

Accessories
- B: 90VDC Brake
- S: Shaft Seal
- D: Brake & Shaft Seal

Shaft Specifications
- 4: Straight Shaft with Keyway
- 2: Straight Shaft without Keyway

Revision Level

Encoder Specifications
- 3: 2048PPR Incremental Encoder
- W: 1024PPR Absolute Encoder

Servomotor & Amplifier Selection

Use the table below to select the appropriate SGM Sigma Servomotor and Amplifier.

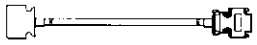
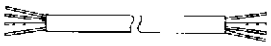
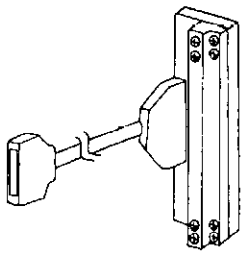
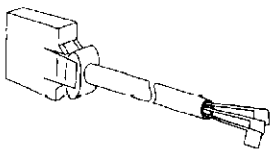
Description	Peak Torque (oz. in.)	Rated Torque (oz. in.)	Motor Inertia ($oz.in.sec^2 \times 10^{-3}$)	Motor MODEL # **(A)**	Amplifier MODEL # **(B)***			Motor Item Class
					Analog Input SGDA-	Digital Input SGDA-	Analog/Digital Input SGDB-	
200V 1-Phase, 2048 PPR Incremental Encoder, Straight Shaft with Keyway	40.5	13.5	0.288	SGM-A3V314	A3VS (Non-Stock)	A3VP (Non-Stock)	–	Non-Stock
			0.416	SGM-A3V314B				
	67.7	22.6	0.368	SGM-A5V314	A5VS (Non-Stock)	A5VP (Non-Stock)	–	
			0.496	SGM-A5V314B				
	135	45.1	0.567	SGM-01V314	01VS (Limited Stock)	01VP (Non-Stock)	–	Limited Stock
			0.688	SGM-01V314B				Non-Stock
	270	90.1	1.74	SGM-02V314	02VS (Limited Stock)	02VP (Non-Stock)	–	Limited Stock
			2.58	SGM-02V314B				Non-Stock
	542	181	2.7	SGM-04V314	04VS (Limited Stock)	04VP (Non-Stock)	05VD (Limited Stock)	Limited Stock
			3.52	SGM-04V314B				Non-Stock
	1010	338	9.52	SGM-08V314	08VS (Limited Stock)	08VP (Non-Stock)	10VD (Limited Stock)	Limited Stock
			11.5	SGM-08V314B				Non-Stock
100V 1-Phase, 2048 PPR Incremental Encoder, Straight Shaft without Keyway	40.5	13.5	0.288	SGM-A3W312L	A3WS (Non-Stock)	A3WP (Non-Stock)	–	Non-Stock
			0.416	SGM-A3W312B				
	67.7	22.6	0.368	SGM-A5W312L	A5WS (Non-Stock)	A5WP (Non-Stock)	–	
			0.496	SGM-A5W312B				
100V 1-Phase, 2048 PPR Incremental Encoder, Straight Shaft with Keyway	135	45.1	0.567	SGM-01W314	01WS (Limited Stock)	01WP (Non-Stock)	–	Limited Stock
			0.688	SGM-01W314B				Non-Stock
	270	90.1	1.74	SGM-02W314	02WS (Limited Stock)	02WP (Non-Stock)	–	Limited Stock
			2.58	SGM-02W314B				Non-Stock
	542	181	2.7	SGM-03W314	03WS (Limited Stock)	03WP (Non-Stock)	–	Limited Stock
			3.52	SGM-03W314B				Non-Stock

Notes: 90VDC Brakes for CE specification SGM Sigma servomotors are standard. Refer to the Peripheral Device Selection table (following page) to specify 90VDC power supplies.
Use the tables on the following page to specify encoder pre-wired cables and connectors.
For technical information, request technical document numbers PI-6022 and DE9409784 from your Yaskawa representative.

* For more detailed SGDA amplifier specifications and dimensions, refer to page 69.

Pre-wired Cable Selection

Use the table below to select Pre-wired Cables for your SGM Sigma Servomotor.

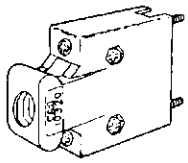
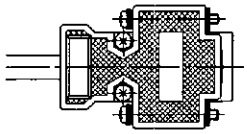
Cable Description **(C)**		Motor Size (kW)	Part Number	Comments	Item Class
Encoder Cable (incremental)		All	SMI-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters 4: 15 meters 5: 20 meters	Stock *
Encoder Cable (absolute)			SMA-□		Limited Stock
Encoder Cable Only for Solder Connections			DP8409123	Up to 70 feet; for use with mating connector.	Stock
Encoder Cable Only for Solder Connections			DP8409179	Over 70 feet; splice cable to accommodate connector.	Stock
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA36P	35 mm din rail mountable; the cable length is 0.5 meters.	Non-Stock
Input/Output 1CN Cable with Pigtail Leads			DE9404859-□	Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	Stock *

Notes: CE spec SGM servomotors come standard with 12" Pigtail power leads.

* Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

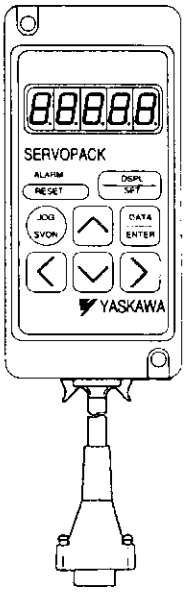
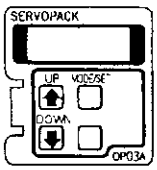
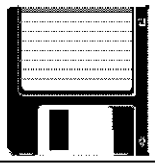
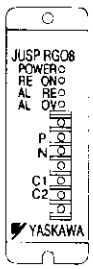
Mating Connector Selection

Use the table below to select Mating Connectors for your SGM Sigma Servomotor.

Connector Description **(D)**		Motor Size (kW)	Part Number	Comments	Item Class
1CN Mating Connector		All	DP9420007	Solder type with cover	Stock
2CN Encoder Cable Connector				Solder type connector case	
Incremental Encoder Cable Connector			17JE-13090-02 (D8A) + 17L-002A (x2)	Manufactured by Daichi Denshi Kougyo	
Absolute Encoder Cable Connector			17JE-13150-02 (D8A) + 17L-002A (x2)		

Peripheral Device Selection

Use the table below to select Peripheral Devices for your SGM Sigma Servomotor.

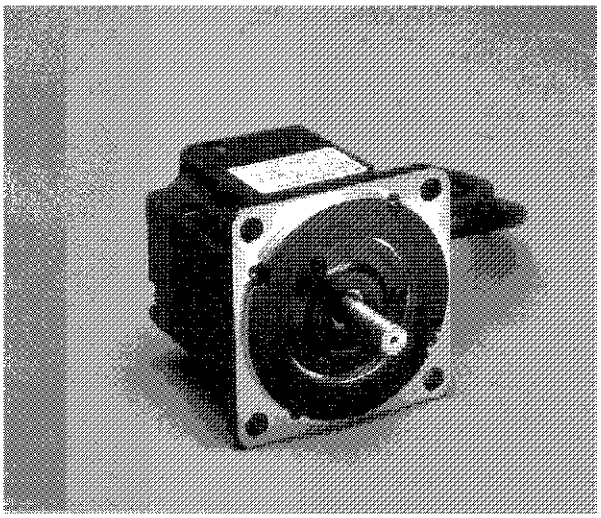
Component Description **(E)**		Part Number	Comments	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	
Regenerative Unit		JUSP-RG08	60W capacity	
100VDC Induction Brake Power Supply		LPDE-1H01	100 VAC Input	Stock
NEMA Flange Adapter		SGM-N23	For 30, 50 and 100W SGM only to NEMA 23 mounting standard	Limited Stock

NOTES

Flat Series

SGMP Servomotors - With Incremental / Absolute Encoder

Rated Output : 100W, 200W, 400W,
750W, 1500W



For Additional Information	Page(s)
SGMP Ratings & Specifications	34
SGMP Speed/Torque Curves	35
SGMP Dimensions	36 - 47
SGMP Selection/Ordering Information	48 - 52
SGMP Optional CE Selection	53 - 67
SGDA Ratings & Specifications	71 - 72
SGDA Dimensions	73 - 74

Design Features

1. **Compact**
   - The length is about 1/2 of our conventional motor
   - Enhanced withstand load since motor output shaft bearing size is upgraded
2. **Enhanced Environmental Resistance**
   - Water resistance, IP55 standard
   - Reinforced lead-out cable access
3. **Application Emphasis**
   - Chip mounters
   - PCB drilling machines
   - Robots
   - Conveyor
   - Packaging
4. **Certified International Standards**
   - UL Recognized (File #: E165827), CE compliance (option)

Servomotor Ratings and Specifications

Time Rating: Continuous
Insulation: Class B
Vibration: 15μm or less
Withstand Voltage: 1500VAC
Insulation Resistance: 500VDC 10MΩ or more
Enclosure: Totally-enclosed, self-cooled
Ambient Temperature: 0 to 40°C
Ambient Humidity: 20 to 80% (non-condensing)
Rated Rotation Speed: 3000 rpm
Max. Rotation Speed: 4500 rpm
Excitation: Permanent magnet
Drive Method: Direct drive
Mounting: Flange-mounted
Applicable Encoder: Incremental encoder 2048PPR, Absolute encoder 12-bit 1024PPR

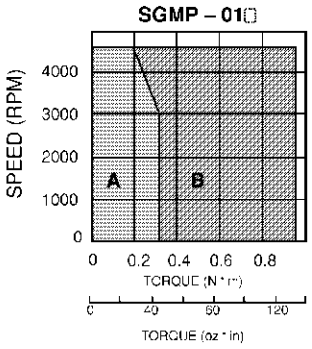
Applied Voltage	MOTORS: SGMP-	Rated Output	Rated Torque		Instantaneous Peak Torque		Continuous Output Current *3	Maximum Output Current *3	Rated Angular Acceleration	Rated Power Rating
		W (hp)	N • m	oz • in	N • m	oz • in	A (rms)	A (rms)	rad/s^2	KW/s
200VAC	01□	100 (0.13)	0.318	45.1	0.96	135	0.89	2.8	49200	15.7
	02□	200 (0.27)	0.637	90.1	1.91	270	2.0	6.0	30500	19.4
	04□	400 (0.54)	1.27	181	3.82	542	2.6	8.0	36700	46.8
	08□	750 (1.01)	2.39	338	7.1	1010	4.1	13.9	11300	26.9
	15□	1500 (2.01)	4.77	676	1.43	2027	7.5	28.0	11800	56.6
100VAC	01□	100 (0.13)	0.318	45.1	0.96	135	2.2	7.1	49200	15.7
	02□	200 (0.27)	0.637	90.1	1.91	207	2.7	8.4	30500	19.4
	03□	300 (0.40)	0.955	135	2.86	406	4.3	13.9	27500	26.3

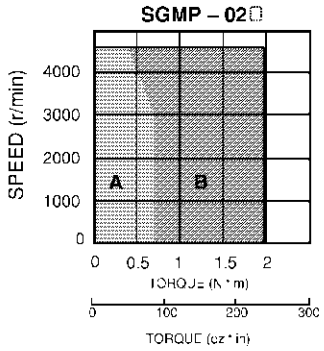
Applied Voltage	MOTORS: SGMP-	Moment Inertia (JM)								Allowable Load Inertia	
		Incremental Encoder w/o Brake		Incremental Encoder w/Brake		Absolute Encoder w/o Brake		Absolute Encoder w/Brake		*1	*2
		(GD^{2}M/4) kg • m^2	oz • in • s^2	(GD^{2}M/4) kg • m^2	oz • in • s^2	(GD^{2}M/4) kg • m^2	oz • in • s^2	(GD^{2}M/4) kg • m^2	oz • in • s^2	(=GD^{2}L/4) kg • m^2	(=GD^{2}L/4) oz • in • s^2
200VAC	01□	0.065×10^{-4}	0.917×10^{-3}	0.094×10^{-4}	1.46×10^{-3}	0.090×10^{-4}	1.27×10^{-3}	0.119×10^{-4}	1.81×10^{-3}	1.20×10^{-4}	17.0×10^{-3}
	02□	0.209×10^{-4}	2.96×10^{-3}	0.318×10^{-4}	4.35×10^{-3}	0.234×10^{-4}	3.31×10^{-3}	0.343×10^{-4}	4.70×10^{-3}	3.69×10^{-4}	52.3×10^{-3}
	04□	0.34×10^{-4}	4.92×10^{-3}	0.456×10^{-4}	6.31×10^{-3}	0.372×10^{-4}	5.27×10^{-3}	0.481×10^{-4}	6.66×10^{-3}	3.82×10^{-4}	54.1×10^{-3}
	08□	2.11×10^{-4}	29.9×10^{-3}	2.99×10^{-4}	35.7×10^{-3}	2.14×10^{-4}	30.3×10^{-3}	3.01×10^{-4}	36.1×10^{-3}	13.4×10^{-4}	190×10^{-3}
	15□	4.03×10^{-4}	57.1×10^{-3}	4.91×10^{-4}	67.8×10^{-3}	4.06×10^{-4}	57.5×10^{-3}	4.93×10^{-4}	68.2×10^{-3}	24.1×10^{-4}	341×10^{-3}
100VAC	01□	0.065×10^{-4}	0.917×10^{-3}	0.094×10^{-4}	1.46×10^{-3}	0.090×10^{-4}	1.27×10^{-3}	0.119×10^{-4}	1.81×10^{-3}	1.20×10^{-4}	17.0×10^{-3}
	02□	0.209×10^{-4}	2.96×10^{-3}	0.318×10^{-4}	4.35×10^{-3}	0.234×10^{-4}	3.31×10^{-3}	0.343×10^{-4}	4.70×10^{-3}	3.69×10^{-4}	52.3×10^{-3}
	03□	0.347×10^{-4}	4.92×10^{-3}	0.456×10^{-4}	6.31×10^{-3}	0.372×10^{-4}	5.27×10^{-3}	0.481×10^{-4}	6.66×10^{-3}	5.73×10^{-4}	81.1×10^{-3}

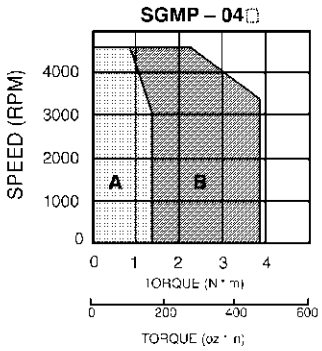
*1 Values show the types with incremental encoder without brake. When "with absolute encoder and brake" types is applied, values may be varied.
*2 JL (allowable load inertia) shows the range requiring no exterior regenerative unit. When these values are exceeded, application may be restricted or a regenerative unit may be required.
*3 Values when SERVOMOTOR is combined with SGDA Servo Amplifier.

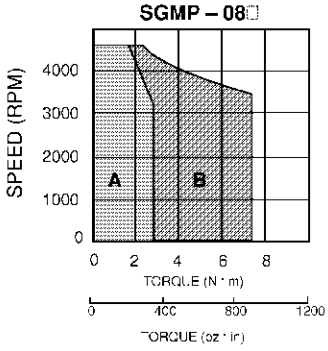
Speed / Torque Curves

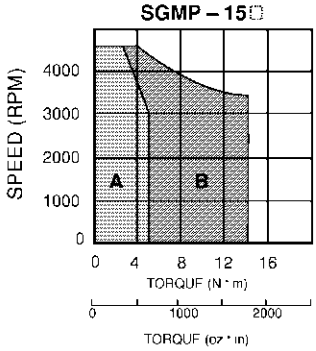
200V



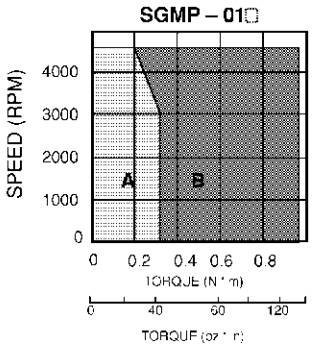


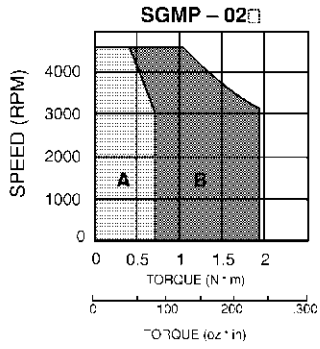


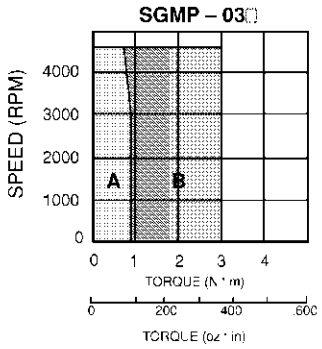




100V







A : CONTINUOUS DUTY ZONE

B : INTERMITTENT DUTY ZONE

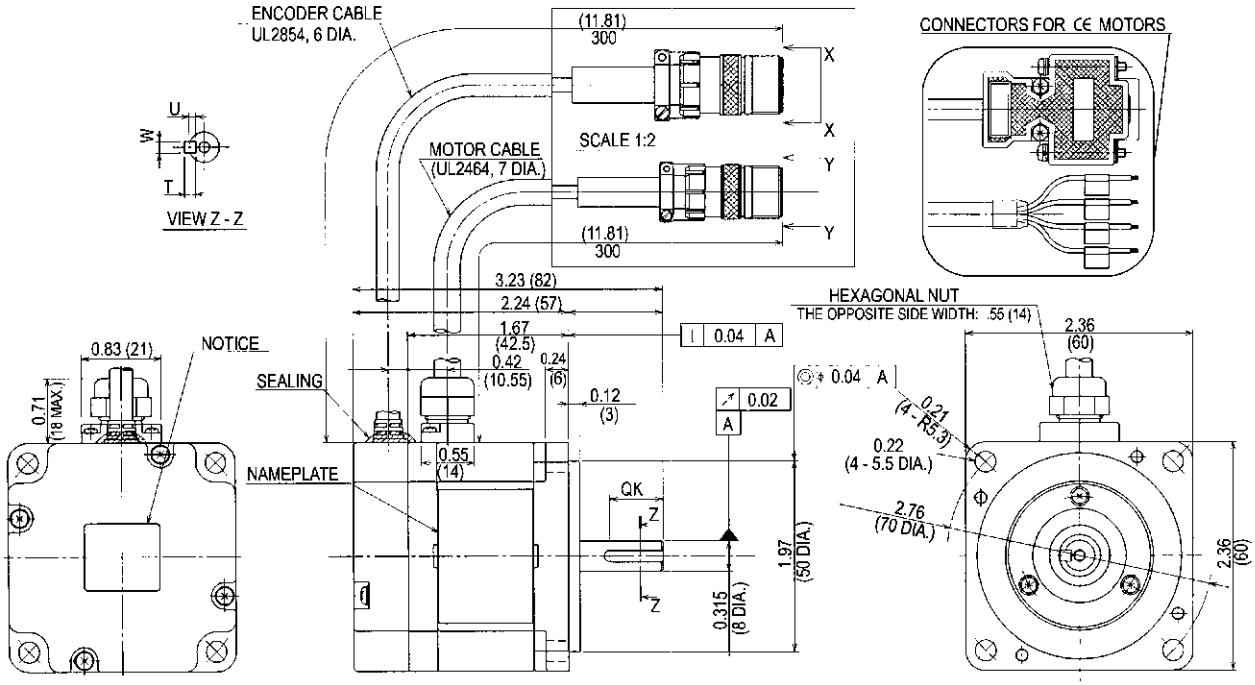
SGMP

Dimensions in inches (mm)

(1) 2048 PPR Incremental Encoder, without Brake

Note: 1. The keyway complies with JIS B1301-1976 (precision). A straight key is supplied.
2. The electromagnetic brake is only to hold the load in position and cannot be used to stop the motor.
3. Conforms to the IP55 enclosure (except connector and output shaft faces).
4. The quoted allowable radial load is the value at a position 5mm (0.2in) from the shaft end.

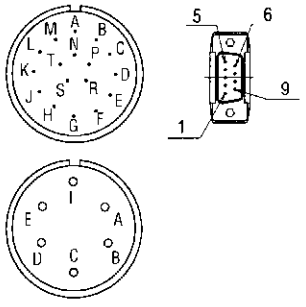
• 100W (0.13HP)



Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
01□312M	Without Keyway				100 (0.13)	0.318 (3.25)	Continuous	3000	1.54 (0.7)	17 (78)	11 (49)
01□314M	0.55 (14)	0.07 (1.8)	0.12 (3)	0.12 (3)							

Note: The quoted allowable radial load is the value at a position 0.79in (20mm.) from the mounting surface.
For CE, these will be "V" for 200V and "L" for 100V.

Connector Specifications



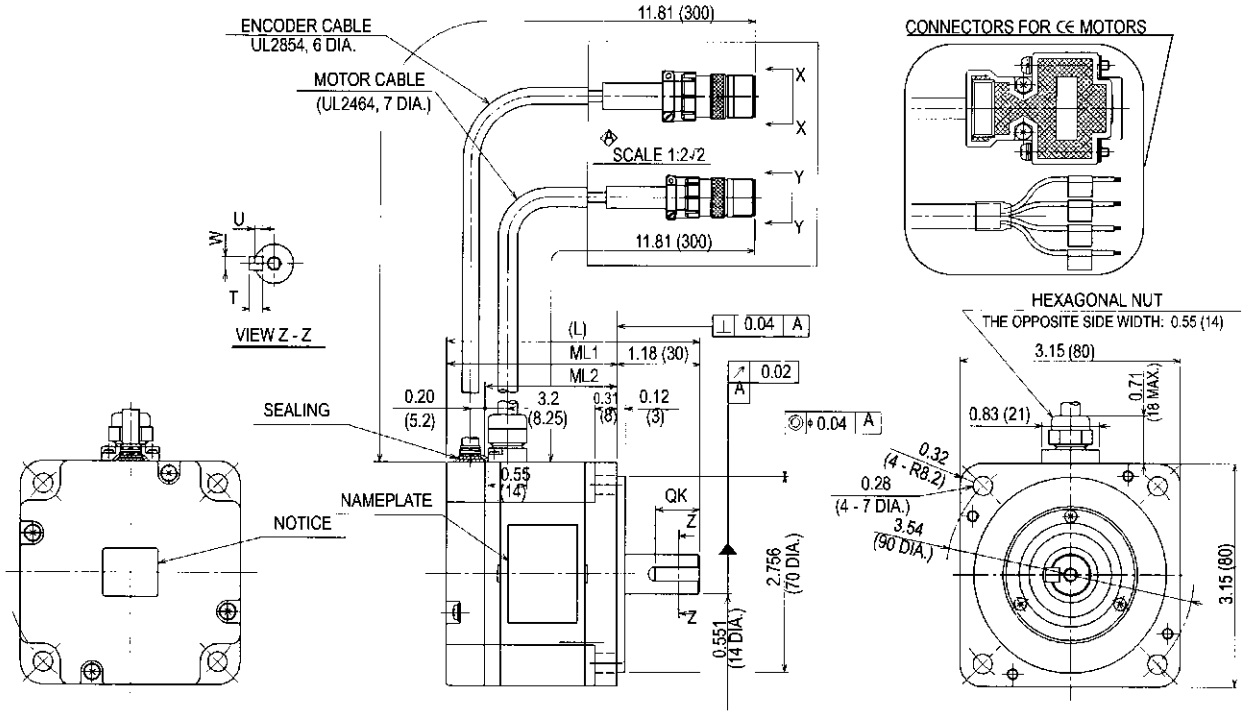
MS Connector: MS310A20-29P (DDK)
Cable Clamp: MS3057-12A
CE connector: 17JE-23090-02 (D8A)
(Made by DDK Ltd)

MS Connector: MS3101A18-12P
Cable Clamp: MS3057-10A (DDK)

Incremental Terminal Specifications		
1	Channel A Output	Blue
2	Channel $\overline{A}$ Ouput	Blue/Black
3	Channel B Output	Yellow
4	Channel $\overline{B}$ Output	Yellow/Black
5	Channel C Output	Green
6	Channel $\overline{C}$ Output	Green/Black
7	0V (Power Supply)	Grey
8	+5V (Power Supply)	Red
9	FG (Frame Ground)	Orange

Motor Wiring Specifications		
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG (Frame Ground)	Green

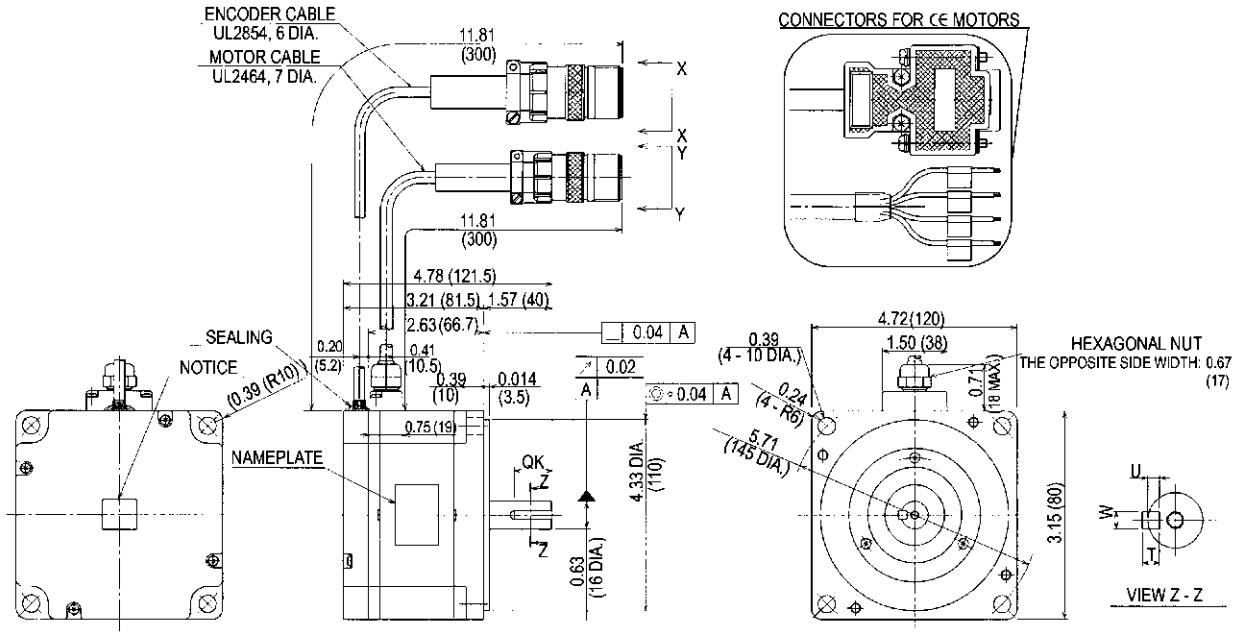
• 200W (0.27HP), 300W (0.40HP), 400W (0.53HP)



Type SGMP-	L	LL	LM	Key QK	Key U	Key W	Key T	Voltage V	Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
02□312M	3.62 (92)	2.44 (62)	1.89 (48.1)	Without Keyway				200	200 (0.27)	0.637 (6.49)	Continuous	3000	3.09 (1.4)	55 (245)	15 (68)
02□314M				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)								
03□312M	4.41 (112)	3.23 (82)	2.68 (68.1)	Without Keyway				100	300 (0.40)	0.95 (9.74)			4.63 (2.1)		
03□314M				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)								
04□312M				Without Keyway				200	400 (0.53)	1.27 (13.0)					
04□314M				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)								

Note: The quoted allowable radial load is the value at a position 0.98in. (25mm) from the mounting surface.

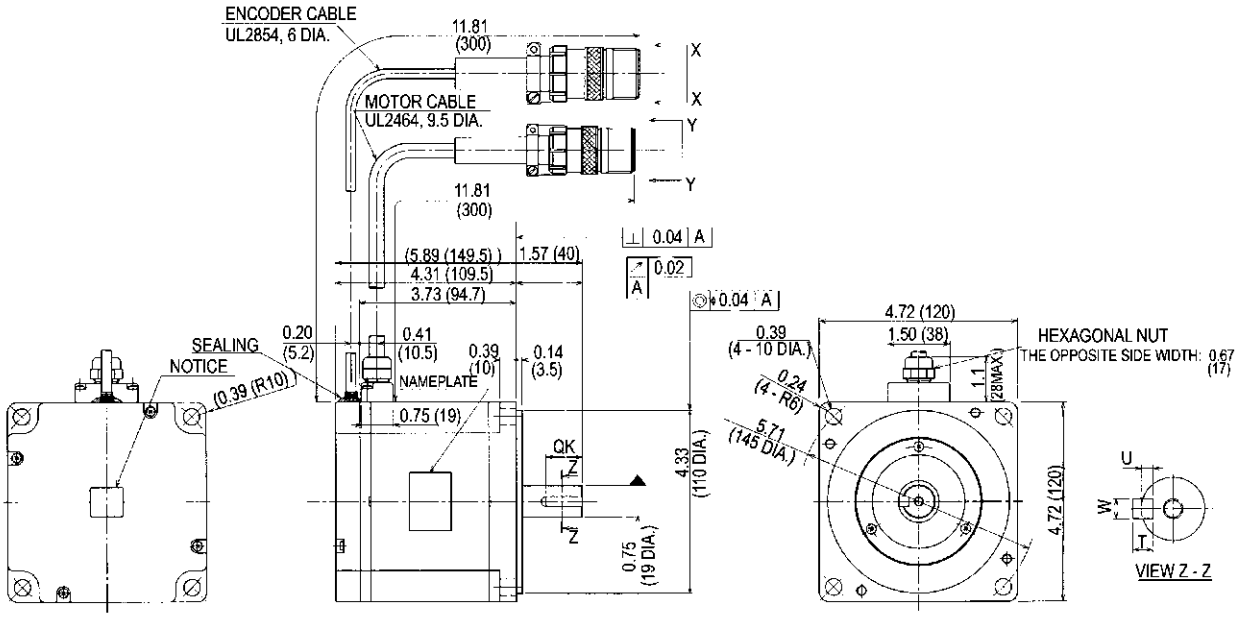
• 750W (1.01HP)



Type SGMP-	Key QK	Key U	Key W	Key T	Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
08□312M	Without Keyway				750 (1.01)	2.39 (24.3)	Continuous	3000	9.26 (4.2)	88 (392)	33 (147)
08□314M	0.87 (22)	0.12 (3)	0.20 (5)	0.20 (5)							

Note: The quoted allowable radial load is the value at a position 1.38in. (35mm) from the motor mounting surface.

- **1500W (2.0HP)**



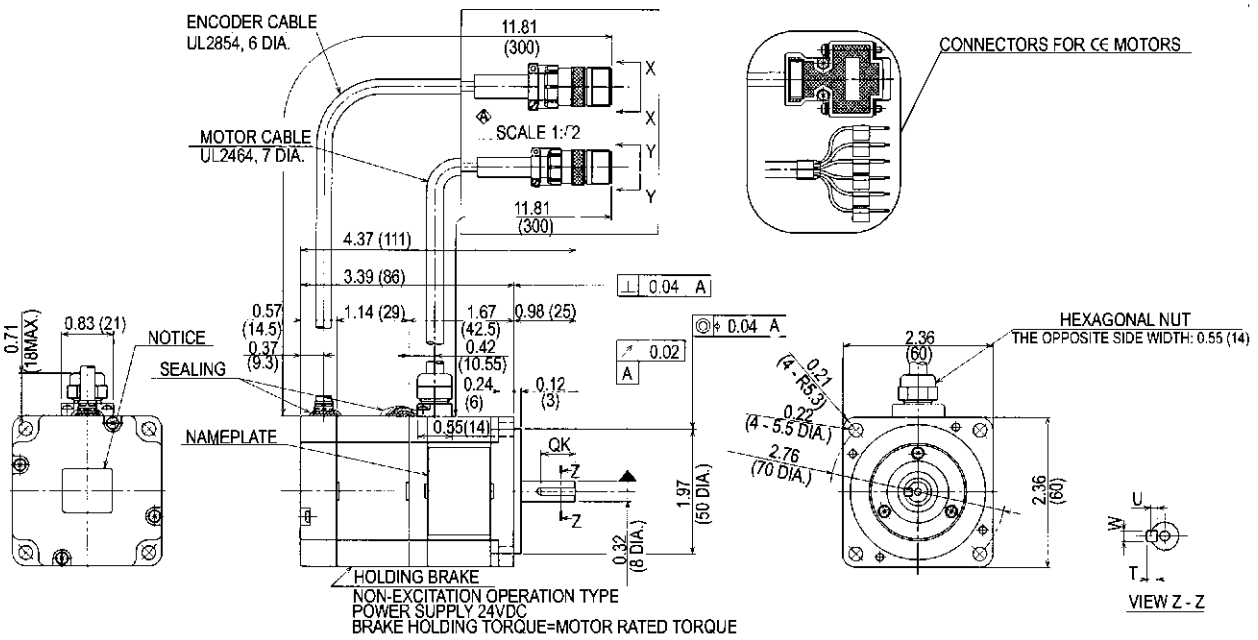
Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
15□312M	Without Keyway				1500 (2.0)	4.77 (48.7)	Continuous	3000	14.55 (6.6)	110 (490)	33 (147)
15□314M	0.87 (22)	0.14 (3.5)	0.24 (6)	0.24 (6)							

Note: The quoted allowable radial load is the value at a position 35mm (1.38in.) from the motor mounting surface.

(2) 2048 PPR Incremental Encoder, with Brake

Note: 1. The keyway complies with JIS B1301-1976 (precision). A straight key is supplied.
2. The electromagnetic brake is only to hold the load in position and cannot be used to stop the motor.
3. Conforms to the IP55 enclosure (except connector and output shaft faces)

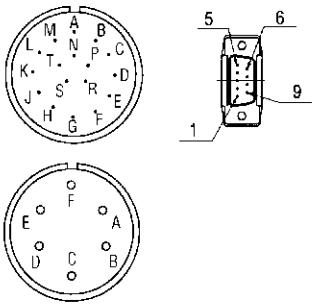
• 100W (0.13HP)



Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
01□312CM	Without Keyway				100 (0.13)	0.318 (3.25)	Continuous	3000	2.2 (0.9)	18 (78)	11 (49)
01□314CM	0.55 (14)	0.07 (1.8)	0.11 (3)	0.11 (3)							

Note: The quoted allowable radial load is the value at a position 0.79in. (20mm) from the motor mounting surface.

Connector Specifications



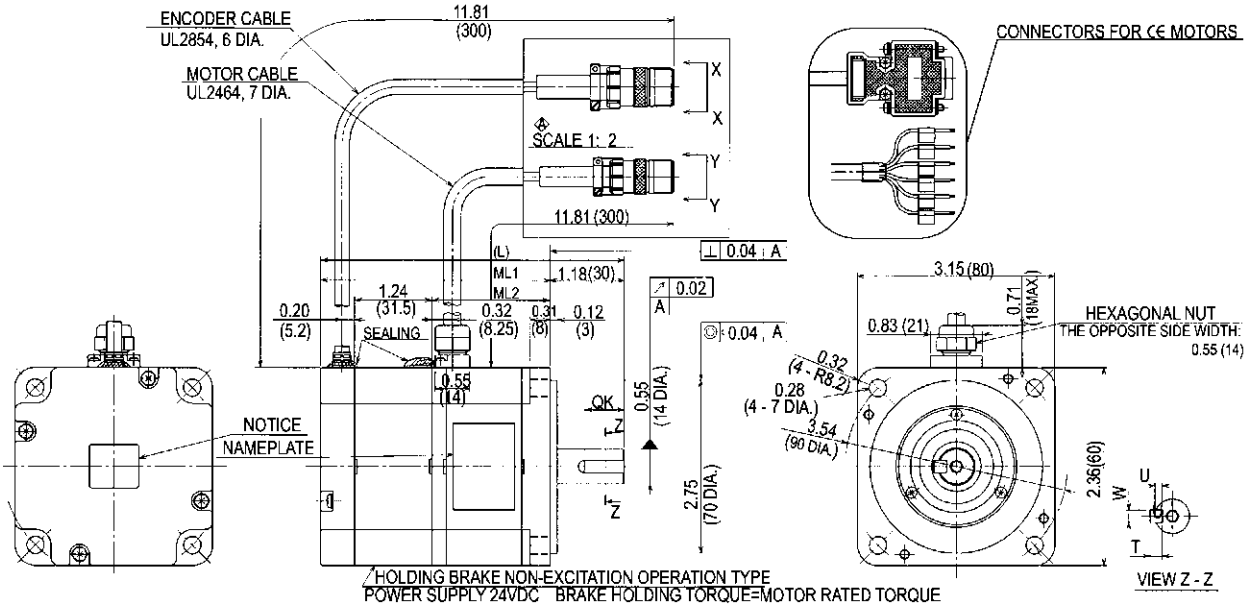
MS Connector: MS3101A20-29P (DDK)
Cable Clamp: MS3057-12A
CE connector: 17JE-23090-02 (D8A)
(Made by DDK Ltd)

MS Connector: MS3101A18-12P (DDK)
Cable Clamp: MS3057-10A

Incremental Terminal Specifications		
A	Channel A Output	Blue
B	Channel $\overline{A}$ Output	Blue/Black
C	Channel B Output	Yellow
D	Channel $\overline{B}$ Output	Yellow/Black
E	Channel C Output	Green
F	Channel $\overline{C}$ Output	Green/Black
G	0VDC	Grey
H	+5VDC	Red
J	Frame Ground	Orange
K	-	-

Motor Wiring Specifications		
A	U-phase	Red
B	V-phase	White
C	W-phase	Blue
D	FG	Green/Yellow
E	Brake	Black
F	Brake	Black

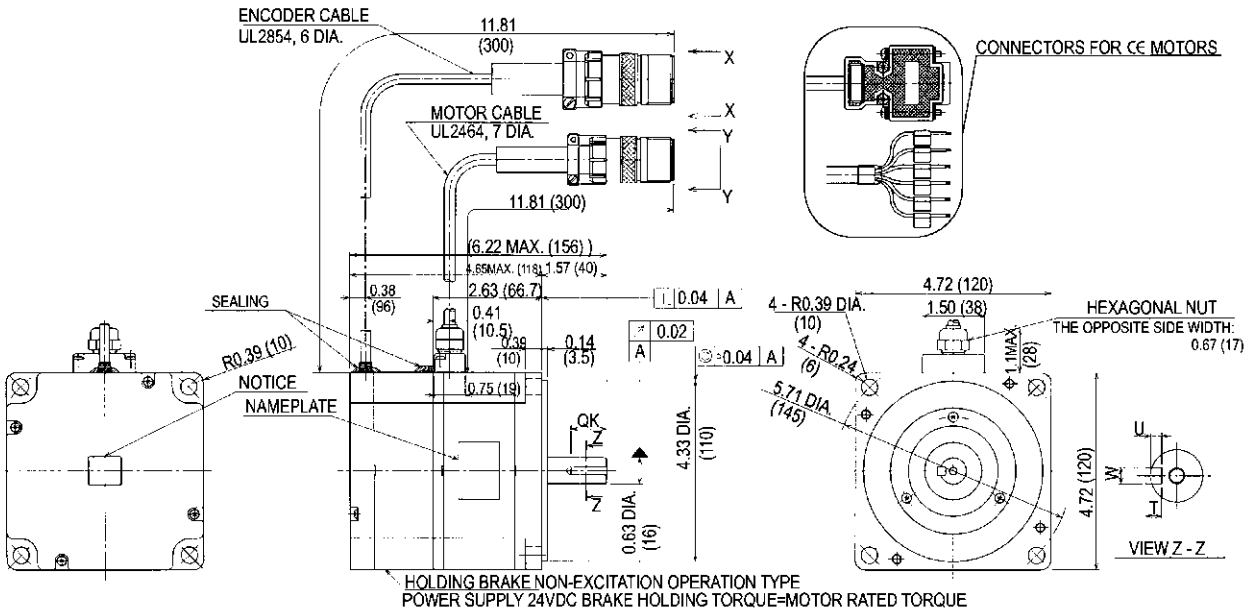
• 200W (0.27HP), 300W (0.40HP), 400W (0.53HP)



Type SGMP-	L	LL	LM	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
				QK	U	W	T							
02□312CM	4.86	3.68	1.89	Without Keyway				200	0.637 (6.49)	Continuous	3000	4.2 (1.9)	55 (245)	15 (68)
02□314CM	(123.5)	(93.5)	(48.1)	0.63 (16)	0.11 (3)	0.20 (5)	0.20 (5)	(0.27)						
03□312CM	5.65 (143.5)	4.47 (113.5)	2.68 (68.1)	Without Keyway				300	0.95 (9.74)			5.7 (2.6)		
03□314CM				0.63 (16)	0.11 (3)	0.20 (5)	0.20 (5)	(0.40)						
04□312CM				Without Keyway				400	1.27 (13.0)					
04□314CM				0.63 (16)	0.11 (3)	0.20 (5)	0.20 (5)	(0.53)						

Note: The quoted allowable radial load is the value at a position 0.98in. (25mm) from the motor mounting surface.

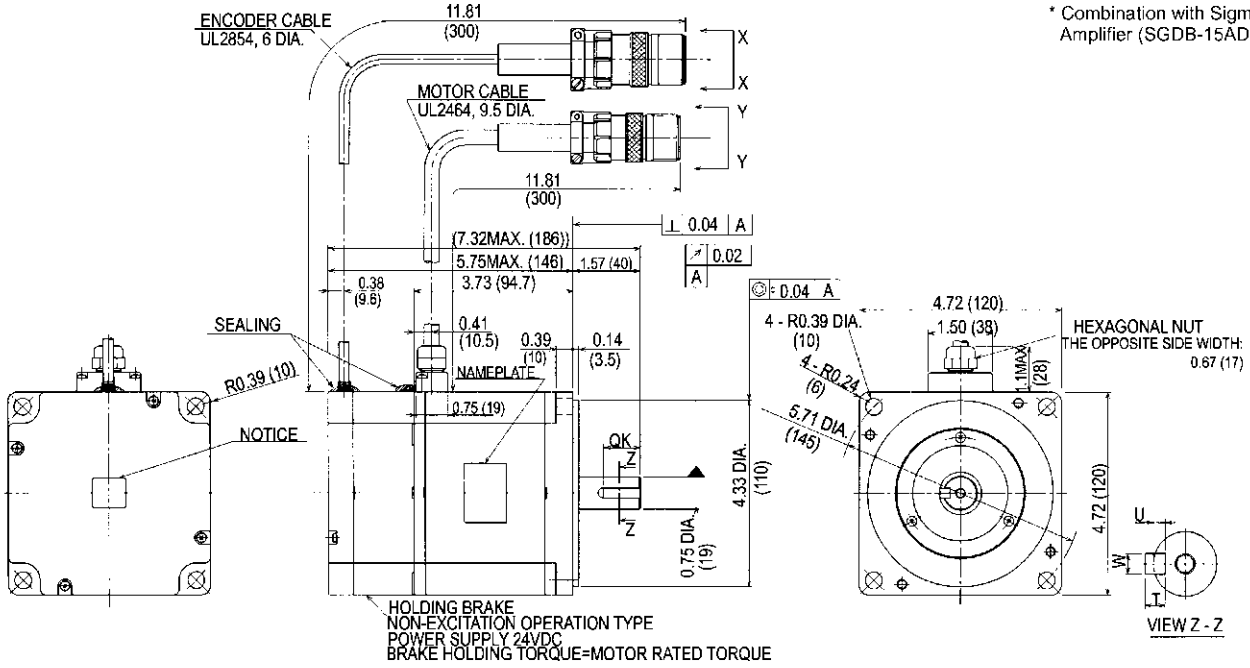
• 750W (1.01HP)



Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
08□312CM	Without Keyway				750 (1.01)	2.39 (24.3)	Continuous	3000	12.6 (5.7)	88 (392)	33 (147)
08□314CM	0.87 (22)	0.12 (3)	0.20 (5)	0.20 (5)							

Note: The quoted allowable radial load is the value at a position 20mm (0.79in.) from the motor mounting surface.

- **1500W (2.0HP)**



* Combination with Sigma Servo Amplifier (SGDB-15ADG)

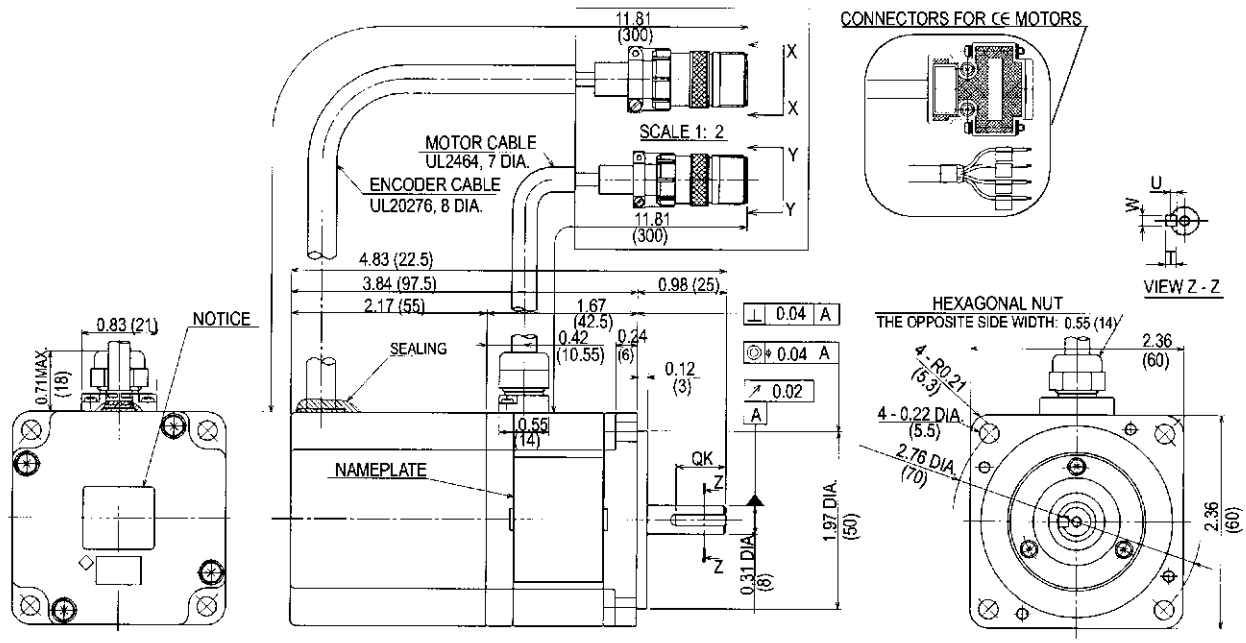
Type SGMP-	Key					Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T								
15□314CM	Without Keyway					1500 (2.0)	4.77 (48.7)	Continuous	3000	17.9 (8.1)	110 (490)	33 (147)
15□314CM	0.87 (22)	0.14 (3.5)	0.24 (6)	0.24 (6)								

Note: The quoted allowable radial load is the value at a position 35mm (1.38in.) from the motor mounting surface.

(3) 1024 PPR Absolute Encoder (12 bit), without Brake

Note: 1. The keyway complies with JIS B1301-1976 (precision). A straight key is supplied.
2. The electromagnetic brake is only to hold the load in position and cannot be used to stop the motor.
3. Conforms to the IP55 enclosure (except connector and output shaft faces).

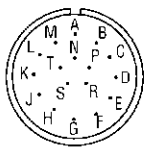
• 100W (0.13HP)

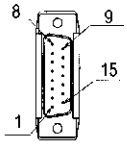


Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
01□W312M	Without Keyway				100 (0.13)	0.318 (3.25)	Continuous	3000	2.1 (0.95)	17.5 (78)	11 (49)
01□W314M	0.55 (14)	0.07 (1.8)	0.12 (3)	0.12 (3)							

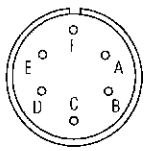
Note: The quoted allowable radial load is the value at a position 0.79 in. (20mm) from the motor mounting surface.

Connector Specifications





Connector: MS3101A20-29P (DDK)
Cable Clamp: MS3057-12A
CE Connector: 17JE-23150-02 (D8A)
(Made by DDK Ltd)

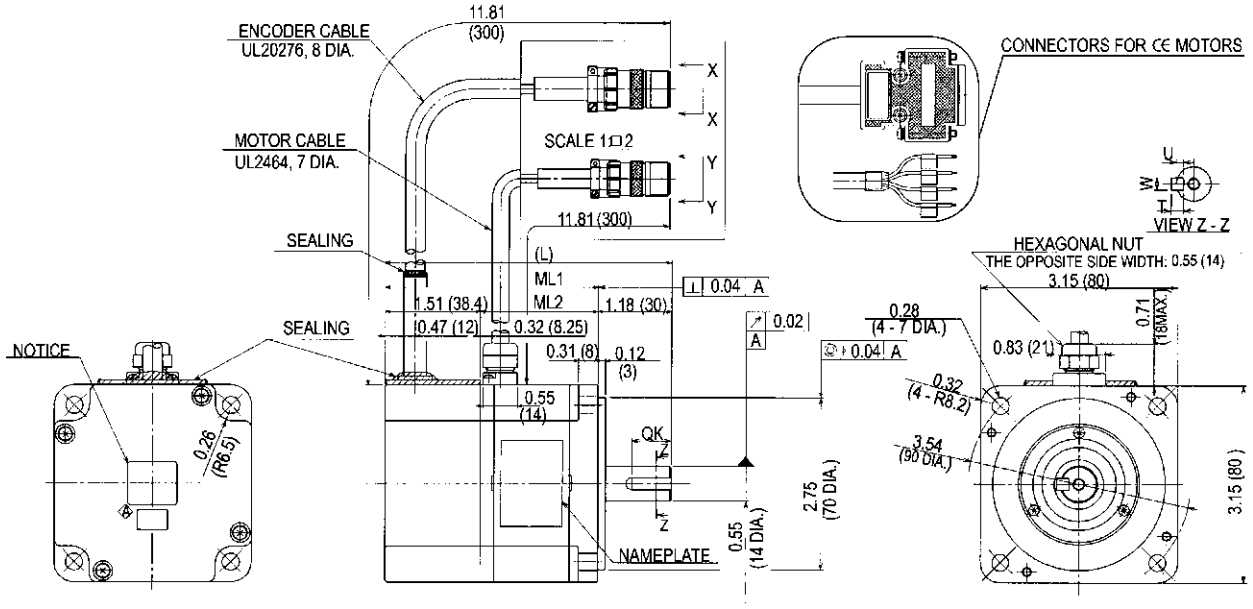


MS Connector: MS3101A18-12P (DDK)
Cable Clamp: MS3057-10A

Incremental Terminal Specifications		
A	Channel A Output	Blue
B	Channel $\bar{A}$ Output	White/Blue
C	Channel B Output	Yellow
D	Channel $\bar{B}$ Output	White/Yellow
E	Channel Z Output	Green
F	Channel $\bar{Z}$ Output	White/Green
G	0V Power Supply	Black
H	+5V Power Supply	Red
J	Frame Ground	Green/Yellow
K	Channel C Output	Purple
L	Channel $\bar{C}$ Output	White/Purple
M	-	-
N	-	-
P	Reset Capacitor	Grey
R	Reset	White/GrEy
S	0V Battery	White/Orange
T	3.6V Battery	Orange

Motor Wiring Specifications		
A	U-phase	Red
B	V-phase	White
C	W-phase	Blue
D	FG	Green/Yellow
E	-	-
F	-	-

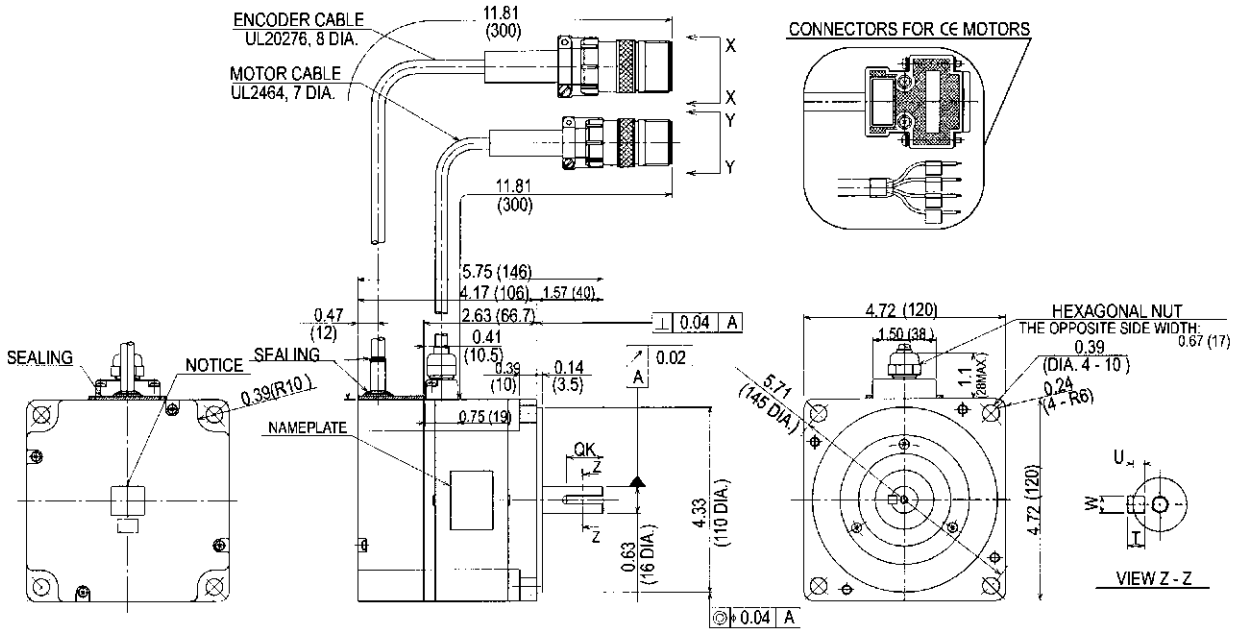
- **200W (0.27HP), 300W (0.40HP), 400W (0.53HP)**



Type SGMP-	L	LL	LM	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	ApproxMass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
				QK	U	W	T							
02□W312M	4.59 (116.5)	3.41 (86.5)	1.89 (48.1)	Without Keyway				200 (0.27)	0.637 (0.27)	Continuous	3000	3.5 (1.6)	55 (245)	15 (68)
02□W314M				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)							
03□W312M	5.37 (136.5)	4.19 (106.5)	1.89 (68.1)	Without Keyway				300 (0.40)	0.95 (0.40)			5.0 (2.3)		
03□W314M				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)							
04□W312M				Without Keyway				400 (0.53)	1.27 (0.53)					
04□W314M				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)							

Note: The quoted allowable radial load is the value at a position 0.98 in. (25mm) from the motor mounting surface.

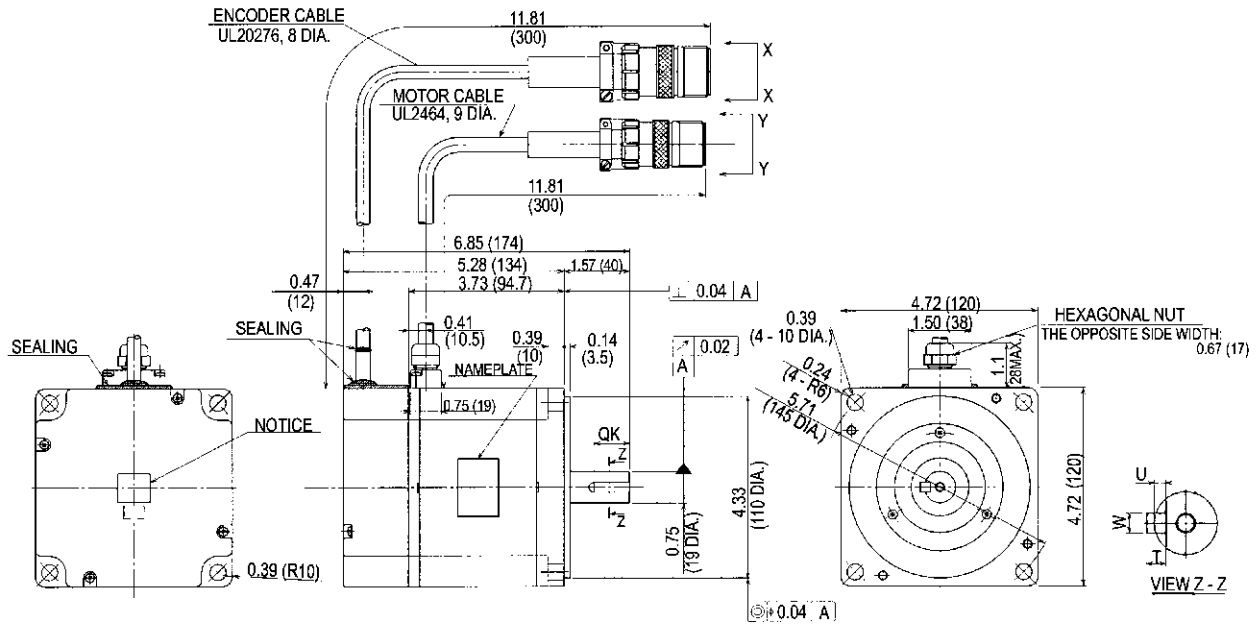
- **750W (1.01HP)**



Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
08□W312M	Without Keyway				750 (1.01)	2.39 (24.3)	Continuous	3000	10.4 (4.7)	88 (392)	33 (147)
08□W314M	0.87 (22)	0.12 (3)	0.20 (5)	0.20 (5)							

Note: The quoted allowable radial load is the value at a position 1.38 in. (35mm) from the motor mounting surface.

- **1500W (2.0HP)**



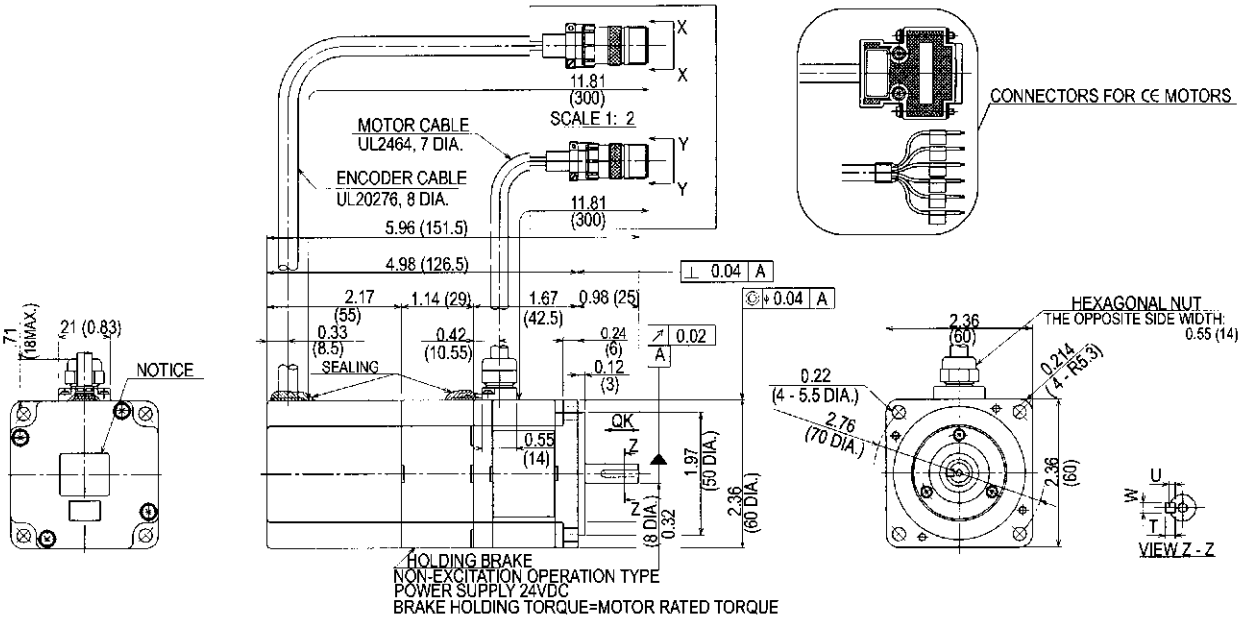
Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
15□W312M	Without Keyway				1500 (2.0)	4.77 (48.7)	Continuous	3000	15.6 (7.1)	110 (490)	33 (147)
15□W314M	0.87 (22)	0.14 (3.5)	0.24 (6)	0.24 (6)							

Note: The quoted allowable radial load is the value at a position 1.38 in. (35mm) from the motor mounting surface.

(4) 1024 PPR Absolute Encoder (12 bit), with Brake

Note: 1. The keyway complies with JIS B1301-1976 (precision). A straight key is supplied.
2. The electromagnetic brake is only to hold the load in position and cannot be used to stop the motor.
3. Conforms to the IP55 enclosure (except connector and output shaft faces).

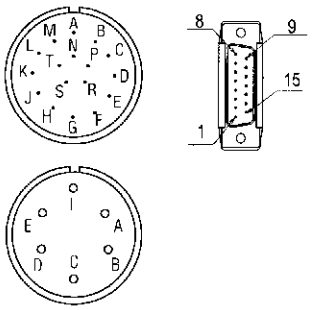
• 100W (0.13HP)



Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
01□W312CM	Without Keyway				100 (0.13)	0.318 (3.25)	Continuous	3000	2.6 (1.2)	18 (78)	11 (49)
01□W314CM	0.55 (14)	0.07 (1.8)	0.12 (3)	0.12 (3)							

Note: The quoted allowable radial load is the value at a position 0.79 in. (20mm) from the motor mounting surface.

Connector Specifications



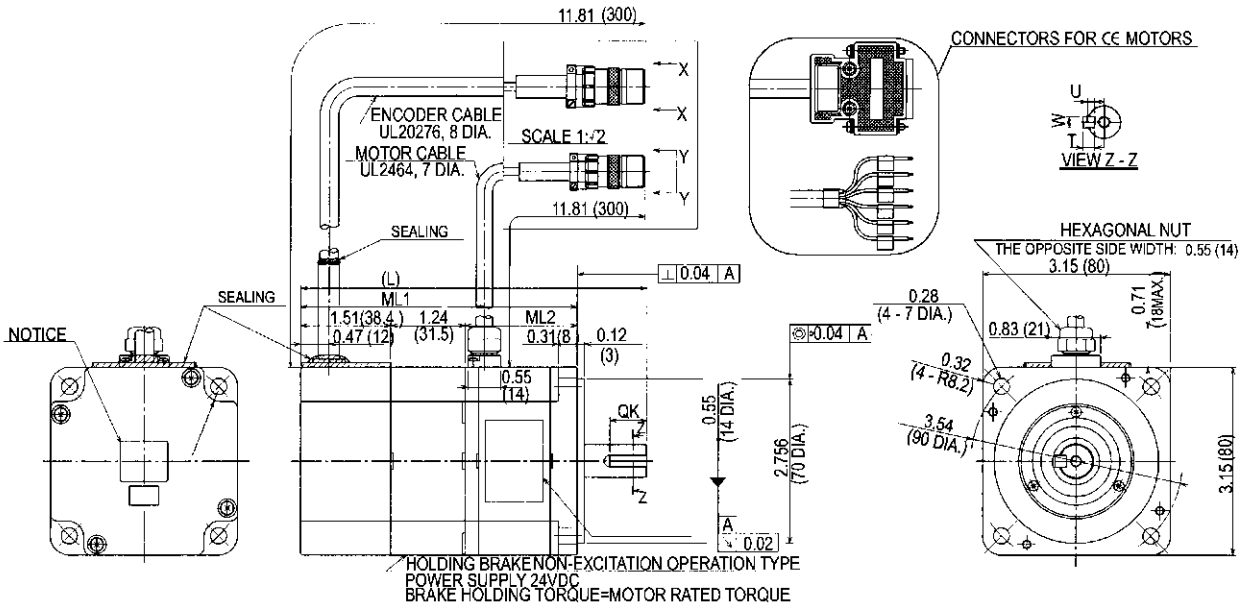
MS Connector: MS3101A20-29P (DDK)
Cable Clamp: MS3057-12A
CE Connector: CE17JE-23150-02 (D8A)
(Made by DDK Ltd)

MS Connector: MS3101A18-2P (DDK)
Cable Clamp: MS3057-12A

Incremental Terminal Specifications		
A	Channel A Output	Blue
B	Channel $\bar{A}$ Output	White/Blue
C	Channel B Output	Yellow
D	Channel $\bar{B}$ Output	White/Yellow
E	Channel Z Output	Green
F	Channel $\bar{Z}$ Output	White/Green
G	0V Power Supply	Black
H	+5V Power Supply	Red
J	Frame Ground	Green/Yellow
K	Channel C Output	Purple
L	Channel $\bar{C}$ Output	White/Purple
M	-	-
N	-	-
P	Reset Capacitor	Grey
R	Reset	White/Grey
S	0V Battery	White/Orange
T	3.6V Battery	Orange

Motor Wiring Specifications		
A	U-phase	Red
B	V-phase	White
C	W-phase	Blue
D	FG	Green/Yellow
E	Brake Terminal	Black
F	Brake Terminal	Black

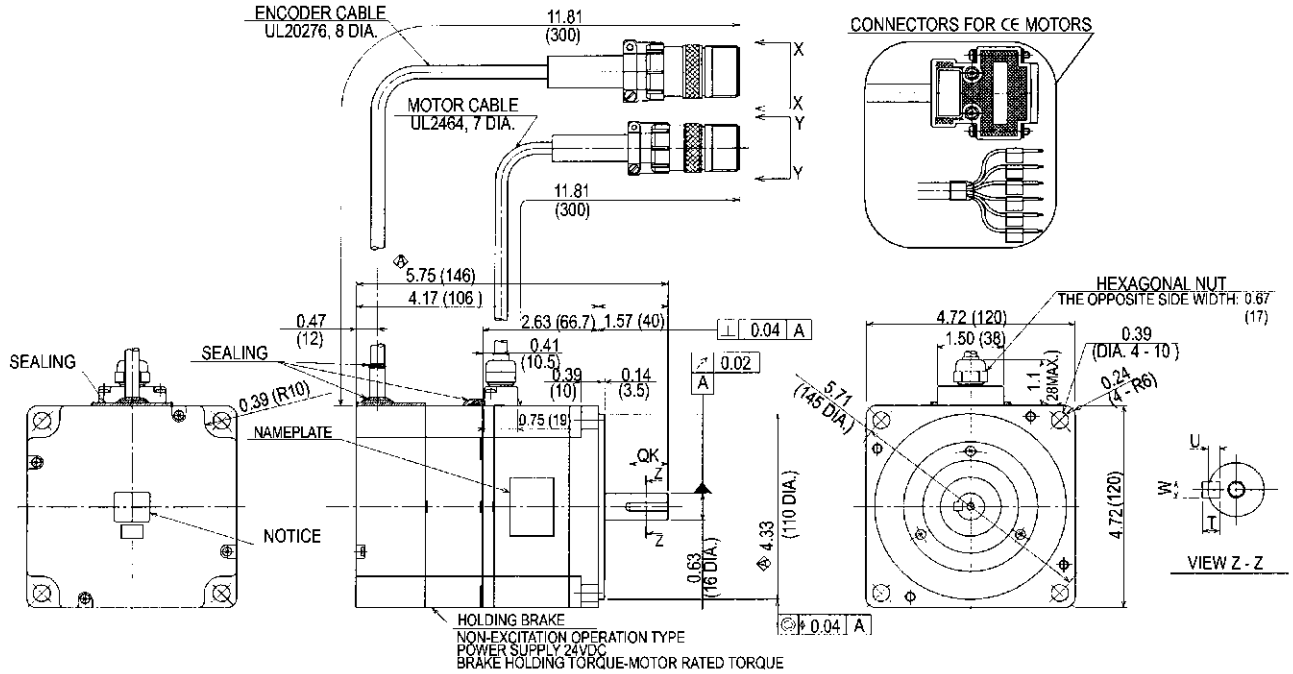
• 200W (0.27HP), 300W (0.40HP), 400W (0.53HP)



Type SGMP-	L	LL	LM	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
				QK	U	W	T							
02□W312CM	5.83	4.64	1.89	Without Keyway				200	0.637 (6.49)	Continuous	3000	5.1 (2.3)	55 (245)	15 (68)
02□W314CM	(148)	(118)	(48.1)	0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)	(0.27)						
03□W312CM	6.61 (168)	5.43 (138)	2.68 (68.1)	Without Keyway				300 (0.40)	0.95 (9.74)			6.6 (3.0)		
03□W314CM				0.63 (16)	0.12 (3)	0.20 (5)	0.20(5)							
04□W312CM				Without Keyway				400 (0.53)	1.27 (13.0)					
04□W314CM				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)							

Note: The quoted allowable radial load is the value at a position 0.98 in. (25mm) from the motor mounting surface.

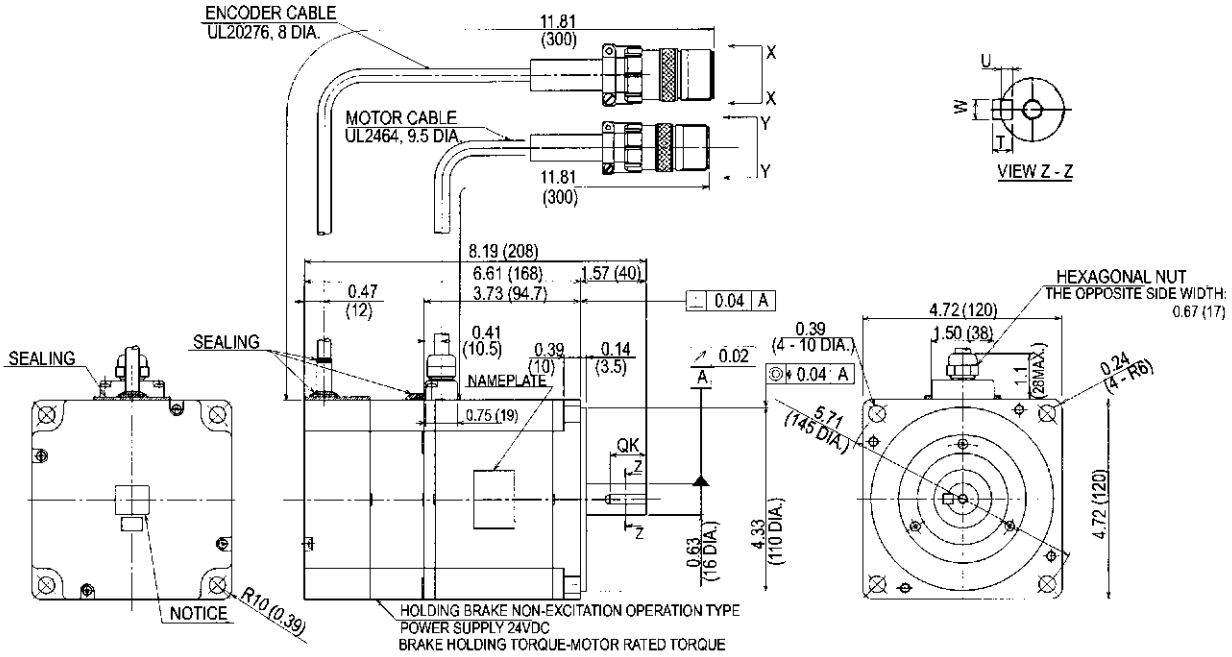
• 750W (1.01HP)



Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
08□W312CM	Without Keyway				750 (1.01)	2.39 (24.3)	Continuous	3000	2.20 (6.2)	88 (392)	33 (147)
08□W314CM	0.87 (22)	0.12 (3)	0.20 (5)	0.20 (5)							

Note: The quoted allowable radial load is the value at a position 1.38 in. (35mm) from the motor mounting surface.

- **1500W (2.0HP)**



Type SGMP-	Key				Output W (HP)	Torque N•m (kgf•cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
	QK	U	W	T							
15□W312CM	Without Keyway				1500 (2.0)	4.77 (48.7)	Continuous	3000	18.96 (8.6)	110 (490)	33 (147)
15□W314CM	0.87 (22)	0.14 (3.5)	0.24 (6)	0.24 (6)							

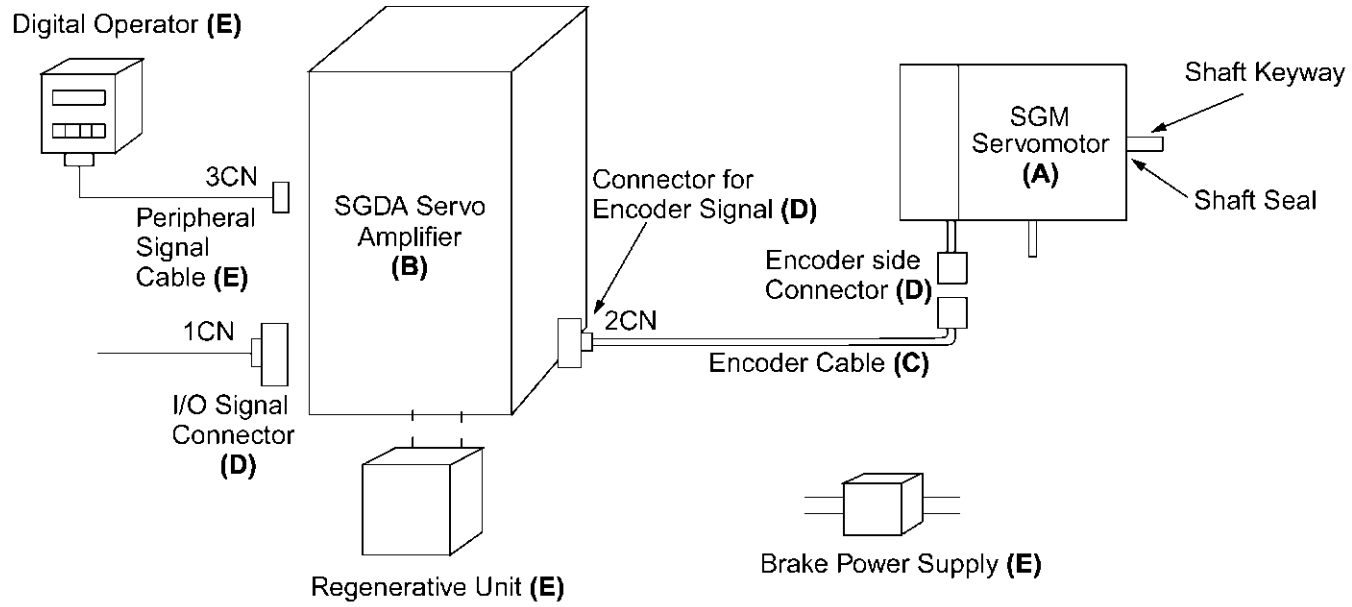
Note: The quoted allowable radial load is the value at a position 1.38 in. (35mm) from the motor mounting surface.

* Combination with Sigma Servo Amplifier
(SGDB-15ADG)

Selecting Your SGMP Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGMP - 01 U 3 1 4 M

Sigma Servomotor Type

Rated Output
- 01: 100W (0.13HP)
- 02: 200W (0.25HP)
- 03: 300W (0.4HP)
- 04: 400W (0.5HP)
- 08: 750W (1HP)
- 15: 1.5kW (2HP)

Power Supply
- U: 200V UL Recognized
- L: 100V UL Recognized

Accessories
- M: Standard
- CM: Standard with 24VDC Brake
- MS: Standard with Shaft Seal
- EM: Standard with Brake & Shaft Seal

Shaft Specifications
- 4: Straight Shaft with Keyway
- 2: Straight Shaft without Keyway

Revision Level

Encoder Specifications
- 3: 2048PPR Incremental Encoder
- W: 1024PPR Absolute Encoder

Note: **Bold** items are Stock Products usually available from inventory. Contact your Yaskawa representative for delivery on all other items.

Servomotor & Amplifier Selection

Use the table below to select the appropriate SGMP Sigma Servomotor and Amplifier.

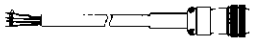
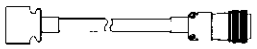
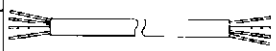
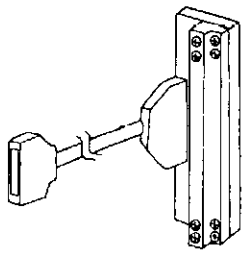
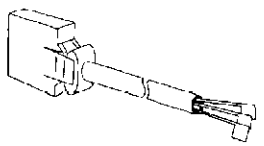
Description	Peak Torque (oz. in.)	Rated Torque (oz. in.)	Motor Inertia ($oz.in.sec^2x10^{-3}$)	Motor MODEL # **(A)**	Amplifier MODEL # **(B)***			Motor & Amplifier Item Class
					Analog Input SGDA-	Digital Input SGDA-	Analog/Digital Input SGDB-	
200V 1-Phase 2048 PPR Incremental Encoder Straight Shaft with Keyway Pre-wired with MS Connectors	135	45.1	0.917	SGMP-01U314M	01AS	01AP	–	Stock
			1.46	SGMP-01U314CM				
	270	90.1	2.96	SGMP-02U314M	02AS	02AP	–	
			4.35	SGMP-02U314CM				
	542	181	4.92	SGMP-04U314M	04AS	04AP	05ADG	
			6.31	SGMP-04U314CM				
	1010	338	29.9	SGMP-08U314M	08AS	08AP	10ADG	
			35.7	SGMP-08U314CM				
	2027	676	57.1	SGMP-15U314M	–	–	15ADG	
			67.8	SGMP-15U314CM				
100V 1-Phase 2048 PPR Incremental Encoder Straight Shaft with Keyway Pre-wired with MS Connectors	135	45.1	0.917	SGMP-01L314M	01BS	01BP	–	
			1.46	SGMP-01L314CM				
	270	90.1	2.96	SGMP-02L314M	02BS	02BP	–	
			4.35	SGMP-02L314CM				
	406	135	4.92	SGMP-03L314M	03BS	03BP	–	
			6.31	SGMP-03L314CM				

Notes: 24VDC Brakes for SGMP Sigma servomotors are standard. Contact a local source for 24VDC power supplies.
Motor power and encoder cables are factory pre-wired with approximately 13" lead length with MS mating connectors.
Use the tables on the following page to specify mating connectors and/or various cable lengths.
For technical information, request manual number TSE-S800-15 from your Yaskawa representative.

* For more detailed SGDA amplifier specifications and dimensions, refer to page 69.

Pre-wired Cable Selection

Use the table below to select Pre-wired Cables for your SGMP Sigma Servomotor.

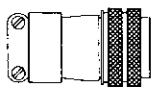
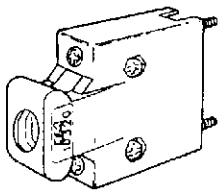
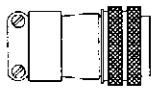
Cable Description **(C)**		Motor Size (kW)	Part Number	Comments	Item Class
Power Cable with MS Connectors (with or without Brake)		0.1, 0.2, 0.4, 0.8, 1.5	B4B-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (standard) 4: 15 meters 5: 20 meters	Stock *
Encoder Cable with MS Connector (incremental or absolute)			DE9407236-□		
Encoder Cable Only for Solder Connections		All	DP8409123	Up to 70 feet; for use with mating connector.	Stock
Encoder Cable Only for Solder Connections			DP8409179	Over 70 feet; splice cable to accommodate connector.	Stock
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA36P □ ①	35 mm din rail mountable; the cable length is 0.5 meters.	Non-Stock
Input/Output 1CN Cable with Pigtail Leads			DE9404859-□ ①	Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	Stock *

* Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

① Exception: For SGMP/SGDB 15, use standard SGDB accessories.

Mating Connector Selection

Use the table below to select Mating Connectors or Kits for your SGMP Sigma Servomotor.

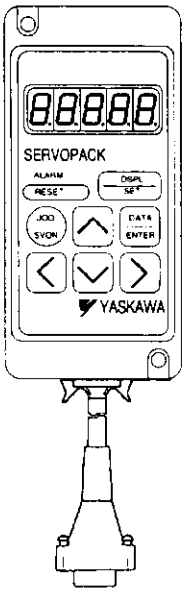
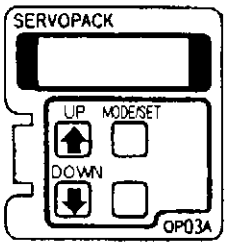
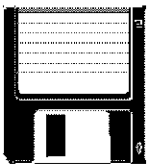
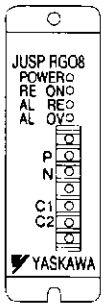
Connector Description **(D)**		Motor Size (kW)	Part Number	Comments	Item Class
MS Connector for Motor Power Cable (with or without Brake)		0.1, 0.2, 0.4, 0.8, 1.5	MS3106B18-12S + MS3057-10A	Straight-type part number Cable clamp part number	Stock
2CN Encoder Cable Connector			DE9406973	Solder type and connector case	
MS Connector for Encoder Cable (incremental or absolute encoder)			MS3106B20-29S + MS3057-12A	Straight-type part number Cable clamp part number	
1CN Mating Connector		All	DP9420007 ①	–	Stock

① Exception: For SGMP/SGDB 15, use standard SGDB accessories.

SGMP

Peripheral Device Selection

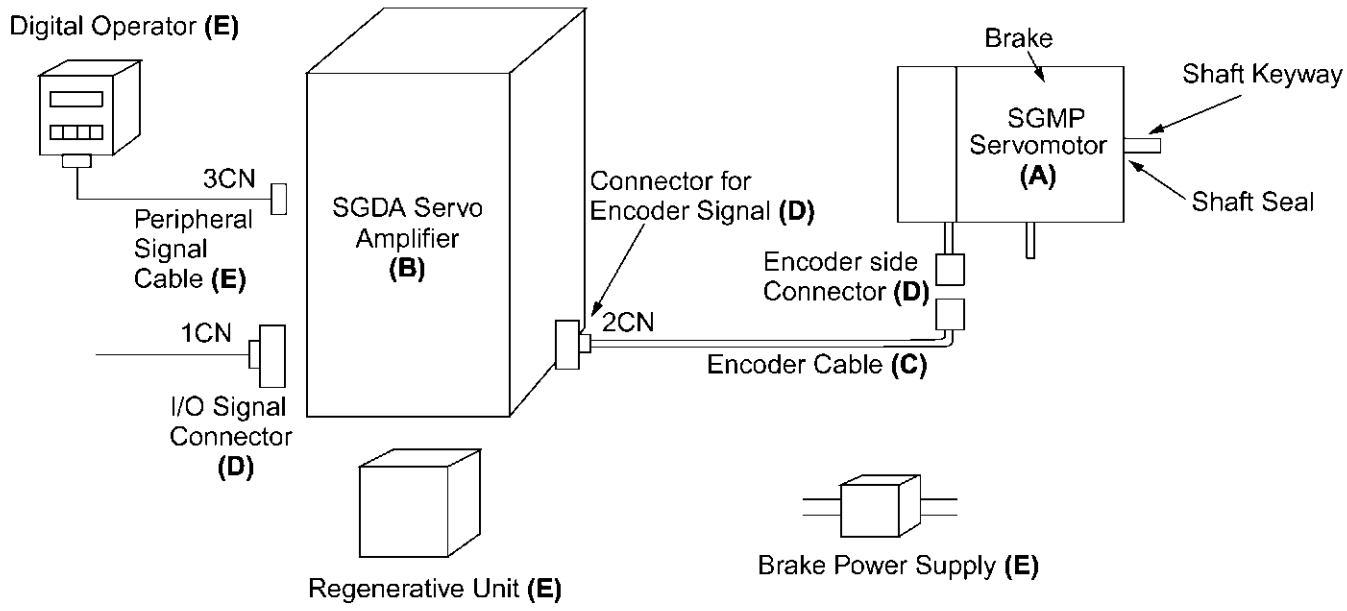
Use the table below to select Peripheral Devices for your SGMP Sigma Servomotor.

Component (E)		Part Number	Description	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	Stock
Regenerative Unit		JUSP-RG08	60W capacity	Stock

Selecting Your SGMP Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGMP - 01 V 3 1 4 B

Sigma Servomotor Type

Rated Output
- 01: 100W (0.13HP)
- 02: 200W (0.25HP)
- 03: 300W (0.4HP)
- 04: 400W (0.5HP)
- 08: 750W (1HP)

Power Supply
- V: 200V CE Specification
- W: 100V CE Specification

Optional Accessories
- B: 90VDC Brake
- S: Shaft Seal
- D: Brake & Shaft Seal

Shaft Specifications
- 4: Straight Shaft with Keyway
- 2: Straight Shaft without Keyway

Revision Level

Encoder Specifications
- 3: 2048PPR Incremental Encoder
- W: 1024PPR Absolute Encoder

Servomotor & Amplifier Selection

Use the table below to select the appropriate SGMP Sigma Servomotor and Amplifier.

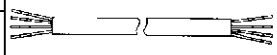
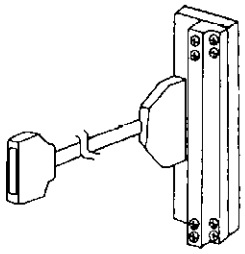
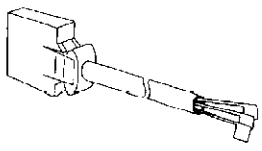
Description	Peak Torque (oz. in.)	Rated Torque (oz. in.)	Motor Inertia ($oz.in.sec^2 \times 10^{-3}$)	Motor MODEL # **(A)**	Amplifier MODEL # **(B)***			Motor Item Class
					Analog Input SGDA-	Digital Input SGDA-	Analog/Digital Input SGDB-	
200V 1-Phase 2048 PPR Incremental Encoder Straight Shaft with Keyway	135	45.1	0.917	SGMP-01V314	01VS (Limited Stock)	01VP (Non-Stock)	–	Non-Stock
			1.46	SGMP-01V314B				
	270	90.1	2.96	SGMP-02V314	02VS (Limited Stock)	02VP (Non-Stock)	–	
			4.35	SGMP-02V314B				
	542	181	4.92	SGMP-04V314	04VS (Limited Stock)	04VP (Non-Stock)	05VD (Limited Stock)	
			6.31	SGMP-04V314B				
	1010	338	29.9	SGMP-08V314	08VS (Limited Stock)	08VP (Non-Stock)	10VD (Limited Stock)	
			35.7	SGMP-08V314B				
100V 1-Phase 2048 PPR Incremental Encoder Straight Shaft with Keyway	135	45.1	0.917	SGMP-01W314	01WS (Limited Stock)	01WP (Non-Stock)	–	Non-Stock
			1.46	SGMP-01W314B				
	270	90.1	2.96	SGMP-02W314	02WS (Limited Stock)	02WP (Non-Stock)	–	
			4.35	SGMP-02W314B				
	542	181	4.92	SGMP-03W314	03WS (Limited Stock)	03WP (Non-Stock)	–	
			6.31	SGMP-03W314B				

Notes: 90VDC Brakes for CE specification SGM Sigma servomotors are standard. Refer to the Peripheral Device Selection table (following page) to specify 90VDC power supplies.
Use the tables on the following page to specify encoder pre-wired cables and connectors.
For technical information, request technical document numbers PI-6022 and DE9409784 from your Yaskawa representative.

* For more detailed SGDA amplifier specifications and dimensions, refer to page 69.

Pre-wired Cable Selection

Use the table below to select Pre-wired Cables for your SGMP Sigma Servomotor.

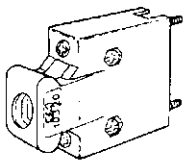
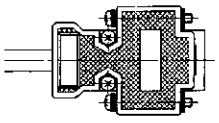
Cable Description **(C)**		Motor Size (kW)	Part Number	Comments	Item Class
Encoder Cable (incremental)		All	SMI-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters 4: 15 meters 5: 20 meters	Stock *
Encoder Cable (absolute)			SMA-□		Limited Stock
Encoder Cable Only for Solder Connections			DP8409123	Up to 70 feet; for use with mating connector.	Stock
Encoder Cable Only for Solder Connections			DP8409179	Over 70 feet; splice cable to accommodate connector.	Stock
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA36P	35 mm din rail mountable; the cable length is 0.5 meters.	Non-Stock
Input/Output 1CN Cable with Pigtail Leads			DE9404859-□	Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	Stock *

Notes: CE spec SGM servomotors come standard with 12" pigtail power leads.

* Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

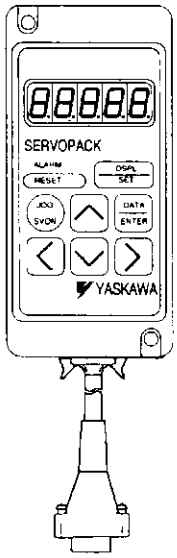
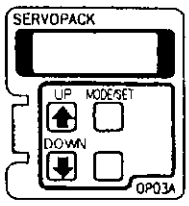
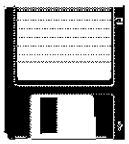
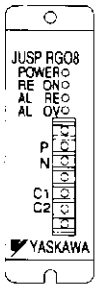
Mating Connector Selection

Use the table below to select Mating Connectors for your SGMP Sigma Servomotor.

Connector Description **(D)**		Motor Size (kW)	Part Number	Comments	Item Class
1CN Mating Connector		ALL	DP9420007	Solder type with cover	Stock
2CN Encoder Cable Connector			DE9406973	Solder type and connector case	
Incremental Encoder Cable Connector			17JE-13090-02 (D8A) + 17L-002A (x2)	Manufactured by Daichi Denshi Kougyo	
Absolute Encoder Cable Connector			17JE-13150-02 (D8A) + 17L-002A (x2)		

Peripheral Device Selection

Use the table below to select Peripheral Devices for your SGMP Sigma Servomotor.

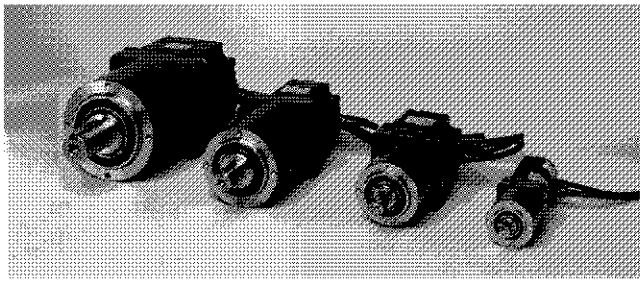
Component (E)		Part Number	Description	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	
Regenerative Unit		JUSP-RG08	60W capacity	
90VDC Induction Brake Power Supply		LPSE-2H01	200VAC Input	

SGMP

NOTES

SGMP Gearmotors (3000rpm) - With Incremental / Absolute Encoder

Rated Output : 100W, 200W, 400W, 750W, 1500W



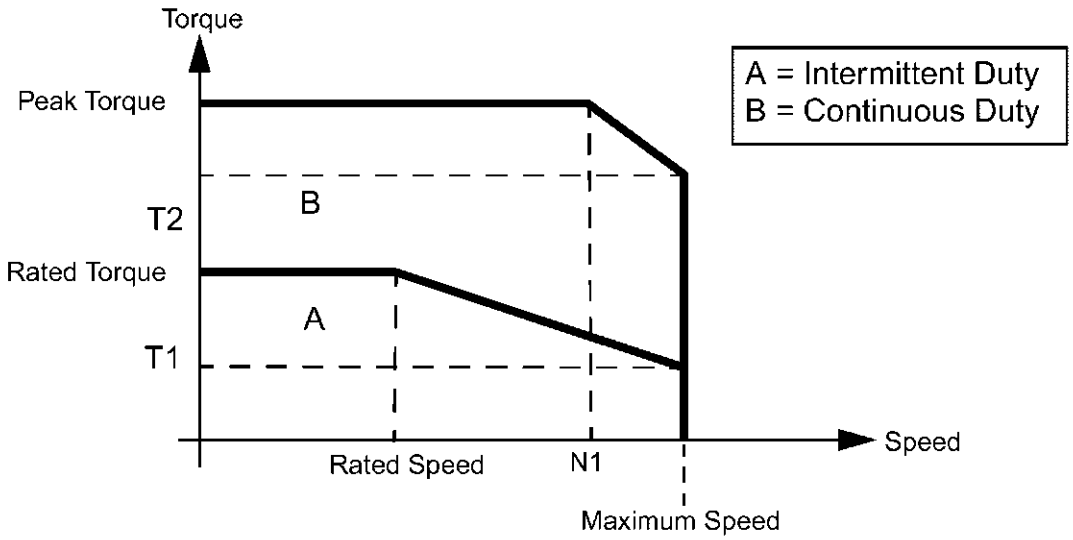
Design Features

1. **Compact**
   - Fits in limited mounting space
2. **Speed**
   - 40.9 to 1,770 in. lb. peak torque
   - Cost-effective solution for low speed and high torque applications
   - Uses time-proven, SGMP motor technology
3. **Encoders**
   - 2048 PPR incremental encoder standard
   - 1024 PPR absolute encoder (option)
4. **Enclosure**
   - Totally enclosed, self-cooled IP55 (not including shaft)
5. **Application Emphasis**
   - Compact, high torque to inertia ratio
   - Chip mounters
   - PCB drilling machines
   - Robots
   - Conveyors
   - Packaging
6. **Certified International Standards**
   - UL Recognized (File #: E165827), CE compliance (option)

Gearmotor Ratings and Specifications

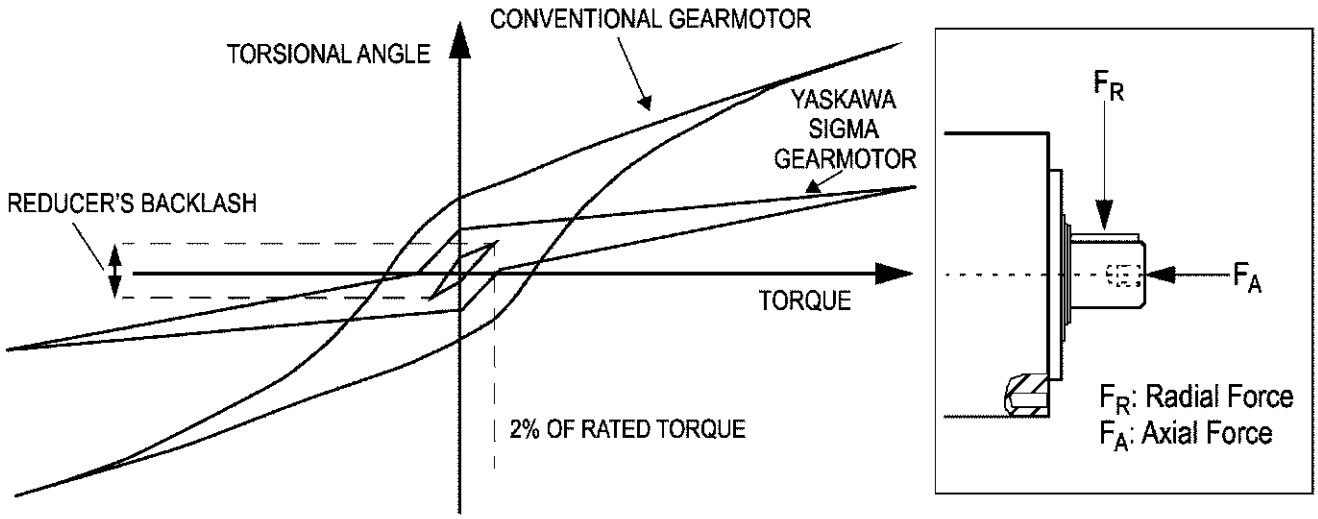
GEARMOTOR Part Number	Rated Torque (in. lb.)	Peak Torque (in. lb.)	Rated Speed (rpm)	Max. Speed (rpm)	Speed N1 (rpm)	Torque T1 (in. lb.)	Torque T2 (in. lb.)	Amplifier Model Number		
								Analog Input SGDA-	Digital Input SGDA-	Analog/Digital Input SGDB-
SG05SA-P01□□	13.68	40.93	600	900	900	8.49	40.92	01□S	01□P	-
SG10SA-P01□□	27.35	81.87	300	450	450	16.98	81.84			
SG25SA-P01□□	50.00	102.00	120	180	180	41.56	102.00			
SG50SA-P01□□	133.95	283.00	60	90	90	83.13	283.00			
SG05SA-P02□□	27.31	81.87	600	900	900/600	15.16	81.8/45.5	02□S	02□P	-
SG10SA-P02□□	54.61	163.74	300	450	450/300	30.31	163.7/90.9			
SG25SA-P02□□	133.71	283.00	120	180	180/120	74.22	283/222			
SG50SA-P02□□	267.43	708.00	60	90	90/60	148.44	637/637			
SG1ASAP02□□	309.00	637.00	30	45	45/30	296.88	637/637			
SG05SA-P03□□	40.93	123.07	600	900	900	27.28	123.07	03□S	03□P	-
SG10SA-P03□□	81.87	246.14	300	450	450	54.56	246.14			
SG25SA-P03□□	200.45	602.66	120	180	128	178.13	475.00			
SG50SA-P03□□	354.00	708.00	60	90	90	267.19	708.00			
SG05SA-P04□□	54.81	164.42	600	900	640	36.38	97.00	04□S	04□P	05□DG
SG10SA-P04□□	109.61	283.00	300	450	320	72.75	194.00			
SG25SA-P04□□	268.38	708.00	120	180	128	178.13	475.00			
SG50SA-P04□□	354.00	708.00	60	90	64	354.00	708.00			
SG05SA-P08□□	102.34	306.04	600	900	640	68.19	75.78	08□S	08□P	10□DG
SG10SA-P08□□	204.67	612.07	300	450	320	136.38	151.36			
SG25SA-P08□□	511.68	1530.18	120	180	128	333.93	371.09			
SG50SA-P08□□	885.00	1770.00	60	90	64	667.85	742.19			
SG05SA-P15□□	205.16	614.50	600	900	640	136.41	197.03	-	-	15□DG
SG10SA-P15□□	410.31	1228.99	300	450	320	272.81	394.06			
SG25SA-P15□□	885.00	1770.00	120	180	128	667.97	964.84			

Note: These performance ratings apply when duty cycles are 60% or less, and when the gearmotor runs for 1,000 cycles per hour or less. Contact your Yaskawa representative when duty cycles exceed 60%, and when the gearmotor runs for more than 1,000 cycles per hour.

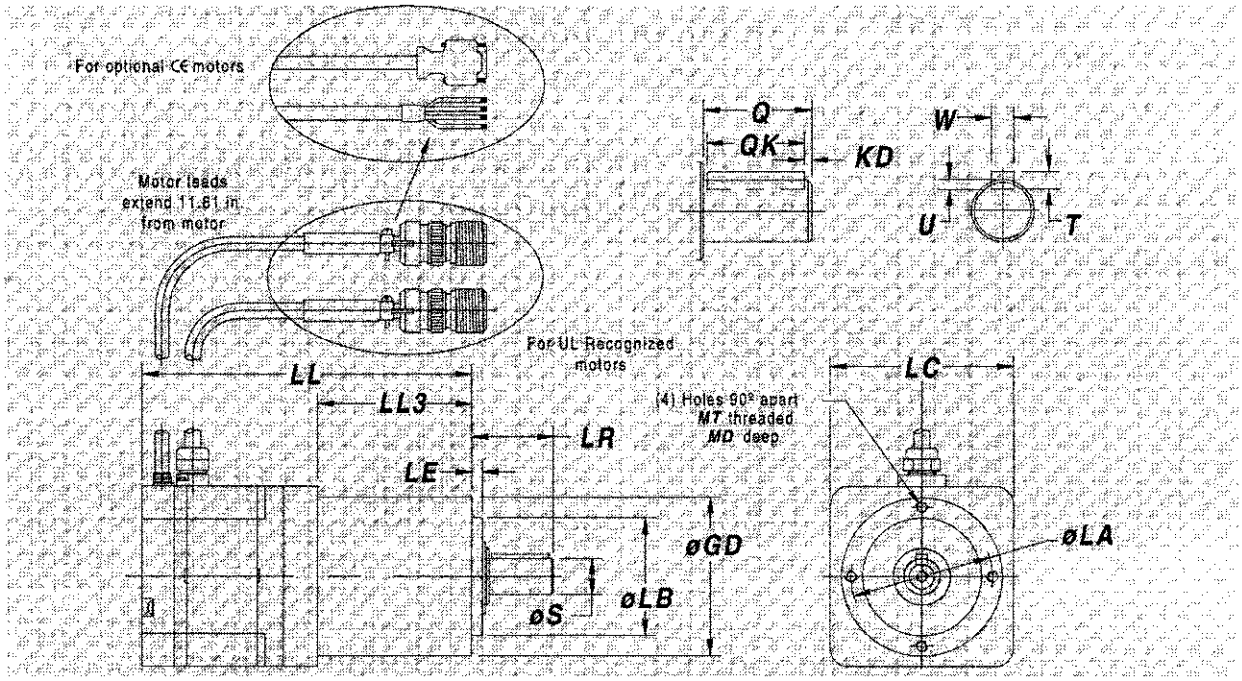


Gearmotor Mechanical Ratings

GEARMOTOR Part Number	Gearhead Backlash (arc min)	Gearhead Maximum Radial Load (lb_f)	Gearhead Maximum Axial Load (lb_f)	Gearhead Inertia ($in\text{-}lb\text{-}s^2$)	Gearmotor Weight (lb)
SG05SA-P01□3	<10	146	158	0.000052	3.52
SG10SA-P01□3	<10	146	158	0.000052	3.52
SG25SA-P01□3	<10	146	158	0.000049	3.52
SG50SA-P01□3	<10	326	349	0.00023	6.39
SG05SA-P02□3	<10	326	349	0.00027	7.28
SG10SA-P02□3	<10	326	349	0.00027	7.28
SG25SA-P02□3	<10	326	349	0.00023	7.94
SG50SA-P02□3	<10	540	428	0.0013	14.34
SG1ASA-P02□3	<10	540	428	0.0013	14.34
SG05SA-P03□3	<10	326	349	0.00027	8.82
SG10SA-P03□3	<10	326	349	0.00027	8.82
SG25SA-P03□3	<10	540	428	0.0013	15.88
SG50SA-P03□3	<10	540	428	0.0013	15.88
SG05SA-P04□3	<10	326	349	0.00027	8.82
SG10SA-P04□3	<10	326	349	0.00027	8.82
SG25SA-P04□3	<10	540	428	0.0013	15.88
SG50SA-P04□3	<10	540	428	0.0013	15.88
SG05SA-P08□3	<10	540	428	0.0014	19.18
SG10SA-P08□3	<10	540	428	0.0014	19.18
SG25SA-P08□3	<10	1035	900	0.0043	34.84
SG50SA-P08□3	<10	1035	900	0.0043	34.84
SG05SA-P15□3	<10	1035	900	0.0047	34.40
SG10SA-P15□3	<10	1035	900	0.0047	39.25
SG25SA-P15□3	<10	1035	900	0.0043	39.25



Dimensions in inches (mm)



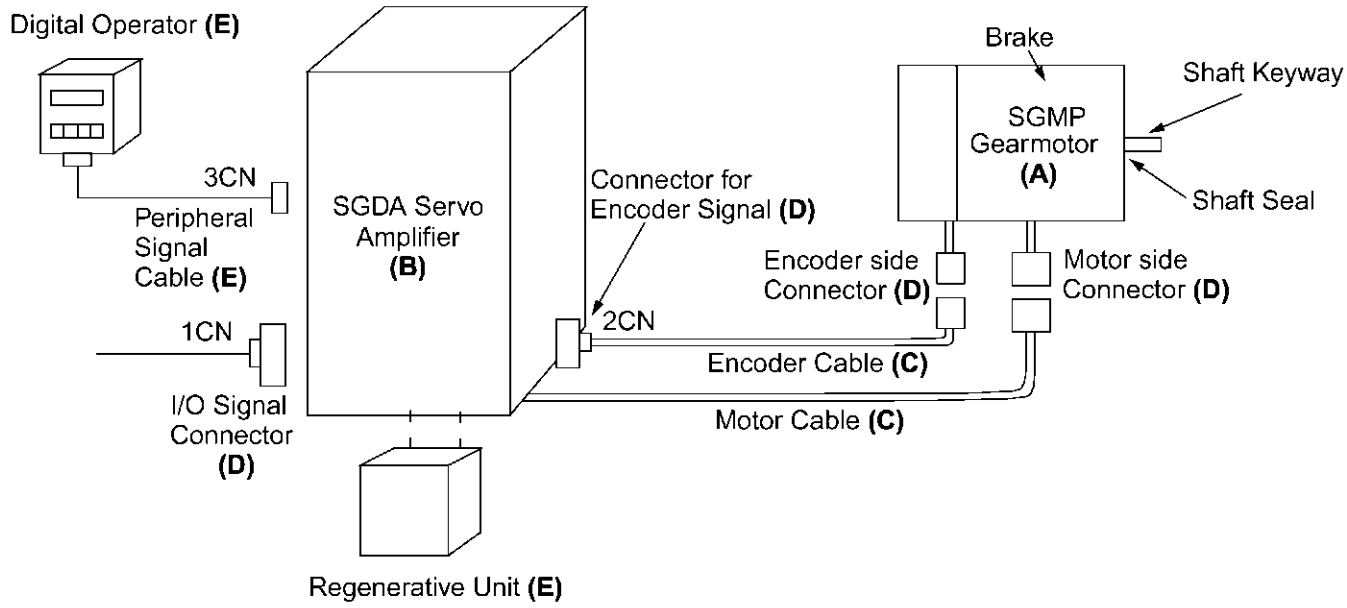
GEARMOTOR	LL3	LL	LE	LR	LB	GD	S	LC	LA	MT	MD	Q	QK	KD	W	T	U
SG05SA-P01□3	1.99	4.98	0.158	0.965	1.378	1.969	0.472	2.362	1.732	M4	0.315	0.709	0.551	0.079	0.158	0.158	0.098
SG10SA-P01□3	1.99	4.98	0.158	0.965	1.378	1.969	0.472	2.362	1.732	M4	0.315	0.709	0.551	0.079	0.158	0.158	0.098
SG25SA-P01□3	2.62	5.61	0.158	0.965	1.378	1.969	0.472	2.362	1.732	M4	0.315	0.709	0.551	0.079	0.158	0.158	0.098
SG50SA-P01□3	2.68	5.51	0.197	1.417	2.047	2.756	0.630	3.150	2.441	M5	0.394	1.102	0.984	0.079	0.197	0.197	0.118
SG05SA-P02□3	2.68	5.98	0.197	1.417	2.047	2.756	0.630	3.150	2.441	M5	0.394	1.102	0.984	0.079	0.197	0.197	0.118
SG10SA-P02□3	2.68	5.98	0.197	1.417	2.047	2.756	0.630	3.150	2.441	M5	0.394	1.102	0.984	0.079	0.197	0.197	0.118
SG25SA-P02□3	3.46	6.77	0.197	1.417	2.047	2.756	0.630	3.150	2.441	M5	0.394	1.102	0.984	0.079	0.197	0.197	0.118
SG50SA-P02□3	4.19	7.50	0.197	1.811	2.677	3.543	0.866	3.150	3.150	M6	0.472	1.417	1.260	0.079	0.267	0.236	0.138
SG1ASA-P02□3	4.19	7.50	0.197	1.811	2.677	3.543	0.866	3.150	3.150	M6	0.472	1.417	1.260	0.079	0.267	0.236	0.138
SG05SA-P04□3	2.68	6.77	0.197	1.417	2.047	2.756	0.630	3.150	2.441	M5	0.394	1.102	0.984	0.079	0.197	0.197	0.118
SG10SA-P04□3	2.68	6.77	0.197	1.417	2.047	2.756	0.630	3.150	2.441	M5	0.394	1.102	0.984	0.079	0.197	0.197	0.118
SG25SA-P04□3	4.19	8.29	0.197	1.811	2.677	3.543	0.866	3.150	3.150	M6	0.472	1.417	1.260	0.079	0.236	0.236	0.138
SG50SA-P04□3	4.19	8.29	0.197	1.811	2.677	3.543	0.866	3.150	3.150	M6	0.472	1.417	1.260	0.079	0.236	0.236	0.138
SG05SA-P08□3	3.15	7.62	0.197	1.811	2.677	3.543	0.866	4.724	3.150	M6	0.472	1.417	1.260	0.079	0.236	0.236	0.138
SG10SA-P08□3	3.15	7.62	0.197	1.811	2.677	3.543	0.866	4.724	3.150	M6	0.472	1.417	1.260	0.079	0.236	0.236	0.138
SG25SA-P08□3	5.30	9.61	0.236	2.756	3.543	4.724	1.260	4.724	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SG50SA-P08□3	5.30	9.61	0.236	2.756	3.543	4.724	1.260	4.724	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SG05SA-P15□3	4.02	9.43	0.236	2.756	3.543	4.724	1.260	4.724	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SG10SA-P15□3	4.02	9.43	0.236	2.756	3.543	4.724	1.260	4.724	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SG25SA-P15□3	5.30	10.71	0.236	2.756	3.543	4.724	1.260	4.724	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276

Tolerances ØLB: +0.0000 -0.0006 ØS: +0.0005 -0.0000 W: +0.0000 -0.0012
Inches:

Selecting Your SGMP Gearmotor System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SG 05 - S A - P 02 U 3 C

Sigma Gearmotor Series
- G: Standard (<10 arc min)

Reduction Ratio
- 05: 5:1
- 10: 10:1
- 25: 25:1
- 50: 50:1
- 1A: 100:1

Construction
- S: Standard

Revision Level

Motor Series
- P: SGMP

Motor Output
- 01: 100W (0.13HP)
- 02: 200W (0.25HP)
- 03: 300W (0.4HP)
- 04: 400W (0.5HP)
- 08: 750W (1HP)
- 15: 1.5kW (2HP)

Power Supply
- U: 200V UL Recognized
- L: 100V UL Recognized

Encoder Specifications
- 3: 2048PPR Incremental Encoder
- W: 1024PPR Absolute Encoder

Accessories
- C: 24VDC Brake

Gearmotor & Amplifier Selection

Use the table below to select the appropriate SGMP Sigma Gearmotor and Amplifier.

Gearmotor (A)					Gearhead only			Amplifier MODEL # (B)*			Motor & Amplifier Item Class
MODEL #	Rated Torque (in. lb.)	Peak Torque (in. lb.)	Rated Speed (RPM)	Max. Speed (RPM)	Inertia (in. lb. sec^2)	Gear Ratio	Backlash [arc min]	Analog Input SGDA-	Digital Input SGDA-	Analog/Digital Input SGDB-	
SG05SA-P01U3	13.68	40.93	600	900	0.000052	5:1	<10	01AS	01AP	–	Limited Stock
SG10SA-P01U3	27.35	81.87	300	450	0.000052	10:1					
SG25SA-P01U3	50.00	102.00	120	180	0.000049	25:1					
SG50SA-P01U3	133.95	283.00	60	90	0.00023	50:1					
SG05SA-P02U3	27.31	81.87	600	900	0.00027	5:1		02AS	02AP	–	
SG10SA-P02U3	54.61	163.74	300	450	0.00027	10:1					
SG25SA-P02U3	133.71	283.00	120	180	0.00023	25:1					
SG50SA-P02U3	267.43	708.00	60	90	0.0013	50:1					
SG1ASA-P02U3	309.00	637.00	30	45	0.0013	100:1					
SG05SA-P04U3	54.81	164.42	600	900	0.00027	5:1		04AS	04AP	05ADG	
SG10SA-P04U3	109.61	283.00	300	450	0.00027	10:1					
SG25SA-P04U3	268.38	708.00	120	180	0.0013	25:1					
SG50SA-P04U3	354.00	708.00	60	90	0.0013	50:1					
SG05SA-P08U3	102.34	306.04	600	900	0.0014	5:1		08AS	08AP	10ADG	
SG10SA-P08U3	204.67	612.07	300	450	0.0014	10:1					
SG25SA-P08U3	511.68	1530.18	120	180	0.0043	25:1					
SG50SA-P08U3	885.00	1770.00	60	90	0.0043	50:1					
SG05SA-P15U3	205.16	614.50	600	900	0.0047	5:1		–	–	15ADG	
SG10SA-P15U3	410.31	1228.99	300	450	0.0047	10:1					
SG25SA-P15U3	885.00	1770.00	120	180	0.0043	25:1					
SG05SA-P01L3	13.68	40.93	600	900	0.000052	5:1	<10	01BS	01BP	–	Limited Stock
SG10SA-P01L3	27.35	81.87	300	450	0.000052	10:1					
SG25SA-P01L3	50.00	102.00	120	180	0.000049	25:1					
SG50SA-P01L3	133.95	283.00	60	90	0.00023	50:1					
SG05SA-P02L3	27.31	81.87	600	900	0.00027	5:1		02BS	02BP	–	
SG10SA-P02L3	54.61	163.74	300	450	0.00027	10:1					
SG25SA-P02L3	133.71	283.00	120	180	0.00023	25:1					
SG50SA-P02L3	267.43	708.00	60	90	0.0013	50:1					
SG1ASA-P02L3	309.00	637.00	30	45	0.0013	100:1					
SG05SA-P03L3	40.93	123.07	600	900	0.00027	5:1		03BS	03BP	–	
SG10SA-P03L3	81.87	246.14	300	450	0.00027	10:1					
SG25SA-P03L3	200.45	602.66	120	180	0.0013	25:1					
SG50SA-P03L3	354.00	708.00	60	90	0.0013	50:1					

Notes: 24VDC Brakes for SGMP Sigma gearmotors are standard. Contact a local source for 24VDC power supplies.

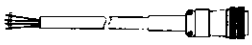
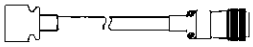
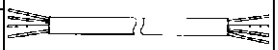
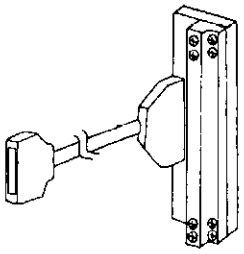
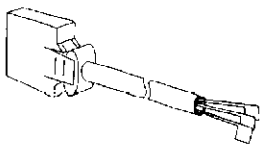
Motor power and encoder cables are factory pre-wired with approximately 13" lead length with MS mating connectors. Use the tables on the following page to specify mating connectors or pre-wired cables in other lengths.

For technical information, request technical bulletin number YEA-TSA-S800-16.16 and manual number TSE-S800-15 from your Yaskawa representative.

* For more detailed SGDA amplifier specifications and dimensions, refer to page 69.

Pre-wired Cable Selection

Use the table below to select Pre-wired Cables for your SGMP Sigma Gearmotor.

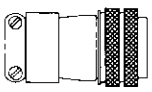
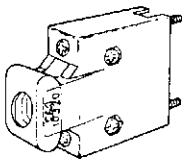
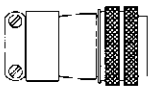
Cable Description **(C)**		Motor Size (kW)	Part Number	Comments	Item Class
Power Cable with MS Connectors (with or without Brake)		0.1, 0.2, 0.4, 0.8, 1.5	B4B-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (std) 4: 15 meters 5: 20 meters	Stock *
Encoder Cable with MS Connector (incremental or absolute)			DE9407236-□		
Encoder Cable Only for Solder Connections		All	DP8409123	Up to 70 feet; for use with mating connector.	Stock
Encoder Cable Only for Solder Connections			DP8409179	Over 70 feet; splice cable to accommodate connector.	Stock
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA36P ①	35 mm din rail mount-able; the cable length is 0.5 meters.	Non-Stock
Input/Output 1CN Cable with Pigtail Leads			DE9404859-□ ①	Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	Stock *

* Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

① Exception: For SGMP/SGDB 15, use standard SGDB accessories.

Mating Connector Selection

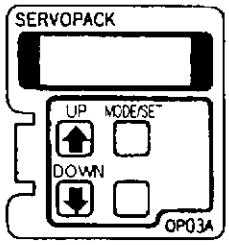
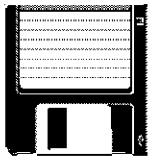
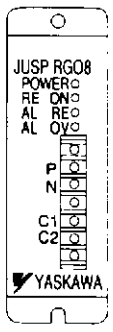
Use the table below to select Mating Connectors or Kits for your SGMP Sigma Servomotor.

Connector Description **(D)**		Motor Size (kW)	Part Number	Comments	Item Class
MS Connector for Motor Power Cable (with or without Brake)		0.1, 0.2, 0.4, 0.8, 1.5	MS3106B18-12S + MS3057-10A	Straight-type part number Cable clamp part number	Stock
2CN Encoder Cable Connector			DE9406973	Solder type and connector case	
MS Connector for Encoder Cable (incremental or absolute encoder)			MS3106B20-29S + MS3057-12A	Straight-type part number Cable clamp part number	
1CN Mating Connector		All	DP9420007 ①	–	Stock

① Exception: For SGMP/SGDB 15, use standard SGDB accessories.

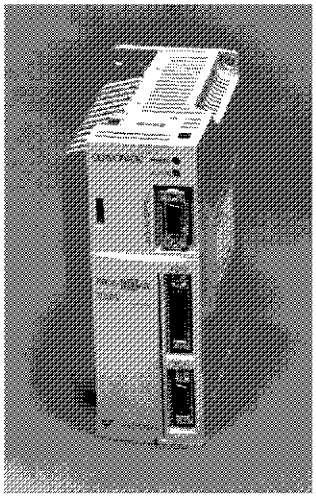
Peripheral Device Selection

Use the table below to select Peripheral Devices for your SGMP Sigma Gearmotor.

Component **(E)**		Part Number	Description	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Std
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	
Regenerative Unit		JUSP-RG08	60W capacity	

NOTES

SGDA Servo Amplifier



For Additional Information	Page(s)
SGDA Ratings & Specifications	71 - 72
SGDA Dimensions	73 - 74
SGDA Internal Connections	75 - 78
SGM Sigma Servo System	11 - 32
SGMP Sigma Servo System	33 - 68

Design Features

1. Compact
- Small sized Servo Amplifier
  Volume ratio approx. 1/4 that of the conventional model. Compatible with incremental encoders or absolute encoder feedback.

2. Quick Response (for Speed/Torque Control)
- Speed control range 1 : 5000
- Frequency characteristics 250Hz
  Positioning time is shortened.

3. Easy Operation
- Includes auto-tuning function, JOG operation, various monitoring functions (I/O monitor, wave form display of speed and torque, and error messages) and PC monitoring function.

4. Simple Wiring
- Simplified troublefree wiring work
  Sigma Servo Amplifier and encoder cables have been reduced from 15 to 9 (in case of incremental encoders).

5. Improved Environmental Resistance
- Servo Amplifier circuit board coated with varnish

6. Electronic Gear Function is Built-In (for Position Control)
- Electrically converts encoder pulse numbers to "command unit equal to machine transitional units".
- Can change users' pulse numbers to lower than 1024 or 2048.

7. Certified International Standards
- UL, cUL Listed (File #: E147823)

Model Number Designation

SGDA - 02 A □

SGDA Servo Amplifier

Model
- P : Position Control (Digital Input)
- S : Speed (Torque) Control (Analog Input)

Power Supply
- A : 200V
- B : 100V
- V : 200V Optional CE
- W : 100V Optional CE

Rated Capacity
- A3 : 30W (0.04 HP)
- A5 : 50W (0.07 HP)
- 01 : 100W (0.13 HP)
- 02 : 200W (0.27 HP)
- 03 : 300W (For 100V only) (0.40 HP)
- 04 : 400W (For 200V only) (0.54 HP)
- 08 : 750W (For 200V only) (1.01 HP)

Servo Amplifier Ratings and Specifications

Voltage	Servo Amplifier SGDA-	Max. Applicable Motor Capacity W (HP)	Combined Specifications						Basic Specificatons
			Max. Output Current A (rms)	Continuous Output Current A (rms)	Motor				
					Allowable Load Inertia *1 JL kg • m^2 × 10^{-4} (oz • in • s^2 × 10^{-3})	Motor Capacity W (HP)	Type		Approx. Mass kg (lb)
							SGM-	SGMP-	
200 VAC	A3☐	30 (0.04)	1.3	0.42	0.63 (8.80)	30 (0.04)	A3☐	-	0.9 (1.98)
	A5☐	50 (0.07)	1.9	0.60	0.78 (11.0)	50 (0.07)	A5☐	-	
	01☐	100 (0.13)	2.8	0.87	1.20 (17.0)	100 (0.13)	01☐	01☐	
	02☐	200 (0.27)	6.0	2.0	3.69 (52.2)	200 (0.27)	02☐	02☐	
	04☐	400 (0.53)	8.0	2.6	3.82 (54.1)	400 (0.53)	04☐	04☐	1.2 (2.65)
	08☐	750 (1.01)	13.9	4.4	13.4 (189)	750 (1.01)	08☐	08☐	1.5 (3.31)
100 VAC	A3☐	30 (0.04)	2.0	0.63	0.63 (8.80)	30 (0.04)	A3☐	-	0.9 (1.98)
	A5☐	50 (0.07)	2.9	0.9	0.78 (11.0)	50 (0.07)	A5☐	-	
	01☐	100 (0.13)	7.1	2.2	1.20 (17.0)	100 (0.13)	01☐	01☐	
	02☐	200 (0.27)	8.4	2.7	3.69 (52.2)	200 (0.27)	02☐	02☐	1.2 (2.65)
	03☐	300 (0.40)	14.8	3.7	3.82 (54.1)	300 (0.40)	03☐	03☐	1.5 (3.31)

Notes for Ratings and Specifications are on Page 72.

*1 : Allowable load inertia ranges require no optional external regenerative unit. Values are 30 times the moment of inertia for 30W (0.04HP) to 200W (0.27HP) servomotors, and 20 times for 400W (0.53HP) and 750W (1.01HP) servomotors. If load inertias exceed these ranges, restrict the operation or use a regenerative unit.

*2 : Supply voltage should not exceed 230V + 10% (253V) or 115V + 10% (127V). A step-down transformer is required if the voltage should exceed these values.

*3 : Use within the ambient temperature range. When enclosed in a box, the internal temperatures must not exceed the ambient temperature range.

*4 : The lowest speed of the speed control range is the speed at which the motor does not stop under 100% load.

*5 : Speed regulation is defined as follows :

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

The motor speed may change due to voltage variations or amplifier drift and changes in processing resistance due to temperature variation.

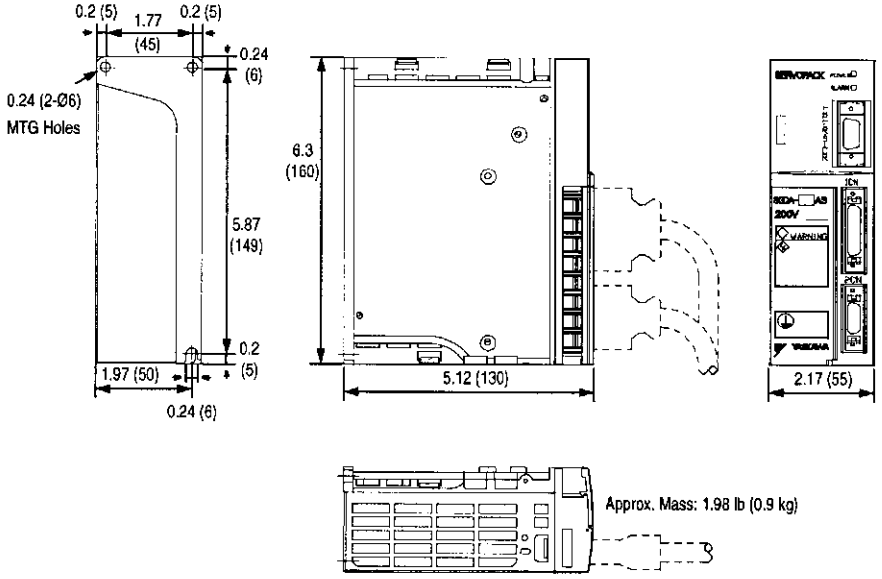
*6 : N is the number of encoder pulses.

Basic Specifications	Power Supply		Single-phase 200 to 230VAC, + 10 to -15%, 50/60 Hz Single-phase 100 to 115VAC *2, + 10 to -15%, 50/60Hz
	Control Method		Single-phase, full-wave rectification IGBT-PWM (single-wave driven)
	Feedback		Incremental encoder 2048 PPR, absolute encoder 1024 PPR
	Location	Ambient Temperature	0 to 55°C *3
		Storage Temperature	-20 to +85°C
		Ambient/Storage Humidity	90% or less (with no condensation)
		Vibration/Shock Resistance	0.5/2 G
	Structure		Base-mounted (book type)
Performance (Speed/Torque Control)	Speed Control Range *4		1 :5000
	Speed Regulation *5	Load Regulation	0 to 100% : 0.01% max. (at rated speed)
		Voltage Regulation	0%
		Temperature Regulation	25±25°C : ±0.1% max (at rated speed)
	Frequency Characteristics		250 Hz (at $J_L = J_M$)
	Torque Control (Repeatability)		±2.0%
	Accel/Decel Time Setting		0 to 10 s
Input Signal (Speed/Torque Control)	Speed Reference	Rated Reference Voltage	±6VDC (positive motor rotation with positive reference) at rated speed (factory setting) Variable setting range : ±2 to ±10VDC at rated torque
		Input Impedance	Approx. 30 kΩ
		Circuit Time Constant	Approx. 47 (μs)
	Torque Reference	Rated Reference Voltage	±3VDC (positive motor rotation with positive reference) at rated speed (factory setting) Variable setting range : ±2 to ±10VDC at rated torque
		Input Impedance	Approx. 30 kΩ
		Circuit Time Constant	Approx. 47 (μs)
Performance (Position Control)	Bias Setting		0 to 450rpm (Setting resolution: 1 rpm)
	Feed Forward Compensation		0 to 100% (Setting resolution: 1%)
	Position Complete Width Setting		0 to 250 reference units. Reference unit: Minimum unit of position data which moves load
Input Signal (Position Control)	Reference Pulse	Type	SIGN + PULSE train 90° phase difference 2-phase pulse (A-phase + B phase), CCW pluse + CW pulse
		Pulse Form	Line driver (+5V level), open collector (+5V or +12V level)
		Pulse Frequency	0 to 450 kpps
	Control Signal		CLEAR (input pulse form identical to reference pulse)
I/O Signals	Position Output	Output Form	A-, B-, C-phase line driver
		Frequency Dividing Ratio	No/N N=2048, 1024 *6 Set No. with value (16 to N) as user parameter
	Sequence Input (Seven Points)		Servo ON, P drive (or motor forward/reverse by torque control, zero-clamp drive reference, or internal setting speed), forward run stop (P-OT), reverse run stop (N-OT), current limit + selection (or internal speed selection), current limit-selection (or internal speed selection), alarm reset
	Sequence Output (Five Points)		Current limit detection (or TGON), speed coincidence, external brake interlock, servo alarm, 3-bit alarm codes
Dynamic Brake			Operated at main power OFF, servo alarm or overtravel
External Regenerative Unit			Required when exceeding the allowable load inertia *1
Overtravel			Dynamic brake stop at P-OT or N-OT or deceleration stop
Protective Functions			Overcurrent, grounding, overload, overvoltage, overspeed, reference input read error, overrun prevention, origin error, CPU error, encoder error
Indicators			Alarm and power LEDs
			Programming panel is available as an option
Others			Torque control, zero clamp operation (position loop stop), soft start/stop, speed coincidence, brake interlock signal output, reverse run connection, JOG run, auto-tuning
Combined Specifications	Motor	Rated/Max. Motor Speed	3000/4500 rpm
		Applicable Encoder	Incremental encoder 2048 PPR, Absolute encoder 1024 PPR optional

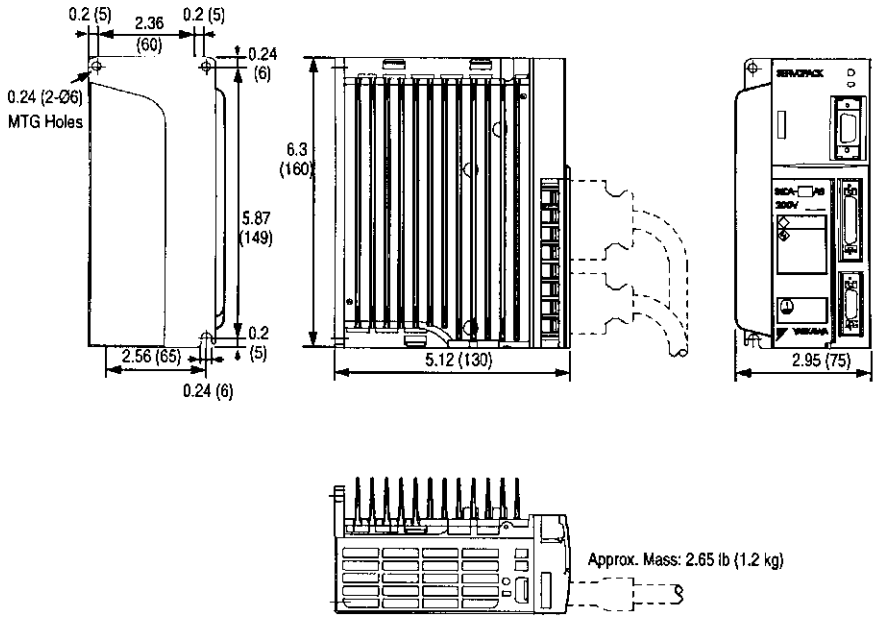
* See notes on previous page.

Dimensions in inches (mm)

(1) SGDA-A3□ to 02□ (200V, 30 to 200W), SGDA- A3□ to 01□ (100V, 30 to 100W)

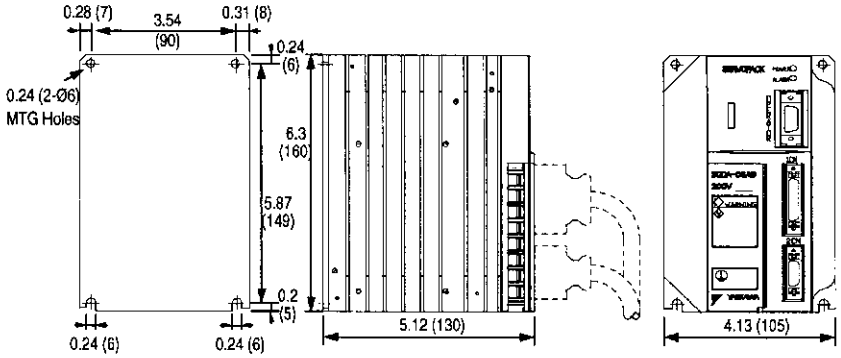


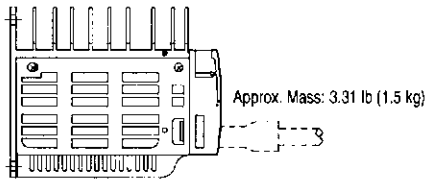
(2) SGDA-04□ (200V, 400W), SGDA-02□ (100V, 200W)



SGDA

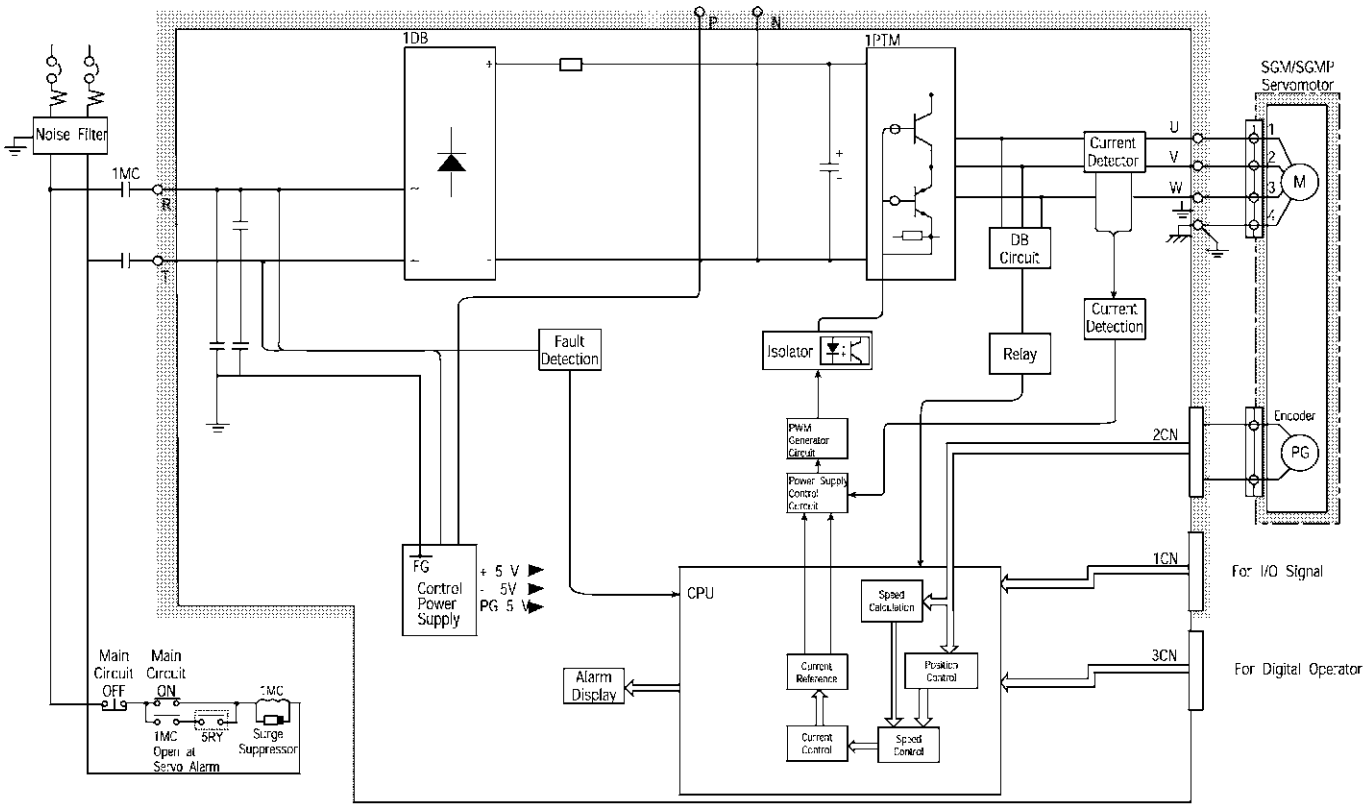
(3) SGDA-08□ (200V, 750W), SGDA-03□ (100V, 300W)





Internal Connection Diagram

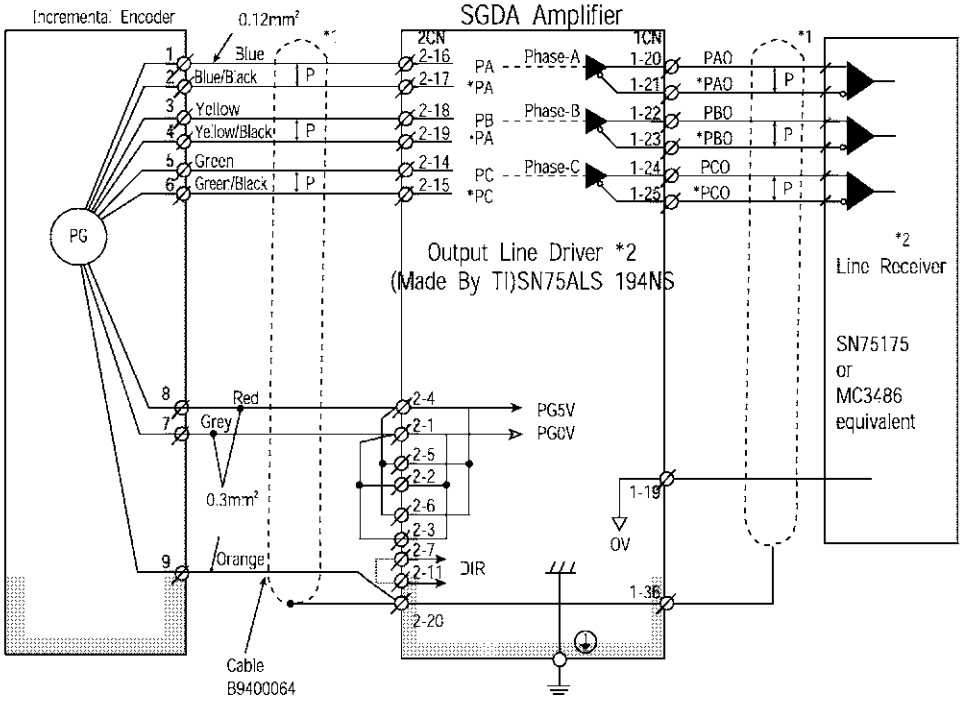
Single-phase 200 to 230 VAC $^{+10}_{-15}$ % 50/60Hz
or
Single-phase 100 to 115 VAC $^{+10}_{+10}$% 50/60 Hz



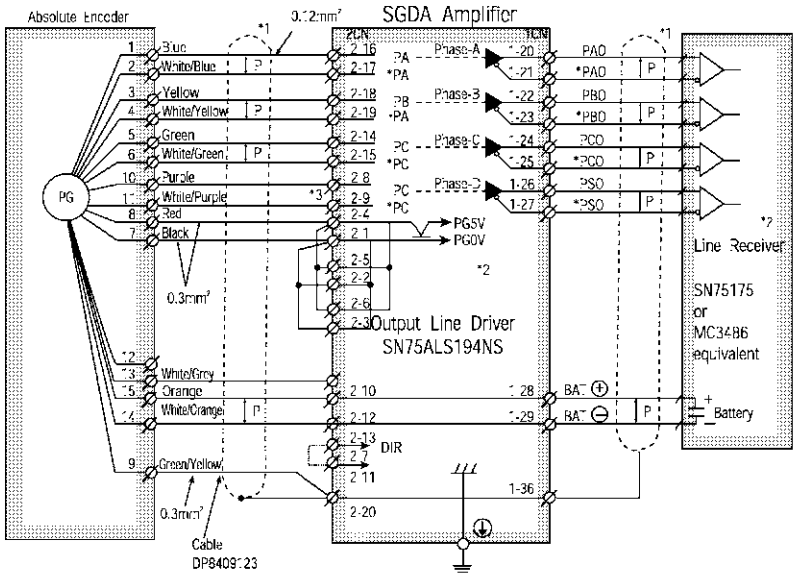
Internal Connection Diagram

Encoder Signal (2CN) Connections

- **Connector 2CN for Incremental Encoder Connection and 1CN Output Processing**



- **Connector 2CN for Absolute Encoder Connection and 1CN Output Processing**



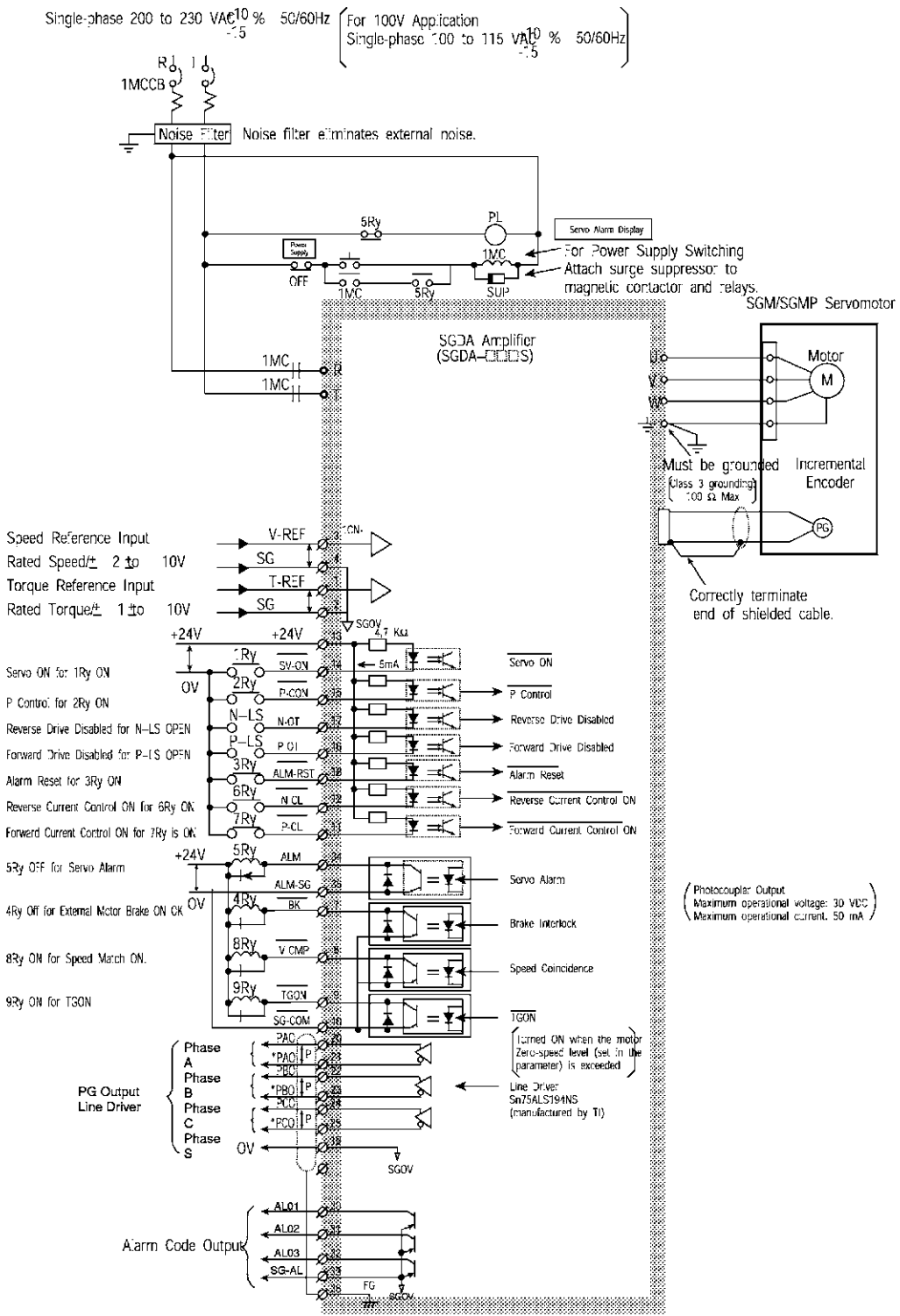
*1 P : Twisted pair wires.

*2 TI: Made by Texas Instruments Inc.

*3 Phase-S signal is effective when using absolute encoder.

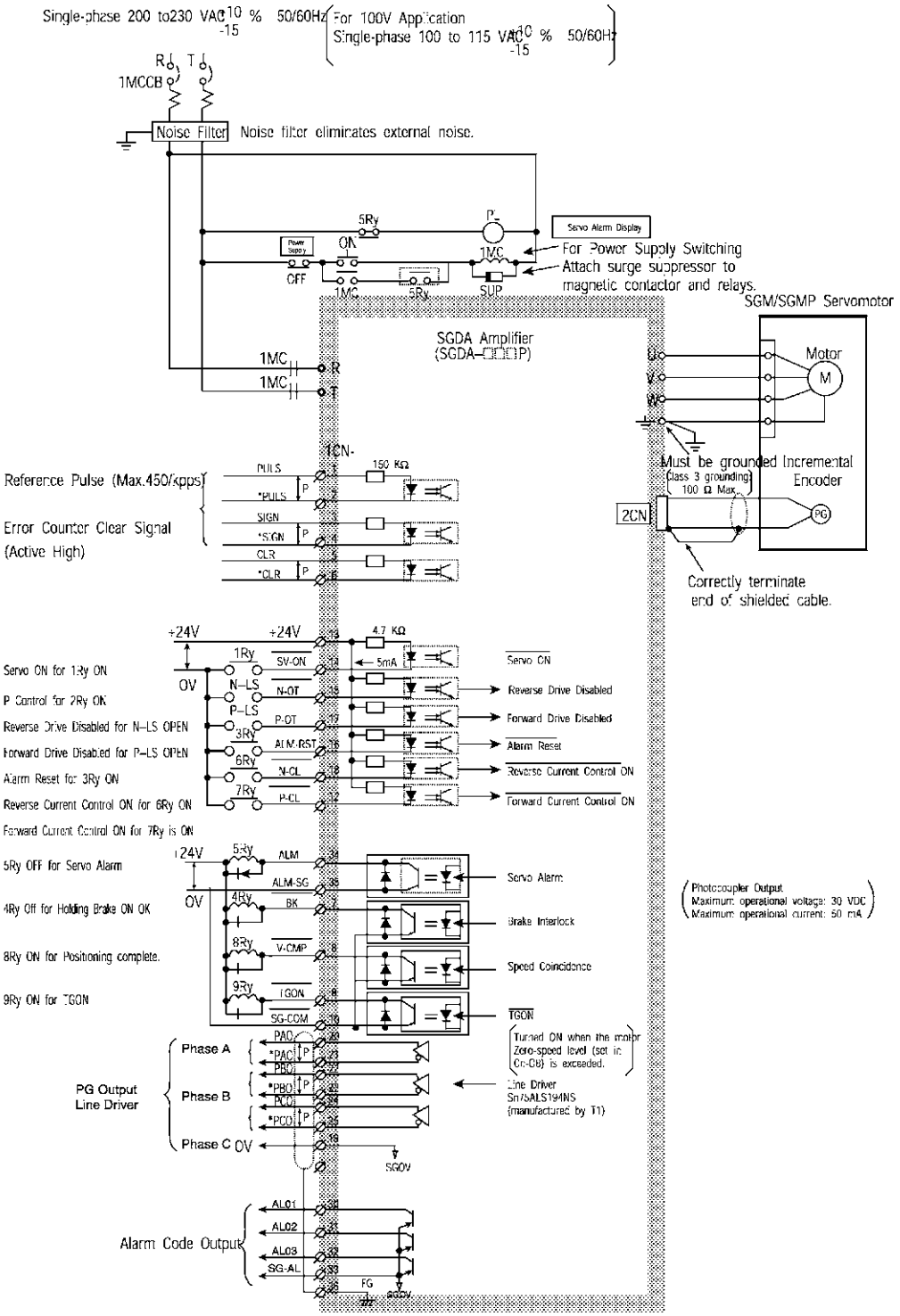
Internal Connection Diagram

Connection Example: SGDA Servo Amplifier (SGDA-□□□S), SGM Servomotor (with Incremental Encoder) and Peripheral Devices



Internal Connection Diagram

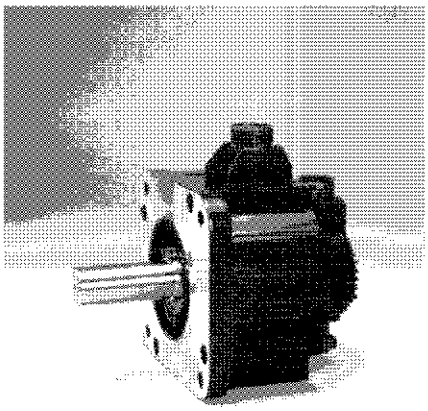
Connection Example: SGDA Servo Amplifier (SGDA-□□□P), SGM Servomotor (with Incremental Encoder) and Peripheral Devices



High Speed Feed Series

SGMG Servomotors (1500rpm) - With Incremental / Absolute Encoder

Rated Output: 0.45kW, 0.85kW, 1.3kW,
1.8kW, 2.9kW, 4.4kW,
5.5kW, 7.5kW, 11kW



Design Features

1. **Compact**
   - Small sized motor
     Lightweight motor designed to have installation compatibility.
     Compatible with previous generation G series motors.
     Both length and mass have been reduced to 2/3 of previous generation.
2. **High Speed**
   - Acceleration performance
     Is double that of single motor.
     9 types of rated outputs ranging from 0.46 to 11.0kW.
3. **Enhanced Environmental Resistance**
   - Water resistance, IP67 standard (excluding shaft)
   - Reinforced lead-out cable access
   - Enhanced withstand load
     Motor output shaft bearing size is upgraded by one rank.
4. **Application Emphasis**
   - Chip mounters
   - PCB drilling machines
   - Robots
   - Conveyors
   - Packaging
5. **Certified International Standards**
   - UL Recognized (File #: E165827), CE compliance (option)

Servomotor Ratings and Specifications

Time Rating: Continuous
Insulation: Class F
Vibration: 15μm or less
Withstand Voltage: 1500VAC
Insulation Resistance: 500VDC
10MΩ or more

Enclosure: Totally-enclosed, self-cooled
IP67 (except for shaft opening)
Ambient Temperature: 0 to 40°C
Ambient Humidity: 20 to 80%
(non-condensing)
Rated Speed*: 1500 rpm
Instantaneous Max Speed*: 3000 rpm

Excitation: Permanent magnet
Drive Method: Direct drive
Mounting: Flange-mounted

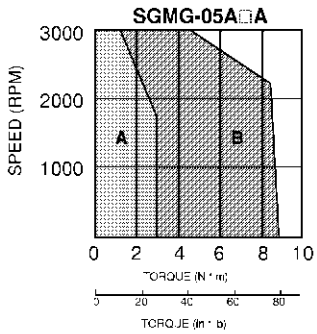
MOTORS: SGMG-	Rated Output*	Rated Torque*		Instantaneous Peak Torque*		Rated Current*	Instantaneous Max. Current*
	kW (HP)	N • m	kgf • cm (lb • in)	N • m	kgf • cm (lb • in)	A (rms)	A (rms)
05A□A	0.45 (0.6)	2.84	29 (25)	8.92	91 (79)	3.8	11
09A□A	0.85 (1.1)	5.39	55 (48)	13.8	141 (122)	7.1	17
13A□A	1.3 (1.7)	8.34	85 (74)	23.3	238 (207)	10.7	28
20A□A	1.8 (2.4)	11.5	117 (102)	28.7	293 (254)	16.7	42
30A□A	2.9 (3.9)	18.6	190 (165)	45.1	460 (404)	23.8	56
44A□A	4.4 (5.9)	28.4	290 (252)	71.1	725 (630)	32.8	84
55A□A	5.5 (7.4)	35.0	357 (310)	87.6	894 (775)	42.1	110
75A□A	7.5 (10)	48.0	490 (425)	119	1210 (1050)	54.7	130
1AA□A	11 (15)	70.0	714 (620)	175	1790 (1550)	58.6	140

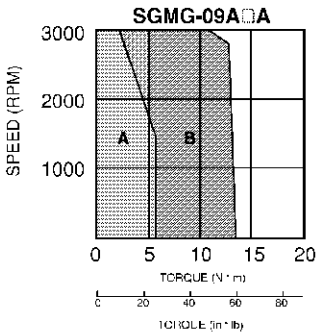
MOTORS: SGMG-	Torque Constant		Moment of Inertia		Holding Brake		Allowable Load Inertia	Rated Power Rate*	Rated Angular Acceleration*	Inertia Time Constant	Inductive Time Constant
					Torque	Inertia					
	N • m/A (rms)	kgf • cm/A (lb • in/A) (rms)	kg • m^2 × 10^{-4}	gf • cm • s^2 (lb • in • s^2 × 10^{-3})	N • m	kg - m^2	kg • m^2 × 10^{-4}	kW/s	rad/s^2	ms	ms
05A□A	0.82	8.4 (7.3)	7.24	7.39 (6.41)	4.41	1.85	36.2	11.2	3930	5.0	5.1
09A□A	0.83	8.4 (7.3)	13.9	14.2 (12.3)	12.7		69.5	20.9	3880	3.1	5.3
13A□A	0.84	8.6 (7.4)	20.5	20.9 (18.2)			103	33.8	4060	2.8	6.3
20A□A	0.73	7.5 (6.5)	31.7	32.3 (28.1)	43.1	7.75	159	41.5	3620	2.1	12.5
30A□A	0.83	8.5 (7.3)	46.0	46.9 (40.7)			230	75.3	4050	1.9	12.5
44A□A	0.91	9.2 (8.0)	67.5	68.9 (59.8)			338	120	4210	1.3	15.7
55A□A	0.88	9.0 (7.8)	89.0	90.8 (78.8)	72.6	7.75	445	137	3930	1.3	16.4
75A□A	0.93	9.4 (8.2)	125	127 (111)			625	184	3850	1.1	18.4
1AA□A	1.25	12.8 (11)	281	287 (249)	84.3	13.2	1405	174	2490	1.2	22.6

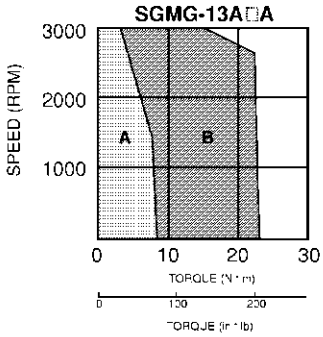
* These items and torque-speed characteristics quoted in combination with and SGDB Servo Amplifier at an armature winding temperature of 20°C.

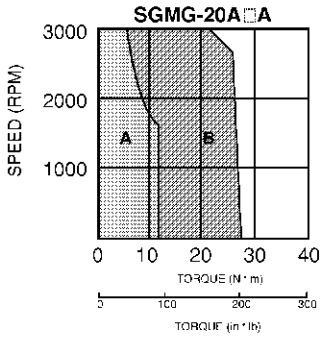
Note: These characteristics can be obtained when the following heat sinks (steel plates) are used for cooling purposes:
Type 05A□A to 13A□A: 400 × 400 × 20 (mm) (15.75 × 15.75 × 0.79 (in))
Type 20A□A to 75A□A: 550 × 550 × 30 (mm) (21.65 × 21.65 × 1.18 (in))
Type 1AA□A: 650 × 650 × 35 (mm) (25.59 × 25.59 × 1.38 (in))

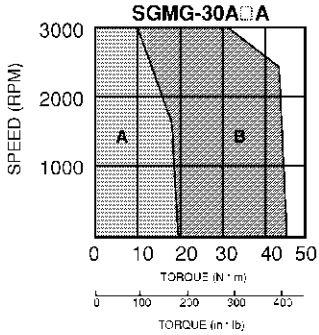
Speed / Torque Curves

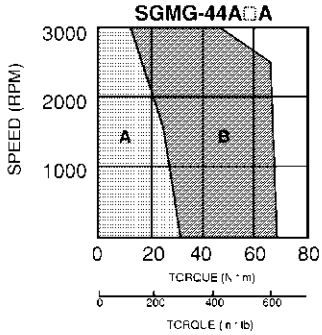


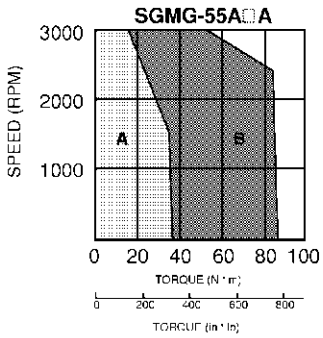


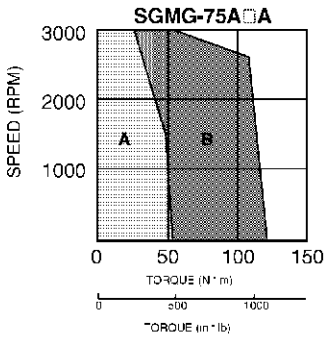


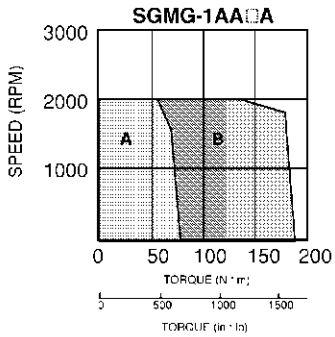










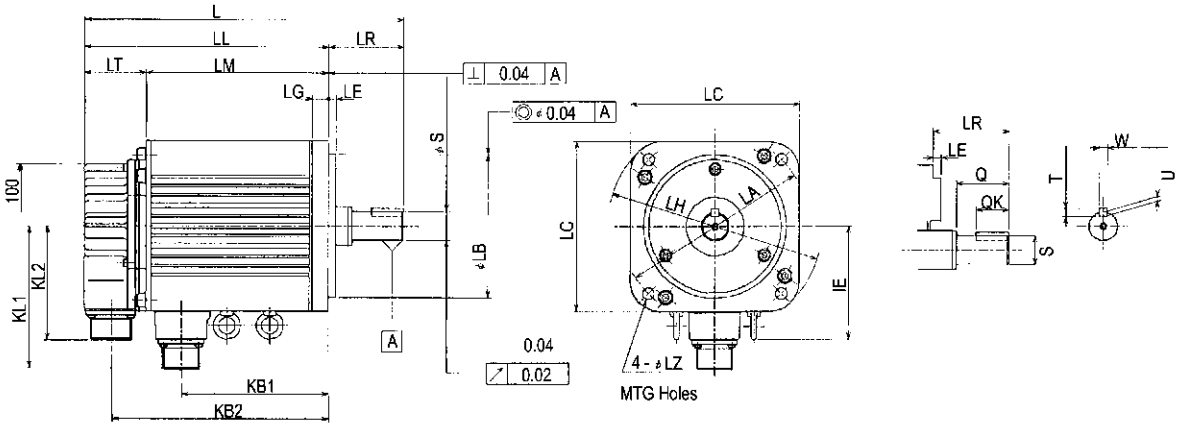


A : **CONTINUOUS DUTY ZONE**

B : **INTERMITTENT DUTY ZONE**

Dimensions in inches (mm)

(1) 8192 PPR Incremental Encoder

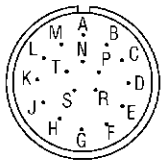


Type SGMG-	L	LL	LM	LR	LT	KB1	KB2	IE	KL1	KL2	Flange Dimensions							Shaft End Dimension						Approx. Mass lb (kg)
											LA	LB	LC	LE	LG	LH	LZ	S	Q	QK	W	T	U	
05A2AB	7.72 (196)	5.43 (138)	3.62 (92)	2.28 (58)	1.81 (46)	2.56 (65)	4.61 (117)	-	4.29 (109)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	12.1 (5.5)
09A2AB	8.62 (219)	6.34 (161)	4.53 (115)	2.28 (58)	1.81 (46)	3.46 (88)	5.51 (140)	-	4.29 (109)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	16.5 (7.5)
13A2AB	9.57 (243)	7.28 (185)	5.47 (139)	2.28 (58)	1.81 (46)	4.41 (112)	6.46 (164)	-	4.29 (109)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.87 (22) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.24 (6)	0.24 (6)	0.14 (3.5)	21.2 (9.6)
20A2AB	9.65 (245)	6.54 (166)	4.69 (119)	3.11 (79)	1.85 (47)	3.5 (89)	5.71 (145)	-	5.51 (140)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	30.9 (14)
30A2AB	10.67 (271)	7.56 (192)	5.71 (145)	3.11 (79)	1.85 (47)	4.53 (115)	6.73 (171)	-	5.51 (140)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	39.7 (18)
44A2AB	12.01 (305)	8.9 (226)	7.05 (179)	3.11 (79)	1.85 (47)	5.87 (149)	8.07 (205)	-	5.51 (140)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	50.7 (23)
55A2AB	14.69 (373)	10.24 (260)	8.39 (213)	4.45 (113)	1.85 (47)	6.85 (174)	9.41 (239)	4.92 (125)	5.91 (150)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	3.54 (90)	0.47 (12)	0.31 (8)	0.20 (5)	66.1 (30)
75A2AB	17.6 (447)	13.15 (334)	11.3 (287)	4.45 (113)	1.85 (47)	9.76 (248)	12.32 (313)	4.92 (125)	5.91 (150)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	3.54 (90)	0.47 (12)	0.31 (8)	0.20 (5)	88.2 (40)
1AA2AB	17.87 (454)	13.31 (338)	11.46 (291)	4.45 (116)	1.85 (47)	9.88 (251)	12.48 (317)	5.59 (142)	6.61 (168)	3.46 (88)	9.25 (235)	7.87 (200) $^{0}_{-0.046}$	8.66 (220)	0.16 (4)	0.71 (18)	10.63 (270)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	3.54 (90)	0.47 (12)	0.31 (8)	0.20 (5)	126.8 (57.5)

Note:
1. Incremental Encoder (8192 PPR) is used as a detector.
2. SGMG-05A2A to 44A2A do not contain eyebolts.
3. Dimensions are the same when using other incremental encoders.
4. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
5. There are no dimensional changes on the CE products.

Connector Wiring on the Incremental Encoder

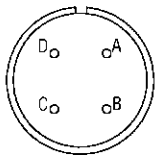
Receptacle: MS3102A20-29P
Applicable Plug: (To be prepared by customer)
Plug: MS3108B20-29S (L Type)
MS3106B20-29S (Straight Type)
Cable Clamp: MS3057-12A



Connector Wiring on the Incremental Encoder			
A	Channel A Output	K	
B	Channel $\overline{A}$ Output	L	
C	Channel B Output	M	-
D	Channel $\overline{B}$ Output	N	-
E	Channel C Output	P	-
F	Channel $\overline{C}$ Output	R	-
G	0V	S	-
H	+5 VDC	T	-
J	FG (Frame Ground)		

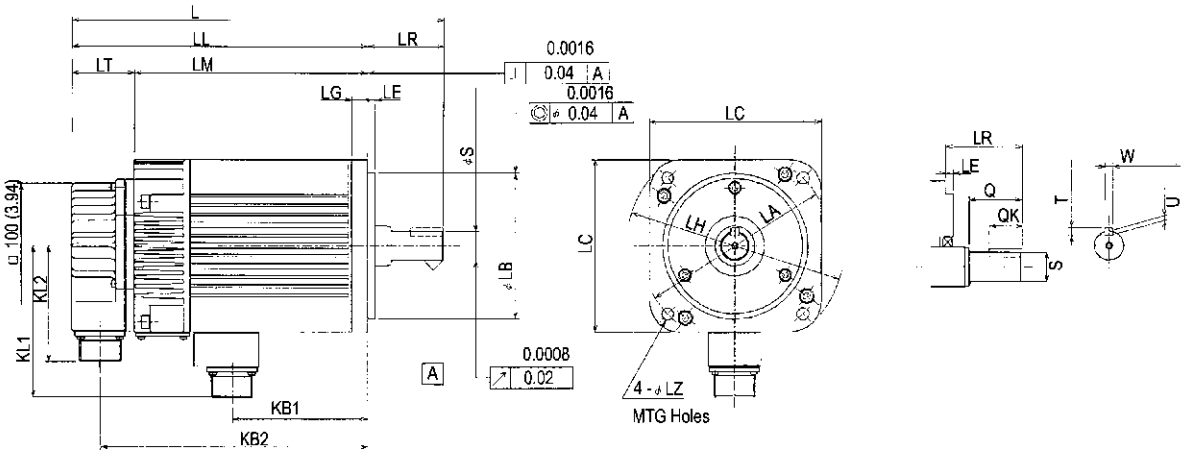
Note: The above-mentioned detector side specifications are common to all the motors with incremental encoders.

Connector Wiring on the Motor Side	
A	U Phase
B	V Phase
C	W Phase
D	Ground Terminal



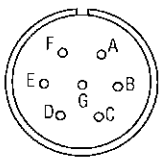
(2) 8192 PPR Incremental Encoder, With Brake

- **0.5 to 4.4kW (0.7 to 5.9HP)**



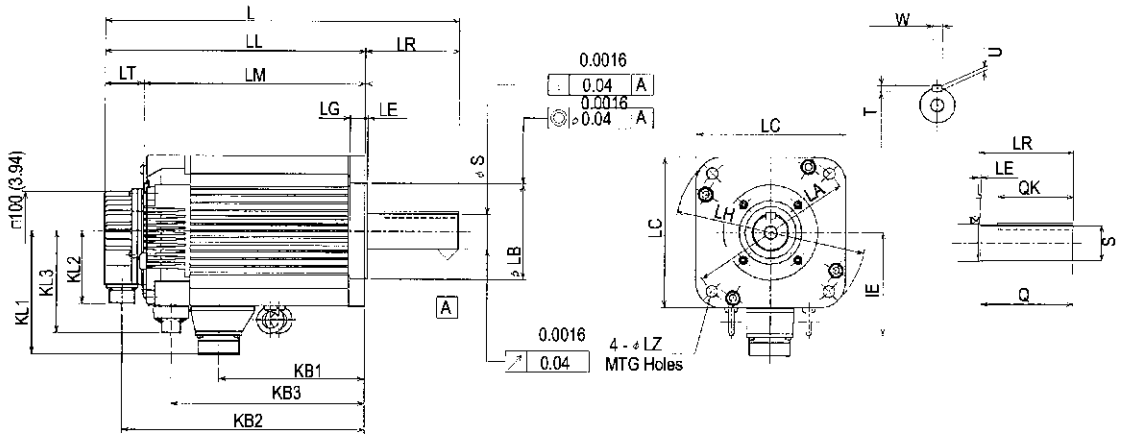
Type SGMG-	L	LL	LM	LR	LT	KB1	KB2	KL1	KL2	Flange Dimensions							Shaft End Dimension						Approx. Mass lb (kg)
										LA	LB	LC	LE	LG	LH	LZ	S	Q	QK	W	T	U	
05A2ABC	9.21 (234)	6.93 (176)	5.08 (129)	2.28 (58)	1.85 (47)	2.2 (56)	6.1 (155)	4.72 (120)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	16.5 (7.5)
09A2ABC	10.12 (257)	7.83 (199)	5.98 (152)	2.28 (58)	1.85 (47)	3.11 (79)	7.01 (178)	4.72 (120)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	21.2 (9.6)
13A2ABC	11.06 (281)	8.78 (223)	6.93 (176)	2.28 (58)	1.85 (47)	4.06 (103)	7.95 (202)	4.72 (120)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.87 (22) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.24 (6)	0.24 (6)	0.14 (3.5)	26.5 (12)
20A2ABC	11.65 (296)	8.54 (217)	6.69 (170)	3.11 (79)	1.85 (47)	3.11 (79)	7.72 (196)	5.75 (146)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	41.9 (19)
30A2ABC	12.68 (322)	9.57 (243)	7.72 (196)	3.11 (79)	1.85 (47)	4.13 (105)	8.74 (222)	5.75 (146)	3.46 (88)	7.87 (200)	4.5 (114).3 $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	51.8 (23.5)
44A2ABC	14.02 (356)	10.91 (277)	9.06 (230)	3.11 (79)	1.85 (47)	5.47 (139)	10.08 (256)	5.75 (146)	3.46 (88)	7.87 (200)	4.5 (114).3 $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	62.8 (28.5)

Note:
1. Incremental Encoder (8192 PPR) is used as a detector.
2. Dimensions are the same when using other incremental encoders.
3. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
4. There are no dimensional changes on the CE products.



Connector Wiring on the Motor Side			
A	U Phase	E	Brake Terminal
B	V Phase	F	Brake Terminal
C	W Phase	G	-
D	FG (Frame Ground)		

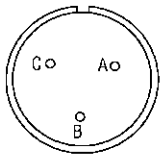
- **5.5 to 11kW (7.4 to 15HP)**



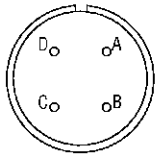
Type SGMG-	L	LL	LM	LR	LT	KB1	KB2	KB3	IE	KL1	KL2	KL3	Flange Dimensions							Shaft End Dimension						Approx. Mass lb (kg)
													LA	LB	LC	LE	LG	LH	LZ	S	Q	QK	W	T	U	
55A2AAC	16.69 (424)	12.24 (311)	10.39 264	4.45 (113)	1.85 (47)	6.85 (174)	11.42 (290)	9.09 (231)	4.92 (125	5.91 (150)	3.46 (88)	4.84 (123)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 ((230)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	77.2 (35)
75A2AAC	19.61 (498)	15.16 (385)	13.31 (338)	4.45 (113)	1.85 (47)	9.76 (248)	14.33 (364)	12.01 (305)	4.92 (125)	5.91 (150)	3.46 (88)	4.84 (123)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 ((230)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	100.3 (45.5)
1AA2AAC	19.65 (499)	15.08 (383)	13.39 (340)	4.57 (116)	4.69 (43)	10.16 (258)	14.25 (362)	12.4 (315)	5.59 (142)	6.61 (168)	3.46 (88)	5.59 (142)	9.25 (235)	7.87 (200) $^{0}_{-0.046}$	8.66 (220)	0.16 (4)	0.71 (18)	10.63 (270)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	0.98 (25)	0.24 (6)	0.24 (6)	0.14 (3.5)	143.3 (65)

Note:
1. Incremental Encoder (8192 PPR) is used as a detector.
2. Dimensions are the same when using other incremental encoders.
3. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
4. There are no dimensional changes on the CE products.

Connector Wiring on Brake, Motor Side

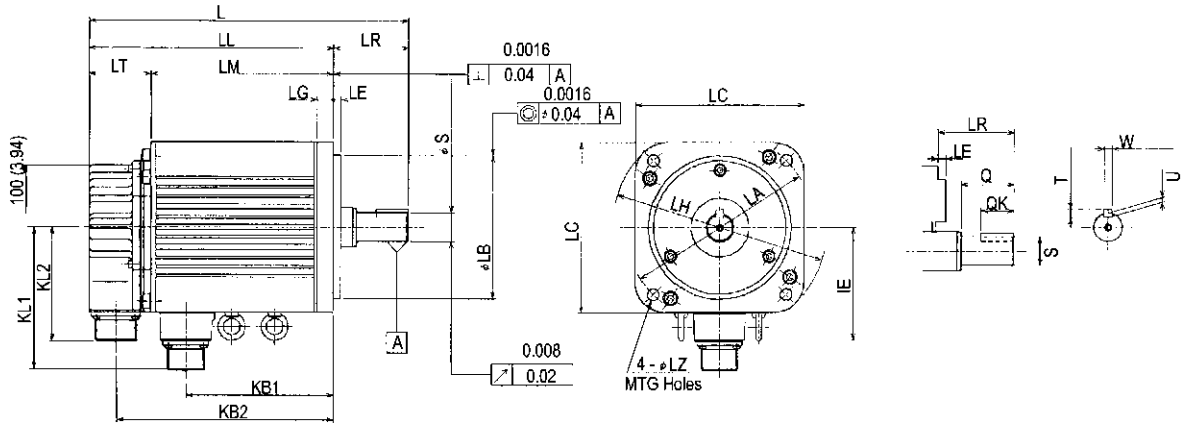


A	Brake Terminal
B	Brake Terminal
C	-



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

(3) 8192 PPR Absolute Encoder (15 bit)

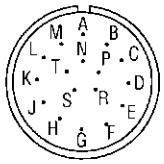


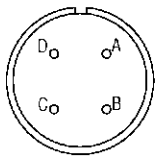
Type SGMG-	L	LL	LM	LR	LT	KB1	KB2	IE	KL1	KL2	Flange Dimensions							Shaft End Dimension						Approx. Mass lb (kg)
											LA	LB	LC	LE	LG	LH	LZ	S	Q	QK	W	T	U	
05ASAB	8.27 (210)	5.98 (152)	3.62 (92)	2.28 (58)	2.36 (60)	2.56 (65)	5.16 (131)	-	4.29 (109)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	13 (5.9)
09ASAB	9.17 (233)	6.89 (175)	4.53 (115)	2.28 (58)	2.36 (60)	3.46 (88)	6.06 (154)	-	4.29 (109)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	17.6 (8.0)
13ASAB	10.12 (257)	7.83 (199)	5.47 (139)	2.28 (58)	2.36 (60)	4.41 (112)	7.01 (178	-	4.29 (109)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.87 (22) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.24 (6)	0.24 (6)	0.14 (3.5)	22 (10)
20ASAB	10.2 (259)	7.09 (180)	4.69 (119)	3.11 (79)	2.4 (61)	3.5 (89)	6.26 (159)	-	5.51 (140)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	30.9 (14)
30ASAB	11.22 (285)	8.11 (206)	5.71 (145)	3.11 (79)	2.4 (61)	4.53 (115)	7.28 (185)	-	5.51 (140)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	40.8 (18.5)
44ASAB	12.56 (319)	9.45 (240)	7.05 (179)	3.11 (79)	2.4 (61)	5.87 (149)	8.62 (219)	-	5.51 (140)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	52.9 (24)
55ASAB	15.24 (387)	10.79 (274)	8.39 (213)	4.45 (113)	2.4 (61)	6.85 (174)	9.96 (253)	4.92 (125)	5.91 (150)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	3.54 (90)	0.47 (12)	0.31 (8)	0.20 (5)	66.1 (30)
75ASAB	18.15 (461)	13.7 (348)	11.3 (287)	4.45 (113)	2.4 (61)	9.76 (248)	12.87 (327)	4.92 (125)	5.91 (150)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	3.54 (90)	0.47 (12)	0.31 (8)	0.20 (5)	88.2 (40)
1AASAB	18.43 (468)	13.86 (352)	11.46 (291)	4.57 (116)	2.4 (61)	9.88 (251)	13.03 (331)	5.59 (142)	6.61 (168)	3.46 (88)	9.25 (235)	7.87 (200) $^{0}_{-0.046}$	8.66 (220)	0.16 (4)	0.71 (18)	10.63 (270)	0.53 (13.5)	1.65 (42) $^{0}_{-0.016}$	4.33 (110)	3.54 (90)	0.47 (12)	0.31 (8)	0.20 (5)	127.9 (58)

Note:
1. Absolute Encoder (8192 PPR) is used as a detector.
2. SGMG-05A2A to 44A2A do not contain eyebolts.
3. Dimensions are the same when using other absolute encoders.
4. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
5. There are no dimensional changes on the CE products.

Connector Specifications

Receptacle: MS3102A20-29P
Applicable Plug: (To be prepared by customer)
Plug: MS3108B20-29S (L Type)
MS3106B20-29S (Straight Type)
Cable Clamp: MS3057-12A





Connector Wiring on the Incremental Encoder (When using 8192 PPR (15 bits))			
A	Channel A Output	K	-
B	Channel $\overline{A}$ Output	L	-
C	Channel B Output	M	-
D	Channel $\overline{B}$ Output	N	-
E	Channel Z (C) Output	P	-
F	Channel $\overline{Z}$ $\overline{(C)}$ Output	R	Reset
G	0V	S	0V (battery)
H	+5 VDC	T	3.6V (battery)
J	FG (Frame Ground)		

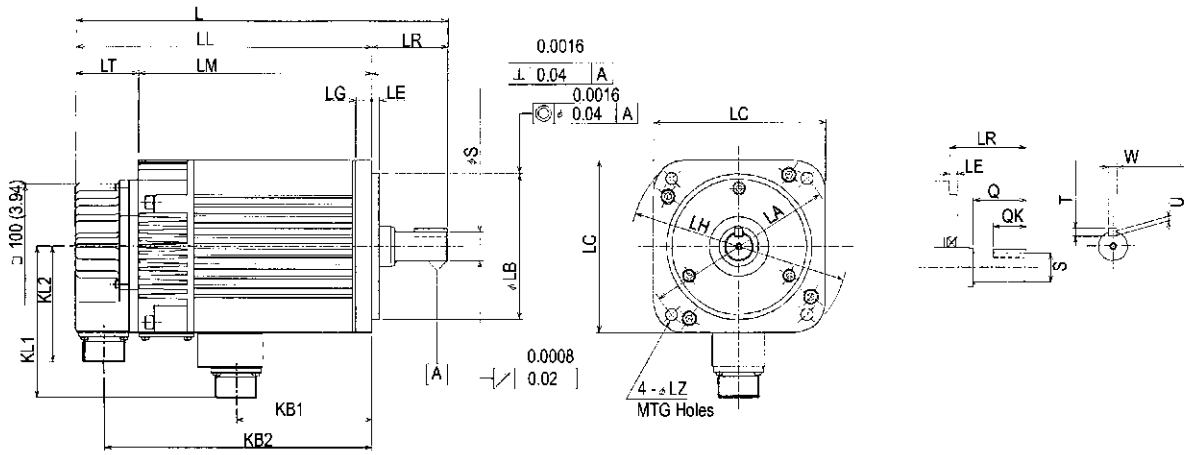
Note: The above-mentioned detector side specifications are common to all the motors with incremental encoders.

Connector Wiring on the Motor Side	
A	U Phase
B	V Phase
C	W Phase
D	FG (Frame Ground)

SGMG

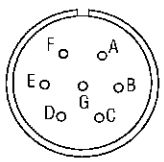
(4) 8192 PPR Absolute Encoder (15 bit), with Brake

- **0.5 to 4.4kW (0.7 to 5.9HP)**



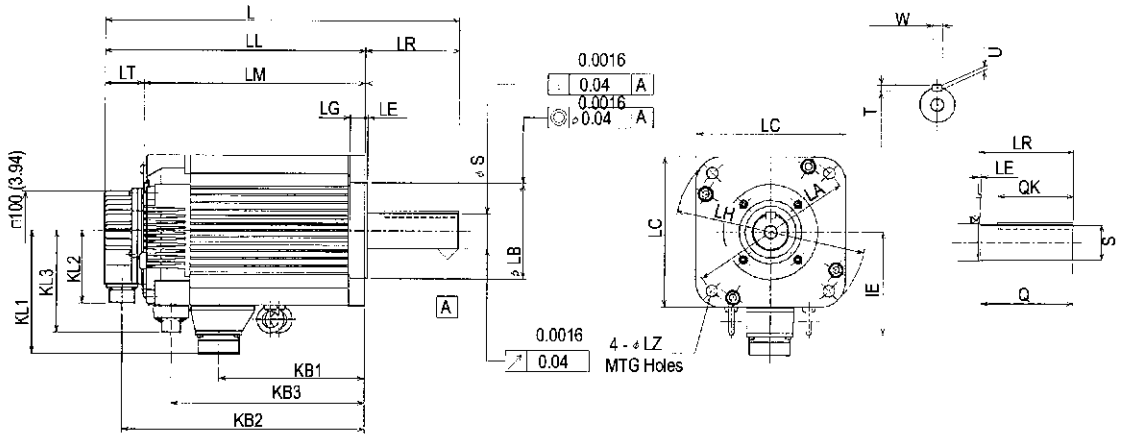
Type SGMG-	L	LL	LM	LR	LT	KB1	KB2	KL1	KL2	Flange Dimensions							Shaft End Dimension						Approx. Mass lb (kg)
										LA	LB	LC	LE	LG	LH	LZ	S	Q	QK	W	T	U	
05ASABC	248 (9.76)	190 (7.5)	5.08 (129)	2.28 (58)	61 (2.4)	2.2 (56)	169 (6.7)	4.72 (120)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	17.4 (7.9)
09ASABC	271 (10.7)	213 (8.4)	5.98 (152)	2.28 (58)	61 (2.4)	3.11 (79)	192 (7.6)	4.72 (120)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.75 (19) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.20 (5)	0.20 (5)	0.12 (3)	22 (9.6)
13ASABC	295 (11.6)	237 (9.3)	6.93 (176)	2.28 (58)	61 (2.4)	4.06 (103)	216 (8.5)	4.72 (120)	3.46 (88)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	0.35 (9)	0.87 (22) $^{0}_{-0.013}$	1.57 (40)	0.98 (25)	0.24 (6)	0.24 (6)	0.14 (3.5)	26.5 (12)
20ASABC	310 (12)	231 (9.1)	6.69 (170)	3.11 (79)	61 (2.4)	3.11 (79)	210 (8.3)	5.75 (146)	3.46 (88)	7.87 (200)	4.5 (114.3) $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	43 (19)
30ASABC	336 (13)	257 (10)	7.72 (196)	3.11 (79)	61 (2.4)	4.13 (105)	236 (9.3)	5.75 (146)	3.46 (88)	7.87 (200)	4.5 (114.3 $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	51.8 (23.5)
44ASABC	370 (15)	291 (11.5)	9.06 (230)	3.11 (79)	61 (2.4)	5.47 (139)	270 (10.6)	5.75 (146)	3.46 (88)	7.87 (200)	4.5 (114.3 $^{0}_{-0.025}$	7.09 (180)	0.13 (3.2)	0.71 (18)	9.06 (230)	0.53 (13.5)	1.38 (35) $^{+0.01}_{0}$	2.99 (76)	2.36 (60)	0.39 (10)	0.31 (8)	0.20 (5)	64 (29)

Note:
1. Incremental Encoder (8192 PPR) is used as a detector.
2. Dimensions are the same when using other incremental encoders.
3. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
4. There are no dimensional changes on the CE products.



Connector Wiring on the Motor Side			
A	U Phase	E	Brake Terminal
B	V Phase	F	Brake Terminal
C	W Phase	G	-
D	FG (Frame Ground)		

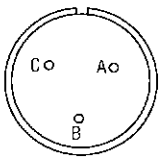
- **5.5 to 11kW (7.4 to 15HP)**



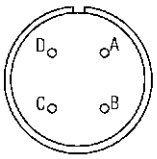
Type SGMG-	L	LL	LM	LR	LT	KB1	KB2	KB3	IE	KL1	KL2	KL3	Flange Dimensions											Shaft End Dimension			Approx. Mass lb (kg)
													LA	LB	LC	LE	LF1	LF2	LG	LH	LJ1	LJ2	LZ	S	SI	Q	
55ASABC	4.38 (17.24)	3.25 (12.80)	2.64 (10.39)	113 (4.45)	61 (1.85)	174 (6.85)	304 (11.97)	231 (9.09)	125 (4.92)	150 (5.91)	88 (3.46)	123 (4.84)	200 (7.87)	114.3 (4.5) $^{0}_{-0.025}$	180 (7.09)	3.2 (0.13)	3 (0.12)	0.5 (0.02)	18 (0.71)	230 (9.06)	76 (2.99)	62 (2.44)	13.5 (0.53)	42 (1.65) $^{0}_{-0.016}$	45 (1.77)	110 (4.33)	36 (79.4)
75ASABC	512 (20.2)	399 (15.7)	338 (13.31)	113 (4.45)	61 (1.85)	248 (9.76)	378 (14.88)	305 (12.01)	125 (4.92)	150 (5.91)	88 (3.46)	123 (4.84)	200 (7.87)	114.3 (4.5) $^{0}_{-0.025}$	180 (7.09)	3.2 (0.13)	3 (0.12)	0.5 (0.02)	18 (0.71)	230 (9.06)	76 (2.99)	62 (2.44)	13.5 (0.53)	42 (1.65) $^{0}_{-0.016}$	45 (1.77)	110 (4.33)	50 (110.2)
1AASABC	513 (20.2)	397 (15.6)	340 (13.39)	116 (4.57)	57 (1.69)	258 (10.16)	376 (14.80)	315 (12.4)	142 (5.59)	168 (6.61)	88 (3.46)	142 (5.59)	235 (9.25)	200 (7.87) $^{0}_{-0.046}$	220 (8.66)	4 (0.16)	4 (0.16)	-	18 (0.71)	270 (10.63)	62 (2.44)	-	13.5 (0.53)	42 (1.65) $^{0}_{-0.016}$	45 (1.77)	110 (4.33)	65.5 (144.4)

Note:
1. Absolute Encoder (8192 PPR) is used as a detector.
2. SGMG-05A2A to 44A2A do not contain eyebolts.
3. Dimensions are the same when using other absolute encoders.
4. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
5. There are no dimensional changes on the CE products.

Connector Wiring on Brake, Motor Side



A	Brake Terminal
B	Brake Terminal
C	-

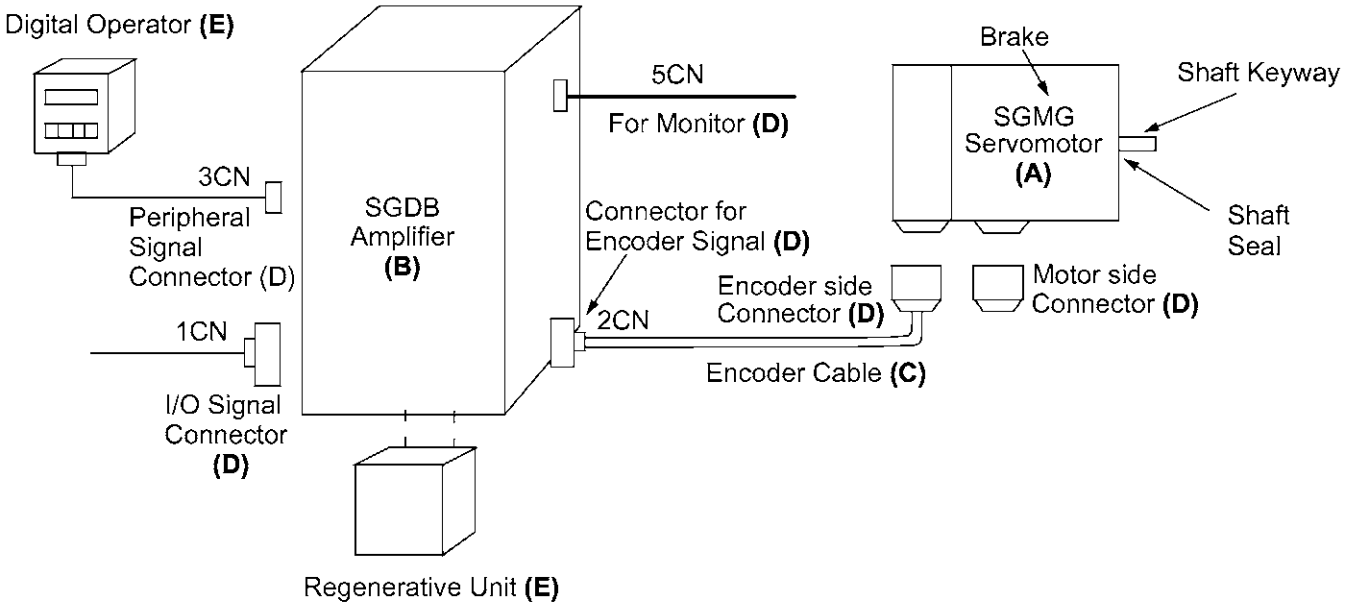


A	U Phase
B	V Phase
C	W Phase
D	FG (Frame Ground)

Selecting Your SGMG Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGMG - 09 A 2 A B C

Sigma Servomotor Type

Rated Output
- 05: 500W (0.7HP)
- 09: 850W (1.14HP)
- 13: 1.3kW (1.7HP)
- 20: 2.0kW (2.7HP)
- 30: 3.0kW (4.0HP)
- 44: 4.4kW (6.0HP)
- 55: 5.5kW (7.5 HP)
- 75: 7.5kW (10HP)
- 1A: 11.0kW (15HP)

Power Supply
- A: 200V

Accessories
- C: 24VDC Brake
- S: Shaft Seal
- G: Brake and Shaft Seal

Shaft Specifications
- B: Straight Shaft with Keyway

Rated Speed
- A: 1500RPM

Encoder Specifications
- 2: 8192PPR Incremental Encoder
- S: 8192PPR Absolute Encoder

Note: Bold items are Stock Products usually available from inventory. Contact your Yaskawa representative for delivery on all other items.

Servomotor & Amplifier Selection

Use the table below to select the appropriate SGMG Sigma Servomotor and Amplifier.

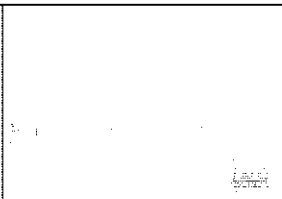
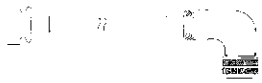
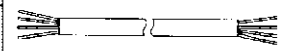
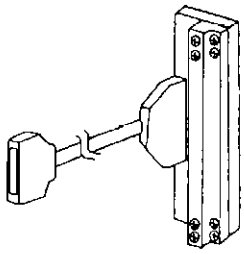
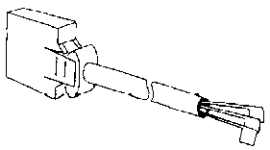
Description	Peak Torque (in. lb.)	Rated Torque (in. lb.)	Motor Inertia (in. lb. sec^2 ¥ 10^{-3})	Motor MODEL # (A)	Amplifier MODEL # (B)* Analog/Digital Input SGDB-	Motor & Amplifier Item Class
200V 3-Phase 8192 PPR Incremental Encoder Straight Shaft with Keyway 3,000 RPM max. MS Connectors	79	25	6.41	SGMG-05A2AB	05ADG	Stock
				SGMG-05A2ABC		
	122	48	12.3	SGMG-09A2AB	10ADG	
				SGMG-09A2ABC		
	207	74	18.2	SGMG-13A2AB	15ADG	
				SGMG-13A2ABC		
	254	102	28.1	SGMG-20A2AB	20ADG	
				SGMG-20A2ABC		
	404	165	40.7	SGMG-30A2AB	30ADG	
				SGMG-30A2ABC		
	630	252	59.8	SGMG-44A2AB	44ADG	
				SGMG-44A2ABC		
	776	310	78.8	SGMG-55A2AB	60ADG Requires Regenerative Unit (E)	
				SGMG-55A2ABC		
	1050	425	111	SGMG-75A2AB	75ADG Requires Regenerative Unit (E)	
				SGMG-75A2ABC		
	1550	620	249	SGMG-1AA2AB	1AADG Requires Regenerative Unit (E)	
				SGMG-1AA2ABC		

Note: 24VDC brakes for SGMG Sigma servomotors are standard. Contact a local source for 24VDC power supplies. For technical information, request manual number TSE-S800-16 from your Yaskawa representative.

* For more detailed SGDB amplifier specifications and dimensions, refer to page 127.

Pre-wired Cable Selection

Use the table below to select Pre-wired Cables for your SGMG Sigma Servomotor.

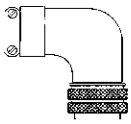
Cable Description (C)		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
Power Cable with Connectors		0.5, 0.9, 1.3	B1E-□	B1BE-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (standard) 4: 15 meters 5: 20 meters	Stock **
		2.0, 3.0	B2E-□	B2BE-□		
		4.4	B3E-□	B3BE-□		
		5.5, 7.5 *	B5E-□	B5E-□ B7BE-□		
		11 *	B6E-□	B6E-□ B7BE-□		
Encoder Cable (incremental or absolute)		All	DE9407237-□E			
Encoder Cable Only for Solder Connections			DP8409123		Up to 70 feet; for use with mating connector.	
Encoder Cable Only for Solder Connections			DP8409179		Over 70 feet; splice cable to accommodate connector.	
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA50P		35 mm din rail mountable; the cable length is 0.5 meters.	
Input/Output 1CN Cable with Pigtail Leads			DE9406969-□		Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	

* When ordering these cables for motors with brakes, order the standard power cable and the additional cable for the brake.

** Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

Connector Selection

Use the table below to select Mating Connectors for your SGMG Sigma Servomotor.

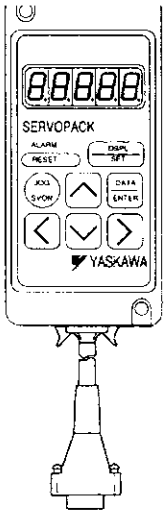
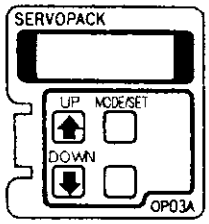
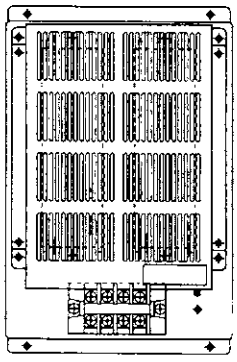
Connector Description (D)		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
MS Connector for Motor Power Cable *		0.5, 0.9, 1.3	MS3106B18-10S MS3108B18-10S MS3057-10A	MS3106B20-15S MS3108B20-15S MS3057-12A	Straight-type connector L-type connector Cable clamp	Stock
		2.0, 3.0, 4.4	MS3106B22-22S MS3108B22-22S MS3057-12A	MS3106B24-10S MS3108B24-10S MS3057-16A	Straight-type connector L-type connector Cable clamp	
		5.5, 7.5, 11	MS3106B32-17S MS3108B32-17S MS3057-20A	MS3106B32-17S+ MS3106A10SL-3S MS3108B32-17S+ MS3108A10SL-3S MS3057-20A MS3057-4A	Straight-type connector L-type connector Cable clamp	
MS Connector for Encoder Cable (incremental or absolute encoder)		All	MS3106B20-29S MS3108B20-29S MS3057-12A		Straight-type connector L-type connector Cable clamp	
1CN Mating Connector			DE9406970		Can use 1CN for analog speed and torque monitor service checks.	
2CN Encoder Mating Connector			DE9406973		–	
3CN Peripheral Mating Connector			Stock 9-pin male D-shell connector		Source locally.	–
5CN Connector and 1m Cable with Pigtails			DE9404559		–	Stock

* Choose either a straight or L-type connector and the associated cable clamp for a complete assembly. For example, L-type connector MS3108B18-10S is compatible with cable clamp MS3057-10A.

SGMG

Peripheral Device Selection

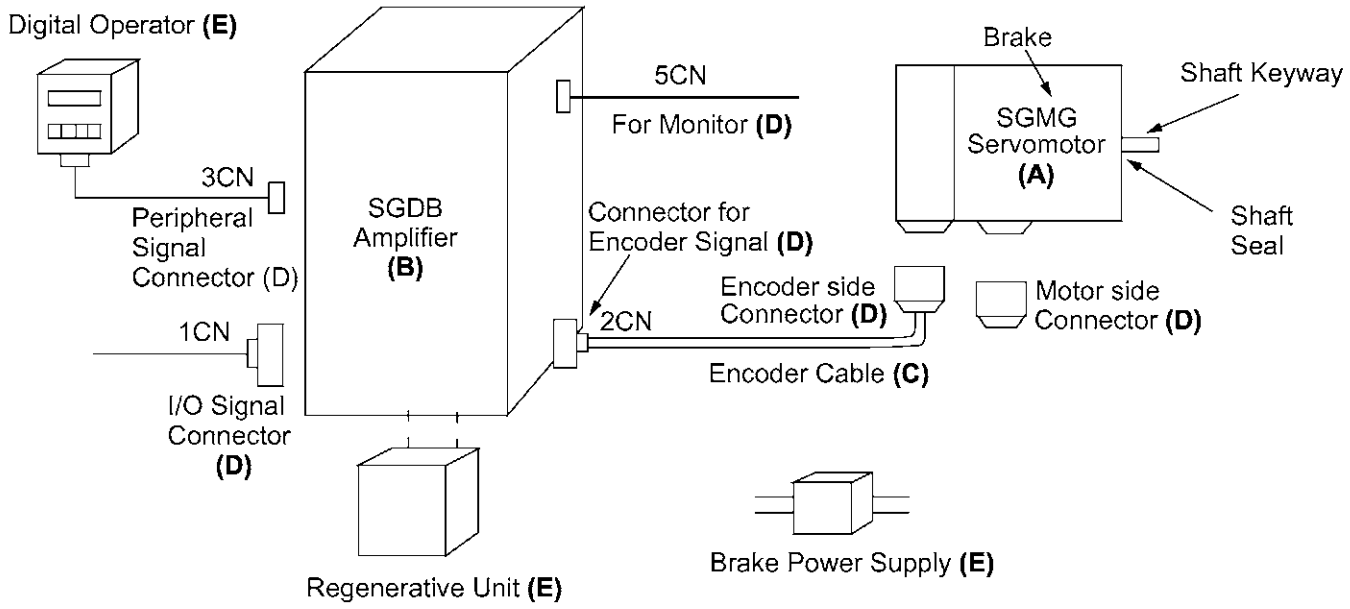
Use the table below to select Peripheral Devices for your SGMG Sigma Servomotor.

Component (E)		Part Number	Description	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	
Regenerative Unit for 6.0 kW amplifier (880 watts)		JUSP-RA04	–	
Regenerative Unit for 7.5 and 11.0kW amplifiers (1760 watts)		JUSP-RA05	–	

Selecting Your SGMG Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGMG - 05 V 2 A B [B]

Sigma Servomotor Type

Rated Output
- 05: 0.5kW (0.7HP)
- 09: 0.85kW (1.14HP)
- 13: 1.3kW (1.7HP)
- 20: 2.0kW (2.7HP)
- 30: 3.0kW (4.0HP)
- 44: 4.4kW (6.0HP)
- 55: 5.5kW (7.5HP)
- 75: 7.5kW (10HP)
- 1A: 11.0kW (15HP)

Power Supply
- V: 200V CE Specification

Encoder Specifications
- 2: 8192PPR Incremental Encoder
- S: 8192PPR Absolute Encoder

Rated Speed
- A: 1500RPM

Shaft Specifications
- B: Straight Shaft with Keyway

Accessories
- B: 90VDC Brake
- S: Shaft Seal
- F: Shaft Seal and Brake

Servomotor & Amplifier Selection

Use the table below to select the appropriate SGMG Sigma Servomotor and Amplifier.

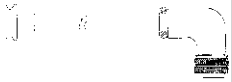
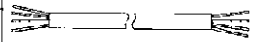
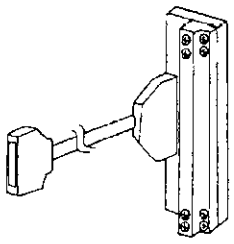
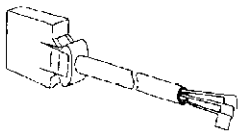
Description	Peak Torque (in. lb.)	Rated Torque (in. lb.)	Motor Inertia (in. lb. $sec^2 \times 10^{-3}$)	Motor MODEL # (A)	Amplifier MODEL # (B)* Analog/Digital Input SGDB-	Motor Item Class
200V 3-Phase 8192 PPR Incremental Encoder Straight Shaft with Keyway 3,000 RPM max. JL04V Circular Connectors	79	25	6.41	SGMG-05V2AB	05VD (Limited Stock)	Limited Stock
				SGMG-05V2ABB		Non-Stock
	122	48	12.3	SGMG-09V2AB	10VD (Limited Stock)	Limited Stock
				SGMG-09V2ABB		Non-Stock
	207	74	18.2	SGMG-13V2AB	15VD (Limited Stock)	Limited Stock
				SGMG-13V2ABB		Non-Stock
	254	102	28.1	SGMG-20V2AB	20VD (Limited Stock)	Limited Stock
				SGMG-20V2ABB		Non-Stock
	404	165	40.7	SGMG-30V2AB	30VD (Limited Stock)	Limited Stock
				SGMG-30V2ABB		Non-Stock
	630	252	59.8	SGMG-44V2AB	60VDY6 (Limited Stock)	Limited Stock
				SGMG-44V2ABB		Non-Stock
	776	310	78.8	SGMG-55V2AB	60VD (Limited Stock) Requires Regen Unit (E)	Limited Stock
				SGMG-55V2ABB		Non-Stock
	1050	425	111	SGMG-75V2AB	75VD (Non-Stock) Requires Regen Unit (E)	Non-Stock
				SGMG-75V2ABB		
	1550	620	249	SGMG-1AV2AB	1AVD (Non-Stock) Requires Regen Unit (E)	
				SGMG-1AV2ABB		

Note: 90VDC brakes for SGMG Sigma servomotors (CE) are standard. See Peripheral Device Selection in this section to order a power supply.
For technical information, request technical document numbers PI-6021 and DE9409784 from your Yaskawa representative.

* For more detailed SGDB amplifier specifications and dimensions, refer to page 127.

Pre-wired Cable Selection

Use the table below to select Pre-wired Cables for your SGMG Sigma Servomotor.

Cable Description (C)		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
Power Cable with Connectors		0.5, 0.9, 1.3	B1CE-□	B1BCE-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (standard) 4: 15 meters 5: 20 meters	Limited Stock
		2.0, 3.0	B2CE-□	B2BCE-□		
		4.4	B3CE-□	B3BCE-□		
		5.5, 7.5, 11	* See note below			–
Encoder Cable (incremental or absolute)		All	A1CE-□			Limited Stock
Encoder Cable Only for Solder Connections			DP8409123		Up to 70 feet; for use with mating connector.	Stock **
Encoder Cable Only for Solder Connections			DP8409179		Over 70 feet; splice cable to accommodate connector.	
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA50P		35 mm din rail mountable; the cable length is 0.5 meters.	
Input/Output 1CN Cable with Pigtail Leads			DE9406969-□		Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	

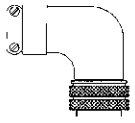
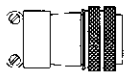
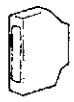
* Pre-wired cables for motors with brakes (5.5, 7.5 & 11kW) are not available, since the applicable mating connectors are compatible with a conduit connection.

** Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

SGMG

Mating Connector Selection

Use the table below to select Mating Connectors for your SGMG Sigma Servomotor.

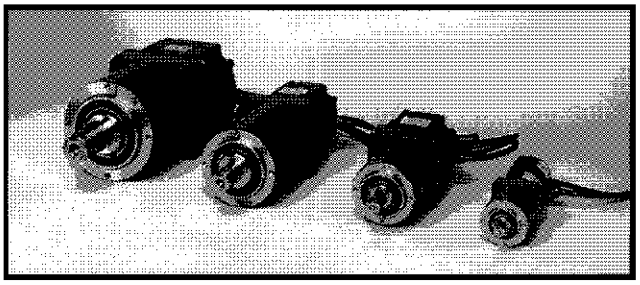
Connector Description (D)		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
Connector for Motor Power Cable *		0.5, 0.9, 1.3	JL04V-8A18-10SE-EB JL04-18CK(13)	JL04V-8A20-15SE-EB JL04-2022CK(14)	L-type connector Cable clamp	Limited Stock
		2.0, 3.0, 4.4	JL04V-8A22-22SE-EB JL04-2022CK(14)	JL04V-8A24-10SE-EB JL04-2428CK(17)	L-type connector Cable clamp	
		5.5, 7.5, 11	JL04V-6A32-17SE –	JL04V-6A32-17SE –	Straight-type connector No cable clamp, conduit coupled 1.875 inches 16UN-2A	
Connector for Encoder Cable (incremental or absolute encoder)		All	JA08A-20-29S-J1-EB JL04-2022CKE(12)		L-type connector Cable clamp	
1CN Mating Connector			DE9406970		Can use 1CN for analog speed and torque monitor service checks.	
2CN Encoder Mating Connector			DE9406973		–	
3CN Peripheral Mating Connector			Stock 9-pin male D-shell connector		Source locally.	–
5CN Connector and 1m Cable with Pigtails			DE9404559		–	Limited Stock

* Choose the connector and the associated cable clamp for a complete assembly.

SGMG

SGMG Gearmotors (1500rpm) - With Incremental / Absolute Encoder

Rated Output : 0.45kW, 0.85kW, 1.3kW,
1.8kW, 2.9kW, 4.4kW,
5.5kW, 7.5kW, 11kW



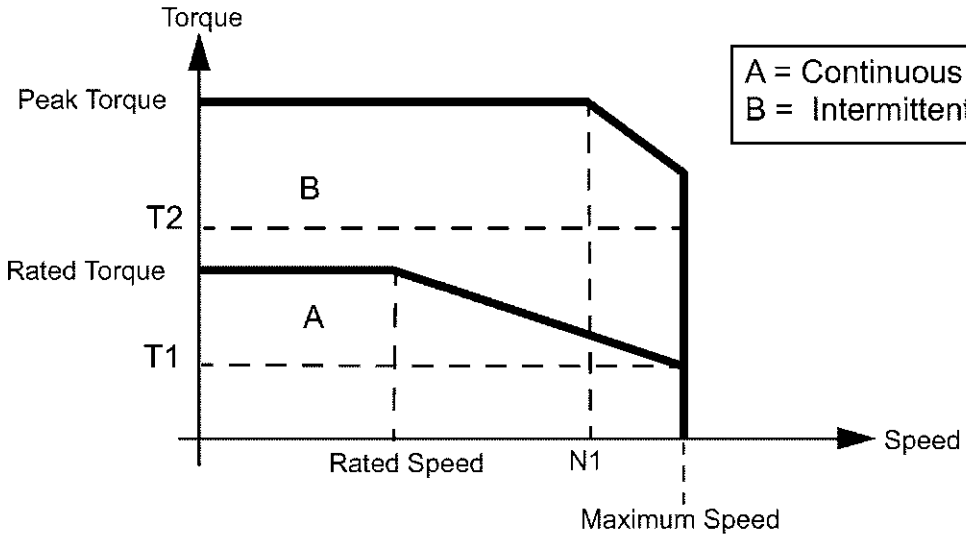
Design Features

1. Compact
   - Fits in limited mounting space
2. Speed
   - 307 to 30,090 in. lb. peak torque
   - Uses time-proven, SGMG motor technology
3. Encoders
   - 8192 PPR incremental encoder standard
   - 8192 PPR absolute encoder (option)
4. Enclosure
   - Totally enclosed, self-cooled IP67 (not including shaft)
5. Application Emphasis
   - Rugged, general purpose
   - Roll feeders
   - Chip mounters
   - X-Y tables
   - PCB drilling machines
   - Packaging
6. Certified International Standards
   - UL Recognized (File #: E165827), CE compliance (option)

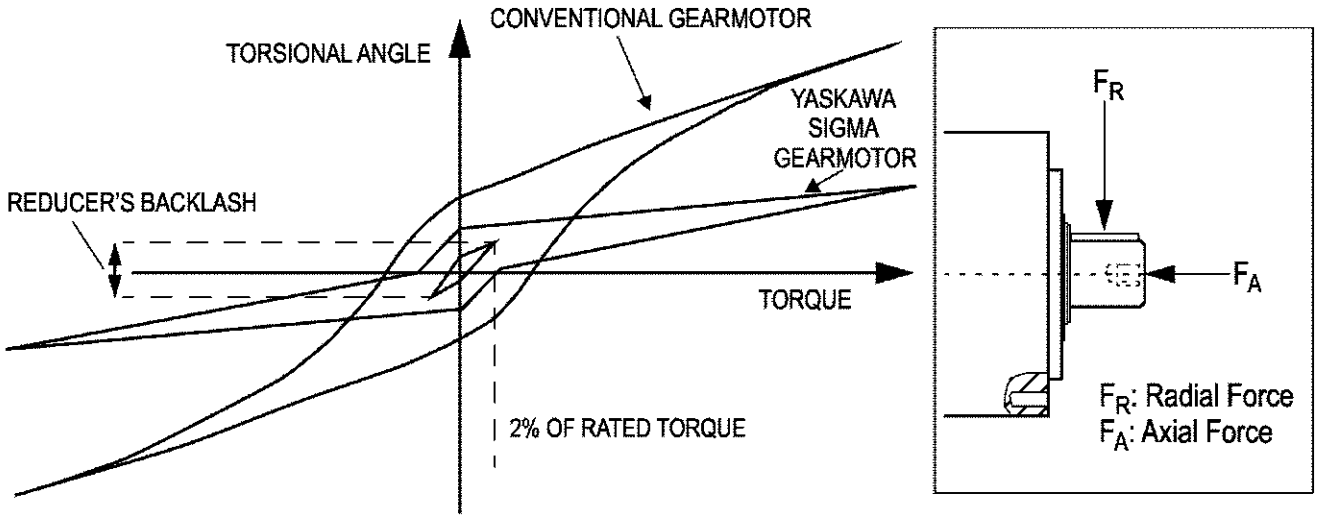
Gearmotor Ratings and Specifications

GEARMOTOR Part Number	Rated Torque (in. lb.)	Peak Torque (in. lb.)	Rated Speed (rpm)	Max. Speed (rpm)	Speed N1 (rpm)	Torque T1 (in. lb.)	Torque T2 (in. lb.)	Amplifier Model Number SGDB-
SG05SA-G05A2	121	383	300	600	460	63	184	05ADG
SH04SA-G05A2	97	307	375	750	575	51	148	
SH05SA-G05A2	121	383	300	600	460	63	184	
SH07SA-G05A2	170	536	214	429	329	88	258	
SH10SA-G05A2	243	708	150	300	230	117	341	
SG10SA-G05A2	243	766	150	300	230	126	368	
SH20S□-G05A2	470	1485	75	150	115	244	714	
SG25SA-G05A2	594	1770	60	120	92	291	851	
SH28S□-G05A2	658	2,079	54	107	82	342	1000	
SH40S□-G05A2	940	2,213	38	75	57	364	1064	
SH50S□-G05A2	1,175	2,213	30	60	46	364	1064	
SH70S□-G05A2	1,645	4,426	21	43	33	728	2129	
SG05SA-G09A2	233	592	300	600	560	116	388	10ADG
SH04SA-G09A2	186	473	375	750	700	93	310	
SH05SA-G09A2	233	592	300	600	560	116	388	
SH07SA-G09A2	326	828	214	429	400	163	543	
SH10SA-G09A2	466	1,183	150	300	280	233	776	
SG10SA-G09A2	466	1,183	150	300	280	233	776	
SH16S□-G09A2	722	1,835	94	188	175	361	1203	
SH20S□-G09A2	902	2,213	75	150	140	435	1451	
SH28S□-G09A2	1,263	2,213	54	107	100	435	1451	
SH50S□-G09A2	2,256	4,426	30	60	56	871	2902	
SH70S□-G09A2	3,158	4,426	21	43	40	871	2902	
SG05SA-G13A2	359	1,004	300	600	540	179	728	15ADG
SG10SA-G13A2	718	1,770	150	300	270	316	1283	
SH04SA-G13A2	287	803	375	750	675	144	582	
SH05SA-G13A2	359	1,004	300	600	540	179	728	
SH07SA-G13A2	502	1,406	214	429	386	251	1019	
SH10SA-G13A2	718	1,770	150	300	270	359	1455	
SH16S□-G13A2	1,113	2,213	94	188	169	396	1604	
SH20S□-G13A2	1,391	2,213	75	150	135	396	1604	
SH28S□-G13A2	1,948	4,426	54	107	96	791	3207	
SH40S□-G13A2	2,782	4,426	38	75	68	791	3207	
SH50S□-G13A2	3,186	4,426	30	60	54	791	3207	
SH70S□-G13A2	3,186	4,426	21	43	39	791	3207	
SH04SA-G20A2	396	986	375	750	700	198	776	20ADG
SH05SA-G20A2	495	1,232	300	600	560	247	970	
SH07SA-G20A2	693	1,725	214	429	400	346	1358	
SH10SA-G20A2	989	2,464	150	300	280	495	1940	
SH16S□-G20A2	1,534	3,820	94	188	175	767	3008	
SH20S□-G20A2	1,918	4,425	75	150	140	959	3760	
SH28S□-G20A2	2,685	4,425	54	107	100	1342	5264	
SH40S□-G20A2	3,835	9,550	38	75	70	1918	7520	
SH50S□-G20A2	4,794	9,736	30	60	56	1955	7666	
SH70S□-G20A2	6,712	9,736	21	43	40	1955	7666	
SH04SA-G30A2	640	1,568	375	750	625	318	970	30ADG
SH05SA-G30A2	800	1,959	300	600	500	398	1212	
SH07SA-G30A2	1,120	2,743	214	429	357	557	1697	
SH10SA-G30A2	1,601	3,540	150	300	250	718	2191	
SH16S□-G30A2	2,482	6,076	94	188	156	1233	3760	
SH20S□-G30A2	3,102	7,595	75	150	125	1541	4700	
SH28S□-G30A2	4,343	9,736	54	107	89	1975	6025	
SH40S□-G30A2	6,204	9,736	38	75	62	1975	6025	
SH50S□-G30A2	7,755	16,815	30	60	50	3412	10405	
SH04S□-G44A2	978	2,444	375	750	600	481	1397	44ADG
SH05S□-G44A2	1,222	3,056	300	600	480	601	1746	
SH07S□-G44A2	1,711	4,278	214	429	343	842	2444	
SH10S□-G44A2	2,444	6,111	150	300	240	1203	3492	
SH16S□-G44A2	3,790	9,475	94	188	150	1865	5414	
SH20S□-G44A2	4,738	9,736	75	150	120	1916	5563	
SH28S□-G44A2	6,633	16,582	54	107	86	3264	9475	
SH40S□-G44A2	8,851	16,815	38	75	60	3310	9609	
SH50S□-G44A2	11,844	29,610	30	60	48	5828	16920	
SH04S□-G55A2	1,203	3,007	375	750	650	601	1746	60ADG
SH05S□-G55A2	1,504	3,759	300	600	520	752	2182	
SH07S□-G55A2	2,105	5,262	214	429	371	1052	3055	
SH10S□-G55A2	3,007	7,518	150	300	260	1504	4365	
SH16S□-G55A2	4662	11,656	94	188	162	2331	6767	
SH20S□-G55A2	5828	15,035	75	150	130	3007	8729	
SH28S□-G55A2	8159	20,398	54	107	93	4080	11843	
SH40S□-G55A2	11656	29,140	38	75	65	5828	16919	
SH50S□-G55A2	14570	30,090	30	60	52	6018	17470	

Gearmotor Speed/Torque Curve



Gearmotor Mechanical Ratings

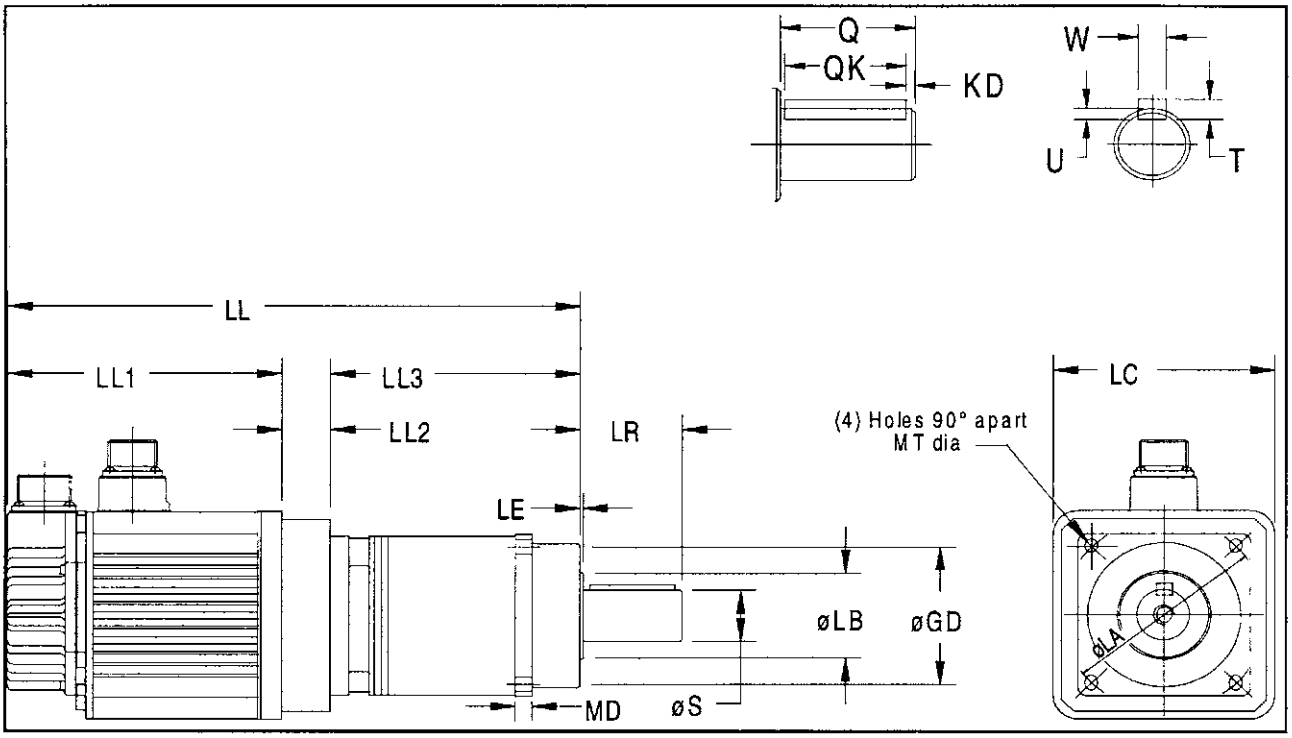


Gearmotor Mounting Specifications

Gearmotor Mechanical Ratings

GEARMOTOR Part Number	Gearhead Backlash (arc min)	Gearhead Maximum Radial Load (lb_f)	Gearhead Maximum Axial Load (lb_f)	Gearhead Inertia ($lb.\ in.\ s^2$)	Gearmotor Weight (lb)
SG05SA-G05A2	<10	1035	900	0.0047	31.97
SH04SA-G05A2	<4	855	720	0.00056	18.294
SH05SA-G05A2	<4	855	720	0.00049	18.294
SH07SA-G05A2	<4	855	720	0.00043	18.294
SH10SA-G05A2	<4	855	720	0.00041	18.294
SG10SA-G05A2	<10	1035	900	0.0047	31.97
SH20S□-G05A2	<6	1350	1215	0.00159	27.77
SG25SA-G05A2	<10	1035	900	0.0043	36.82
SH28S□-G05A2	<6	1350	1215	0.00159	27.77
SH40S□-G05A2	<6	1350	1215	0.00106	27.77
SH50S□-G05A2	<6	1350	1215	0.00106	27.77
SH70S□-G05A2	<6	2025	2115	0.00239	44.02
SG05SA-G09A2	<10	1035	900	0.00470	36.6
SH04SA-G09A2	<4	855	720	0.00056	22.924
SH05SA-G09A2	<4	855	720	0.00049	22.924
SH07SA-G09A2	<4	855	720	0.00043	22.924
SH10SA-G09A2	<4	1350	1215	0.00115	30.42
SG10SA-G09A2	<10	1035	900	0.0047	36.6
SH16S□-G09A2	<6	1350	1215	0.00159	32.4
SH20S□-G09A2	<6	1350	1215	0.00159	32.4
SH28S□-G09A2	<6	1350	1215	0.00159	32.4
SH50S□-G09A2	<6	2025	2115	0.00239	48.65
SH70S□-G09A2	<6	2025	2115	0.00239	48.65
SG05SA-G13A2	<10	1035	900	0.00470	41.01
SG10SA-G13A2	<10	1035	900	0.00470	41.01
SH04SA-G13A2	<4	1350	1215	0.00239	34.83
SH05SA-G13A2	<4	1350	1215	0.00212	34.83
SH07SA-G13A2	<4	1350	1215	0.00186	34.83
SH10SA-G13A2	<4	1350	1215	0.00177	34.83
SH16S□-G13A2	<6	1350	1215	0.00221	36.81
SH20S□-G13A2	<6	1350	1215	0.00221	36.81
SH28S□-G13A2	<6	2025	2115	0.00451	53.06
SH40S□-G13A2	<6	2025	2115	0.00300	53.06
SH50S□-G13A2	<6	2025	2115	0.00300	53.06
SH70S□-G13A2	<6	2025	2115	0.00300	53.06
SH04SA-G20A2	<4	2025	2115	0.00726	56.26
SH05SA-G20A2	<4	2025	2115	0.00646	56.26
SH07SA-G20A2	<4	2025	2115	0.00575	56.26
SH10SA-G20A2	<4	2025	2115	0.00531	56.26
SH16S□-G20A2	<6	2025	2115	0.00673	62.76
SH20S□-G20A2	<6	2025	2115	0.00673	62.76
SH28S□-G20A2	<6	2025	2115	0.00673	62.76
SH40S□-G20A2	<6	3150	3037	0.00531	94.76
SH50S□-G20A2	<6	3150	3037	0.00531	94.76
SH70S□-G20A2	<6	3150	3037	0.00522	94.76
SH04SA-G30A2	<4	2025	2115	0.00726	65.08
SH05SA-G30A2	<4	2025	2115	0.00646	65.08
SH07SA-G30A2	<4	2025	2115	0.00575	65.08
SH10SA-G30A2	<4	2025	2115	0.00531	65.08
SH16S□-G30A2	<6	3150	3037	0.00726	103.58
SH20S□-G30A2	<6	3150	3037	0.00708	103.58
SH28S□-G30A2	<6	3150	3037	0.00690	103.58
SH40S□-G30A2	<6	3150	3037	0.00531	103.58
SH50S□-G30A2	<6	4050	5062	0.02040	152.18
SH04S□-G44A2	<4	3150	3037	0.0281	110.19
SH05S□-G44A2	<4	3150	3037	0.0230	110.19
SH07S□-G44A2	<4	3150	3037	0.0187	110.19
SH10S□-G44A2	<4	3150	3037	0.0164	110.19
SH16S□-G44A2	<6	3150	3037	0.0073	114.59
SH20S□-G44A2	<6	3150	3037	0.0071	114.59
SH28S□-G44A2	<6	4050	5062	0.0296	163.19
SH40S□-G44A2	<6	4050	5062	0.0215	163.19
SH50S□-G44A2	<6	6075	6255	0.0271	217.69
SH04S□-G55A2	<4	3150	3037	0.0320	125.63
SH05S□-G55A2	<4	3150	3037	0.0270	125.63
SH07S□-G55A2	<4	3150	3037	0.0226	125.63
SH10S□-G55A2	<4	3150	3037	0.0204	125.63
SH16S□-G55A2	<6	4050	5062	0.03717	178.63
SH20S□-G55A2	<6	4050	5062	0.03558	178.63
SH28S□-G55A2	<6	6075	6255	0.03823	233.13
SH40S□-G55A2	<6	6075	6255	0.03372	233.13
SH50S□-G55A2	<6	6075	6255	0.03106	233.13

Dimensions in inches (mm)



GEARMOTOR	LL1	LL2	LL3	LL	LE	LR	LB	GD	S	LC	LA	MT	MD	Q	QK	KD	W	T	U
SG05SA-G05A2	5.43	1.10	4.02	10.55	0.236	2.756	3.543	4.724	1.260	4.720	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SH04SA-G05A2	5.43	0.87	3.78	10.08	0.079	1.496	1.496	2.756	0.866	5.118	3.346	0.260	0.276	1.417	1.260	0.079	0.236	0.236	0.138
SH05SA-G05A2	5.43	0.87	3.78	10.08	0.079	1.496	1.496	2.756	0.866	5.118	3.346	0.260	0.276	1.417	1.260	0.079	0.236	0.236	0.138
SH07SA-G05A2	5.43	0.87	3.78	10.08	0.079	1.496	1.496	2.756	0.866	5.118	3.346	0.260	0.276	1.417	1.260	0.079	0.236	0.236	0.138
SH10SA-G05A2	5.43	0.87	3.78	10.08	0.079	1.496	1.496	2.756	0.866	5.118	3.346	0.260	0.276	1.417	1.260	0.079	0.236	0.236	0.138
SG10SA-G05A2	5.43	1.10	4.02	10.55	0.236	2.756	3.543	4.724	1.260	4.720	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SH20SA-G05A2	5.43	1.10	5.77	12.30	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SG25SA-G05A2	5.43	1.10	5.30	11.83	0.236	2.756	3.543	4.724	1.260	4.720	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SH28SA-G05A2	5.43	1.10	5.77	12.30	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH40SA-G05A2	5.43	1.10	5.77	12.30	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH50SA-G05A2	5.43	1.10	5.77	12.30	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH70SA-G05A2	5.43	1.20	7.13	13.76	0.118	3.346	2.756	5.118	1.575	5.118	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SG05SA-G09A2	6.34	1.10	4.02	11.46	0.236	2.756	3.543	4.724	1.260	4.720	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SH04SA-G09A2	6.34	0.87	3.78	10.99	0.079	1.496	1.496	2.756	0.866	5.118	3.346	0.260	0.276	1.417	1.260	0.079	0.236	0.236	0.138
SH05SA-G09A2	6.34	0.87	3.78	10.99	0.079	1.496	1.496	2.756	0.866	5.118	3.346	0.260	0.276	1.417	1.260	0.079	0.236	0.236	0.138
SH07SA-G09A2	6.34	0.87	3.78	10.99	0.079	1.496	1.496	2.756	0.866	5.118	3.346	0.260	0.276	1.417	1.260	0.079	0.236	0.236	0.138
SH10SA-G09A2	6.34	1.10	4.49	11.93	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SG10SA-G09A2	6.34	1.10	4.02	11.46	0.236	2.756	3.543	4.724	1.260	4.720	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SH16SA-G09A2	6.34	1.10	5.77	13.21	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH20SA-G09A2	6.34	1.10	5.77	13.21	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH28SA-G09A2	6.34	1.10	5.77	13.21	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH50SA_G09A2	6.34	1.20	7.13	14.67	0.118	3.346	2.756	5.118	1.575	5.118	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH70SA-G09A2	6.34	1.20	7.13	14.67	0.118	3.346	2.756	5.118	1.575	5.118	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197

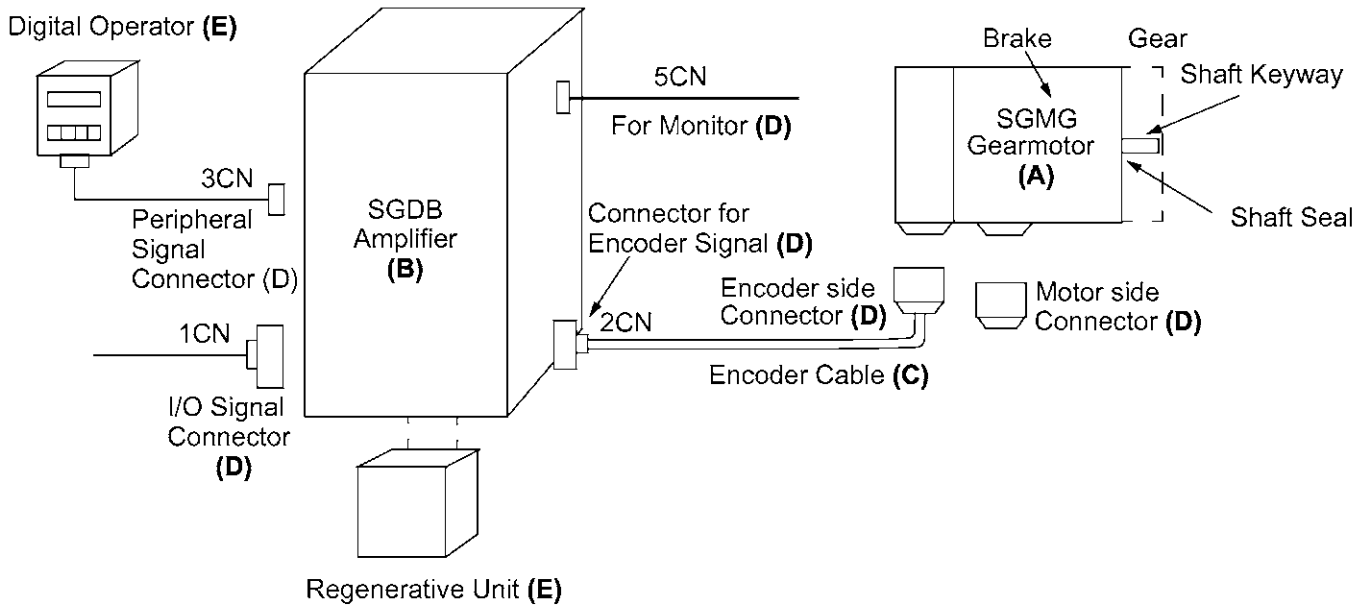
Dimensions in inches (mm)

GEARMOTOR	LL1	LL2	LL3	LL	LE	LR	LB	GD	S	LC	LA	MT	MD	Q	QK	KD	W	T	U
SG05SA-G13A2	7.28	1.10	4.02	12.40	0.236	2.756	3.543	4.724	1.260	4.720	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SG10SA-G13A2	7.28	1.10	4.02	12.40	0.236	2.756	3.543	4.724	1.260	4.720	4.252	M8	0.630	2.284	1.969	0.158	0.394	0.394	0.276
SH04SA-G13A2	7.28	1.10	4.49	12.87	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH05SA-G13A2	7.28	1.10	4.49	12.87	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH07SA-G13A2	7.28	1.10	4.49	12.87	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH10SA-G13A2	7.28	1.10	4.49	12.87	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH16SA-G13A2	7.28	1.10	5.77	14.15	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH20SA-G13A2	7.28	1.10	5.77	14.15	0.079	2.362	2.165	3.543	1.260	5.118	4.724	0.354	0.394	2.283	1.969	0.157	0.394	0.315	0.197
SH28SA-G13A2	7.28	1.20	7.13	15.61	0.118	3.346	2.756	5.118	1.575	5.118	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH40SA-G13A2	7.28	1.20	7.13	15.61	0.118	3.346	2.756	5.118	1.575	5.118	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH50SA-G13A2	7.28	1.20	7.13	15.61	0.118	3.346	2.756	5.118	1.575	5.118	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH70SA-G13A2	7.28	1.20	7.13	15.61	0.118	3.346	2.756	5.118	1.575	5.118	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH04SA-G20A2	6.54	1.83	5.55	13.92	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH05SA-G20A2	6.54	1.83	5.55	13.92	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH07SA-G20A2	6.54	1.83	5.55	13.92	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH10SA-G20A2	6.54	1.83	5.55	13.92	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH16SA-G20A2	6.54	1.83	7.13	15.50	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH20SA-G20A2	6.54	1.83	7.13	15.50	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH28SA-G20A2	6.54	1.83	7.13	15.50	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH40SA-G20A2	6.54	1.83	7.87	16.24	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH50SA-G20A2	6.54	1.83	7.87	16.24	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH70SA-G20A2	6.54	1.83	7.87	16.24	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH04SA-G30A2	7.56	1.83	5.55	14.94	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH05SA-G30A2	7.56	1.83	5.55	14.94	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH07SA-G30A2	7.56	1.83	5.55	14.94	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH10SA-G30A2	7.56	1.83	5.55	14.94	0.118	3.346	2.756	5.118	1.575	7.087	6.496	0.433	0.472	3.228	2.756	0.197	0.472	0.315	0.197
SH16SA-G30A2	7.56	1.83	7.87	17.26	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH20SA-G30A2	7.56	1.83	7.87	17.26	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH28SA-G30A2	7.56	1.83	7.87	17.26	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH40SA-G30A2	7.56	1.83	7.87	17.26	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH50SA-G30A2	7.56	1.48	9.90	18.94	0.118	4.252	4.724	7.087	2.953	7.087	9.843	0.669	0.669	4.134	3.543	0.276	0.787	0.472	0.295
SH04SA-G44A2	8.90	1.48	6.87	17.25	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH05SA-G44A2	8.90	1.48	6.87	17.25	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH07SA-G44A2	8.90	1.48	6.87	17.25	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH10SA-G44A2	8.90	1.48	6.87	17.25	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH16SA-G44A2	8.90	1.83	7.87	18.60	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH20SA-G44A2	8.90	1.83	7.87	18.60	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH28SA-G44A2	8.90	1.48	9.90	20.28	0.118	4.252	4.724	7.087	2.953	7.087	9.843	0.669	0.669	4.134	3.543	0.276	0.787	0.472	0.295
SH40SA-G44A2	8.90	1.48	9.90	20.28	0.118	4.252	4.724	7.087	2.953	7.087	9.843	0.669	0.669	4.134	3.543	0.276	0.787	0.472	0.295
SH50SA-G44A2	8.90	1.48	10.12	20.49	0.118	5.236	5.118	7.874	3.346	7.087	11.417	0.669	0.787	5.118	4.921	0.118	0.866	0.551	0.354
SH04SA-G55A2	10.24	2.58	6.87	19.69	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH05SA-G55A2	10.24	2.58	6.87	19.69	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH07SA-G55A2	10.24	2.58	6.87	19.69	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH10SA-G55A2	10.24	2.58	6.87	19.69	0.118	3.346	3.543	6.299	2.165	7.087	8.465	0.512	0.591	3.228	2.756	0.236	0.630	0.394	0.236
SH16SA-G55A2	10.24	2.58	9.90	22.72	0.118	4.252	4.724	7.087	2.953	7.087	9.843	0.669	0.669	4.134	3.543	0.276	0.787	0.472	0.295
SH20SA-G55A2	10.24	2.58	9.90	22.72	0.118	4.252	4.724	7.087	2.953	7.087	9.843	0.669	0.669	4.134	3.543	0.276	0.787	0.472	0.295
SH28SA-G55A2	10.24	2.58	10.12	22.94	0.118	5.236	5.118	7.874	3.346	7.087	11.417	0.669	0.787	5.118	4.921	0.118	0.866	0.551	0.354
SH40SA-G55A2	10.24	2.58	10.12	22.94	0.118	5.236	5.118	7.874	3.346	7.087	11.417	0.669	0.787	5.118	4.921	0.118	0.866	0.551	0.354
SH50SA-G55A2	10.24	2.58	10.12	22.94	0.118	5.236	5.118	7.874	3.346	7.087	11.417	0.669	0.787	5.118	4.921	0.118	0.866	0.551	0.354

Selecting Your SGMG Gearmotor System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SG 05 - S A - G 02 A 2 C

Sigma Gearmotor Series
- G: Stock (10 arc min)
- H: High Precision

Reduction Ratio

04: 4:1	25: 25:1
05: 5:1	28: 28:1
07: 7:1	40: 40:1
10: 10:1	50: 50:1
16: 16:1	70: 70:1
20: 20:1	1A: 100:1

Construction
- S: Standard

Orientation
- A: Mounted horizontally
- B: Mounted vertically (shaft facing UP)
- C: Mounted vertically (shaft facing DOWN)

Used to specify gearbox lubrication during manufacturing.

Motor Series
- G: SGMG

Motor Output
- 05: 0.5kW (0.7HP)
- 09: 0.9kW (1.2HP)
- 13: 1.3kW (1.7HP)
- 20: 2.0kW (2.7HP)
- 30: 3.0kW (4.0HP)
- 44: 4.4kW (6.0HP)
- 55: 5.5kW (7.5HP)

Power Supply
- A: 200V

Encoder Specifications
- 2: 8192PPR Incremental Encoder
- S: 8192PPR Absolute Encoder

Accessories
- C: 24VDC Brake

Gearmotor & Amplifier Selection

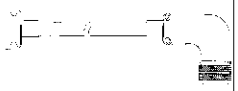
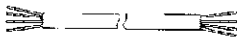
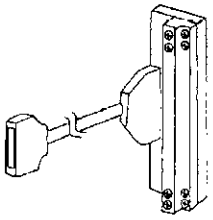
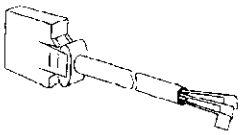
Use the table below to select the appropriate SGMG Sigma Gearmotor and Amplifier.

Description	Gearmotor				Gearhead only			Gearmotor MODEL # (A)	Amplifier MODEL # SGDB- (B)*	Motor & Amplifier Item Class
	Rated Torque (in. lb.)	Peak Torque (in. lb.)	Rated Speed (RPM)	Max. Speed (RPM)	Inertia (lb. in. sec^2)	Gear Ratio	Backlash [arc min]			
200V 3-phase 8192 PPR Incremental Encoder Straight Shaft with Keyway MS connectors	121	383	300	600	0.0047	5:1	<10	SG05SA-G05A2	05ADG	Limited Stock
	97	307	375	750	0.00056	4:1	<4	SH04SA-G05A2		
	121	383	300	600	0.00049	5:1	<4	SH05SA-G05A2		
	170	536	214	429	0.00043	7:1	<4	SH07SA-G05A2		
	243	708	150	300	0.00041	10:1	<4	SH10SA-G05A2		
	243	766	150	300	0.0047	10:1	<10	SG10SA-G05A2		
	470	1485	75	150	0.00159	20:01	<6	SH20S□-G05A2		
	594	1770	60	120	0.0043	25:1	<10	SG25SA-G05A2		
	658	2,079	54	107	0.00159	28:1	<6	SH28S□-G05A2		
	940	2,213	38	75	0.00106	40:1	<6	SH40S□-G05A2		
	1,175	2,213	30	60	0.00106	50:1	<6	SH50S□-G05A2		
	1,645	4,426	21	43	0.00239	70:1	<6	SH70S□-G05A2		
	233	592	300	600	0.00470	5:1	<10	SG05SA-G09A2	10ADG	
	186	473	375	750	0.00056	4:1	<4	SH04SA-G09A2		
	233	592	300	600	0.00049	5:1	<4	SH05SA-G09A2		
	326	828	214	429	0.00043	7:1	<4	SH07SA-G09A2		
	466	1,183	150	300	0.00115	10:1	<4	SH10SA-G09A2		
	466	1,183	150	300	0.0047	10:1	<10	SG10SA-G09A2		
	722	1,835	94	188	0.00159	16:1	<6	SH16S□-G09A2		
	902	2,213	75	150	0.00159	20:1	<6	SH20S□-G09A2		
	1,263	2,213	54	107	0.00159	28:1	<6	SH28S□-G09A2		
	2,256	4,426	30	60	0.00239	50:1	<6	SH50S□-G09A2		
	3,158	4,426	21	43	0.00239	70:1	<6	SH70S□-G09A2		
	359	1,004	300	600	0.00470	5:1	<10	SG05SA-G13A2	15ADG	
	718	1,770	150	300	0.00470	10:1	<10	SG10SA-G13A2		
	287	803	375	750	0.00239	4:1	<4	SH04SA-G13A2		
	359	1,004	300	600	0.00212	5:1	<4	SH05SA-G13A2		
	502	1,406	214	429	0.00186	7:1	<4	SH07SA-G13A2		
	718	2,008	150	300	0.00177	10:1	<4	SH10SA-G13A2		
	1,113	2,213	94	188	0.00221	16:1	<6	SH16S□-G13A2		
	1,391	2,213	75	150	0.00221	20:1	<6	SH20S□-G13A2		
	1,948	4,426	54	107	0.00451	28:1	<6	SH28S□-G13A2		
	2,782	4,426	38	75	0.00300	40:1	<6	SH40S□-G13A2		
	3,186	4,426	30	60	0.00300	50:1	<6	SH50S□-G13A2		
	3,186	4,426	21	43	0.00300	70:1	<6	SH70S□-G13A2		
	396	986	375	750	0.00726	4:1	<4	SH04SA-G20A2	20ADG	
	495	1,232	300	600	0.00646	5:1	<4	SH05SA-G20A2		
	693	1,725	214	429	0.00575	7:1	<4	SH07SA-G20A2		
	989	2,464	150	300	0.00531	10:1	<4	SH10SA-G20A2		
	1,534	3,820	94	188	0.00673	16:1	<6	SH16S□-G20A2		
	1,918	4,775	75	150	0.00673	20:1	<6	SH20S□-G20A2		
	2,685	6,685	54	107	0.00673	28:1	<6	SH28S□-G20A2		
	3,835	9,550	38	75	0.00531	40:1	<6	SH40S□-G20A2		
	4,794	9,736	30	60	0.00531	50:1	<6	SH50S□-G20A2		
	6,712	9,736	21	43	0.00522	70:1	<6	SH70S□-G20A2		
	640	1,568	375	750	0.00726	4:1	<4	SH04SA-G30A2	30ADG	
	800	1,959	300	600	0.00646	5:1	<4	SH05SA-G30A2		
	1,120	2,743	214	429	0.00575	7:1	<4	SH07SA-G30A2		
	1,601	3,540	150	300	0.00531	10:1	<4	SH10SA-G30A2		
	2,482	6,076	94	188	0.00726	16:1	<6	SH16S□-G30A2		
	3,102	7,595	75	150	0.00708	20:1	<6	SH20S□-G30A2		
	4,343	9,736	54	107	0.00690	28:1	<6	SH28S□-G30A2		
	6,204	9,736	38	75	0.00531	40:1	<6	SH40S□-G30A2		
	7,755	16,815	30	60	0.02040	50:1	<6	SH50S□-G30A2		
	978	2,444	375	750	0.0281	4:1	<4	SH04S□-G44A2	44ADG	
	1,222	3,056	300	600	0.0230	5:1	<4	SH05S□-G44A2		
	1,711	4,278	214	429	0.0187	7:1	<4	SH07S□-G44A2		
	2,444	6,111	150	300	0.0164	10:1	<4	SH10S□-G44A2		
	3,790	9,475	94	188	0.0073	16:1	<6	SH16S□-G44A2		
	4,738	9,736	75	150	0.0071	20:1	<6	SH20S□-G44A2		
	6,633	16,582	54	107	0.0296	28:1	<6	SH28S□-G44A2		
	8,851	16,815	38	75	0.0215	40:1	<6	SH40S□-G44A2		
	11,844	29,610	30	60	0.0271	50:1	<6	SH50S□-G44A2		
	1,203	3,007	375	750	0.0320	4:1	<4	SH04S□-G55A2	60ADG Requires Regen Unit (E)	
	1,504	3,759	300	600	0.0270	5:1	<4	SH05S□-G55A2		
	2,105	5,262	214	429	0.0226	7:1	<4	SH07S□-G55A2		
	3,007	7,518	150	300	0.0204	10:1	<4	SH10S□-G55A2		
	4662	11656	94	188	0.03717	16:1	<6	SH16S□-G55A2		
	5828	15035	75	150	0.03558	20:1	<6	SH20S□-G55A2		
	8159	20398	54	107	0.03823	28:1	<6	SH28S□-G55A2		
	11656	29140	38	75	0.03372	40:1	<6	SH40S□-G55A2		
	14570	30090	30	60	0.03106	50:1	<6	SH50S□-G55A2		

Notes: 24VDC brakes for SGMG Sigma gearmotors are standard. Contact a local source for 24VDC power supplies.
For technical information, request manual number TSE-S800-16 from your Yaskawa representative.
□ Implies that part number is incomplete. See Model Number Designation on previous page to complete part number.
* For more detailed SGDB amplifier specifications and dimensions, refer to page 127.

Pre-wired Cable Selection

Use the table below to select Pre-wired Cables for your SGMG Sigma Gearmotor.

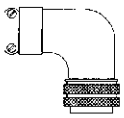
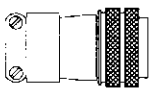
Cable Description (C)		Motor Size (kW)	Part Number without Brake	Part Number with Brake	Comments	Item Class
Power Cable with Connectors		0.5, 0.9, 1.3	B1E-□	B1BE-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (standard) 4: 15 meters 5: 20 meters	Stock **
		2.0, 3.0	B2E-□	B2BE-□		
		4.4	B3E-□	B3BE-□		
		5.5, 7.5 *	B5E-□	B5E-□ B7BE-□		
		11 *	B6E-□	B6E-□ B7BE-□		
Encoder Cable (incremental or absolute)		All	DE9407237-□ rev. E			
Encoder Cable Only for Solder Connections			DP8409123		Up to 70 feet; for use with mating connector.	
Encoder Cable Only for Solder Connections			DP8409179		Over 70 feet; splice cable to accommodate connector.	
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA50P		35 mm din rail mountable; the cable length is 0.5 meters.	
Input/Output 1CN Cable with Pigtail Leads			DE9406969-□		Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	

* When ordering these cables for motors with brakes, order the standard power cable and the additional cable for the brake.

** Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

Mating Connector Selection

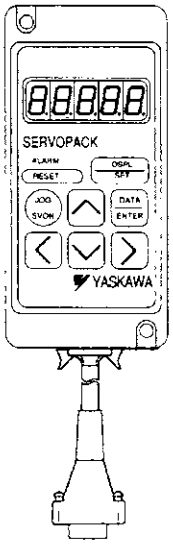
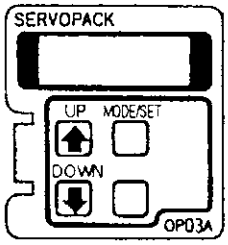
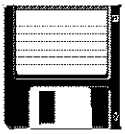
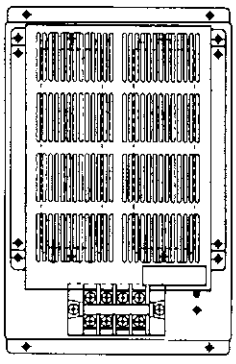
Use the table below to select Mating Connectors for your SGMG Sigma Gearmotor.

Connector Description (D)		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
MS Connector for Motor Power Cable *		0.5, 0.9, 1.3	MS3106B18-10S MS3108B18-10S MS3057-10A	MS3106B20-15S MS3108B20-15S MS3057-12A	Straight-type connector L-type connector Cable clamp	Stock
		2.0, 3.0, 4.4	MS3106B22-22S MS3108B22-22S MS3057-12A	MS3106B24-10S MS3108B24-10S MS3057-16A	Straight-type connector L-type connector Cable clamp	
		5.5, 7.5, 11	MS3106B32-17S MS3108B32-17S MS3057-20A	MS3106B32-17S+ MS3106A10SL-3S MS3108B32-17S+ MS3108A10SL-3S MS3057-20A MS3057-4A	Straight-type connector L-type connector Cable clamp	
MS Connector for Encoder Cable (incremental or absolute encoder)		All	MS3106B20-29S MS3108B20-29S MS3057-12A		Straight-type connector L-type connector Cable clamp	
1CN Mating Connector			DE9406970		Can use 1CN for analog speed and torque monitor service checks.	
2CN Encoder Mating Connector			DE9406973		–	
3CN Peripheral Mating Connector			Stock 9-pin male D-shell connector		Source locally.	–
5CN Connector and 1m Cable with Pigtails			DE9404559		–	Stock

* Choose either a straight or L-type connector and the associated cable clamp for a complete assembly. For example, L-type connector MS3108B18-10S is compatible with cable clamp MS3057-10A.

Peripheral Device Selection

Use the table below to select Peripheral Devices for your SGMG Sigma Gearmotor System.

Component (E)		Part Number	Description	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	
Regenerative Unit for 6.0 kW amplifier (880 watts)		JUSP-RA04	–	

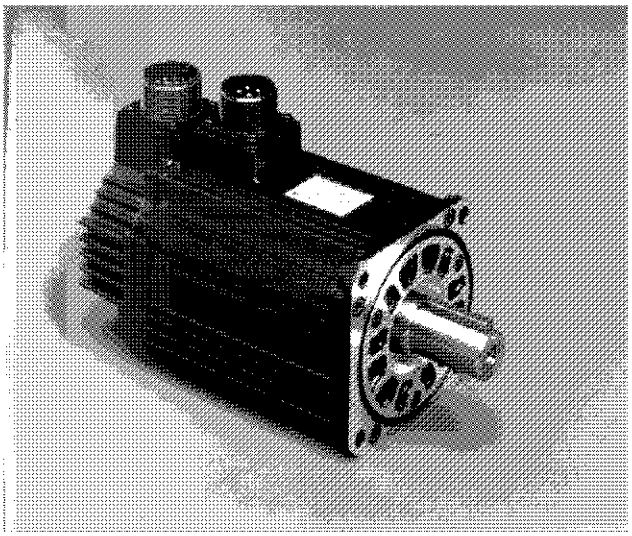
SGMG

NOTES

Super High Power Rate Series

SGMS Servomotors (3000rpm) - With Incremental / Absolute Encoder

Rated Output: 1.0kW, 1.5kW, 2.0kW, 3.0kW, 4.0kW, 5.0kW



For Additional Information	Page(s)
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SGMS Speed/Torque Curves	111
SGMS Dimensions	112 - 115
SGMS Selection/Ordering Information	116 - 120
SGMS Optional CE Selection	121 - 125
SGDB Ratings & Specifications	129 - 130
SGDB Dimensions	131 - 137

Design Features

1. **Compact**
   - Small sized motor
     Six frame sizes: up to 140 in. lb. RMS - torque.
2. **High Speed**
   - Rated Speed: 3000 RPM
   - Maximum Speed: 4500 RPM
3. **Encoders**
   - 4095 PPR incremental encoder standard
   - 8192 PPR absolute encoder (option)
4. **Enclosure**
   - Totally enclosed, self-cooled IP67 (excluding shaft)
   - IP67 with shaft seal (option)
5. **Application Emphasis**
   - High torque to inertia ratio
   - Chip mounters
   - PCB drilling machines
   - Robots
   - Conveyors
   - Packaging
6. **Certified International Standards**
   - UL Recognized and c-UL pending (File # E165827), CE compliance (option)

Servomotor Ratings and Specifications

Time Rating: Continuous
Insulation: Class F
Vibration: 15μm or less
Withstand Voltage: 1500VAC
Insulation Resistance: 500VDC 10MΩ min.

Enclosure: Totally-enclosed, self-cooled IP67 (except for shaft opening)
Ambient Temperature: 0 to 40°C
Ambient Humidity: 20 to 80% (non-condensing)
Rated Speed: 3000 rpm
Instantaneous Max Speed: 4500 rpm

Excitation: Permanent magnet
Drive Method: Direct drive
Mounting: Flange-mounted
Painting Color: Muncell notation N1.5

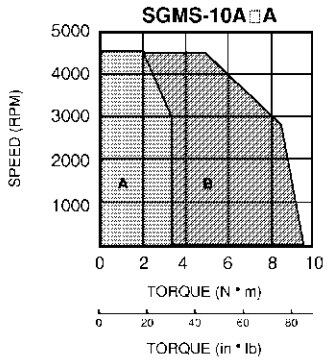
MOTORS: SGMS-	Rated Output*	Rated Torque*		Instantaneous Peak Torque*		Rated Current*	Instantaneous Max. Current*
	kW (HP)	N • m	kgf • cm (lb • in)	N • m	kgf • cm (lb • in)	A (rms)	A (rms)
10A□A	1.0 (1.3)	3.18	32.4 (28.2)	9.54	97.2 (84.4)	5.7	17
15A□A	1.5 (2.0)	4.9	50 (43)	14.7	150 (130)	9.5	28
20A□A	2.0 (2.7)	6.36	65 (56.4)	19.1	195 (169)	12.4	42
30A□A	3.0 (4.0)	9.8	100 (87)	29.4	300 (260)	18.8	56
40A□A	4.0 (5.4)	12.6	129 (112)	37.8	387 (336)	24.3	77
50A□A	5.0 (6.7)	15.8	161 (140)	47.6	486 (422)	28.2	84

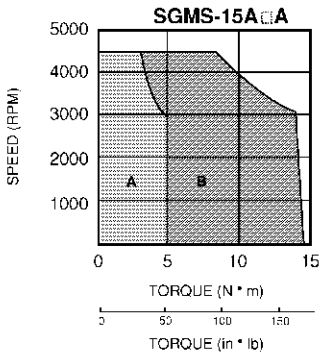
MOTORS: SGMS-	Torque Constant		Moment of Inertia		Holding Brake Torque	Holding Brake Inertia		Allowable Load Inertia	Rated Power Rate*	Rated Angular Acceleration*	Inertia Time Constant	Inductive Time Constant
	N • m/A (rms)	kgf • cm/A (lb • in/A) (rms)	kg • m^2 × 10^{-4}	gf • cm • s^2 (lb • in • s^2 × 10^{-3})	N • m	kg • m^2 × 10^{-4}	gf • cm • s^2 (lb • in • s^2 × 10^{-3})	kg • m^2 × 10^{-4}	kW/s	rad/s^2	ms	ms
10A□A	0.64	6.5 (5.6)	1.74	1.78 (1.54)	7.84	0.215	0.219 (0.190)	1.74	57.9	18250	0.87	7.1
15A□A	0.57	5.8 (5.1)	2.47	2.52 (2.19)				2.47	97.2	19840	0.71	7.7
20A□A	0.56	5.7 (5.0)	3.19	3.26 (2.82)				3.19	127	19970	0.58	8.3
30A□A	0.57	5.8 (5.1)	7.00	7.14 (6.20)	2.0	1.85	1.89 (1.64)	7.0	137	14000	0.74	13.0
40A□A	0.55	5.6 (4.9)	9.60	9.80 (8.50)				9.6	166	13160	0.60	14.1
50A□A	0.61	6.2 (5.4)	12.3	12.6 (10.9)				12.3	202	12780	0.57	14.7

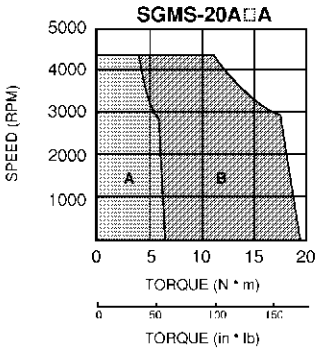
* These items and torque-speed characteristics quoted in combination with an SGDB Servo Amplifier at an armature winding temperature of 20°C.

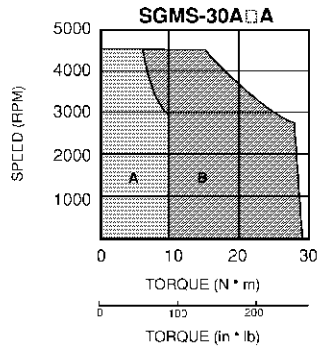
Note: These characteristics can be obtained when the following heat sinks (steel plates) are used for cooling purposes:
Type 10A□A to 20A□A: 300 × 300 × 12 (mm) (11.81 × 11.81 × 0.47 (in))
Type 30A□A to 50A□A: 400 × 400 × 20 (mm) (15.75 × 15.75 × 0.79 (in))

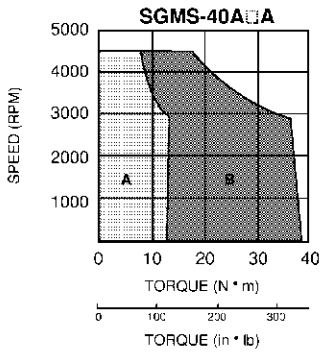
Speed / Torque Curves

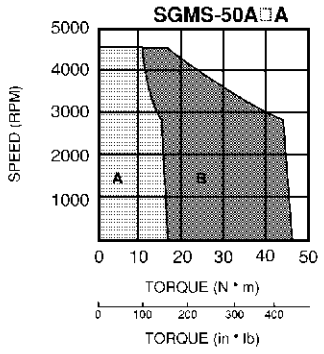










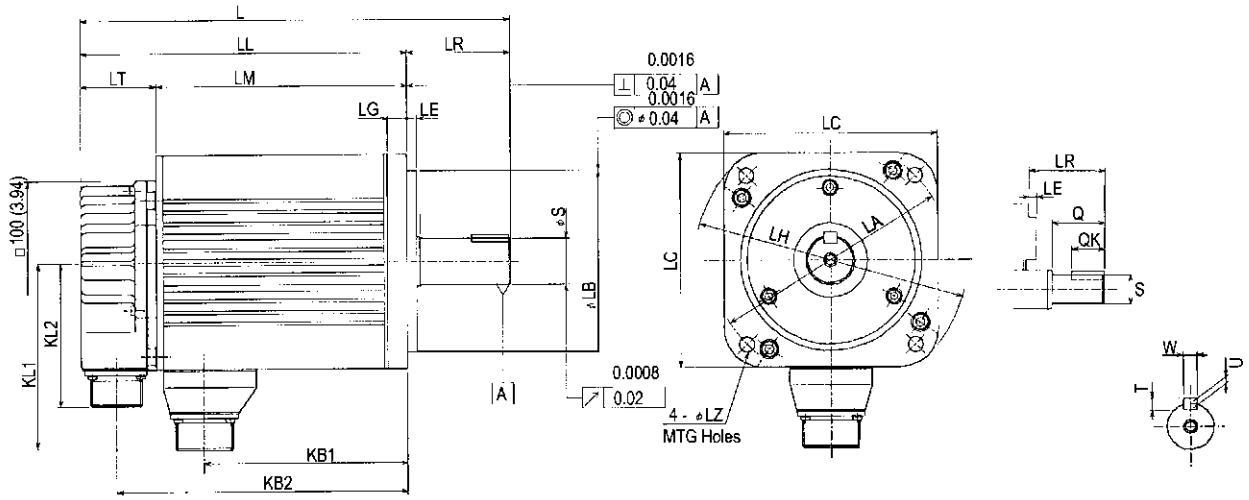


A : CONTINUOUS DUTY ZONE

B : INTERMITTENT DUTY ZONE

Dimensions in inches (mm)

(1) 4096 PPR Incremental Encoder



Type SGMS-	L	LL	LM	LR	LT	KB1	KB2	KL1	KL2	Flange Dimensions								Shaft End Dimension		Approx. Mass lb (kg)
										LA	LB	LC	LE	LG	LH	LJ	LZ	S	Q	
10A6AB	7.64 (194)	5.87 (149)	4.06 (103)	1.77 (45)	1.81 (46)	2.99 (76)	5.04 (128)	3.78 (96)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	10.1 (4.6)
15A6AB	8.66 (220)	6.89 (175)	5.08 (129)	1.77 (45)	1.81 (46)	4.02 (102)	6.06 (154)	3.78 (96)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	12.8 (5.8)
20A6AB	9.57 (243)	7.8 (198)	5.98 (152)	1.77 (45)	1.81 (46)	4.92 (125)	6.97 (177)	3.78 (96)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	15.4 (7.0)
30A6AB	10.31 (262)	7.83 (199)	6.02 (153)	2.48 (63)	1.81 (46)	4.8 (122)	7.01 (178)	4.49 (114)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	24.3 (11)
40A6AB	11.77 (299)	9.29 (236)	7.48 (190)	2.48 (63)	1.81 (46)	6.26 (159)	8.46 (215)	4.49 (114)	3.43 (87)	5.71 (145)	110 (4.33) $^{0}_{-0.0014}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	30.9 (14)
50A6AB	13.35 (339)	10.87 (276)	9.06 (230)	2.48 (63)	1.81 (46)	7.83 (199)	10.04 (255)	4.49 (114)	3.43 (87)	5.71 (145)	110 (4.33) $^{0}_{-0.0014}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	37.5 (17)

Note:
1. Incremental Encoder (4096 PPR) is used as a detector.
2. Dimensions are the same when using other incremental encoders.
3. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
4. There are no dimensional changes on the CE products.

Connector Specifications

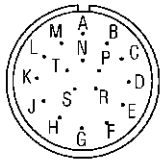
Receptacle: MS3102A20-29P

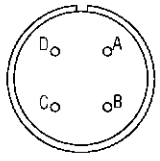
Applicable Plug: (To be prepared by customer)

Plug: MS3108B20-29S (L Type)

MS3106B20-29S (Straight Type)

Cable Clamp: MS3057-12A



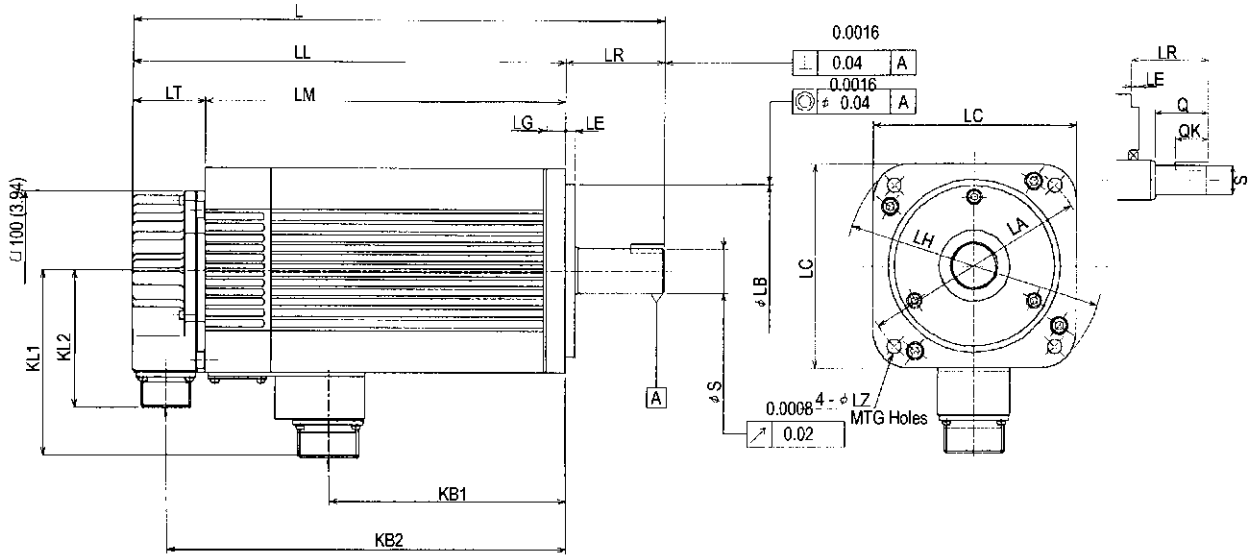


Connector Wiring on the Incremental Encoder			
A	Channel A Output	K	
B	Channel $\overline{A}$ Output	L	
C	Channel B Output	M	-
D	Channel $\overline{B}$ Output	N	-
E	Channel C Output	P	-
F	Channel $\overline{C}$ Output	R	-
G	0V	S	-
H	+5 VDC	T	-
J	FG (Frame Ground)		

Note: The above-mentioned detector side specifications are common to all the motors with incremental encoders.

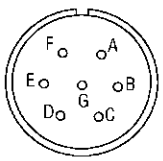
Connector Wiring on the Motor Side	
A	U Phase
B	V Phase
C	W Phase
D	Ground Terminal

(2) 4096 PPR Incremental Encoder, with Brake



Type SGMS-	L	LL	LM	LR	LT	KB1	KB2	KL1	KL2	Flange Dimensions								Shaft End Dimension		Approx. Mass lb (kg)
										LA	LB	LC	LE	LG	LH	LJ	LZ	S	Q	
10A6ABC	9.37 (238)	7.6 (193)	5.79 (147)	1.77 (45)	1.81 (46)	2.64 (67)	6.77 (172)	3.94 (100)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	13.2 (6.0)
15A6ABC	10.39 (264)	8.62 (219)	6.81 (173)	1.77 (45)	1.81 (46)	3.66 (93)	7.8 (198)	3.94 (100)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	16.5 (7.5)
20A6ABC	11.3 (287)	9.53 (242)	7.72 (196)	1.77 (45)	1.81 (46)	4.57 (116)	8.7 (221)	3.94 (100)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	18.7 (8.5)
30A6ABC	11.81 (300)	9.33 (237)	7.52 (191)	2.48 (63)	1.81 (46)	4.45 (113)	8.5 (216)	4.69 (119)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	30.9 (14)
40A6ABC	13.27 (337)	10.79 (274)	8.98 (228)	2.48 (63)	1.81 (46)	5.91 (150)	9.96 (253)	4.69 (119)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	37.5 (17)
50A6ABC	13.27 (377)	12.36 (314)	10.55 (268)	2.48 (63)	1.81 (46)	7.48 (190)	11.54 (293)	4.69 (119)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	44.1 (20)

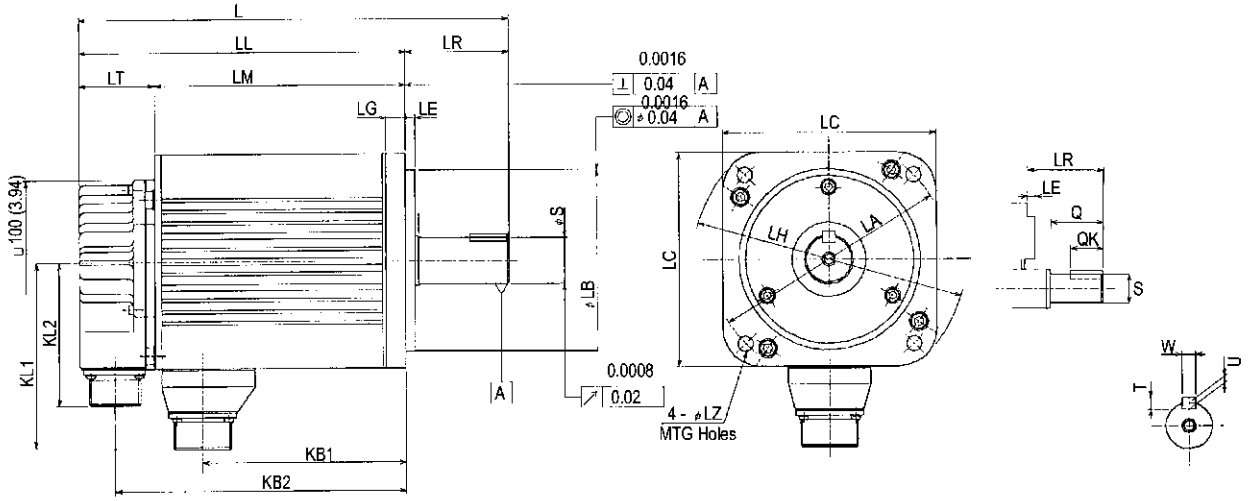
Note:
1. Incremental Encoder (4096 PPR) is used as a detector.
2. Dimensions are the same when using other incremental encoders.
3. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
4. There are no dimensional changes on the CE products.



Connector Wiring on the Motor Side			
A	U Phase	E	Brake Terminal
B	V Phase	F	Brake Terminal
C	W Phase	G	-
D	FG Frame Ground		

SGMS

(3) 8192 PPR Absolute Encoder (15 bit)

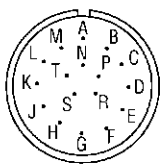


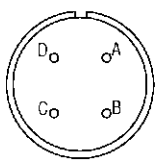
Type SGMS-	L	LL	LM	LR	LT	KB1	KB2	KL1	KL2	Flange Dimensions								Shaft End Dimension		Approx. Mass lb (kg)
										LA	LB	LC	LE	LG	LH	LJ	LZ	S	Q	
10ASAB	8.19 (208)	6.42 (163)	4.06 (103)	1.77 (45)	2.36 (60)	2.99 (76)	5.59 (142)	3.78 (96)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	11 (5.0)
15ASAB	9.21 (234)	7.44 (189)	5.08 (129)	1.77 (45)	2.36 (60)	4.02 (102)	6.61 (168)	3.78 (96)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	13.7 (6.2)
20ASAB	10.12 (257)	8.35 (212)	5.98 (152)	1.77 (45)	2.36 (60)	4.92 (125)	7.52 (191)	3.78 (96)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	16.3 (7.4)
30ASAB	10.87 (276)	8.39 (213)	6.02 (153)	2.48 (63)	2.36 (60)	4.8 (122)	7.56 (192)	4.49 (114)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	25.4 (11.5)
40ASAB	12.32 (313)	9.84 (250)	7.48 (190)	2.48 (63)	2.36 (60)	6.26 (159)	9.02 (229)	4.49 (114)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	32 (14.5)
50ASAB	13.9 (353)	11.42 (290)	9.06 (230)	2.48 (63)	2.36 (60)	7.83 (199)	10.59 (269)	4.49 (114)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (12)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	38.6 (17.5)

Note:
1. Incremental Encoder (81926 PPR) is used as a detector.
2. Dimensions are the same when using other incremental encoders.
3. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
4. There are no dimensional changes on the CE products.

Connector Specifications

Receptacle: MS3102A20-29P
Applicable Plug: (To be prepared by customer)
Plug: MS3108B20-29S (L Type)
MS3106B20-29S (Straight Type)
Cable Clamp: MS3057-12A



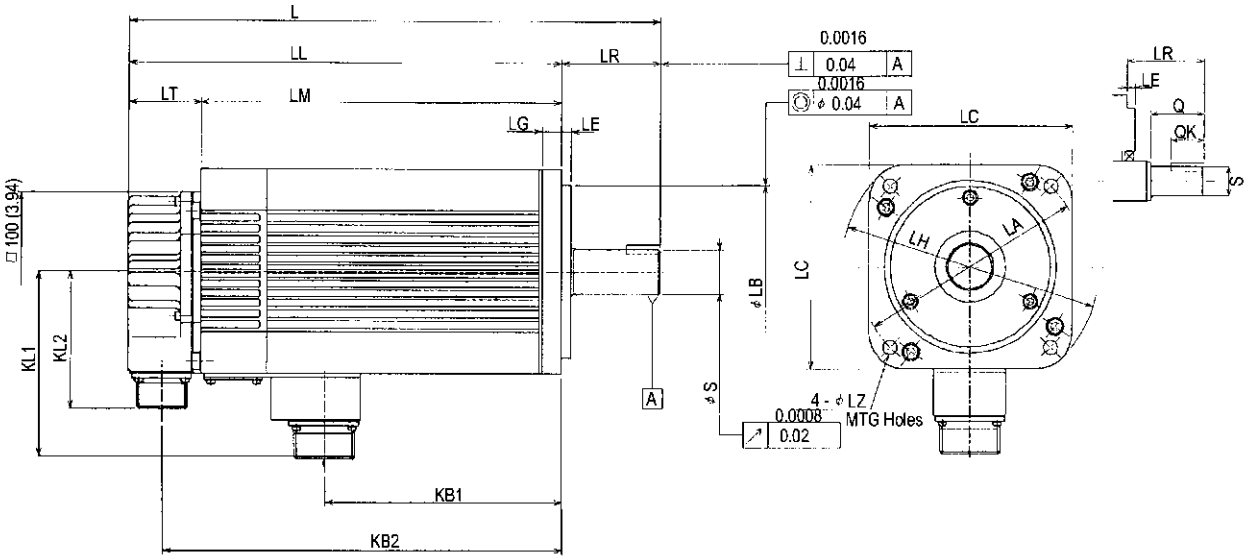


Connector Wiring on the Incremental Encoder (When using 8192 PPR (15 bits))			
A	Channel A Output	K	-
B	Channel $\overline{A}$ Output	L	-
C	Channel B Output	M	-
D	Channel $\overline{B}$ Output	N	-
E	Channel Z (C) Output	P	-
F	Channel $\overline{Z}$ ($\overline{C}$) Output	R	Reset
G	0V	S	0V (battery)
H	+5 VDC	T	3.6V (battery)
J	FG (Frame Ground)		

Note: The above-mentioned detector side specifications are common to all the motors with incremental encoders.

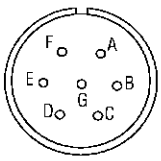
Connector Wiring on the Motor Side	
A	U Phase
B	V Phase
C	W Phase
D	FG (Frame Ground)

(4) 8192 PPR Absolute Encoder (15 bit), With Brake



Type SGMS-	L	LL	LM	LR	LT	KB1	KB2	KL1	KL2	Flange Dimensions								Shaft End Dimension		Approx. Mass lb (kg)
										LA	LB	LC	LE	LG	LH	LJ	LZ	S	Q	
10ASABC	9.92 (252)	8.15 (207)	5.79 (147)	1.77 (45)	2.36 (60)	2.64 (67)	7.32 (186)	3.94 (100)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	14.3 (65)
15ASABC	10.94 (278)	9.17 (233)	6.81 (173)	1.77 (45)	2.36 (60)	3.66 (93)	8.35 (212)	3.94 (100)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	17.6 (8.0)
20ASABC	11.85 (301)	10.08 (256)	7.72 (196)	1.77 (45)	2.36 (60)	4.57 (116)	9.25 (235)	3.94 (100)	3.43 (87)	4.53 (115)	3.74 (95) $^{0}_{-0.035}$	3.94 (100)	0.12 (3)	0.39 (10)	5.12 (130)	1.77 (45)	0.28 (7)	0.94 (24) $^{0}_{-0.013}$	1.57 (40)	19.8 (9.0)
30ASABC	12.36 (314)	9.88 (251)	7.52 (191)	2.48 (63)	2.36 (60)	4.45 (113)	9.06 (230)	4.69 (119)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (2)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	32 (14.5)
40ASABC	13.82 (351)	11.34 (288)	8.98 (228)	2.48 (63)	2.36 (60)	5.91 (150)	10.51 (267)	4.69 (119)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (2)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	38.6 (17.5)
50ASABC	15.39 (391)	12.91 (328)	10.55 (268)	2.48 (63)	2.36 (60)	7.48 (190)	12.09 (307)	4.69 (119)	3.43 (87)	5.71 (145)	4.33 (110) $^{0}_{-0.035}$	5.12 (130)	0.24 (6)	0.47 (2)	6.5 (165)	1.77 (45)	0.35 (9)	1.1 (28) $^{0}_{-0.013}$	2.17 (55)	45.2 (20.5)

Note:
1. Incremental Encoder (8192 PPR) is used as a detector.
2. Dimensions are the same when using other incremental encoders.
3. Tolerances on the dimensions LB of flange type and S of shaft extensions are based on JIS (Japanese Industrial Standard) B0401 "Limits and Fits for Engineering."
4. There are no dimensional changes on the CE products.

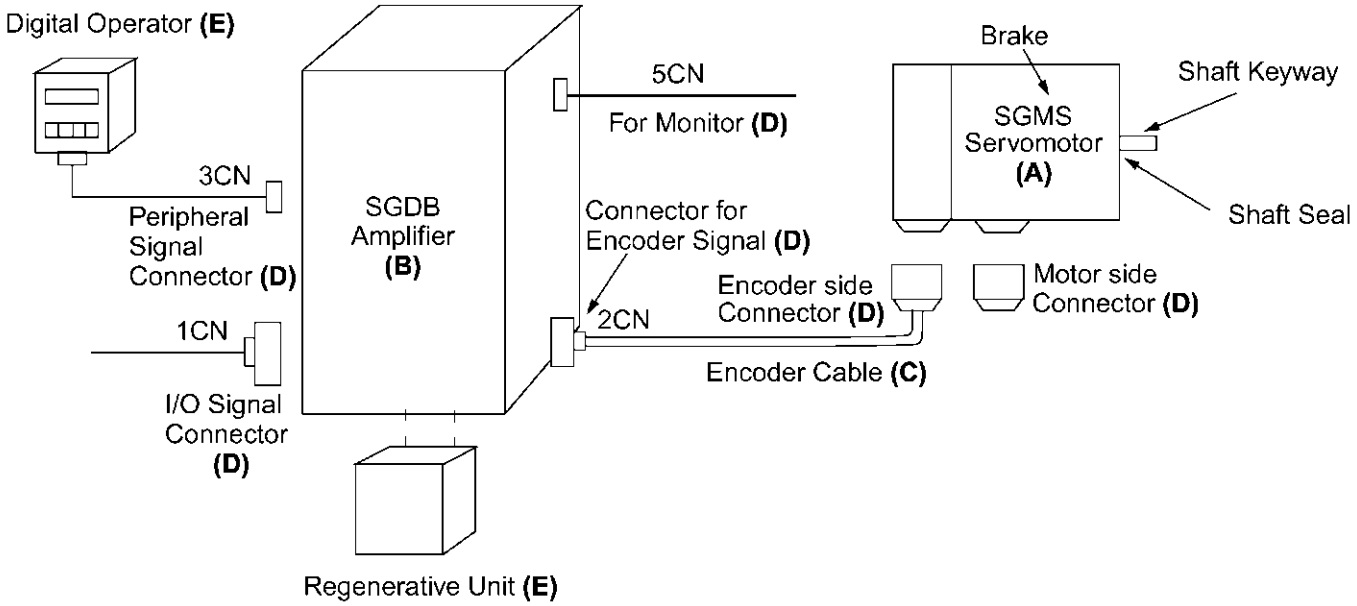


Connector Wiring on the Motor Side			
A	U Phase	E	Brake Terminal
B	V Phase	F	Brake Terminal
C	W Phase	G	-
D	FG (Frame Ground)		

Selecting Your SGMS Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGMS - 10 A 6 A B C

Sigma Servomotor Type

Rated Output
- 10: 1.0kW (1.3HP)
- 15: 1.5kW (2.0HP)
- 20: 2.0kW (2.7HP)
- 30: 3.0kW (4.0HP)
- 40: 4.0kW (5.4HP)
- 50: 5.0kW (6.7 HP)

Power Supply
- A: 200V

Accessories
- C: 24VDC Brake
- S: Shaft Seal
- G: Shaft Seal and Brake

Shaft Specifications
- B: Straight Shaft with Keyway

Rated Speed
- A: 3000RPM

Encoder Specifications
- 6: 4096PPR Incremental Encoder
- S: 8192PPR Absolute Encoder

Note: **Bold** items are Stock Products usually available from inventory. Contact your Yaskawa representative for delivery on all other items.

Servomotor & Amplifier Selection

Use the table below to select the appropriate SGMS Sigma Servomotor and Amplifier.

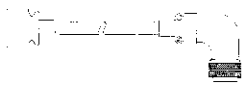
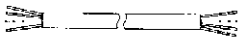
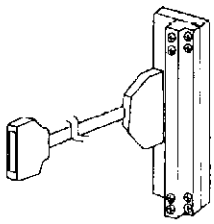
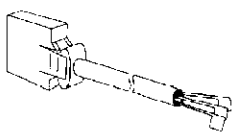
Description	Peak Torque (in. lb.)	Rated Torque (in. lb.)	Motor Inertia (in. lb. sec^2 x 10^{-3})	Motor MODEL # **(A)**	Amplifier MODEL # **(B)*** Analog/Digital Input SGDB-	Motor & Amplifier Item Class
200V 3-Phase 4096 PPR Incremental Encoder Straight Shaft with Keyway MS Connectors	84.4	28.2	1.54	SGMS-10A6AB	10ADG	Stock
				SGMS-10A6ABC		
	130	43	2.19	SGMS-15A6AB	15ADG	
				SGMS-15A6ABC		
	169	56.4	2.82	SGMS-20A6AB	20ADG	
				SGMS-20A6ABC		
	260	87	6.2	SGMS-30A6AB	30ADG	
				SGMS-30A6ABC		
	336	112	8.5	SGMS-40A6AB	44ADG	
				SGMS-40A6ABC		
	422	140	11	SGMS-50A6AB		
				SGMS-50A6ABC		

Note: 24VDC brakes for SGMS Sigma servomotors are standard. Contact a local source for 24VDC power supplies. For technical information, request manual number TSE-S800-16 from your Yaskawa representative.

* For more detailed SGDB amplifier specifications and dimensions, refer to page 127.

Pre-wired Cable Selection

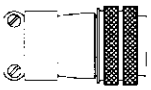
Use the table below to select Pre-wired Cables for your SGMS Sigma Servomotor.

Cable Description **(C)**		Motor Size (kW)	Part Number without Brake	Part Number with Brake	Comments	Item Class
Power Cable with L-type Connectors		1.0, 1.5, 2.0	B1E-□	B1BE-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (standard) 4: 15 meters 5: 20 meters	Stock *
		3.0	B2E-□	B2BE-□		
		4.0, 5.0	B3E-□	B3BE-□		
Encoder Cable (incremental or absolute)		All	DE9407237-□E			
Encoder Cable Only for Solder Connections			DP8409123		Up to 70 feet; for use with mating connector.	
Encoder Cable Only for Solder Connections			DP8409179		Over 70 feet; splice cable to accommodate connector.	
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA50P		35 mm din rail mountable; the cable length is 0.5 meters.	
Input/Output 1CN Cable with Pigtail Leads			DE9406969-□		Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	

* Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

Mating Connector Selection

Use the table below to select Mating Connectors for your SGMS Sigma Servomotor.

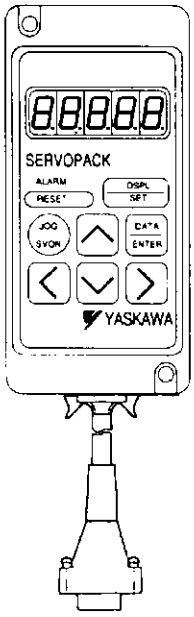
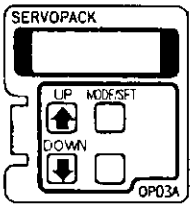
Connector Description **(D)**		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
MS Connector for Motor Power Cable *		1.0, 1.5, 2.0	MS3106B18-10S MS3108B18-10S MS3057-10A	MS3106B20-15S MS3108B20-15S MS3057-12A	Straight-type connector L-type connector Cable clamp	Stock
		3.0, 4.0, 5.0	MS3106B22-22S MS3108B22-22S MS3057-12A	MS3106B24-10S MS3108B24-10S MS3057-16A	Straight-type connector L-type connector Cable clamp	
MS Connector for Encoder Cable (incremental or absolute encoder)		All	MS3106B20-29S MS3108B20-29S MS3057-12A		Straight-type connector L-type connector Cable clamp	
1CN Mating Connector			DE9406970		Can use 1CN for analog speed and torque monitor service checks.	
2CN Encoder Mating Connector			DE9406973		–	
3CN Peripheral Mating Connector			Stock 9-pin male D-shell connector		Source locally.	–
5CN Connector and 1m Cable with Pigtails			DE9404559		–	Stock

* Choose either a straight or L-type connector and the associated cable clamp for a complete assembly. For example, L-type connector MS3108B18-10S is compatible with cable clamp MS3057-10A.

SGMS

Peripheral Device Selection

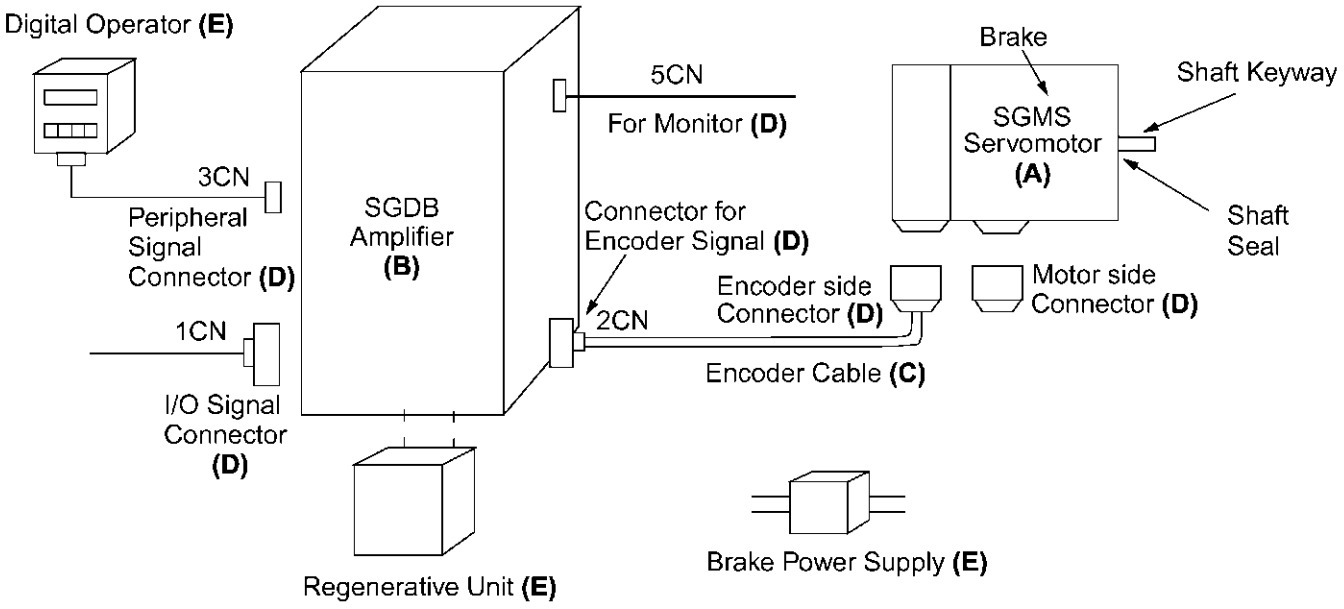
Use the table below to select Peripheral Devices for your SGMS Sigma Servomotor.

Component **(E)**		Part Number	Description	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	

Selecting Your SGMS Sigma Servo System

Use the diagram below to locate and identify the components of your system. Each item is letter-coded and cross-referenced in the option tables on the following pages.

System Configuration



Model Number Designation

SGMS - 10 V 6 A B [B]

Sigma Servomotor Type

Rated Output
- 10: 1.0kW (1.3HP)
- 15: 1.5kW (2.0HP)
- 20: 2.0kW (2.7HP)
- 30: 3.0kW (4.0HP)
- 40: 4.0kW (5.4HP)
- 50: 5.0kW (6.7 HP)

Power Supply
- V: 200V CE Specification

Accessories
- B: 90VDC Brake
- S: Shaft Seal
- F: Shaft Seal and Brake

Shaft Specifications
- B: Straight Shaft with Keyway

Rated Speed
- A: 3000RPM

Encoder Specifications
- 6: 4096PPR Incremental Encoder
- S: 8192PPR Absolute Encoder

SGMS

Servomotor & Amplifier Selection

Use the table below to select the appropriate SGMS Sigma Servomotor and Amplifier.

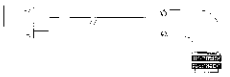
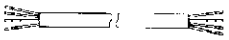
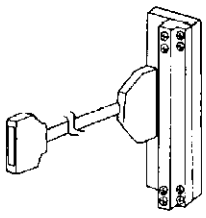
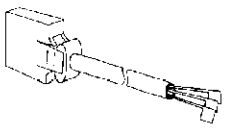
Description	Peak Torque (in. lb.)	Rated Torque (in. lb.)	Motor Inertia (in. lb. sec^2 × 10^{-3})	Motor MODEL # **(A)**	Amplifier MODEL # **(B)*** Analog/Digital Input SGDB-	Motor Item Class
200V 3-Phase 4096 PPR Incremental Encoder Straight Shaft with Keyway MS Connectors	84.4	28.2	1.54	SGMS-10V6AB	10VD (Limited Stock)	Limited Stock
				SGMS-10V6ABB		Non-Stock
	130	43	2.19	SGMS-15V6AB	15VD (Limited Stock)	Limited Stock
				SGMS-15V6ABB		Non-Stock
	169	56.4	2.82	SGMS-20V6AB	20VD (Limited Stock)	Limited Stock
				SGMS-20V6ABB		Non-Stock
	260	87	6.2	SGMS-30V6AB	30VD (Limited Stock)	Limited Stock
				SGMS-30V6ABB		Non-Stock
	336	112	8.5	SGMS-40V6AB	60VDY6 (Limited Stock)	Limited Stock
				SGMS-40V6ABB		Non-Stock
	422	140	11	SGMS-50V6AB	60VDY7 (Limited Stock)	Limited Stock
				SGMS-50V6ABB		Non-Stock

Note: 90VDC brakes for SGMS Sigma servomotors (CE) are standard. See Peripheral Device Selection in this section to order a power supply.
For technical information, request technical document numbers PI-6021 and DE9409784 from your Yaskawa representative.

* For more detailed SGDB amplifier specifications and dimensions, refer to page 127.

Pre-wired Cable Selection

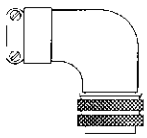
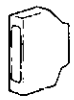
Use the table below to select Pre-wired Cables for your SGMS Sigma Servomotor.

Cable Description **(C)**		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
Power Cable with Connectors		1.0, 1.5, 2.0	B1CE-□	B1BCE-□	Use the following key to specify required cable length (last digit of part #): 1: 3 meters 2: 5 meters 3: 10 meters (standard) 4: 15 meters 5: 20 meters	Limited Stock
		3.0	B2CE-□	B2BCE-□		
		4.0, 5.0	B3CE-□	B3BCE-□		
Encoder Cable (incremental or absolute)		All	A1CE-□			Limited Stock
Encoder Cable Only for Solder Connections			DP8409123		Up to 70 feet; for use with mating connector.	Stock *
Encoder Cable Only for Solder Connections			DP8409179		Over 70 feet; splice cable to accommodate connector.	
Input/Output 1CN Cable & Transition Terminal Block			JUSP-TA50P		35 mm din rail mountable; the cable length is 0.5 meters.	
Input/Output 1CN Cable with Pigtail Leads			DE9406969-□		Use the following key to specify required cable length (last digit of part #): 1: 1 meter (standard) 2: 2 meters 3: 3 meters	

* Standard cable lengths are Stock items; non-standard cable lengths are Limited Stock items.

Mating Connector Selection

Use the table below to select Mating Connectors for your SGMS Sigma Servomotor.

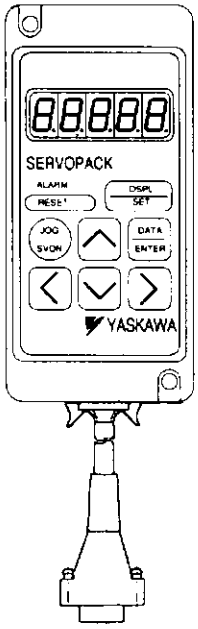
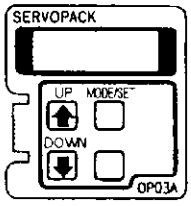
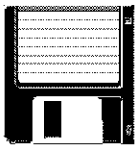
Connector Description **(D)**		Motor Size (kW)	Part Number		Comments	Item Class
			without Brake	with Brake		
Connector for Motor Power Cable *		1.0, 1.5, 2.0	JL04V-8A18-10SE-EB JL04-18CK(13)	JL04V-8A20-15SE-EB JL04-2022CK(14)	L-type connector Cable clamp	Limited Stock
		3.0, 4.0, 5.0	JL04V-8A22-22SE-EB JL04-2022CK(14)	JL04V-8A24-10SE-EB JL04-2428CK(17)	L-type connector Cable clamp	
Connector for Encoder Cable (incremental or absolute encoder)		All	JA08A-20-29S-J1-EB JL04-2022CKE(12)		L-type connector Cable clamp	
1CN Mating Connector			DE9406970		Can use 1CN for analog speed and torque monitor service checks.	
2CN Encoder Mating Connector			DE9406973		–	
3CN Peripheral Mating Connector			Stock 9-pin male D-shell connector		Source locally.	–
5CN Connector and 1m Cable with Pigtails			DE9404559		–	Limited Stock

* Choose the connector and the associated cable clamp for a complete assembly.

SGMS

Peripheral Device Selection

Use the table below to select Peripheral Devices for your SGMS Sigma Servomotor.

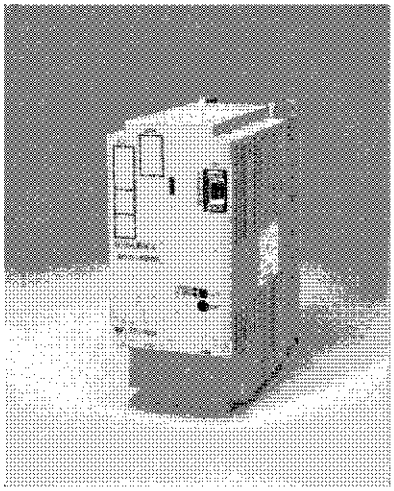
Component (E)		Part Number	Description	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1	Portable unit with built-in cable	Stock
Digital Operator Panel		JUSP-OP03A	Plugs into front of amplifier	Non-Stock
SVMON Software		SVMON	Programming software for DOS 3.3 on a 3.5" floppy disk	Stock
Software Interface Cable		YS-11	Pre-wired 1.5 meter cable with 9-pin connector	

SGMS

NOTES

SGDB Servo Amplifier

- All Digital for Speed, Torque & Position Control
- With Incremental / Absolute Encoder



For Additional Information	Page(s)
SGDB Ratings & Specifications	129 - 130
SGDB Dimensions	131 - 137
SGDB Internal Connections	138 - 140
SGMG Sigma Servo System	79 - 108
SGMS Sigma Servo System	109 - 116

Design Features

1. Improved Performance
   - Stability
     Increased 2 to 3 times.
   - Positioning settling time
     Shortened to 1/2 to 1/3.
   - Speed loop frequency characteristics
     Enhanced to 2 to 3 times.
   - Servo rigidity
     Enhanced 2 to 3 times.
2. Easy Operation
   - All-in-one model (speed, torque and position control)
     All-in-one model, yet common to incremental and absolute encoders.
   - PC monitoring function
     Can be found in standard applications.
   - Auto-tuning function
     Included in its specifications.
   - Multi-axis communication
     Also installed as standard specification. One personal computer can communicate with 14 (max) SGDB models by parameter setting.
   - Main circuit and control circuit
     Both are separated.
   - Speed command power supply output
     ±12V / ±30mA is included as standard specification.

Model Number Designation

SGDB - □□ A D □

Sigma Series
SGDB Servo
Amplifier

Rated Output

Type	Capacity kW (HP)
05	0.5 (0.67)
10	1.0 (1.3)
15	1.5 (2.0)
20	2.0 (2.7)
30	3.0 (4.0)
44	4.4 (5.9)
60	6.0 (8.0)
75	7.5 (10)
1A	11.0 (15)

Applicable Motor Series

[G] : Standard SGMG (1500 rpm)

Note: Amplifiers are also compatible with SGMS, SGM and SGMP motors via digital field parameter adjustment.

Model

[D] : Speed, Torque and Position Control

Power Supply

[A] : 200V

[V] : 200V optional CE

SGDB Amplifier Ratings and Specifications

Basic Specifications	Input Power Supply		Main Circuit *1	Three-phase 200 to 230 VAC +10% to -15%, 50/60 Hz
			Control Circuit *1	Single-phase 200 to 230 VAC +10% to -15%, 50/60 Hz
	Control Mode			Three-phase, full-wave rectification IGBT PWM (sine-wave driven)
	Feedback			Incremental encoder, absolute encoder
	Location	Ambient/Storage Temp. *2		0 to 55°C / -20 to 85°C
		Ambient/Storage Humidity		90% or less (no-condensing)
		Vibration/Shock Resistance		4.9m/s^2/19.6m/s^2
	Structure			Base mounted (duct ventilation available as option) and flat mount type
	Approx. mass			03 to 15: 4.0kg (9 lbs), 20 to 30: 5.0kg (11 lbs) 44 to 50 : 8kg (18 lbs), 60 to 75: 15.5kg (33 lbs), 1A: 23kg (51 lbs)
Speed/Torque Control Mode	Performance	Speed Control Range		1 : 5000 (Provided that the lower limit of the speed control range does not cause the motor to stop when the rated torque load is applied)
		Speed Regulation *3	Load Regulation	0% to 100%: 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)
		Frequency Characteristics		250Hz (at $J_L = J_M$)
		Accel/Decel Time Setting		0 to 10s
	Input Signal	Speed Reference	Reference Voltage *4	±6VDC (variable setting range: ±2 to ±10VDC) at rated speed (forward rotation with positive reference)
			Input Impedance	Approx. 30kΩ
			Circuit Time Constant	Approx. 47μs
		Torque Reference	Reference Voltage *4	±1 to ±10V at rated speed (forward rotation with positive reference)
			Input Impedance	Approx. 30kΩ
			Circuit Time Constant	Approx. 47μs
		Built-in Reference Power Supply		±12V, ±30mA
		Contact Speed Reference	Rotation Direction Selection	Uses P control signal
			Speed Selection	Forward/reverse rotation current control signals are used (1st to 3rd speed selection). When both signals are OFF, the motor stops or enters another control mode.
Positioning Control Mode	Performance	Bias Setting		0 to 450 rpm (setting resolution: 1 rpm)
		Feed-forward Compensation		0 to 100% (setting resolution: 1%)
		Position Complete Width Setting		0 to 250 reference units (setting resolution: 1 reference unit)
	Input Signal	Reference Signal	Type	SIGN + PULSE train, 90° phase difference 2-phase pulse (phase A + phase B), or CCW + CW pulse train
			Pulse Buffer	Line driver (+5V level), open collector (+5V or +12V level)
			Pulse Frequency	Max. 450/200 kpps (line driver/open collector)
		Control SIgnal		CLEAR (input pulse form identical to reference pulse)
		Built-in Open Collector Power Supply *5		+12V (With built-in 1kΩ resistor)

Ratings and Specifications (cont'd)

I/O Signals	Position Output	Output Form	Phases A, B and C: Line driver output Phase S: Line driver output (Only when 12-bit absolute encoder is used)
		Frequency Dividing Ratio	(16 to N) /N (N: Number of encoder pulses)
	Sequence Input		Servo ON, P control (or forward/reverse rotation in contact input speed control mode), forward rotation prohibited (P-OT), reverse rotation prohibited (N-OT), alarm reset, forward rotation current limit and reverse rotation current limit (or contact input speed control)
	Sequence Output		Servo alarm, 3-bit alarm codes
		Any 3 of those signals	Positioning complete (speed coincidence), TGON, servo ready, current limit, brake release, overload detected
	Analog Monitor Output	Any 2 of those signals	Speed: 2V/1000 rpm or 1V/1000 rpm Torque: 2V/rated torque Error: 0.05V/reference unit or 0.05 V/100 reference units
Built-in Functions	Dynamic Brake (DB)		Activated at main power OFF, servo alarm, servo OFF or overtravel
	Regenerative Processing		Incorporated. For 60 to 1A types, external regenerative resistor must be mounted.
	Overtravel (OT) Prevention		Motor is stopped by dynamic brake, decelerates to a stop, or coasts to a stop when P-OT or N-OT is activated.
	Protection		Overcurrent, overload, regenerative error, main circuit voltage error, heat sink overheat, power open phase, overflow, overspeed, encoder error, encoder disconnected, overrun, CPU error, parameter error.
	LED Display		POWER, ALARM, CHARGE
	Analog Monitor (5CN)		Same analog monitor signal as 1CN is available.
	Communication	Interface	Digital Operator (mount type or hand type) RS422A port such as person computer (RS232C port can be used if some conditions are met).
		1 : N Communication	N can be up to 14 when RS422A port is used.
		Axis Address Setting *6	Hexadecimal rotary switch (1SW) 1 : 1: N communication, 0 : 1 : 1 communication
		Functions	Status display, user constant setting, monitor display, alarm traceback display, jogging, autotuning, etc.
	Others		Zero-clamp, reverse rotation connection

*1 The power voltage must not exceed 230V + 10% (253V). If it is likely that it will exceed this limit, use a stepdown transformer.

*2 The ambient temperature must be within the specified range. Even if the Servo Amplifier is installed in a box, the temperature inside the box must not exceed the range.

*3 Speed regulation can be calculated using the following formula:

$$\left(\text{Speed regulation} = \frac{\text{(no-load motor speed - full-load motor speed)}}{\text{rated motor speed}} \times 100\%\right)$$

Under actual operating conditions, voltage or temperature fluctuation causes drift to the amplifier or changes the operating resistance, resulting in the motor speed being changed. The percentage of the motor speed change to the rated motor speed is called "speed regulation".

*4 Forward rotation is defined as the clockwise rotation when viewed from the motor on the opposite side of the load. (It is the counterclockwise rotation when viewed from the load or shaft).

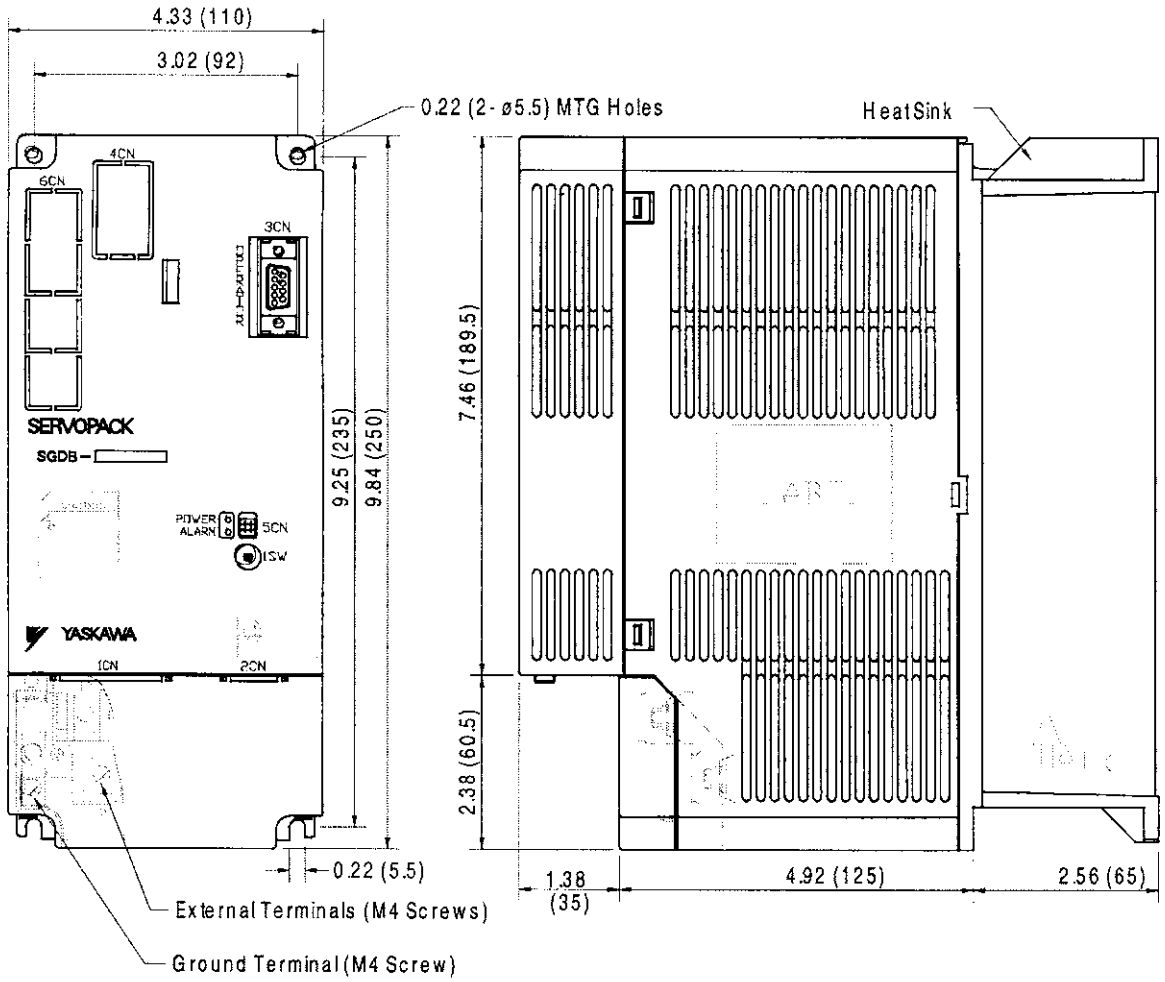
*5 Built-in open collector power supply is not electrically isolated from the control circuit inside the Servo Amplifier.

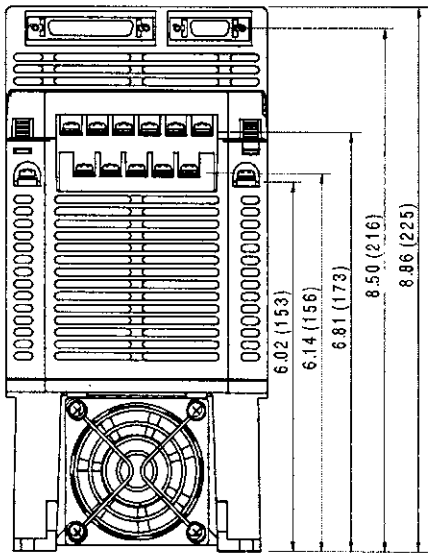
*6 For 1 : 1 communication, set the rotary switch to "0".

Dimensions in inches (mm)

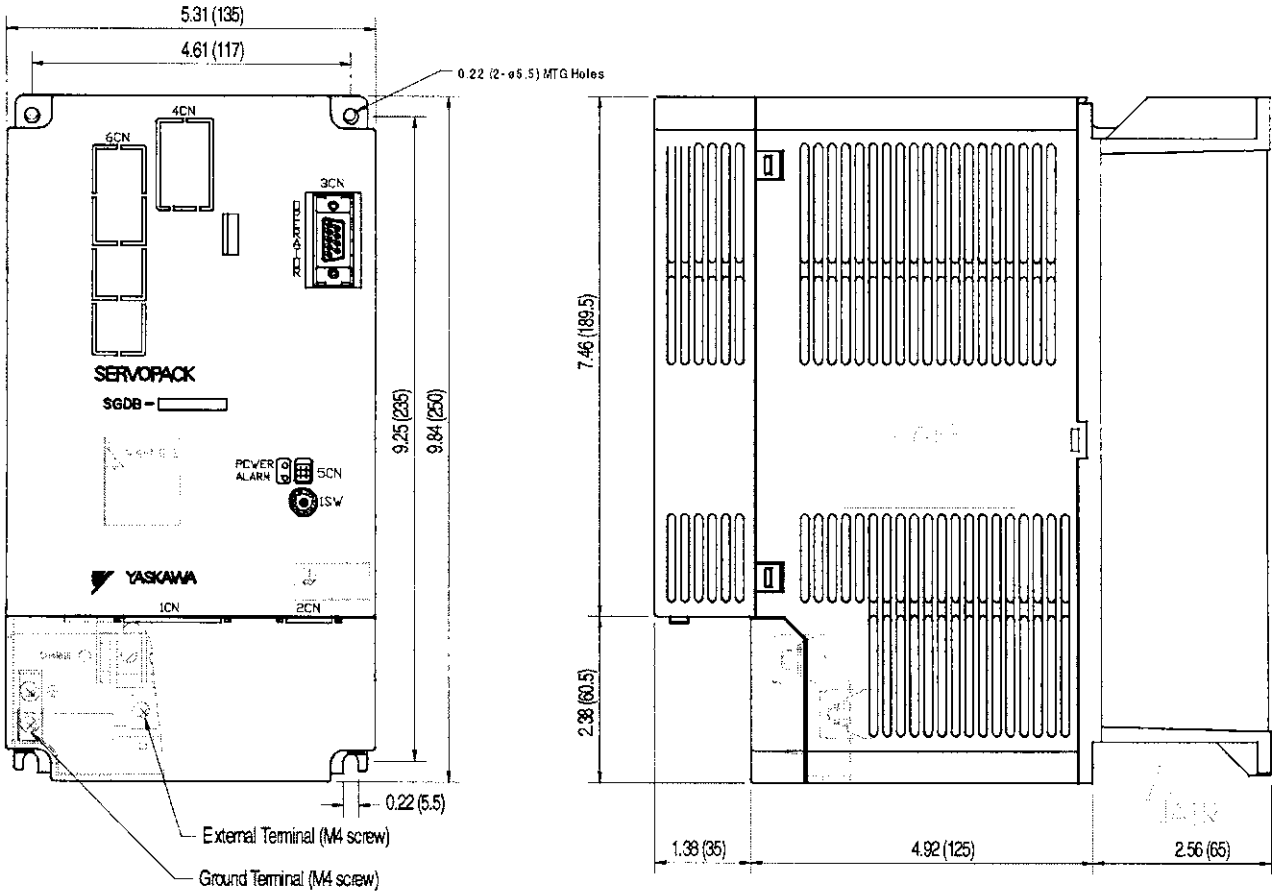
SGDB Servo Amplifier (Standard)

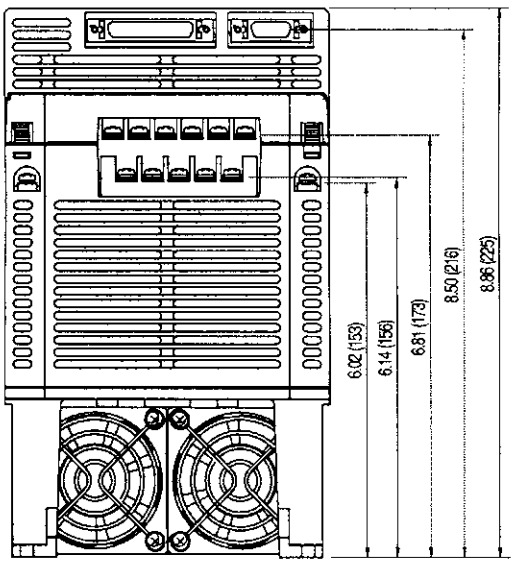
(1) SGDB-03 to 15AD□



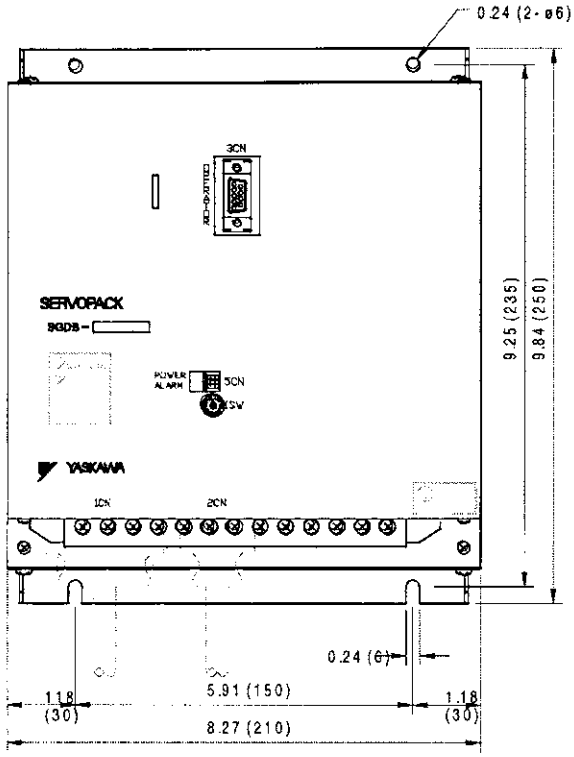


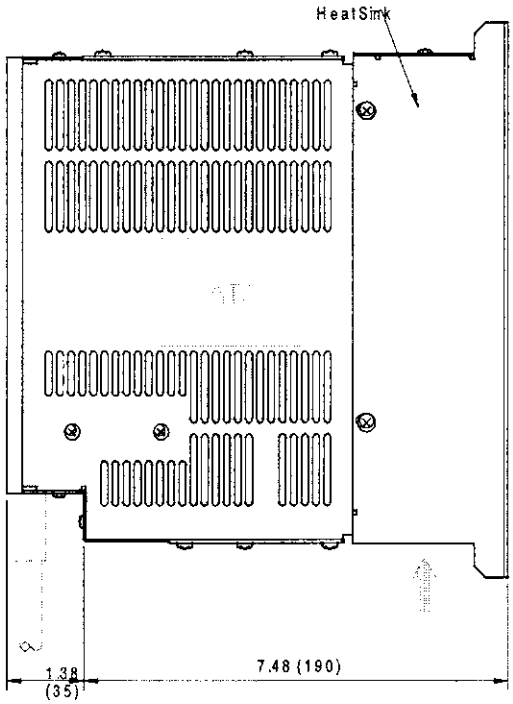
(2) SGDB-20 to 30AD□

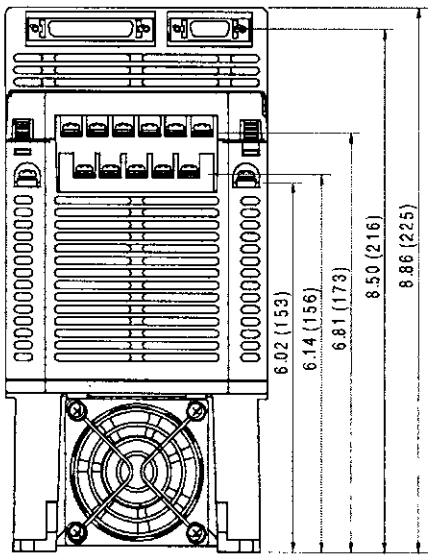




(3) SGDB-44 to 50AD□

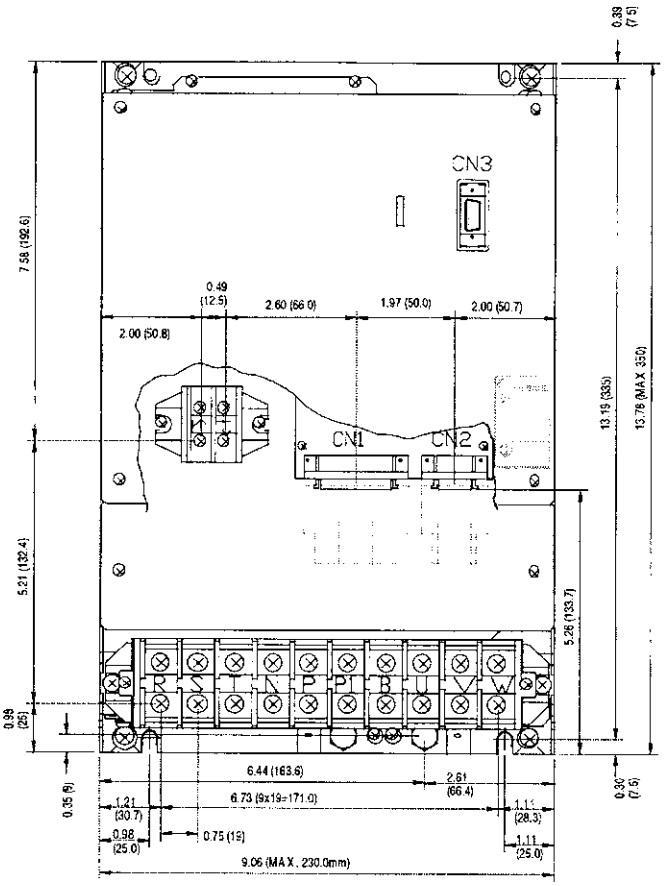


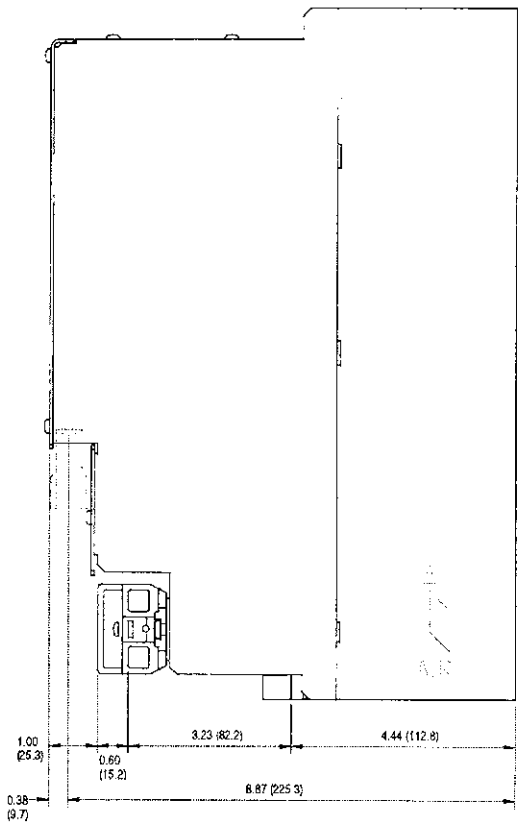


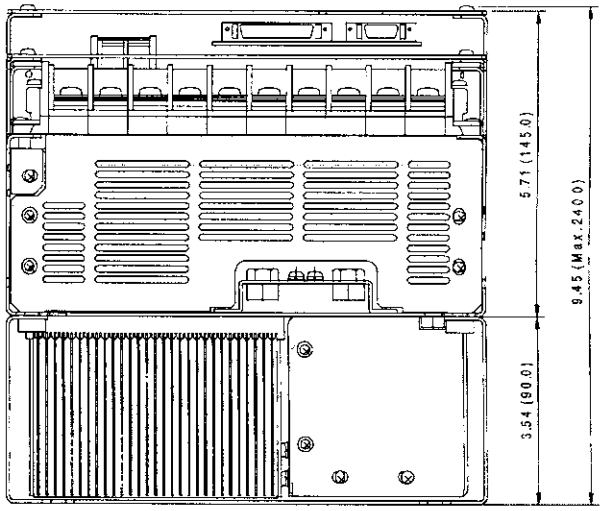


SGDB

(4) SGDB-60 to 75AD□

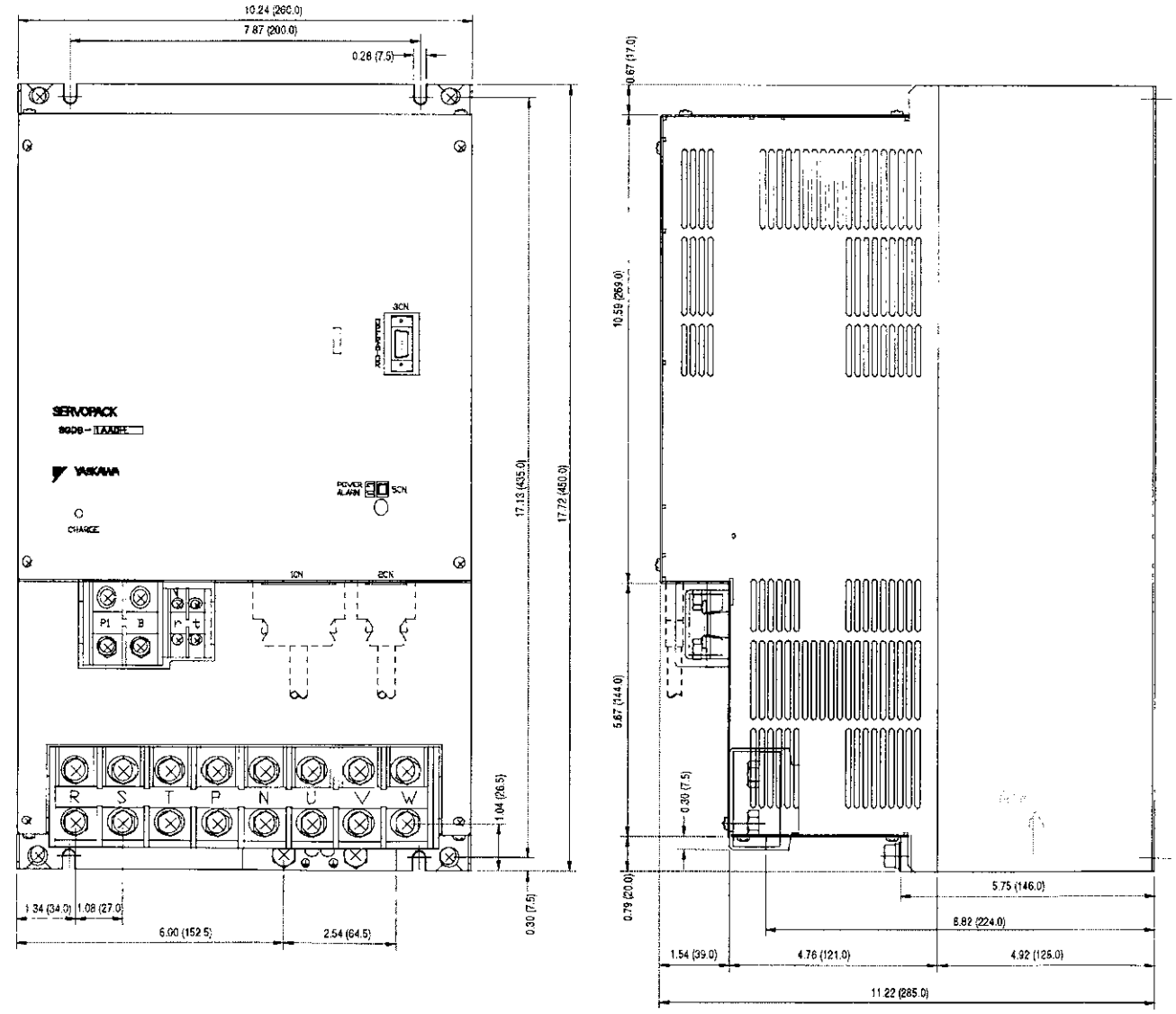


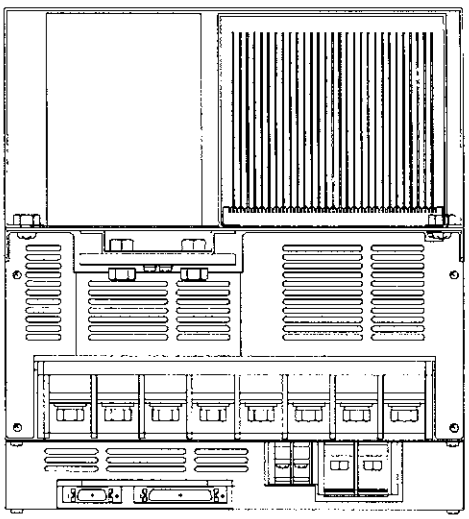




SGDB

(5) SGDB-1AAD□



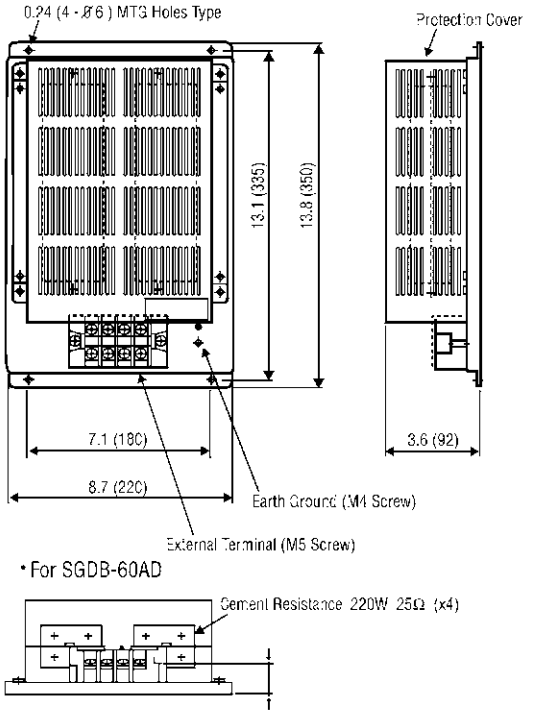


- SGDB-03 to 1AA□

Symbols	Connector on Servo Amplifier Side	Note
1CN	10250-52A2JL	Manufactured by 3M
2CN	10220-52A2JL	
3CN	17JE-13090-37 (D2B)	Manufactured by Daiichi Denshi Kogyo K.K.
5CN	DF11-4DP-2DSA	Manufactured by Hirose Denki

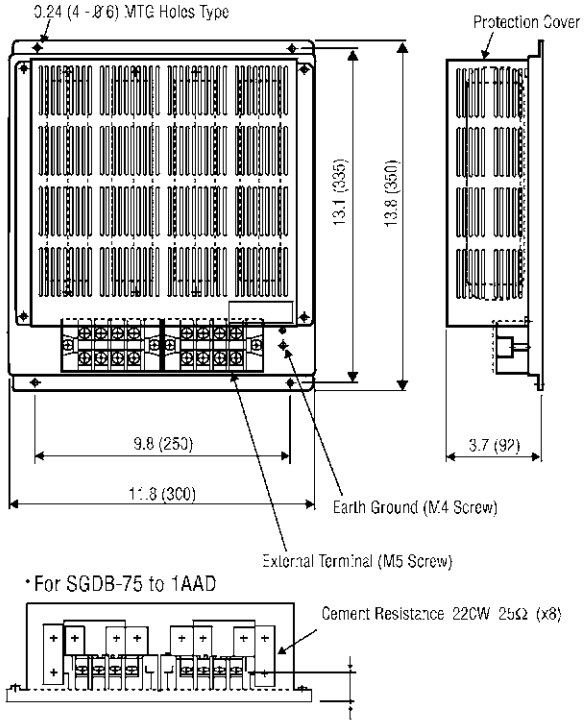
Regenerative Resistance (JUSP-RA□□)

- **Type JUSP-RA04**



• For SGDB-60AD

- **Type JUSP-RA05**



• For SGDB-75 to 1AAD

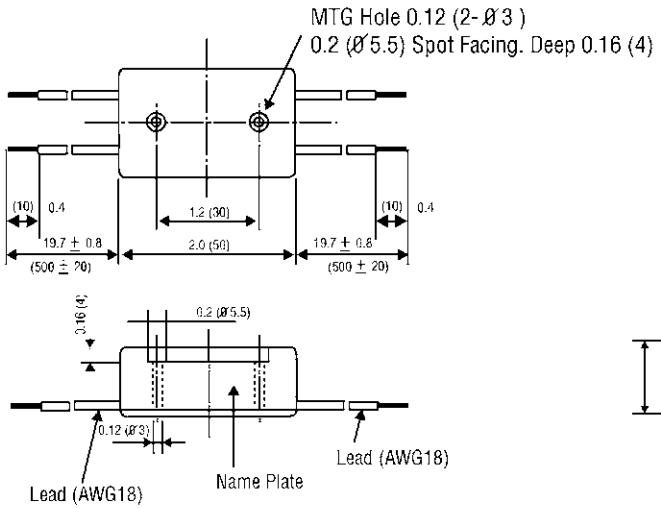
SGDB

Braking Power Supply (LPSE-2H01, LPDE-1H01) Spec.

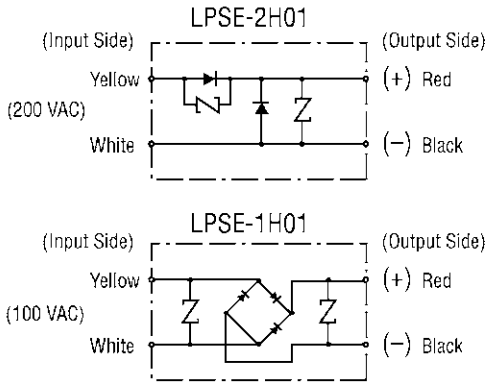
For Optional CE products (motors with 90VDC/brake)

Type	Rated		Read Connection	
	Input Power Supply	Output Power Supply	Input Side	Output Side
LPSE-SH01	50/60Hz 200VAC (180 to 230VAC)	90 VDC	Yellow, White	Red (+)
LPDE-1H01	50/60Hz AC100VAC (90 to 120VAC)		Blue, White	Black (-)

(Note) 1. Insulation Resistance: 100MΩ or more at 500V Megger.
2. Withstand Voltage: 1500VAC for a minute or 1800VAC for a second.
3. Operating Voltage: 90VDC Max. 1ADC.
4. Ambient Temperature: Max. 60°C.

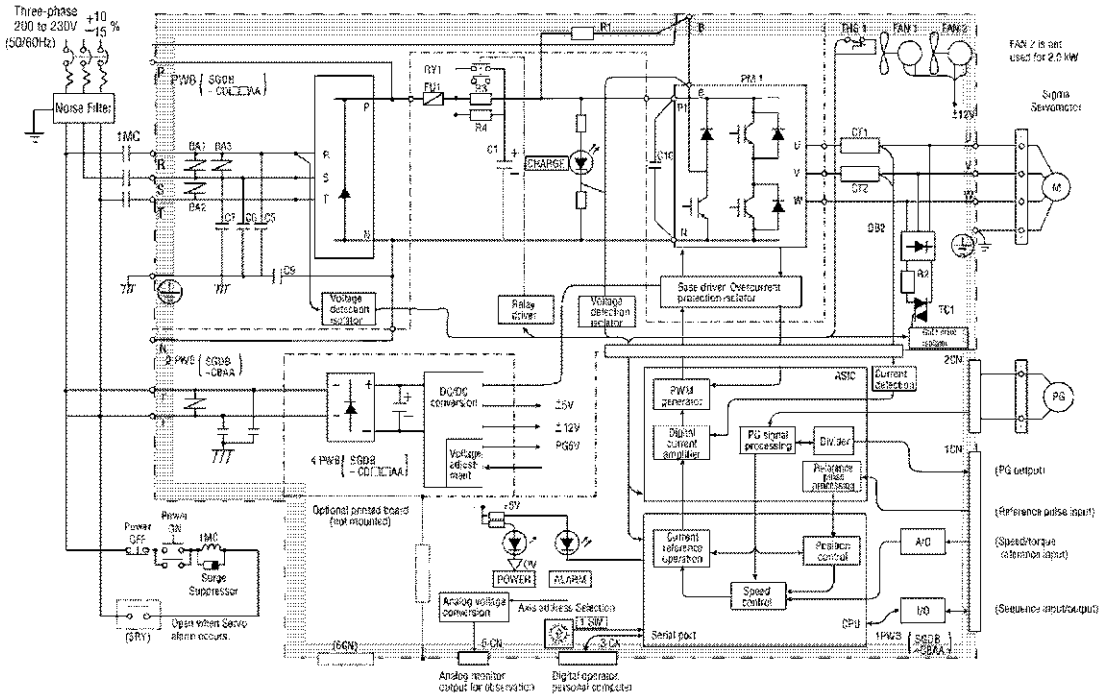


< Circuit Diagram >



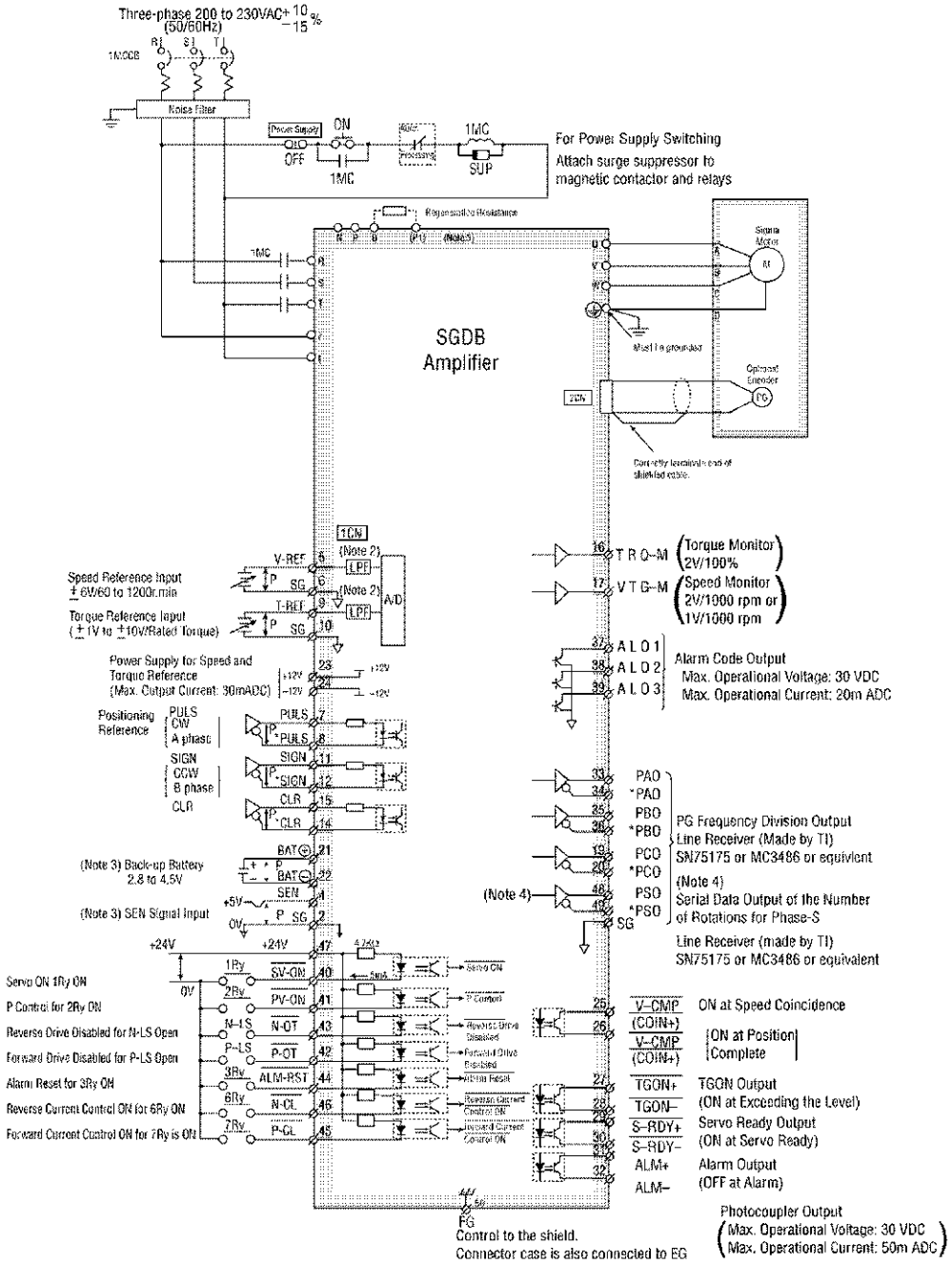
Internal Connection Diagram

- **2.0kW to 3.0kW (2.7 to 4.0HP)**



Internal Connection Diagram

Connection Example

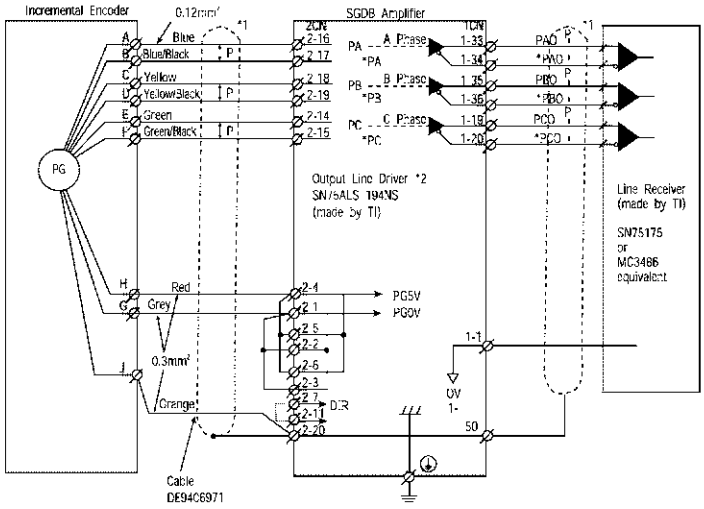


Note: 1 1P : Twisted pair cable.
2 Constant number at primary filter is 47
3 Connects when using absolute encoder
4 Effective when using 12-bit absolute encoder
5 Type SGDB-60 to 1A needs regenerative resistance (external type, option).
TI: Texas Instruments Inc.

Internal Connection Diagram

Encoder Signal (2CN) Connections

- **Connector 2CN for Incremental Encoder Connection and 1CN Output Processing**

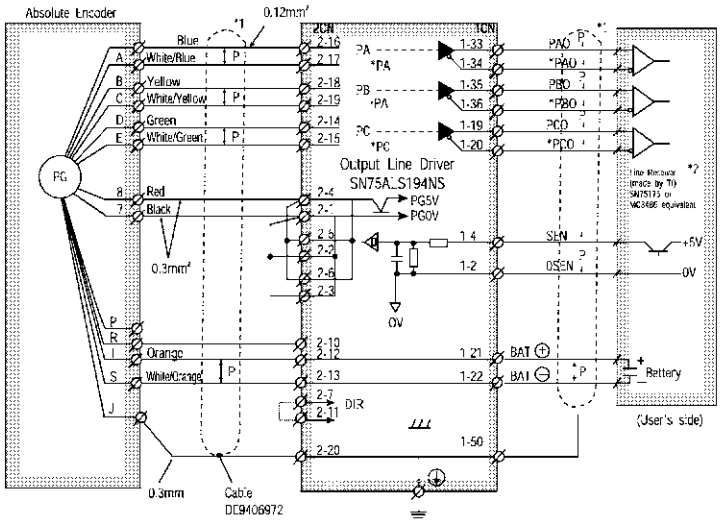


Notes: *1 P : Twisted pair cable.

*2 Made by Texas Instruments Inc.

*3 Connector number changes when connecting with SGMP-15A motor. Refer to the SGMP section (P44 to 53) for detail.

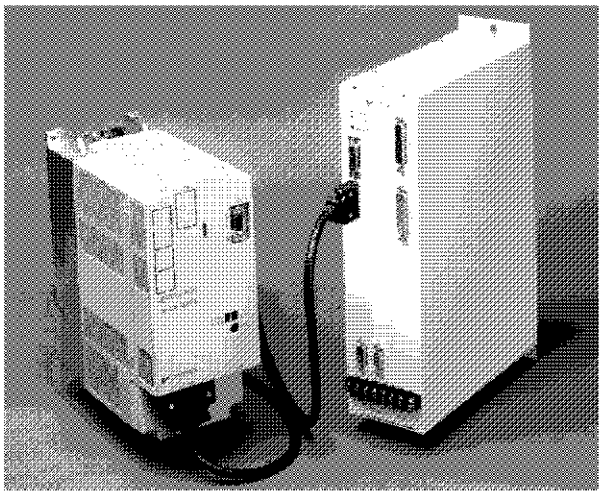
- **Connector 2CN for Absolute Encoder Connection and 1CN Output Processing**



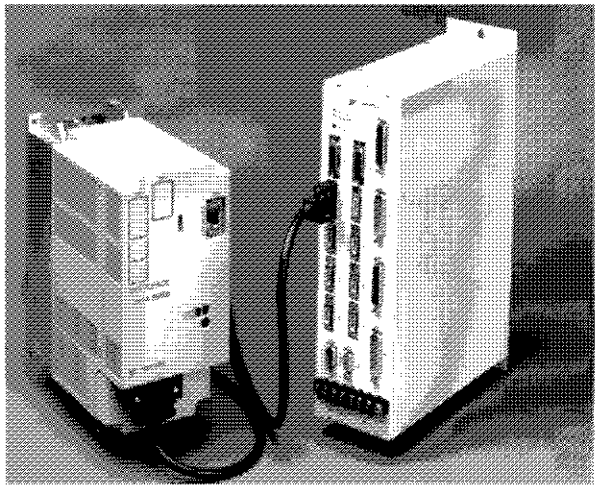
Notes: *1 P : Twisted pair cable.

*2 TI: Made by Texas Instruments Inc.

*3 Connector number changes when connecting with SGMP-15A motor. Refer to the SGMP section (P44 to 63) for detail.



Single-Axis (1.5 Axes)



Multi-Axis (2, 4, 8 Axes)

Standard Features

- 32-bit Microprocessor
- 8MHz Encoder Input Frequency
- 16-bit DAC Output Resolution
- Position Accuracy of +/- 1 Quadrature Count
- Dual Encoder Inputs
- Polarized Plug & Play Connectors
- Pre-wired Cables
- UL/cUL Listed

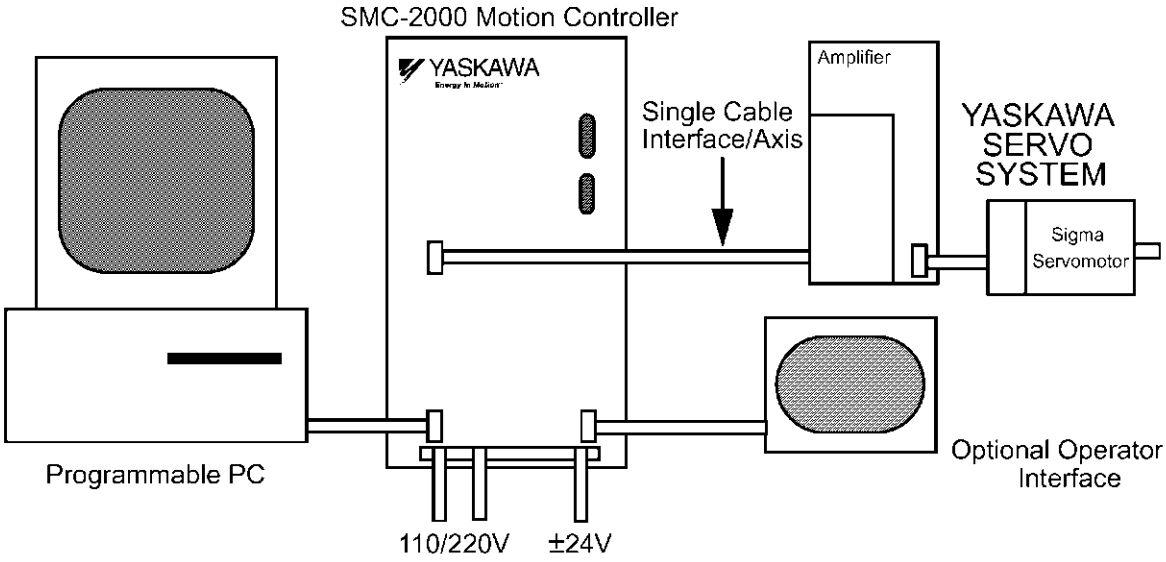
Programming Controls

- Yaskawa's "Y-Term" Windows® -based Software for Programming, Set-up and Troubleshooting
- Scope Functions
- Auto-tuning and Graphical Manual Tuning
- System Monitoring Screens
- Context-sensitive Help
- Direct Access to SMC-2000

Selecting Your SMC-2000 Motion Controller

Use the diagram below to locate and identify the components of your controller system.

System Configuration



1. Select the SMC-2000 Controller based on the number of axes required:
   SMC20001: 1/1.5 Axes SMC20004: 4 Axes
   SMC20002: 2 Axes SMC20008 8 Axes
2. Yaskawa offers input/output and feedback cables with correctly matched, high quality, polarized connectors attached to permit correct interconnection. Refer to the Pre-wired Cables Selection Table to select the correct cable assembly from the list of standard cable lengths.
3. Refer to the Pre-wired Cables Selection Table to select suitable software to be used with the controller.

Model Number Designation

SMC-2000 ☐ ☐

Motion Controller Series

Number of Axes
- 1: 1/1.5
- 2: 2
- 4: 4
- 8: 8

Accessories
- I: Extended I/O - 40 in, 42 out
- M: Ability to Write Array Memory
- W: Absolute Encoder Interface
- D: Device Net
- P: Profibus
- S: Interbus-S

SMCC BL 0 ☐ ☐

Motion Controller Cable

Cable Type
- 0: Pigtail
- 1: SGDA Amplifier
- 2: SGDB Amplifier
- 4: All Digital
- 5: I/O 25 Pin w/ Pigtail
- 6: D1 15 Pin w/ Pigtail
- 7: COM1 Cable (9 Pin: F-F)
- 9: DR2
- A: SGDA Cable w/ Breakout
- B: SGDB Cable w/ Breakout

Accessories
- 05: 5 feet
- 10: 10 feet
- 15: 15 feet
- 20: 20 feet (I/O cables only)

Motion Controller Selection

Use the table below to select the number of axes control required for your application.

Motion Controller Number	Description	Servo Loop Update Time (msec) Minimum
SMC20001	One Axis	250
SMC20002	Two Axes	375
SMC20004	Four Axes	500
SMC20008	Eight Axes	875

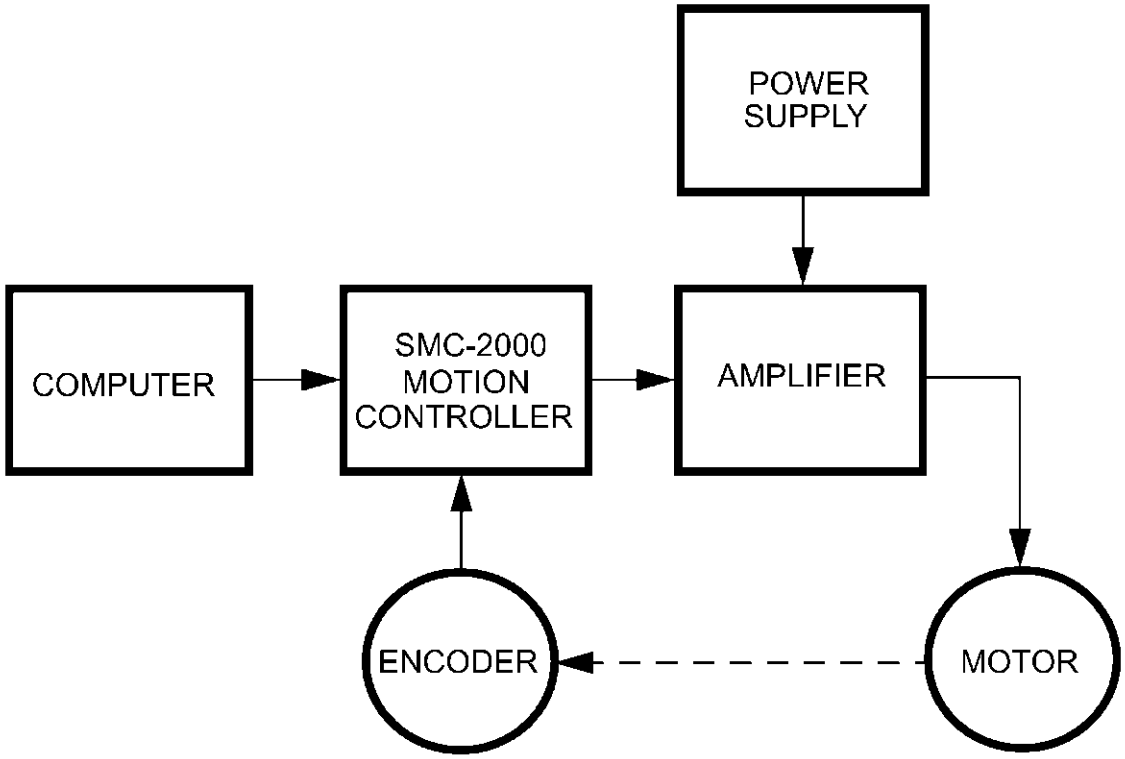
Pre-wired Cable Selection

Use the table below to select cables for connecting the Motion Controller to peripheral devices.

Cable Part Number	Description	Where Used
SMCCBL005 SMCCBL010 SMCCBL015	5 feet 10 feet 15 feet	Motion Controller to Pigtail
SMCCBL105 SMCCBL110 SMCCBL115	5 feet 10 feet 15 feet	Motion Controller to SGDA Amplifier
SMCCBL205 SMCCBL210 SMCCBL215	5 feet 10 feet 15 feet	Motion Controller to SGDB Amplifier
SMCCBL405 SMCCBL410 SMCCBL415	5 feet 10 feet 15 feet	Motion Controller to All Digital
SMCCBL5	I/O Cable 25 Pin Connector	-
SMCCBL6	Dedicated I/O 15 Pin (D1 or D2)	-
SMCCBL7	5 feet	COM1 to PC Cable
SMCCBL905 SMCCBL910 SMCCBL915	5 feet 10 feet 15 feet	Motion Controller DR2
SMCCBLAO5 SMCCBLA10 SMCCBLA15	5 feet 10 feet 15 feet	Motion Controller to SGDA with Breakout
SMCCBLB05 SMCCBLB10 SMCCBLB15	5 feet 10 feet 15 feet	Motion Controller to SGDB with Breakout
JUSP-TA50P	0.5 meters; 35mm din rail mountable	50 pin Breakout Board used with Extended I/O Option; Need 1 per 20 in & 21 out

Note: Software Part No. SMCGUI1 consists of programming, tuning, and monitoring software, and a COM1 cable.

Elements of a Yaskawa Motion Control System

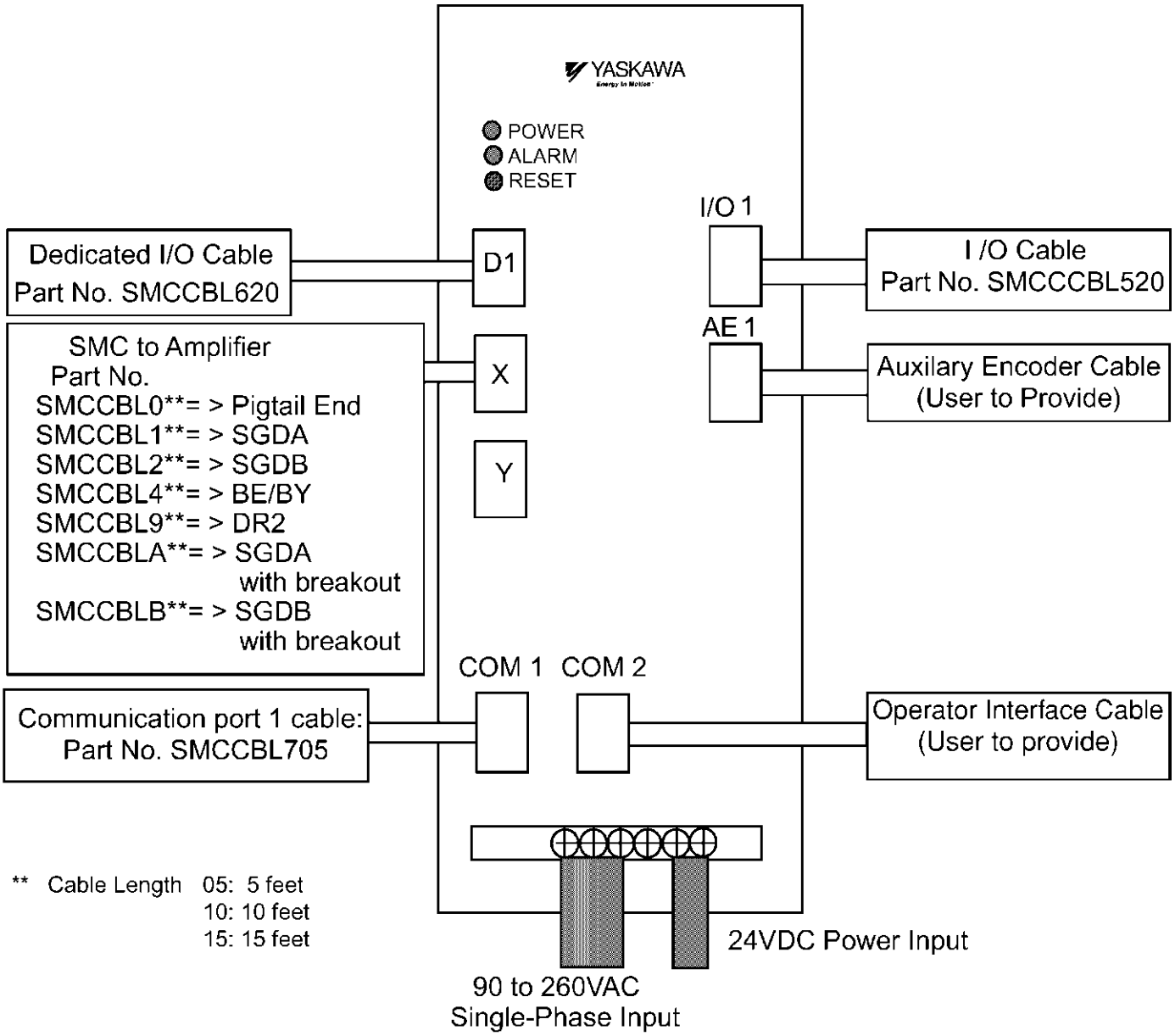


Since the motor converts current into torque to produce motion, each axis of motion requires a properly sized motor to move the load at the required acceleration and speed.

The amplifier converts the ±10 Volt signal from the motion controller into ample current to power the motor.

The encoder translates motion into an electrical signal to be fed back to the motion controller enabling the decoding and control of various motion parameters, i.e. jogging, point-to-point positioning, liner and circular interpolation with infinite vector feed, electronic gearing and user-defined path following. Some of the several motion parameters that can be controlled are: acceleration/deceleration rates and slew speed. The SMC-2000 Motion Controller also has the ability to eliminate “jerk” through S-curve profiling.

Connection Diagram



NOTES

Sigma Servo System

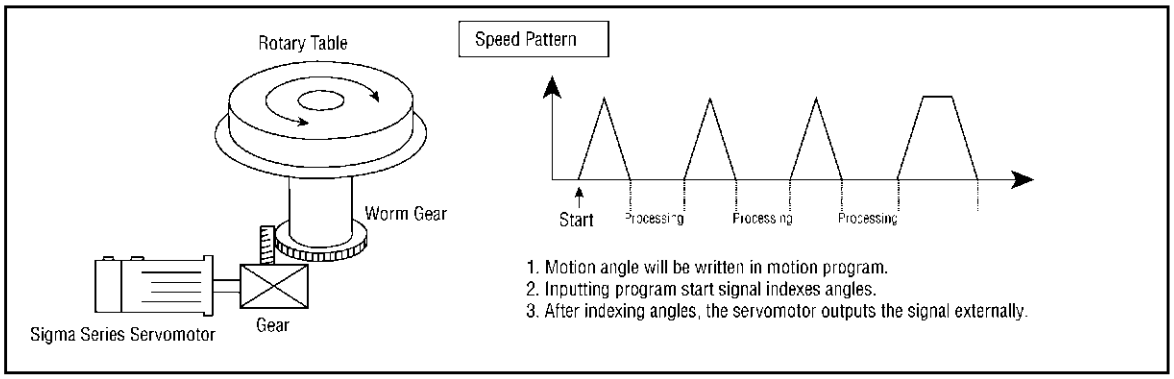
Sigma Series Safety Notes

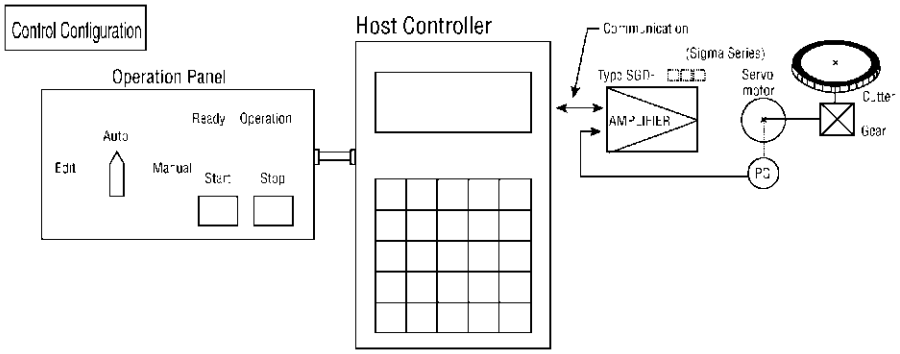
Selecting Motor Capacities

NOTES

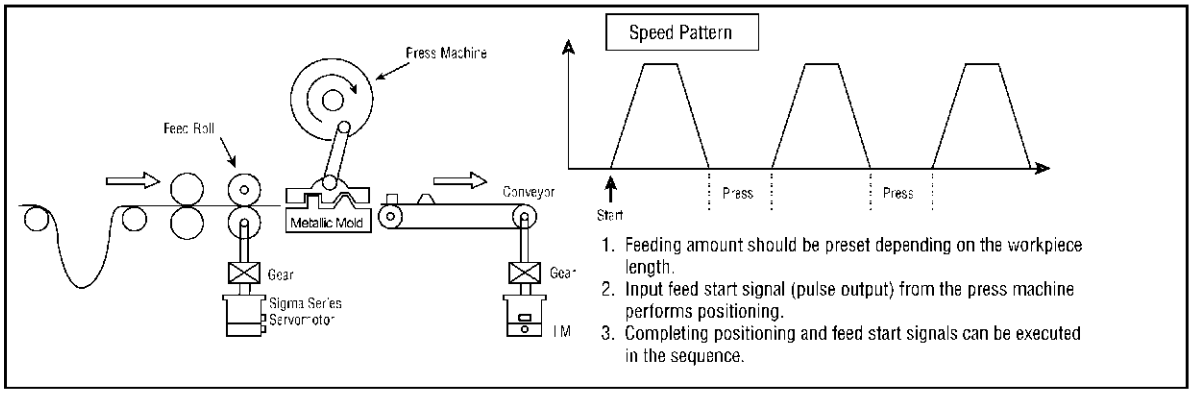
General Application Examples

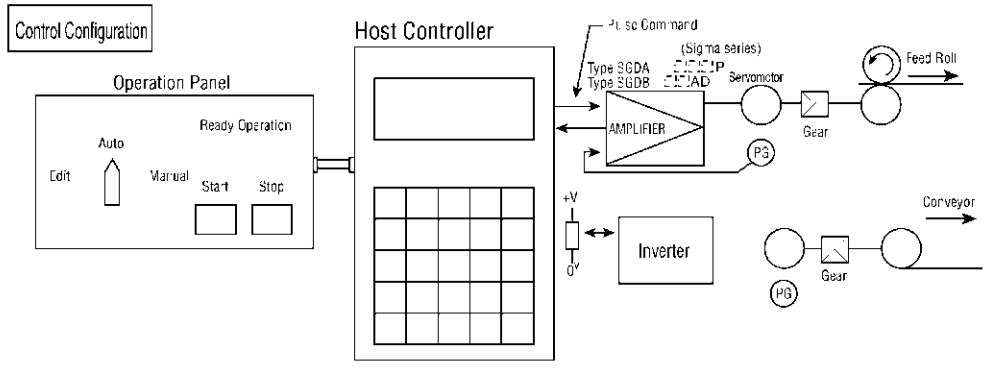
Rotary Table





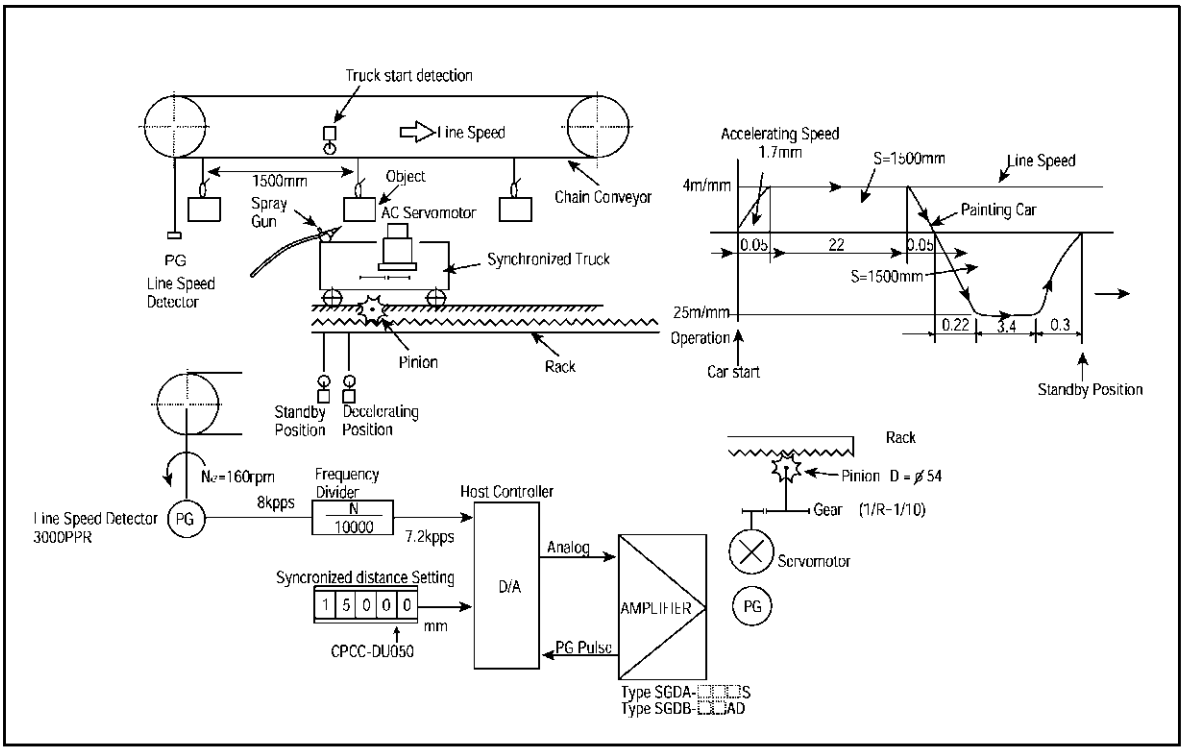
Roll Feeder



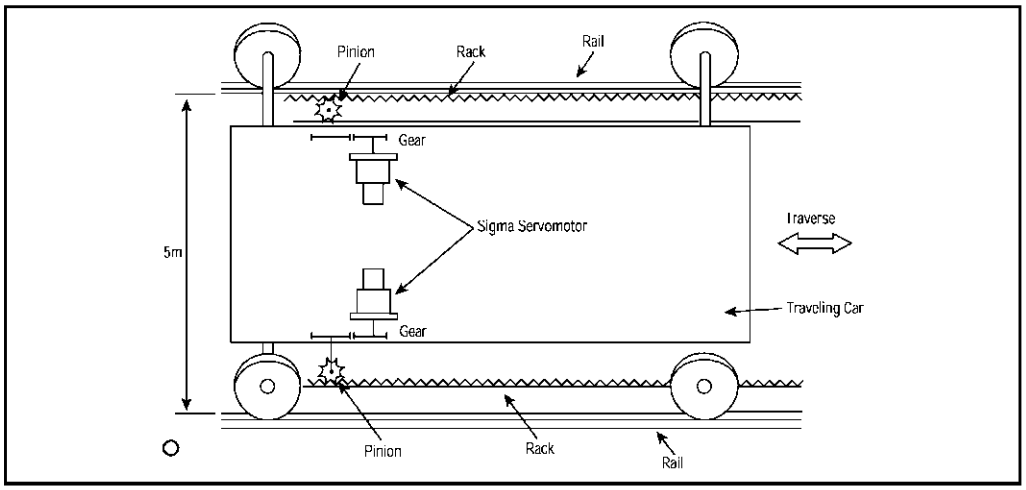


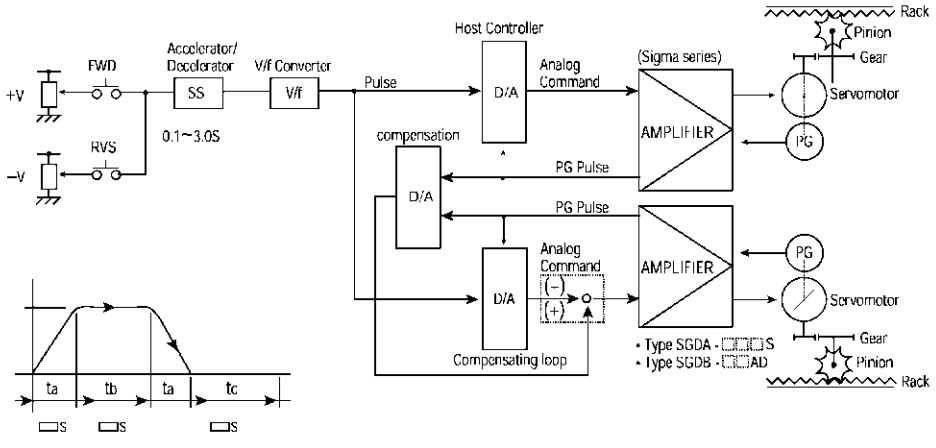
Appendix

Conveyor Synchronous Drives



Synchronous Drives





Sigma Series Safety Notes

Safety Precautions

- Even after the power is turned OFF, residual voltage still remains in the capacitor inside the Servo Amplifier. Be sure to isolate the power supply from the Servo Amplifier completely and allow the Servo Amplifier to discharge for at least five minutes before touching the terminals or opening the Servo Amplifier case.

- Even if the servo is in the OFF status, high voltage remains at the motor output terminals (U, V, W) while the power is being turned ON or for a short time after the power is turned OFF, so take care not to touch them.

- The servomotor carries a high-frequency switching current and as a result, a leakage current will be present. To discharge this leakage current, be sure to connect the Servo Amplifier ground terminal (⏚ or ⏚) or the servomotor frame ground (FG or ⏚) terminal to earth. Be sure to ground the machine body itself as well. We recommend Class 3 grounding (100Ω max, 1.6mm diameter or larger) or better to prevent possible shock and malfunction.

- To prevent malfunction while turning ON the power, do not stand close to the motor or the machine being driven.

- If the system is not to be used for a long period of time, be sure to turn OFF the power supply to the Servo Amplifier.

- To prevent shock, always cover the front terminal strip with the terminal strip cover.

YASKAWA has made every effort to assure quality in our products, but malfunction may occur as a result of electrical noise, electrostatic discharge, or faults in components, connections or wiring. We urge all users to assure matching between our products and their own machinery, and to take full safety precautions.

For example, we suggest that limit switches be installed to prevent overrun and to arrange the sequence so that the limit switch operates immediately to turn OFF the servo.

- Always insert a no-fuse breaker between the Servo Amplifier and the power supply. Refer to the specific example for each product for connection methods.

- Design the sequence so that an alarm signal output from the Servo Amplifier will turn OFF the power supply to the Servo Amplifier terminals R, (S), T or L1, L2, r and t.
Refer to the specific examples for each product for connection methods.

Sigma Series Safety Notes

Precautions When Using

Improper use of the Servo Amplifier may prevent normal operation, and could even damage the Servo Amplifier. Observe the following precautions.

- Never apply supply voltages in excess of permissible ratings to input terminals (R, (S), T, L1, L2, r, t, L or N). Never connect the power supply to any terminal other than the power supply connector. For details on connection of the power supply, refer to the manuals for the specific Servo Amplifier.

- The input power supply is a capacity input type. A large charging current will flow when the power is turned ON and the power supply impedance may cause a drop in voltage. We recommend using a specialized line for the Servo Amplifier power supply.

- Refer to the "Ratings and Specifications" for each Servo Amplifier for power supply rated output data.

- The recommended operating temperature range is from 0 to +55°C (32 to 131°F). Operation at temperatures above this range may cause malfunction or failure.

- When conducting a voltage resistance test, disconnect all Servo Amplifier terminal connectors, and assure that the test voltage is not input to the Servo Amplifier under any circumstances.

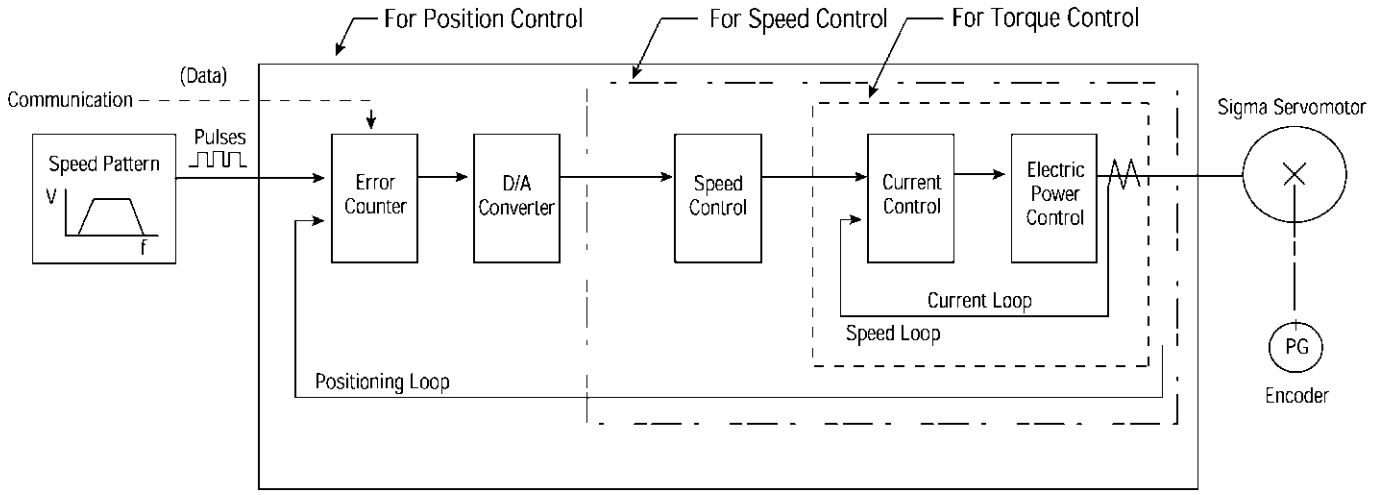
- Never operate under overload conditions exceeding motor or Servo Amplifier capacity (e.g., continuous operation above rated current).

- After turning OFF the power, wait 15 to 20s before turning it back ON again to allow the internal circuits to initialize fully. Otherwise, the system may not come up normally.

- When a leakage breaker is used, be sure to use a high-speed leakage breaker designed to operate in high-frequency environments.

Selecting Motor Capacities

Checkpoints When Selecting Servo Amplifiers



Sigma Series Servo Amplifier

Selecting Sigma Series Servo Amplifier Models

▼

a. Variable speed drive required?
b. Position control loop at host controller required?

Yes ▶ Use speed command.

No ▼

c. Tension control required?
d. Torque control, such as pushed stopping required?

Yes ▶ Use torque command.

No ▼

e. Switching variable speed drive and torque control required?

Yes ▶ Switch speed and torque commands.

No ▼

f. Direct positioning by pulse input required?

Yes ▶ Select positioning control.

No ▼

g. Switching speed, torque and position control required in one unit?

Yes ▶ Use speed, torque and position (pulse) commands by switching.

Applicable Sigma Series Servo Amplifier		
SGDA		SGDB
-□□□S	-□□□P	-□□AD
○		○
○		○
○		○
	○	○
		○

Capacity	30 to 750W	0.3 to 11kW
Power Supply	Single phase 200VAC/ 100VAC, 50/60Hz	Three-phase 200VAC

Checkpoints When Selecting Motor Capacity

► 5 Check Points

1. N_M (Driven motor speed of motor shaft conversion) ≤ N_R (Motor rated speed)
2. T_L (Load torque of motor shaft conversion) ≤ T_R (Motor rated load torque)
3. Tp (Starting torque) ≤ Tp (max.) (Max. momentary motor torque)
4. Trms (Torque RMS) ≤ T_R
5. GD_L^2 (Load GD^2 of motor shaft conversion) ≤ GD^2_{AL} (Allowable GD^2 set by a servo driver)

Note: Tp (Max.) should be smaller than the maximum momentary torque when combining a motor and a servo driver.

▼

* Understand your machine specifications
* Calculate N_M, T_L, GD^2_L according to the speed diagram.

▼

* Calculate the running power (Po)
  the accel power (Pa)

Motor power (P) ≥ $\frac{(Po) + (Pa)}{1 \sim 2}$

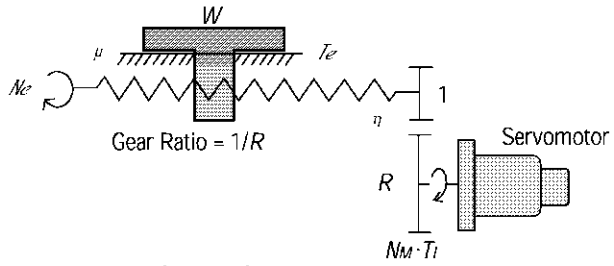
▼

Temporarily selects a motor

▼

(Check)

* Regenerative ability
* Torque RMS



Influence of gear

Motor torque: proportional to the current

$$T = K_\tau \times I_a$$

Motor temperature rise: proportional to square of the current

$$\theta = K \times I^2_a \times R$$

$$\theta = \propto I^2_a \propto T^2$$

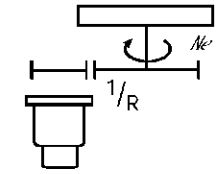
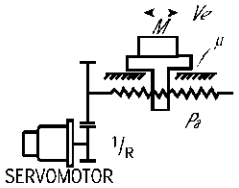
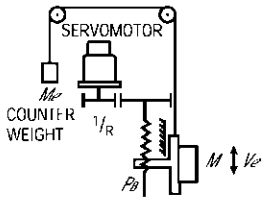
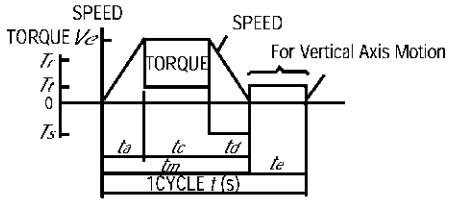
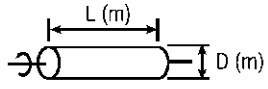
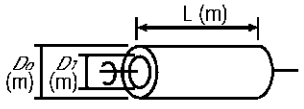
Influence of gear

1. Rotation speed: $N_M = Nt \times R$ (R times the driven motor speed)
2. Torque: $T_L = T\ell \times 1/R$ (1/R of load torque is motorshaft torque)
3. $GD^2 : GD^2_L \times (1/R)^2$ (Motor shaft conversion when load shaft is $1/R^2$)

Relationship between GD^2 and J (moment of inertia)

1. When J is an engineering unit: J (kg • m • s^2)
   $GD^2 = 4 \bullet g \bullet J$ (kg • m^2) g = 9.8 (m • s^{-2})
2. When J is a physical unit: J (kg • m^2)
   $GD^2 = 4 \bullet J$ (kg • m^2)

Formula for Servomotor Output

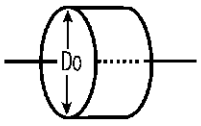
Motion		Rotating Motion	Linear Motion	
			Horizontal Axis	Vertical Axis
Mechanical Configuration				
		Nℓ : Driven Motor Speed (rpm) Vℓ : Load Speed (m/min) Tℓ : Load Torque (N m) μ : Friction Coefficient PB : Ball Screw Lead (m)	M : Weight of Linear Motion Part (kg) Mc : Counter Weight (kg) 1/R : Gear Ratio η : Mechanical Efficiency Tpm : Servomotor Peak Torque (N • m)	
Speed Diagram				
Motion per Cycle (m)		$= \frac{Vl}{60} \bullet \frac{ta + 2tc + td}{2}$ $\left(\text{Where, } t_a = t_d \quad l = \frac{Vl}{60}(t_m - t_a)\right)$		
Driven Motor Speed (r / min)		Nl	$Nl = \frac{(Vl)}{P_B}$	$Nl = \frac{Vl}{P_B}$
Motor Speed (r / min)		$N_M = Nl \bullet R$		
Load Torque (N • m)		$T_L = \frac{Tl}{R \bullet \eta}$	$T_L = \frac{9.8 \times \mu \bullet M \bullet P_B}{2\pi \bullet R \bullet \eta}$	$T_L = \frac{9.8 \times (M - M_C)P_B}{2\pi \bullet R \bullet \eta}$
Load Inertia (kg • m²)		$J_L = J_{L1} + J_{L2} + J_{L3}$		
	Linear Motion	-	$J_{L1} = M \bullet \left(\frac{P_B}{2\pi R}\right)^2$	$J_{L1} = (M + M_C) \bullet \left(\frac{P_B}{2\pi R}\right)^2$
	Rotating Motion	Solid Cylinder:  Hollow Cylinder:  <Inertia for Motor Shaft> Gear Input : $J_{L2} = J_K$	$K = \frac{1}{8}M_K \bullet D^2$ or $J_K = \frac{\pi}{32}\rho \bullet L \bullet D$ M_K : Weight (kg) ρ : Density (kg/m²) .....Iron $\rho = 7.87 \times 10^3$ (kg/m³) .....Aluminum $\rho = 2.70 \times 10^3$ (kg/m³) $J_K = \frac{1}{8}M_K(D_o^2 + D_i^2)$ or $J_K = \frac{\pi}{32}\rho \bullet L(D_o^4 - D_i^4)$ Gear Output : $J_{L3} = \frac{J_K}{R^2}$	

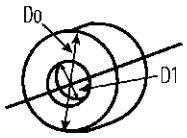
Appendix

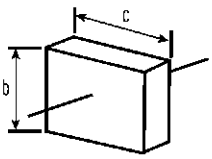
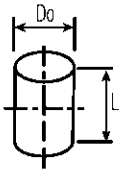
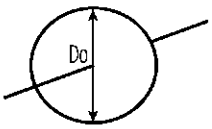
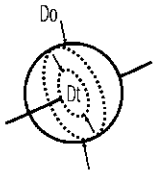
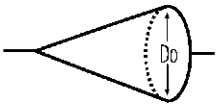
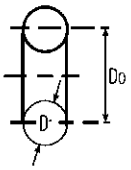
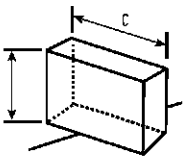
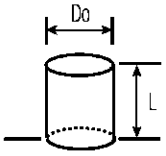
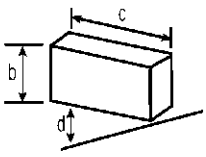
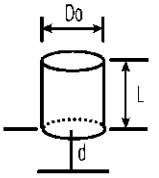
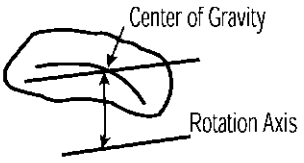
Formula for Servomotor Output

Motion	Rotating Motion	Linear Motion	
		Horizontal Axis	Vertical Axis
Min. Starting Time (s)	$t_{am} = \frac{2\pi \bullet N_M(J_M + J_L)}{60(T_{PM} - T_L)}$		
Min. Braking Time (s)	$t_{dm} = \frac{2\pi \bullet N_M(J_M + J_L)}{60(T_{PM} + T_L)}$		
Running Power (W)	$P_O = \frac{2\pi \bullet N_M \bullet T_L}{60}$		
Accel Power (W)	$P_O = \left(\frac{2\pi}{60} \bullet N_M\right)^2 \frac{J_L}{t_a} \quad (t_a \leq t_m)$		
Required Starting Torque (N • m^2)	$T_P = \frac{2\pi \bullet N_M(J_M + J_L)}{60 \times t_d} + T_L \quad (t_a \leq t_{am})$		
Required Braking Torque (N • m^2)	$T_S = \frac{2\pi \bullet N_M(J_M + J_L)}{60 \times t_d} - T_L \quad (t_a \leq t_{am})$		
Torque RMS (N • m)	$T_{rms} = \sqrt{\frac{T_P^2 \bullet t_a + T_L^2 \bullet t_c + T_S^2 \bullet t_d}{t}}$	$T_{rms} = \sqrt{\frac{T_P \bullet T_L^2(t_c + t_e) + T_S^2 \bullet t_d}{t}}$	

Simple Graphics GD^{2*}

<table>
<tr><td rowspan="2">When rotation axis and center line of cylinder is the same</td><td>Closed cylinder
$(D^2 = D_o^2/2)$
 

or
$GD^2 = 125\pi\rho LD$
ρ : density (g/cm^2) (Steel: 7.866)
L : length (m)
D : diameter (m)</td><td>Open Cylinder
$D^2 = (D_O^2 + D_1^2)/2$
 

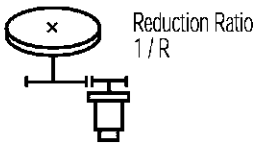
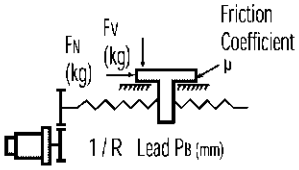
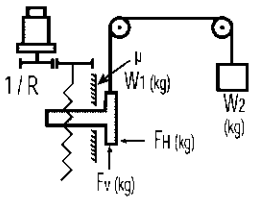
or
$GD^2 = 125\pi\rho L(D_O^4 - D_1^4)$
ρ : density (g/cm^2)
L : length (m)
D_0 D_1: diameter (m)</td></tr>
<tr><td rowspan="3">When rotation axis goes through the center of gravity</td><td>Rectangular parallelpiped
$D^2 = (b^2 + c^2)/3$
 
</td><td>Cylinder
$D^2 = L^2/3 + D_O^2/4$
 
</td></tr>
<tr><td>Ball
$D^2 = \frac{2}{5}D_O^2$
 
</td><td>Open Ball
$D^2 = \frac{2}{5} \cdot \frac{D_O^5 - D_1^3}{D_O^3 - D_1^3}$
 
</td></tr>
<tr><td>Cone
$D^2 = \frac{3}{10}D_O^2$
 
</td><td>Circle
$D^2 = D_O^2 + \frac{3}{4}D_1^2$
 
</td></tr>
<tr><td>When rotation axis is on the edge</td><td>Rectangular parallelpiped
$D^2 = (4b^2 + C^2)/3$
 
</td><td>Cylinder
$D^2 = \frac{4}{3}L^2 + \frac{D_O^2}{4}$
 
</td></tr>
<tr><td>When rotation axis is outside of rotation body</td><td>Rectangular parallelpiped
$D^2 = \frac{4_b^2 + C^2}{3} + 4(bd + d^2)$
 
</td><td>Cylinder
$D^2 = \frac{4}{3}L^2 + \frac{D_O^2}{4} + 4(dL + d^2)$
 
</td></tr>
<tr><td>General formula when rotation axis is outside of rotation body</td><td colspan="2">Rotation diameter general formula
$D_2^2 = D_1^2 + 4_d^2$
D_1 : Rotation diameter when an axis is parallel to the rotation axis and goes through the center of gravity.
 
</td></tr>
</table>

*GD^2 = Gravity x (Rotation diameter)^2

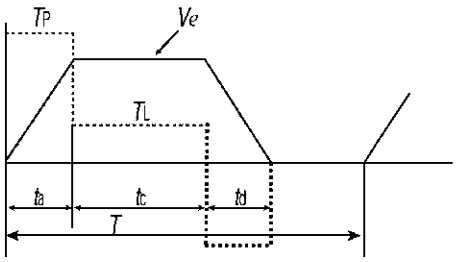
Conventional and SI Unit Conversion Ratio

	Conventional Unit	SI Unit	Conversion Ratio
Power / Load	kgf	N	1kgf = 9.80665N
Weight	kgf	-	The value of Weight by conventional unit and Mass by SI unit are qual. (Mass Wkgf by conventional unit is equal to Mass Wkg by SI unit)
Mass	kgf • s^2/m	kg	
Torque	kgf • m	N • m	1gf • m = 9.800665N • m
Moment of Inertia	gf • cm • s^2	kg • m^2	1kgf • cm • s^2 = 0.980665 x 10^{-4}kg • m^2
GD^2	kgf • m^2		Relation between GD^2 (kgf m^2) and inertia J (kg m^2): $J = GD^2/4$

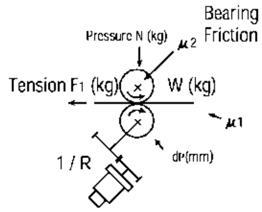
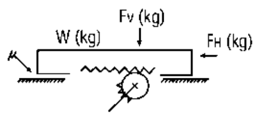
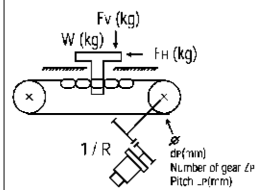
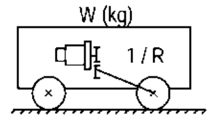
Application Examples

Mechanical Configuration	Body of Rotation	Ball Screw (Horizontal)	Ball Screw (Vertical)
			
① Driven Motor Speed N*l* (rpm)	Nl	$\frac{1000 \times Vl}{P_B}$ V*l* = Load Speed (m/min)	$\frac{1000 \times Vl}{P_B}$ V*l* = Load Speed (m/min)
② Speed of Motor Shaft Conversion N_M (rpm)	$R \times Nl$	$R \times Nl$	$R \times Nl$
③ Linear Motion GD^2 ($kg \cdot m^2$) Load Axis Conversion GD^2l	x	$W \cdot \left(\frac{P_B}{1000\pi}\right)^2$	$W \cdot \left(\frac{P_B}{1000\pi}\right)^2$
Motor Axis Conversion GD^2_L	x	$GD^2 \times \left(\frac{1}{R}\right)^2$ $\left[\text{or } W \cdot \left(\frac{Vl}{\pi \cdot N_M}\right)^2\right]$	$GD^2 \times \left(\frac{1}{R}\right)^2$ $\left[\text{or } W \cdot \left(\frac{Vl}{\pi \cdot N_M}\right)^2\right]$ $[w = w_1 + w_2]$
④ Load Torque (kg • m) Load Axis Conversion T*l*	Tl	$\{\mu \cdot (W + F_V) + F_H\} \cdot \frac{P_B}{2000\pi}$	$\{\mu F_H + W_1 - W_2 + F_V\} \cdot \frac{P_B}{2000\pi}$
Motor Axis Conversion T_L	$Tl \times \frac{1}{R} \times \frac{1}{\eta}$	$Tl \times \frac{1}{R} \times \frac{1}{\eta}$ $\left[\text{or } \frac{\{\mu \cdot (W + F_V) + F_H\} \cdot Vl}{2\pi \cdot N_M \cdot \eta}\right]$ η = Mechanical Efficiency	$Tl \times \frac{1}{R} \times \frac{1}{\eta}$ $\left[\text{or } \frac{\{\mu F_H + W_1 + W_2 + F_V\} \cdot Vl}{2\pi \cdot N_M \cdot \eta}\right]$ η = Mechanical Efficiency
⑤ Load Running Power P_0 (kW)	$\frac{Tl \cdot Nl}{973 \times \eta}$	$\frac{\{\mu \cdot (W + F_V) + F_H\} \cdot Vl}{6120 \times \eta}$	$\frac{\{\mu F_H + W_1 - W_2 + F_V\} \cdot Vl}{6120 \times \eta}$

Application Examples

	Body of Rotation	Ball Screw (Horizontal)	Ball Screw (Vertical)
⑥ Load Accel Power	$\frac{GD^2/ \cdot N/^2}{365 \times 10^3 \times t_a}$ t_a = Accel Time (s)	$\frac{GD^2/ \cdot N/^2}{365 \times 10^3 \times t_a}$ t_a = Accel Time (s)	$\frac{GD^2/ \cdot N/^2}{365 \times 10^3 \times t_a}$ t_a = Accel Time (s)
⑦ Starting Torque T_P (kg • m) Decel Torque T_S (kg • m) Torque RMS Trms (kg • m)			
Remarks		* Gear backlash problem * Application not requiring high speed • Small motor but large torque	* Sliding down by $W_1 \neq W_2$ * Brake-ON timing

Application Examples

	Roll Feed	Rack & Pinion	Chain, Timing Belt	Truck
Mechanical Configuration				 C: Travel Resistance (kg/t)
① Driven Motor Speed Nl (rpm)	$\frac{1000 \times Vl}{P_B}$ $[P_B = \pi \cdot d_P]$ $V\ell$ = Load Speed (m/min)	$\frac{1000 \times Vl}{P_B}$ $[P_B = \pi \cdot d_P$ or $P_B = Z_P \cdot L_P]$ $V\ell$ = Load Speed (m/min)	$\frac{1000 \times Vl}{P_B}$ $[P_B = \pi \cdot d_P$ or $P_B = Z_P \cdot L_P]$ $V\ell$ = Load Speed (m/min)	$\frac{1000 \times Vl}{P_B}$ $[P_B = \pi \cdot d_P]$ $V\ell$ = Load Speed (m/min)
② Speed of Motor Shaft Conversion N_M (rpm)	$R \times Nl$	$R \times Nl$	$R \times Nl$	$R \times Nl$
③ Linear Motion GD^2 ($kg \cdot m^2$) Load Axis Conversion $GD^2 l$	$W \cdot \left(\frac{d_P}{1000}\right)^2$	$W \cdot \left(\frac{d_P}{1000}\right)^2$	$W \cdot \left(\frac{d_P}{1000}\right)^2$	$W \cdot \left(\frac{d_P}{1000}\right)^2$
Motor Axis Conversion GD^2_L	$GD^2 \times \left(\frac{1}{R}\right)^2$ $\left[\text{or } W \cdot \left(\frac{Vl}{\pi \cdot N_M}\right)^2\right]$	$GD^2 \times \left(\frac{1}{R}\right)^2$ $\left[\text{or } W \cdot \left(\frac{Vl}{\pi \cdot N_M}\right)^2\right]$	$GD^2 \times \left(\frac{1}{R}\right)^2$ $\left[\text{or } W \cdot \left(\frac{Vl}{\pi \cdot N_M}\right)^2\right]$	$GD^2 \times \left(\frac{1}{R}\right)^2$ $\left[\text{or } W \cdot \left(\frac{Vl}{\pi \cdot N_M}\right)^2\right]$
④ Load Torque ($kg \cdot m$) Load Axis Conversion Tl	$(F_1 + \mu_1 W + \mu_2 N) \cdot \frac{d_P}{2000}$	$\{\mu(W + F_V) + F_H\} \cdot \frac{d_P}{2000}$	$\{\mu(W + F_V) + F_H\} \cdot \frac{d_P}{2000}$	$C \cdot W \frac{d_P}{2 \times 10^6}$
Motor Axis Conversion T_L	$Tl \times \frac{1}{R} \times \frac{1}{\eta}$ η = Mechanical Efficiency $\left[\text{or } \frac{(F_1 + \mu_1 W + \mu_2 N) \cdot Vl}{2\pi \cdot N_M \cdot \eta}\right]$	$Tl \times \frac{1}{R} \times \frac{1}{\eta}$ η = Mechanical Efficiency $\left[\text{or } \frac{\{\mu(W + F_V) + F_H\} \cdot Vl}{2\pi \cdot N_M \cdot \eta}\right]$	$Tl \times \frac{1}{R} \times \frac{1}{\eta}$ η = Mechanical Efficiency $\left[\text{or } \frac{\{\mu(W + F_V) + F_H\} \cdot Vl}{2\pi \cdot N_M \cdot \eta}\right]$	$Tl \times \frac{1}{R} \times \frac{1}{\eta}$ η = Mechanical Efficiency $\left[\text{or } \frac{C \cdot W \cdot Vl}{2 \times 10^3 \times \pi \times N_M \cdot \eta}\right]$
⑤ Load Running Power P_o (kW)	$\frac{(F_1 + \mu_1 W + \mu_2 N) \cdot Vl}{6120 \times \eta}$	$\frac{\{\mu(W + F_V) + F_H\} \cdot Vl}{6120 \times \eta}$	$\frac{\{\mu(W + F_V) + F_H\} \cdot Vl}{6120 \times \eta}$	$\frac{C \cdot W \cdot Vl}{6120 \times 10^3 \times \eta}$

Application Examples

	Roll Feed	Rack & Pinion	Chain, Timing Belt	Truck
⑥ Load Accel Power	$\frac{GD^2l \bullet Nl^2}{365 \times 10^3 \times t_a}$ t_a = Accel Time (s)	$\frac{GD^2l \bullet Nl^2}{365 \times 10^3 \times t_a}$ t_a = Accel Time (s)	$\frac{GD^2l \bullet Nl^2}{365 \times 10^3 \times t_a}$ t_a = Accel Time (s)	$\frac{GD^2l \bullet Nl^2}{365 \times 10^3 \times t_a}$ t_a = Accel Time (s)
⑦ Starting Torque T_P (kg • m) Decel Torque T_S (kg • m) Torque RMS Trms (kg • m)	$T_P = \frac{(GD_M^2 + GD_L^2) \bullet N_M}{375 \bullet t_a} + T_L$ $T_S = \frac{(GD_M^2 + GD_L^2) \bullet N_M}{375 \bullet t_a} - T_L$		$T_{rms} = \sqrt{\frac{T_P^2 \bullet t_a + T_L^2 \bullet t_c + T_S^2 \bullet t_d}{T}}$ (Ball screw: When load torque is forced while not working.) $\left[T_{rms} = \frac{\sqrt{T_P^2 \bullet t_a + T_L^2 (T - t_a - t_d) + T_S^2 \bullet t_d}}{T}\right]$	
Remarks	• Constant length feeding of coils and seat material. * Roll slip effects accuracy. * Separately installed major link roll; PG is available.	* Used for positioning long traveling distance. * Many separated PGs.	• Positioning for conveyors * Distortion, movement and pitch error problems (not suitable for frequent use). * Radial load due to too much tension on a belt chain.	* Car slip

Servomotor Sizing

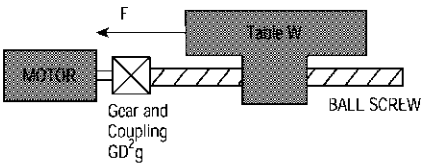
Servomotor sizing software is available for selecting motor capacity. Fill out the machine data table below as an aid to selecting the most appropriate drive system. Consult your YASKAWA representative for sizing software.

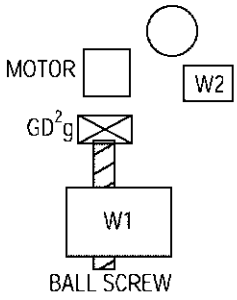
MECHANICAL SPECIFICATIONS

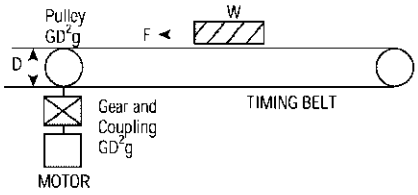
Fill in the following according to the drive method. The optimal servomotor can be selected using the data. For details, contact your YASKAWA representative.

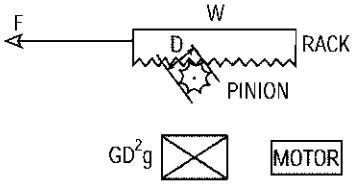
Load Data

① Ball Screw Horizontal Axis				
Load weight	W	—	kg (1d)	
Thrust	F	—	kg (1d)	
Friction coefficiency	μ	—		
Mechanical efficiency	η	—		
Reduction ratio R	(= Nm/Nℓ)	—		
Gear + coupling	GD^2g	—	kg • cm^2	
Ball screw pitch	P	—	mm	
Ball screw diameter	D	—	mm	
Ball screw length	L	—	mm	
② Ball Screw Vertical Axis				
Load weight	W_1	—	kg (lb)	
Counterweight	W_2	—	kg (lb)	
Friction coefficiency	μ	—		
Mechanical efficiency	η	—		
Reduction ratio R	(= Nm/Nℓ)	—		
Gear + coupling	GD^2g	—	kg • cm^2 (lb • in^2)	
Ball screw pitch	P	—	mm	
Ball screw diameter	D	—	mm	
Ball screw length	L	—	mm	
③ Timing Belt				
Load weight	W	—	kg (lb)	
Thrust	F	—	kg (lb)	
Friction coefficiency	μ	—		
Mechanical efficiency	η	—		
Reduction ratio R	(= Nm/Nℓ)	—		
Gear + coupling	GD^2g	—	kg • cm^2 (lb • in^2)	
Pulley	GD^2d	—	kg • cm^2 (lb • in^2)	
Pulley diameter	D	—	mm (in)	
④ Rack & Pinion	W	—	kg (lb)	
Load weight	W	—	kg (lb)	
Thrust	F	—	kg (lb)	
Friction coefficiency	μ	—		
Mechanical efficiency	η	—		
Reduction ratio R	(= Nm/Nℓ)	—		
Gear + coupling	GD^2g	—	kg • cm^2 (lb • in^2)	
Pinion diameter	D	—	mm (in)	
Pinion thickness	t	—	mm (in)	









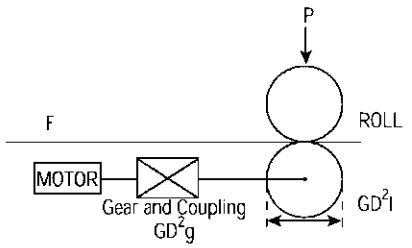
Appendix

Servomotor Sizing

Load Data

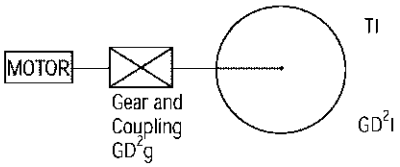
⑤ Roll Feeder

Load GD^2	$GD^2/$	—	kg • cm^2 (lb • in^2)	
Tension	F	—	kg (lb)	
Pressure	P	—	kg (lb)	
Roll diameter	D	—	mm (in)	
Friction coefficiency	μ	—		
Mechanical efficiency	η	—		
Reduction ratio R	(= Nm/N/)	—		
Gear + coupling	GD^2g	—	kg • cm^2 (lb • in^2)	



⑥ Rotor Feeder

Load GD^2	$GD^2/$	—	kg • cm^2 (lb • in^2)	
Load torque	T/	—	kg • cm (lb • in)	
Mechanical efficiency	η	—		
Reduction ratio R	(= Nm/N/)	—		
Gear + coupling	GD^2g	—	kg • cm^2 (lb • in^2)	



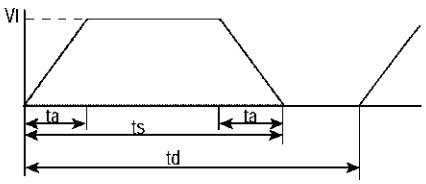
⑦ Others

Load GD^2	$GD^2/$	—	kg • cm^2 (lb • in^2)
Load Torque	T/	—	kg • cm^2 (lb • in)
Motor speed	Nm	—	rpm
DUTY	t_d	—	s
Positioning time	t_s	—	s
Accel/decel time	t_a	—	s

Driving Pattern

• Duty Cycle

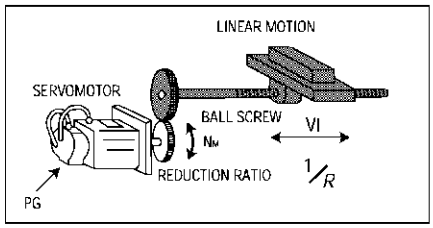
DUTY	t_d	—	s	
Positioning distance	L_s	—	mm (in)	
Speed	V/	—	m/min	
Positioning time	t_s	—	s	
Accel/decel time	t_a	—	s	



Note: Fill in either V/ or t_s. If both are filled in, specify the prior one.

Position Control Selection <Detection Unit • Loop Gain>

(1) Position Detection Unit



$$A = \frac{1000 \bullet P_B}{F_{PG} \bullet R \bullet kK} \text{ (mm/pulse)}$$

P_B : Ball screw lead (m)

F_{PG} : Number of PG pulses (P/R)

k : Dividing ratio of PG feedback pulse

K : Multiplier of PG feedback pulses

(2) Reference Pulse Frequency (V_S)

$$V_S = \frac{1000 \bullet Vl}{60 \bullet A} \text{(pps)} \leq \text{Max. reference pulse frequency of Servo Amplifier}$$

Vl : Load speed (m/min)

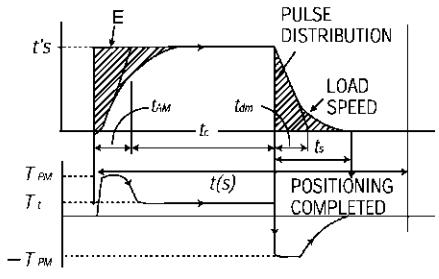
(3) PG Feedback Pulse Frequency (V_{FB})

$$V_{FB} = \frac{N_M \times F_{PG}}{60} \text{ (pps)} \leq \text{Max. PG feedback pulse frequency of Servo Amplifier}$$

N_M = Motor speed (r/min)

(4) Position Loop Gain (K_P), Error Counter Lag Pulses (ε), Setting Time (t_s), Torque RMS (T_{rms})

① Step Input of Reference Pulses



$$K_P \cong \frac{1.4}{t_{am}}\left(\frac{1}{s}\right)$$

t_{am} : Min. starting time

$$\varepsilon = \frac{V_S}{K_P} \text{ (pulse)}$$

$$t_s \cong \alpha \bullet t_{dm}$$

α = 3 (ε < 1000 pulse)

α = 4 (ε > 1000 pulse)

t_{dm} : Min. braking time

$$T_{rms} = \sqrt{\frac{T_{PM}^2 \bullet t_{am} + T_L^2 \bullet T_{PM}^2 \bullet t_{dm}}{t}} \text{(N • m)}$$

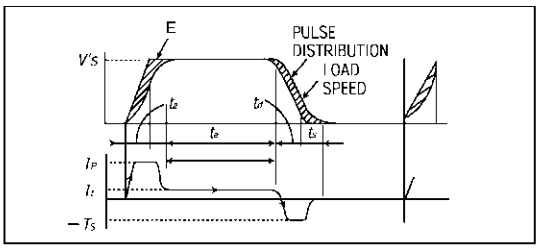
T_{PM} : Servomotor peak torque (N • m)

T_L : Load torque for motor shaft (N • m)

Appendix

Position Control Selection <Detecting Unit • Loop Gain>

② Ramp Input of Reference Pulses



$$K_P \cong 30\left(\frac{1}{s}\right)$$
$$t_s \cong 0.10 \text{ to } 0.15 \text{ (s)}$$
} In use of AC servomotor

$$\varepsilon = \frac{V_s}{K_P} \text{ (Pulse)}$$

$$T_{rms} = \sqrt{\frac{T_P^2 \bullet t_a + T_L^2 \bullet t_c + T_S^2 \bullet t_d}{t}} \text{ (N • m)}$$

T_P : Required starting torque (N • m)

T_S : Required braking torque (N • m)

t_a : Starting time (s) $t_a \geq t_{am}$

t_d : Braking time (s) $t_d \geq t_{dm}$

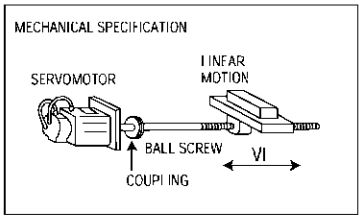
N_M : Motor speed (r/min)

N_R : Servomotor rated speed (r/min)

(5) Electrical Stopping Accuracy (± Δ ε)

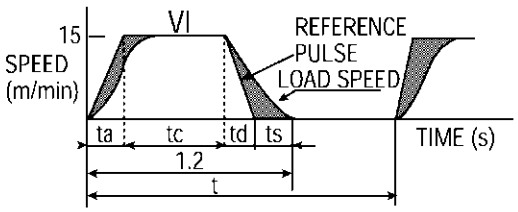
$$\pm\Delta\varepsilon = \pm \frac{\varepsilon}{\text{(Servo Amplifier Speed Control Range)} \times \frac{N_M}{N_R}} \text{ (pulse)}$$

Servomotor Selection



- Load Speed : Vl = 15m/min
- Linear Motion Weight : M = 80kg
- Ball Screw Length : L_B = 0.8m
- Ball Screw Diameter : D_B = 0.016m
- Ball Screw Load : P_B = 0.005m
- Coupling Weight : M_C = 0.3kg
- Coupling Outer Diameter : D_C = 0.03m
- Number of Positionings : n = 40/min
- Motion Stroke : l = 0.25m
- Positioning Time : t_m = 1.2s or less
- Electrical Stopping Accuracy : δ = ±0.01mm
- Friction Coefficient : μ = 0.2
- Mechanical Efficiency : η = 0.9 (90%)

(1) Speed Diagram



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

Where $t_a = t_d$, t_s = 0.1 (s)

$$t_a = t_m - t_s - \frac{60l}{Vl} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1\ (s)$$

$$t_c = 1.2 - 0.1 - 0.1 \times 2 = 0.9\ (s)$$

(2) Speed

- Driven Motor Speed

$$Nl = \frac{Vl}{P_B} = \frac{15}{0.005} = 3000\ (r/min)$$

- Motor Speed

Because of direct coupling, reduction ratio: $\frac{1}{R} = \frac{1}{1}$

Therefore, $N_M = Nl \cdot R = 3000 \times 1 = 3000\ (r/min)$

(3) Load Torque

$$T_L = \frac{9.8\mu \cdot M \cdot P_B}{2\pi R \cdot \eta} = \frac{9.8 \times 0.2 \times 80 \times 0.005}{2\pi \times 1 \times 0.9} = 0.139\ (N \cdot m)$$

(4) Load Inertia

- Linear Motion

$$J_{L1} = M\left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.005}{2\pi \times 1}\right)^2 = 0.507 \times 10^{-4}\ (kg \cdot m^2)$$

- Ball Screw

$$J_B = \frac{\pi}{32}\rho \cdot L_B \cdot D_B^2 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 0.8 \times (0.016)^4 = 0.405 \times 10^{-4}\ (kg \cdot m^2)$$

- Coupling

$$J_C = \frac{1}{8} M_C \cdot D_C^2 = \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.338 \times 10^{-4}\ (kg \cdot m^2)$$

- Load Inertia for Motor Shaft

$$J_L = J_{L1} \cdot J_B \cdot J_C = 1.25 \times 10^{-4}\ (kg \cdot m^2)$$

Servomotor Selection

(5) Load Running Power

$$P_O = \frac{2\pi N_M \cdot T_L}{60} = \frac{2\pi \times 3000 \times 0.139}{60} = 43.7\ (\mathrm{W})$$

(6) Load Accel Power

$$P_a = \left(\frac{2\pi}{60} N_M\right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times 3000\right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4\ (\mathrm{W})$$

(7) Temporary Servomotor Selection

Selection Condition
- $T_L \leq$ Motor rated torque
- $P_a + P_o \leq 2 \times$ Motor rated output
- $N_M \leq$ Allowable Load Inertia of Servo Amplifier

From the above condition, the following are temporarily selected:
- Servomotor type SGMP-02A312
- Servo Amplifier type SGDA-02AP (for positioning control)

< Ratings >

- Rated output : 200 (W)
- Rated speed : 3000 (rpm)
- Rated torque : 0.637 (N • m)
- Peak torque : 1.91 (N • m)
- Motor inertia : 0.209×10^{-4} (kg • m^2)
- Allowable load inertia of Servo Amplifier : 3.69×10^{-4} (kg • m^2)
- Number of PG pulses : 2048 (PPR)

Servomotor Selection

(8) Servomotor Checking

(a) Required Starting Torque

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L = \frac{2\pi \times 3000 \times 0.209 + 1.25 \times 10^{-4}}{60 \times 0.1} + 0.139 \cong 0.597(\mathrm{N \cdot m}) < \text{Peak torque} \cdots \text{Available}$$

(b) Required Braking Torque

$$T_L = \frac{2\pi N_M (J_M + J_L)}{60 t_a} - T_L = \frac{2\pi \times 3000 \times (0.209 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139 \cong 0.139(\mathrm{N \cdot m}) < \text{Peak torque} \cdots \text{Available}$$

(c) Torque RMS

$$T_{rms} = \sqrt{\frac{T_P^2 \bullet t_a + T_L^2 \bullet t_c + T_S^2 \bullet t_d}{t}} = \sqrt{\frac{0.597^2 \times 0.1 + 0.139^2 \times 0.9 + 0.319^2 \times 0.1}{1.5}} \cong 0.205(\mathrm{N \cdot m}) < \text{Rated torque} \cdots \text{Available}$$

(9) Dividing Ratio of PG Feedback Pulses

Electrical stopping accuracy $\delta = \pm 0.01$mm. Therefore, the position detection unit $\Delta\ell$ = 0.001mm/pulse. Multiplier of PG feedback pulse K = 1.

$$\frac{P_B}{\Delta l} \times \left(\frac{\mathrm{B}}{\mathrm{A}}\right) = \frac{5}{0.01} \times \left(\frac{\mathrm{B}}{\mathrm{A}}\right) = 2048 \times 4$$

$$k = \frac{\mathrm{B}}{\mathrm{A}} = \frac{2048 \times 4}{500}$$

(10) Reference Pulse Frequency

$$\mathrm{V}_S = \frac{1000 \mathrm{V} l}{60 \times \Delta l} = \frac{1000 \times 15}{60 \times 0.01} = 25,000 \text{ (pps)}$$

(11) Error Counter Lag Pulses

Position loop gain K_P = 30 (1 / s)

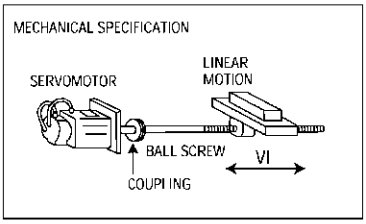
$$\varepsilon = \frac{\mathrm{V}_S}{K_P} = \frac{25,000}{30} = 833 \text{ (pulse)}$$

(12) Electrical Stopping Accuracy

$$\pm\Delta\varepsilon = \pm \frac{\varepsilon}{(\text{Servo Amplifier Speed Control Range}) \times \frac{N_M}{N_R}} = \pm \frac{833}{5000 \times \frac{3000}{3000}} \cong \pm 0.17 < \pm 1 \text{ (pulse)} = \pm 0.01 \text{ (mm)}$$

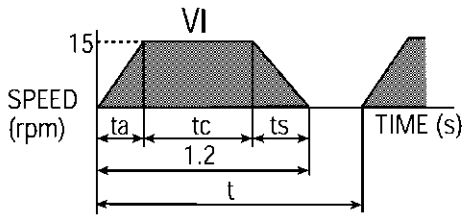
Temporarily selected Servo Amplifier. Servomotor suitable for position control can be used.

Servomotor Selection (Speed Control)



- Load Speed : Vl = 15m/min
- Linear Motion Weight : M = 500kg
- Ball Screw Length : L_B = 1.4m
- Ball Screw Diameter : D_B = 0.04m
- Ball Screw Load : P_B = 0.01m
- Coupling Weight : M_C = 1kg
- Coupling Outer Diameter : D_C = 0.06m
- Number of Feeds : n = 40/min
- Feed Stroke : l = 0.275m
- Positioning Time : t_m = 1.2s or less
- Friction Coefficient : μ = 0.2
- Mechanical Efficiency : η = 0.9 (90%)

(1) Speed Diagram



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

Where $t_a = t_d$

$$t_a = t_m - \frac{60 \times l}{Vl} = 1.2 - \frac{60 \times 0.275}{15} = 0.1\ (s)$$

$$t_c = 1.2 - 0.1 \times 2 = 1.0\ (s)$$

(2) Speed

- Driven Motor Speed

$$Nl = \frac{Vl}{P_B} = \frac{15}{0.01} = 1500\ (r/min)$$

- Motor Speed

Because of direct coupling, reduction ratio: $\frac{1}{R} = \frac{1}{1}$

Therefore, $N_M = Nl \bullet R = 1500 \times 1 = 1500 (r/min)$

(3) Load Torque

$$T_L = \frac{9.8\mu \bullet M \bullet P_B}{2\pi R \bullet \eta} = \frac{9.8 \times 0.2 \times 500 \times 0.01}{2\pi \times 1 \times 0.9} = 1.73\ (N \bullet m)$$

(4) Load Inertia

- Linear Motion

$$J_{L1} = M\left(\frac{P_B}{2\pi R}\right)^2 = 500 \times \left(\frac{0.01}{2\pi \times 1}\right)^2 = 12.7 \times 10^{-4} (kg \cdot m^2)$$

- Ball Screw

$$J_B = \frac{\pi}{32}\rho \bullet L_B \bullet D_B^4 = \frac{\pi}{32} \times 7.87 \times 10^{-3} \times 1.4 \times (0.04)^4 = 27.7 \times 10^{-4} (kg \cdot m^2)$$

- Coupling

$$J_C = \frac{1}{8} M_C \bullet D_C^2 = \frac{1}{8} \times 1 \times (0.06)^2 = 4.5 \times 10^{-4} (kg \cdot m^2)$$

- Load Inertia for Motor Shaft

$$J_L = J_{L1} \bullet J_B \bullet J_C = 44.9 \times 10^{-4} (kg \cdot m^2)$$

Servomotor Selection (Speed Control)

(5) Load Running Power

$$P_O = \frac{2\pi N_M \cdot T_L}{60} = \frac{2\pi \times 1500 \times 1.73}{60} = 272 \text{ (W)}$$

(6) Load Accel Power

$$P_a = \left(\frac{2\pi}{60} N_M\right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times 1500\right)^2 \times \frac{44.9 \times 10^{-4}}{0.1} = 1108 \text{ (W)}$$

(7) Temporary Servomotor Selection

Selection Condition
- $T_L \leq$ Motor rated torque
- $P_a + P_o \leq 2 \times$ Motor rated output
- $N_M \leq$ Motor Rated Speed
- $J_L \leq$ Allowable Load Inertia of Servo Amplifier

From the above condition, the following are temporarily selected:
- Servomotor type SGMG-09A2A
- Servo Amplifier type SGDB-10ADG

< Ratings >

- Rated output : 850 (W)
- Rated speed : 1500 (rpm)
- Rated torque : 5.39 (N • m)
- Peak torque : 13.8 (N • m)
- Motor inertia : 13.9×10^{-4} (kg • m^2)
- Allowable load inertia of Servo Amplifier : 69.58×10^{-4} (kg • m^2)

Servomotor Selection (Speed Control)

(8) Servomotor Checking

(a) Required Starting Torque

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L = \frac{2\pi \times 1500 \times (13.9 + 44.9) \times 10^{-4}}{60 \times 0.1} + 1.73 \cong 11 (\mathrm{N \cdot m}) < \text{Peak torque} \cdots \text{Available}$$

(b) Required Braking Torque

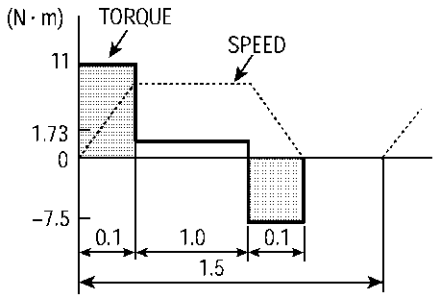
$$T_L = \frac{2\pi N_M (J_M + J_L)}{60 t_d} - T_L = \frac{2\pi \times 1500 \times (13.9 + 44.9) \times 10^{-4}}{60 \times 0.1} - 1.73 \cong 7.5 (\mathrm{N \cdot m}) < \text{Peak torque} \cdots \text{Available}$$

(c) Torque RMS

$$T_{rms} = \sqrt{\frac{T_P^2 \bullet t_a + T_L^2 \bullet t_c + T_S^2 \bullet t_d}{t}} = \sqrt{\frac{(11)^2 \times 0.1 + (1.73)^2 \times 1.0 + (7.5)^2 \times 0.1}{1.5}} \cong 3.72 (\mathrm{N \cdot m}) < \text{Peak torque} \cdots \text{Available}$$

(9) Final Selection of Servomotor

Temporarily selected Servo Amplifier, servomotor suitable for position control can be used.
The graph below is the torque diagram.



Commitment to Quality

The Sigma Series Servo System is a product of Yaskawa's rigorous quality assurance (QA) standards, combining leading edge technology, unsurpassed performance and user friendly application with absolute reliability.

Yaskawa consistently applies quality control (QC) and reliability control (RC) methods across the company's operations, beginning with product planning and design and extending to order entry and after-sale service.

During the production process, Yaskawa assures product quality by utilizing the techniques of statistical quality control (SQC). Because of its outstanding achievements in quality assurance, Yaskawa is the first manufacturer specializing in industrial electronic equipment to win the prestigious Deming Application Award.

Founded in 1915, Yaskawa is a global leader in the research, development and manufacturing of industrial and commercial products.

Today this includes AC servos such as the Sigma Servo System and DC servos, AC inverters, CNC control systems, industrial robots, PLCs, process computers, motors for computer peripherals and AC and DC motors.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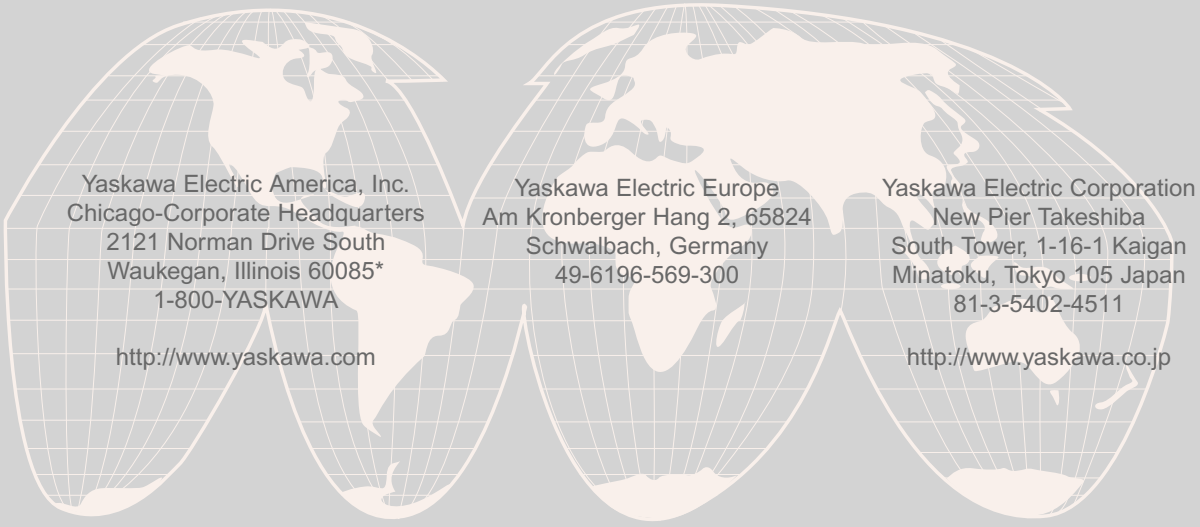

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