

# SANMOTION

SANYO DENKI AMERICA CORE PRODUCTS



MOTION AND CONTROL

5th Edition Rev.3

**SANYO DENKI**

# SANMOTION

SANMOTION stepper and servo systems are continuously improved for exceptional performance and reliability, especially in multi-axis synchronous motion control applications. Custom engineering services are available to reduce the time to market for life enhancing equipment in an array of manufacturing industries.

## SANMOTION R

AC SERVO SYSTEMS

With highly sophisticated control, this model offers a reduction in position settling time and advanced safety functions.

*2.4W to 5 kW*

### MOTOR SIZE

14, 20, 40, 60, 80, 86, 130, 220 mm

### INTERFACE

EtherCAT  
Analog/Pulse Input  
Indexer  
Modbus



## SANMOTION Model No. PB

CLOSED LOOP STEPPING SYSTEMS

Hybrid system combining the ease-of-use of stepping motors with the reliability of servo motors.

*0.05 to 6.1 N·m*

### MOTOR SIZE

28, 42, 60, 86 mm

### INTERFACE

EtherCAT  
Pulse Input  
Indexer



## SANMOTION F2

2-PHASE STEPPING SYSTEMS

High torque bipolar stepping motors and High performance microstep drivers.

*0.0065 to 19 N·m*

### MOTOR SIZE

14 mm, NEMA 11, 17, 23, 50 mm, 60 mm, NEMA 34, 42

### INTERFACE

Pulse Input



## SANMOTION C

MOTION CONTROLLER

Equipped with the industry-trusted high-speed fieldbus EtherCAT interface, these models are available in two configurations: a high-performance type (SMC100-A) for controlling robots and a standard type (SMC100-B) that specializes in PTP (Point-to-Point) positioning. They are ideal for applications such as assembly equipment and conveying machines.

### INTERFACE

EtherCAT



## MCE Electrified Monocarrier

MCE actuator is a highly compact and cost-effective alternative to building a linear motion system from multiple, separately-sourced components. Optimally designed for ease and accuracy, MCE Monocarriers are supplied preassembled, pretested, and ready to install.

### MOTOR SIZE

Stepping motor: NEMA 17

Servo motor: 30 W, 100 W, 200 W



## New Models

### SANMOTION R AC SERVO SYSTEMS

#### SANMOTION R 3E Model AC Servo Amplifiers with Built-in Positioning Function

AC servo amplifiers with a built-in positioning function. The lineup comes in a wide variety of capacities and with 100, 200, and 400 V input voltages. These products are ideal for building positioning systems for rotary tables and conveying machines.



#### Compact Cylinder Linear Servo Motor

Compact 20 mm wide cylinder linear servo motor that has industry-leading acceleration and deceleration performance, high thrust, and a compact design. It contributes to shortening equipment cycle times and simplifying system design for semiconductor manufacturing equipment, inspection equipment, and assembly equipment.



### SANMOTION C MOTION CONTROLLER

#### Motion Controllers with High-Speed EtherCAT Fieldbus

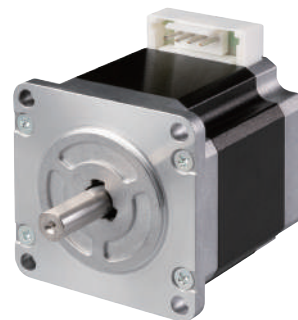
Compact motion controllers featuring high-speed EtherCAT fieldbus. They are available in a high-performance type for controlling robots or a standard type that specializes in PTP (Point-to-Point) positioning. They are suitable for motion control applications such as robots, conveying machines, and semiconductor manufacturing equipment.



### SANMOTION F2 2-PHASE STEPPING SYSTEMS

#### NEMA 23 Stepper Motor

SANMOTION NEMA 23 stepper motors are designed with high torque, low noise, and energy savings efficient machine performance. Torque performance is improved in all speed ranges, and it is more than 40% higher in the speed range that is most frequently used.



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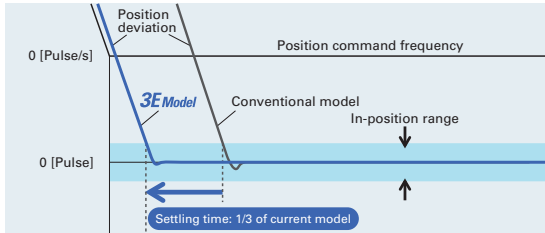
# SANMOTION R

AC SERVO SYSTEMS



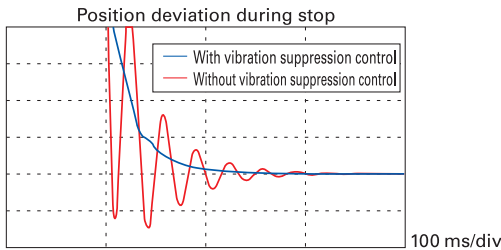
## High Response

The 3E Model has a speed frequency response of 2.2 kHz, approximately twice that of our conventional product. Additionally, the position settling time has been shortened to 1/3 of the original time.



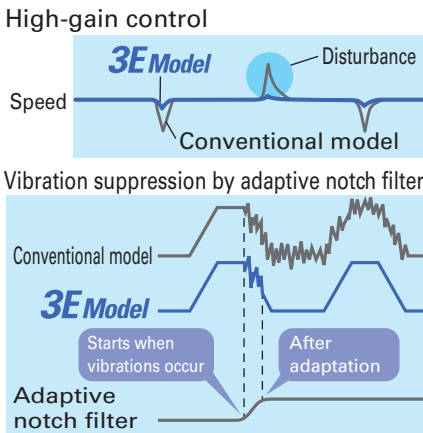
## Vibration Suppression Control

Feed forward vibration suppression control eliminates the typical vibrations seen at stationary positions in a servo system. This noise suppression is easily reduced by using simple on-board tuning procedures.



## Improved Control Accuracy

The 3E Model is equipped with a gain increase function, a function for suppressing micro-vibrations at settling time, an adaptive notch filter for suppressing mechanical resonance, and a feed-forward vibration control function.



## EtherCAT Model

- Model-based Following Control
- Auto Tuning
- Vibration Suppression Control
- Disturbance Suppression
- Homing Mode
- Position Mode (PP, CSV, IP)
- Velocity Mode (PV, CSV)
- Torque Mode (TQ, CST)
- Safety Function



## Indexer Model

- Auto Tuning
- Vibration Suppression Control
- Disturbance Suppression
- Point data: Max. 254 points
- Position Command Range:  $\pm 31$  bit
- Homing Function
- Point Loop/Conditional Jump
- Jogging Function



## Analog/Pulse Input Model

- Model-based Following Control
- Auto Tuning
- Vibration Suppression Control
- Disturbance Suppression
- Position command
- Pulse Input Frequency: Max. 5M Hz
- Velocity Command\*
- Analog Voltage: Max.  $\pm 12V$
- Preset Command: 3 points
- Torque Command\*
- Analog Voltage: Max.  $\pm 12V$
- \*AC input type only



# Lineup

## R2 Servo Motors - Small Capacity, Medium Inertia

Rated Power	Flange Size mm inch	Rated Torque N·m lb·in	Peak Torque at Stall N·m lb·in	Speed min <sup>-1</sup>	Model	Servo Amplifier Interface								Page		
						EtherCAT				Indexer		Modbus			Analog / Pulse	
						200 VAC	100 VAC	48 VDC	24 VDC	200 VAC	100 VAC	200 VAC	100 VAC		200 VAC	48 VDC
2.4 W	14	0.023	0.06	Max. 1500	R2GAD102RM			■								9
	0.55	0.204	0.53	Rated 1000												
20 W	20	0.064	0.23	Max. 6000	R2GA02D20F			■								10
	0.79	0.57	2.04	Rated 3000	R2FA02D20D				■							
		0.064	0.18	1.59	Rated 3000	R2GA02D30F			■							
30 W	20	0.095	0.38	Max. 6000	R2GA02D30F			■								11
		0.84	3.4	Rated 3000	R2FA02D30H				■							
	0.79	0.095	0.38	Max. 3000	R2FA02D30H				■							
		0.84	3.4	Rated 3000	R2AA04003F	■				■		■		■		
	40	0.098	0.37	Max. 6000	R2EA04003F		■				■				■	
		0.87	3.3	Rated 3000	R2GA04003F			■							■	
1.57	0.098	0.24	Max. 6000	R2GA04003F												
	0.87	2.1	Rated 3000	R2FA04003F				■								
50 W	40	0.098	0.33	Max. 6000	R2AA04005F	■				■		■				13
		0.87	2.9	Rated 3000	R2EA04005F		■				■				■	
	1.57	0.159	0.54	Max. 6000	R2GA04005F			■							■	
		1.41	5.2	Rated 3000	R2FA04005D				■							
	40	0.159	0.40	Max. 4500	R2FA04005D				■							
		1.41	3.5	Rated 3000	R2EA04008F		■				■		■			
1.57	0.255	0.86	Max. 6000	R2EA04008F												
	2.27	7.6	Rated 3000	R2GA04008D			■							■		
2.27	0.255	0.86	Max. 5000	R2GA04008D												
	7.6	Rated 3000	R2AA04010F	■				■		■			■			
100 W (90 W)	40	0.318	1.18	Max. 6000	R2AA04010F	■				■		■		■	15	
1.57	2.81	10.4	Rated 3000	R2FA06007R				■							16	
	60	0.318	0.84	Max. 2500	R2FA06007R				■							
2.36	2.81	7.43	Rated 2100	R2AA06010F	■				■		■		■			
	0.318	1.13	Max. 6000	R2EA06010F		■				■		■				
100 W	60	0.318	1	Max. 6000	R2EA06010F		■				■		■		17	
		2.81	8.8	Rated 3000	R2GA06010D			■						■		
	2.36	0.318	0.84	Max. 5000	R2GA06010D			■						■		
200 W	60	0.637	2.2	Max. 6000	R2AA06020F	■				■		■		■	18	
		5.64	19.5	Rated 3000	R2EA06020F		■				■		■			
	2.36	0.637	1.5	Max. 4500	R2GA06020D			■						■		
5.64	1.27	4.8	Max. 6000	R2GA06020D												
	42	Rated 3000	R2AA06040FX	■				■		■		■				
400 W (360 W)	60	11.2	42	Max. 6000	R2AA06040FX	■				■		■		■	19	
		2.36	1.15	4.8	Max. 6000	R2AA06040FC	■				■		■			
750 W	80	2.39	8.5	Max. 6000	R2AA06040FC	■				■		■		■	20	
		21.2	75	Rated 3000	R2AA08075F	■				■		■		■		
1 kW	86	3.18	11.6	Max. 6000	R2AA08075F	■				■		■		■	21	
3.39	28.1	102.7	Rated 300	R2AAB8100H	■				■		■		■			

## R2 Servo Motors - Medium Capacity, Medium Inertia

Rated Power	Flange Size mm inch	Rated Torque N·m lb·in	Peak Torque at Stall N·m lb·in	Speed min <sup>-1</sup>	Model	Servo Amplifier Interface								Page		
						EtherCAT				Indexer		Modbus			Analog / Pulse	
						200 VAC	100 VAC	48 VDC	24 VDC	200 VAC	100 VAC	200 VAC	100 VAC		200 VAC	48 VDC
0.55 kW	130	2.6	7	Max. 5000	R2AA13050D	■				■		■		■		22
	5.12	23	62	Rated 2000												
1.2 kW	130	5.7	16	Max. 5000	R2AA13120D	■				■		■		■		23
	5.12	50	142	Rated 2000												
2 kW	130	9.5	30	Max. 5000	R2AA13200D	■				■		■		■		24
	5.12	84	265	Rated 2000												
5 kW	220	24	75	Max. 4000	R2AA22500L	■				■		■		■		25
	8.67	212	664	Rated 2000												

# AC SERVO SYSTEMS

## Lineup

### R1 Servo Motors - Small Capacity, Low Inertia

Rated Power	Flange Size mm inch	Rated Torque N·m lb·in	Peak Torque at Stall N·m lb·in	Speed min <sup>-1</sup>	Model	Servo Amplifier Interface								Page		
						EtherCAT				Indexer		Modbus			Analog / Pulse	
						200 VAC	100 VAC	48 VDC	24 VDC	200 VAC	100 VAC	200 VAC	100 VAC		200 VAC	48 VDC
100 W	40 1.57	0.318 2.81	1.18 10.4	Max. 6000 Rated 3000	R1AA04010F	■				■		■		■		26
200 W	60 2.36	0.637 5.64	2.2 19.5	Max. 6000 Rated 3000	R1AA06020F	■				■		■		■		27
400 W	60 2.36	1.27 11.2	4.8 42	Max. 6000 Rated 3000	R1AA06040F	■				■		■		■		28
750 W	80 3.15	2.39 21.2	8.5 75	Max. 6000 Rated 3000	R1AA08075V	■				■		■		■		29
					R1AA08075F	■				■		■		■		

### Linear Actuator

Rated Thrust	Motor Size mm inch	Rated Thrust N lb	Peak Thrust N lb	Speed m/s	Model	Servo Amplifier Interface								Page		
						EtherCAT				Indexer		Modbus			Analog / Pulse	
						200 VAC	100 VAC	48 VDC	24 VDC	200 VAC	100 VAC	200 VAC	100 VAC		200 VAC	48 VDC
5.1 N	12 0.47	5.1 1.15	16.5 3.71	Max. 2.0 Rated 1.0	DE0AC001A03CX00			■								30
15 N	20 0.79	15 3.37	50 11.2	Max. 1.4 Rated 0.7	DE0BC005A05CX00			■								31

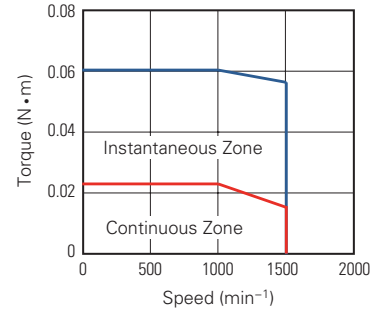


■ Specifications

Power Supply	48 VDC	
Model	R2GAD102RMXH30	
Rated Power	kW	0.0024
Maximum Speed	min <sup>-1</sup>	1500
Rated Speed	min <sup>-1</sup>	1000
Rated Torque	N·m	0.023
	lb·in	0.204
Peak Torque at Stall	N·m	0.06
	lb·in	0.53
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.0023
	lb·in <sup>2</sup>	0.000786
Encoder	17bit serial absolute	
Motor Mass	kg	0.15
	lb	0.33
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 ~ 90% RH, no condensation	

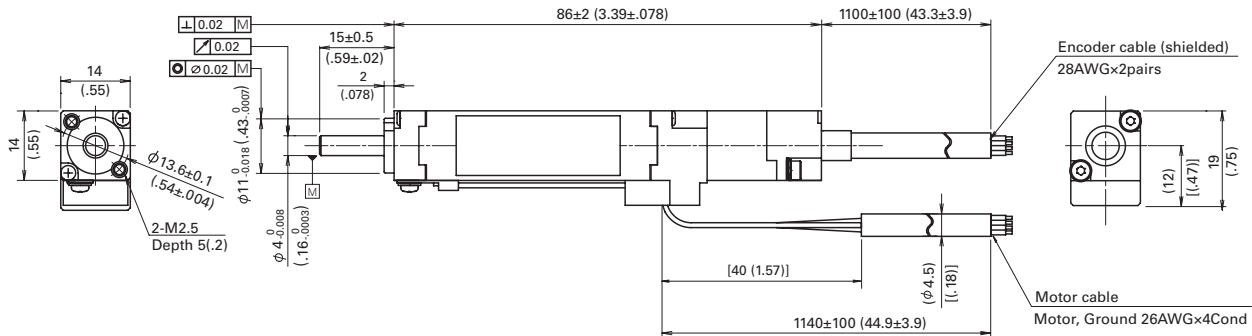
■ Torque Curve

● R2GAD102RM



■ Dimension

Unit: mm (inch)



■ Compatible Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	R2GAD102RMXH30(E01)	RF2J14A0HL5			

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R2** MOTOR

**20W**

MOTOR FLANGE SIZE

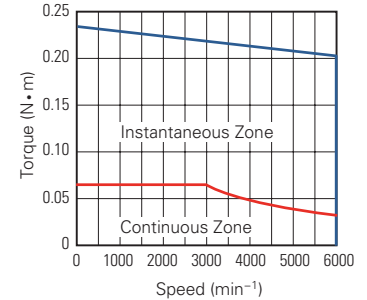
**20 mm (0.79 inch)**

## Specifications

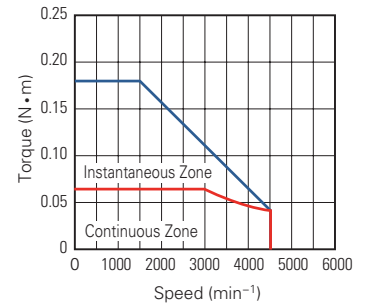
Power Supply		48 VDC	24 VDC
Model		R2GA02D20F	R2FA02D20D
Rated Power	kW	0.02	0.02
Maximum Speed	min <sup>-1</sup>	6000	4500
Rated Speed	min <sup>-1</sup>	3000	3000
Rated Torque	N·m	0.064	0.064
	lb·in	0.57	0.57
Peak Torque at Stall	N·m	0.23	0.18
	lb·in	2.04	1.59
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.0033	0.0033
	lb·in <sup>2</sup>	0.0011	0.0011
Encoder		2000 P/R incremental	13bit serial absolute
Motor Mass	kg	0.14	0.14
	lb	0.31	0.31
Operating Temperature		0 to 40°C (32 to 104°F)	
Humidity		20 ~ 90% RH, no condensation	

## Torque Curve

### R2GA02D20F

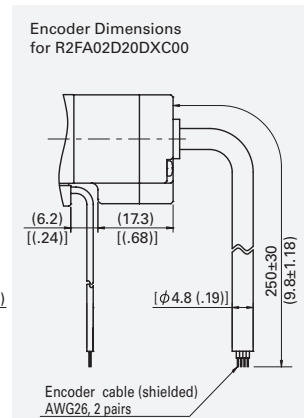
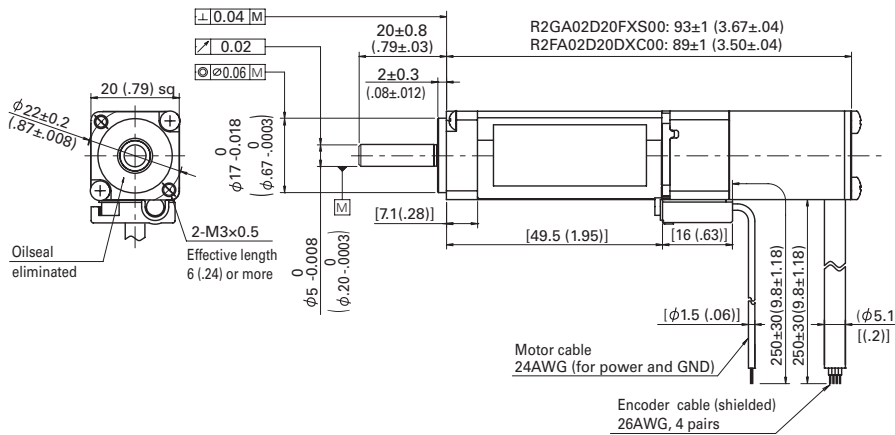


### R2FA02D20D



## Dimension

Unit: mm (inch)



## Compatible Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	R2GA02D20FXS00(E01)	RS2K04AAHA5 RF2J24A8HL5			
24 VDC	R2FA02D20DXC00(E01)	RS2K04A2HA5 RS2K24A0HL5			

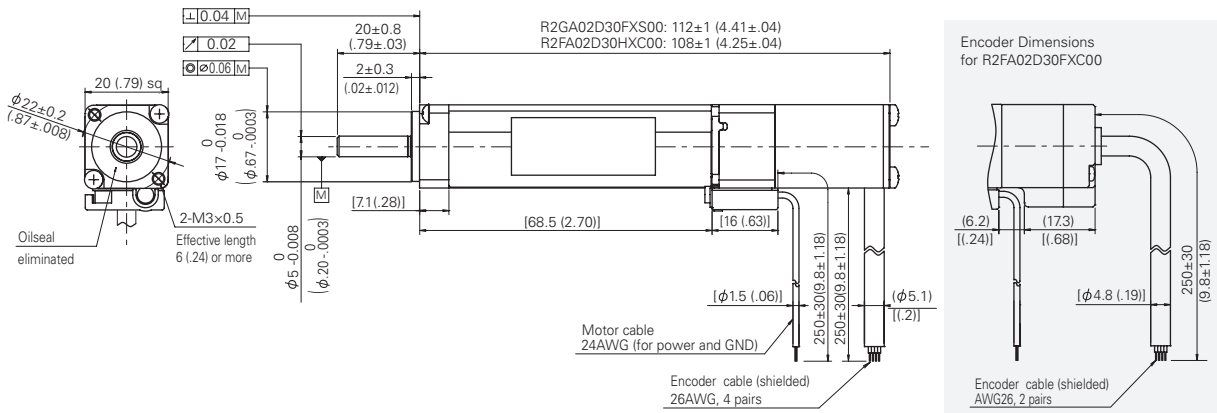
E01: w/ CPC screw lock type connector assembly.

**Specifications**

Power Supply		48 VDC	24 VDC
Model		R2GA02D30F	R2FA02D30H
Rated Power	kW	0.03	0.03
Maximum Speed	min <sup>-1</sup>	6000	3000
Rated Speed	min <sup>-1</sup>	3000	3000
Rated Torque	N·m	0.095	0.095
	lb·in	0.84	0.84
Peak Torque at Stall	N·m	0.38	0.38
	lb·in	3.36	3.36
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.0046	0.0046
	lb·in <sup>2</sup>	0.0016	0.0016
Encoder		2000 P/R incremental	13bit serial absolute
Motor Mass	kg	0.18	0.18
	lb	0.4	0.4
Operating Temperature		0 to 40°C (32 to 104°F)	
Humidity		20 ~ 90% RH, no condensation	

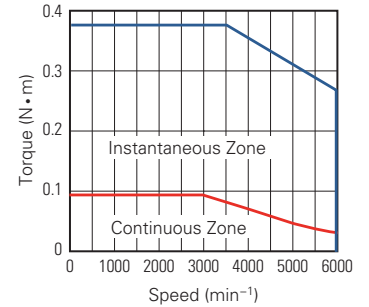
**Dimension**

Unit: mm (inch)

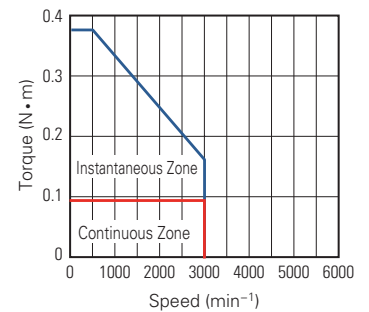


**Torque Curve**

● **R2GA02D30F**



● **R2FA02D30H**



**Compatible Amplifier**

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	R2GA02D30FXS00(E01)	RS2K04AAHA5 RF2J24A8HL5			
24 VDC	R2FA02D30HXC00(E01)	RS2K04A2HA5 RS2K24A0HL5			

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R2** MOTOR

**30 W**

MOTOR FLANGE SIZE

**40 mm (1.57 inch)**

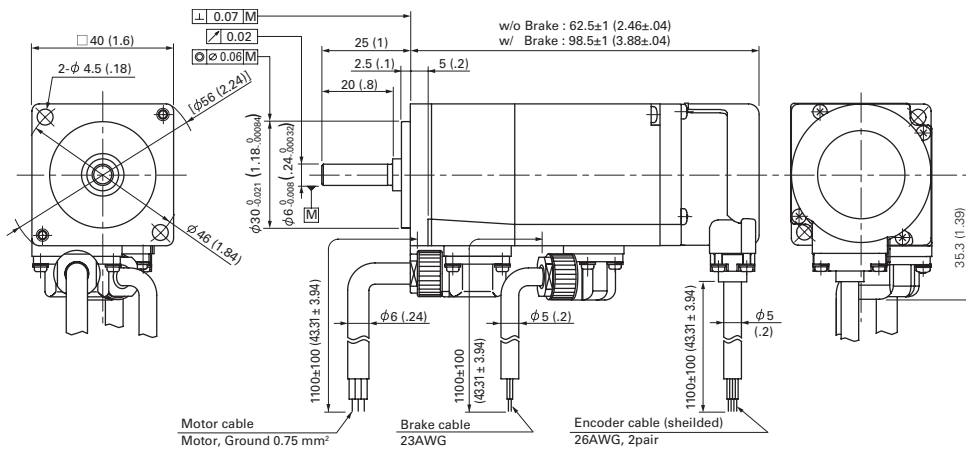
## Specifications



Power Supply		200 VAC	100 VAC	48 VDC	24 VDC
Model		R2AA04003F	R2EA04003F	R2GA04003F	R2FA04003F
Rated Power	kW	0.03	0.03	0.03	0.03
Maximum Speed	min <sup>-1</sup>	6000	6000	6000	6000
Rated Speed	min <sup>-1</sup>	3000	3000	3000	3000
Rated Torque	N·m	0.098	0.098	0.098	0.098
	lb·in	0.87	0.87	0.87	0.87
Peak Torque at Stall	N·m	0.37	0.37	0.37	0.33
	lb·in	3.3	3.3	3.3	2.92
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.028	0.028	0.0247	0.0247
	lb·in <sup>2</sup>	0.0095	0.0095	0.0084	0.0084
Encoder		17 bit serial absolute			
Motor Mass	kg	0.35	0.35	0.35	0.37
	lb	0.78	0.78	0.78	0.82
Operating Temperature		0 to 40°C (32 to 104°F)			
Humidity		20 to 90% RH, no condensation			

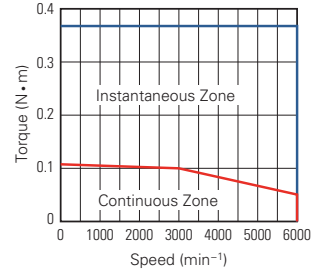
## Dimension

Unit: mm (inch)

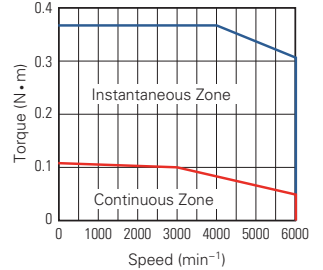


## Torque Curve

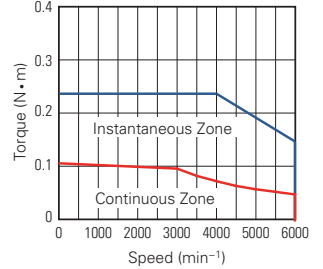
### R2AA04003F



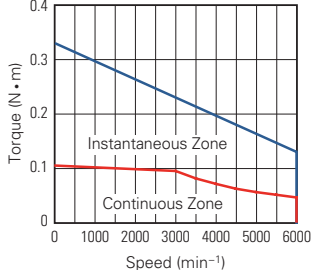
### R2EA04003F



### R2GA04003F



### R2FA04003F



## Compatible Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA04003FXR00M(E01)	RS3A01A2HA4	RS3A01A0CA4	RS3A01A0FA4	RS3A01A0AA4
100 VAC	R2EA04003FXR00M(E01)	RS3E01A2HA4	RS3E01A0CA4	RS3E01A0FA4	
48 VDC	R2GA04003FXR03M(E01)	RS2K04A2HA5 RF2K24A0HL5			RF2G21A0A00
24 VDC	R2FA04003FXR03M(E01)	RS2J04A2HA5			
	R2FA04003FCR03M(E01)	w/Brake RF2K24A0HL5			

E01: w/ CPC screw lock type connector assembly.

**R2** MOTOR**50 W**MOTOR  
FLANGE SIZE**40 mm (1.57 inch)****Specifications**

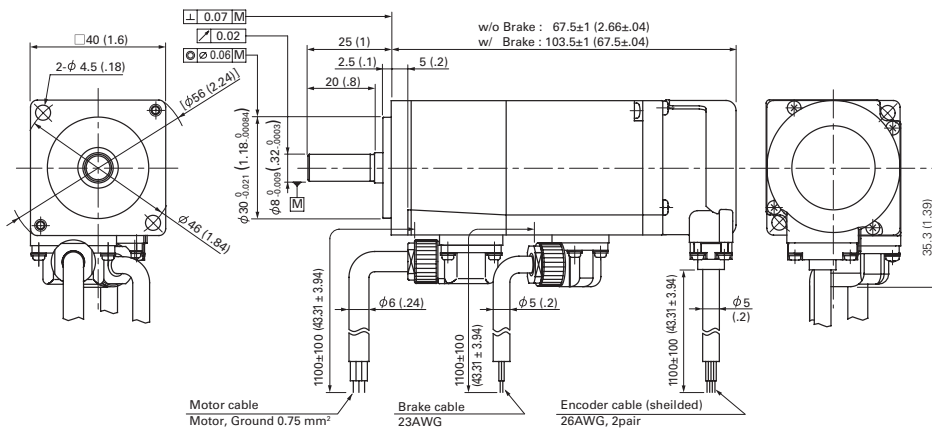
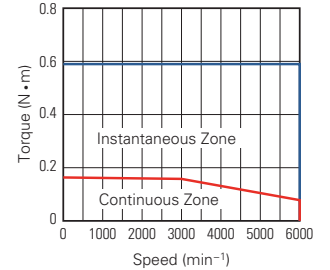
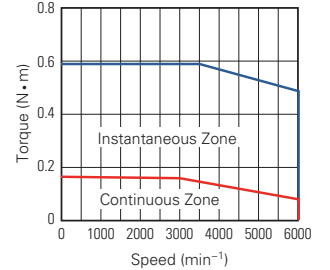
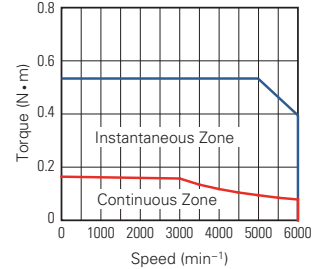
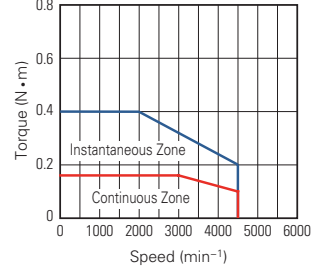
Power Supply		200 VAC	100 VAC	48 VDC	24 VDC
Model		R2AA04005F	R2EA04005F	R2GA04005F	R2FA04005D <sup>*2</sup>
Rated Power	kW	0.05	0.05	0.05	0.05
Maximum Speed	min <sup>-1</sup>	6000	6000	6000	4500
Rated Speed	min <sup>-1</sup>	3000	3000	3000	3000
Rated Torque	N·m	0.159	0.159	0.159	0.159
	lb·in	1.41	1.41	1.41	1.41
Peak Torque at Stall	N·m	0.59	0.59	0.54	0.40
	lb·in	5.22	5.22	4.78	3.54
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.0409	0.0409	0.0376	0.0376
	lb·in <sup>2</sup>	0.0139	0.0139	0.0128	0.0128
Encoder		17bit serial absolute <sup>*1</sup>			
Motor Mass	kg	0.39	0.39	0.39	0.41
	lb	0.87	0.87	0.87	0.90
Operating Temperature		0 to 40°C (32 to 104°F)			
Humidity		20 to 90% RH, no condensation			

\*1 2000 p/r incremental encoder equipped motor is also available for R2AA04005F.

\*2 Brake equipped motor is available. Refer to page 64 for brake specifications.

**Dimension**

Unit: mm (inch)

**Torque Curve****R2AA04005F****R2EA04005F****R2GA04005F****R2FA04005D****Compatible Amplifier**

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA04005FXR00M(E01)	RS3A01A2HA4	RS3A01A0CA4	RS3A01A0FA4	RS3A01A0AA4
100 VAC	R2EA04005FXR00M(E01)	RS3E02A2HA4	RS3E02A0CA4	RS3E02A0FA4	
48 VDC	R2GA04005FXR03M(E01)	RS2K04A2HA5			RF2G21A0A00
24 VDC	R2FA04005DXR03M(E01)	RS2J04A2HA5			
	R2FA04005DCR03M(E01)	w/Brake	RF2K24A0HL5		

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R2** MOTOR

**80 W**

MOTOR FLANGE SIZE

**40 mm (1.57 inch)**

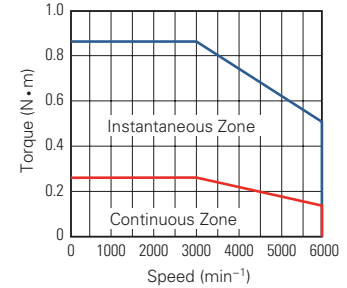
## Specifications



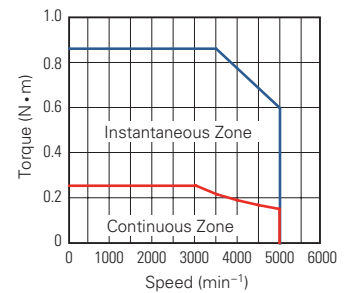
## Torque Curve

Power Supply		100 VAC	48 VDC
Model		R2EA04008F*2	R2GA04008D*2
Rated Power	kW	0.08	0.08
Maximum Speed	min <sup>-1</sup>	6000	5000
Rated Speed	min <sup>-1</sup>	3000	3000
Rated Torque	N·m	0.255	0.255
	lb·in	2.27	2.27
Peak Torque at Stall	N·m	0.86	0.86
	lb·in	7.6	7.6
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.066	0.0627
	lb·in <sup>2</sup>	0.023	0.021
Encoder		17bit serial absolute	
Motor Mass	kg	0.51	0.51
	lb	1.13	1.13
Operating Temperature		0 to 40°C (32 to 104°F)	
Humidity		20 to 90% RH, no condensation	

### R2EA04008F



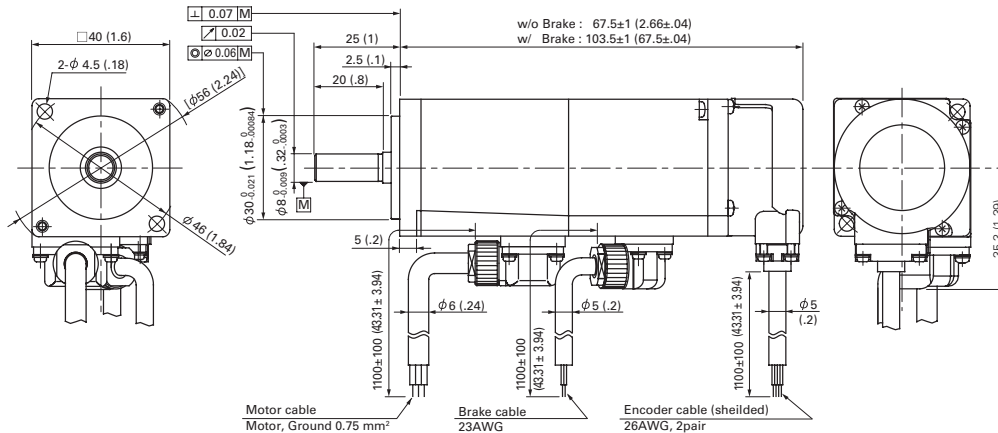
### R2GA04008D



\*2 Brake equipped motor is available. Refer to page 67 for brake specifications.

## Dimension

Unit: mm (inch)



## Compatible Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
100 VAC	R2EA04008FXR00M(E01)	w/ Brake	RS3E02A2HA4	RS3E02A0CA4	RS3E02A0FA4	
	R2EA04008FCR00M(E01)					
48 VDC	R2GA04008DXR03M(E01)	w/ Brake	RS2K04A2HA5			RF2G21A0A00
	R2GA04008DCR03M(E01)					

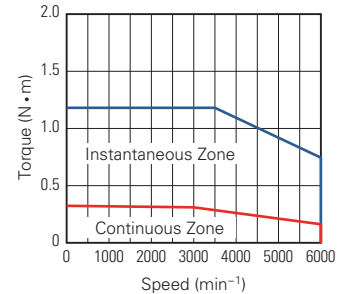
E01: w/ CPC screw lock type connector assembly.

**R2** MOTOR**100 W (90 W)**MOTOR  
FLANGE SIZE**40 mm (1.57 inch)****Specifications**

Power Supply	200 VAC	
Model	R2AA04010F*2	
Rated Power	kW	0.1 (0.09 *2)
Maximum Speed	min <sup>-1</sup>	6000
Rated Speed	min <sup>-1</sup>	3000
Rated Torque	N·m	0.318 (0.286*2)
	lb·in	2.81 (2.04*2)
Peak Torque at Stall	N·m	1.18
	lb·in	10.4
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.066
	lb·in <sup>2</sup>	0.023
Encoder	17bit serial absolute*1	
Motor Mass	kg	0.51
	lb	1.13
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

**Torque Curve**

## ● R2AA04010F

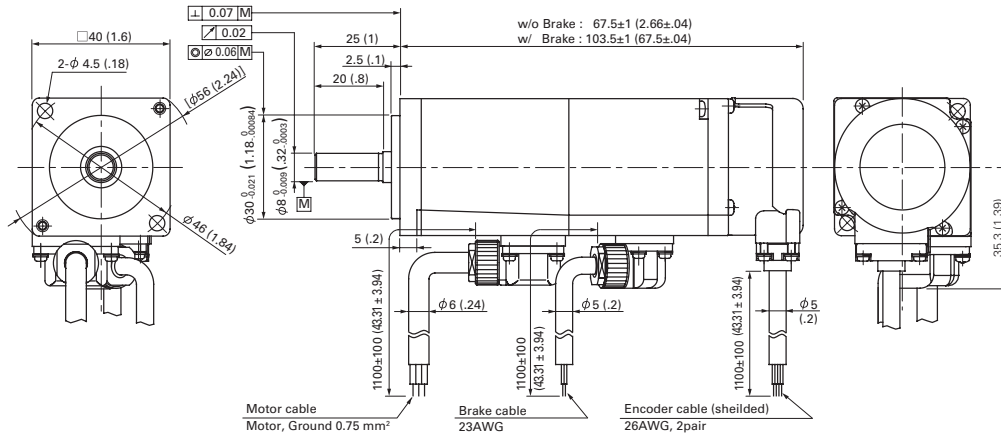


\*1 2000 p/r incremental encoder equipped motor is also available.

\*2 ( ): Specification for brake motor. Refer to page 67 for brake specifications.

**Dimension**

Unit: mm (inch)

**Compatible Amplifier**

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA04010FXR00M(E01)		RS3A01A2HA4	RS3A01A0CA4	RS3A01A0FA4	RS3A01A0AA4
	R2AA04010FCR00M6(E01)	w/ Brake	RS2A01A2HA5			

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R2** MOTOR

**60 W**

MOTOR FLANGE SIZE

**60 mm (2.36 inch)**

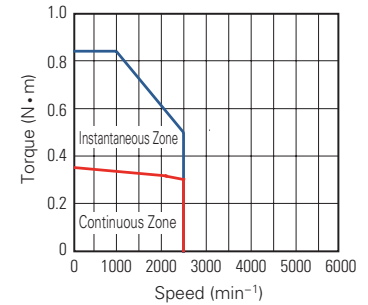
## Specifications



Power Supply	24 VDC	
Model	R2FA06007R <sup>*2</sup>	
Rated Power	kW	0.07
Maximum Speed	min <sup>-1</sup>	2500
Rated Speed	min <sup>-1</sup>	2100
Rated Torque	N·m	0.318
	lb·in	2.81
Peak Torque at Stall	N·m	0.84
	lb·in	7.43
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.117
	lb·in <sup>2</sup>	0.040
Encoder	17bit serial absolute	
Motor Mass	kg	0.74
	lb	1.63
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

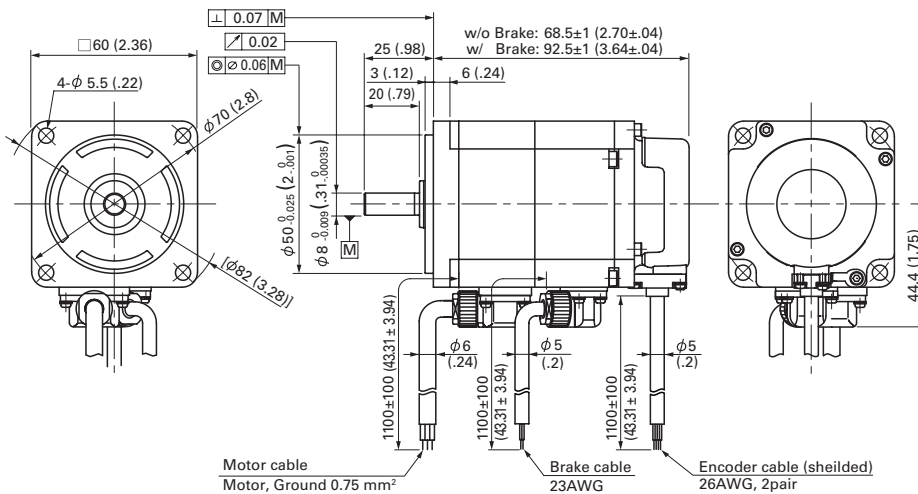
### R2FA06007R



\*2 Brake equipped motor is available. Refer to page 67 for brake specifications.

## Dimension

Unit: mm (inch)



## Compatible Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
24 VDC	R2FA06007RXR03M(E01)		RS2J04A2HA5			
	R2FA06007RCR03M(E01)	w/ Brake	RS2K24A0HL5			

E01: w/ CPC screw lock type connector assembly.



Specifications

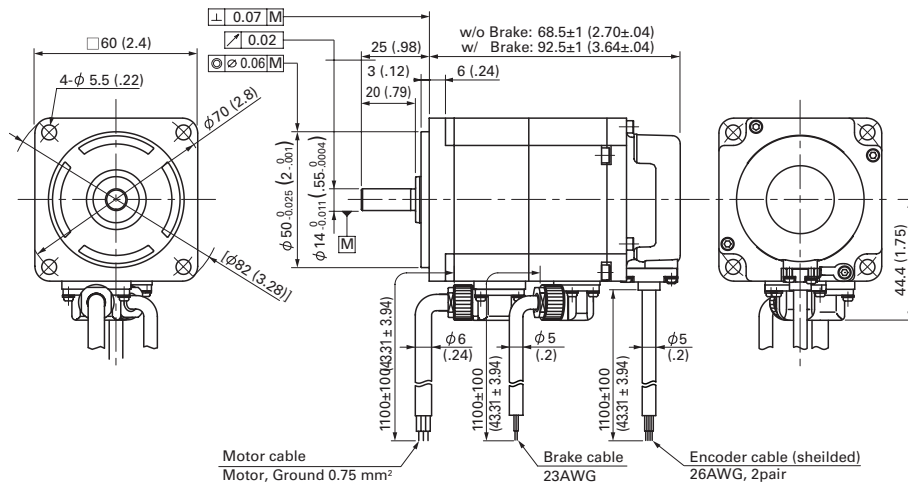


Power Supply		200 VAC	100 VAC	48 VDC
Model		R2AA06010F	R2EA06010F	R2GA06010D
Rated Power	kW	0.1	0.1	0.1
Maximum Speed	min <sup>-1</sup>	6000	6000	5000
Rated Speed	min <sup>-1</sup>	3000	3000	3000
Rated Torque	N·m	0.318	0.318	0.318
	lb·in	2.81	2.81	2.81
Peak Torque at Stall	N·m	1.13	1	0.84
	lb·in	10.0	8.80	7.43
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.1203	0.1203	0.117
	lb·in <sup>2</sup>	0.0409	0.0409	0.0400
Encoder		17bit serial absolute*1		
Motor Mass	kg	0.71	0.71	0.71
	lb	1.58	1.58	1.58
Operating Temperature		0 to 40°C (32 to 104°F)		
Humidity		20% to 90% RH, no condensation		

\*1 2000 p/r incremental encoder equipped motor is also available for R2AA06010F.

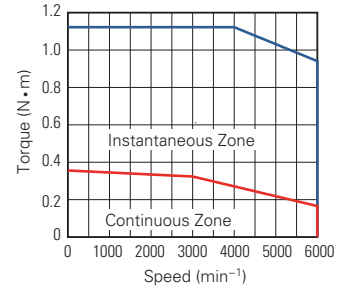
Dimension

Unit: mm (inch)

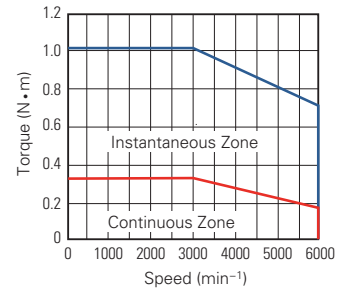


Torque Curve

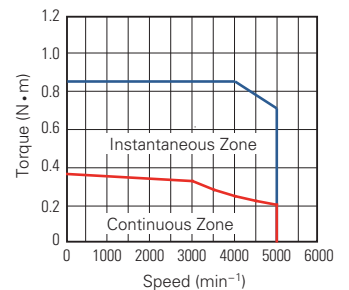
R2AA06010F



R2EA06010F



R2GA06010D



Compatible Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA06010FXR00M(E01)		RS3A01A2HA4	RS3A01A0CA4	RS3A01A0FA4	RS3A01A0AA4
100 VAC	R2EA06010FXR00M(E01)	w/ Brake	RS2E02A0KA4	RS3E02A0CA4	RS3E02A0FA4	
	R2EA06010FCR00M(E01)					
48 VDC	R2GA06010DXR03M(E01)		RS2K04A2HA5			RF2G21A0A00
	R2GA06010DXR03M(E01)					

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R2** MOTOR

**200 W**

MOTOR FLANGE SIZE

**60 mm (2.36 inch)**

## Specifications



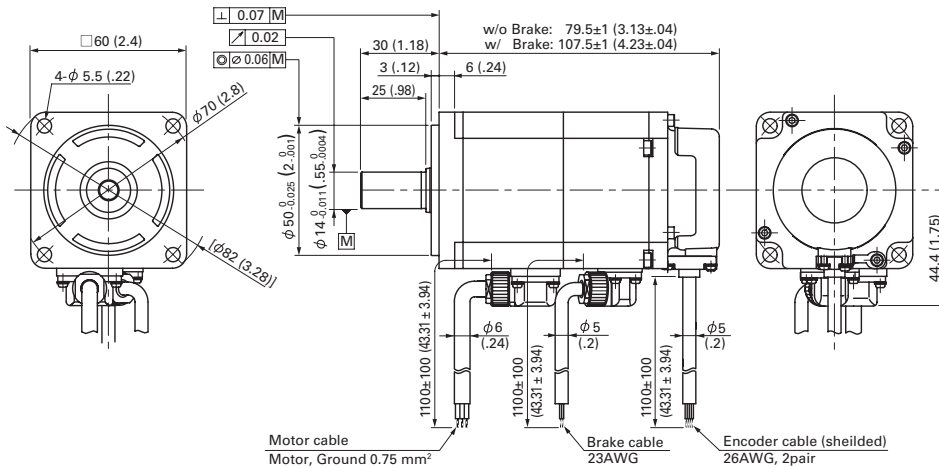
Power Supply		200 VAC	100 VAC	48 VDC
Model		R2AA06020F	R2EA06020F*2	R2GA06020D*2
Rated Power	kW	0.2	0.2	0.2
Maximum Speed	min <sup>-1</sup>	6000	6000	4500
Rated Speed	min <sup>-1</sup>	3000	3000	3000
Rated Torque	N·m	0.637	0.637	0.637
	lb·in	5.64	5.64	5.64
Peak Torque at Stall	N·m	2.2	2.2	1.5
	lb·in	19.5	19.5	13.3
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.2223	0.2223	0.219
	lb·in <sup>2</sup>	0.0756	0.0756	0.0748
Encoder		17bit serial absolute*1		
Motor Mass	kg	0.96	0.96	0.96
	lb	2.13	2.13	2.13
Operating Temperature		0 to 40°C (32 to 104°F)		
Humidity		20% to 90% RH, no condensation		

\*1 2000 p/r incremental encoder equipped motor is also available for R2AA06020F.

\*2 Brake equipped motor is available. Refer to page 67 for brake specifications.

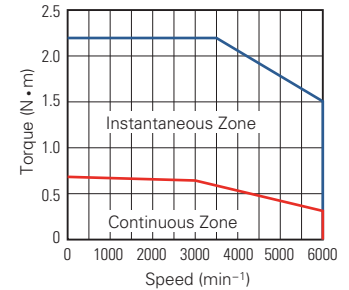
## Dimension

Unit: mm (inch)

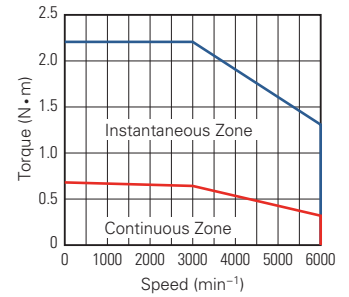


## Torque Curve

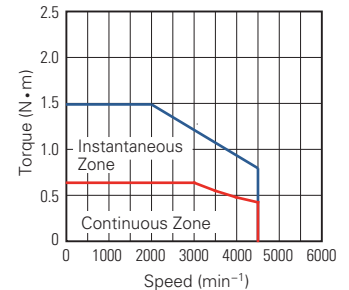
### R2AA06020F



### R2EA06020F



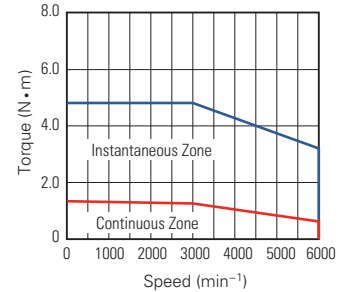
### R2GA06020D



## Compatible Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA06020FXR00M(E01)		RS3A02A2HA4	RS3A02A0CA4	RS3A02A0FA4	RS3A02A0AA4
100 VAC	R2EA06020FXR00M(E01)	w/ Brake	RS2E03A0KA4	RS3E03A0CA4	RS3E03A0FA4	
	R2EA06020FCR00M(E01)					
48 VDC	R2GA06020DXR03M(E01)		RS2K04A2HA5			RF2G21A0A00
	R2GA06020DXR03M(E01)		RF2K24A0HL5			

E01: w/ CPC screw lock type connector assembly.

**R2** MOTOR**400 W (360 W)**MOTOR  
FLANGE SIZE**60 mm (2.36 inch)****Specifications****Torque Curve**● **R2AA06040F**

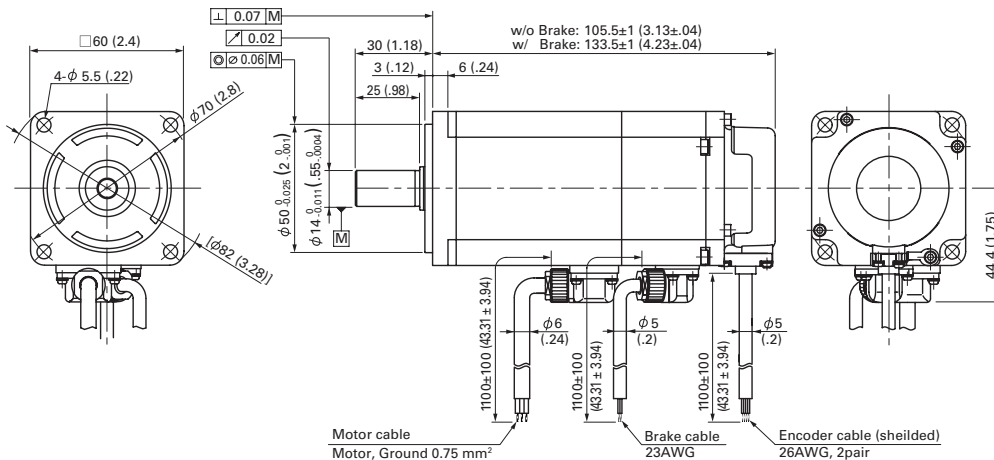
Power Supply	200 VAC	
Model	R2AA06040F	
Rated Power	kW	0.4 (0.36 <sup>*2</sup> )
Maximum Speed	min <sup>-1</sup>	6000
Rated Speed	min <sup>-1</sup>	3000
Rated Torque	N·m	1.27 (1.15 <sup>*2</sup> )
	lb·in	11.2 (10.2 <sup>*2</sup> )
Peak Torque at Stall	N·m	4.8
	lb·in	42
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.4153
	lb·in <sup>2</sup>	0.142
Encoder	17bit serial absolute <sup>*1</sup>	
Motor Mass	kg	1.4
	lb	3.11
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

\*1 2000 p/r incremental encoder equipped motor is also available.

\*2 ( ): Specification for brake motor. Refer to page 67 for other brake specifications.

**Dimension**

Unit: mm (inch)

**Compatible Amplifier**

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA06040FXR00M(E01)		RS3A02A2HA4	RS3A02A0CA4	RS3A02A0FA4	RS3A02A0AA4
	R2AA06040FCR00M6(E01)	w/ Brake				

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R2** MOTOR

**750W**

MOTOR FLANGE SIZE

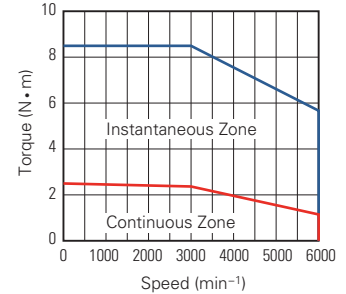
**80 mm (3.15 inch)**

## Specifications



## Torque Curve

### R2AA08075F

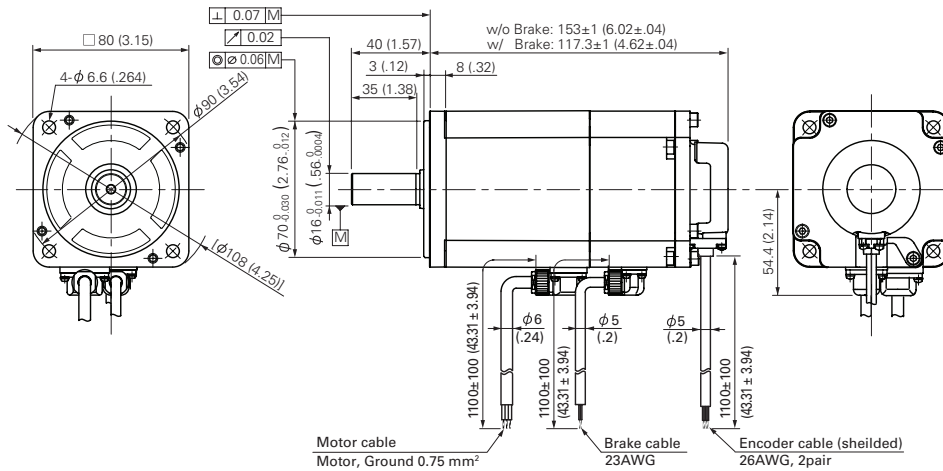


Power Supply	200 VAC	
Model	R2AA08075F	
Rated Power	kW	0.75
Maximum Speed	min <sup>-1</sup>	6000
Rated Speed	min <sup>-1</sup>	3000
Rated Torque	N·m	2.39
	lb·in	21.2
Peak Torque at Stall	N·m	8.5
	lb·in	75
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	1.8233
	lb·in <sup>2</sup>	0.620
Encoder	17bit serial absolute*1	
Motor Mass	kg	2.7
	lb	6
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

\*1 2000 p/r incremental encoder equipped motor is also available.

## Dimension

Unit: mm (inch)



## Compatible Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA08075FXR00M(E01)	w/ Brake	RS3A03A2HA4	RS3A03A0CA4	RS3A03A0FA4	RS3A03A0AA4
	R2AA08075FCR00M(E01)					

E01: w/ CPC screw lock type connector assembly.

R2 MOTOR

1 kW

MOTOR FLANGE SIZE

86 mm (3.39 inch)

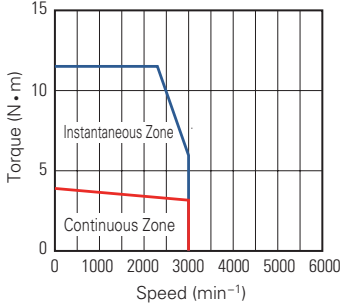
Specifications



Torque Curve

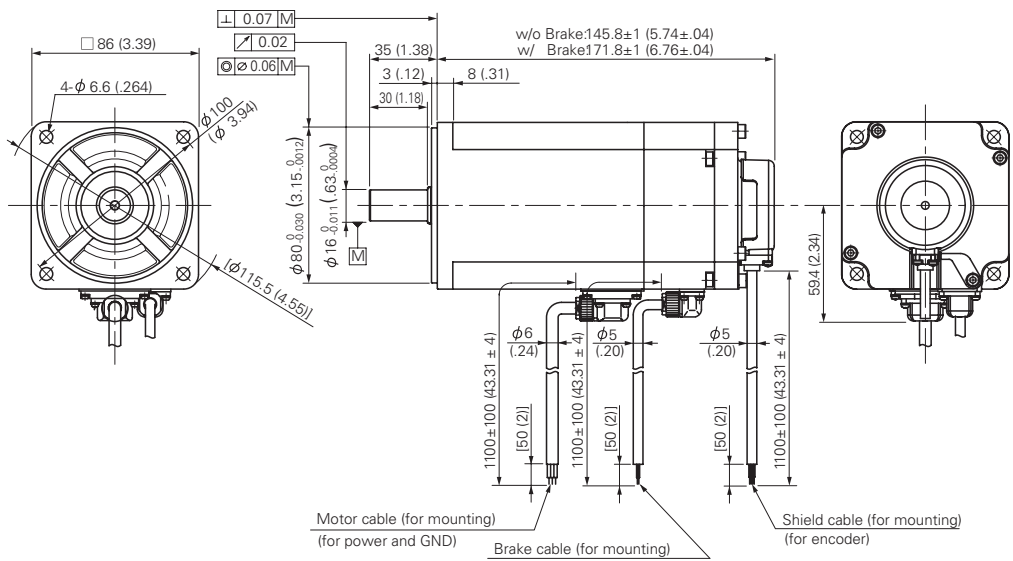
Power Supply	200 VAC	
Model	R2AAB8100H	
Rated Power	kW	1.0
Maximum Speed	min <sup>-1</sup>	3000
Rated Speed	min <sup>-1</sup>	3000
Rated Torque	N·m	3.18
	lb·in	28.1
Peak Torque at Stall	N·m	11.6
	lb·in	102.7
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	2.38
	lb·in <sup>2</sup>	0.813
Encoder	17bit serial absolute	
Motor Mass	kg	3.6
	lb	7.9
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	Below 90% RH, no condensation	

R2AAB8100H



Dimension

Unit: mm (inch)



Compatible Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AAB8100HXR00M(E01)	w/ Brake	RS3A03A2HA4	RS3A03A0CA4	RS3A03A0FA4	RS3A03A0AA4
	R2AAB8100HCR00M(E01)					

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R2** MOTOR

**0.55 kW**

MOTOR FLANGE SIZE

**130 mm (5.12 inch)**

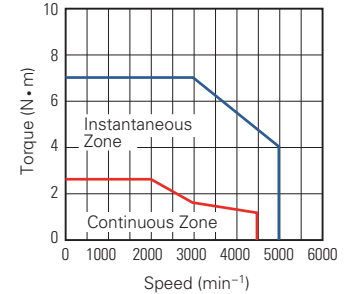
## Specifications

Power Supply	200 VAC	
Model	R2AA13050D	
Rated Power	kW	0.55
Maximum Speed	min <sup>-1</sup>	5000
Rated Speed	min <sup>-1</sup>	2000
Rated Torque	N·m	2.6
	lb·in	23
Peak Torque at Stall	N·m	7
	lb·in	62
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	3.1
	lb·in <sup>2</sup>	1.05
Encoder	17bit serial absolute	
Motor Mass	kg	5
	lb	11
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	



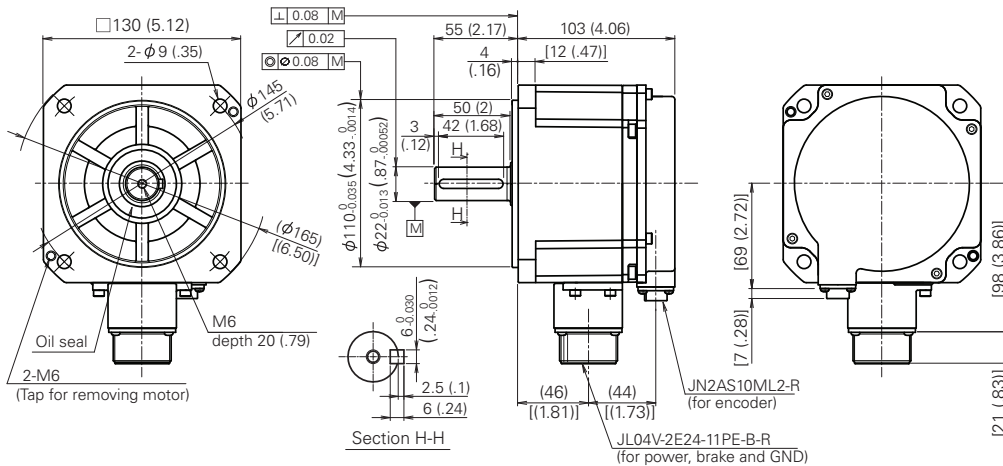
## Torque Curve

### R2AA13050D



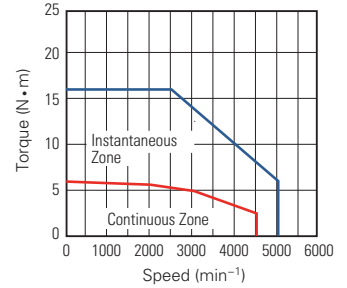
## Dimension

Unit: mm (inch)



## Compatible Amplifier

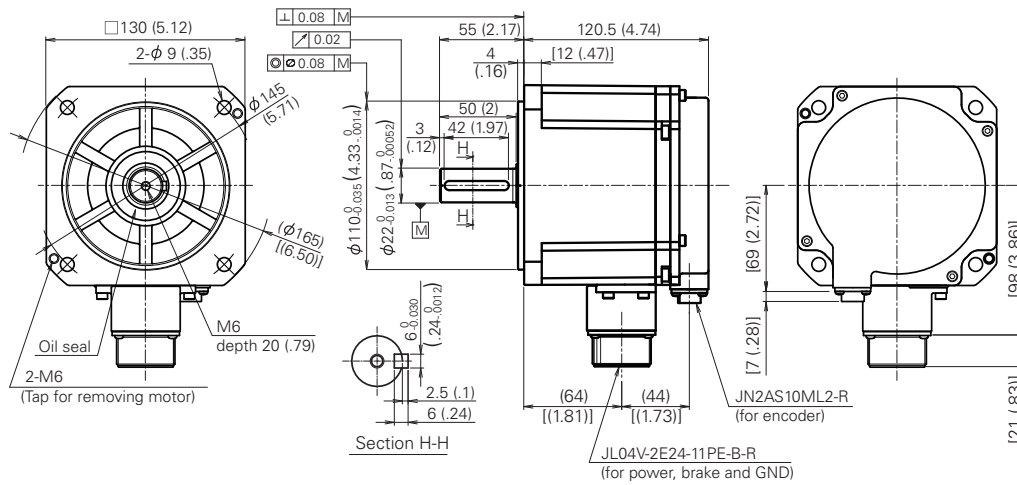
Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA13050DXR00M	RS3A03A2HA4	RS3A03A0CA4	RS3A03A0FA4	RS3A03A0AA4

**R2** MOTOR**1.2 kW**MOTOR  
FLANGE SIZE**130 mm (5.12 inch)****Specifications****Torque Curve**● **R2AA13120D**

Power Supply	200 VAC	
Model	R2AA13120D	
Rated Power	kW	1.2
Maximum Speed	min <sup>-1</sup>	5000
Rated Speed	min <sup>-1</sup>	2000
Rated Torque	N·m	5.7
	lb·in	50
Peak Torque at Stall	N·m	16
	lb·in	142
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	6
	lb·in <sup>2</sup>	2.04
Encoder	17bit serial absolute	
Motor Mass	kg	7
	lb	16
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

**Dimension**

Unit: mm (inch)

**Compatible Amplifier**

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA13120DXR00M	RS3A05A2HA4	RS3A05A0CA4	RS3A05A0FA4	RS3A05A0AA4

# AC SERVO SYSTEMS

**R2** MOTOR

**2 kW**

MOTOR FLANGE SIZE

**130 mm (5.12 inch)**

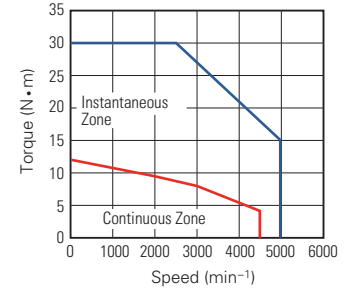
## Specifications

Power Supply	200 VAC	
Model	R2AA13200D*2	
Rated Power	kW	2
Maximum Speed	min <sup>-1</sup>	5000
Rated Speed	min <sup>-1</sup>	2000
Rated Torque	N·m	9.5
	lb·in	84
Peak Torque at Stall	N·m	30
	lb·in	265
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	12.2
	lb·in <sup>2</sup>	4.15
Encoder	17bit serial absolute	
Motor Mass	kg	10
	lb	22
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	



## Torque Curve

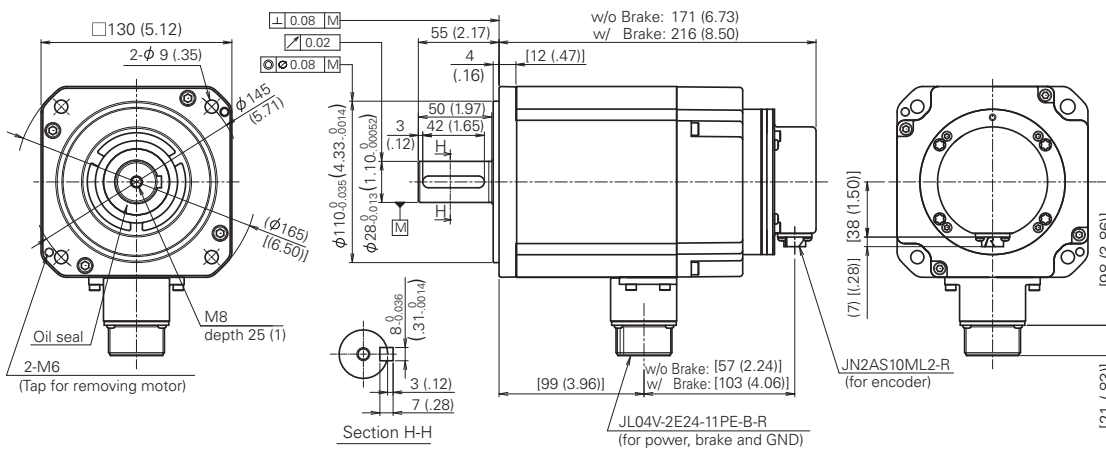
### R2AA13200D



\*2 Brake equipped motor is available. Refer to page 67 for brake specifications.

## Dimension

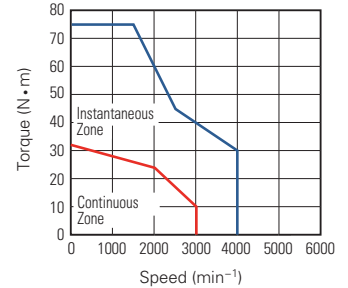
Unit: mm (inch)



## Compatible Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA13200DXR00M	RS3A10A2HA4	RS3A10A0CA4	RS3A10A0FA4	RS3A10A0AA4
	R2AA13200DCR00M				



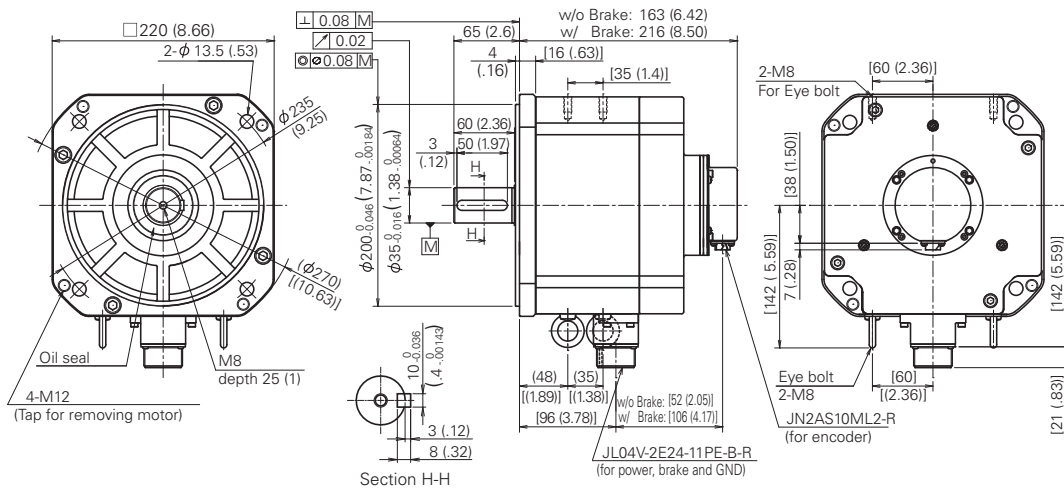
**R2** MOTOR**5 kW**MOTOR  
FLANGE SIZE**220 mm (8.66 inch)****Specifications****Torque Curve****R2AA22500L**

Power Supply	200 VAC	
Model	R2AA22500L*2	
Rated Power	kW	5
Maximum Speed	min <sup>-1</sup>	4000
Rated Speed	min <sup>-1</sup>	2000
Rated Torque	N·m	24
	lb·in	212
Peak Torque at Stall	N·m	75
	lb·in	664
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	55
	lb·in <sup>2</sup>	18.7
Encoder	17bit serial absolute	
Motor Mass	kg	24
	lb	53
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

\*2 Brake equipped motor is available. Refer to page 67 for brake specifications.

**Dimension**

Unit: mm (inch)

**Compatible Amplifier**

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA22500LXR00M		RS3A15A2HA4	RS3A15A0CA4	RS3A15A0FA4	RS3A15A0AA4
	R2AA22500LCR00M	w/ Brake				

# AC SERVO SYSTEMS

**R1** MOTOR

**100W**

MOTOR FLANGE SIZE

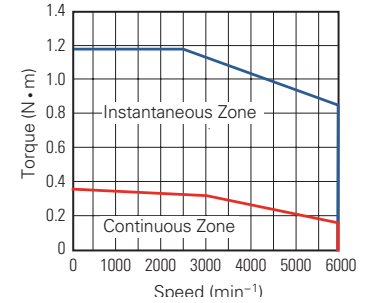
**40 mm (1.57 inch)**

## Specifications



## Torque Curve

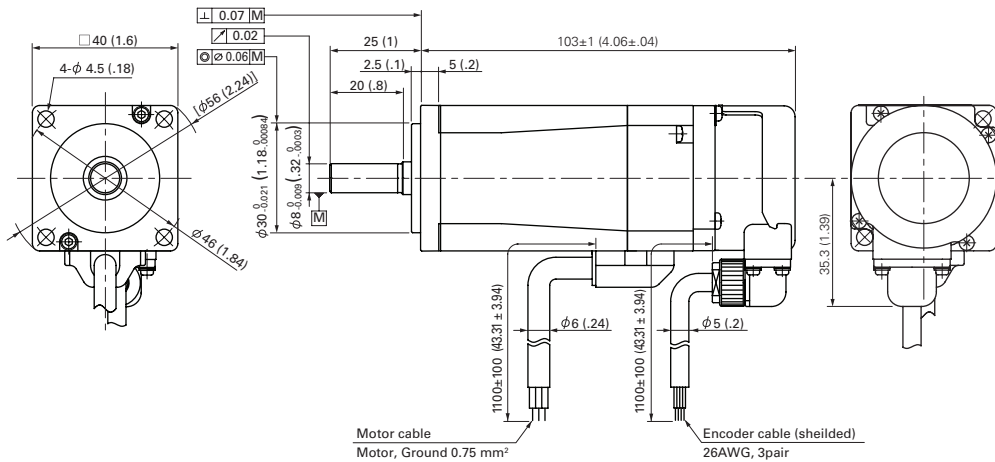
### R1AA04010F



Power Supply	200 VAC	
Model	R1AA04010F	
Rated Power	kW	0.1
Maximum Speed	min <sup>-1</sup>	6000
Rated Speed	min <sup>-1</sup>	3000
Rated Torque	N·m	0.318
	lb·in	2.81
Peak Torque at Stall	N·m	1.18
	lb·in	10.4
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.0242
	lb·in <sup>2</sup>	0.0083
Encoder	17bit serial absolute	
Motor Mass	kg	0.61
	lb	1.34
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

## Dimension

Unit: mm (inch)



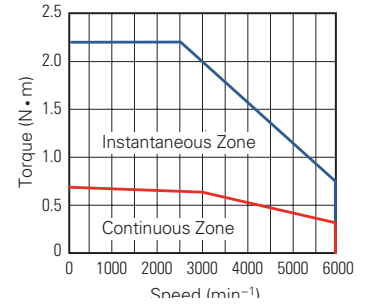
## Compatible Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R1AA04010FXR03M(E01)	RS3A01A2HA4	RS3A01A0CA4	RS3A01A0FA4	RS3A01A0AA4

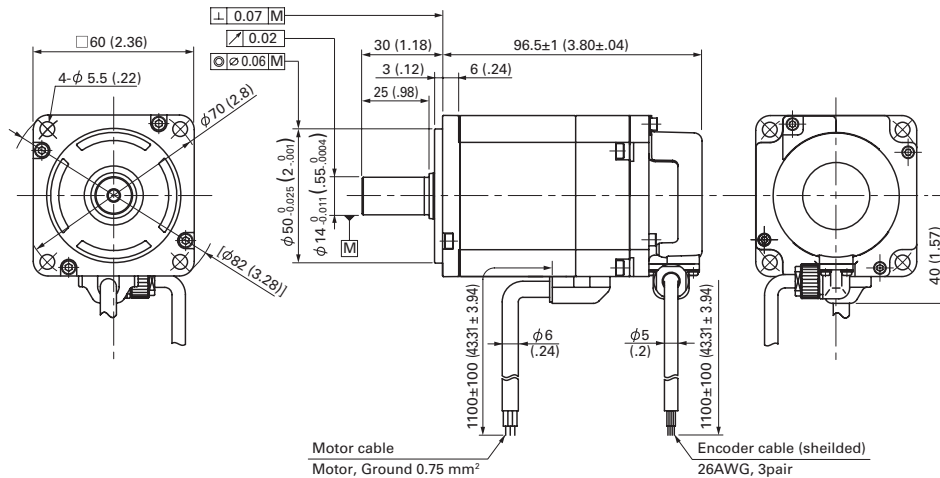
E01: w/ CPC screw lock type connector assembly.

**R1** MOTOR**200 W**MOTOR  
FLANGE SIZE**60 mm (2.36 inch)****Specifications**

Power Supply	200 VAC	
Model	R1AA06020F	
Rated Power	kW	0.1
Maximum Speed	min <sup>-1</sup>	6000
Rated Speed	min <sup>-1</sup>	3000
Rated Torque	N·m	0.637
	lb·in	5.64
Peak Torque at Stall	N·m	2.2
	lb·in	19.5
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.122
	lb·in <sup>2</sup>	0.0417
Encoder	17bit serial absolute	
Motor Mass	kg	1.1
	lb	2.43
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

**Torque Curve**● **R1AA06020F****Dimension**

Unit: mm (inch)

**Compatible Amplifier**

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R1AA06020FXR03M(E01)	RS3A02A2HA4	RS3A02A0CA4	RS3A02A0FA4	RS3A02A0AA4

E01: w/ CPC screw lock type connector assembly.

# AC SERVO SYSTEMS

**R1** MOTOR

**400 W**

MOTOR FLANGE SIZE

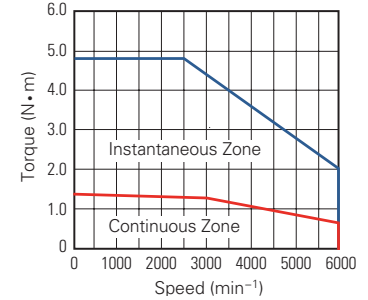
**60 mm (2.36 inch)**

## Specifications



## Torque Curve

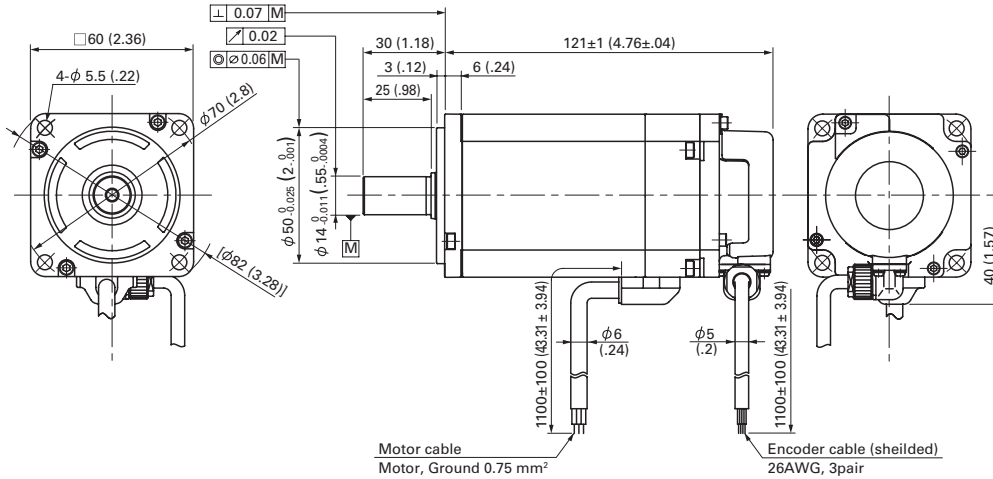
### ● R1AA06040F



Power Supply	200 VAC	
Model	R1AA06040F	
Rated Power	kW	0.4
Maximum Speed	min <sup>-1</sup>	6000
Rated Speed	min <sup>-1</sup>	3000
Rated Torque	N·m	1.27
	lb·in	11.2
Peak Torque at Stall	N·m	4.8
	lb·in	42
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.203
	lb·in <sup>2</sup>	0.0694
Encoder	17bit serial absolute	
Motor Mass	kg	1.5
	lb	3.31
Operating Temperature	0 to 40°C (32 to 104°F)	
Humidity	20 to 90% RH, no condensation	

## Dimension

Unit: mm (inch)



## Compatible Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R1AA06040FXR03M(E01)	RS3A02A2HA4	RS3A02A0CA4	RS3A02A0FA4	RS3A02A0AA4

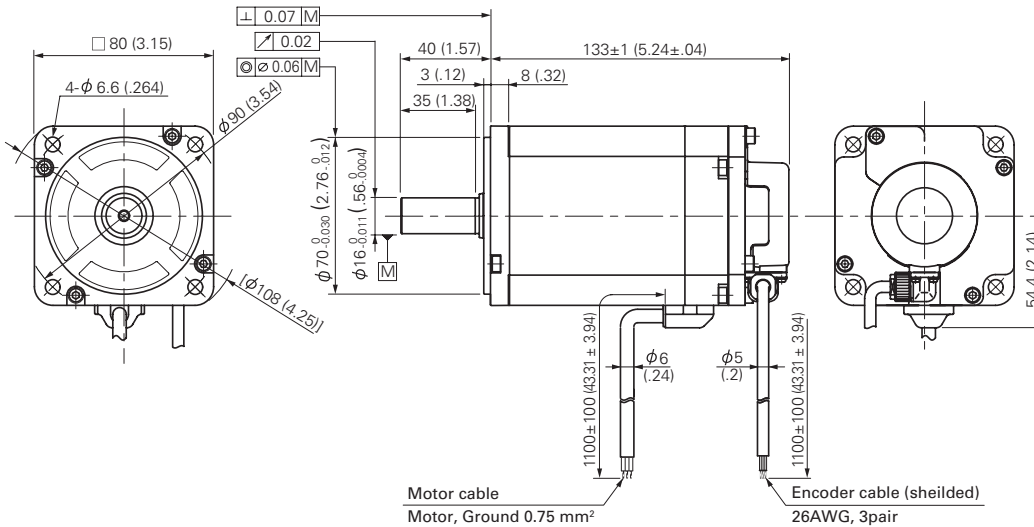
E01: w/ CPC screw lock type connector assembly.

**R1** MOTOR**750 W**MOTOR  
FLANGE SIZE**80 mm (3.15 inch)****Specifications**

Power Supply		200 VAC	200 VAC
Model		R1AA08075V	R1AA08075F
Rated Power	kW	0.75	0.75
Maximum Speed	min <sup>-1</sup>	6000	6000
Rated Speed	min <sup>-1</sup>	3000	3000
Rated Torque	N·m	2.39	2.39
	lb·in	21.2	21.2
Peak Torque at Stall	N·m	8.5	8.5
	lb·in	75	75
Rotor Moment of Inertia	x10 <sup>-4</sup> kg·m <sup>2</sup>	0.719	0.719
	lb·in <sup>2</sup>	0.246	0.246
Encoder		17bit serial absolute	
Motor Mass	kg	3.1	3.1
	lb	6.83	6.83
Operating Temperature		0 to 40°C (32 to 104°F)	
Humidity		20 to 90% RH, no condensation	

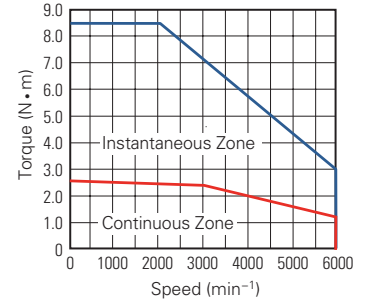
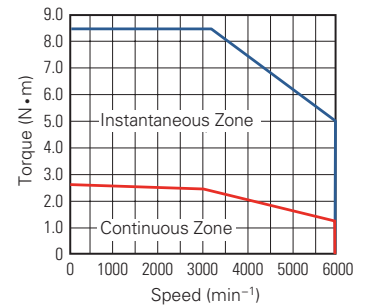
**Dimension**

Unit: mm (inch)

**Compatible Amplifier**

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R1AA08075VXR03M(E01)	RS3A03A2HA4	RS3A03A0CA4	RS3A03A0FA4	RS3A03A0AA4
	R1AA08075FXR03M(E01)	RS3A05A2HA4	RS3A05A0CA4	RS3A05A0FA4	RS3A05A0AA4

E01: w/ CPC screw lock type connector assembly.

**Torque Curve****R1AA08075V****R1AA08075F**

# AC SERVO SYSTEMS

**LINEAR ACTUATOR**

**Rated Thrust 5.1 N**

**MOTOR FLANGE SIZE**

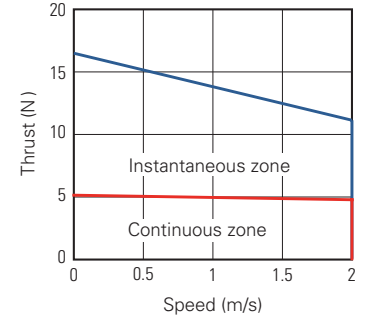
**12 mm (0.46 inch)**

## Specifications



## Thrust Curve

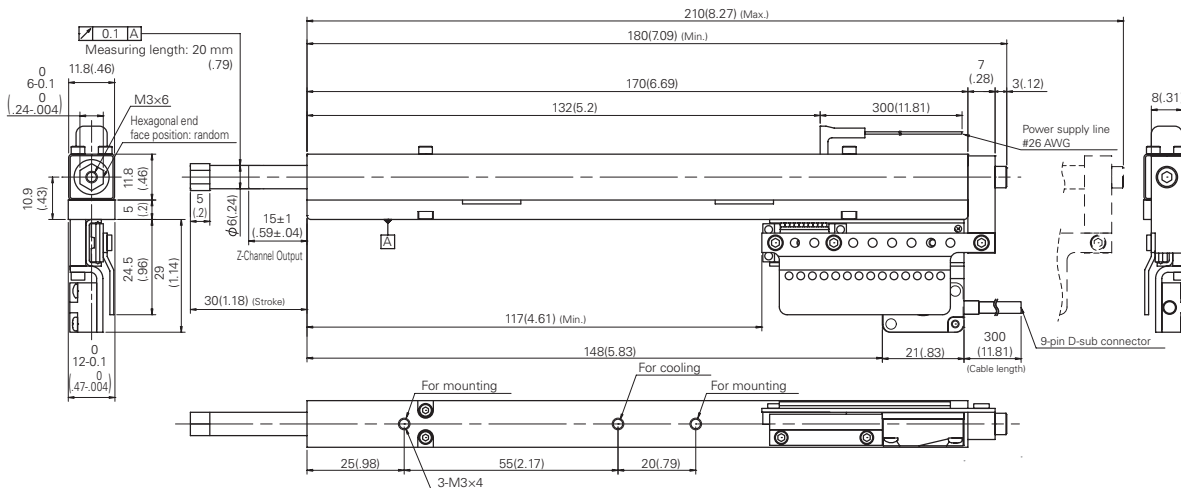
### ● DE0AC001A03MX00



Power Supply	48VDC	
Model	DE0AC001A03MX00	
Rated Thrust	N	5.1
	lb	1.15
Peak Thrust	N	16.5
	lb	3.71
Maximum Speed	m/s	2.0
Rated Speed	m/s	1.0
Encoder	Optical Incremental Encoder	
Linear Encoder Resolution (quadratured)	μm	1
Motor Mass	g	185
	lb	0.408
Operating Temperature	0 to 40°C (32 to 104 °F)	
Humidity	20 to 80% RH, no condensation	

## Dimension

Unit: mm (inch)



## Compatible Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	DE0AC001A03MX00(E01)	RF2J24A8HL5			

E01: w/ CPC screw lock type connector assembly.

**LINEAR ACTUATOR**

**Rated Thrust 15 N**

**MOTOR FLANGE SIZE**

**20 mm (0.79 inch)**

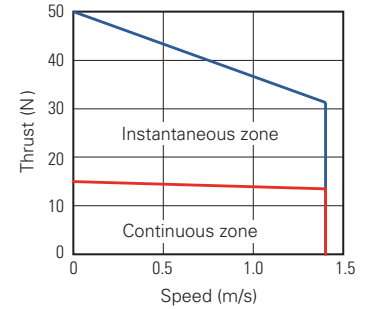
**Specifications**



Power Supply	48VDC	
Model	DE0BC005A05CX00	
Rated Thrust	N	15
	lb	3.37
Peak Thrust	N	50
	lb	11.24
Maximum Speed	m/s	1.4
Rated Speed	m/s	0.7
Encoder	Optical Incremental Encoder	
Linear Encoder Resolution (quadratured)	µm	1
Motor Mass	g	450
	lb	0.992
Operating Temperature	0 to 40°C (32 to 104 °F)	
Humidity	20 to 80% RH, no condensation	

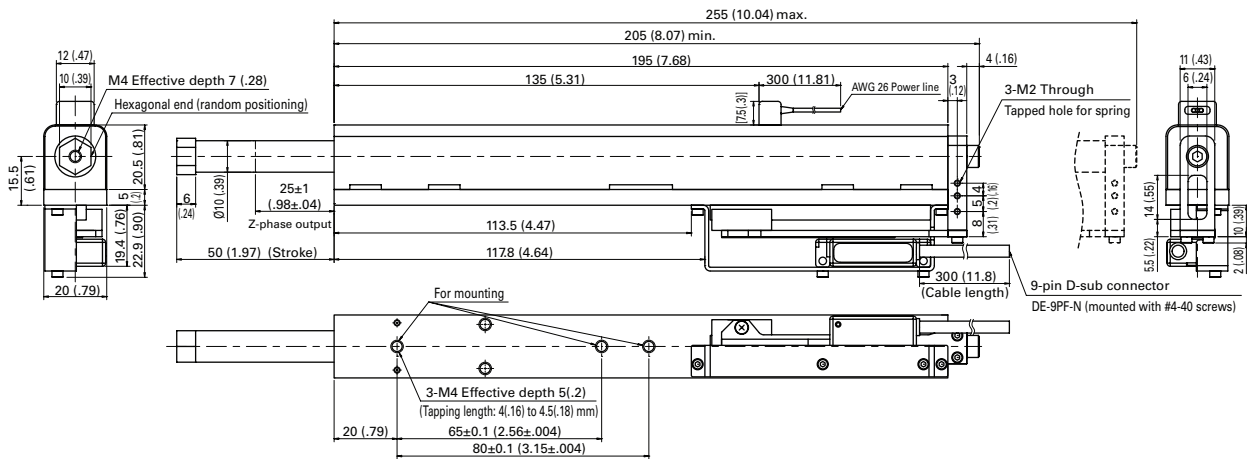
**Thrust Curve**

**DE0AC001A03MX00**



**Dimension**

Unit: mm (inch)



**Compatible Amplifier**

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	DE0BC005A05CX00(E01)	RF2J24A8HL5			

E01: w/ CPC screw lock type connector assembly.

Control function	Position control/Speed control/Torque control (Parameter switching)	
Main circuit power <sup>(Note 1)</sup>	3-Phase: 200 to 240 VAC +10, -15%, 50/60 Hz±3 Hz Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz±3 Hz <sup>(Note 2)</sup>	
Control power	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz±3 Hz	
Environment	Ambient temperature	0 to +55°C
	Storage temperature	-20 to +65°C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s <sup>2</sup>
	Shock	19.6 m/s <sup>2</sup>
Structure	Built-in tray type power supply	

Note 1) Always use input voltage within the specification range for the main circuit power supply.

Note 2) AC200V-single-phase input type corresponds only to RS3A01A0AA4/RS3A02A0AA4/RS3A03A0AA4/RS3A05A0AA4.

### Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	2200 Hz (In high frequency sampling mode) *Differs for each model.
Allowable load inertia moment	10 times motor rotor inertia moment

### Built-in Functions

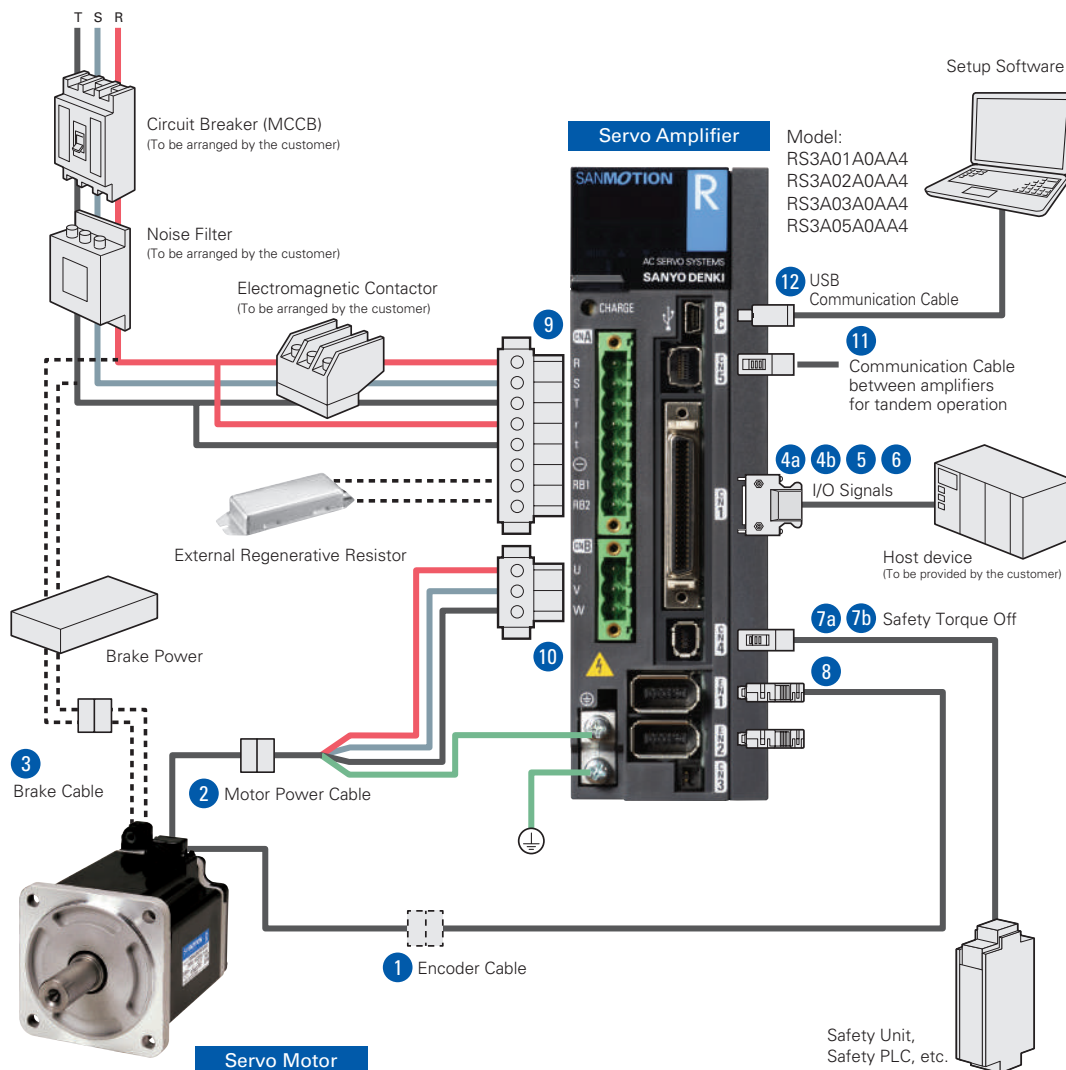
Protection functions	Overcurrent, Current detection error, Overload, Regeneration error, Overheating, External error, Overvoltage, Main circuit power supply under voltage, Main circuit power supply open phase, Control circuit power supply under voltage, Encoder error, Overspeed Speed control error, Speed feedback error, Excessive position deviation, Position command pulse error, Built-in memory error, Parameter error, Cooling fan error
Digital operator	Status display, Monitor display, Alarm display, Parameter setting, Test run, Adjustment mode
Dynamic brake circuit	Built-in
Regenerative resistor	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min <sup>-1</sup> ) Torque (thrust force) command monitor (TCMON) 2.0 V±10% (at 100%)

### Input/Output Signals

Position command	Maximum input pulse frequency	4M pulse/s (Reverse + Forward pulse, Code +pulse) 1M pulse/s (90°-phase difference two-phase pulse)
		Forward + Reverse command pulse, Code + Pulse train command or 90°-phase difference two-phase pulse train command N/D(N=1 to 2097152, D=1 to 2097152), 1/2097152 ≤ N/D ≤ 2097152
Speed command	Command voltage	DC±2.0V at 1000min <sup>-1</sup> command. Positive command (forward) motor rotation, maximum input voltage ±10V.
	Input impedance	Approximately 10kΩ
Torque command	Command voltage	DC±2.0V at 1000min <sup>-1</sup> command. Positive command (forward) motor rotation, maximum input voltage ±10V.
	Input impedance	Approximately 10kΩ
General input	Sequence input	Interactive photo coupler (sink, source connection): ×8 input Input power voltage range: DC5V±5% / DC12V~DC24V±10%, 100mA or over(DC24V) Servo ON, Alarm reset, Torque limit, Encoder clear, Forward rotation prohibit, Command prohibit, Reverse rotation prohibit, Command prohibit, External trip, Forced discharge, Emergency stop, Gain switching, Internal speed setting, etc.
		Torque limit input
General output	Sequence output	Open collector output: × 8 outputs Power supply for general output circuit (CN1-49,OUT-PWR): DC5V±5% / DC12V to DC24V±10%, 20mA or over Specification of Power supply for general output circuit
		<ul style="list-style-type: none"> <li>• DC5V±5% , Maximum current value 10mA (per 1 output )</li> <li>• DC12V~DC15V±10% , Maximum current value 30mA (per 1 output)</li> <li>• DC24V±10% , Maximum current value 50mA (per 1 output)</li> </ul>
		Servo ready, Power ON, Servo ON, Holding brake timing, Torque limiting, Low speed, Velocity attainment, Matching speed, Zero speed, Command acceptable, Status of gain switch, Velocity loop proportional control status, Control mode switchover status, Forward OT, Reverse OT, Reverse OT, Warning, Alarm code (3bits), etc.
Position signal output	Encoder output pulse signal	N/32768(N=1~32767), 1/N(N=1~64) or 2/N(N=2~64)
	Encoder output serial signal	Binary code output, decimal ASCII output



# System Configuration: 10A, 20A, 30A, 50A

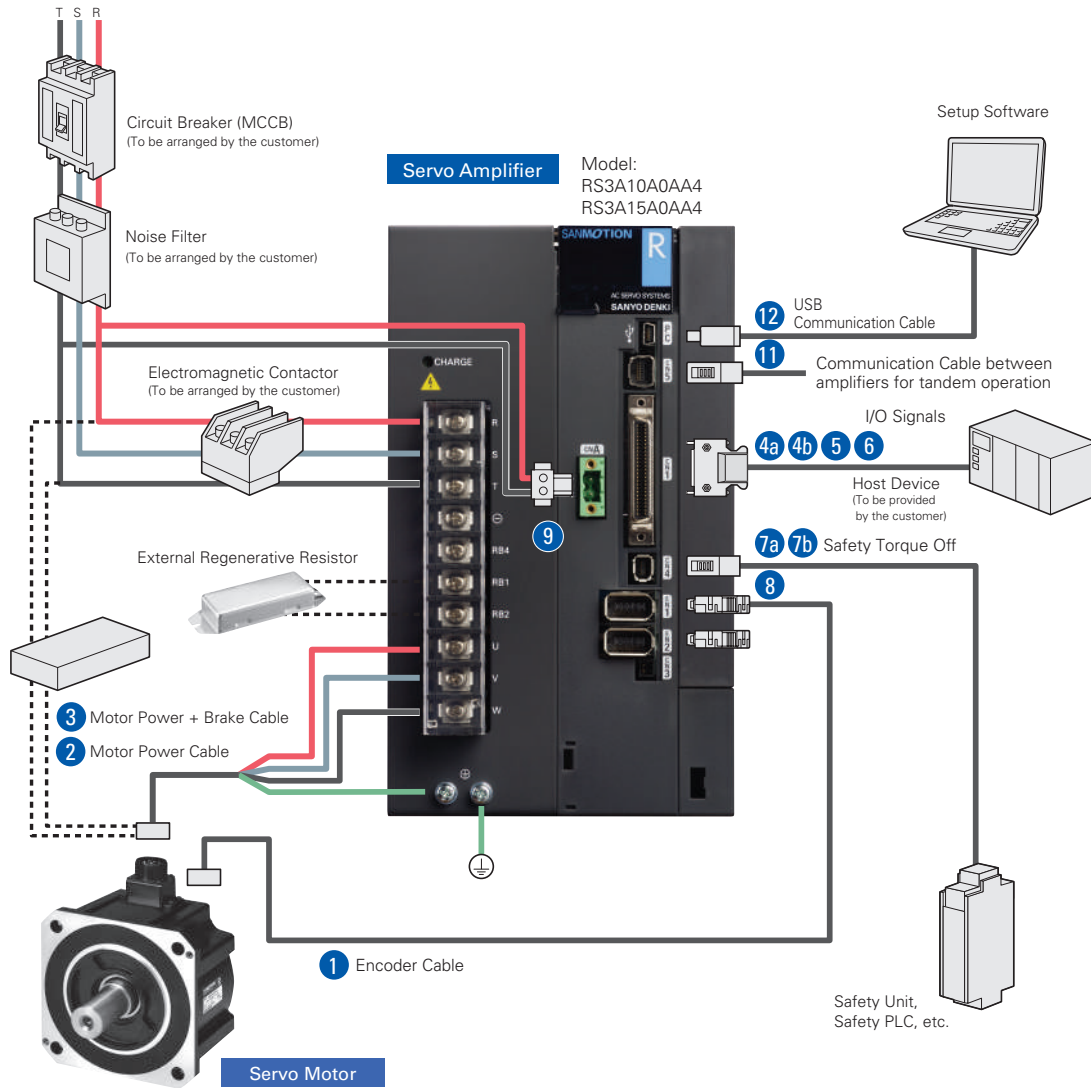


Item	Parts Number	Description
✓ 1	Encoder Cable: 10 ft EEXTKABS2410FT EEXTKABS24JN10FT	For 0.55 kW and 1.2 kW motor
✓ 2	Motor Power Cable: 10 ft MEXTK1810FT MEXTK18JN10FT MEXTK14JN10FT	For 0.55 kW motor For 1.2 kW motor
✓ 3	Brake Cable: 10 ft MEXTBRK2010FT	Only for brake equipped motor
4a	I/O Cable: 2 m QH0-CJ0201-S01	Both sides 50 pin connectors
✓ 4b	Terminal Block QH0-TB001-S01	Used with I/O Cable (4a)
5	I/O Cable: 2 m QH0-CJ0203-S01	One side 50 pin connector, one side flying leads
6	Connector [CN1] AL-00385594	No need if I/O cable (4a or 5) is selected
✓ 7a	Connector [CN4] AL-00718252-01	For STO, no need if (7b) is selected
7b	Connector [CN4] AL-00849548-02	For STO cancellation, no need if (7a) is selected
8	Connector [EN1, EN2] AL-00632607	No need if Encoder Cable (1) is selected
9	Connector [CNA] AL-00686902-01	Supplied with Amplifier
10	Connector [CNB] AL-Y0004079-01	No need if Motor Power Cable (2) is selected
11	Communication Cable: 1 m AL-00911582-01	For tandem operation
✓ 12	USB Communication Cable: 1 m AL-00896515-01	Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.

Note: I/O cable can be chosen either 4a or 5. Connector for CN4 can be chosen either 7a or 7b.

## System Configuration: 100A, 150A

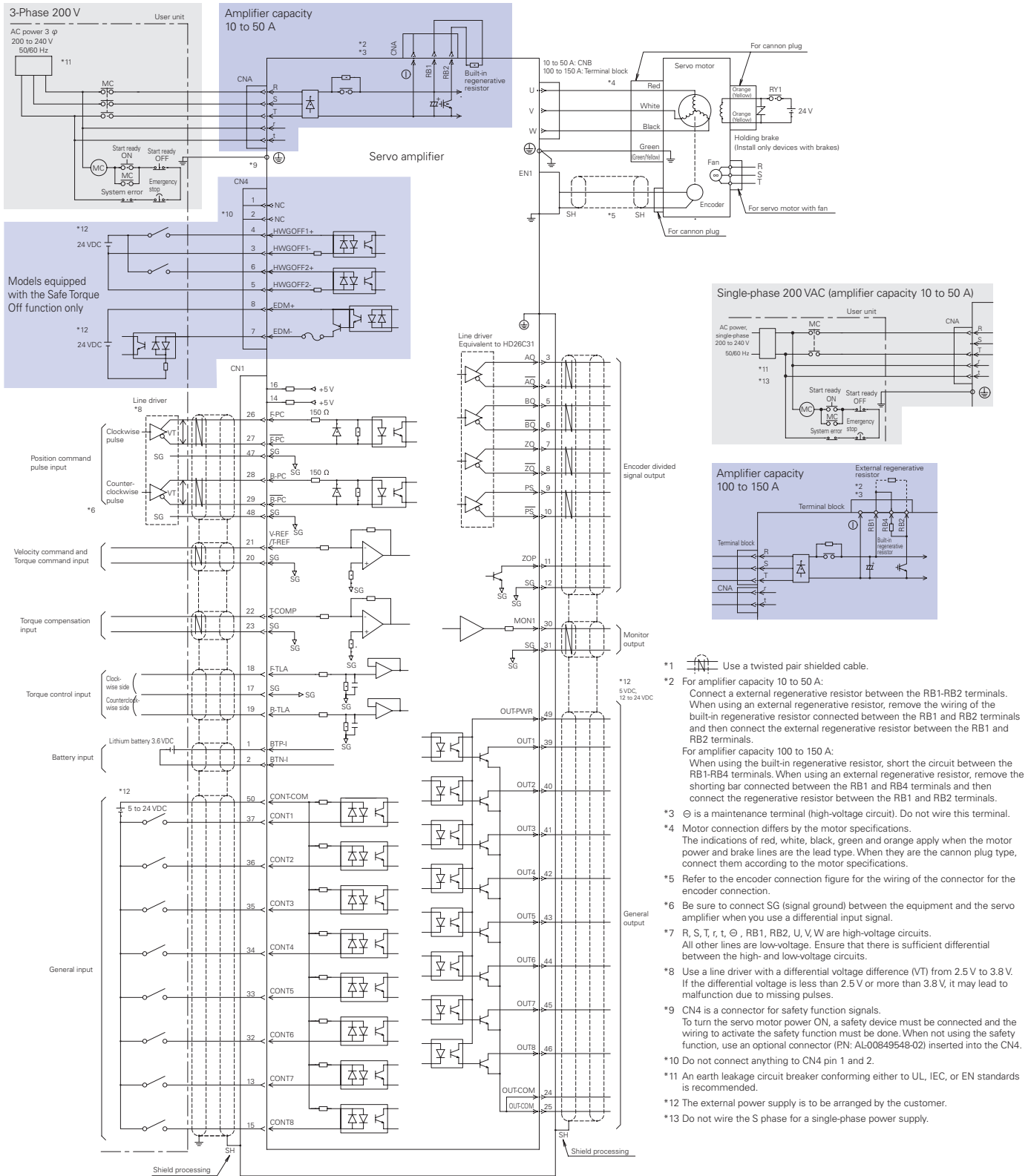


Item	Parts Number	Description
✓ 1	Encoder Cable: 10 ft EEXTKABS24JN10FT	
✓ 2	Motor Power Cable: 10 ft MEXT10JN10FT MEXT08JN10FT	For 2 kW motor For 5 kW motor
✓ 3	Motor Power + Brake Cable: 10 ft MEXTB10JN10FT MEXTB08JN10FT	For brake equipped 2 kW motor For brake equipped 5 kW motor
4a	I/O Cable: 2 m QH0-CJ0201-S01	Both sides 50 pin connectors, no need if (5) is selected
✓ 4b	Terminal Block QH0-TB001-S01	Used with I/O Cable (4a)
5	I/O Cable: 2 m QH0-CJ0203-S01	One side 50 pin connector, one side flying leads
6	Connector [CN1] AL-00385594	No need if I/O cable (4a or 5) is selected
✓ 7a	Connector [CN4] AL-00718252-01	For STO, no need if (7b) is selected
7b	Connector [CN4] AL-00849548-02	For STO cancellation, no need if (7a) is selected
8	Connector [EN1, EN2] AL-00632607	No need if Encoder Cable (1) is selected
✓ 9	Connector [CNA] AL-Y0005159-01	
10	Communication Cable: 1m AL-00911582-01	For tandem operation
✓ 11	USB Communication Cable: 1m AL-00896515-01	Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.

Note: I/O cable can be chosen either 4a or 5. Connector for CN4 can be chosen either 7a or 7b.

# Wiring Diagram

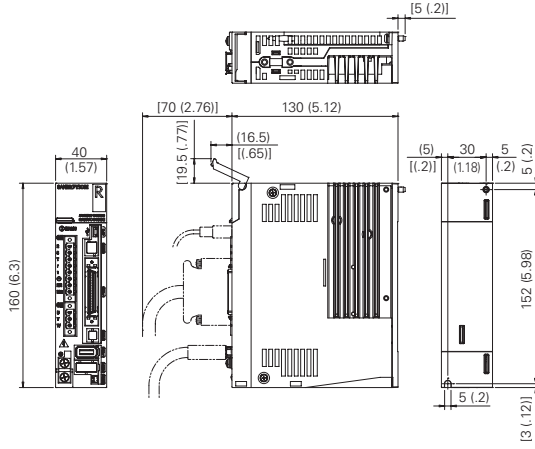


## Dimensions

Unit: mm (inch)

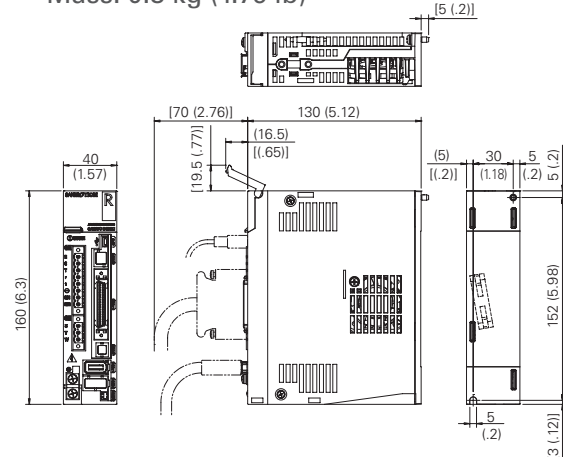
### ■ RS3A01A0AA4

Mass: 0.8 kg (1.76 lb)



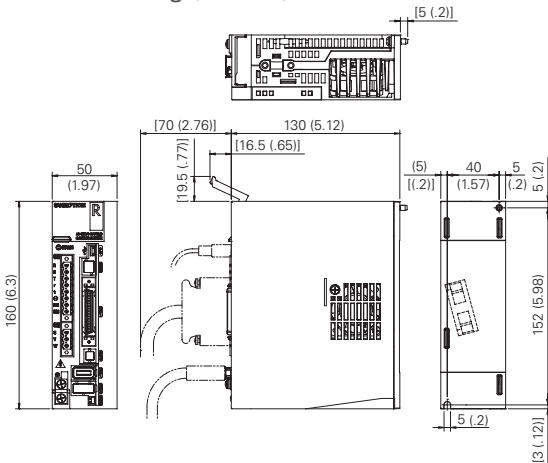
### ■ RS3A02A0AA4

Mass: 0.8 kg (1.76 lb)



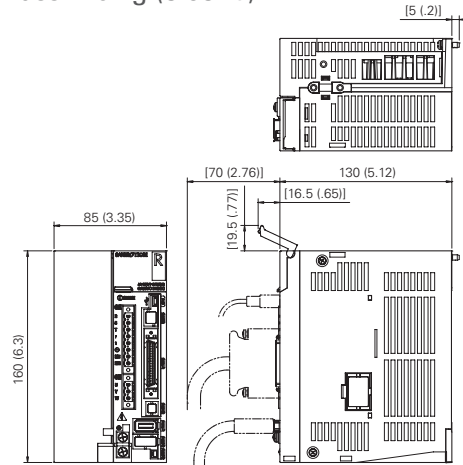
### ■ RS3A03A0AA4

Mass: 0.9 kg (1.98 lb)



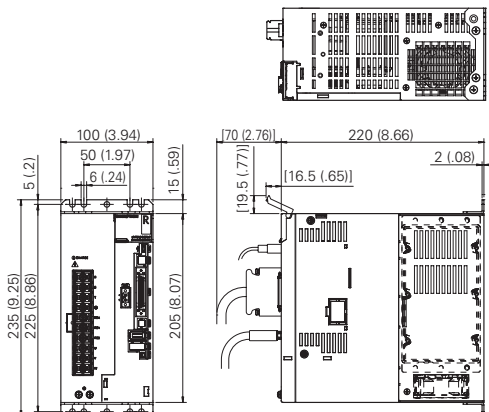
### ■ RS3A05A0AA4

Mass: 1.6 kg (3.53 lb)



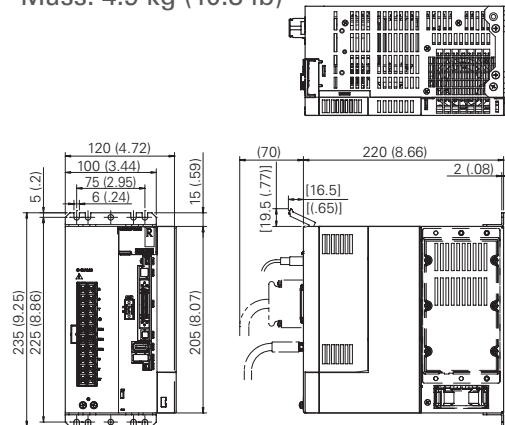
### ■ RS3A10A0AA4

Mass: 4.2 kg (9.26 lb)



### ■ RS3A15A0AA4

Mass: 4.9 kg (10.8 lb)



# Indexer Type Servo Amplifier



Control function		Position control
Main circuit power		Three-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 1) Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)
Control circuit power		Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)
Environment	Ambient temperature	0 to +55°C
	Storage temperature	-20 to +65°C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Operation altitude	Below 1000 m
	Vibration resistance	4.9 m/s <sup>2</sup>
	Impact resistance	19.6 m/s <sup>2</sup>
Structure		Built-in tray type power supply

Note 1) Single-phase 200 VAC class input can be used with RS3A01A0CA4, RS3A02A0CA4, RS3A03A0CA4, RS3A05A0CA4 models only.  
Note 2) Single-phase 100 VAC class input can be used with RS3E01A0CA4, RS3E02A0CA4, RS3E03A0CA4 models only.

## Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	1000 Hz (In high frequency sampling mode)
Permissible load moment of inertia	10 times the motor rotary inertia

## Built-in Functions

Protection functions	Overcurrent, Current detection error, Overload, Regeneration error, Overheating, External error, Overvoltage, Main circuit power supply undervoltage, Main circuit power supply open phase, Control circuit power supply undervoltage, Encoder error, Overspeed, Speed control error, Speed feedback error, Excessive position deviation, Position command pulse error, Built-in memory error, Parameter error, Cooling fan error
LED display	Status display, Monitor display, Alarm display
Dynamic brake circuit	Built-in
Regeneration process	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min <sup>-1</sup> ) Torque (thrust force) command monitor (TCMON) 2.0V±10% (at 100%)

## Positioning Function

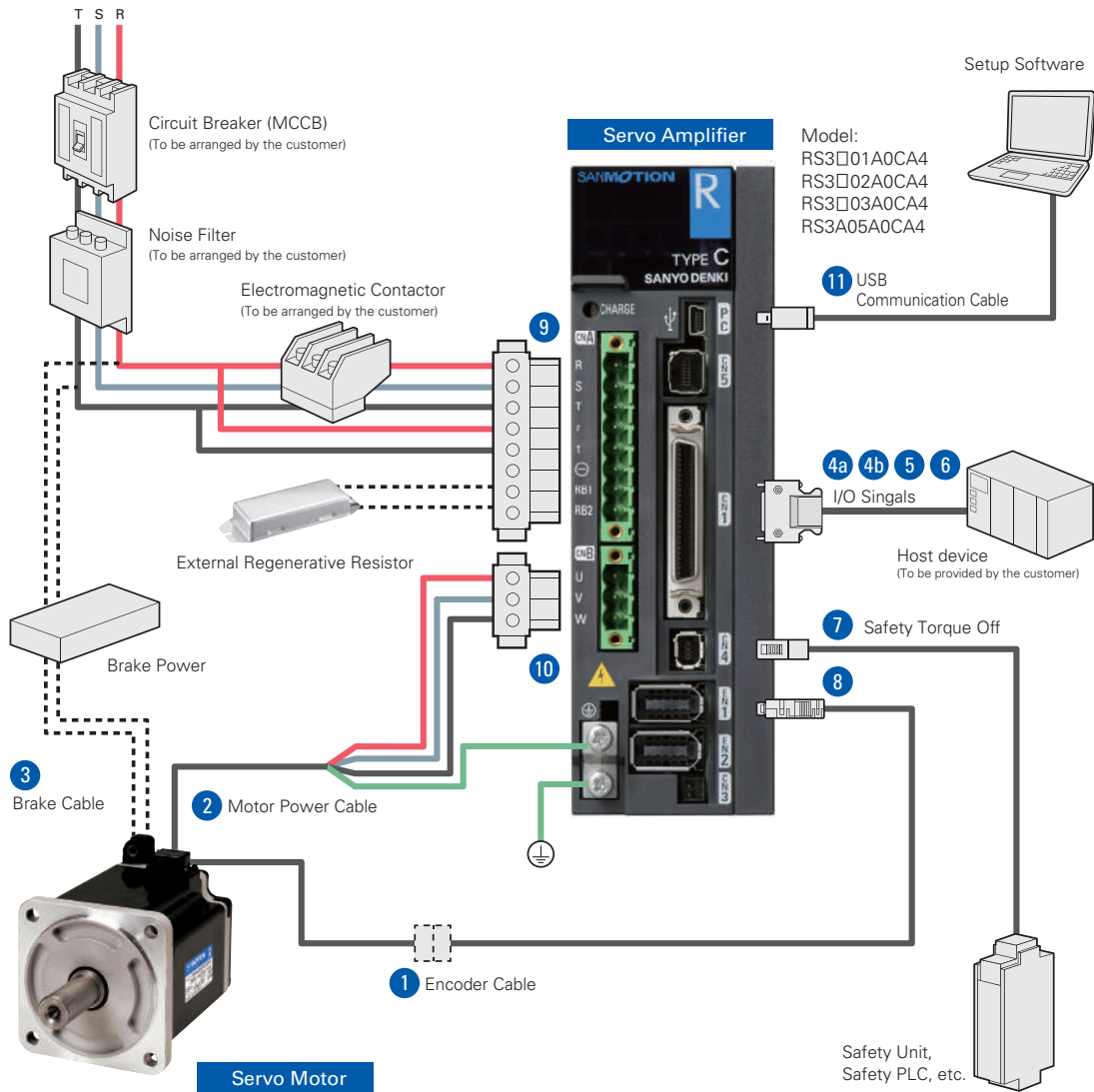
Number of control axis	1 axis
Number of points to be registered	Up to 254 points (P000 to P253) can be set
Max. command amount	-2,147,483,648 to +2,147,483,647
Command unit	mm, deg, or pulse
Rapid feed rate	2,147,483,647 mm/sec (0.001 mm/pulse selected)
Acceleration/deceleration	Automatic acceleration/deceleration (straight line/S-shape switchover)
Point data setting	Set by inputting numeric values using a PC or by teaching
Movement point number setting	Parallel 8 bit (binary code)
Torque limit	0 to 510% (With 100% be the rated torque value) However, less than instantaneous max. stall current
Software limit	Yes
Move mode	Homing, Manual (JOG, 1 Step), Point specified move
Area signal	Up to 8 zones

## Input/Output Signals

Sequential input signal	Servo motor power ON, Alarm reset, Start, Homing, Manual, Override/Manual high speed, Cancel, Decelerate before home position, External error, Over travel, 1 Step feed, Interrupt startup, Output selection, MFIN, Point specified input
Sequential output signal	NC ready, Holding brake timing, Error, External operation enabled, In operation Positioning complete, In-position output, Homing complete, General-purpose output (8 bit)

# AC SERVO SYSTEMS

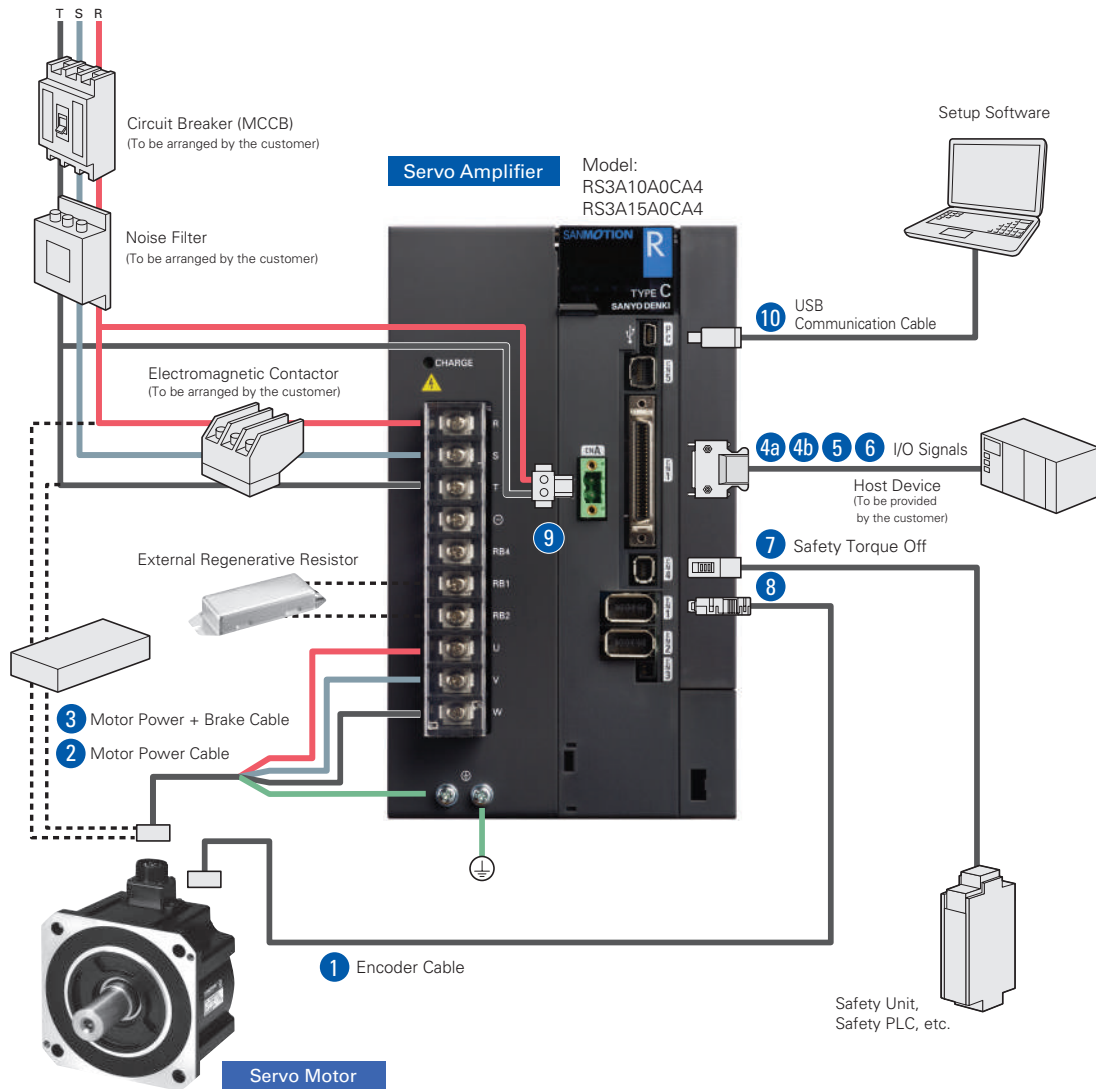
## System Configuration: 10A, 20A, 30A, 50A



Item	Parts Number	Description
✓ 1	EEXTKABS2410FT EEXTKABS24JN10FT	Encoder Cable: 10 ft For 0.55 kW and 1.2 kW motor
✓ 2	MEXTK1810FT MEXTK18JN10FT MEXTK14JN10FT	Motor Power Cable: 10 ft For 0.55 kW motor For 1.2 kW motor
✓ 3	MEXTBRK2010FT	Brake Cable: 10 ft Only for Brake Equipped Motor
4a	QH0-CJ0201-S01	I/O Cable: 2 m Both sides 50 pin connectors
✓ 4b	QH0-TB001-S01	Terminal block Used with I/O Cable (4a)
5	QH0-CJ0203-S01	I/O Cable: 2 m One side 50 pin connector, one side flying leads
6	AL-00385594	Connector [CN1] No need if I/O cable (4a or 5) is selected
7	AL-00718252-01	Connector [CN4] For STO
✓ 8	AL-Y0012504-01	Connector [EN1] No need if Encoder Cable (1) is selected
9	AL-00686902-01	Connector [CNA] Supplied with Amplifier
✓ 10	AL-Y0004079-01	Connector [CNB] No need if Motor Power Cable (2) is selected
✓ 11	AL-00896515-01	USB Communication Cable: 1m Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.  
Note: I/O Cable can be chosen either 4a or 5.

# System Configuration: 100A, 150A



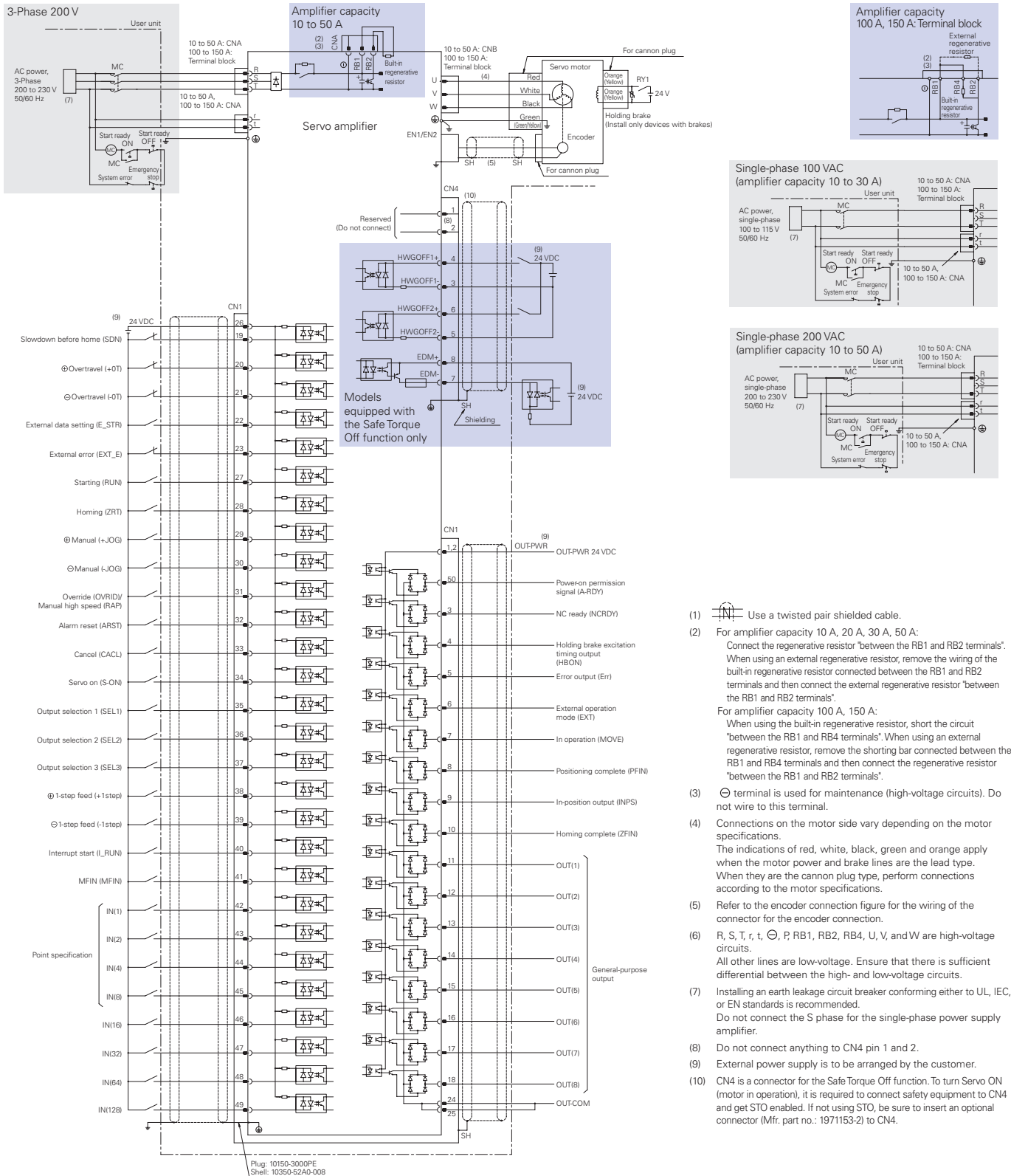
Item	Parts Number	Description
✓ 1	EEXTKABS24JN10FT	Encoder Cable: 10 ft
✓ 2	MEXT10JN10FT MEXT08JN10FT	Motor Power Cable: 10 ft For 2 kW motor For 5 kW motor
✓ 3	MEXTB10JN10FT MEXTB08JN10FT	Motor Power + Brake Cable: 10 ft For brake equipped 2 kW motor For brake equipped 5 kW motor
4a	QH0-CJ0201-S01	I/O Cable: 2 m Both sides 50 pin connectors
✓ 4b	QH0-TB001-S01	Terminal block Used with I/O Cable (4a)
5	QH0-CJ0203-S01	I/O Cable: 2 m One side 50 pin connector, one side flying leads
6	AL-00385594	Connector [CN1] No need if I/O cable (4a or 5) is selected
7	AL-00718252-01	Connector [CN4] For STO
✓ 8	AL-Y0012504-01	Connector [EN1] No need if Encoder Cable (1) is selected
9	AL-00686902-01	Connector [CNA]
✓ 10	AL-00896515-01	USB Communication Cable: 1m Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.  
Note: I/O Cable can be chosen either 4a or 5.

## Wiring Diagram

### ■ Sinking type (NPN) output

Sourcing type (PNP) output connection is also available. Ask us for detail.



- Use a twisted pair shielded cable.
- For amplifier capacity 10 A, 20 A, 30 A, 50 A:  
Connect the regenerative resistor "between the RB1 and RB2 terminals". When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 terminals and then connect the external regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 100 A, 150 A:  
When using the built-in regenerative resistor, short the circuit "between the RB1 and RB4 terminals". When using an external regenerative resistor, remove the shorting bar connected between the RB1 and RB4 terminals and then connect the regenerative resistor "between the RB1 and RB2 terminals".
- ⊖ terminal is used for maintenance (high-voltage circuits). Do not wire to this terminal.
- Connections on the motor side vary depending on the motor specifications.  
The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type. When they are the cannon plug type, perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- R, S, T, r, t, ⊕, P, RB1, RB2, RB4, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Installing an earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended.  
Do not connect the S phase for the single-phase power supply amplifier.
- Do not connect anything to CN4 pin 1 and 2.
- External power supply is to be arranged by the customer.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.

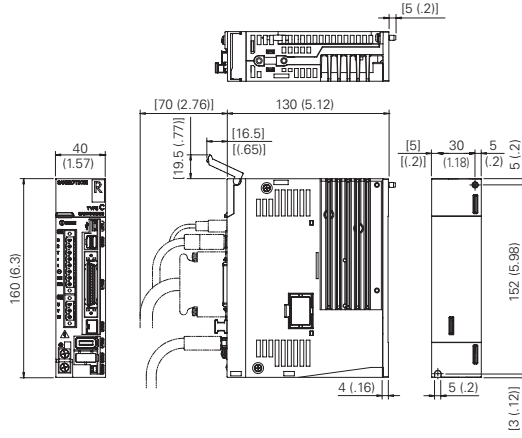


# Dimensions

Unit: mm (inch)

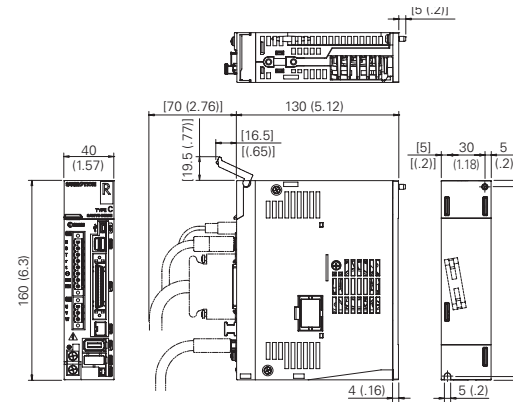
## ■ RS3□01A0CA4

Mass: 0.8 kg (1.76 lb)



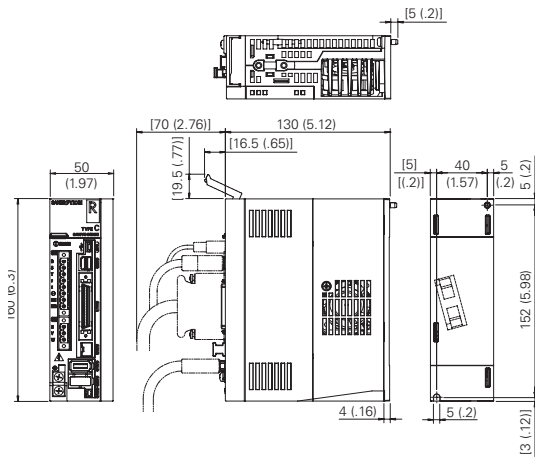
## ■ RS3□02A0CA4

Mass: 0.8 kg (1.76 lb)



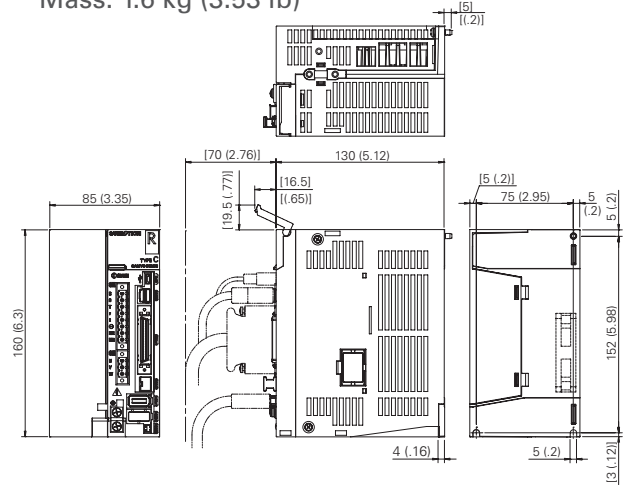
## ■ RS3□03A0CA4

Mass: 0.9 kg (1.98 lb)



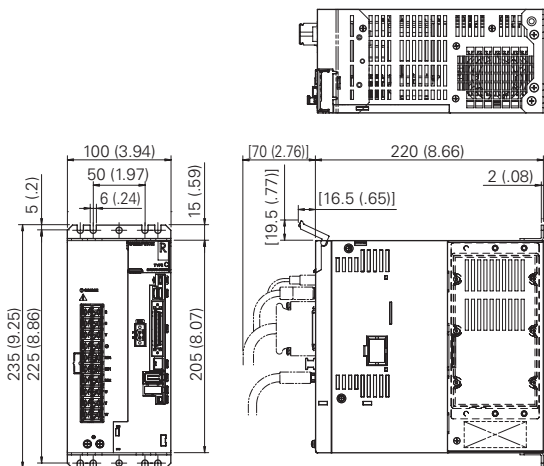
## ■ RS3A05A0CA4

Mass: 1.6 kg (3.53 lb)



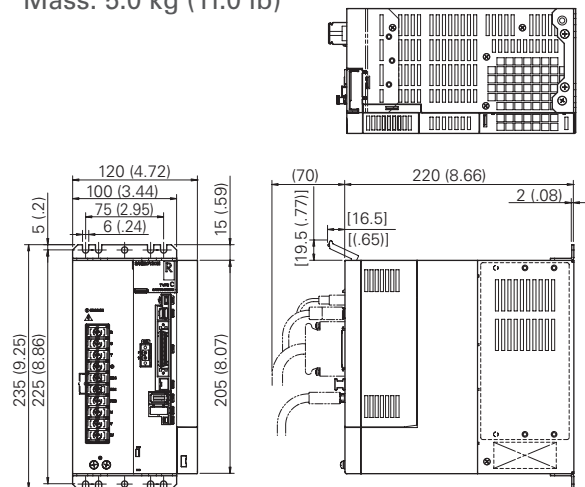
## ■ RS3A10A0CA4

Mass: 4.2 kg (9.26 lb)



## ■ RS3A15A0CA4

Mass: 5.0 kg (11.0 lb)



Control function	Position control	
Main circuit power	Three-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 1) Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)	
Control circuit power	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)	
Environment	Ambient temperature	0 to +55°C
	Storage temperature	-20 to +65°C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Operation altitude	Below 1000 m
	Vibration resistance	4.9 m/s <sup>2</sup>
Impact resistance	19.6 m/s <sup>2</sup>	
Structure	Built-in tray type power supply	

Note 1) Single-phase 200 VAC class input can be used with RS3A01A0CA4, RS3A02A0CA4, RS3A03A0CA4, RS3A05A0CA4 models only.

Note 2) Single-phase 100 VAC class input can be used with RS3E01A0CA4, RS3E02A0CA4, RS3E03A0CA4 models only.

### Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	1000 Hz (In high frequency sampling mode)
Permissible load moment of inertia	10 times the motor rotary inertia

### Built-in Functions

Protection functions	Overcurrent, Current detection error, Overload, Regeneration error, Overheating, External error, Overvoltage, Main circuit power supply undervoltage, Main circuit power supply open phase, Control circuit power supply undervoltage, Encoder error, Overspeed, Speed control error, Speed feedback error, Excessive position deviation, Position command pulse error, Built-in memory error, Parameter error, Cooling fan error
LED display	Status display, Monitor display, Alarm display
Dynamic brake circuit	Built-in
Regeneration process	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min <sup>-1</sup> ) Torque (thrust force) command monitor (TCMON) 2.0V±10% (at 100%)

### Positioning Function

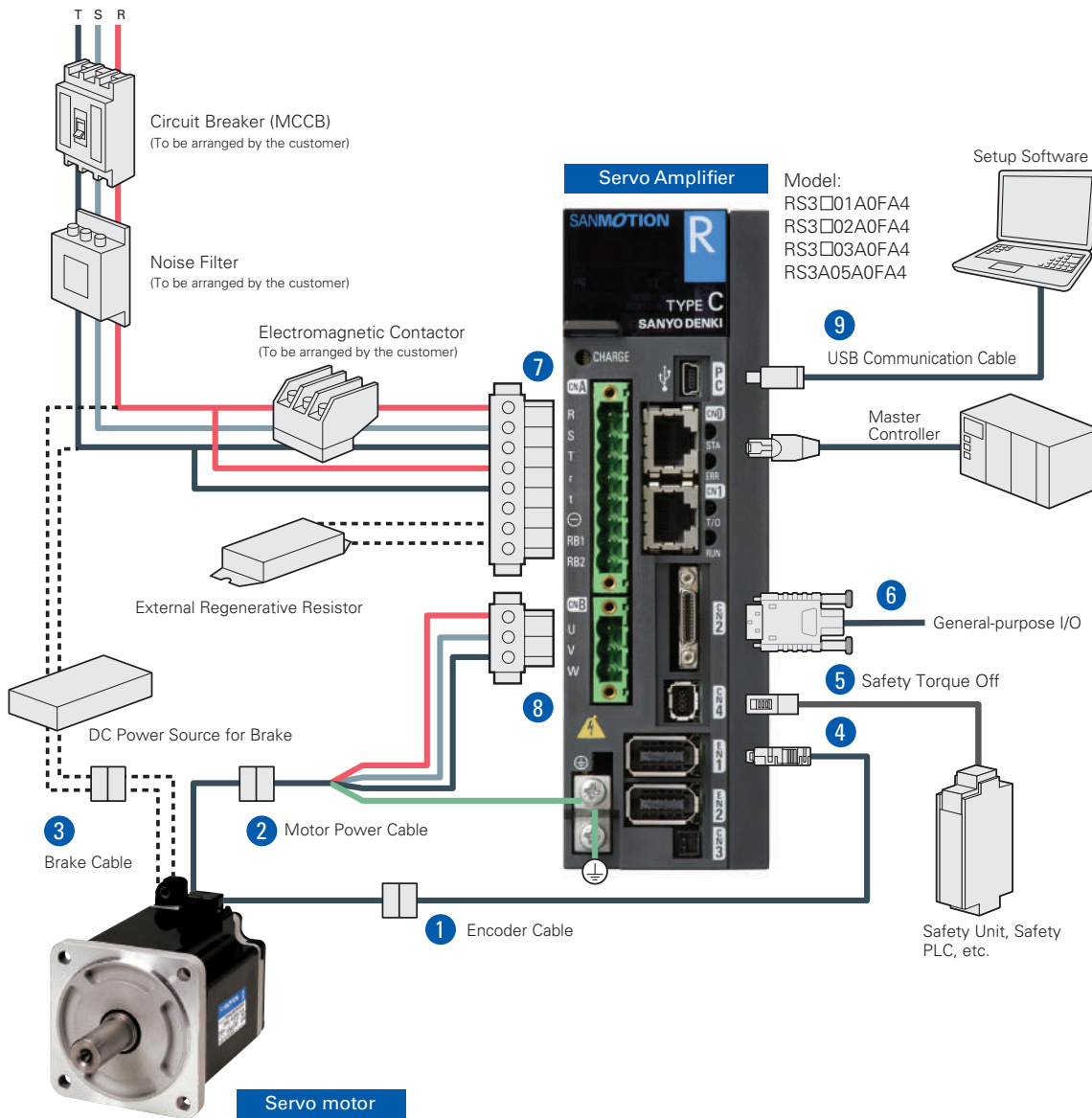
Number of control axis	1 axis
Number of points to be registered	Up to 254 points (P000 to P253) can be set
Max. command amount	-2,147,483,648 to +2,147,483,647
Command unit	mm, deg, or pulse
Rapid feed rate	2,147,483,647 mm/sec (0.001 mm/pulse selected)
Acceleration/deceleration	Automatic acceleration/deceleration (straight line/S-shape switchover)
Point data setting	Set by inputting numeric values using a PC or by teaching
Movement point number setting	Parallel 8 bit (binary code)
Torque limit	0 to 510% (With 100% be the rated torque value) However, less than instantaneous max. stall current
Software limit	Yes
Move mode	Homing, Manual (JOG, 1 Step), Point specified move
Area signal	Up to 8 zones

### Modbus Interface

Item	Content	Default Value	Remark
Protocol	Modbus-RTU	-	Fixed to binary mode (ASCII mode is not supported)
Interface	RS-485 (1:N)	-	N=8
Baud rate (bps)	4800, 9600, 19200, 38400, 57600, 115200	115200	Set up with setup software or rotary switch on the front surface of the amplifier.
Start bit	1	1	Fixed
Data length (bit)	8	8	Fixed
Parity	None, even/odd number	even	(Note 3)
Stop bit	1, 2	1	(Note 3)
Electric specification	Based on RS-485 (half duplex communication)	RS-485 compliant (half duplex communication)	Fixed
Connector	RJ-45	-	-

Note: This servo amplifier can be connected to up to 8 axes per segment. When connecting 8 axes or more, contact us for details.

# System Configuration: 10A, 20A, 30A, 50A

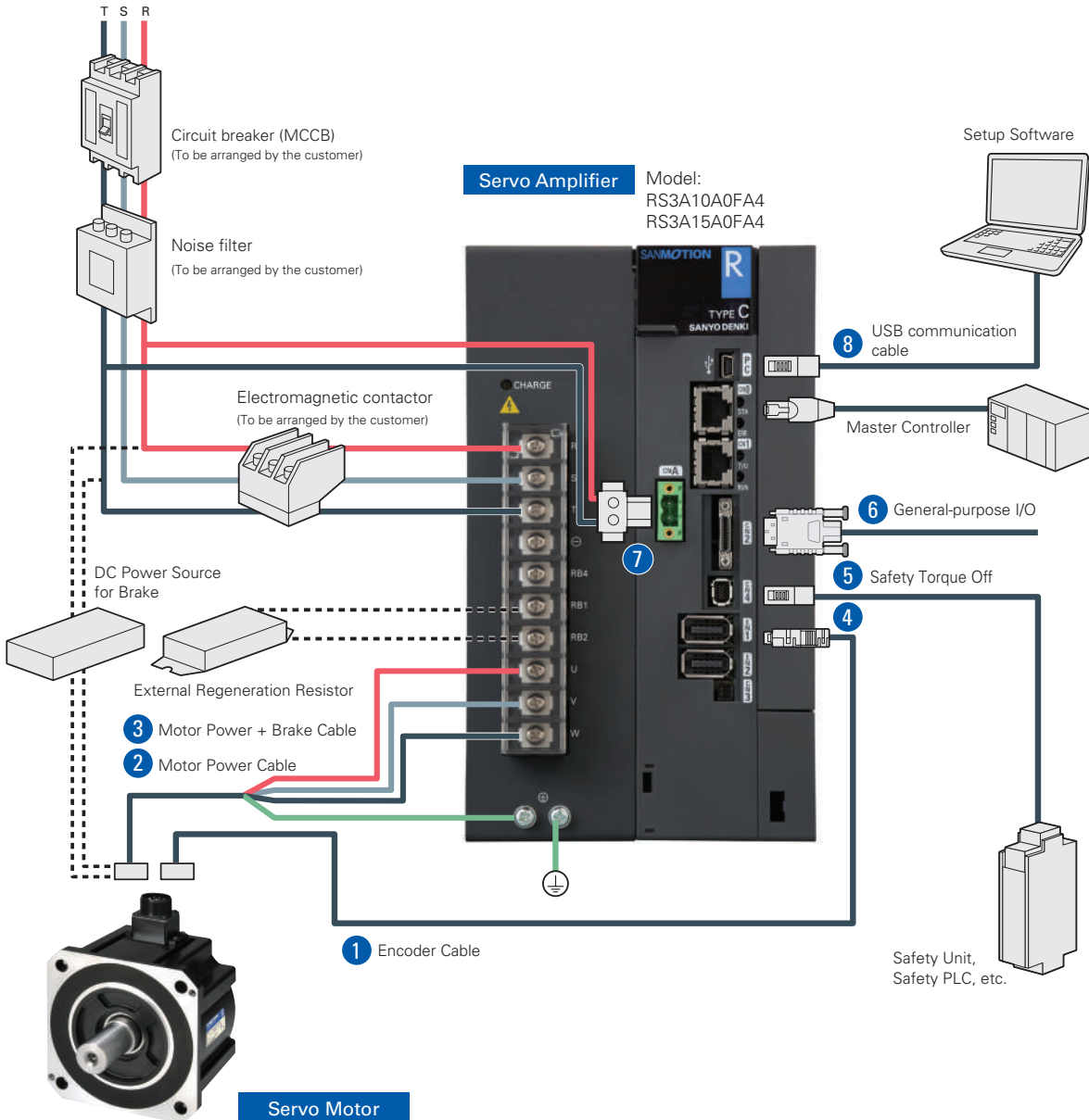


Item	Parts Number	Description
✓ 1	Encoder Cable: 10 ft EEXTKABS2410FT EEXTKABS24JN10FT	For 0.55 kW and 1.2 kW motor
✓ 2	Motor Power Cable: 10 ft MEXTK1810FT MEXTK18JN10FT MEXTK14JN10FT	For 0.55 kW motor For 1.2 kW motor
✓ 3	Brake Cable: 10 ft MEXTBRK2010FT	Only for Brake Equipped Motor
✓ 4	Connector [EN1] AL-Y0012504-01	No need if Encoder Cable (1) is selected
5	Connector [CN4] AL-00718252-01	For STO
6	Connector [CN2] AL-00842383	For general purpose I/O
7	Connector [CNA] AL-00686902-01	Supplied with Amplifier
✓ 8	Connector [CNB] AL-Y0004079-01	No need if Motor Power Cable (2) is selected
✓ 9	USB Communication Cable: 1m AL-00896515-01	Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.

# AC SERVO SYSTEMS

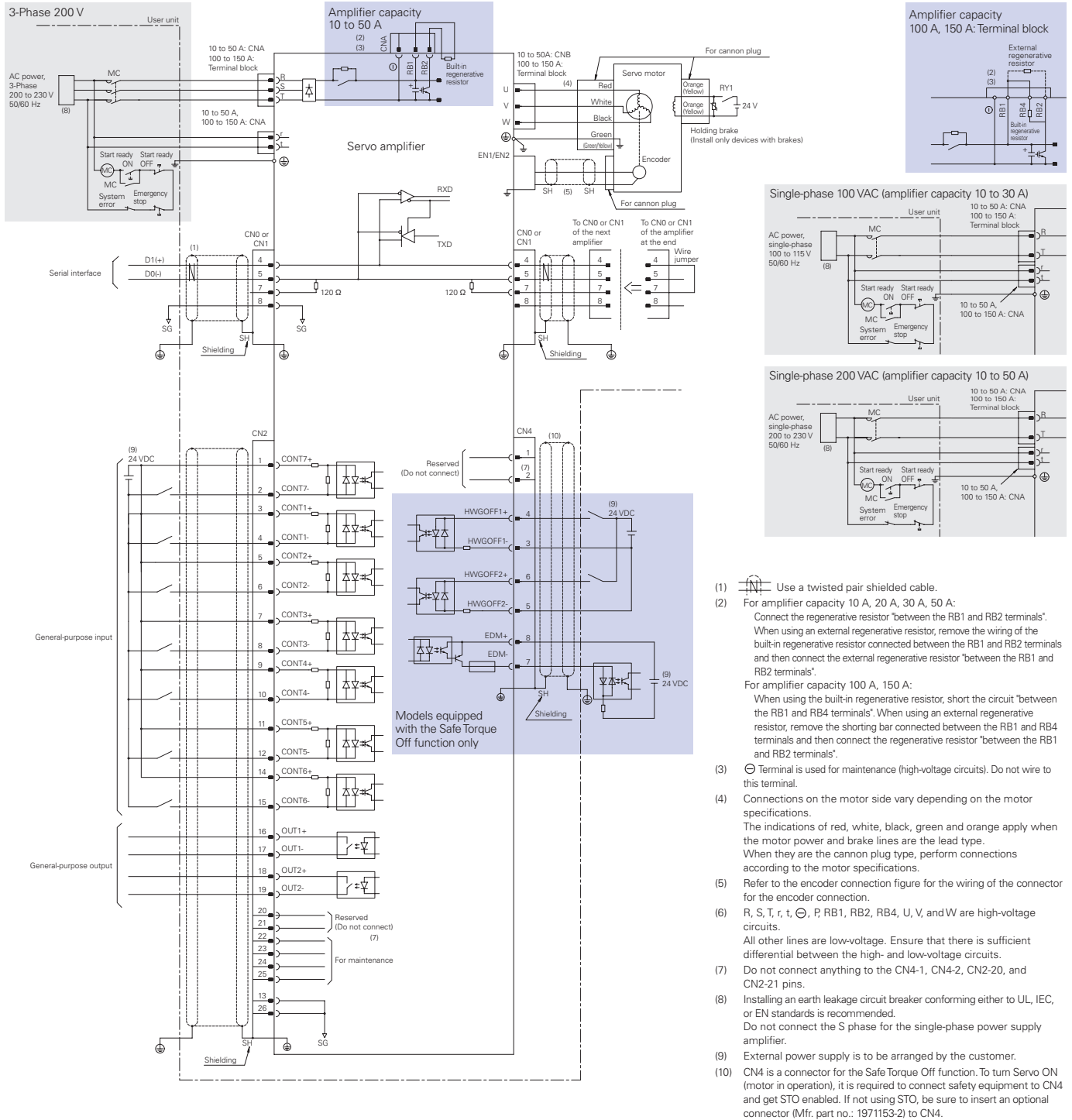
## System Configuration: 100A, 150A



Item	Parts Number	Description
✓ 1	EEXTKABS24JN10FT	Encoder Cable: 10 ft
✓ 2	MEXT10JN10FT MEXT08JN10FT	Motor Power Cable: 10 ft For 2 kW motor For 5 kW motor
✓ 3	MEXTB10JN10FT MEXTB08JN10FT	Motor Power + Brake Cable: 10 ft For brake equipped 2 kW motor For brake equipped 5 kW motor
✓ 4	AL-Y0012504-01	Connector [EN1] No need if Encoder Cable (1) is selected
5	AL-00718252-01	Connector [CN4] For STO
6	AL-00842383	Connector [CN2] For general purpose I/O
7	AL-00686902-01	Connector [CNA]
✓ 8	AL-Y0004079-01	Connector [CNB] No need if Motor Power Cable (2) is selected
✓ 10	AL-00896515-01	USB Communication Cable: 1m Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.

# Wiring Diagram



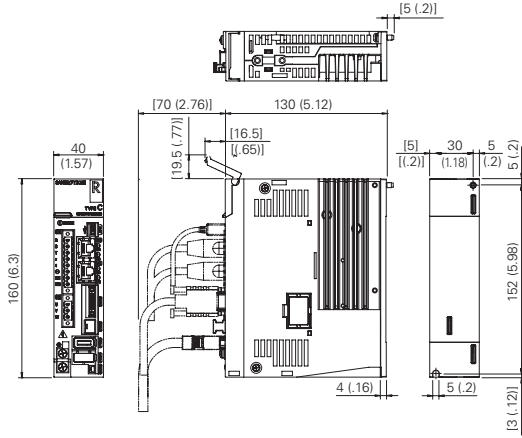
- (1) Use a twisted pair shielded cable.
- (2) For amplifier capacity 10 A, 20 A, 30 A, 50 A:  
 Connect the regenerative resistor between the RB1 and RB2 terminals\*.  
 When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 terminals and then connect the external regenerative resistor between the RB1 and RB2 terminals\*.
- For amplifier capacity 100 A, 150 A:  
 When using the built-in regenerative resistor, short the circuit between the RB1 and RB4 terminals\*. When using an external regenerative resistor, remove the shorting bar connected between the RB1 and RB4 terminals and then connect the regenerative resistor between the RB1 and RB2 terminals\*.
- (3) Terminal used for maintenance (high-voltage circuits). Do not wire to this terminal.
- (4) Connections on the motor side vary depending on the motor specifications.  
 The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type.  
 When they are the cannon plug type, perform connections according to the motor specifications.
- (5) Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- (6) R, S, T, r, t, P, RB1, RB2, RB4, U, V, and W are high-voltage circuits.  
 All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- (7) Do not connect anything to the CN4-1, CN4-2, CN2-20, and CN2-21 pins.
- (8) Installing an earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended.  
 Do not connect the S phase for the single-phase power supply amplifier.
- (9) External power supply is to be arranged by the customer.
- (10) CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.

## Dimensions

Unit: mm (inch)

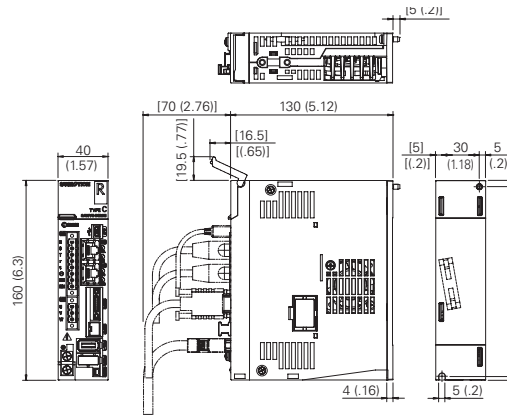
### ■ RS3□01A0FA4

Mass: 0.8 kg (1.76 lb)



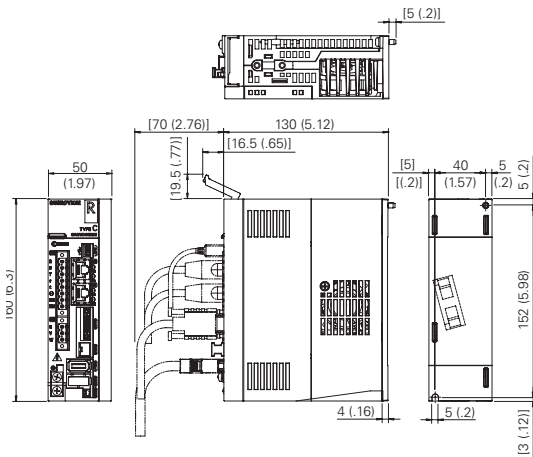
### ■ RS3□02A0FA4

Mass: 0.8 kg (1.76 lb)



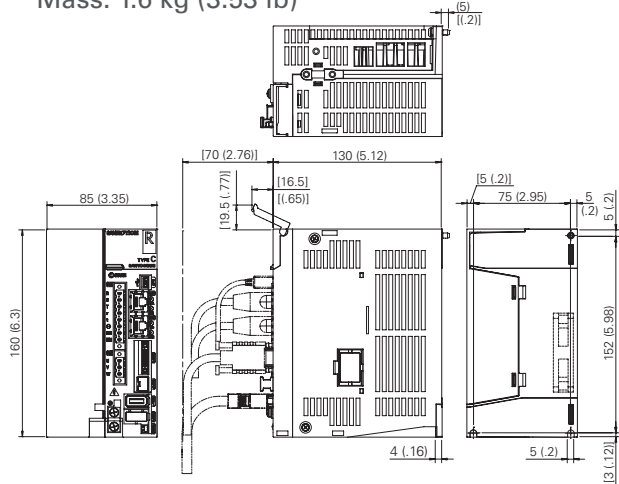
### ■ RS3□03A0FA4

Mass: 0.9 kg (1.98 lb)



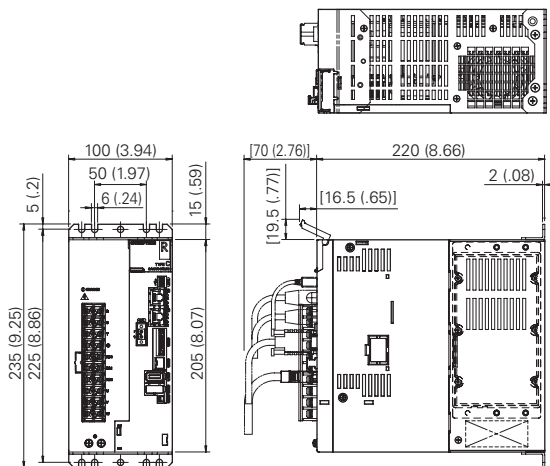
### ■ RS3A05A0FA4

Mass: 1.6 kg (3.53 lb)



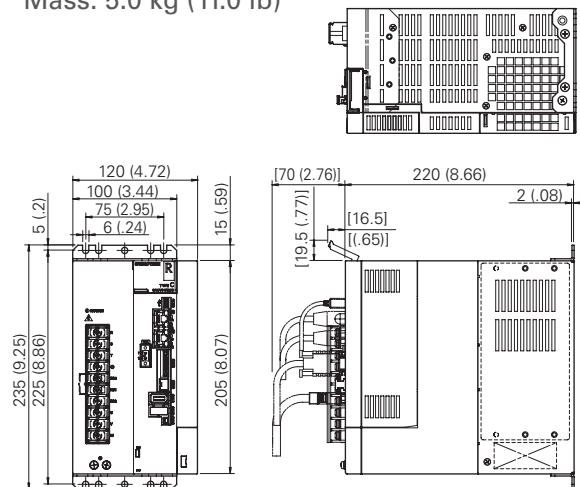
### ■ RS3A10A0FA4

Mass: 4.2 kg (9.26 lb)



### ■ RS3A15A0FA4

Mass: 5.0 kg (11.0 lb)



# EtherCAT Interface Servo Amplifier



Control function	Speed control/Torque control/Position control (Parameter changeover)	
Main circuit power	Three-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz	
	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 1) Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)	
Control circuit power	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz ± 3Hz	
	Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)	
Environment	Ambient temperature	0 to +55°C
	Storage temperature	-20 to +65°C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s <sup>2</sup>
Shock	19.6 m/s <sup>2</sup>	
Structure	Built-in tray type power supply	

Note 1) Single-phase 200 VAC class input can be used with RS3A01A0HA4, RS3A02A0HA4, RS3A03A0HA4, RS3A05A0HA4 models only.

Note 2) Single-phase 100 VAC class input can be used with RS3E01A0HA4, RS3E02A0HA4, RS3E03A0HA4 models only.

## Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	2200 Hz (In high frequency sampling mode) *Differs for each model.
Allowable load inertia moment	10 times motor rotor inertia moment

## Built-in Functions

Protection functions	Over current, Current detection error, Overload, Regeneration error, Overheat error, External overheating, Over voltage, Main circuit power low voltage, Main circuit power supply open phase, Control power supply low voltage, Encoder error, Over speed, Speed control error, Speed feedback error, Excessive position, Position command pulse error, Built-in memory error, Parameter error, Cooling fan error.
Digital operator	Status display, Monitor display, Alarm display, Test operation
Dynamic brake circuit	Built-in
Regenerative resistor	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min <sup>-1</sup> )
	Torque (thrust force) command monitor (TCMON) 2.0 V±10% (at 100%)

## Safety Standard

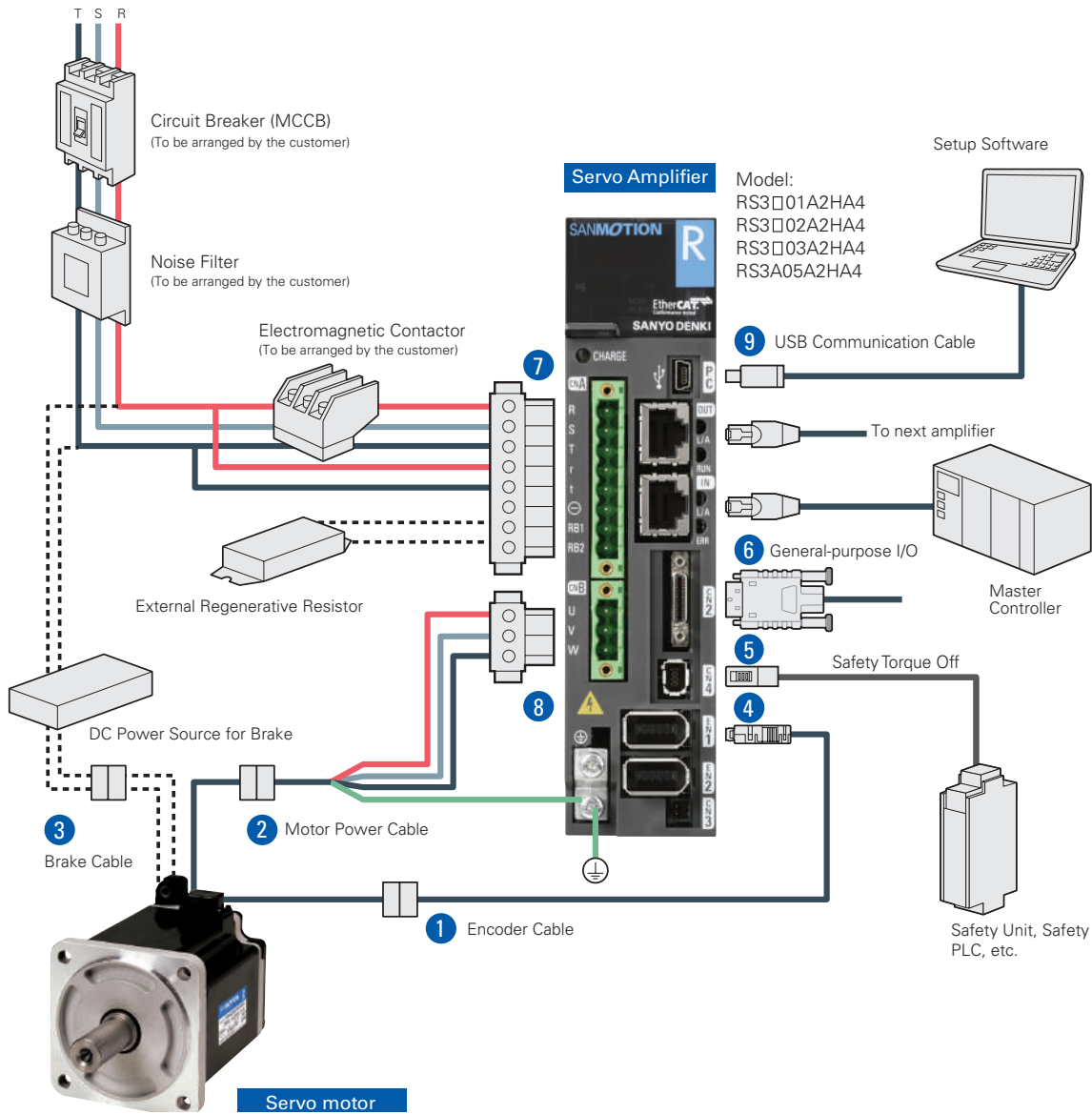
Servo amplifier type	Safety standards		
All models	UL, c-UL ratings		UL 61800-5-1
	EN standards	Low-voltage directive	IEC/EN 61800-5-1
		EMC directive	<ul style="list-style-type: none"> <li>• IEC/EN 61000-6-4</li> <li>• IEC/EN 61000-6-2</li> <li>• EN61000-6-7</li> </ul> <ul style="list-style-type: none"> <li>• IEC/EN 61800-3</li> <li>• IEC/EN 61326-1</li> </ul>
	KC mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4
Model with safety function	Function safety standards		<ul style="list-style-type: none"> <li>• IEC61508, SIL3</li> <li>• IEC62061, SILCL3</li> <li>• ISO13894-1, Cat3, PL=e</li> </ul>

## EtherCAT Interface Specifications

Physical layer	IEC61158-2 IEEE802.3u 100BASE-TX
Data link layer	IEC61158-3,-4 Type12
Application layer	IEC61158-5,-6 Type12
Device profile	IEC61800-7 Profile type1(CiA402) CoE (CANopen over EtherCAT) FoE (File access over EtherCAT)
Communication port	RJ45 connector (2 ports)
Baud rate	100 Mbps (Full duplex)
Max. No. of nodes	65535 nodes
Transmission distance/topology	Max. 100 m (between nodes)/Daisy-chain
Cable	Twisted-pair CAT5e (straight or cross)
Communication object	SDO (Service Data Object) PDO (Process Data Object)
Minimum communication cycle time	125 µs (62.5 µs: speed/torque control only)
PDO length	Output: Max. 31 objects, Input: Max. 31 objects Total: Max. 62 objects
Synchronization function	SYNC0, SYNC1 Event Synchronization Mode, Synchronous with SM2 Event Mode, Asynchronous Mode
Operation mode	Profile Position Mode, Profile Velocity Mode, Profile Torque Mode, Homing Mode, Cycle Sync Position Mode, Cycle Sync Velocity Mode, Cycle Sync Torque Mode
LED indicator	Port 0/1 link display, RUN display, error display
General Input/Output	7 inputs, 2 outputs (9 total)

# AC SERVO SYSTEMS

## System Configuration: 10A, 20A, 30A, 50A

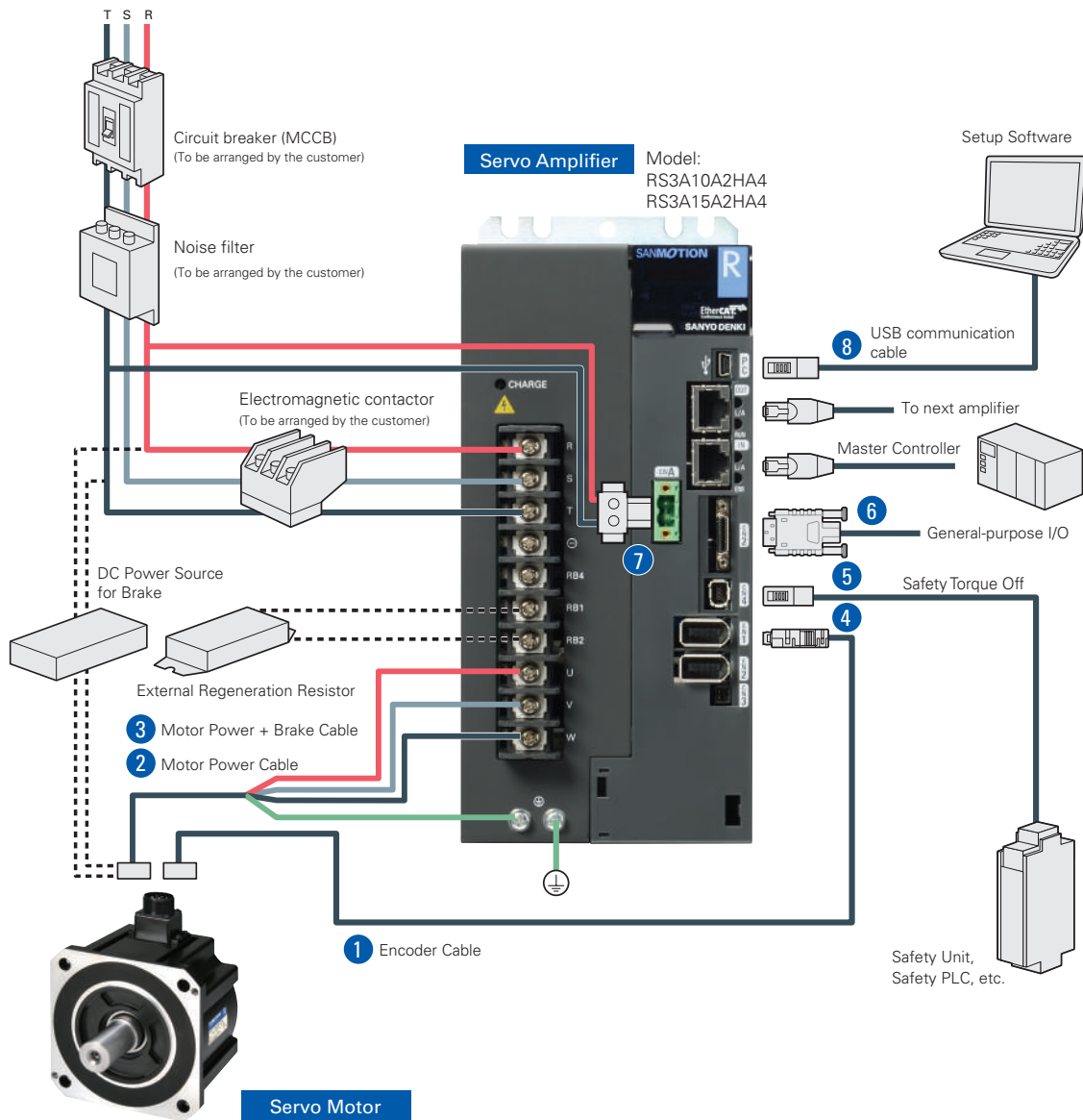


Item	Parts Number	Description
✓ 1	EEXTKABS2410FT EEXTKABS24JN10FT	Encoder Cable: 10 ft For 0.55 kW and 1.2 kW motor
✓ 2	MEXTK1810FT MEXTK18JN10FT MEXTK14JN10FT	Motor Power Cable: 10 ft For 0.55 kW motor For 1.2 kW motor
✓ 3	MEXTBRK2010FT MEXTB08JN10FT	Brake Cable: 10 ft Only for brake equipped motor For brake equipped 5 kW motor
✓ 4	AL-Y0012504-01	Connector [EN1, EN2] No need if Encoder Cable (1) is selected
5	AL-00718252-01	Connector [CN4] For STO, no need if safety device is not installed
6	AL-00842383	Connector [CN2] For general I/O signals
7	AL-Y0005159-01	Connector [CNA] Supplied with Amplifier
8	AL-Y0004079-01	Connector [CNB] No need if Motor Power Cable (2) is selected
✓ 9	AL-00896515-01	USB Communication Cable: 1m Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.



# System Configuration: 100A, 150A

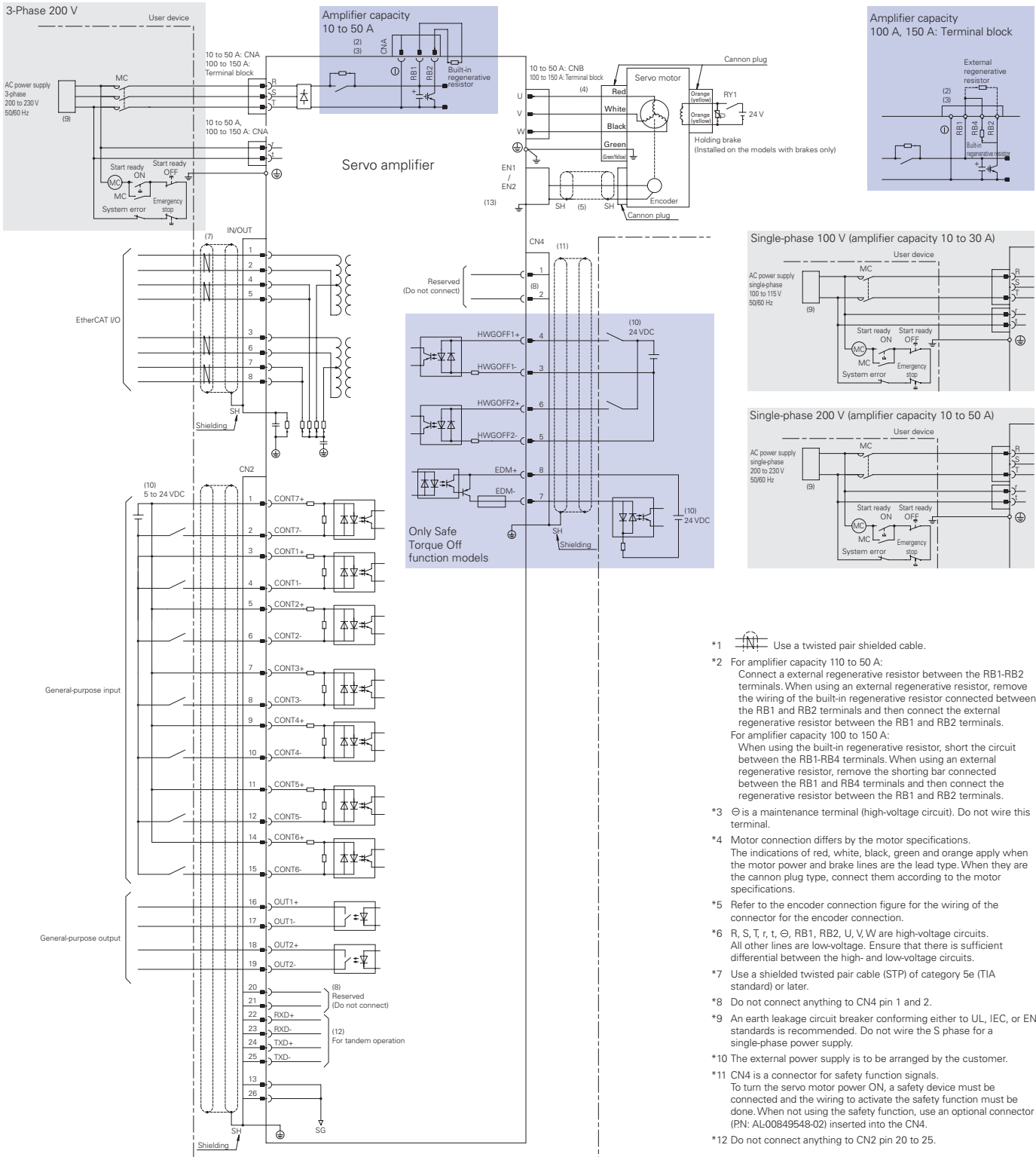


Item	Parts Number	Description
✓ 1	EEXTKABS24JN10FT	Encoder Cable: 10 ft
✓ 2	MEXT10JN10FT MEXT08JN10FT	Motor Power Cable: 10 ft For 2 kW motor For 5 kW motor
✓ 3	MEXTB10JN10FT MEXTB08JN10FT	Motor Power + Brake Cable: 10 ft For brake equipped 2 kW motor For brake equipped 5 kW motor
4	AL-Y0012504-01	Connector [EN1, EN2] No need if Encoder Cable (1) is selected
5	AL-00718252-01	Connector [CN4] For STO, no need if safety device is not installed
6	AL-00842383	Connector [CN2] For general I/O signals
✓ 7	AL-Y0005159-01	Connector [CNA]
✓ 8	AL-00896515-01	USB Communication Cable: 1m Communication with SANMOTION MOTOR Setup software
9	AL-00880402-01	Battery [CN3] Used when using a battery -backup method absolute encoder

All items marked with a check must be included to build a complete system.

# AC SERVO SYSTEMS

## Wiring Diagram

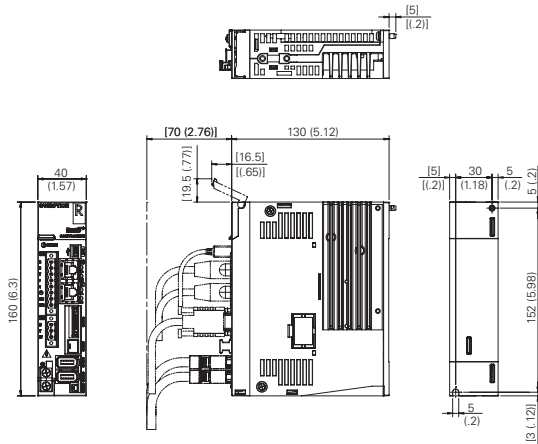


# Dimensions

Unit: mm (inch)

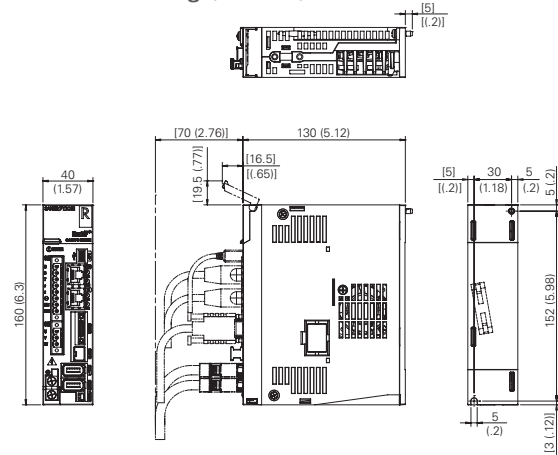
## ■ RS3□01A2HA4

Mass: 0.8 kg (1.76 lb)



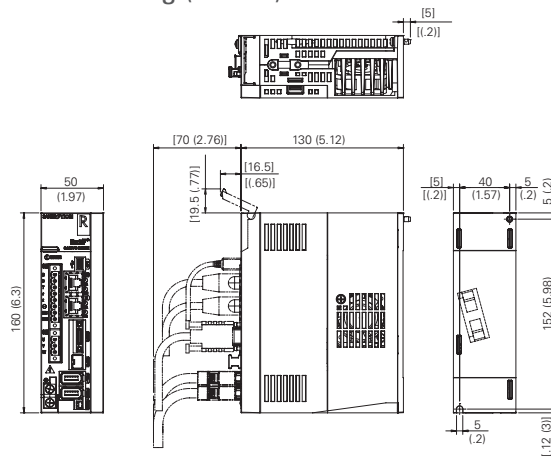
## ■ RS3□02A2HA4

Mass: 0.8 kg (1.76 lb)



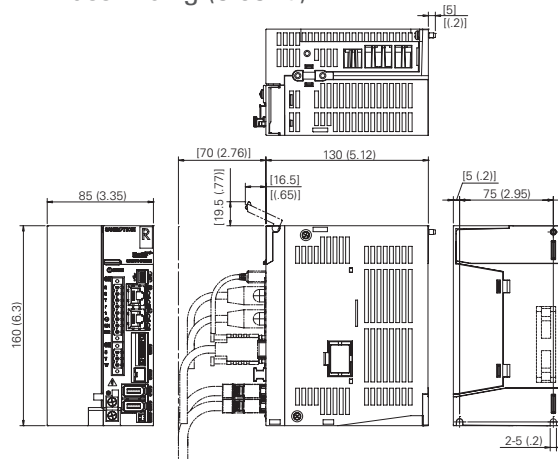
## ■ RS3□03A2HA4

Mass: 0.9 kg (1.98 lb)



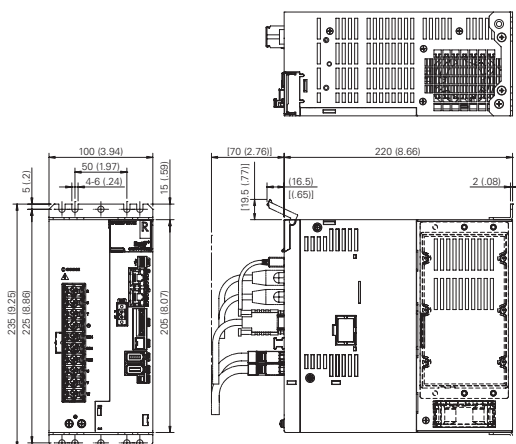
## ■ RS3A05A2HA4

Mass: 1.6 kg (3.53 lb)



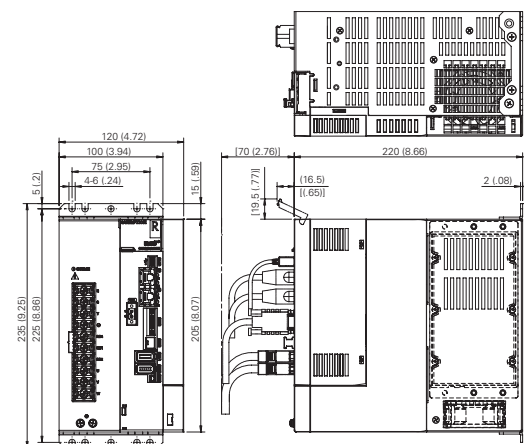
## ■ RS3A10A2HA4

Mass: 4.2 kg (9.26 lb)



## ■ RS3A15A2HA4

Mass: 4.9 kg (10.8 lb)



### Specifications

Control function	Position control	
Main circuit power	48 VDC $\pm$ 10% (Note 1)	
Control circuit power	5 VDC $\pm$ 5% (Note 2)	
Environment	Ambient temperature	0 to +40°C (Note 3)
	Storage temperature	-20 to +65°C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s <sup>2</sup> Frequency range 10 to 55 Hz tested for 2 hours in each direction X.Y.Z
Shock	19.6 m/s <sup>2</sup>	
Structure	Built-in tray type power supply	

Note 1) Enter the voltage within specification ranges to the power source voltage of the main circuit.

Note 2) The control power source is used as the power source to the encoder.  
Even if the voltage input is within the specification field, when the wiring is long to the encoder, the voltage may decrease as a result of the wiring and the encoder may not operate properly.

Note 3) Use within the operation ambient temperature range.

### Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	1200 Hz

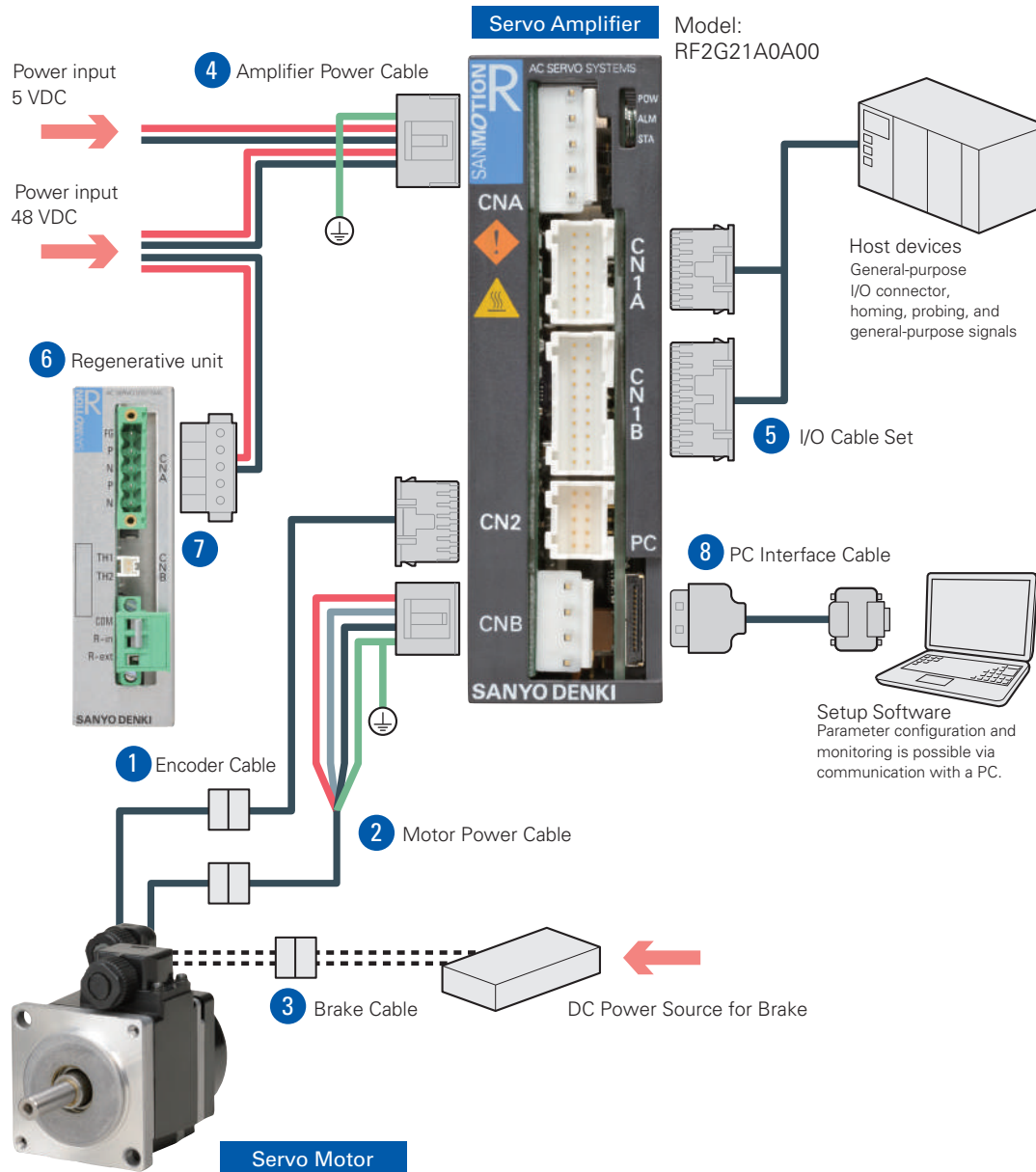
### Built-in Functions

Protection functions	Over current, Current detection error, Overload, Amplifier overheating, External overheating, Over voltage, Main circuit power low voltage, Control power supply low voltage, Encoder error, Over velocity, Velocity control error, Velocity feedback error, Excessive position, Position command pulse error, Built-in memory error, Parameter error
LED display	Status display, Alarm display, Power-supplied-state display
Dynamic brake circuit	Built-in

### Input Command

Position command	Maximum input pulse frequency	5M PPS (reverse rotation + normal rotation pulse and code + pulse) 1.25M PPS (90° phase difference, two-phase pulse)
	Input pulse configuration	Normal rotation + reverse rotation command pulse, code + pulse train command, or 90° phase difference, two-phase pulse train command
	Electronic gear	N/D (N=1 through 2097152, D=1 through 2097152), 1/2097152 $\leq$ N/D $\leq$ 2097152
Sequence input signal	Servo-on, alarm reset, torque limit, encoder-clear, forward rotation prohibit, reverse rotation prohibit, command prohibit, external trip, forced discharge, emergency stop, gain switching, internal velocity setting, etc.	
Sequence output signal	Servo-ready, power-on, servo-on, holding brake timing, torque and velocity limited state, low velocity, velocity attainment, velocity-matching, zero-velocity, command acceptable, status of gain switch, velocity loop proportional control state, control mode switching state, forward OT, reverse OT, warning, alarm code (3 bits), etc.	
Position output signal	N/32768 (N=1 through 32767), 1/N (N=1 through 64) or 2/N (N=2 through 64)	

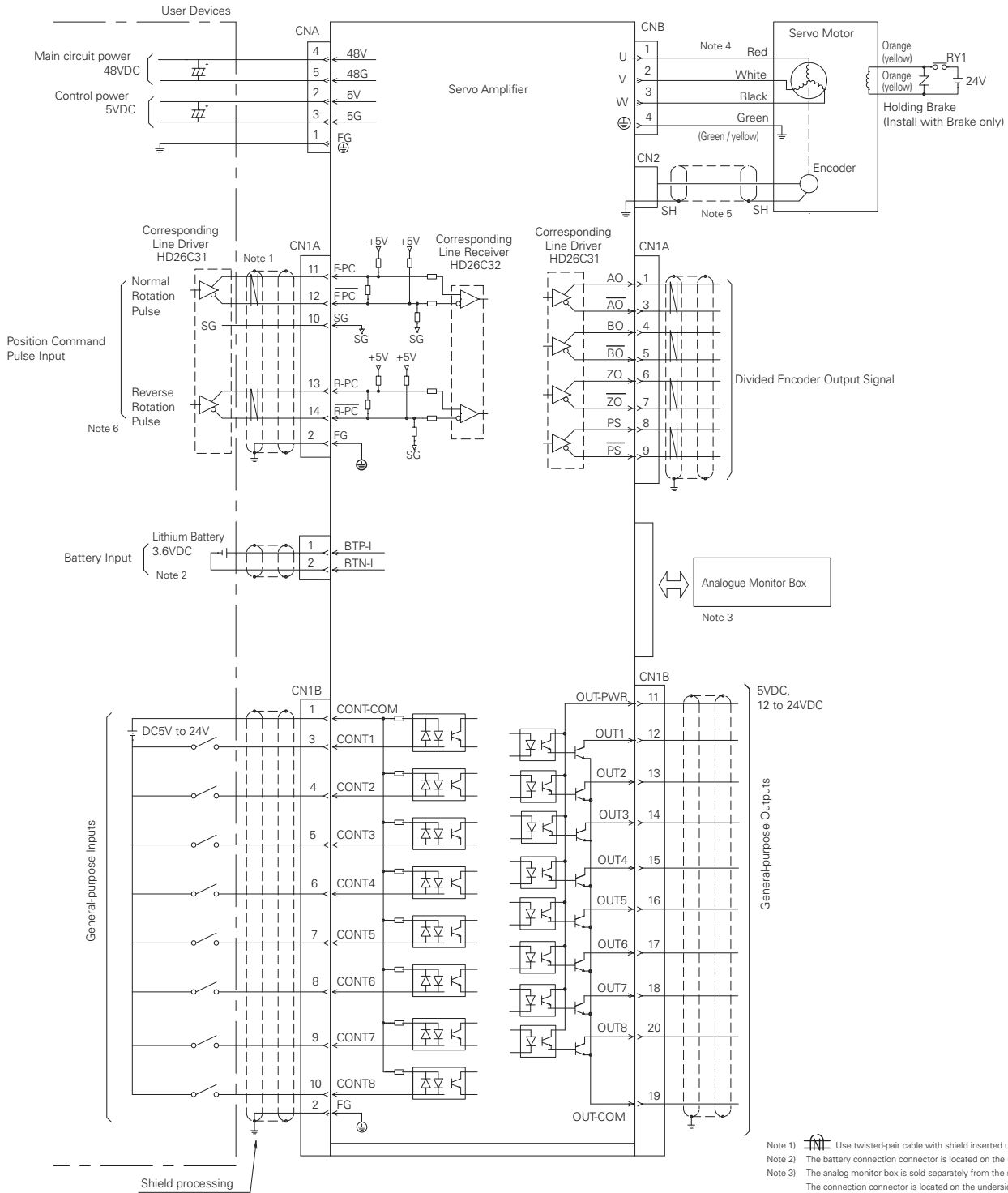
# System Configuration



Item	Parts Number	Description
✓ 1 Encoder Cable: 10 ft	EEXTGABS2410FT	
✓ 2 Motor Power Cable: 10 ft	MEXTG1810FT	
✓ 3 Brake Cable: 10 ft	MEXTGBRK2010FT	Only for Brake Equipped Motor
✓ 4 Amplifier Power Cable: 2 m	AL-00745943-01	
✓ 5 I/O Cable Set, for CN1A and CN1B	AL-00745949-01	
6 Regenerative Unit	RF1BB00	No need if I/O Cable (5) is selected
7 Connector [CNA]	AL-00329461-01	
✓ 8 PC Interface Cable	AL-00490833-01	Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.

## Wiring Diagram



External power sources must be supplied by user.

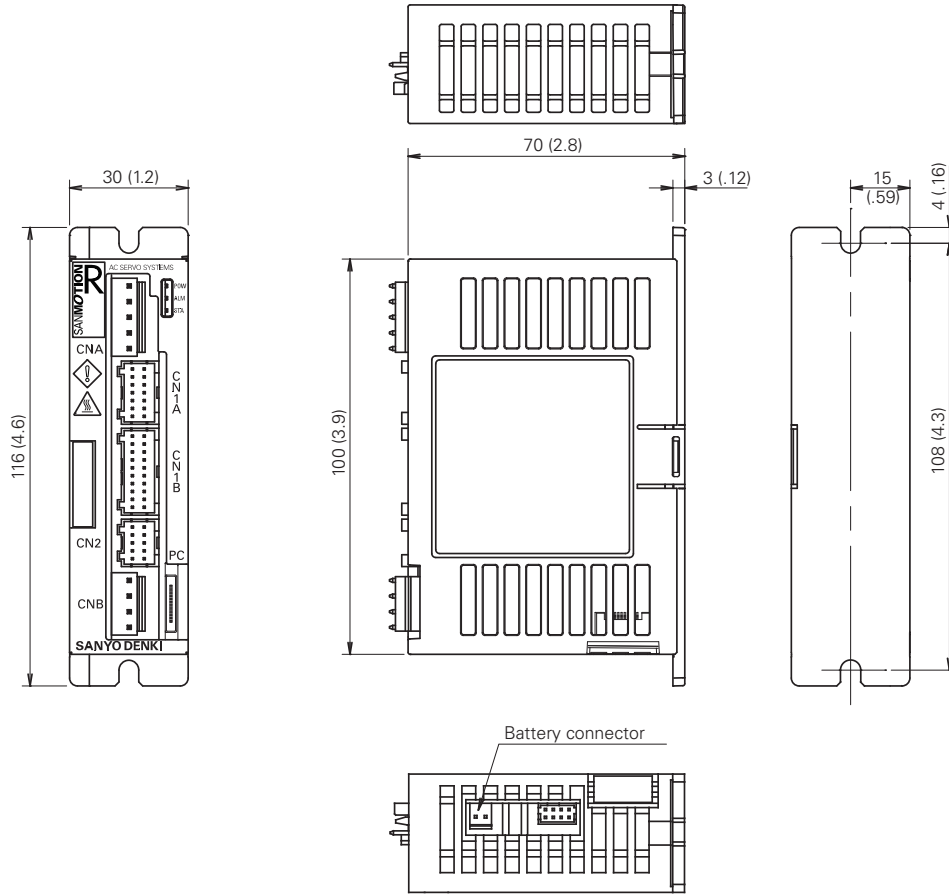
- Note 1) Use twisted-pair cable with shield inserted under jacket.
- Note 2) The battery connection connector is located on the underside of the amplifier.
- Note 3) The analog monitor box is sold separately from the servo amplifier. The connection connector is located on the underside of the amplifier.
- Note 4) The motor-side connection depends on the motor specification. Red, white, black, green, orange tags indicate lead types for the motor power lines and brake wires.
- Note 5) Refer to the encoder connection diagram in the instruction manual.
- Note 6) Connect the SG (signal ground) between the servo amplifier and equipment.

# Dimensions

Unit: mm (inch)

## RF2G21A0A00

Mass: 0.23 kg (0.51 lb)



### Specifications

Amplifier Model		RS2K04A2HA5	RS2J04A2HA5
Control function		Position control/Speed control/Torque control (Parameter changeover)	
Main circuit power		48 VDC ±10%	24 VDC ±10%
Control circuit power		24 VDC ±10%	
Environment	Ambient temperature	0 to + 40°C	
	Storage temperature	-20 to + 65°C	
	Operation/Storage humidity	Below 90% RH (no condensation)	
	Elevation	Below 1000 m	
	Vibration	5 m/s <sup>2</sup> Frequency range 10 to 55 Hz tested for 2 hours in each direction X.Y.Z	
	Shock	20 m/s <sup>2</sup>	
Structure		Built-in tray type power supply	

### Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	800 Hz

### Built-in Functions

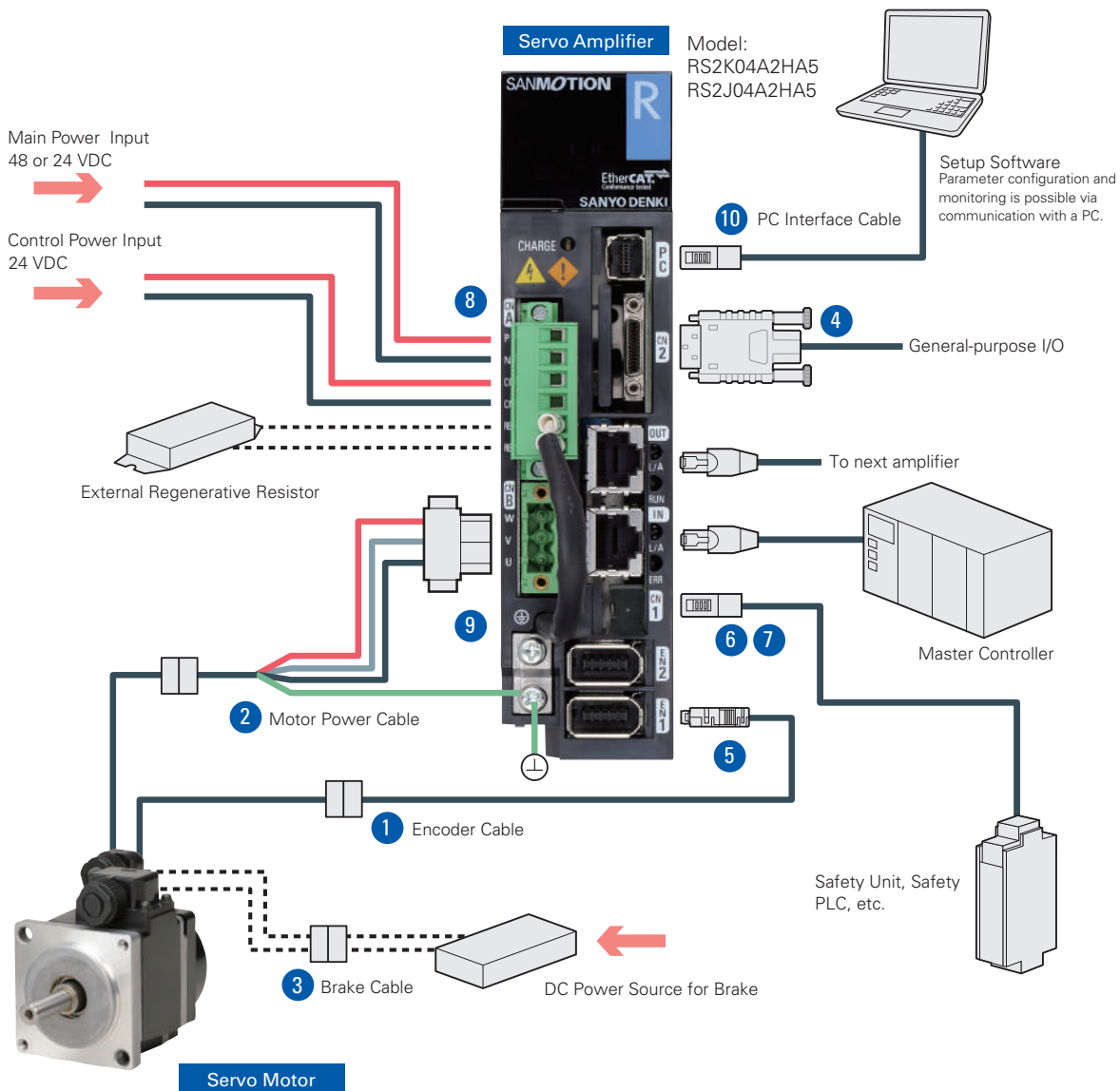
Protection functions	Over current, Current detection error, Over load, Regeneration error, Magnetic pole position estimation error, Amplifier overheating, External overheating, Over voltage, Main circuit power low voltage, Main circuit power supply open phase, Control power supply low voltage, encoder error, Over speed, Speed control error, Speed feedback error, Excessive position, Position command error, Built-in memory error, Parameter error.
LED display	Status display, Monitor display, Alarm display, Test operation, Adjustment mode
Dynamic brake circuit	Built-in
Regeneration process circuit	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min <sup>-1</sup> ) Torque monitor (TCMON) 2.0V±10% (at 100%)

### EtherCAT Interface Specifications

Physical layer	IEC61158-2 IEEE802.3u 100BASE-TX
Data link layer	IEC61158-3,-4 Type12
Application layer	IEC61158-5,-6 Type12
Device profile	IEC61800-7 Profile type1(CiA402) <ul style="list-style-type: none"> <li>• CoE (CANopen over EtherCAT)</li> <li>• FoE (File access over EtherCAT)</li> </ul>
Communication port	RJ45 connector (2 ports)
Baud rate	100 Mbps (Full duplex)
Max. No. of nodes	65535 nodes
Transmission distance/topology	Max. 100 m (between nodes)/Daisy-chain
Cable	Twisted-pair CAT5e (straight or cross)
Communication object	SDO (Service Data Object) PDO (Process Data Object)
PDO length	Output: Max. 20 objects, Input: Max. 20 objects Total: Max. 40 Bytes
Synchronization function	SYNC0, SYNC1 Event Synchronization Mode (DC Mode), Synchronous with SM2 Event Mode, Asynchronous Mode
Operation mode	Profile Position Mode, Profile Velocity Mode, Profile Torque Mode, Homing Mode, Cycle Sync Position Mode, Cycle Sync Velocity Mode, Cycle Sync Torque Mode
LED indicator	Port 0/1 link display, RUN display, error display
General Input/Output	6 inputs, 2 outputs (8 total)



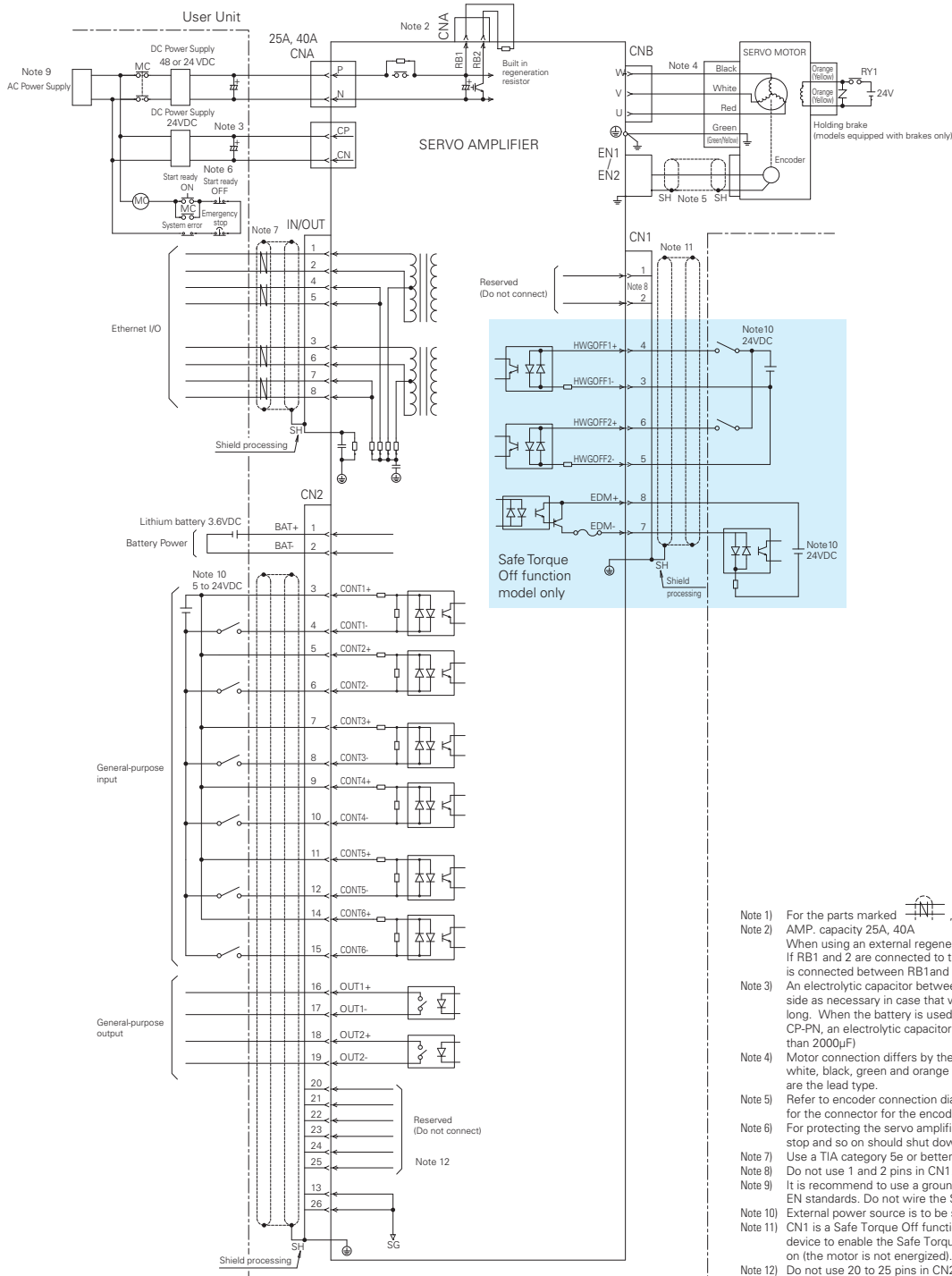
# System Configuration



Item	Parts Number	Description
✓ 1	Encoder Cable: 10 ft EEXTKABS2410FT	
✓ 2	Motor Power Cable: 10 ft MEXTK1810FT	
✓ 3	Brake Cable: 10 ft MEXTBRK2010FT	Only for Brake Equipped Motor
4	I/O Connector [CN2] AL-00842383	
5	Connector [EN1] AL-00632607	No need if Encoder Cable (1) is selected
✓ 6	Connector [CN1] AL-00718252-01	For STO, no need if connector (7) is selected
✓ 7	Connector [CN1] AL-00849548-02	For STO cancellation, no need if connector (6) is selected
8	Connector [CNA] AL-Y0010913-01	Supplied with Amplifier
9	Connector [CNB] AL-Y0004079-01	No need if Motor Power Cable (2) is selected
10	PC Interface Cable AL-00689703-01	Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.

## Wiring Diagram

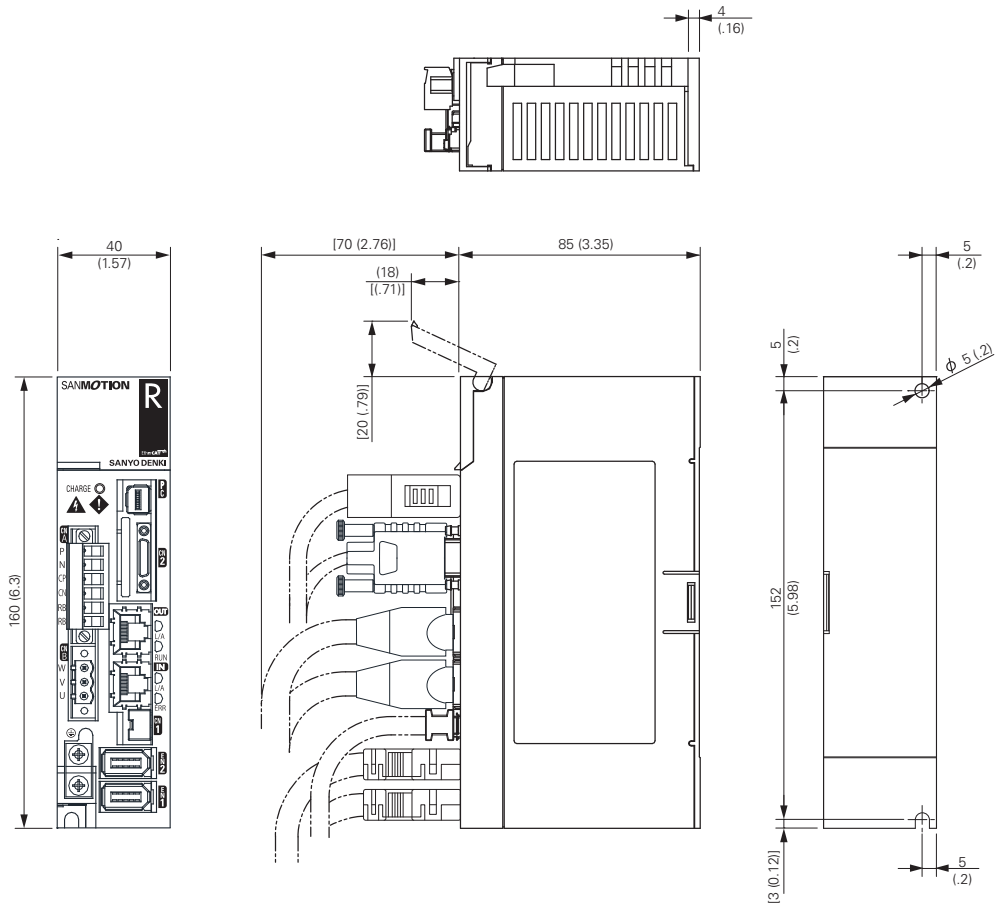


# Dimensions

Unit: mm (inch)

- RS2K04A2HA5
- RS2J04A2HA5

Mass: 0.55 kg (1.2 lb)



### Specifications

Amplifier Model	RF2J14A0HL5	RF2K24A0HL5	RF2J24A8HL5
Combined Motor	2.4 W	20 to 200 W	Linear actuator
Total 4 axes output limitation	9.6 W	300 W	120 W
Control function	Position control/Speed control/Torque control (Parameter switching)		
Main circuit power (Note 1)	48/24 VDC±10% (Note 1)		
Control circuit power	24 VDC±10% (Note 1)		
Environment	Ambient temperature	0 to +55°C	
	Storage temperature	-20 to +65°C	
	Operation/Storage humidity	Below 90% RH (no condensation)	
	Elevation	1000 m or lower	
	Vibration	4.9 m/s <sup>2</sup> freq. range 10 to 55 Hz in X, Y, and Z direction each, within 2 hours	
Shock	19.6 m/s <sup>2</sup>		
Structure	External tray type DC power supply		

Note 1) Always use input voltage within the specification range for the main circuit power supply.

### Performance

Speed control range	1:5000
Frequency characteristics	800 Hz

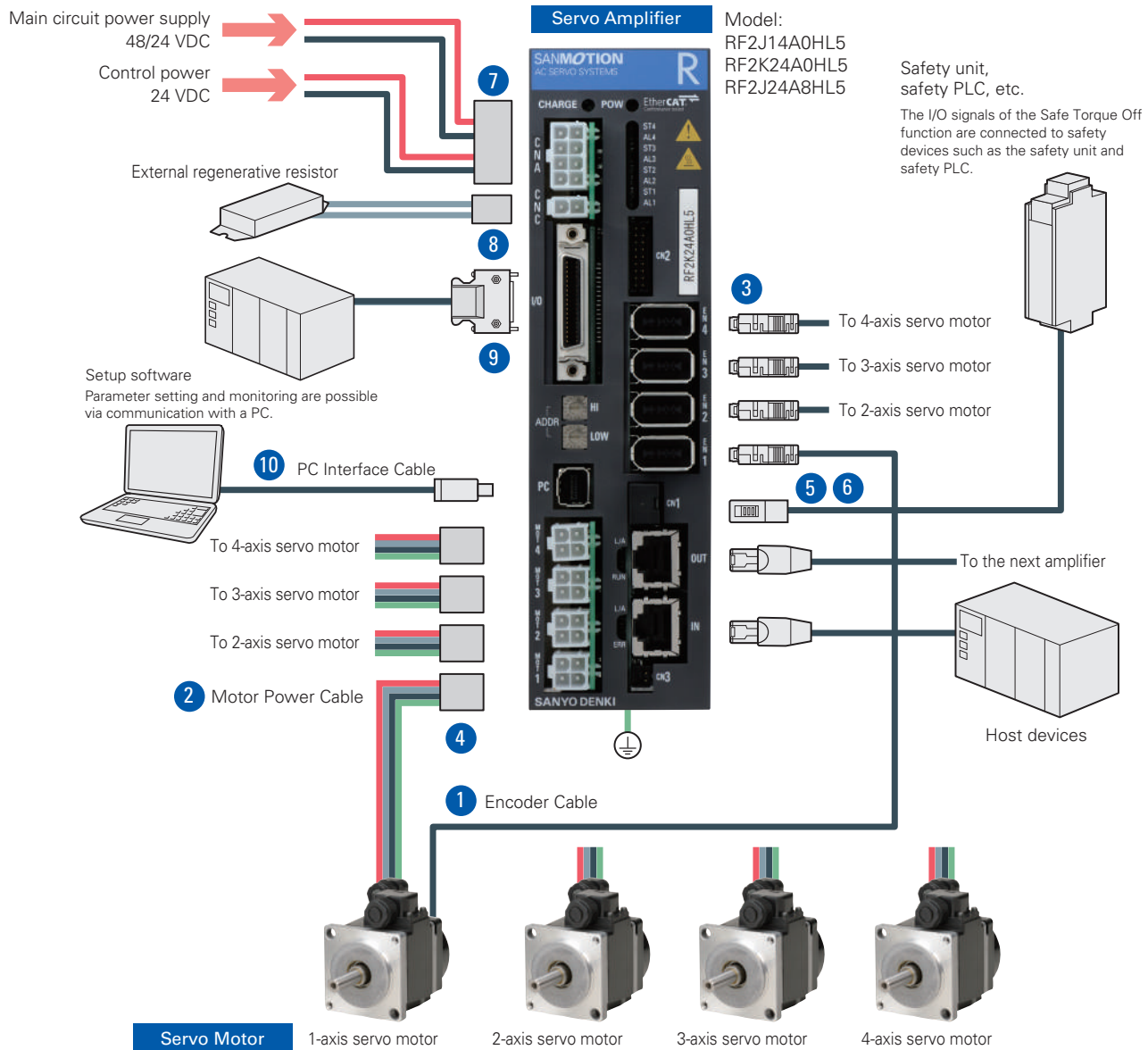
### Built-in Functions

Protection functions	Over current, Current detection error, Overload, Regeneration error, Overheating, External disorder, Over voltage, Main circuit power low voltage, Encoder error, Over speed, Speed control error, Speed feedback error, Unreasonable position deviation, Position command pulse error, Built-in memory error, Parameter error
LED display	Alarm display (red), status display (green), control power establishment (green), main circuit charge (red), communication link (green) × 2, communication RUN (green), communication Error (red)
Regeneration process	External type (Connect to the CNC connector, if a regenerative resistor is required.)

### EtherCAT interface specifications

Physical layer	IEC61158-2 IEEE802.3u 100BASE-TX
Data link layer	IEC61158-3,-4 Type12
Application layer	IEC61158-5,-6 Type12
Device profile	IEC61800-7 Profile type1(CiA402) • CoE (CANopen over EtherCAT) • FoE (File access over EtherCAT)
Communication port	RJ45 connector (2 ports)
Baud rate	100 Mbps (Full duplex)
Max. No. of nodes	65535 nodes
Transmission distance/topology	Max. 100 m (between nodes)/Daisy-chain
Cable	Twisted-pair CAT5e (straight or cross)
Communication object	SDO (Service Data Object) PDO (Process Data Object)
Synchronization types	SYNC0, SYNC1 Event Synchronization Mode, Asynchronous Mode
Operation mode	Profile Position Mode, Profile Velocity Mode, Profile Torque Mode, Homing Mode, Cycle Sync Position Mode, Cycle Sync Velocity Mode, Cycle Sync Torque Mode
LED indicator	Port 0/1 link display, RUN display, error display
General Input/Output	Input: 8 points (total), Output: 2 points / axis (8 points in total)

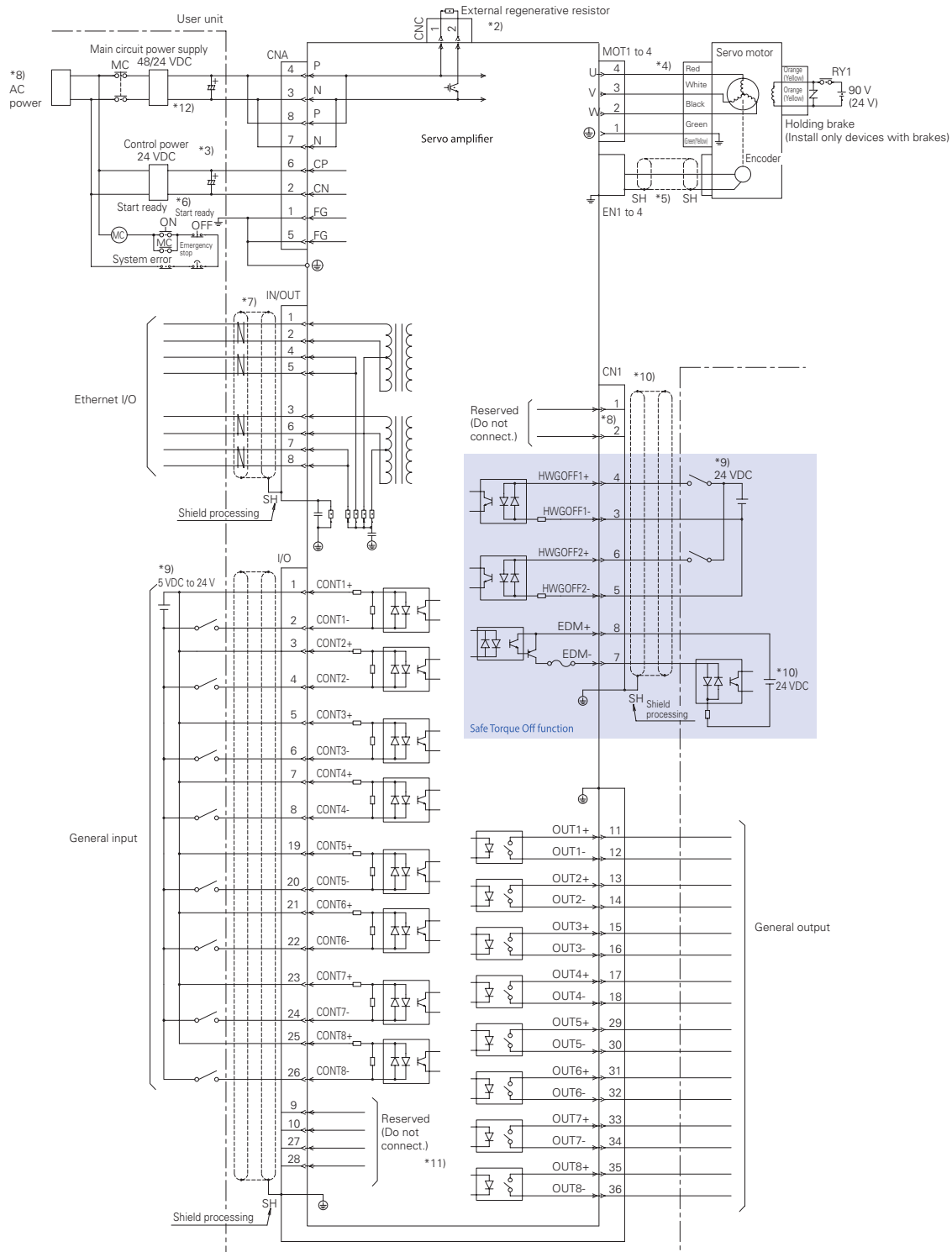
# System Configuration



Item	Parts Number	Description
✓ 1	EEXTKABS2410FT 1026-107008 1026-107024	Encoder Cable: 10 ft For R2GA02D20FXS00E01 and R2GA02D0FXS00E01 For DE0AC001A03MX00E01
✓ 2	1026-107009 1026-107025	Motor Power Cable: 10 ft For DE0AC001A03MX00E01
3	AL-00632607	Connector [EN1 to 4] No need if Encoder Cable (1) is selected
4	AL-00922660	Connector [MOT1 to 4] No need if Motor Cable (2) is selected
5	AL-00718252-01	Connector [CN1] For STO, no need if safety device is not installed
6	AL-00849548-02	Connector [CN1] For STO cancellation, supplied with Amplifier.
✓ 7	AL-00922656	Connector [CNA] For amplifier power supply
8	AL-00922658	Connector [CNC] For regenerative resistor connection
9	AL-00922662	Connector [I/O] For general I/O signal
10	AL-00490833-01	PC Interface Cable Communication with SANMOTION MOTOR Setup software

All items marked with a check must be included to build a complete system.

## Wiring Diagram



\*1 Use a twisted pair shielded cable.

\*2 The servo amplifier contains an internal regenerative process circuit. If DC voltage increases due to the regenerative power occurring when the motor is stopped, connect a regenerative resistor.

\*3 When the wiring from the DC power supply to the servo amplifier is long, install an electrolytic capacitor on the amplifier side between P-N and CP-CN if necessary.  
 When using a battery for the DC power supply between P-N and CP-CN, always install an electrolytic capacitor (2000 µF or more).

\*4 Motor connection differs by the motor specifications. The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type.

\*5 Refer to the encoder connection figure for the wiring of the connector for the encoder connection.

\*6 Turn the power off as a way to shut off the main circuit power for the protection of the servo amplifier during emergency stops.

\*7 Use a shielded twisted pair cable (STP) with Category 5e (TIA standards) or higher.

\*8 An earth leakage circuit breaker conforming to UL and either IEC or EN standards is recommended.

\*9 The external power supply is to be arranged by the customer.

\*10 CN1 is a connector for the Safe Torque Off function. Connect the connector to the safety function to make the Safe Torque Off function active. Otherwise, the servo will not be turned on (no power to the motor).

\*11 Do not connect anything to I/O-9, 10, 27 and 28.

\*12 Contact us for main circuit power supply 24 VDC.

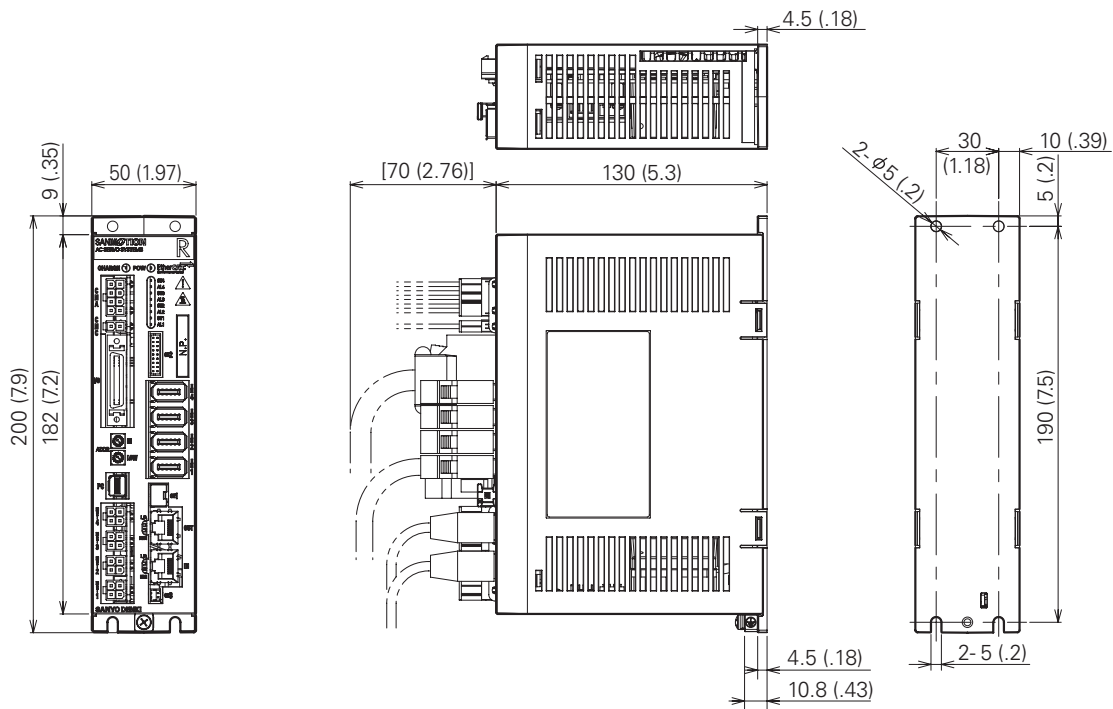
# Dimensions

Unit: mm (inch)

■ RF2J14A0HL5 Mass: 0.75 kg (1.65 lb)

■ RF2K24A0HL5 Mass: 0.8 kg (1.76 lb)

■ RF2J24A8HL5 Mass: 0.75 kg (1.65 lb)



# AC SERVO SYSTEMS

## Brake Equipped Motors

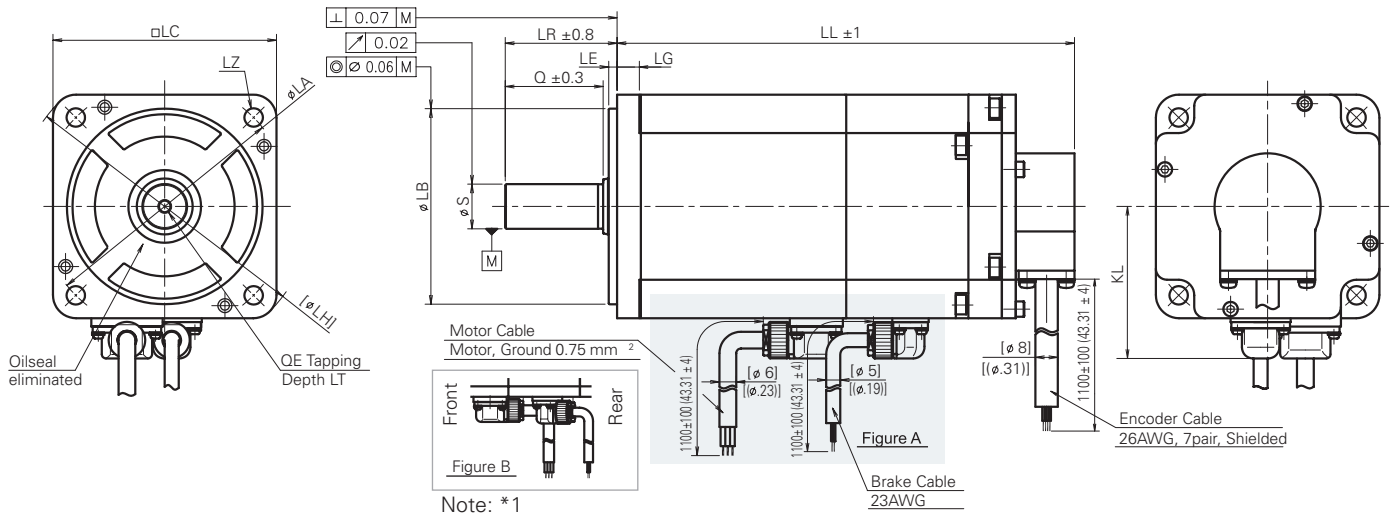
Motor Model		R2FA04003F	R2FA04005D	R2EA04008F	R2GA04008D	R2AA04010F	
Rated Power		30 W	50 W	80 W	80 W	90 W	
Power Supply		24 VDC	24 VDC	100 VAC	48 VDC	200 VAC	
Brake	Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	24 ±10%	
	Input Current	Amp	0.27	0.27	0.27	0.27	
	Minimum Static Friction Torque	N • m	0.32	0.32	0.32	0.32	0.32
		lb • in	2.8	2.8	2.8	2.8	2.8
	Inertia	x10 <sup>-4</sup> kg • m <sup>2</sup>	0.0078	0.0078	0.0078	0.0078	0.0078
		lb • in <sup>2</sup>	0.0027	0.0027	0.0027	0.0027	0.0027
Mass	kg	0.27	0.27	0.27	0.27	0.27	
	lb	0.60	0.60	0.60	0.60	0.60	

Motor Model		R2FA06007R	R2GA06010D	R2EA06020F	R2GA06020D	R2AA06040F	
Rated Power		70 W	100 W	200 W	200 W	400 W	
Power Supply		24 VDC	48 VDC	100 VAC	48 VDC	200 VAC	
Brake	Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	24 ±10%	
	Input Current	Amp	0.27	0.27	0.32	0.32	
	Minimum Static Friction Torque	N • m	0.36	0.36	1.37	1.37	1.37
		lb • in	3.2	0.32	12.1	12.1	12.1
	Inertia	x10 <sup>-4</sup> kg • m <sup>2</sup>	0.06	0.06	0.06	0.06	0.06
		lb • in <sup>2</sup>	0.021	0.021	0.021	0.021	0.021
Mass	kg	0.36	0.3	0.39	0.35	0.39	
	lb	0.80	0.66	0.86	0.78	0.86	

Motor Model		R2AA08075F	R2AAB8100H	R2AA13200D	R2AA22500L	
Rated Power		750 W	1 kW	2 kW	5 kW	
Power Supply		200 VAC	200 VAC	200 VAC	200 VAC	
Brake	Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	
	Input Current	Amp	0.37	0.3	0.66	
	Minimum Static Friction Torque	N • m	2.55	3.92	12	42
		lb • in	22.6	34.7	106	372
	Inertia	x10 <sup>-4</sup> kg • m <sup>2</sup>	0.25	0.343	0.5	5.1
		lb • in <sup>2</sup>	0.085	0.117	0.17	1.7
Mass	kg	0.89	0.84	1.5	5.5	
	lb	2.0	1.9	3.3	12	



# Incremental Encoder with Hall Sensor Equipped Motor



## ■ Dimensions

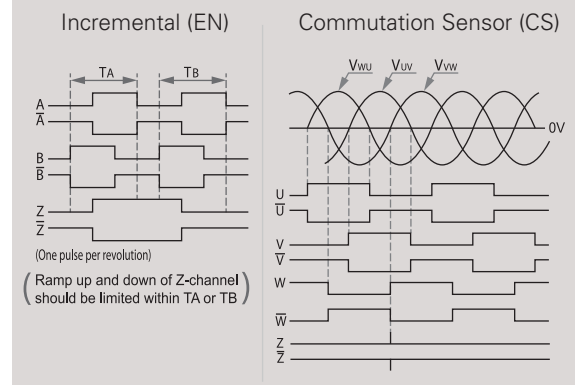
Unit: mm (inch)

P/N	LL	LG	KL	LA	LB	LE
R2AA04005FXK30M <sup>*1</sup>	68.5 (2.70)		34.4 (1.35)			
R2AA04005FCK30M <sup>*1</sup>	104.5 (4.11)	5	35.3 (1.39)	46	30 <sup>0</sup> <sub>-0.021</sub>	2.5
R2AA04010FXK00M	84 (3.31)	(.2)	34.4 (1.35)	(1.81)	(1.18 <sup>0</sup> <sub>-0.0084</sub> )	(.1)
R2AA04010FCK00M	120 (4.72)		35.3 (1.39)			
R2AA06010FXK30M <sup>*1</sup>	78.2 (3.08)					
R2AA06010FCK30M <sup>*1</sup>	106.2 (4.18)					
R2AA06020FXK00M	89.2 (3.51)	6	44.6	70	50 <sup>0</sup> <sub>-0.025</sub>	
R2AA06020FCK00M	117.2 (4.61)	(.24)	(1.76)	(2.76)	(1.97 <sup>0</sup> <sub>-0.001</sub> )	3
R2AA06040FXK00M	115.2 (4.54)					(.12)
R2AA06040FCK00M	143.2 (5.64)					
R2AA08075FXK00M	128.3 (5.05)	8	54.4	90	70 <sup>0</sup> <sub>-0.030</sub>	
R2AA08075FCK00M	163.7 (6.44)	(.31)	(2.14)	(3.54)	(2.76 <sup>0</sup> <sub>-0.012</sub> )	

P/N	LH	LC	LZ	LR	S	Q	QE	LT
R2AA04005FXK30M <sup>*1</sup>								
R2AA04005FCK30M <sup>*1</sup>	56	40	2-ø4.5					
R2AA04010FXK00M	(2.20)	(1.57)	(2-ø.18)	25	8 <sup>0</sup> <sub>-0.009</sub>	20	N/A	N/A
R2AA04010FCK00M				(.98)	(.31 <sup>0</sup> <sub>-0.004</sub> )	(.79)		
R2AA06010FXK30M <sup>*1</sup>								
R2AA06010FCK30M <sup>*1</sup>								
R2AA06020FXK00M	82	60	4-ø5.5					
R2AA06020FCK00M	(3.23)	(2.36)	(4-ø.22)	30	14 <sup>0</sup> <sub>-0.011</sub>	25		
R2AA06040FXK00M				(1.18)	(.55 <sup>0</sup> <sub>-0.004</sub> )	(.98)	M5	12
R2AA06040FCK00M								(.47)
R2AA08075FXK00M	108	80	4-ø6.6	40	16 <sup>0</sup> <sub>-0.011</sub>	35		
R2AA08075FCK00M	(4.25)	(3.15)	(4-ø.26)	(1.57)	(.63 <sup>0</sup> <sub>-0.004</sub> )	(1.38)		

## ■ Encoder Specifications

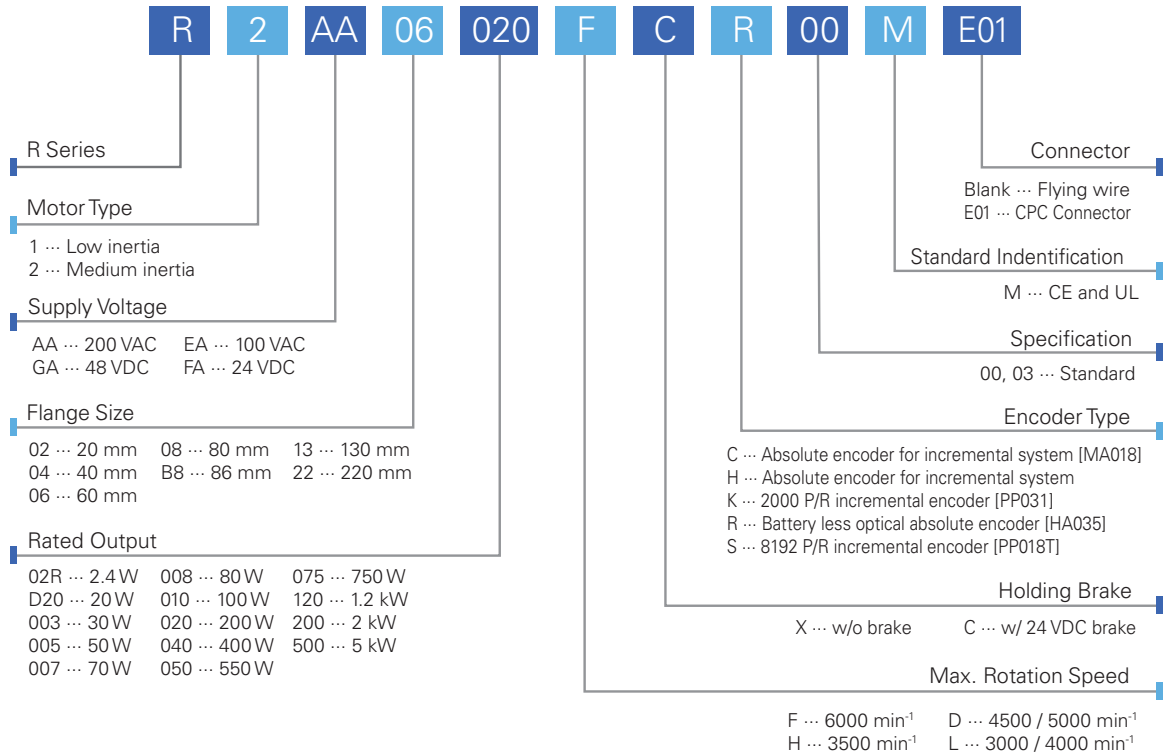
Item	Specification
Pulse per Revolution	2000 P/R
Channel	3 (A, B, Z Channel)
CS Pulse per Revolution	5 Pulse/Rate
CS Channel	3 (U, V, W Channel)
Frequency Response	0 to 7200 min <sup>-1</sup>
Input Voltage	+5 ±0.25 VDC
Input Current	300 mA Max.
Output Signal	Line Driver AM26LS31 Equivalent
Insulation Resistance	50 MΩ Min. 250 VDC between frame and lead wire (without shield wire)
Operating Temp. Range	0 to 85°C (Motor: 0 to 40°C)
Rotor Inertia	0.007 x 10 <sup>-4</sup> (kg·m <sup>2</sup> )



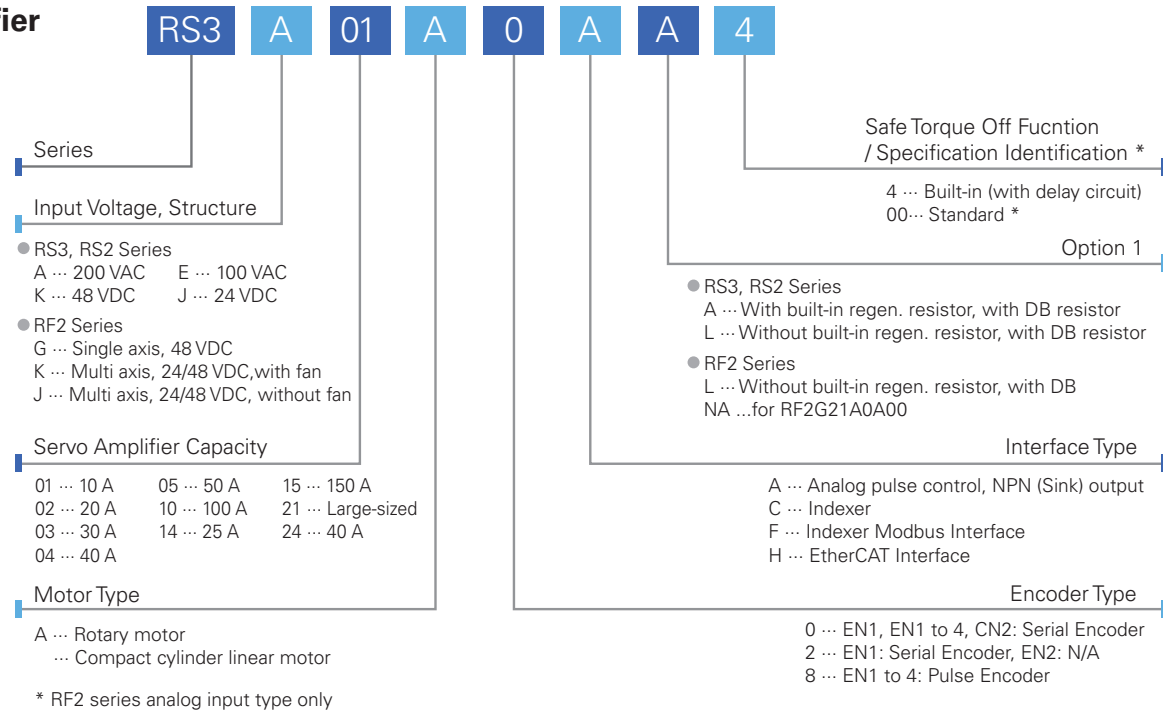
Note: \*1 - The motor and encoder connectors of R2AA04005F and R2AA06010F are mounted toward the rear side of motor (Figure B). Other motos have Figure A.

## Model Numbering System

### Motor



### Amplifier



# MEMO

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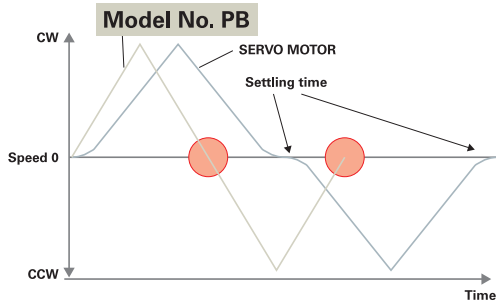
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# SANMOTION Model No. PB

CLOSED LOOP STEPPING SYSTEMS

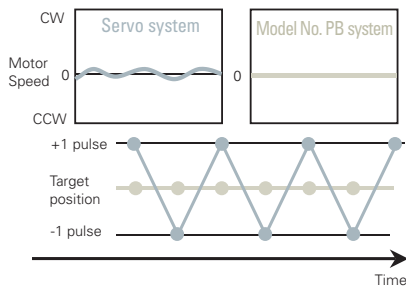
## High Speed Positioning

High torque performance in the low speed range delivers a shorter positioning time for a short stroke/high hit rate application.



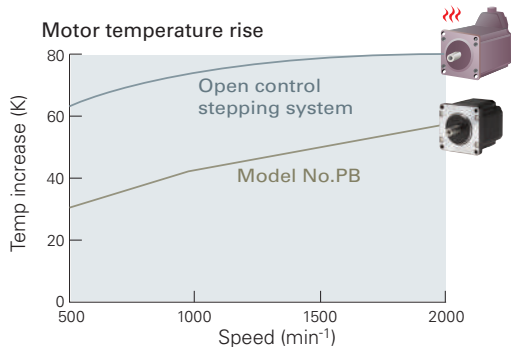
## Zero Motor Hunting

PB system eliminates the usual motor hunting seen in servo systems; this is done by applying constant torque delivered to the motor which is a typical characteristic of stepping motor systems.



## Improved Efficiency

Low motor heat generation is achieved by controlling the current to the motor which gives you optimum motor performance through all of the motors speed/torque range.



## Indexer Model

- Homing Function
- Position Command Range:  $\pm 31$  bit
- Relative/Absolute Travel
- Point Mode
- Point data: Max. 128 points
- Program Mode
- Program size: Max. 1024 lines
- Point Loop/Conditional Jump
- Jogging Function
- Torque Limit Function
- Alarm/  $\pm OT$
- Holding Brake Control



## Pulse Input Model

- Homing Function
- Jogging Function
- Pulse Input Frequency: Max. 400 kHz
- Resolution: 100 to 16,000 P/R
- Encoder Signal Output
- ALM Output
- In-position Output
- Holding Brake Control



## EtherCAT Model

- Multi-axis Control
- Homing Mode
- Position Mode (PP, CSV)
- Velocity Mode (PV, CSV)
- Jogging Function
- Holding Brake Control

**EtherCAT**  
Conformance tested



# Lineup

Flange Size	Motor Length	Max. Stall Torque	Model	Driver							Page
				Indexer			Pulse Input			EtherCAT	
	Type R			Type M	Type P		Type M	Type E Multi-axis			
	100 VAC	200 VAC		24/48 VDC	100 VAC	200 VAC	24/48 VDC	24/48 VDC			
mm N·m	inch oz·in										
28 mm 1.1 inch	59.2 2.33	0.055 7.79	PBM281DXE50							■	70
	58.5 2.30	0.05 7.08	PBM282FXE20			■			■		71
	117.1 4.61	0.155 22.0	PBM284FXE20			■			■		72
	78.5 3.09	0.115 16.3	PBM285DXE50							■	73
42 mm 1.65 inch	55.9 2.20	0.35 49.6	PBM423FXK30-M	■	■		■	■			74
	57.6 2.27	0.39 55.2	PBM423FXE20			■			■		
	55.9 2.20	0.39 55.2	PBM423DXK50							■	
60 mm 2.36 inch	68.8 2.71	1.3 184.1	PBM603FXK30-M	■	■		■	■			75
	70.3 2.77	1.3 184.1	PBM603FXE20			■			■		
	68.8 2.71	1.05 148.7	PBM603DXK50							■	
	100.8 3.97	1.9 269.1	PBM604FXK30-M	■	■		■	■			
86 mm 3.39 inch	102.3 4.03	1.9 269.1	PBM604FXE20			■			■		76
	100.8 3.97	1.85 262	PBM604DXK50							■	
	79.5 3.13	3.1 439	PBM861FXK30-M	■	■		■	■			
86 mm 3.39 inch	110 4.33	6.1 863.9	PBM862FXK30-M	■	■		■	■			78

## Driver Command Type

	Driver Type	
	AC Input	DC Input
<b>Indexer Model</b> Startup via I/O Signal Startup preset points or programs in the driver memory using the Input/Output signals. Startup via RS-485 Serial Communication Control by transmitting speed, acceleration/deceleration and distance data via serial communication.	Type R	Type M
<b>Pulse Input Model</b> Controlled by Pulse Stream Signal Motion is generated by responding to pulse input commands from a host device.	Type P	
<b>EtherCAT Model</b> Controlled through EtherCAT interface Motion command is sent through EtherCAT which is a field-bus system that allows 100Mbps high-speed and highly reliable communication.		TypeE Multi-axis

# CLOSED LOOP STEPPING SYSTEMS

MOTOR FLANGE SIZE

**28 mm (1.10 inch)**

MOTOR LENGTH

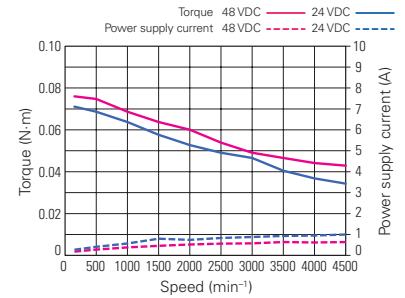
**59.2 mm (2.33 inch)**

## Specifications

Power Supply	24/48 VDC	
Model	PBM281DXE50	
Driver Type	Type E Multi-axis	
Maximum Stall Torque	N·m	0.055
	oz·in	7.79
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.01
	oz·in <sup>2</sup>	0.055
Incremental Encoder	2000 P/R (500 P/R x4)	
Motor Weight	kg	0.16
	lb	0.35
Operating Temperature	-10 to 40°C (16 to 104°F)	
Humidity	20 to 90% RH, no condensation	

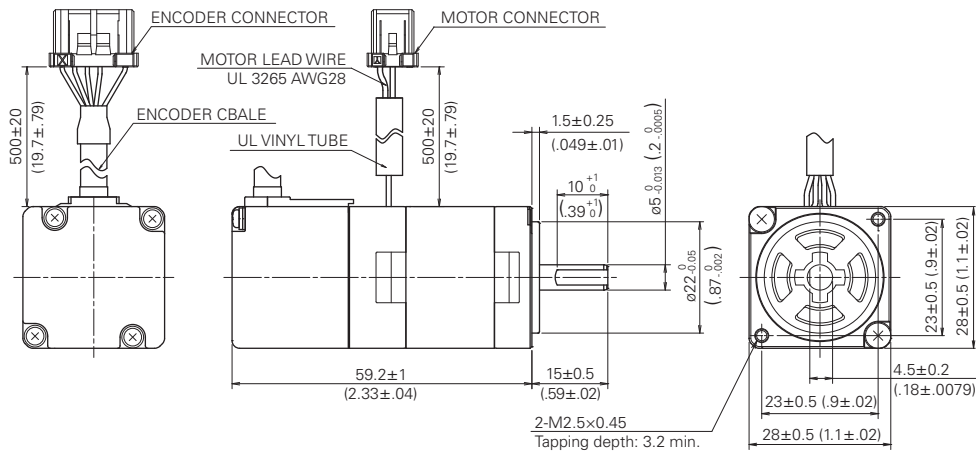
## Torque Curve

### ● PBM281DXE50



## Dimension

Unit: mm (inch)



## Compatible Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
24/48 VDC	PBM281DXE50			PB4D003E440

**MOTOR FLANGE SIZE**

**28 mm (1.10 inch)**

**MOTOR LENGTH**

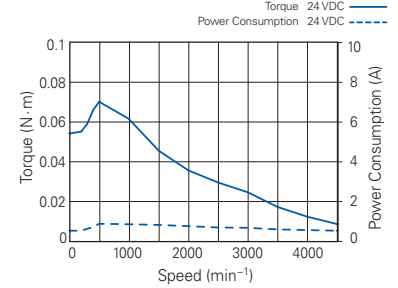
**58.5 mm (2.30 inch)**

**Specifications**

Power Supply	24/48 VDC	
Model	PBM282FXE20	
Driver Type	Type M	
Maximum Stall Torque	N·m	0.05
	oz·in	7.08
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.008
	oz·in <sup>2</sup>	0.044
Incremental Encoder	2000 P/R (500 P/R x4)	
Motor Weight	kg	0.16
	lb	0.35
Operating Temperature	-10 to 40°C (16 to 104°F)	
Humidity	20 to 90% RH, no condensation	

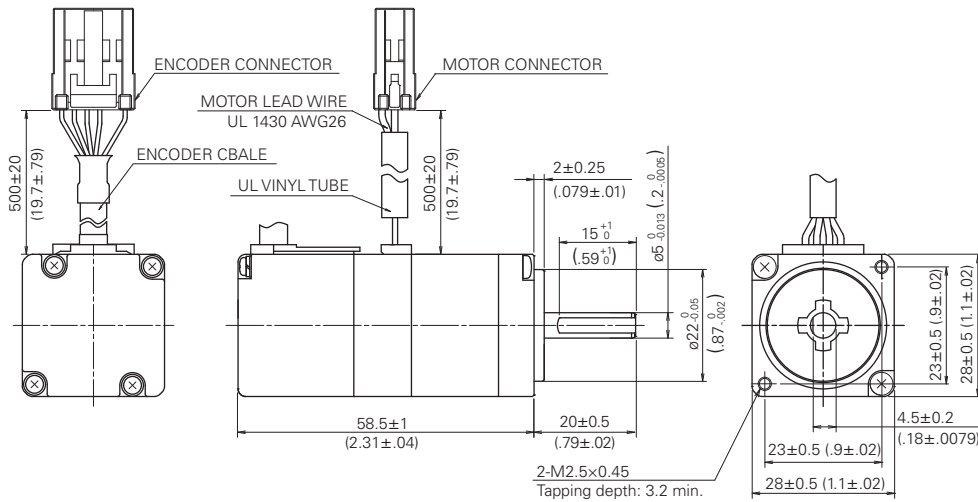
**Torque Curve**

**● PBM282FXE20**



**Dimension**

Unit: mm (inch)



**Compatible Driver**

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
24/48 VDC	PBM282FXE20	PB3D003M200		

# CLOSED LOOP STEPPING SYSTEMS

**MOTOR FLANGE SIZE**

**28 mm (1.10 inch)**

**MOTOR LENGTH**

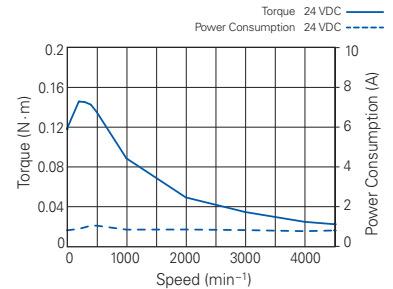
**117.1 mm (4.61 inch)**

## Specifications

Power Supply	24/48 VDC	
Model	PBM284FXE20	
Driver Type	Type M	
Maximum Stall Torque	N·m	0.155
	oz·in	22.0
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.016
	oz·in <sup>2</sup>	0.088
Incremental Encoder	2000 P/R (500 P/R x4)	
Motor Weight	kg	0.23
	lb	0.51
Operating Temperature	-10 to 40°C (16 to 104°F)	
Humidity	20 to 90% RH, no condensation	

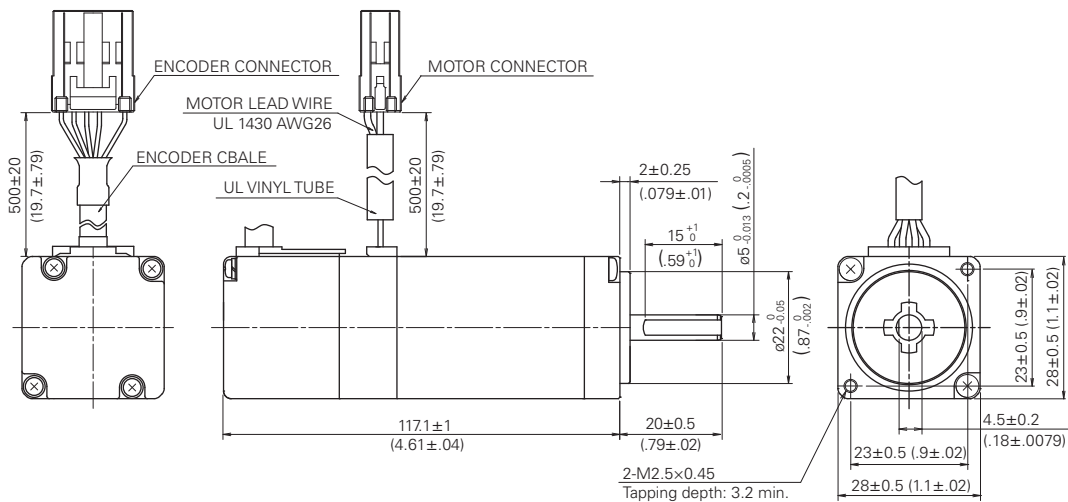
## Torque Curve

### ● PBM284FXE20



## Dimension

Unit: mm (inch)



## Compatible Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
24/48 VDC	PBM284FXE20	PB3D003M200		



**MOTOR FLANGE SIZE**

**28 mm (1.10 inch)**

**MOTOR LENGTH**

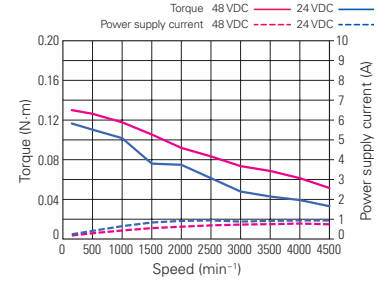
**78.5 mm (3.09 inch)**

**Specifications**

Power Supply	24/48 VDC	
Model	PBM285DXE50	
Driver Type	Type E Multi-axis	
Maximum Stall Torque	N·m	0.115
	oz·in	16.3
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.022
	oz·in <sup>2</sup>	0.12
Incremental Encoder	2000 P/R (500 P/R x4)	
Motor Weight	kg	0.26
	lb	0.57
Operating Temperature	-10 to 40°C (16 to 104°F)	
Humidity	20 to 90% RH, no condensation	

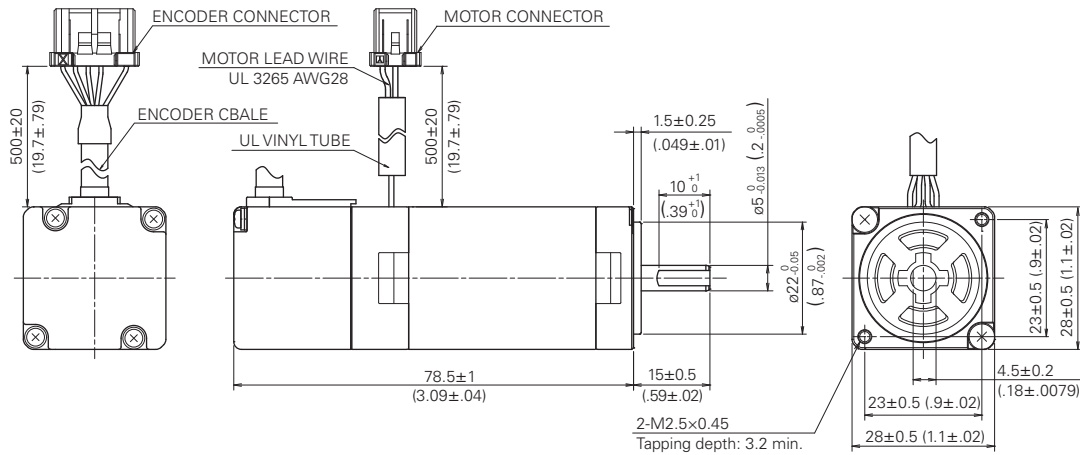
**Torque Curve**

**PBM285DXE50**



**Dimension**

Unit: mm (inch)



**Compatible Driver**

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
24/48 VDC	PBM285DXE50			PB4D003E440

# CLOSED LOOP STEPPING SYSTEMS

MOTOR FLANGE SIZE

**42 mm (1.65 inch)**

MOTOR LENGTH

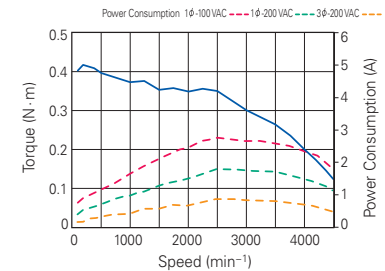
**55.9/57.6 mm (2.2/2.27 inch)**

## Specifications

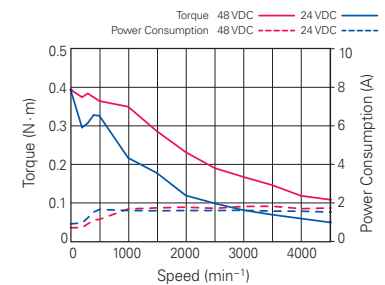
Power Supply	100/200 VAC	24/48 VDC	24/48 VDC
Model	PBM423FXK30-M	PBM423FXE20	PBM423DXK50
Driver Type	Type R, Type P	Type M	Type E Multi-axis
Maximum Stall Torque	N·m	0.35	0.39
	oz·in	49.6	55.2
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.056	0.056
	oz·in <sup>2</sup>	0.31	0.31
Incremental Encoder	16000 P/R (4000 P/R x4)	2000 P/R (500 P/R x4)	16000 P/R (4000 P/R x4)
Motor Weight	kg	0.35	0.35
	lb	0.77	0.77
Operating Temperature	-10 to 40°C (16 to 104°F)		
Humidity	20 to 90% RH, no condensation		

## Torque Curve

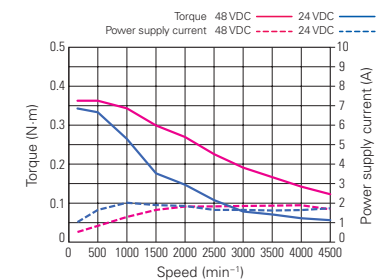
### ● PBM423FXK30-M



### ● PBM423FXE20



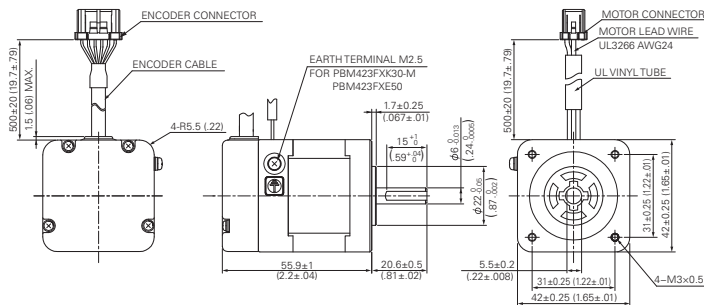
### ● PBM423DXK50



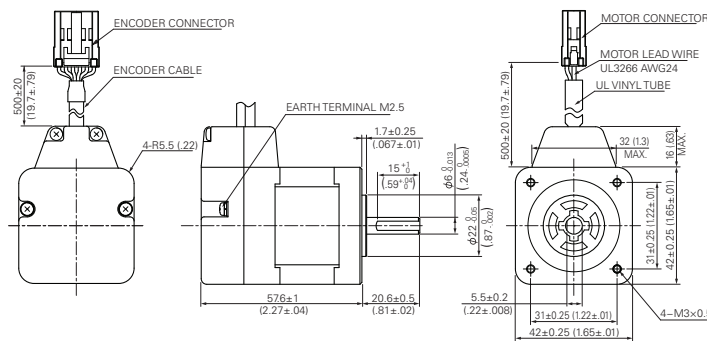
## Dimension

Unit: mm (inch)

### PBM423FXK30-M PBM423DXK50



### PBM423FXE20



## Compatible Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM423FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM423FXE20	PB3D003M200		
	PBM423DXK50			PB4D003E440

**MOTOR FLANGE SIZE**

**60 mm (2.36 inch)**

**MOTOR LENGTH**

**68.8/70.3 mm (2.71/2.77 inch)**

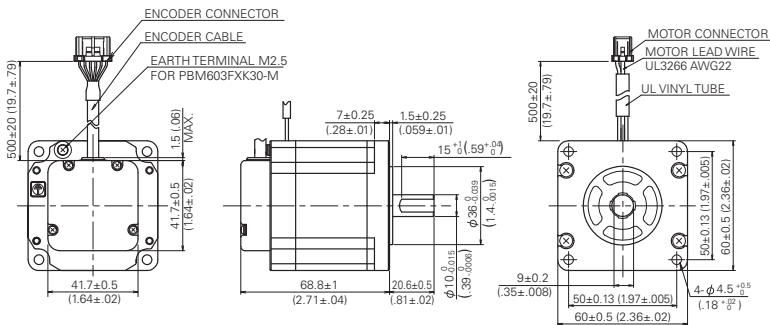
**Specifications**

Power Supply		100/200 VAC	24/48 VDC	24/48 VDC
Model		PBM603FXK30-M	PBM603FXE20	PBM603DXK50
Driver Type		Type R, Type P	Type M	Type E Multi-axis
Maximum Stall Torque	N·m	1.3	1.3	1.05
	oz·in	184.1	184.1	148.7
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.4	0.4	0.4
	oz·in <sup>2</sup>	2.2	2.2	2.19
Incremental Encoder		16000 P/R (4000 P/R x4)	2000 P/R (500 P/R x4)	16000 P/R (4000 P/R x4)
Motor Weight	kg	0.85	0.85	0.85
	lb	1.87	1.87	1.87
Operating Temperature		-10 to 40°C (16 to 104°F)		
Humidity		20 to 90% RH, no condensation		

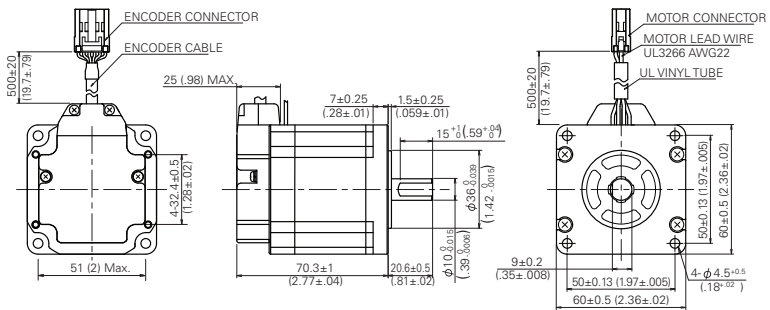
**Dimension**

Unit: mm (inch)

**PBM603FXK30-M  
PBM603DXK50**



**PBM603FXE20**

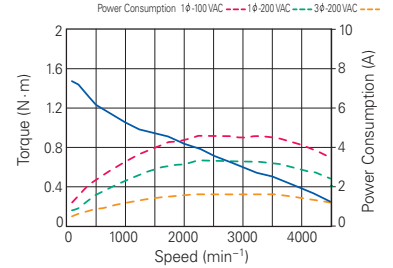


**Compatible Driver**

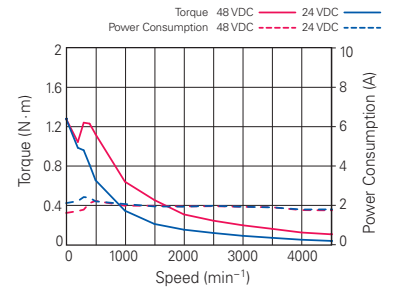
Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM603FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM603FXE20	PB3D003M200		
	PBM603DXK50			PB4D003E440

**Torque Curve**

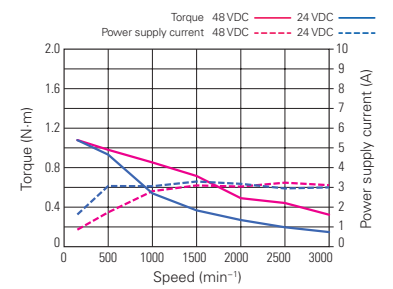
**PBM603FXK30-M**



**PBM603FXE20**



**PBM603DXK50**



# CLOSED LOOP STEPPING SYSTEMS

**MOTOR FLANGE SIZE**

**60 mm (2.36 inch)**

**MOTOR LENGTH**

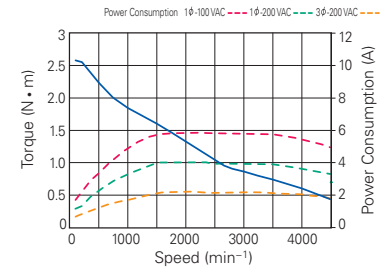
**100.8/102.3 mm (3.97/4.03 inch)**

## Specifications

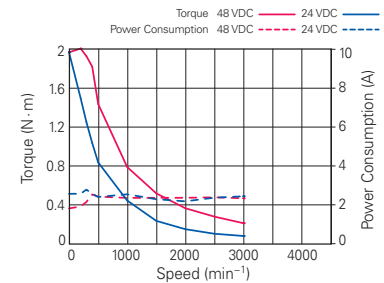
Power Supply	100/200 VAC	24/48 VDC	24/48 VDC	
Model	PBM604FXK30-M	PBM604FXE20	PBM604DXK50	
Driver Type	Type R, Type P	Type M	Type E Multi-axis	
Maximum Stall Torque	N·m	1.9	1.9	1.85
	oz·in	269.1	269.1	262
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.84	0.84	0.84
	oz·in <sup>2</sup>	4.6	4.6	4.6
Incremental Encoder	16000 P/R (4000 P/R x4)	2000 P/R (500 P/R x4)	16000 P/R (4000 P/R x4)	
Motor Weight	kg	1.42	1.42	1.42
	lb	3.13	3.13	3.13
Operating Temperature	-10 to 40°C (16 to 104°F)			
Humidity	20 to 90% RH, no condensation			

## Torque Curve

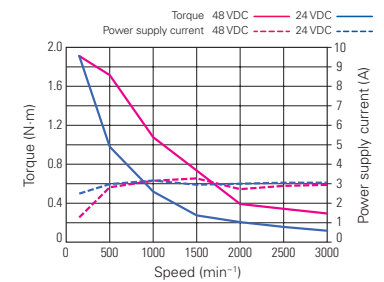
### ● PBM604FXK30-M



### ● PBM604FXE20



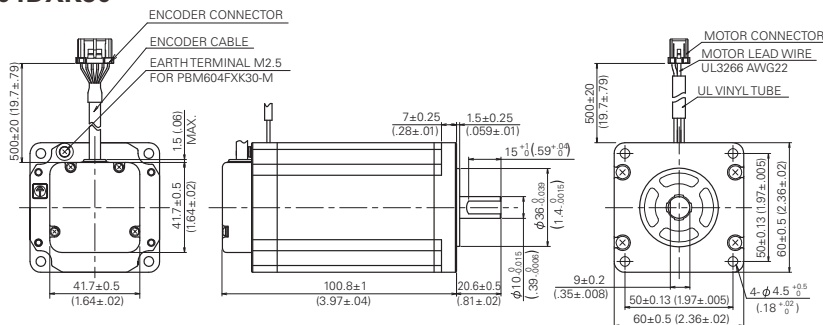
### ● PBM604DXK50



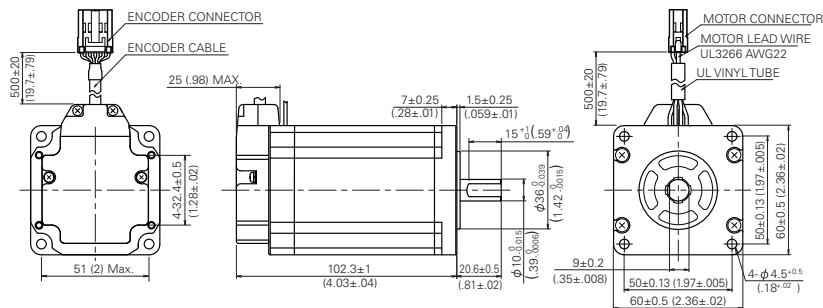
## Dimension

Unit: mm (inch)

### PBM604FXK30-M PBM604DXK50



### PBM604FXE20



## Compatible Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM604FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM604FXE20	PB3D003M200		
	PBM604DXK50	PB4D003E440		

**MOTOR FLANGE SIZE**

**86 mm (3.37 inch)**

**MOTOR LENGTH**

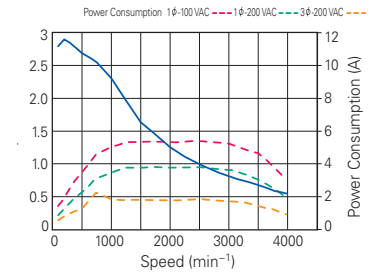
**79.5 mm (3.13 inch)**

**Specifications**

Power Supply	100/200 VAC	
Model	PBM861FXK30-M	
Driver Type	Type R, Type P	
Maximum Stall Torque	N·m	3.1
	oz·in	439.0
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	1.48
	oz·in <sup>2</sup>	8.1
Incremental Encoder	16000 P/R (4000 P/R x4)	
Motor Weight	kg	1.9
	lb	4.2
Operating Temperature	-10 to 40°C (16 to 104°F)	
Humidity	20 to 90% RH, no condensation	

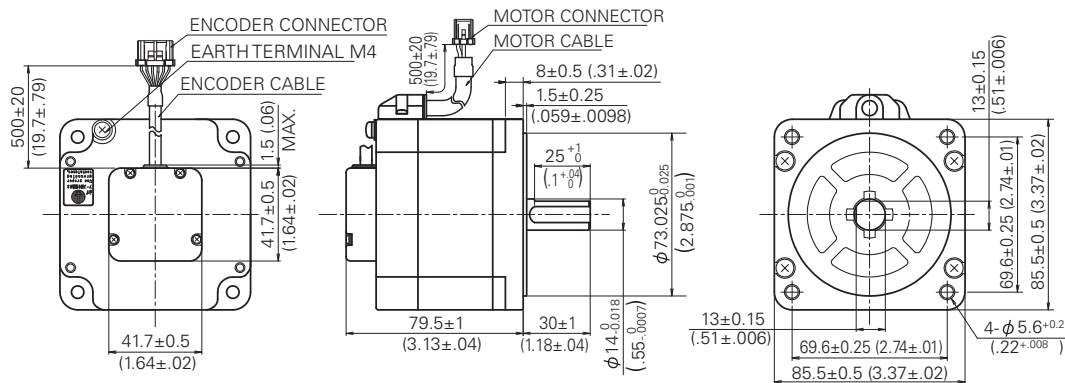
**Torque Curve**

**PBM861FXK30-M**



**Dimension**

Unit: mm (inch)



**Compatible Driver**

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM861FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	

# CLOSED LOOP STEPPING SYSTEMS

MOTOR  
FLANGE SIZE

**86 mm (3.37 inch)**

MOTOR  
LENGTH

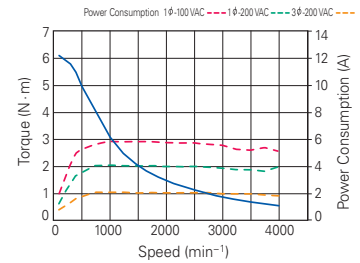
**110 mm (4.33 inch)**

## Specifications

Power Supply	100/200 VAC	
Model	PBM862FXK30-M	
Driver Type	Type R, Type P	
Maximum Stall Torque	N·m	6.1
	oz·in	863.8
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	3
	oz·in <sup>2</sup>	16
Incremental Encoder	16000 P/R (4000 P/R x4)	
Motor Weight	kg	3.1
	lb	6.8
Operating Temperature	-10 to 40°C (16 to 104°F)	
Humidity	20 to 90% RH, no condensation	

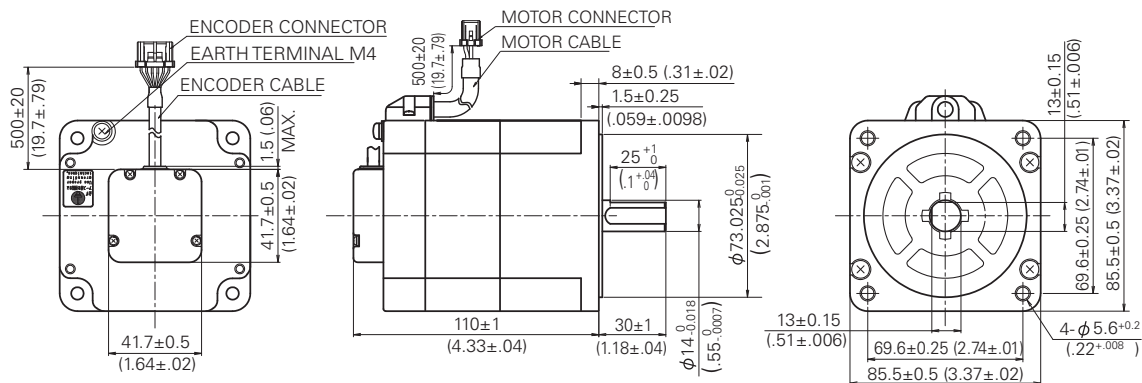
## Torque Curve

### ● PBM862FXK30-M



## Dimension

Unit: mm (inch)



## Compatible Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM862FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	

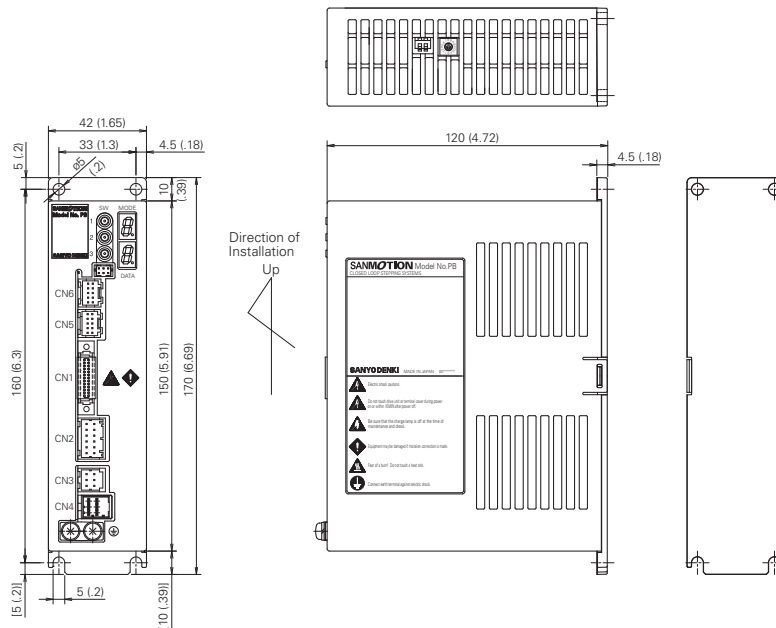
# AC Input Driver Indexer Model Type R



Driver Model		PB4A002R300	PB4A002R301
Power Supply		Single phase AC100V to 115V -15% +10% 50/60Hz	Single phase / 3-phase AC200V to 230V -15% +10% 50/60Hz
Environment	Ambient Temp.	Operating	0 to 55°C
		Storage	-20 to 65°C
	Operating / Storage Humidity		90% RH (non-condensing)
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2h)
Structure		Tray Structure, Rear Mounting Type	
Mass		Approx. 0.65kg	
Dimensions		W42×H150×D120 mm	
Functions	Rotation Speed		0 to 4500 min <sup>-1</sup> (86 mm: 0 to 4000 min <sup>-1</sup> )
	Resolution (P/R)		Electronic Gear 100 to 16000
	Regeneration Process		Internal (software processing)
	Holding Brake Control Function		Internal
	Protective Functions		Power Voltage Error, Regeneration Voltage Error, Over-speed, Encoder Disconnection, CPU Error, Overload Stop, Servo Error, Zero-return Error, Nonvolatile Memory Error, Initialization Error, Over-current, Amplifier Overheat, Motor Overheat, Counter Overflow
	Display		7SEG LED Display (2 pieces)
	Digital Operator		Resolution, Related Motor, Positive Direction Definition, Gain, Node Address, Trans. Speed, Holding Brake Control, Jog Driving
	Operation Functions		Auto Zero-return / Push Operation (Current limit)
Communication Specifications (PCIF)		RS-485 Start-Stop Synchronization, Half Duplex Communication, Trans. Speed: 9600, 38400, 115200, 307200bps	
Input/Output Signals	Input Signals	Functions	ALMCLR General-purpose Input x8 (Point, STOP, EXE, SELECT, HOME sensor, Limit, Deviation CLR, Pause, Jog, Interlock)
		Electric	General-purpose Input: Interactive Input Photo Coupler DC5V to 24V
	Output Signals	Functions	ALMCLR General-purpose Output x7 (Point No., Ack, Busy, HOME END, Push END, ZONE, Input Monitor, In-position, Bit Out)
		Electric	General-purpose Output: Open Collector, DC30V/15 mA Max.

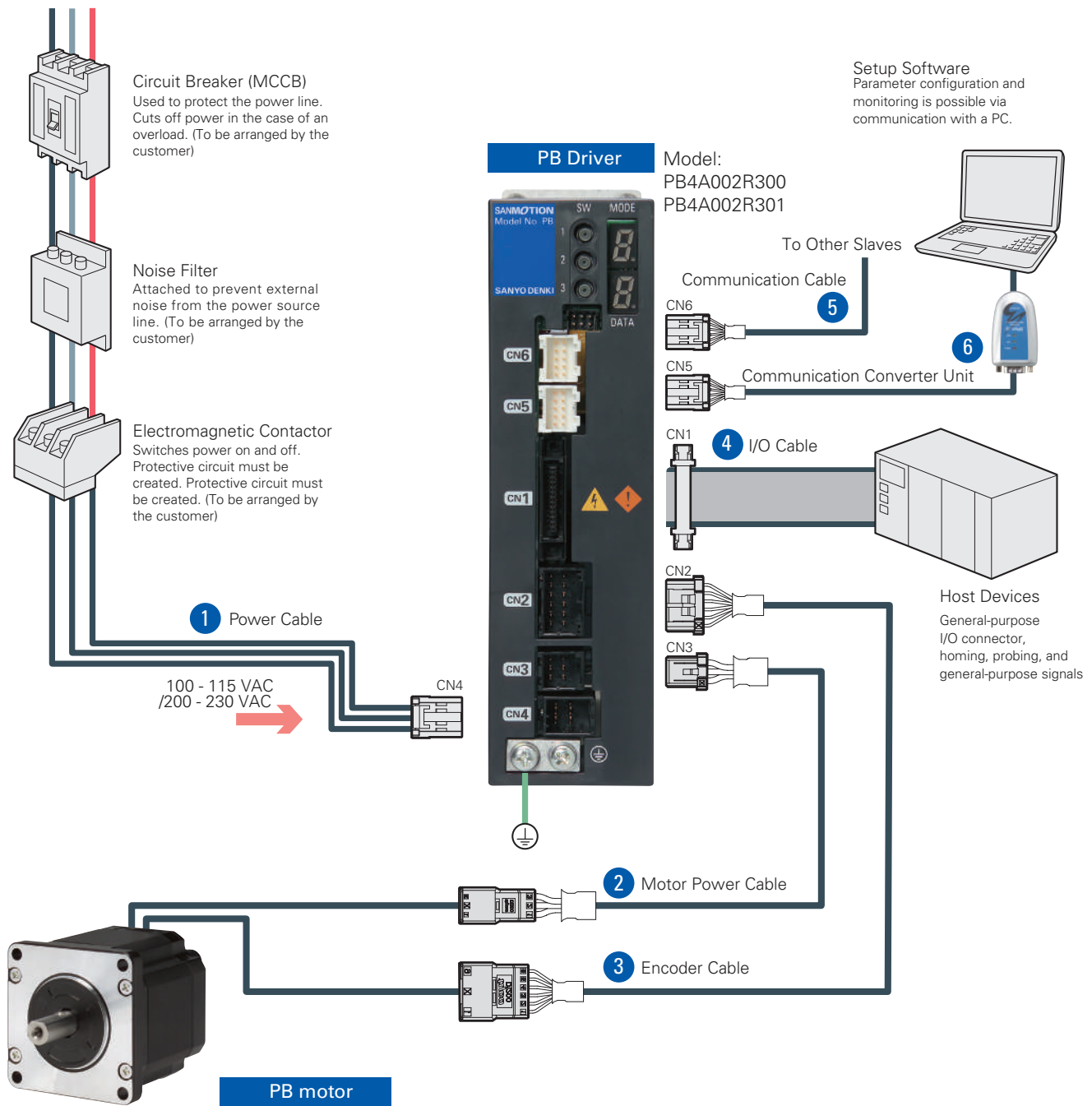
## Dimension

Unit: mm (inch)



# CLOSED LOOP STEPPING SYSTEMS

## System Configuration



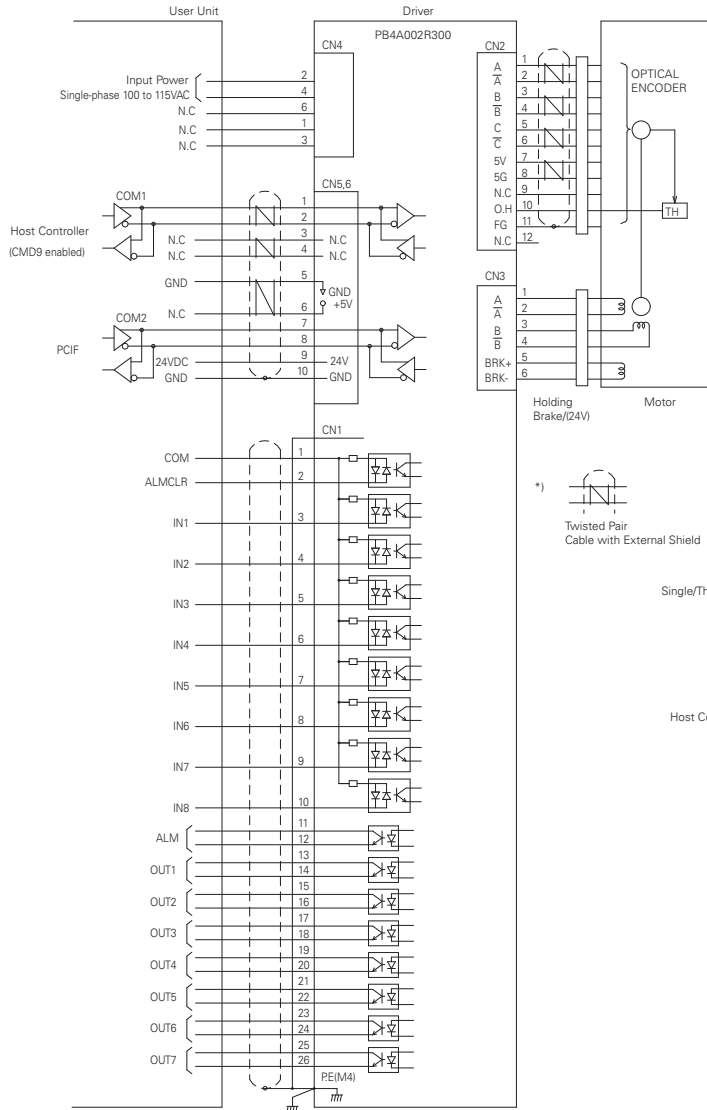
Item	Parts Number	Description
✓ 1	Power Cable: 1 m PBC8P0010A	
2	Motor Power Cable: 3 m PBC7M0030A	Extension Cable
3	Encoder Cable: 3 m PBC7E0030A	Extension Cable
4	I/O Cable (unshielded): 1 m PBC5S0010A	26 pin, Unshielded Cable
5	Communication Cable: 0.3 m PBC6C0003A	Both side same connector, for daisy chain
✓ 6	Communication Converter Unit PBFM-U6	USB/RS-485 conversion Communication with SPBALL-01 Setup Software

All items marked with a check must be included to build a complete system.

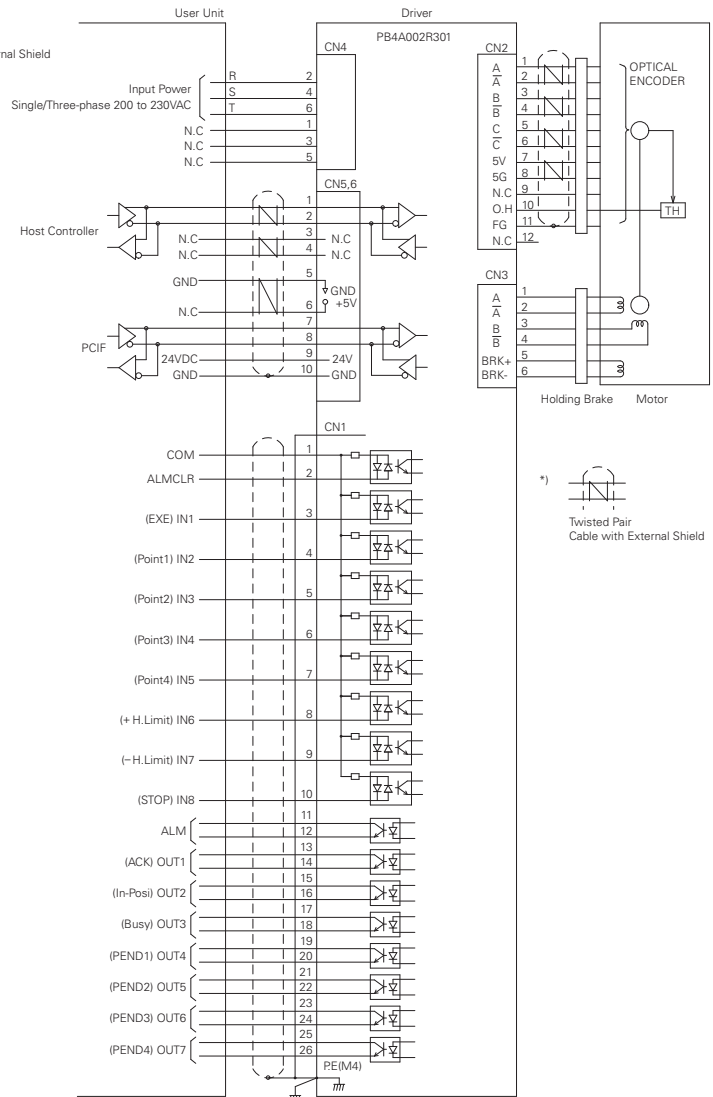


# Wiring Diagram

## 100 to 115 VAC Input Driver Model: PB4A002R300



## 200 to 230 VAC Input Driver Model: PB4A002R301



# CLOSED LOOP STEPPING SYSTEMS

## AC Input Driver Pulse Input Model Type P

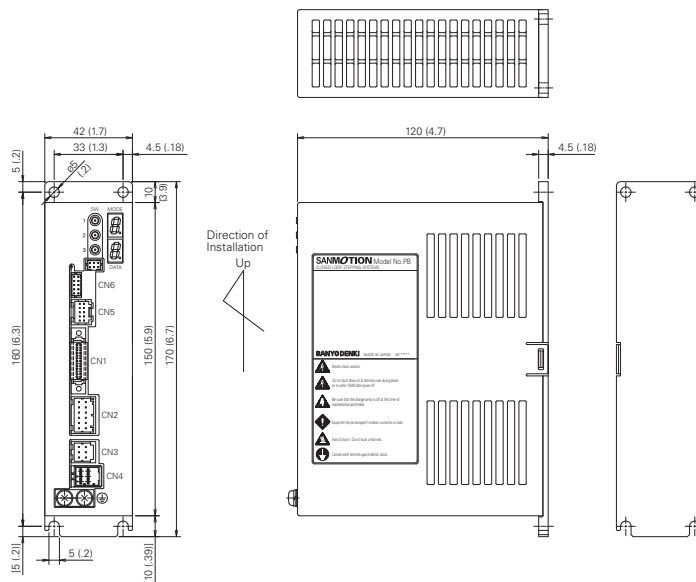


Driver Model		PB4A002P300	PB4A002P301
Power Supply		Single phase AC100V to 115V -15% +10% 50/60Hz	Single phase / 3-phase AC200V to 230V -15% +10% 50/60Hz
Environment	Ambient temp.	Operating	0 to 55°C
		Storage	-20 to 65°C
	Operating / Storage Humidity		90% RH (non-condensing)
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2h)
Structure		Tray Structure, Rear Mounting Type	
Mass		Approx. 0.65kg	
Dimensions		W42×H150×D120 mm	
Functions	Rotation Speed		0 to 4500 min <sup>-1</sup> (86 mm: 0 to 4000 min <sup>-1</sup> )
	Resolution (P/R)		Electronic gear 100 to 16000
	Regeneration Process		Internal (software processing)
	Holding Brake Control Function		Internal
	Protective Functions		Power Voltage Error, Regeneration Voltage Error, Over-speed, Encoder Disconnection, CPU Error, Overload Stop, Servo Error, Zero-return Error, Nonvolatile Memory Error, Initialization Error, Over-current, Amplifier Overheat, Motor Overheat, Counter Overflow
	Display		7SEG LED Display (2 pieces)
	Digital Operator		Resolution, Related Motor, Positive Direction Definition, Gain, Node Address, Trans. Speed, Holding Brake Control, Jog Driving
	Operation Functions		Auto Zero-return / Push Operation (Current limit)
	Communication Specifications (PCIF)		RS-485 Start-Stop Synchronization, Half Duplex Communication, Trans. Speed: 115200bps
Input/Output Signals	Input Signals	Functions	Pulse Input, STOP, ALMCLR
		Electric	General-purpose Input ×2 (Deviation CLR, HOME, Push, Brake Control, Counter Reset) Pulse Input: Line receiver (1 or 2 input mode) General-purpose Input: Interactive Input Photo Coupler DC5V to 24V
	Output Signals	Functions	Encoder Signal (A / B / C) ALM, In-position General-purpose Output ×2 (HOME END, Push END, ZONE, Input Monitor)
		Electric	Encoder Signal Output: Line Amplifier 4000P/R *C-phase / phase origin signal outputs will not be emitted at velocities over 200 min <sup>-1</sup> . General-purpose Output: Open collector DC30V / 15mA Max.

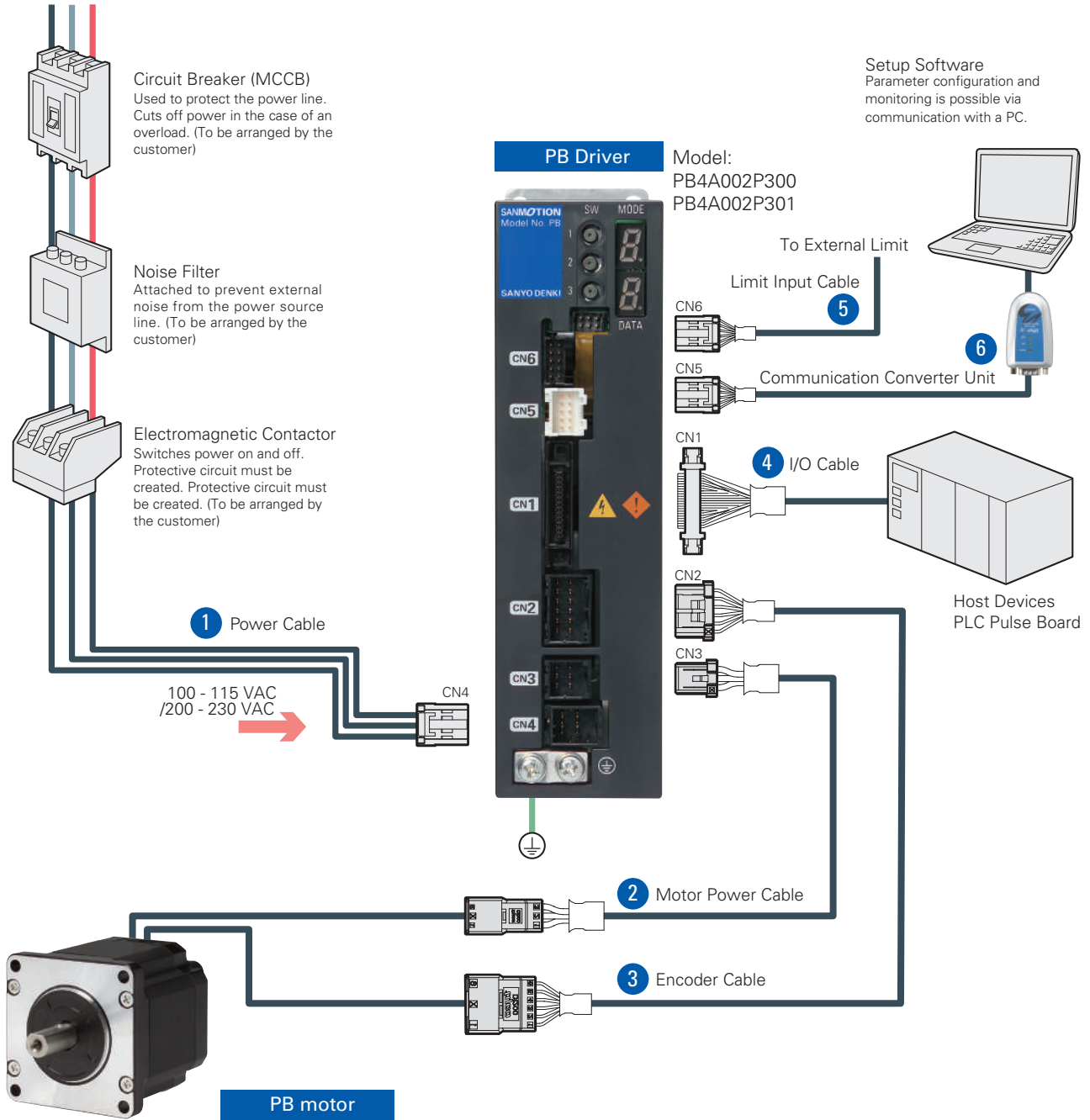
\* A function that finely adjusts the unit step angle per pulse parameters. Setup software is required.

### Dimension

Unit: mm (inch)



# System Configuration



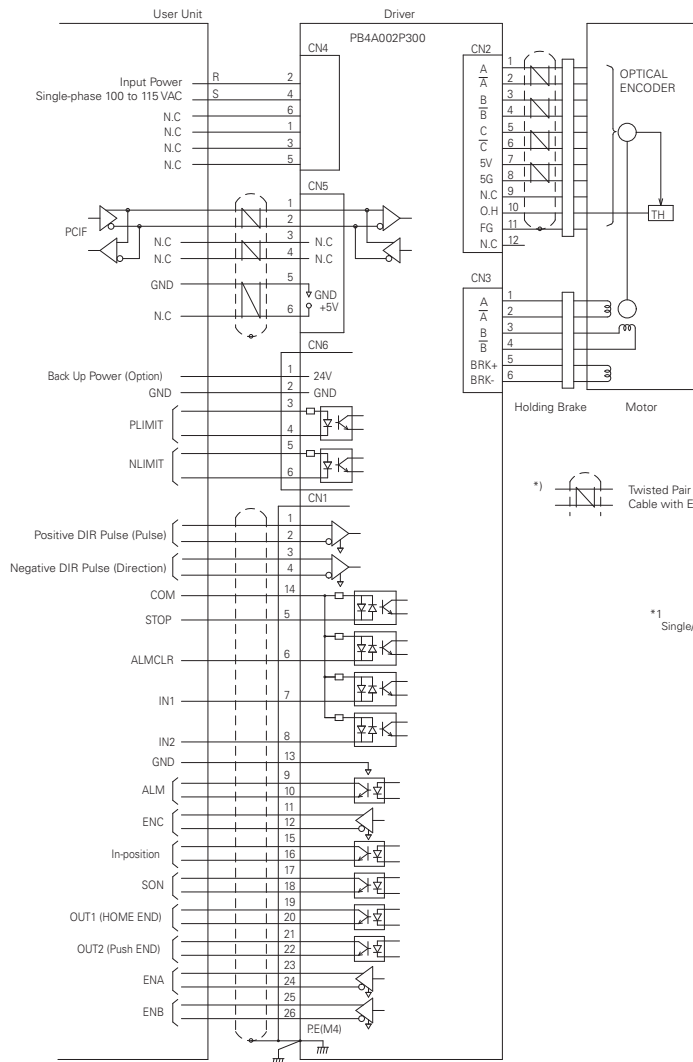
Item	Parts Number	Description
✓ 1	Power Cable: 1 m PBC8P0010A	
2	Motor Power Cable: 3 m PBC7M0030A	Extension Cable
3	Encoder Cable: 3 m PBC7E0030A	Extension Cable
4	I/O Cable: 1 m PBC5S0010C	26 pin, Shielded Cable
5	Limit Input Cable 1 m PBC7S0010A	
✓ 6	Communication Converter Unit PBFM-U6	USB/RS-485 conversion Communication with SPBALL-01 Setup Software

All items marked with a check must be included to build a complete system.

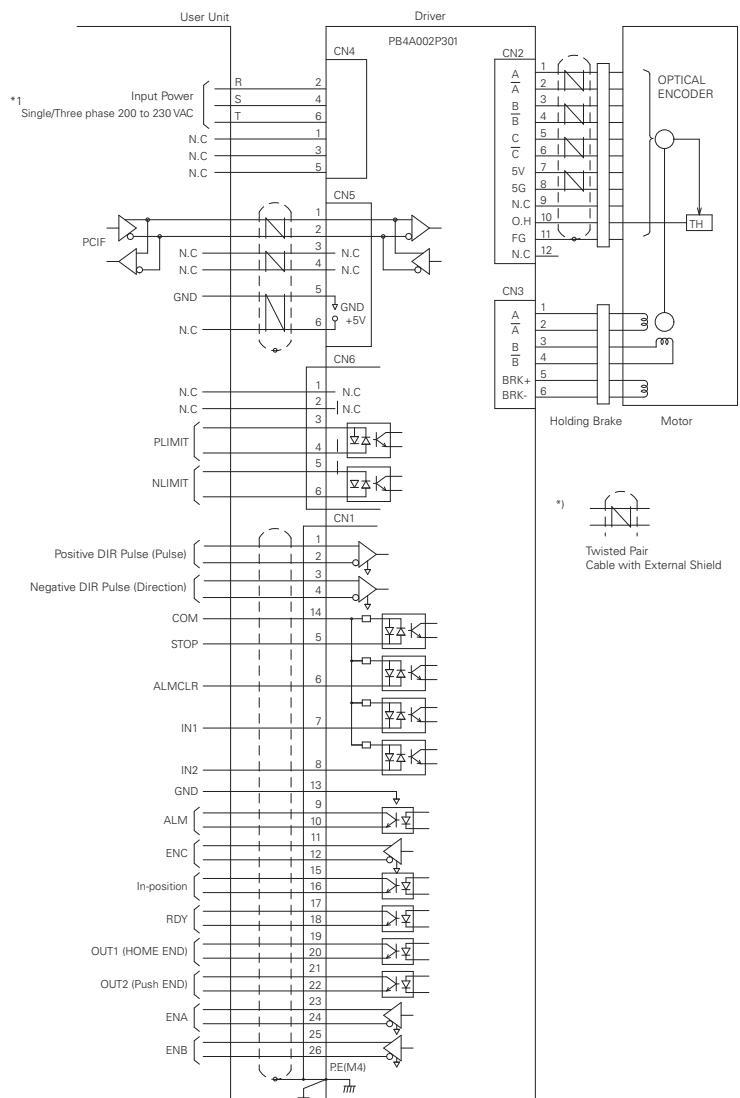
# CLOSED LOOP STEPPING SYSTEMS

## Wiring Diagram

### 100 to 115 VAC Input Driver Model: PB4A002P300



### 200 to 230 VAC Input Driver Model: PB4A002P301



\*1 When using with single-phase power supply, wire to pins 2 and 4.

# DC Input Driver Indexer / Pulse Input Model Type M

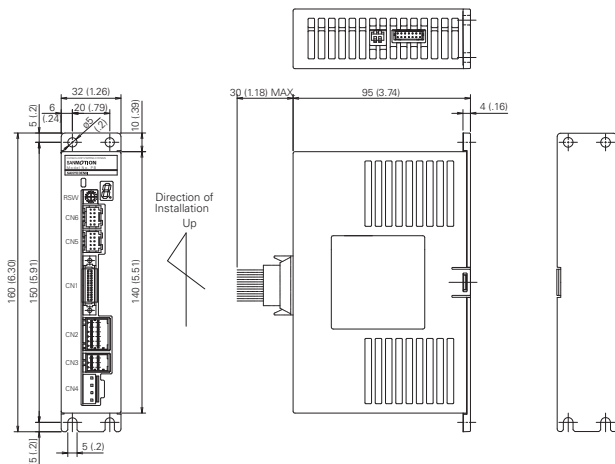


Driver Model		PB3D003M200		
Interface		Generic Input (SW1=ON)	Pulse Train Input (SW1 = OFF)	
Power Supply		DC24V/48V ±10% (28 mm Motor is only available as 24V.)		
Environment	Ambient temp.	0 to 55°C		
	Operating Storage	-20 to 70°C		
	Operating/Storage Humidity	90% RH (non-condensing)		
Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2h)		
Mass/Dimensions		Approx. 0.36Kg/W32×H160×D95 mm		
Functions	Rotation Speed	0 to 4500 min <sup>-1</sup>		
	Resolution (P/R)	500, 1000, 2000, 4000, 5000, 10000		
	Regeneration Process	Internal		
	Protective Functions	Power Voltage Error, Regeneration Voltage Error, Over-speed, Encoder Disconnection, CPU Error, Overload Stop, Excessive Position Deviation, Zero-return Error, Nonvolatile Memory Error, Initialization Error (Power Line Disconnection)		
	Display	7SEG LED Display		
	Functions	Normal Drive (incremental move, absolute move), Zero-return, Module Operation, Push Operation, Teaching Functions Point Functions: 128Point Program Functions: 1PRG×1024Line, 32PRG×32Line, 128PRG×8Line	Normal Drive, Zero-return	
	Rotary Switch	Node Address Setting (0 to F)	Normalize velocity loop gain setting	
DIP-Switches		SSW1: Interface Selection (On: RS-485, OFF: Pulse) SW2: Terminating Resistor Setting (On: with terminating resistance)		
Input/Output Signals	Input Signals	(Normal Mode) STOP, EXE, POINT, HOME, JOG, SELECT, Pause, Interlock, Generic Input, MODE SELECT, Hard Limit, ALM CLR (Teaching Mode) STOP, JOG, Point, PWR Pulse input: Photo coupler: DC3V to 5V (Input resistance=270Ω) Input signal: DC5V to 24V	Pulse, STOP, ALMCLR, Gain Setting, Deviation Clear, HOME	
	Output Signals	(Normal Mode) Ack, PEND, END, Busy, Zone, Mode MON, STOP MON, In-position, Homing complete, Generic Output, Encoder Output, SON MON, ALM, HEND, Input Monitor (Teaching Mode) PEND, HEND, In-position, Mode MON, SON MON Output signal: Open collector DC30V / 30mA Max. *Encoder C-phase signal outputs within 200 min <sup>-1</sup>	ALM, STOP MON, In-position, Homing complete, Encoder Output, SON MON, STOP MON	
	Communication Specifications Trans.	RS-485 Standard Start-Stop Synchronization, Half Duplex 9600, 38400, 115200, 128000bps	9600bps	

\* A function that finely adjusts the unit step angle per pulse parameters. Setup software is required.

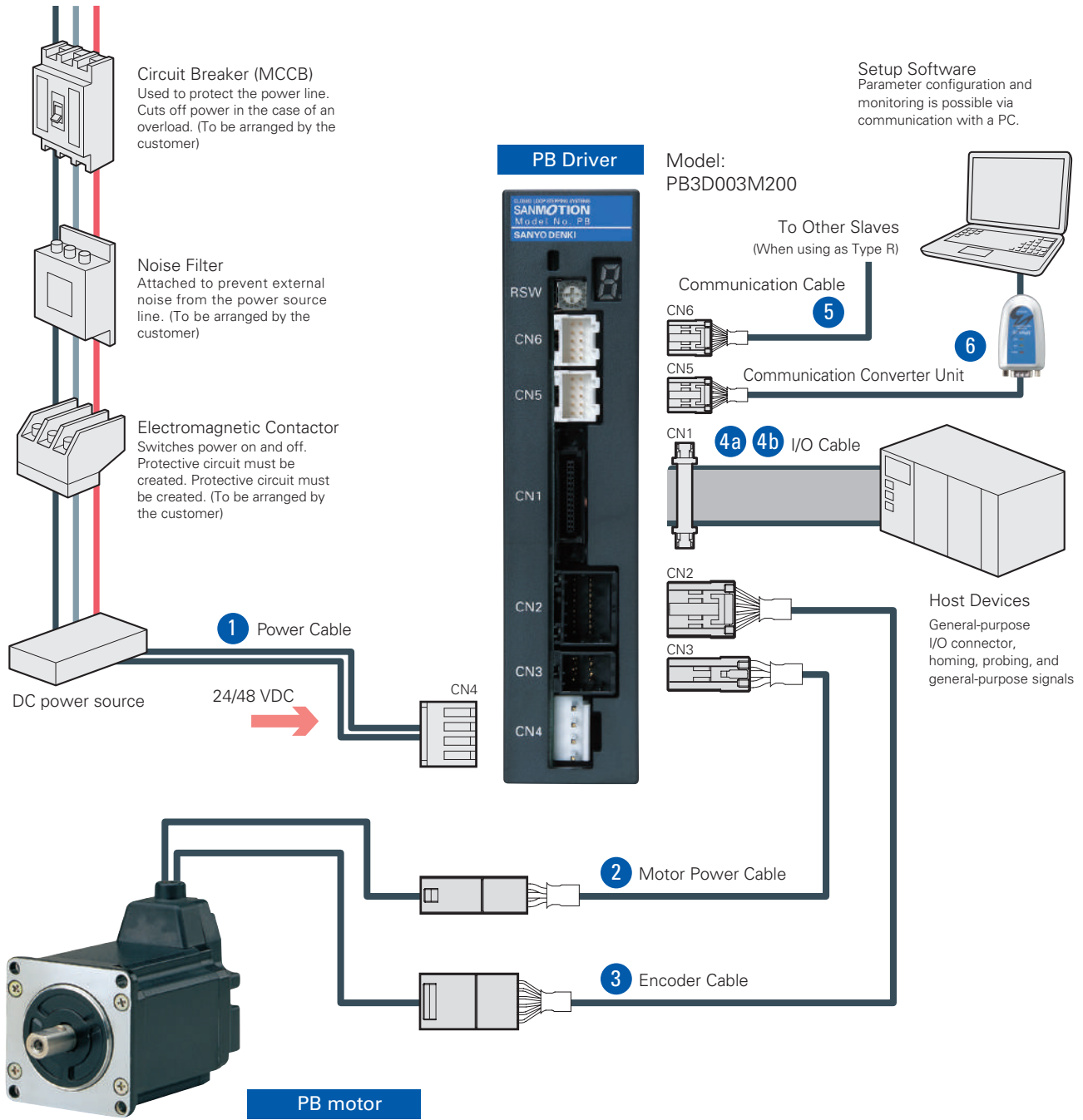
## Dimension

Unit: mm (inch)



# CLOSED LOOP STEPPING SYSTEMS

## System Configuration

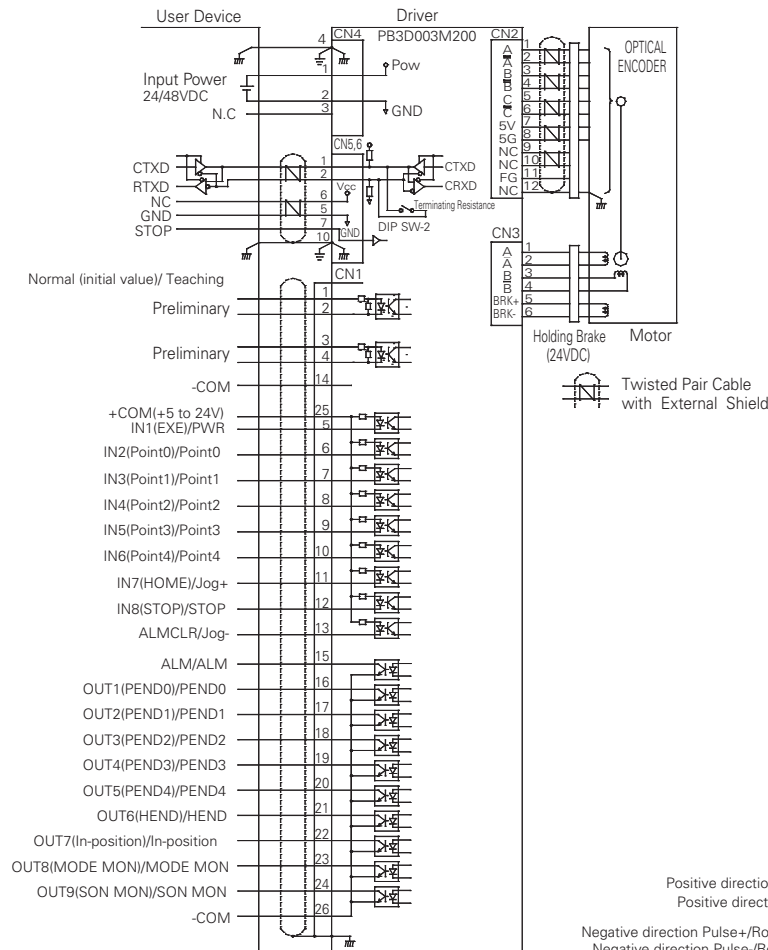


Item		Parts Number	Description
✓ 1	Power Cable: 1 m	PBC6P0010A	
2	Motor Power Cable: 3 m	PBC6M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC6E0030A	Extension Cable
4a	I/O Cable: 1 m	PBC5S0010A	26 pin, Unshielded Cable
4b	I/O Cable: 1 m	PBC5S0010C	26 pin, Shielded Cable
5	Communication Cable: 0.3 m	PBC6C0003A	
✓ 6	Communication Converter Unit	PBFM-U6	USB/RS-485 conversion Communication with SPBA1W-01 Setup Software

All items marked with a check must be included to build a complete system.

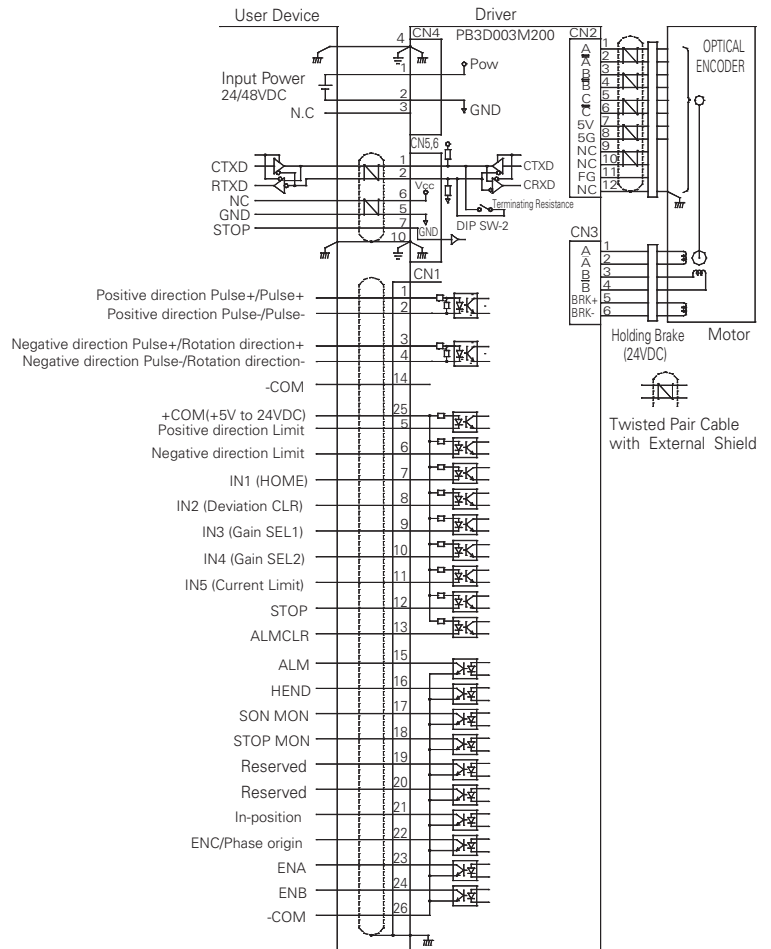
# Wiring Diagram

## Indexer DIP Switch SW1: ON



Note: The CN1 general-purpose input/output signal function is selected through communication. Please see the basic specifications for details.

## Pulse Input DIP Switch SW1: OFF



Note: The CN1 general-purpose input/output signal function is selected through communication. Please see the basic specifications for details.

# CLOSED LOOP STEPPING SYSTEMS

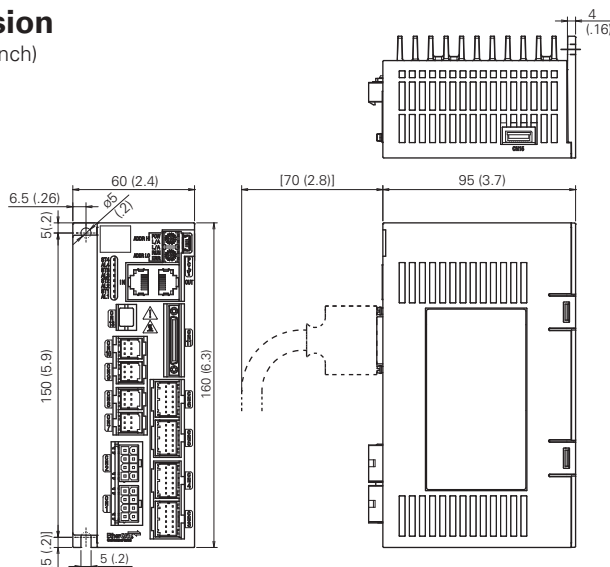
## DC Input Driver EtherCAT Multi-Axis Model



Driver Model		PB4D003E440	
Power Supply		Main power supply 24/48VDC ±10% 14A Control power supply 24VDC ±10% 1.5A	
	Ambient temp.	Operating	0 to 55°C
		Storage	-20 to 65°C
	Operating / Storage Humidity		90% RH (non-condensing)
	Vibration Resistance		5m/s <sup>2</sup> (Tested X, Y and Z directions for 2 hours in the frequency range between 10 to 55Hz.)
	Shock resistance		20m/s <sup>2</sup>
	Elevation		Below 1,000m above sea level
Mass		0.7kg	
Dimensions		W60×H160×D95mm	
Functions	Rotation Speed		0 to 4500 min <sup>-1</sup> (0 to 3000 min <sup>-1</sup> for 60 mmsq. motor)
	Resolution (P/R)		10000
	Regeneration Process		Regenerative resistor (Option)
	Holding Brake Control Function		Built in
	Protective Functions		Main circuit overcurrent, Overload, Initializing operation error, Driver overheat, Main circuit overvoltage, Regeneration error, Main circuit voltage lack, Control circuit voltage lack, Encoder disconnection, Overspeed, Position deviation error, Wrap around, Memory error, CPU and around circuit error, Communication error.
	Display		Status display, Alarm display
	PC interface		USB2.0
Interface	Physical layer / Protocol		100BASE-TX / IEEE802.3 compliant ethernet
	Transmission speed		100Mbit/s, Full duplex
	Communication port / Topology		2 ports (RJ45) / Daisy-chain (Max. 65535 nodes)
	Device profile		CoE (IEC61800-7-201), FoE (ASCII code access)
	Synchronization		SM2 event synchronization, DC synchronization (SYNC0 / SYNC1), Asynchronous Minimum Cycle Time 0.25ms
I/O Signals	Input Signal		Photocoupler input type, Number of inputs: 16 Input resistance: 2.2kΩ Input voltage: "H" level: 4.0 to 26.4VDC, "L" level: 0 to 1.0VDC
	Output Signal		Open-collector output via photocoupler, Number of outputs: 12 Output signal standards: VCEO: 4.75 to 26.4V IC: 50mA or less (In use of 24VDC.)

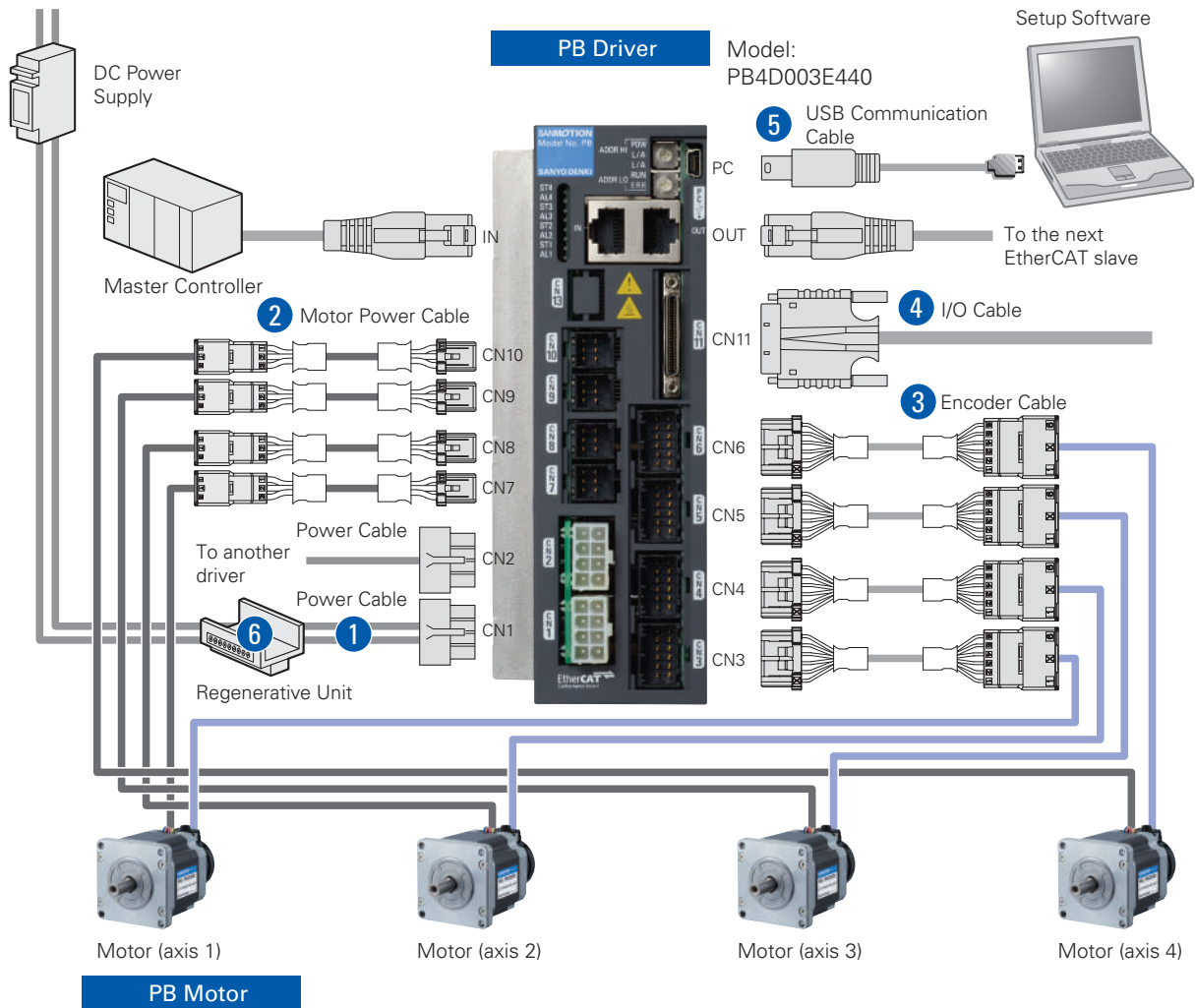
### Dimension

Unit: mm (inch)





# System Configuration

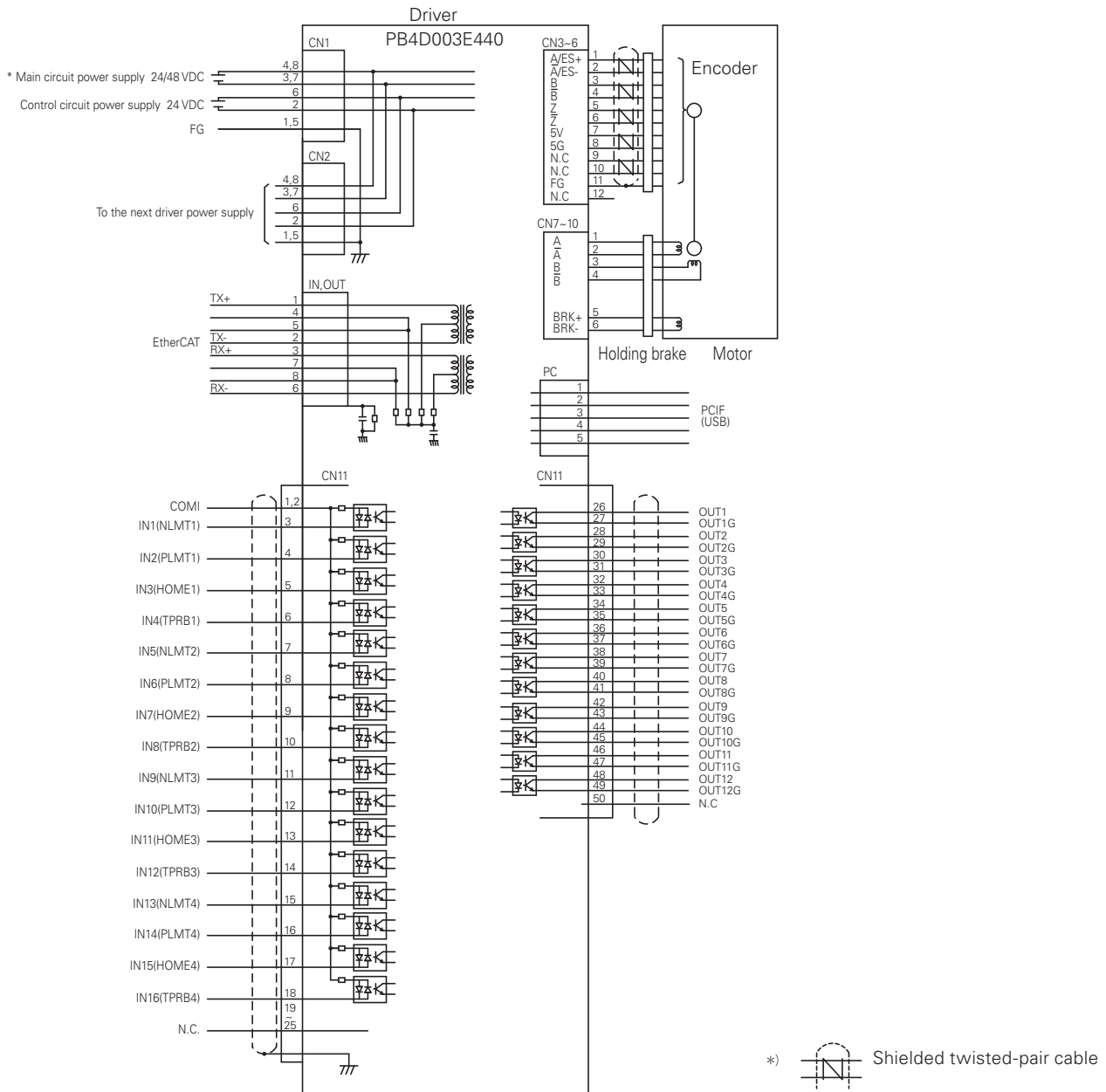


Item		Parts Number	Description
✓ 1	Power Cable: 1 m	PBC10P0010A	
2	Motor Power Cable: 3 m	PBC8M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC7E0030A	Extension Cable
4	I/O Cable: 1 m	PBC9S0010C	
✓ 5	USB Communication Cable: 1 m	AL-00896515-01	Communication with SANMOTION MOTOR Setup Software
6	Regen Unit	PBFE-02	Need when using 60 mmsq motor. (Ask us)

All items marked with a check must be included to build a complete system.

# CLOSED LOOP STEPPING SYSTEMS

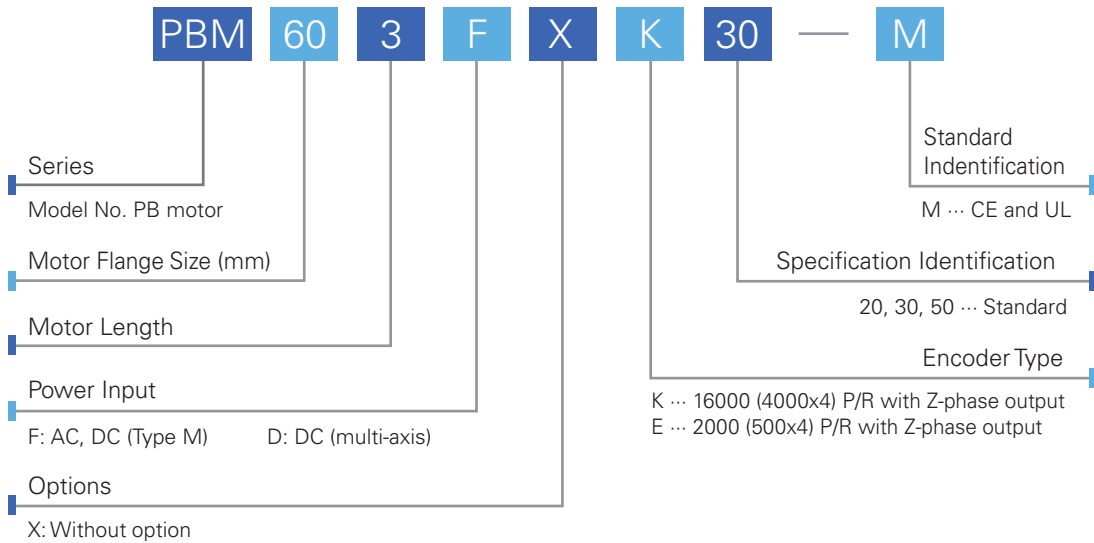
## Wiring Diagram



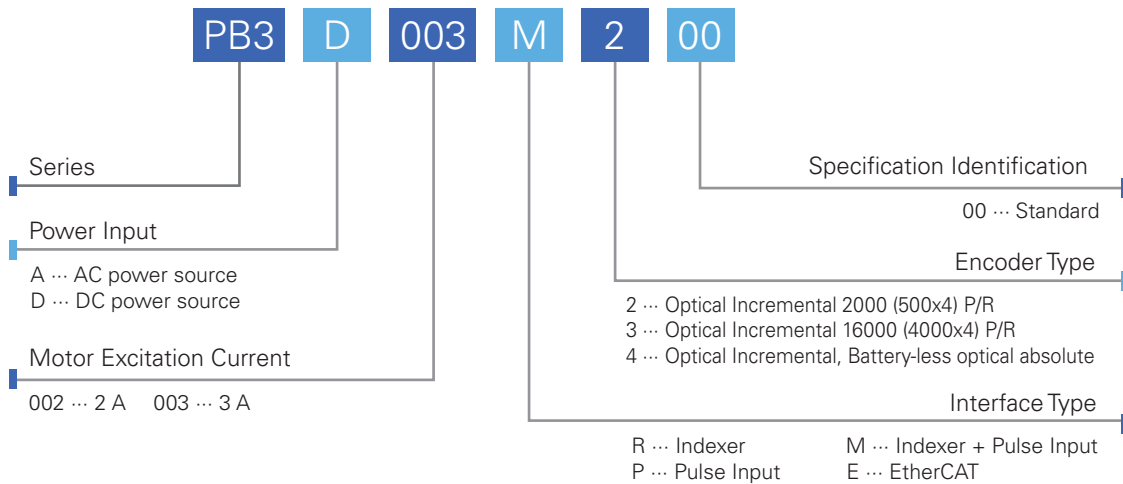
\* Keep the max. extended length to 2 m or less and the max. current consumption to 14 A or less (7 A for normal operation) while in use.

# Model Numbering System

## Motor



## Driver



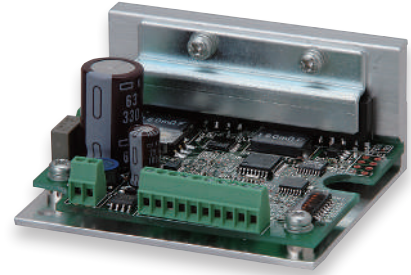
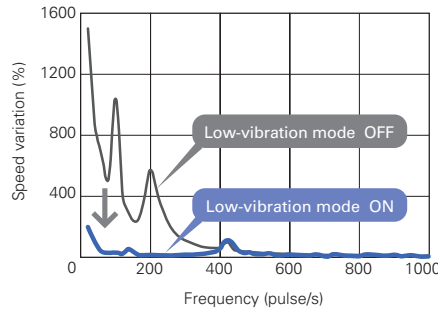
## 2-PHASE STEPPING SYSTEMS

# SANMOTION F2

## 2-PHASE STEPPING SYSTEMS

### Low Vibration

This driver features approximately 10% less vibration compared with our conventional product. Also, a low-vibration mode function provides smooth driving, even with one-division (full-step) and two-division (half-step) coarse resolution settings. This allows vibrations to be suppressed without control system restrictions.



## Lineup

Motor Size	Holding Torque		Current Amp	Model		Type	Driver BS1D200P10	Page
	N·m	oz·in		Single Shaft	Double Shaft			
14 mm 0.55 inch	0.0065	0.92	0.3	SH2141-5541	SH2141-5511			94
	0.01	1.42	0.4	SH2145-5641	SH2145-5611			
28 mm NEMA 11	0.07	9.91	1	SH2281-5771	SH2281-5731		■	95
	0.145	20.53	1	SH2285-5771	SH2285-5731		■	96
42 mm NEMA 17	0.083	11.75	1	SS2421-5041			■	97
	0.186	26.33	1	SS2422-5041			■	
	0.29	41.07	1	SF2421-10B41	SF2421-10B11	CONN	■	98
	0.43	60.89	1	SF2422-10B41	SF2422-10B11	CONN	■	99
	0.51	72.22	1		103H5210-5214	TAP	■	100
					103H5210-52XB12	BRK, TAP	■	
	0.8	113.3	1	SF2423-10B41	SF2423-10B11	CONN	■	101
0.37	52.39	1	SF2424-10B41	SF2424-10B11	CONN	■	102	
42 mm NEMA 17 0.9°/step	0.23	32.5	2	SH1421-5241			■	103
	0.35	48.1	2	SH1422-5241			■	104
	0.48	37.9	2	SH1424-5241			■	105
50 mm 1.97 inch	0.1	14.16	1	SS2501-8040			■	106
	0.215	30.44	1	SS2502-8040			■	
56 mm NEMA 23	0.55	77.9	3	103H7121-5840				107
			2	SM2561C20B41		CONN	■	108
	0.75	106.2	4	SM2561C40B41		CONN		
			6	SM2561C60B41		CONN		
	1	141.6	3	103H7123-5840				109
	1.4	198.2	2	SM2562C20B41		CONN	■	110
		4	SM2562C40B41		CONN			
		6	SM2562C60B41		CONN			

Type Blank: Lead wires CBL: Cable type CONN: Connector type BRK: Electrical Magnetic Brake Equipped

Motor Size	Holding Torque		Current	Model		Type	Driver BS1D200P10	Page
	N·m	oz·in	Amp	Single Shaft	Double Shaft			
56 mm NEMA 23	1.6	226.6	3	<b>103H7126-5840</b>				111
	2.35	332.8	2	<b>SM2563C20B41</b>		CONN	■	112
			4	<b>SM2563C40B41</b>		CONN		
			6	<b>SM2563C60B41</b>		CONN		
	2.5	354	2	<b>SM2564C20B41</b>		CONN	■	113
			4	<b>SM2564C40B41</b>		CONN		
			6	<b>SM2564C60B41</b>		CONN		
	2	283.2	3	<b>103H7128-5840</b>				114
	1	141.6	3	<b>SP2563-5260</b>		CBL		115
				<b>SP2563-5200</b>		CONN		
1.7	240.7	3	<b>SP2566-5260</b>		CBL		116	
			<b>SP2566-5200</b>		CONN			
60 mm 2.36 inch w/ NEMA 23 mounting	0.88	124.6	4	<b>103H7821-1760</b>	<b>103H7821-1730</b>			117
	1.37	194	4	<b>103H7822-1760</b>	<b>103H7822-1730</b>			118
	1.1	155.8	4.4		<b>103H7822-2511</b>			119
					<b>103H7822-25XB12</b>	BRK		
2.7	382.3	4	<b>103H7823-1760</b>	<b>103H7823-1730</b>			120	
60 mm 2.36 inch 0.9°/step	0.69	97.7	2	<b>SH1601-5240</b>			■	121
	1.28	181.2	2	<b>SH1602-5240</b>			■	122
	2.15	304.4	2	<b>SH1603-5240</b>			■	123
86 mm NEMA 34	3.3	467.3	4	<b>SM2861-5152</b>	<b>SM2861-5122</b>			124
	3.3	467.3	6	<b>SM2861-5252</b>				
	6.4	906.3	4	<b>SM2862-5152</b>	<b>SM2862-5122</b>			125
			6	<b>SM2862-5252</b>				
	6.4	906.3	6		<b>SH2862-52XB12</b>	BRK		126
	9	1274.5	4	<b>SM2863-5152</b>	<b>SM2863-5122</b>			127
	9	1274.5	6	<b>SM2863-5252</b>				
	6.4	906.3	6	<b>SP2862-5260</b>		CBL		128
9			1274.5	6	<b>SP2863-5260</b>		CBL	129
106 mm NEMA 42	13.2	1869.2	6	<b>103H89222-5241</b>				130
	19	2690.5	6	<b>103H89223-5241</b>				131
42 mm NEMA 17 Vacuum	0.37	52.39	2	<b>103H5208-49V40</b>		CBL	■	132
56 mm NEMA 23 Vacuum	0.45	63.72	2	<b>103H7121-47V40</b>		CBL	■	133

Type Blank: Lead wires CBL: Cable type CONN: Connector type BRK: Electrical Magnetic Brake Equipped

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**14 mm (0.55 inch)**

MOTOR LENGTH

**30/43.8 mm (1.18/1.72 inch)**

## ■ Specification

Bipolar winding, 1.8°/step

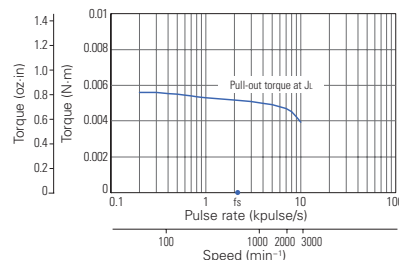
RoHS

Model	Single Shaft	SH2141-5541	SH2145-5641
	Double Shaft	SH2141-5511	SH2145-5611
Holding Torque	N·m	0.0065	0.01
	oz·in	0.92	1.42
Rated Current	A/phase	0.3	0.4
Wiring Resistance	Ω/phase	21	19
Winding Inductance	mH/phase	4.2	4
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.00058	0.0011
	oz·in <sup>2</sup>	0.0032	0.0060
Motor Weight	kg	0.028	0.042
	lb	0.062	0.093
Operating Temperature	-10 to 50°C (14 to 122 °F)		
Humidity	20 to 90% RH, no condensation		

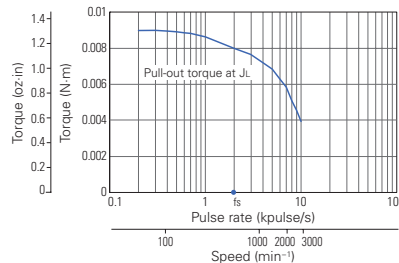
## ■ Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $J_L = [0.01 \times 10^{-4} \text{kg} \cdot \text{m}^2 (0.05 \text{oz} \cdot \text{in}^2)]$  pulley balancer method | fs: Maximum self-start frequency when not loaded

### ● SH2141-55

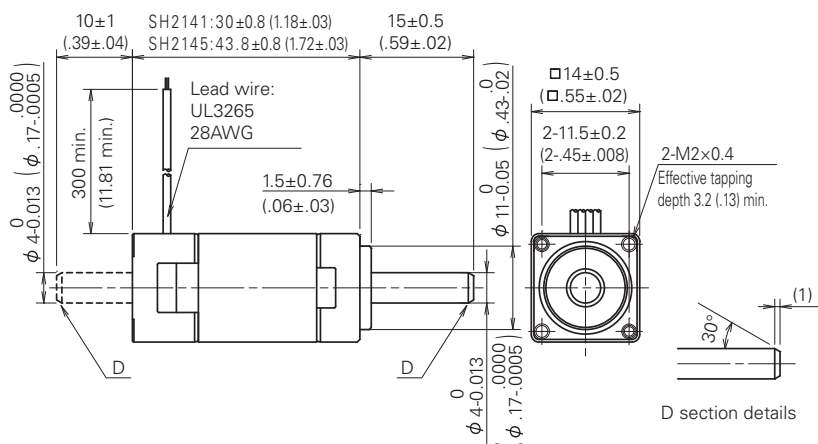


### ● SH2145-56

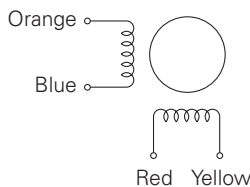


## ■ Dimension

Unit: mm (inch)



## ■ Internal Wiring



### ● Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

MOTOR FLANGE SIZE

28 mm (NEMA 11)

MOTOR LENGTH

32 mm (1.26 inch)

## Specification

### Bipolar winding, 1.8°/step

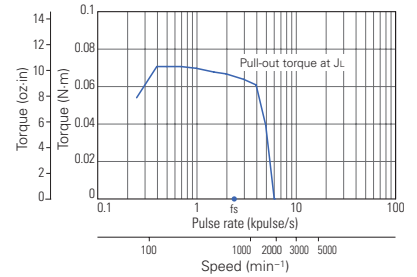
RoHS

Model	Single Shaft	SH2281-5771
	Double Shaft	SH2281-5731
Holding Torque	N·m	0.07
	oz·in	9.91
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	2.6
Winding Inductance	mH/phase	1.85
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.01
	oz·in <sup>2</sup>	0.05
Motor Weight	kg	0.11
	lb	0.24
Operating Temperature	-10 to 50°C (14 to 122°F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

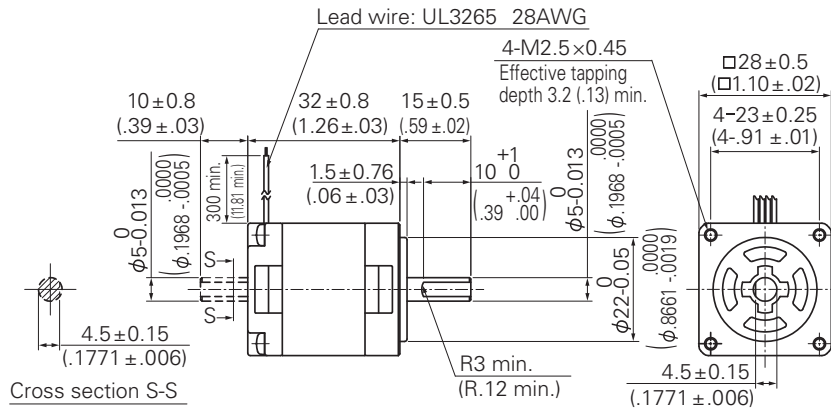
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [0.01 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (0.05 \text{ oz}\cdot\text{in}^2)]$  pulley balancer method | fs: Maximum self-start frequency when not loaded

### SH2281-57

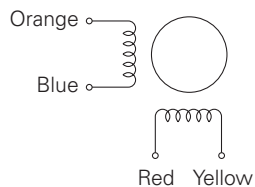


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation	1	-	-	+	+
sequence	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**28 mm (NEMA 11)**

MOTOR LENGTH

**51.5 mm (2.03 inch)**

## Specification

### Bipolar winding, 1.8°/step

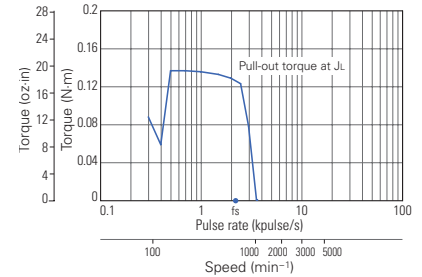
RoHS

Model	Single Shaft	SH2285-5771
	Double Shaft	SH2285-5731
Holding Torque	N·m	0.145
	oz·in	20.53
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	3.75
Winding Inductance	mH/phase	3.4
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.022
	oz·in <sup>2</sup>	0.12
Motor Weight	kg	0.20
	lb	0.44
Operating Temperature	-10 to 50°C (14 to 122°F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

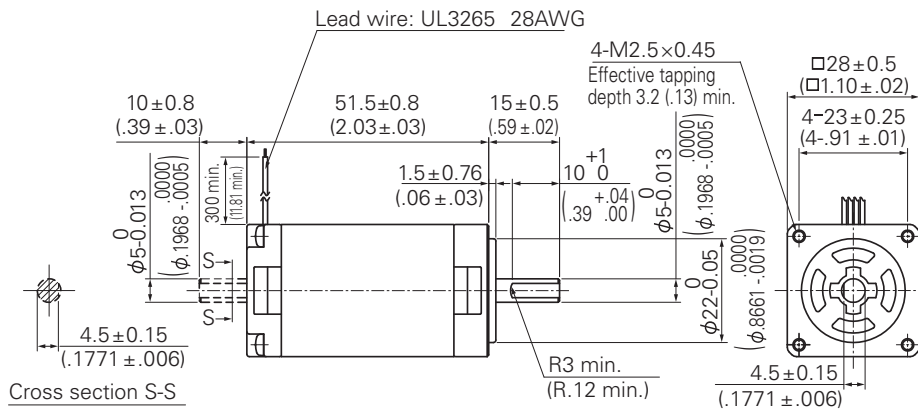
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $J_L = [0.01 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (0.05 \text{ oz}\cdot\text{in}^2)]$  pulley balancer method |  $f_s$ : Maximum self-start frequency when not loaded

### SH2281-57

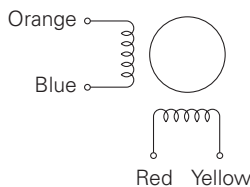


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-



MOTOR FLANGE SIZE

42 mm (NEMA 17)

MOTOR LENGTH

11.6/18.6 mm (.457/.732 inch)

## Specification

### Bipolar winding, 1.8°/step

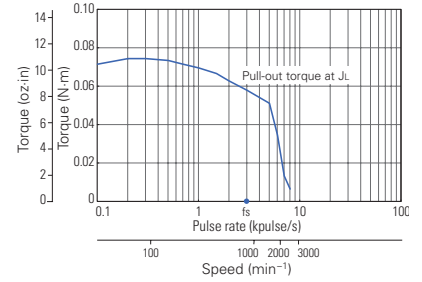
RoHS

Model	Single Shaft	SS2421-5041	SS2422-5041
Holding Torque	N·m	0.083	0.186
	oz·in	11.75	26.33
Rated Current	A/phase	1	1
Wiring Resistance	Ω/phase	3.5	5.4
Winding Inductance	mH/phase	1.2	2.9
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.015	0.028
	oz·in <sup>2</sup>	0.082	0.153
Motor Weight	kg	0.07	0.14
	lb	0.15	0.31
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

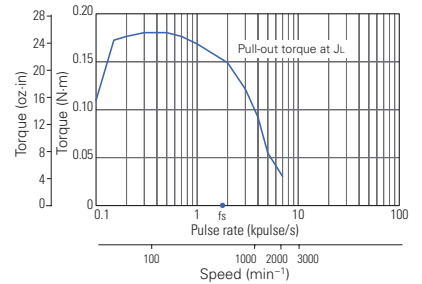
## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[0.33 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (1.80 oz·in<sup>2</sup>) pulley balancer method] |  $f_s$ : Maximum self-start frequency when not loaded

### SS2421-5041



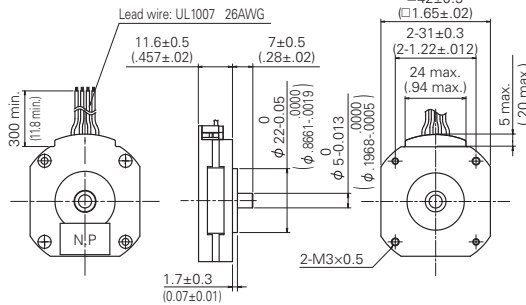
### SS2422-5041



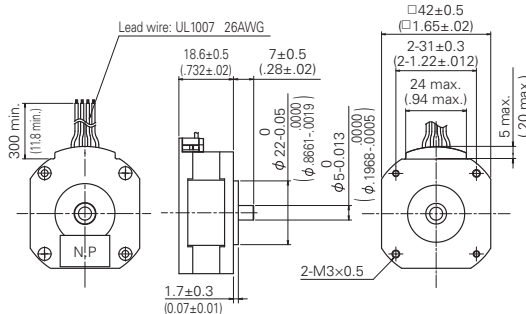
## Dimension

Unit: mm (inch)

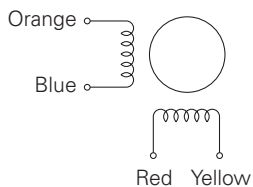
### SS2421-5041



### SS2422-5041



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**42 mm (NEMA 17)**

MOTOR LENGTH

**33 mm (1.30 inch)**

## Specification

### Bipolar winding, 1.8°/step

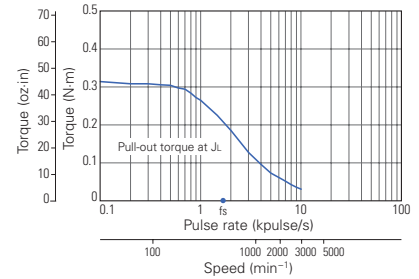
RoHS

Model	Single Shaft	SF2421-10B41
	Double Shaft	SF2421-10B11
Holding Torque	N·m	0.29
	oz·in	41.07
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	3.6
Winding Inductance	mH/phase	7
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.031
	oz·in <sup>2</sup>	0.169
Motor Weight	kg	0.23
	lb	0.51
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $J_L = [0.94 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (5.14 \text{ oz}\cdot\text{in}^2)]$  pulley balancer method |  $f_s$ : Maximum self-start frequency when not loaded

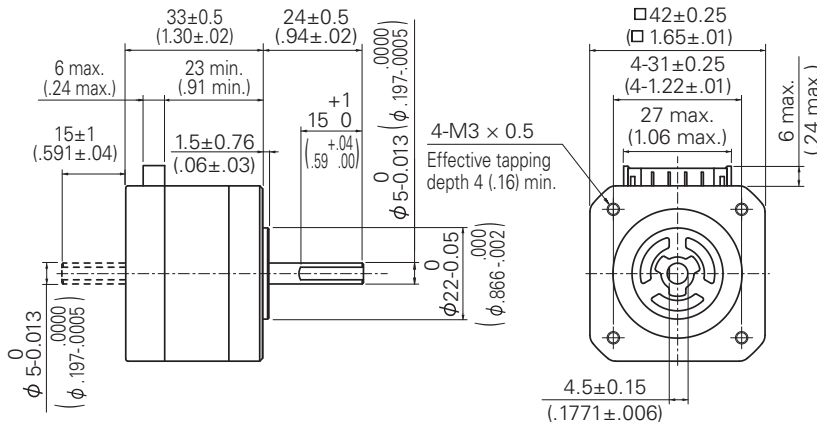
### SF2421-10B



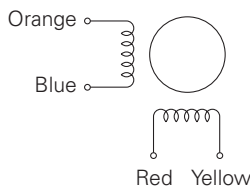
## Dimension

Unit: mm (inch)

Motor Cable Model Number: 4835775-1



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Connector pin number	3	7	5	9
Excitation sequence 1	-	-	+	+
Excitation sequence 2	+	-	-	+
Excitation sequence 3	+	+	-	-
Excitation sequence 4	-	+	+	-

MOTOR FLANGE SIZE

**42 mm (NEMA 17)**

MOTOR LENGTH

**39 mm (1.54 inch)**

## ■ Specification

### Bipolar winding, 1.8°/step

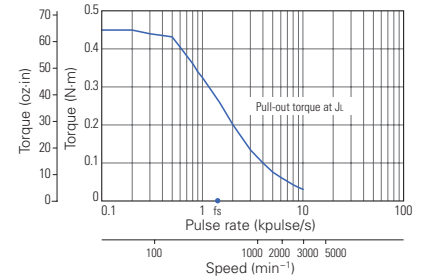
RoHS

Model	Single Shaft	SF2422-10B41
	Double Shaft	SF2422-10B11
Holding Torque	N·m	0.43
	oz·in	60.89
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	4.4
Winding Inductance	mH/phase	9.6
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.046
	oz·in <sup>2</sup>	0.252
Motor Weight	kg	0.3
	lb	0.66
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## ■ Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (5.14 oz·in<sup>2</sup>) pulley balancer method] | fs: Maximum self-start frequency when not loaded

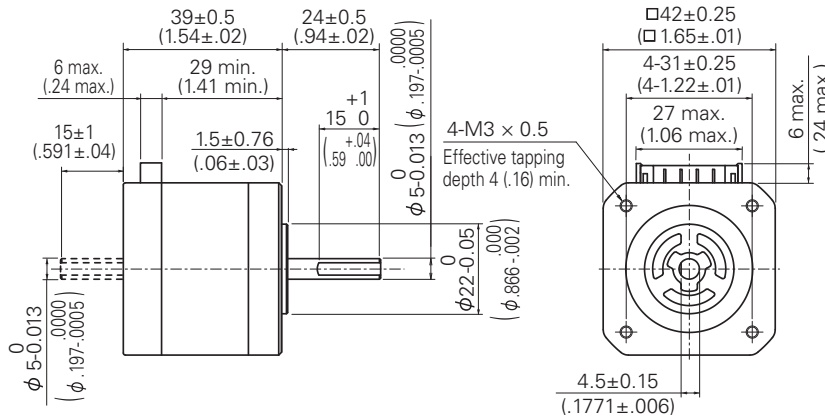
### ● SF2422-10B



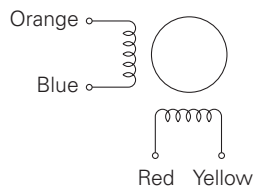
## ■ Dimension

Unit: mm (inch)

Motor Cable Model Number: 4835775-1



## ■ Internal Wiring



### ● Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Connector pin number	3	7	5	9
Excitation sequence 1	-	-	+	+
Excitation sequence 2	+	-	-	+
Excitation sequence 3	+	+	-	-
Excitation sequence 4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**42 mm (NEMA 17)**

MOTOR LENGTH

**48/81.6 mm (1.89/3.21 inch)**

## Specification

### Bipolar winding, 1.8°/step

RoHS

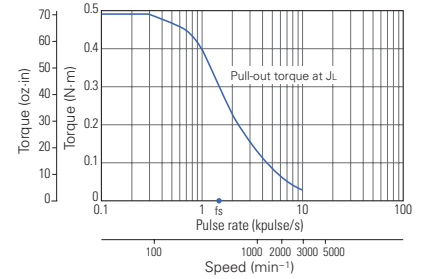
Model	Double Shaft	103H5210-5214
	w/ Brake	103H5210-52XB12
Holding Torque	N·m	0.51
	oz·in	72.2
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	4.8
Winding Inductance	mH/phase	9.5
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.074 (0.089*)
	oz·in <sup>2</sup>	0.405 (0.487*)
Motor Weight	kg	0.37 (0.51*)
	lb	0.82 (1.12*)
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation
Brake	Power Source	VDC / W
	Static Friction Torque	N·m
		oz·in
		24 VDC / 2.4 W
		0.3 Min.
		42.5 Min.

\* Specifications for brake motor

## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=0.94 \times 10^{-4}$  kg·m<sup>2</sup> (5.14 oz·in<sup>2</sup>) pulley balancer method |  $f_s$ : Maximum self-start frequency when not loaded

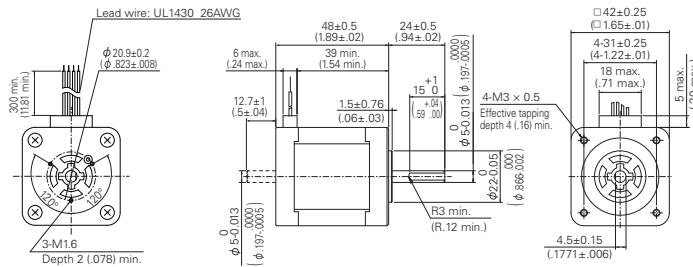
### 103H5210-52



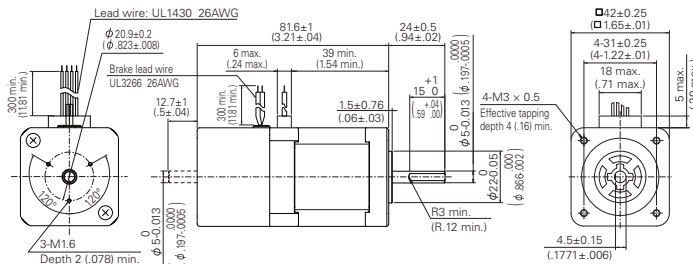
## Dimension

Unit: mm (inch)

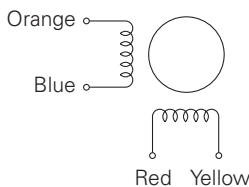
### 103H5210-5214



### 103H5210-52XB12



## Internal Wiring

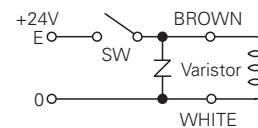


### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence	1	-	-	+
	2	+	-	+
	3	+	+	-
	4	-	+	-

## Brake Connection



MOTOR FLANGE SIZE

42 mm (NEMA 17)

MOTOR LENGTH

48 mm (1.89 inch)

## Specification

### Bipolar winding, 1.8°/step

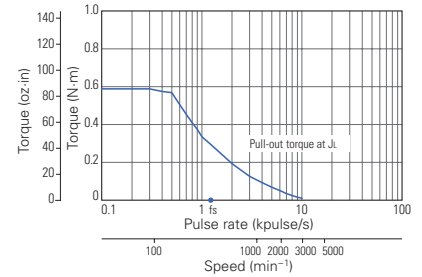
RoHS

Model	Single Shaft	SF2423-10B41
	Double Shaft	SF2423-10B11
Holding Torque	N·m	0.56
	oz·in	79.30
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	5.2
Winding Inductance	mH/phase	12.5
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.063
	oz·in <sup>2</sup>	0.344
Motor Weight	kg	0.38
	lb	0.84
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=0.94 \times 10^{-4}$ kg·m<sup>2</sup> (5.14 oz·in<sup>2</sup>) pulley balancer method | fs: Maximum self-start frequency when not loaded

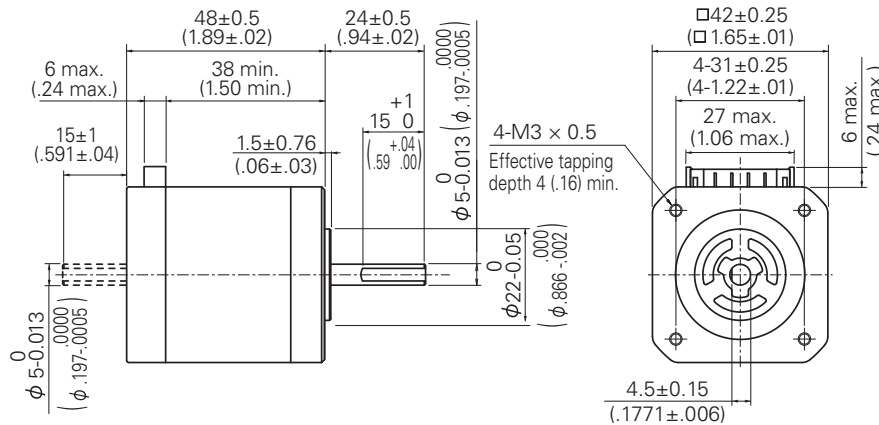
### SF2423-10B



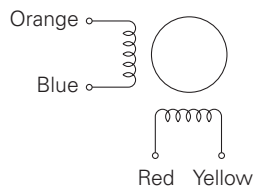
## Dimension

Unit: mm (inch)

Motor Cable Model Number: 4835775-1



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Connector pin number	3	7	5	9
Excitation sequence 1	-	-	+	+
Excitation sequence 2	+	-	-	+
Excitation sequence 3	+	+	-	-
Excitation sequence 4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**42 mm (NEMA 17)**

MOTOR LENGTH

**59.5 mm (2.34 inch)**

## Specification

### Bipolar winding, 1.8°/step

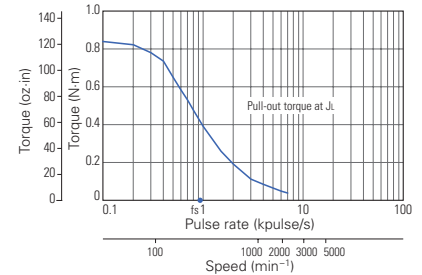
RoHS

Model	Single Shaft	SF2424-10B41
	Double Shaft	SF2424-10B11
Holding Torque	N·m	0.8
	oz·in	113.3
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	6.5
Winding Inductance	mH/phase	16
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.094
	oz·in <sup>2</sup>	0.514
Motor Weight	kg	0.51
	lb	1.12
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=2.6 \times 10^{-4}$  kg·m<sup>2</sup> (14.2 oz·in<sup>2</sup>) pulley balancer method | fs: Maximum self-start frequency when not loaded

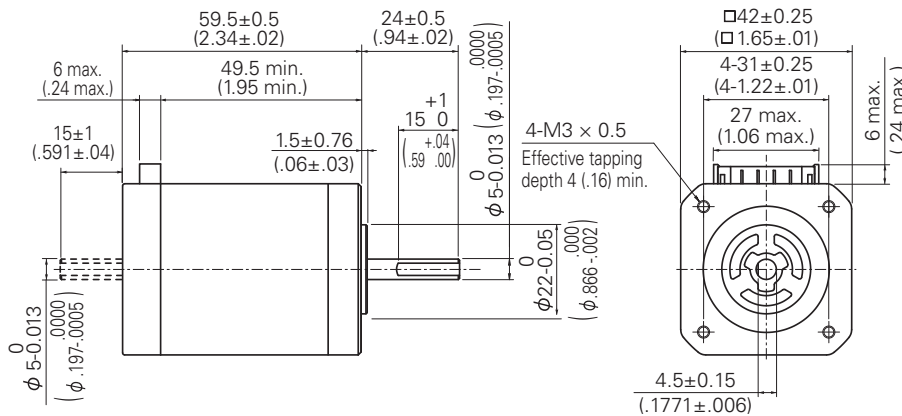
### SF2424-10B



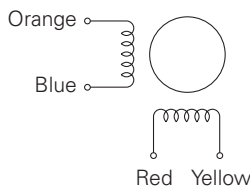
## Dimension

Unit: mm (inch)

Motor Cable Model Number: 4835775-1



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Connector pin number	3	7	5	9
Excitation sequence 1	-	-	+	+
Excitation sequence 2	+	-	-	+
Excitation sequence 3	+	+	-	-
Excitation sequence 4	-	+	+	-

MOTOR FLANGE SIZE

**42 mm (NEMA 17)**

MOTOR LENGTH

**33 mm (1.25 inch)**

## ■ Specification

**Bipolar winding, 0.9 °/step**

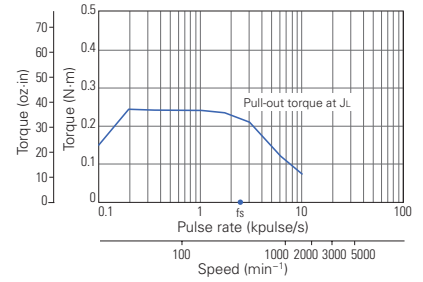
RoHS

Model	Single Shaft	SH1421-5241
Holding Torque	N·m	0.23
	oz·in	32.5
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	0.85
Winding Inductance	mH/phase	2.1
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.044
	oz·in <sup>2</sup>	0.24
Motor Weight	kg	0.24
	lb	0.53
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## ■ Torque Curve

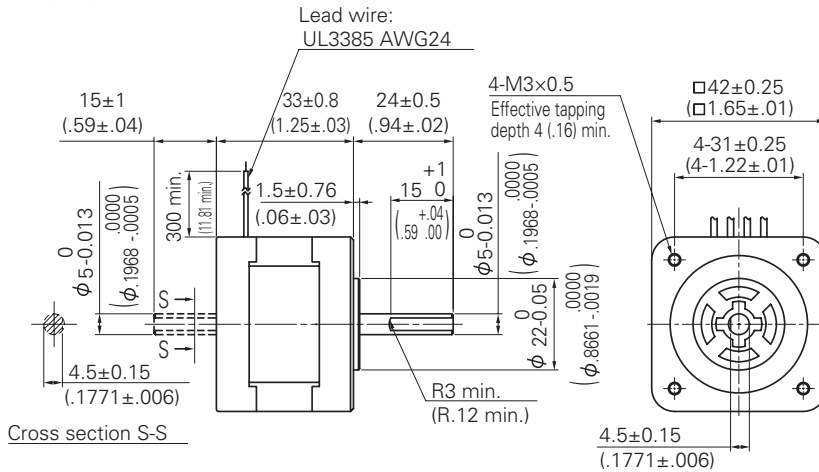
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=0.94 \times 10^{-4}$ kg·m<sup>2</sup> (5.14 oz·in<sup>2</sup>) pulley balancer method | fs: Maximum self-start frequency when not loaded

### ● SH1421-52

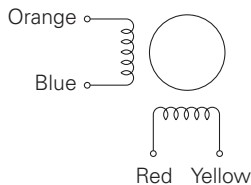


## ■ Dimension

Unit: mm (inch)



## ■ Internal Wiring



### ● Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**42 mm (NEMA 17)**

MOTOR LENGTH

**39 mm (1.54 inch)**

## Specification

Bipolar winding, 0.9 °/step

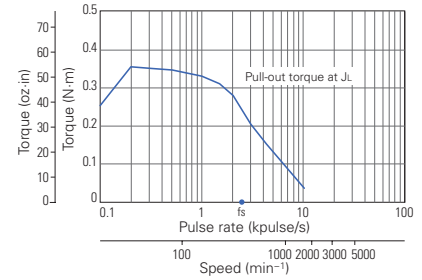
RoHS

Model	Single Shaft	SH1422-5241
Holding Torque	N·m	0.34
	oz·in	48.1
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	1.05
Winding Inductance	mH/phase	3.6
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.66
	oz·in <sup>2</sup>	0.36
Motor Weight	kg	0.29
	lb	0.64
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

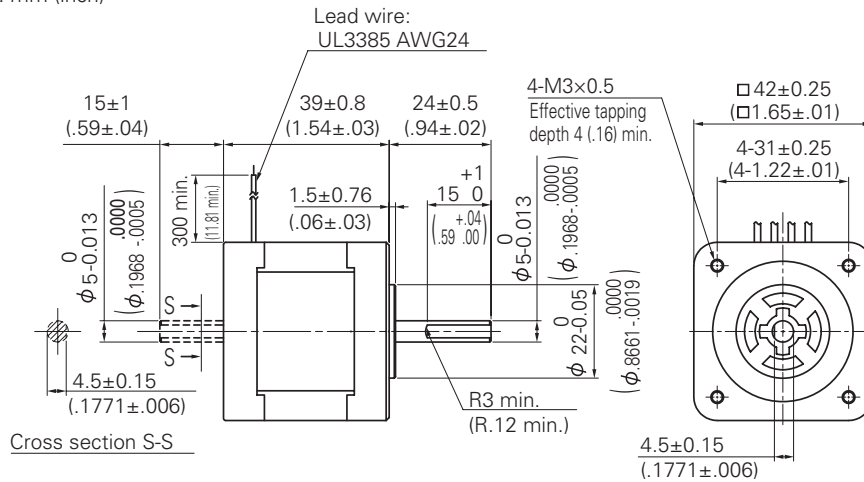
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2 (5.14 \text{oz}\cdot\text{in}^2)]$  pulley balancer method |  $f_s$ : Maximum self-start frequency when not loaded

### SH1422-52

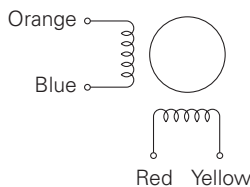


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation	1	-	-	+
sequence	2	+	-	+
	3	+	+	-
	4	-	+	-





# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**50 mm (1.97 inch)**

MOTOR LENGTH

**11.4/16.4 mm (0.43/0.63 inch)**

## Specification

Bipolar winding, 1.8°/step

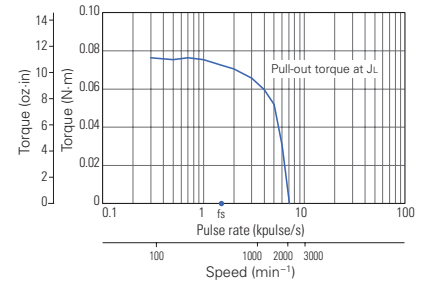
RoHS

Model	Single Shaft	SS2501-8040	SS2502-8040
Holding Torque	N·m	0.1	0.215
	oz·in	14.16	30.44
Rated Current	A/phase	1	1
Wiring Resistance	Ω/phase	4.5	5.9
Winding Inductance	mH/phase	2	3.2
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.026	0.049
	oz·in <sup>2</sup>	0.142	0.268
Motor Weight	kg	0.09	0.15
	lb	0.2	0.33
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

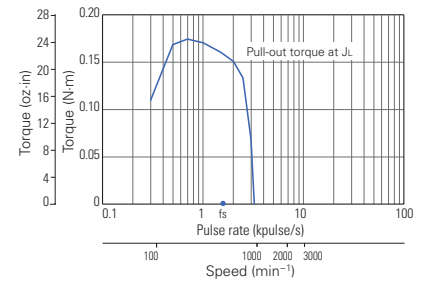
## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $J_L = [0.01 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (1.80 \text{ oz}\cdot\text{in}^2)$  pulley balancer method | fs: Maximum self-start frequency when not loaded

### SS2501-8040



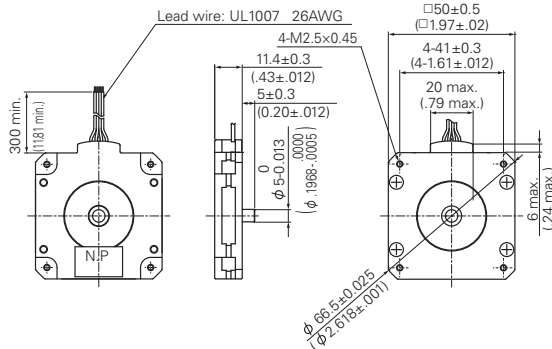
### SS2502-8040



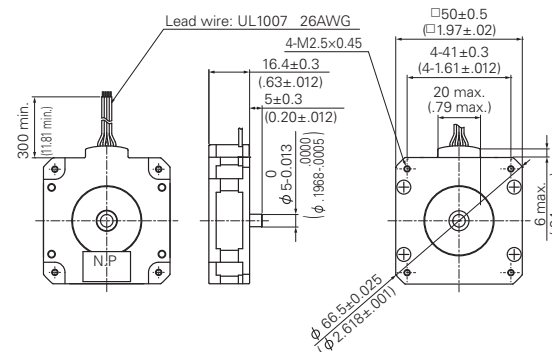
## Dimension

Unit: mm (inch)

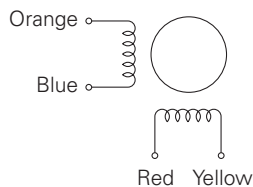
### SS2501-8040



### SS2502-8040



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**41.8 mm (1.65 inch)**

## ■ Specification

### Bipolar winding, 1.8°/step

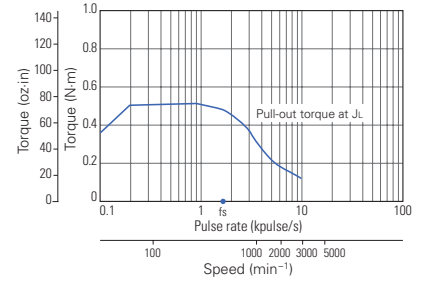
RoHS

Model	Single Shaft	103H7121-5840
Holding Torque	N·m	0.55
	oz·in	77.9
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	0.54
Winding Inductance	mH/phase	1.74
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.1
	oz·in <sup>2</sup>	0.55
Motor Weight	kg	0.47
	lb	1.04
Operating Temperature	-10 to 50°C (14 to 122°F)	
Humidity	20 to 90% RH, no condensation	

## ■ Torque Curve

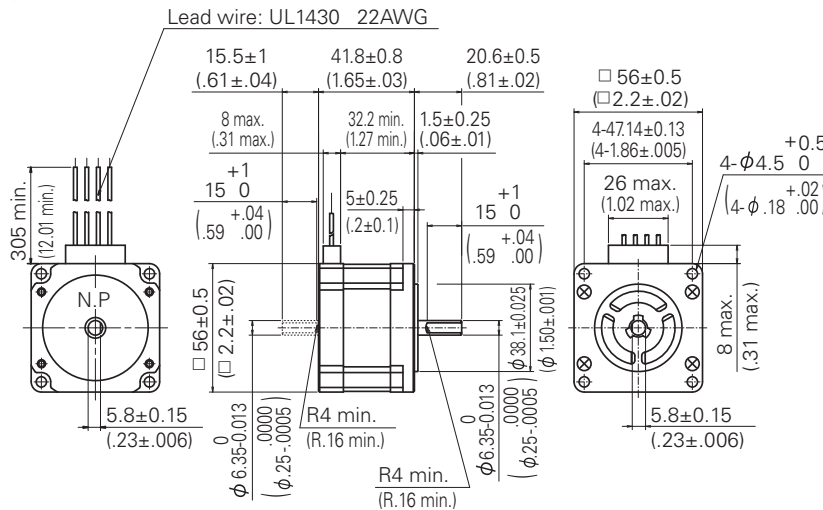
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [0.94 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (5.14 \text{ oz}\cdot\text{in}^2)$  pulley balancer method] | fs: Maximum self-start frequency when not loaded

### ● 103H7121-58

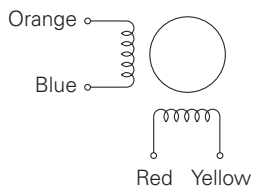


## ■ Dimension

Unit: mm (inch)



## ■ Internal Wiring



### ● Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**41.8 mm (1.65 inch)**

## Specification

Bipolar winding, 1.8°/step

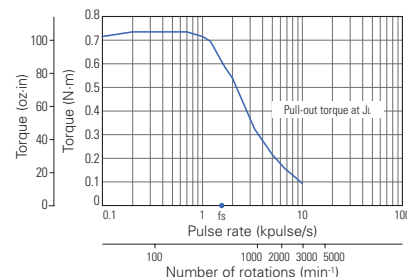


Model	Single Shaft	SM2561C20B41	SM2561C40B41	SM2561C60B41
Holding Torque	N·m	0.75	0.75	0.75
	oz·in	106.2	106.2	106.2
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	1.1	0.28	0.14
Winding Inductance	mH/phase	3.5	0.85	0.38
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.14	0.14	0.14
	oz·in <sup>2</sup>	0.77	0.77	0.77
Motor Weight	kg		0.49	
	lb		1.08	
Operating Temperature		-10 to 50°C (14 to 122°F)		
Humidity		20 to 90% RH, no condensation		

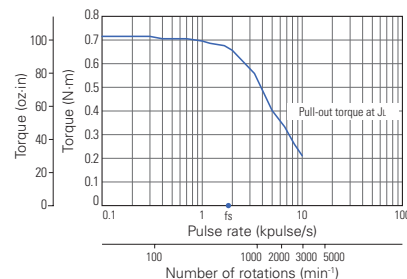
## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | Pull-out torque:  $J_L=0.94 \times 10^{-4}$  kg·m<sup>2</sup> (5.14 oz·in<sup>2</sup>) (with rubber coupling) | fs: Maximum self-start frequency when not loaded

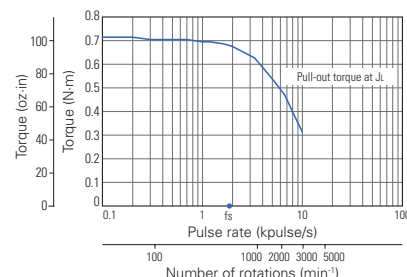
### SM2561C20B41



### SM2561C40B41



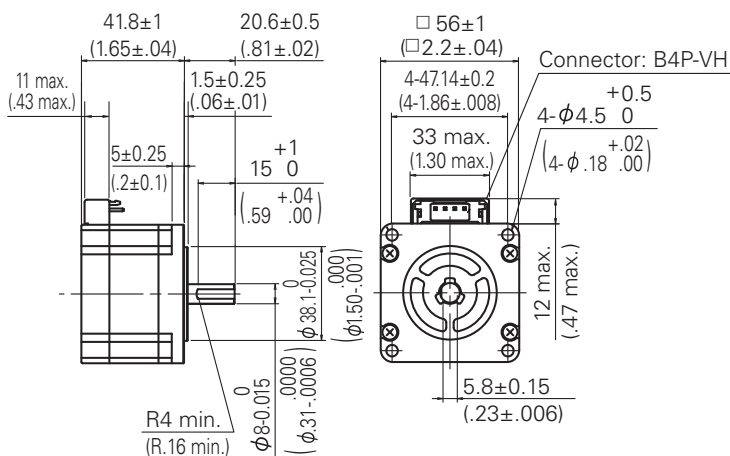
### SM2561C60B41



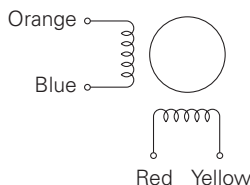
## Dimension

Unit: mm (inch)

Motor Cable Model Number: 4837961-1



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-



# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**53.8 mm (2.12 inch)**

## Specification

Bipolar winding, 1.8°/step

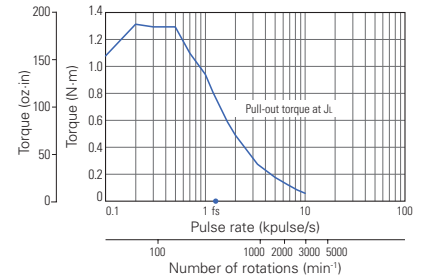


Model	Single Shaft	SM2562C20B41	SM2562C40B41	SM2562C60B41
Holding Torque	N·m	1.4	1.4	1.4
	oz·in	198.2	198.2	198.2
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	1.5	0.37	0.18
Winding Inductance	mH/phase	6.5	1.5	0.72
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.28	0.28	0.28
	oz·in <sup>2</sup>	1.53	1.53	1.53
Motor Weight	kg		0.69	
	lb		1.52	
Operating Temperature		-10 to 50°C (14 to 122°F)		
Humidity		20 to 90% RH, no condensation		

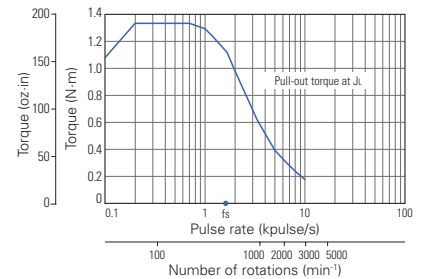
## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | Pull-out torque:  $JL=2.6 \times 10^{-4}$ kg·m<sup>2</sup> (14.2 oz·in<sup>2</sup>) (with rubber coupling) | fs: Maximum self-start frequency when not loaded

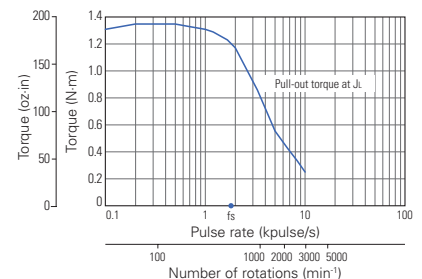
### SM2562C20B41



### SM2562C40B41



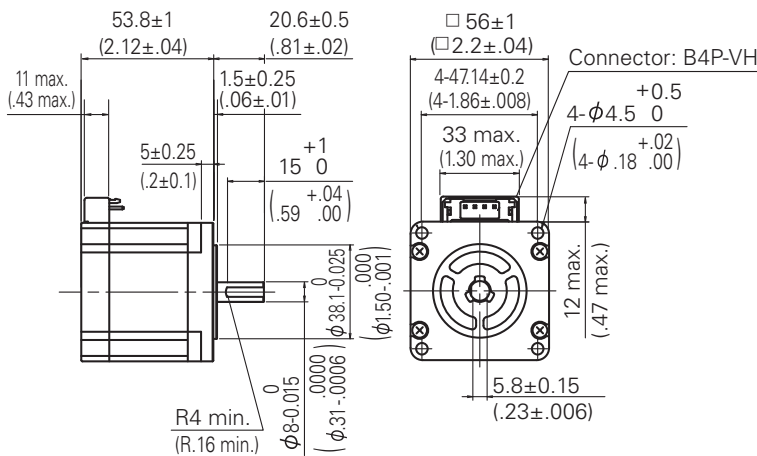
### SM2562C60B41



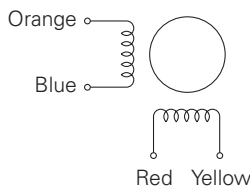
## Dimension

Unit: mm (inch)

Motor Cable Model Number: 4837961-1



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence	1	-	-	+
	2	+	-	+
	3	+	+	-
	4	-	+	-

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**75.8 mm (2.98 inch)**

## Specification

### Bipolar winding, 1.8°/step

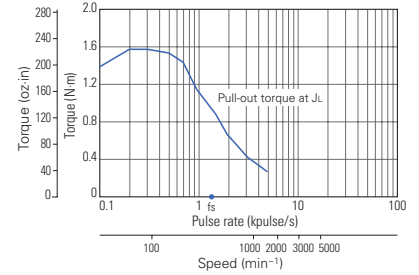
RoHS

Model	Single Shaft	103H7126-5840
Holding Torque	N·m	1.6
	oz·in	226.6
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	0.94
Winding Inductance	mH/phase	4
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.36
	oz·in <sup>2</sup>	1.97
Motor Weight	kg	0.98
	lb	2.16
Operating Temperature	-10 to 50°C (14 to 122°F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

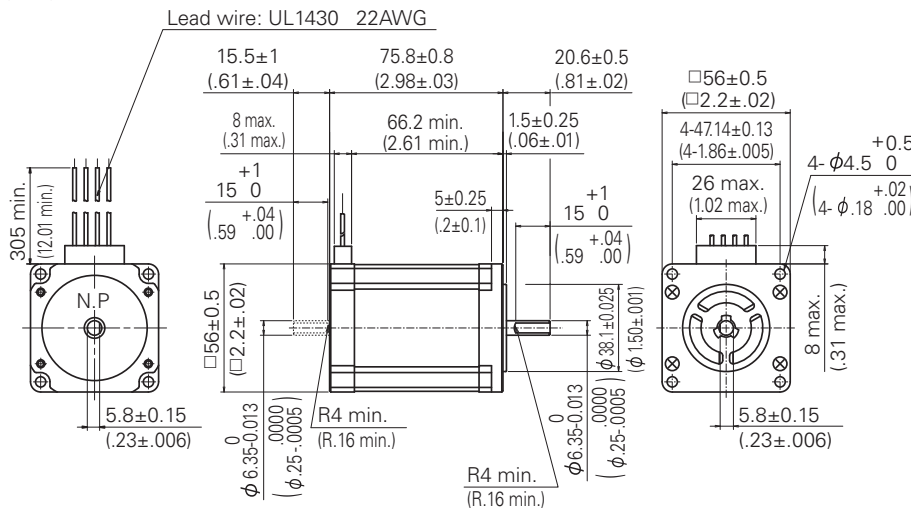
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [2.6 \times 10^{-4} \text{kg}\cdot\text{m}^2 (14.22 \text{oz}\cdot\text{in}^2)]$  pulley balancer method | fs: Maximum self-start frequency when not loaded

### 103H7126-58

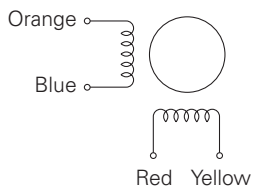


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence 1	-	-	+	+
Excitation sequence 2	+	-	-	+
Excitation sequence 3	+	+	-	-
Excitation sequence 4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**75.8 mm (2.98 inch)**

## Specification

Bipolar winding, 1.8°/step

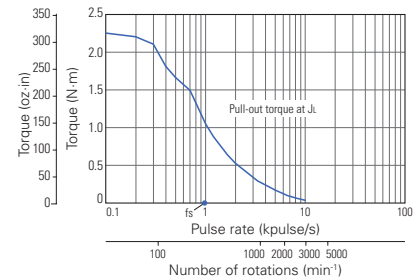


Model	Single Shaft	SM2563C20B41	SM2563C40B41	SM2563C60B41
Holding Torque	N·m	2.35	2.35	2.35
	oz·in	332.8	332.8	332.8
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	2.1	0.52	0.25
Winding Inductance	mH/phase	9.5	2.4	1.05
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.5	0.5	0.5
	oz·in <sup>2</sup>	2.73	2.73	2.73
Motor Weight	kg		1.1	
	lb		2.43	
Operating Temperature		-10 to 50°C (14 to 122°F)		
Humidity		20 to 90% RH, no condensation		

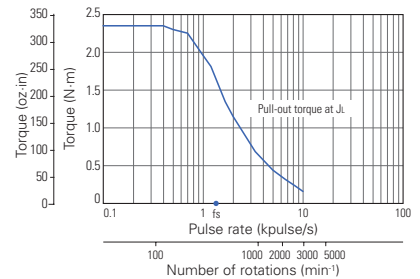
## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | Pull-out torque:  $JL=7.4 \times 10^{-4}$ kg·m<sup>2</sup> (40.5 oz·in<sup>2</sup>) (with rubber coupling) | fs: Maximum self-start frequency when not loaded

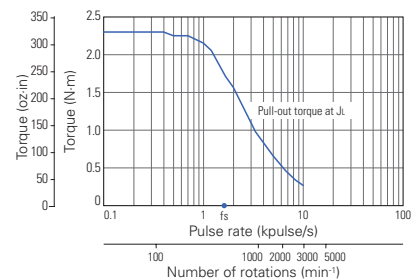
### SM2563C20B41



### SM2563C40B41



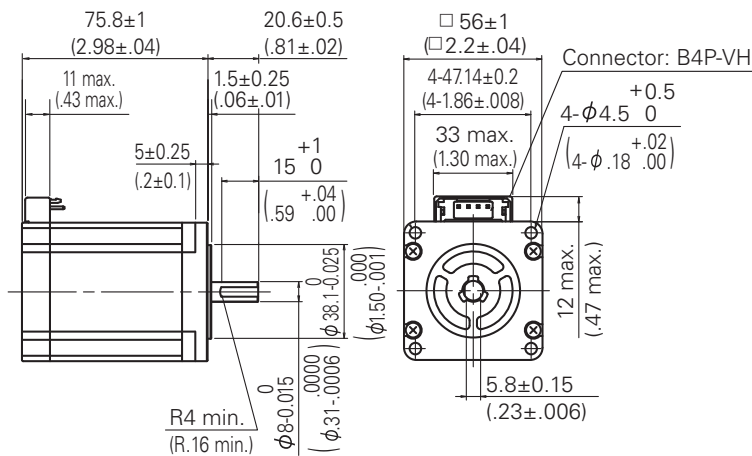
### SM2563C60B41



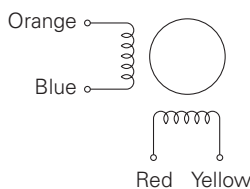
## Dimension

Unit: mm (inch)

Motor Cable Model Number: 4837961-1



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-



MOTOR FLANGE SIZE

56 mm (NEMA 23)

MOTOR LENGTH

85.8 mm (3.38 inch)

## Specification

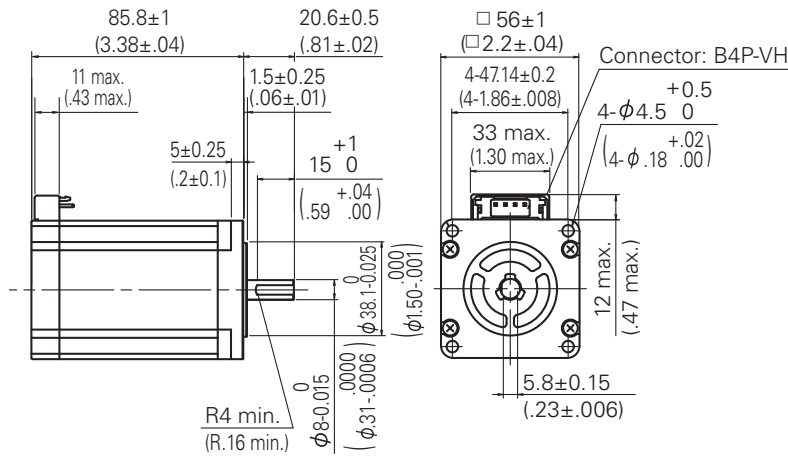
### Bipolar winding, 1.8°/step



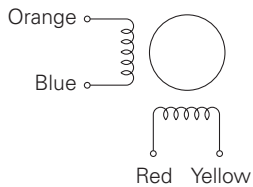
Model	Single Shaft	SM2564C20B41	SM2564C40B41	SM2564C60B41
Holding Torque	N·m	2.5	2.5	2.5
	oz·in	354.0	354.0	354.0
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	2.1	0.59	0.27
Winding Inductance	mH/phase	11	2.8	1.15
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.6	0.6	0.6
	oz·in <sup>2</sup>	3.28	3.28	3.28
Motor Weight	kg		1.27	
	lb		2.80	
Operating Temperature		-10 to 50°C (14 to 122°F)		
Humidity		20 to 90% RH, no condensation		

## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

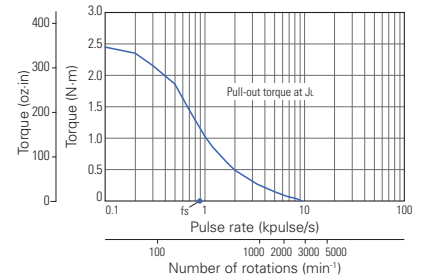
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

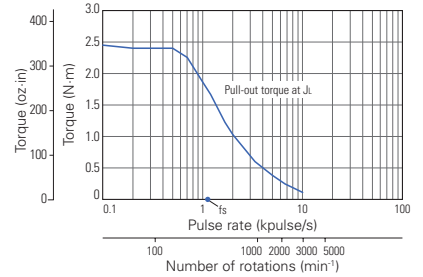
## Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | Pull-out torque:  $JL=[7.4 \times 10^{-4} \text{kg}\cdot\text{m}^2 (40.5 \text{oz}\cdot\text{in}^2)]$  (with rubber coupling) | fs: Maximum self-start frequency when not loaded

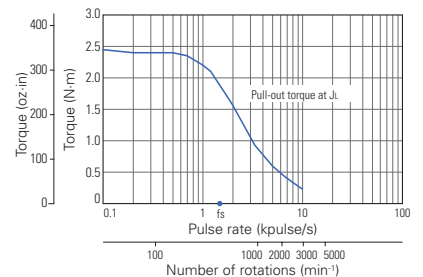
### SM2564C20B41



### SM2564C40B41



### SM2564C60B41



# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**94.8 mm (3.73 inch)**

## Specification

Bipolar winding, 1.8°/step

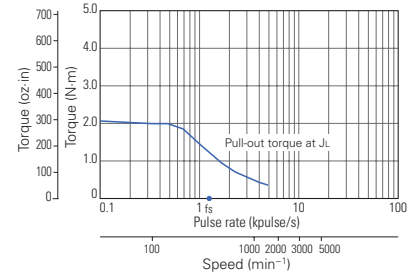
RoHS

Model	Single Shaft	103H7128-5840
Holding Torque	N·m	2
	oz·in	283.2
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	1.03
Winding Inductance	mH/phase	4.3
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.49
	oz·in <sup>2</sup>	2.68
Motor Weight	kg	1.3
	lb	2.87
Operating Temperature	-10 to 50°C (14 to 122°F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

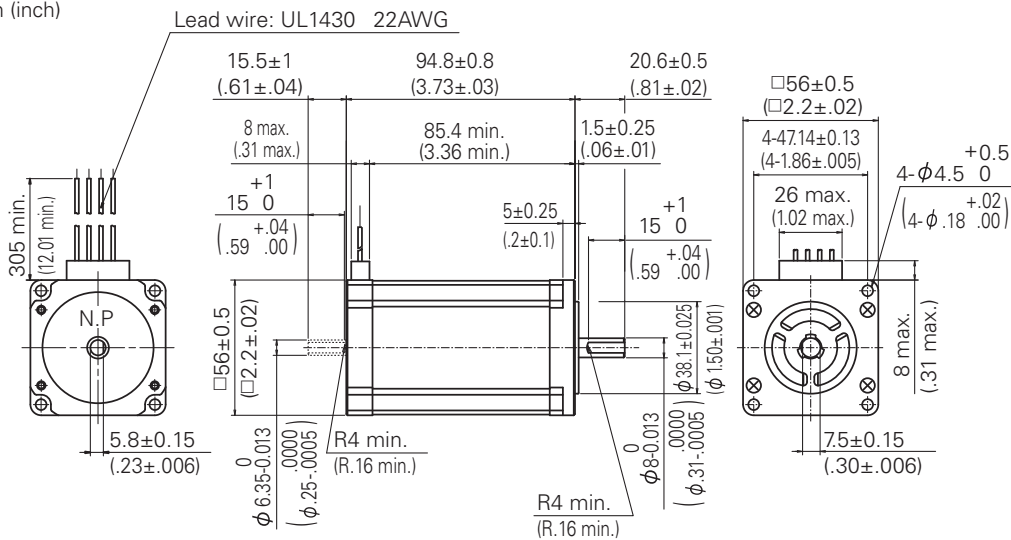
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | JL=[ $7.4 \times 10^{-4}$ kg·m<sup>2</sup> (40.46 oz·in<sup>2</sup>) pulley balancer method] | fs: Maximum self-start frequency when not loaded

### 103H7128-58

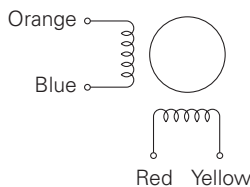


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**80 mm (3.15 inch)**

## Specification

**Bipolar winding, 1.8°/step**

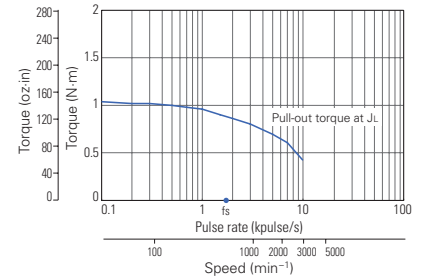


Model	Cable Type	SP2563-5260
	Connector Type	SP2563-5200
Holding Torque	N·m	1
	oz·in	141.6
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	0.75
Winding Inductance	mH/phase	3.4
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.21
	oz·in <sup>2</sup>	1.15
Motor Weight	kg	0.9
	lb	2
Operating Temperature	-10 to 40°C (14 to 104°F)	
Humidity	95% Max. at 40°C Max., no condensation	

## Torque Curve

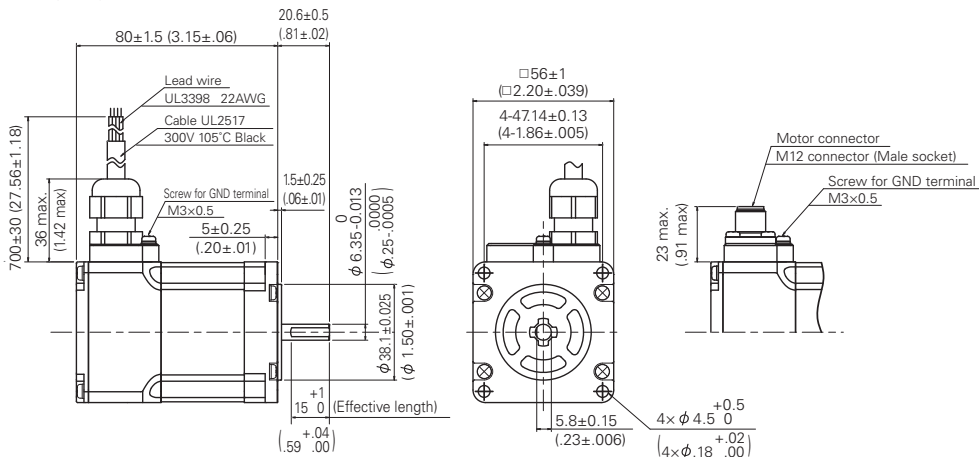
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=2.6 \times 10^{-4}$  kg·m<sup>2</sup> (14.22 oz·in<sup>2</sup>) pulley balancer method | fs: Maximum self-start frequency when not loaded

### SP2563-52

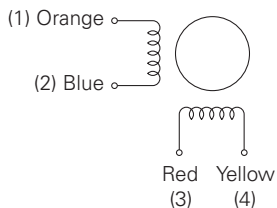


## Dimension

Unit: mm (inch)



## Internal Wiring



## Direction of motor rotation

The output shaft rotates clockwise as seen from the shaft side, when excited by DC in the following order.

Lead wire color	RED	BLU	YEL	ORG
Connector pin number	(3)	(2)	(4)	(1)
Excitation sequence	1	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**102 mm (4.02 inch)**

## Specification

### Bipolar winding, 1.8°/step

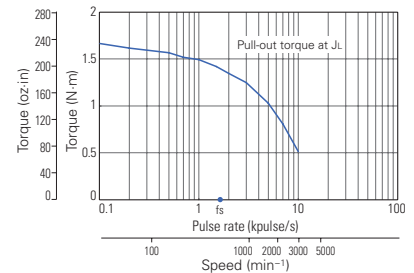


Model	Cable Type	SP2566-5260
	Connector Type	SP2566-5200
Holding Torque	N·m	1.7
	oz·in	240.7
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	1
Winding Inductance	mH/phase	4.4
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.36
	oz·in <sup>2</sup>	1.97
Motor Weight	kg	1.2
	lb	2.65
Operating Temperature	-10 to 40°C (14 to 104°F)	
Humidity	95% Max. at 40°C Max., no condensation	

## Torque Curve

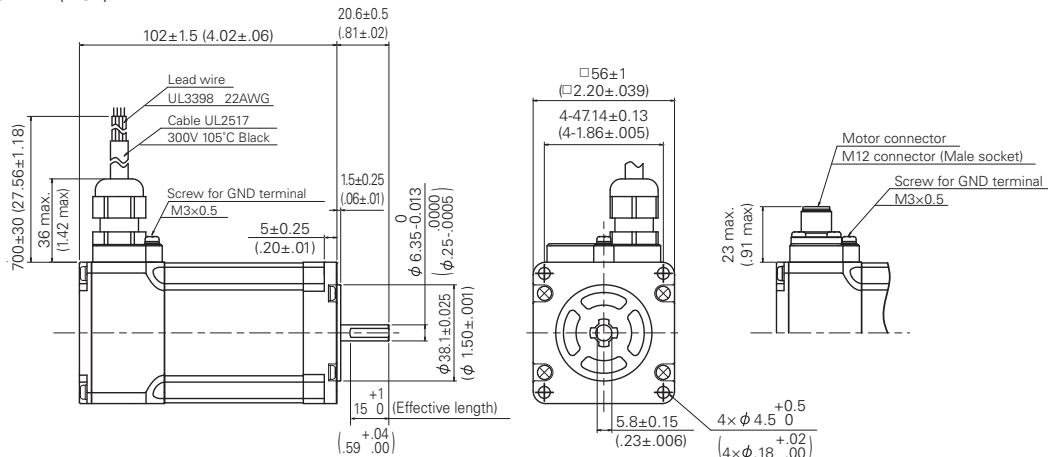
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [7.4 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (40.46 \text{ oz}\cdot\text{in}^2)]$  pulley balancer method |  $f_s$ : Maximum self-start frequency when not loaded

### SP2566-52

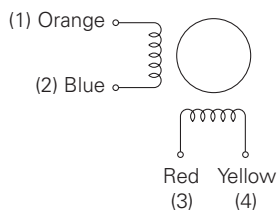


## Dimension

Unit: mm (inch)



## Internal Wiring



## Direction of motor rotation

The output shaft rotates clockwise as seen from the shaft side, when excited by DC in the following order.

Lead wire color	RED	BLU	YEL	ORG
Connector pin number	(3)	(2)	(4)	(1)
Excitation sequence	1	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+





MOTOR FLANGE SIZE

**60 mm (2.36 inch)**

MOTOR LENGTH

**52.5/94.2 mm (2.07/3.71 inch)**

**Specification**

**Unipolar winding, 1.8°/step**

RoHS

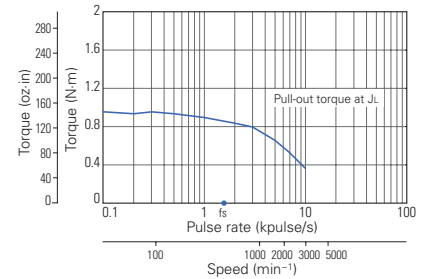
Model	Double Shaft	103H7822-2511
	w/ Brake	103H7822-25XB12
Holding Torque	N·m	1.1
	oz·in	155.8
Rated Current	A/phase	4.4
Wiring Resistance	Ω/phase	0.4
Winding Inductance	mH/phase	0.61
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.4 (0.56*)
	oz·in <sup>2</sup>	2.19 (3.06*)
Motor Weight	kg	0.77 (1.2*)
	lb	1.7 (2.6*)
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation
Brake	Power Source	VDC / W
	Static Friction Torque	N·m
		oz·in
		24 VDC / 6 W
		0.8 Min.
		113.3 Min.

\* Specifications for brake motor

**Torque Curve**

Constant current circuit, Source voltage: 24 VDC | Operating current: 6 A/Phase (RTA A-NDC06.V set value), half-step |  $JL=[2.6 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (14.22 oz·in<sup>2</sup>) pulley balancer method] | fs: Maximum self-start frequency when not loaded

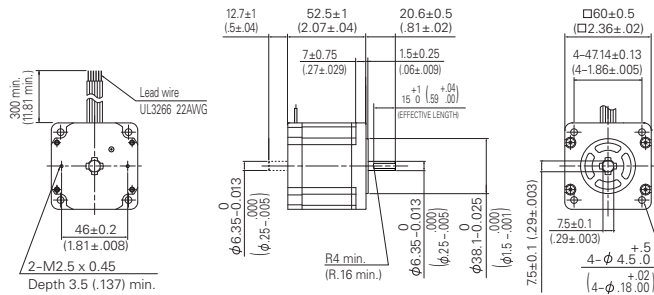
**103H7822-25**



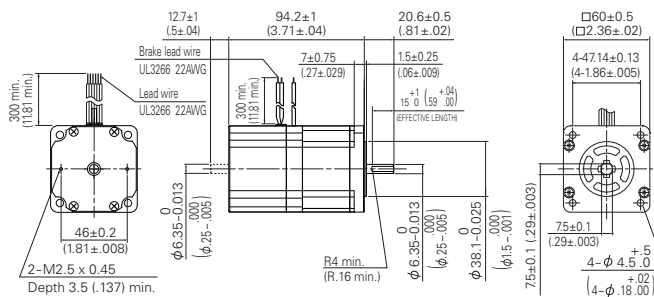
**Dimension**

Unit: mm (inch)

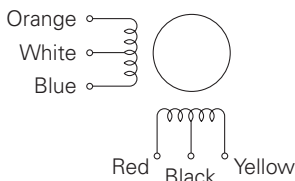
**103H7822-2511**



**103H7822-25XB12**



**Internal Wiring**

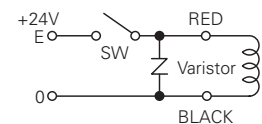


**Direction of motor rotation**

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	WHT & BLK	RED	BLU	YEL	ORG
Excitation sequence	1	+	-	-	-
	2	+	-	-	-
	3	+	-	-	-
	4	+	-	-	-

**Brake Connection**







MOTOR FLANGE SIZE

**60 mm (2.36 inch)**

MOTOR LENGTH

**42 mm (1.65 inch)**

## Specification

**Bipolar winding, 0.9 °/step**

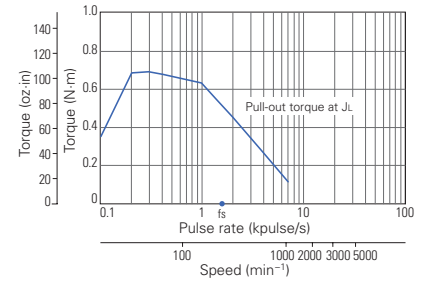
RoHS

Model	Single Shaft	SH1601-5240
Holding Torque	N·m	0.69
	oz·in	97.7
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	1.2
Winding Inductance	mH/phase	3.5
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.24
	oz·in <sup>2</sup>	1.31
Motor Weight	kg	0.55
	lb	1.21
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

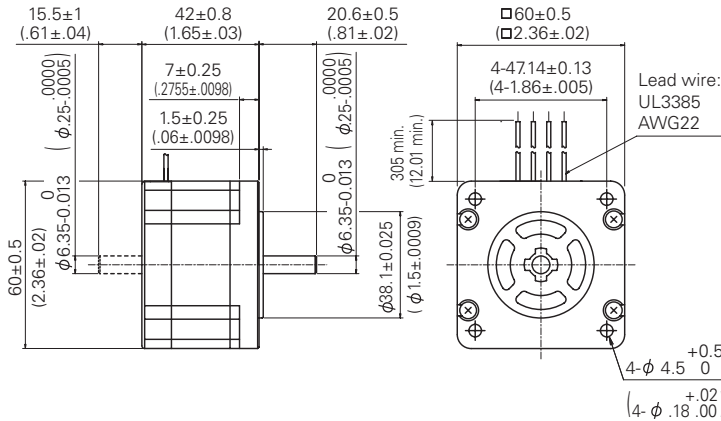
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [0.94 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (5.14 \text{ oz}\cdot\text{in}^2)]$  pulley balancer method | fs: Maximum self-start frequency when not loaded

### SH1601-52

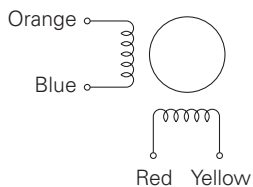


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**60 mm (2.36 inch)**

MOTOR LENGTH

**54 mm (2.13 inch)**

## Specification

Bipolar winding, 0.9 °/step

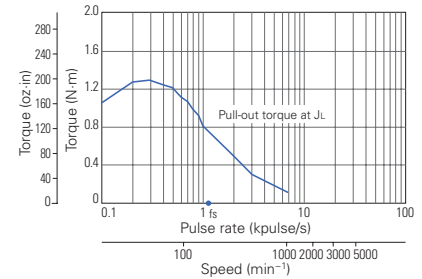
RoHS

Model	Single Shaft	SH1602-5240
Holding Torque	N·m	1.28
	oz·in	181.2
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	1.65
Winding Inductance	mH/phase	6.1
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.4
	oz·in <sup>2</sup>	2.19
Motor Weight	kg	0.8
	lb	1.76
Operating Temperature	-10 to 50°C (14 to 122 °F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

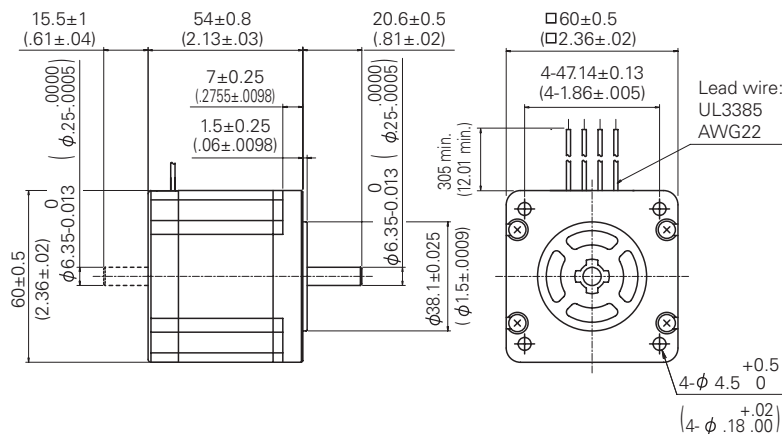
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[2.6 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (14.22 oz·in<sup>2</sup>) pulley balancer method | fs: Maximum self-start frequency when not loaded

### SH1602-52

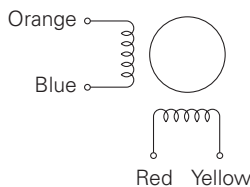


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence	1	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+

MOTOR FLANGE SIZE

60 mm (2.36 inch)

MOTOR LENGTH

76 mm (2.99 inch)

## Specification

Bipolar winding, 0.9 °/step

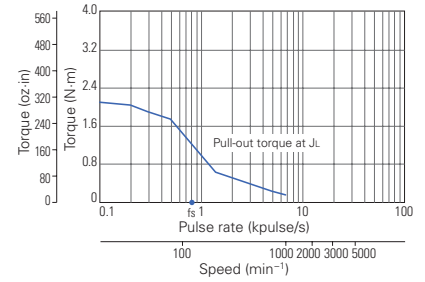
RoHS

Model	Single Shaft	SH1603-5240
Holding Torque	N·m	2.15
	oz·in	304.4
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	2.3
Winding Inductance	mH/phase	8.8
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.75
	oz·in <sup>2</sup>	4.10
Motor Weight	kg	1.2
	lb	2.65
Operating Temperature	-10 to 40°C (14 to 104 °F)	
Humidity	95% RH max.: under 40°C, no condensation	

## Torque Curve

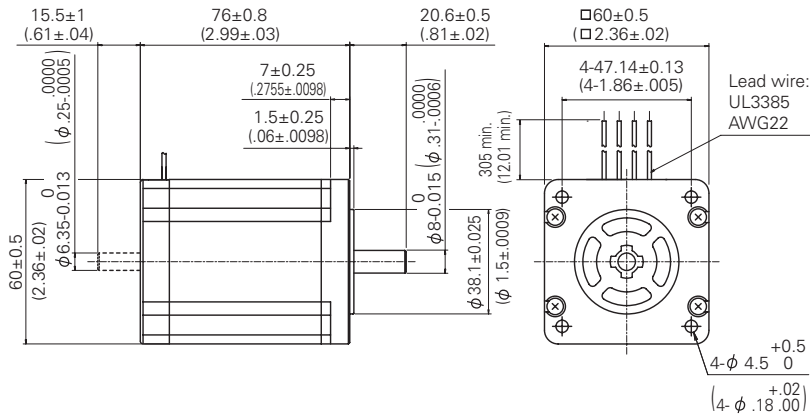
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=7.4 \times 10^{-4}$ kg·m<sup>2</sup> (40.46 oz·in<sup>2</sup>) pulley balancer method | fs: Maximum self-start frequency when not loaded

### SH1603-52

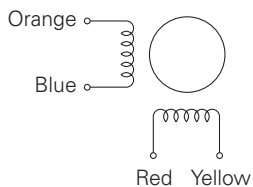


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence 1	-	-	+	+
Excitation sequence 2	+	-	-	+
Excitation sequence 3	+	+	-	-
Excitation sequence 4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**86 mm (NEMA 34)**

MOTOR LENGTH

**66 mm (2.6 inch)**

## Specification

### Bipolar winding, 1.8°/step

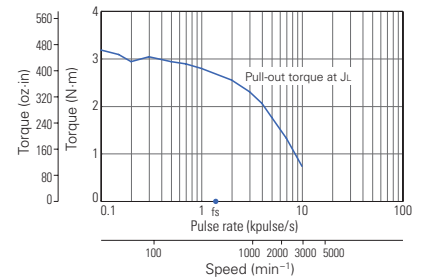


Model	Single Shaft	SM2861-5152	SM2861-5252
	Double Shaft	SM2861-5122	
Holding Torque	N·m	3.3	3.3
	oz·in	467.3	467.3
Rated Current	A/phase	4	6
Wiring Resistance	Ω/phase	0.56	0.29
Winding Inductance	mH/phase	3.7	1.7
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	1.48	1.48
	oz·in <sup>2</sup>	8.09	8.09
Motor Weight	kg	1.75	1.75
	lb	3.92	3.92
Operating Temperature	-10 to 50°C (14 to 122°F)		
Humidity	20 to 90% RH, no condensation		

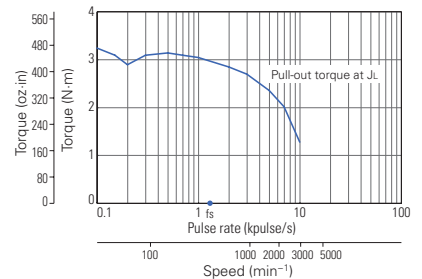
## Torque Curve

Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[15.3 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (83.65 oz·in<sup>2</sup>) pulley balancer method] | fs: Maximum self-start frequency when not loaded

### SM2861-51

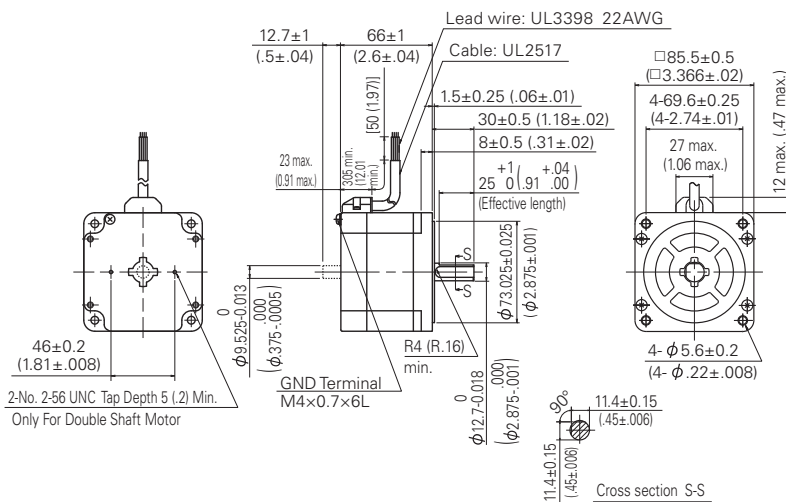


### SM2861-52

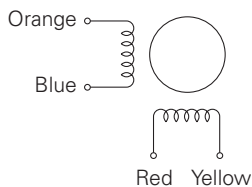


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence	1	-	-	+
	2	+	-	+
	3	+	+	-
	4	-	+	-





MOTOR FLANGE SIZE

86 mm (NEMA 34)

MOTOR LENGTH

127 mm (5 inch)

## Specification

### Bipolar winding, 1.8°/step

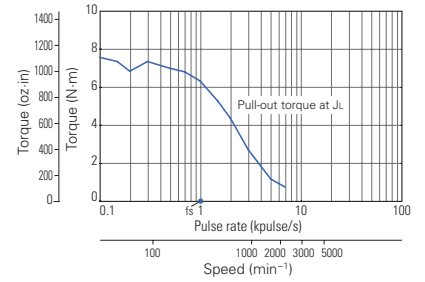


Model	Single Shaft	SM2863-5152	SM2863-5252
	Double Shaft	SM2863-5122	
Holding Torque	N·m	9	9
	oz·in	1274.5	1274.5
Rated Current	A/phase	4	6
Wiring Resistance	Ω/phase	1	0.46
Winding Inductance	mH/phase	7.9	3.8
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	4.5	4.5
	oz·in <sup>2</sup>	24.6	24.6
Motor Weight	kg	4	4
	lb	8.96	8.96
Operating Temperature	-10 to 50°C (14 to 122°F)		
Humidity	20 to 90% RH, no condensation		

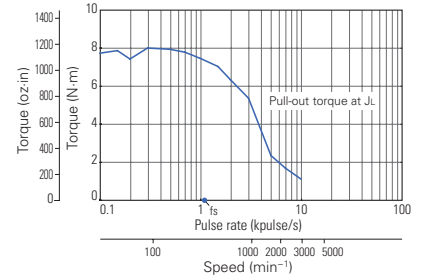
## Torque Curve

Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[44 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (240.56 oz·in<sup>2</sup>) pulley balancer method] | fs: Maximum self-start frequency when not loaded

### SM2863-51

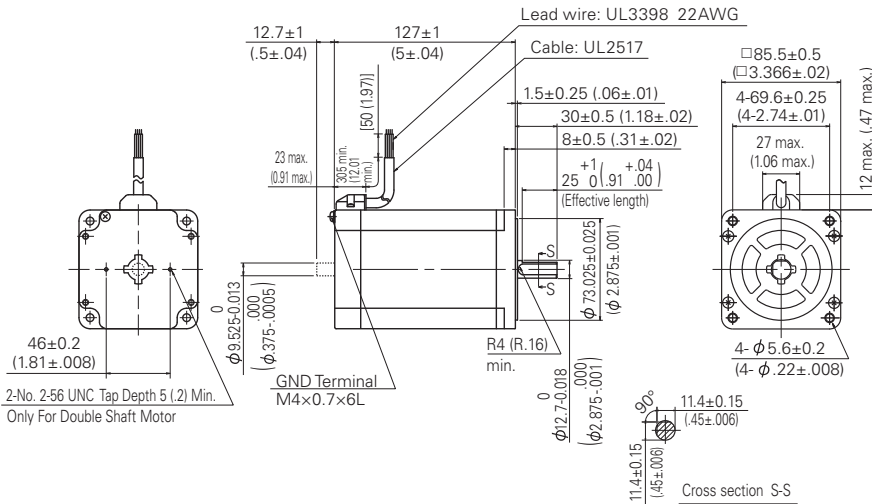


### SM2863-52

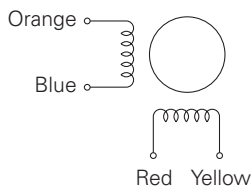


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**86 mm (NEMA 34)**

MOTOR LENGTH

**120 mm (4.72 inch)**

## Specification

Bipolar winding, 1.8°/step

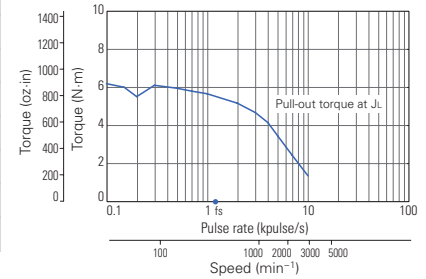


Model	Cable Type	SP2862-5260
Holding Torque	N·m	6.4
	oz·in	906.3
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.41
Winding Inductance	mH/phase	2.8
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	3
	oz·in <sup>2</sup>	16.4
Motor Weight	kg	3.1
	lb	6.8
Operating Temperature		-10 to 40°C (14 to 104°F)
Humidity		95% Max. at 40°C Max., no condensation

## Torque Curve

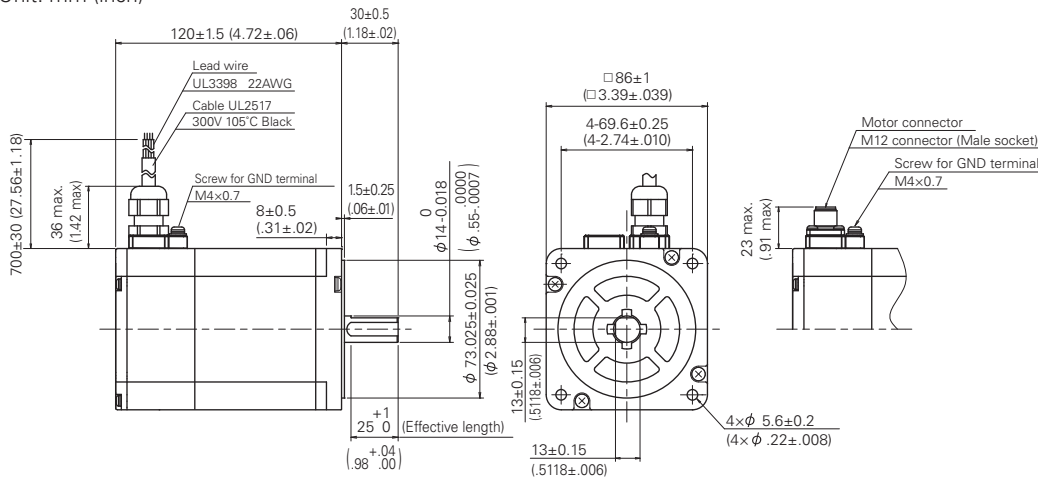
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[15.3 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (83.65 oz·in<sup>2</sup>) pulley balancer method] | fs: Maximum self-start frequency when not loaded

### SP2862-52

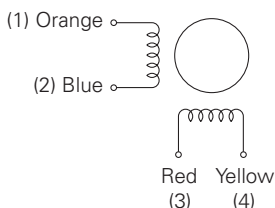


## Dimension

Unit: mm (inch)



## Internal Wiring



## Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Connector pin number	(3)	(2)	(4)	(1)
Excitation sequence	1	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+



MOTOR FLANGE SIZE

86 mm (NEMA 34)

MOTOR LENGTH

150 mm (5.91 inch)

## Specification

Bipolar winding, 1.8°/step

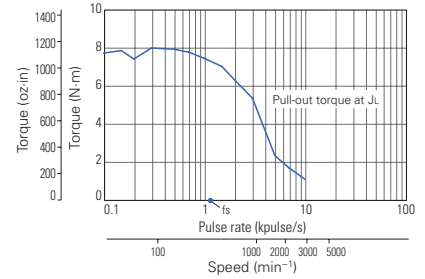


Model	Cable Type	SP2863-5260
Holding Torque	N·m	9
	oz·in	1274.5
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.53
Winding Inductance	mH/phase	3.8
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	4.5
	oz·in <sup>2</sup>	24.6
Motor Weight	kg	4.2
	lb	9.3
Operating Temperature	-10 to 40°C (14 to 104°F)	
Humidity	95% Max. at 40°C Max., no condensation	

## Torque Curve

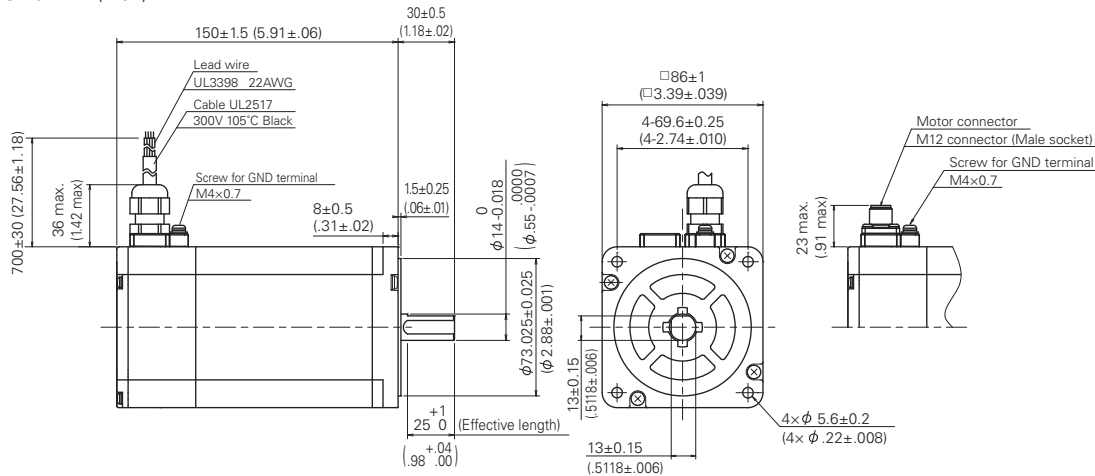
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=[44 \times 10^{-4} \text{kg}\cdot\text{m}^2$  (240.56 oz·in<sup>2</sup>) pulley balancer method] | fs: Maximum self-start frequency when not loaded

### SP2863-52

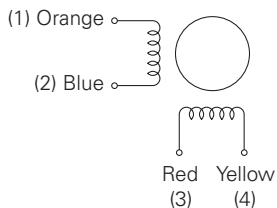


## Dimension

Unit: mm (inch)



## Internal Wiring



## Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Connector pin number	(3)	(2)	(4)	(1)
Excitation sequence	1	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**106 mm (NEMA 42)**

MOTOR LENGTH

**163.3 mm (6.4 inch)**

## Specification

Bipolar winding, 1.8°/step

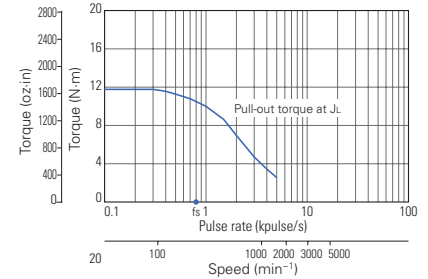
RoHS

Model	Single Shaft	103H89222-5241
Holding Torque	N·m	13.2
	oz·in	1869.2
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.45
Winding Inductance	mH/phase	5.4
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	14.6
	oz·in <sup>2</sup>	79.83
Motor Weight	kg	7.5
	lb	16.53
Operating Temperature	-10 to 50°C (14 to 122°F)	
Humidity	20 to 90% RH, no condensation	

## Torque Curve

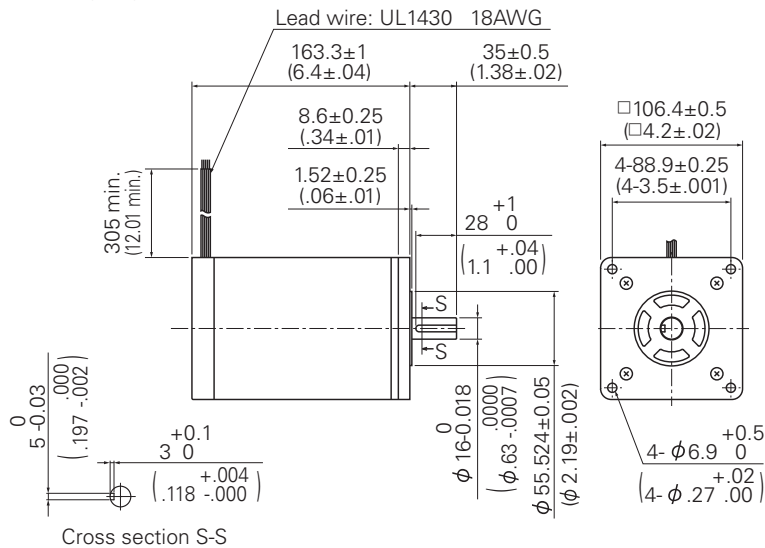
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [44 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (240.56 \text{ oz}\cdot\text{in}^2)$  pulley balancer method] | fs: Maximum self-start frequency when not loaded

### 103H89222-52

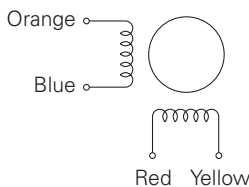


## Dimension

Unit: mm (inch)



## Internal Wiring



### Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence	1	-	-	+
	2	+	-	+
	3	+	+	-
	4	-	+	-

MOTOR FLANGE SIZE

**106 mm (NEMA 42)**

MOTOR LENGTH

**221.3 mm (8.7 inch)**

## ■ Specification

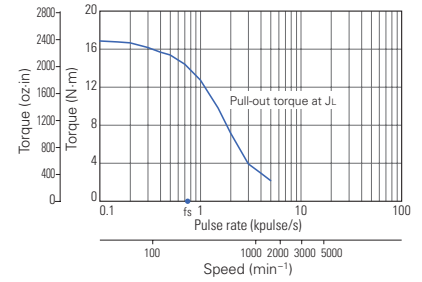
### Bipolar winding, 1.8°/step

Model	Single Shaft	103H89223-5241
Holding Torque	N·m	19
	oz·in	2690.5
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.63
Winding Inductance	mH/phase	8
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	22
	oz·in <sup>2</sup>	120.28
Motor Weight	kg	10.5
	lb	23.15
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation

## ■ Torque Curve

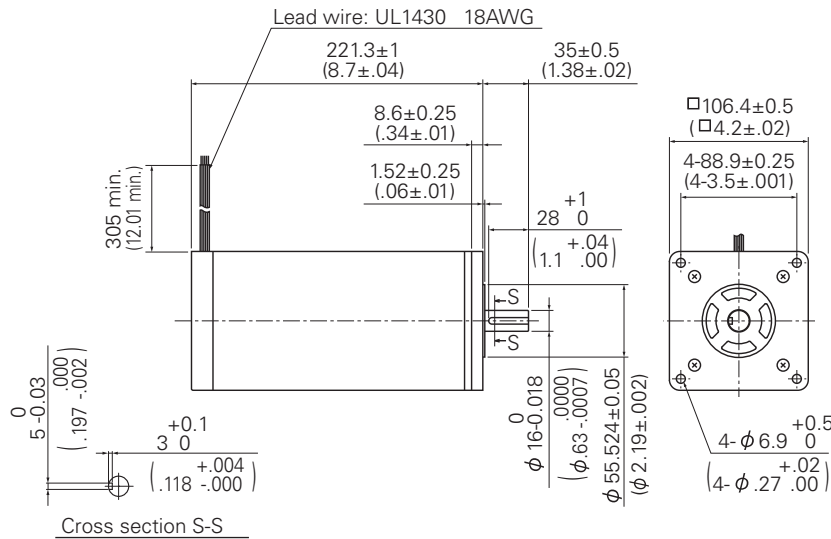
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [44 \times 10^{-4} \text{kg}\cdot\text{m}^2 (240.56 \text{oz}\cdot\text{in}^2)$  pulley balancer method] | fs: Maximum self-start frequency when not loaded

### ● 103H89223-52

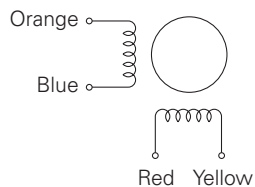


## ■ Dimension

Unit: mm (inch)



## ■ Internal Wiring



### ● Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

# 2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE

**42 mm (NEMA 17)**

MOTOR LENGTH

**39 mm (1.54 inch)**

## ■ Specification

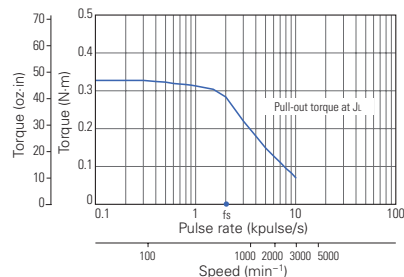
### Bipolar winding, 1.8°/step, Vacuum

Model	Single Shaft	103H5208-49V40
Holding Torque	N·m	0.37
	oz·in	52.39
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	1.27
Winding Inductance	mH/phase	2
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.056
	oz·in <sup>2</sup>	0.306
Motor Weight	kg	0.34
	lb	0.75
Baking Temperature	Less than 200°C (392°F)	
Working Pressure Range	$1 \times 10^{-5}$ Pa or more	

## ■ Torque Curve

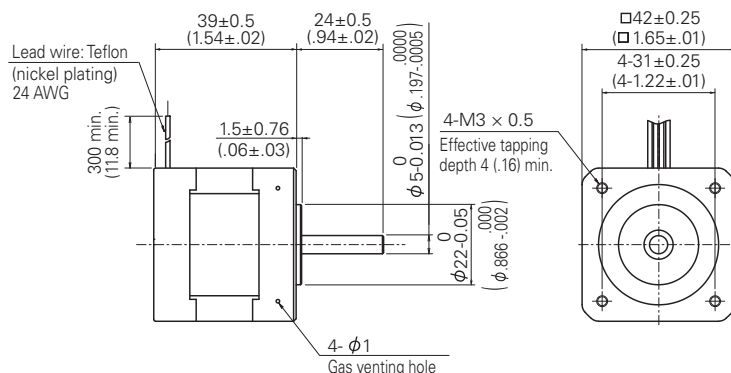
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL = [0.94 \times 10^{-4} \text{ kg}\cdot\text{m}^2 (5.14 \text{ oz}\cdot\text{in}^2)]$  pulley balancer method | fs: Maximum self-start frequency when not loaded

### ● 103H5208-49V40

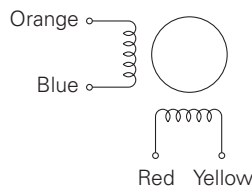


## ■ Dimension

Unit: mm (inch)



## ■ Internal Wiring



### ● Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG	
Excitation sequence	1	-	-	+	+
	2	+	-	-	+
	3	+	+	-	-
	4	-	+	+	-

MOTOR FLANGE SIZE

**56 mm (NEMA 23)**

MOTOR LENGTH

**45.9 mm (1.81 inch)**

**Specification**

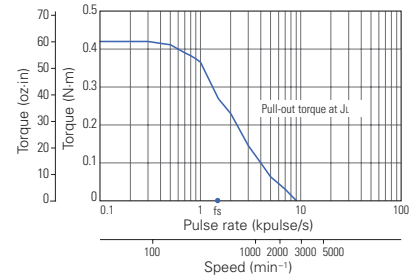
**Bipolar winding, 1.8°/step, Vacuum**

Model	Single Shaft	103H7121-47V40
Holding Torque	N·m	0.45
	oz·in	63.72
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	0.94
Winding Inductance	mH/phase	3.4
Rotor Inertia	$\times 10^{-4}$ kg·m <sup>2</sup>	0.1
	oz·in <sup>2</sup>	0.547
Motor Weight	kg	0.67
	lb	1.48
Baking Temperature	Less than 200°C (392°F)	
Working Pressure Range	$1 \times 10^{-5}$ Pa or more	

**Torque Curve**

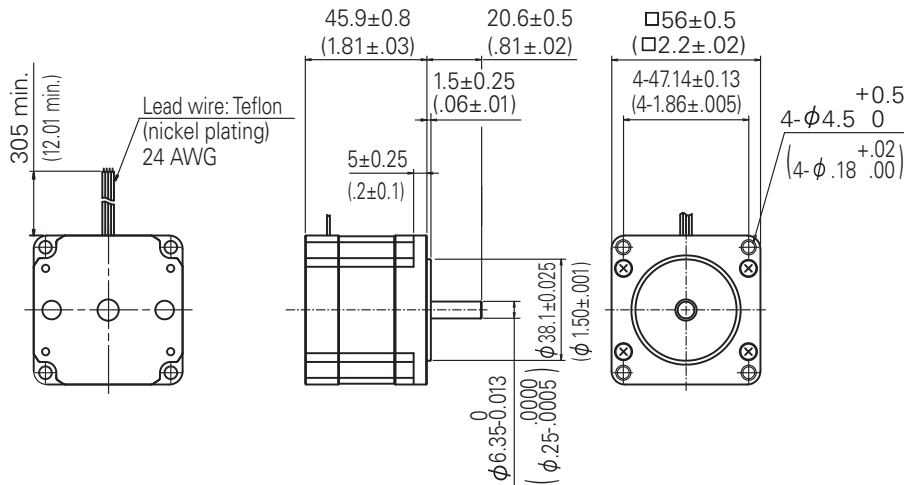
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) |  $JL=0.94 \times 10^{-4}$ kg·m<sup>2</sup> (5.14 oz·in<sup>2</sup>) pulley balancer method | fs: Maximum self-start frequency when not loaded

**103H7121-47V40**

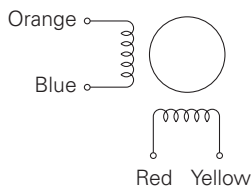


**Dimension**

Unit: mm (inch)



**Internal Wiring**



**Direction of motor rotation**

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

Lead wire color	RED	BLU	YEL	ORG
Excitation sequence	1	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+

## 2-PHASE STEPPING SYSTEMS

### Motor General Specifications

Motor model number	SH2141	SH228□	SS242□	SH142□	SF242□	SS250□
Type	-					
Operating ambient temperature	-10°C to +50°C					
Storage temperature	-20°C to +65°C					
Operating ambient humidity	20 to 90 RH (no condensation)					
Storage humidity	5 to 95 RH (no condensation)					
Operation altitude	1000 m (3281 feet) max. above sea level					
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s <sup>2</sup> (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.					
Impact resistance	500 m/s <sup>2</sup> of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.					
Thermal class	Class B (+130°C)					
Withstandable voltage	At normal temperature and humidity, no failure with 500 VAC @50/60 Hz applied for one minute between motor winding and frame.					
Insulation resistance	100 MΩ or more at 500 VDC (between motor winding and frame)					
Protection grade	IP40					
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)					
Static angle error	±0.09°			±0.054°	±0.09°	
Thrust play *1	0.075 mm (0.003 in) max. (load: 0.35 N (0.08 lbs))	0.075 mm (0.003 in) max. (load: 1.5 N (0.34 lbs))	0.075 mm (0.003 in) max. (load: 4 N (0.9 lbs))	0.075 mm (0.003 in) max. (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) max. (load: 4 N (0.9 lbs))
Radial play *2	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s <sup>2</sup> (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.					
Shaft runout	0.025 mm (0.001 in)					
Concentricity of mounting pilot relative to shaft	ø0.05 mm (ø0.002 in)	ø0.05 mm (ø0.002 in)	ø0.075 mm (ø0.003 in)	ø0.05 mm (ø0.002 in)	ø0.05 mm (ø0.002 in)	ø0.075 mm (ø0.003 in)
Squareness of mounting surface relative to shaft	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally					

Motor model number	103H712□	SH160□	103H78□□	103H8922□	SM286□
Type	-				S1 (continuous operation)
Operating ambient temperature	-10°C to +50°C				-10°C to +40°C
Storage temperature	-20°C to +65°C				-20°C to +60°C
Operating ambient humidity	20 to 90 RH (no condensation)				95% max.: 40°C max., 57% max.: 50°C max.,
Storage humidity	5 to 95% RH (no condensation)				35% max.: 60°C max. (no condensation)
Operation altitude	1000 m (3281 feet) max. above sea level				
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s <sup>2</sup> (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.				
Impact resistance	500 m/s <sup>2</sup> of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.				
Thermal class	Class B (+130°C)				Class F (+155°C)
Withstandable voltage	At normal temperature and humidity, no failure with 1000 VAC @50/60 Hz applied for one minute between motor winding and frame.			At normal temperature and humidity, no failure with 1500 VAC @50/60 Hz applied for one minute between motor winding and frame.	
Insulation resistance	At normal temperature and humidity, not less than 100 MΩ between winding and frame by 500 VDC megger.				
Protection grade	IP40				IP43
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)				
Static angle error	±0.054°	±0.054°	±0.09°		
Thrust play *1	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))				
Radial play *2	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (2.25 lbs))	0.025 mm (0.001 in) (load: 10 N (1.12 lbs))
Shaft runout	0.025 mm (0.001 in)				
Concentricity of mounting pilot relative to shaft	ø0.075 mm (ø0.003 in)				
Squareness of mounting surface relative to shaft	0.075 mm (0.003 in)	0.1 mm (0.004 in)	0.075 mm (0.003 in)	0.15 mm (0.006 in)	0.075 mm (0.003 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally				

Regarding the SH2145, SM256□, 103H5208-49V40 and 103H7121-47V40, please ask us.

\*1 Thrust play: Shaft displacement under axial load.

\*2 Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

# 2-Phase Bipolar DC Input Micro-step Driver

## Specification

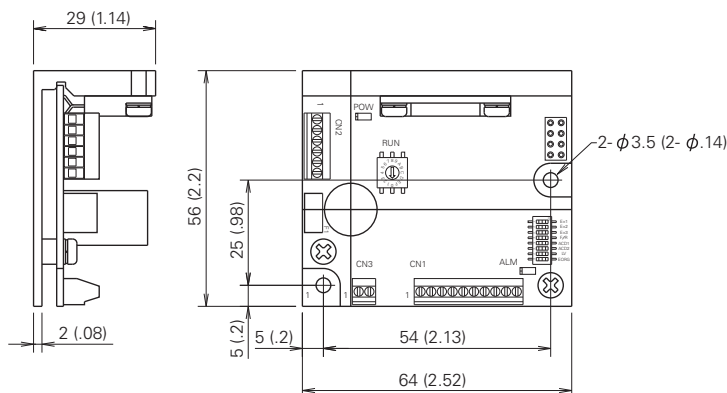
Driver model	BS1D200P10		
Basic specifications	Input source	24/36 VDC ± 10%	
	Source current	3 A	
	Environment	Protection class	Class III
		Operation environment	Installation category (over-voltage category) : I, pollution degree: 2
		Ambient operation temperature	0 to + 50°C
		Storage temperature	-20 to + 70°C
		Operating ambient humidity	35 to 85% RH (no condensation)
		Storage humidity	10 to 90% RH (no condensation)
		Operation altitude	1000 m (3281 feet) or less above sea level
		Vibration resistance	Tested under the following conditions: 5 m/s <sup>2</sup> frequency range 10 to 55 Hz, direction along X, Y and Z axes, for 2 hours each
		Impact resistance	Not influenced at NDS-C-0110 standard section 3.2.2 division "C".
		Withstandable voltage	Not influenced when 0.5 kVAC is applied between power input terminal and cabinet for one minute.
Insulation resistance	10 MΩ min. when measured with 500 VDC megohmmeter between input terminal and cabinet.		
Mass (Weight)	0.09 kg (0.20 lbs)		
Functions	Selection functions	Step angle, pulse input mode, low vibration mode, step current, operating current, original excitation phase	
	Protection functions	Open phase protection, Main circuit power source voltage decrease	
	LED indication	Power monitor, alarm display	
I/O signals	Command pulse input signal	Photocoupler input system, input resistance: 220 Ω input signal "H" level: 4.0 to 5.5 V, input signal "L" level: 0 to 0.5 V Maximum input frequency: 150 kpulse/s	
	Power down input signal	Photocoupler input system, input resistance: 220 Ω input signal "H" level: 4.0 to 5.5 V, input signal "L" level: 0 to 0.5 V	
	Phase origin monitor output signal	From the photocoupler by the open collector output Output specification: V <sub>ceo</sub> = 40 V Max., I <sub>c</sub> = 10 mA Max.	
	Rotation monitor output signal	From the photocoupler by the open collector output Output specification: V <sub>ceo</sub> = 40 V Max., I <sub>c</sub> = 10 mA Max.	

## Safety Standards

	Directives	Category	Standard	Name
CE (TÜV)	Low-voltage directives	–	EN61010-1	–
	EMC directives	Emission	EN55011-A	Terminal disturbance voltage
			EN55011-A	Electromagnetic radiation disturbance
			EN61000-4-2	ESD (Electrostatic discharge)
		Immunity	EN61000-4-3	RS (Radio-frequency amplitude modulated electromagnetic field)
			EN61000-4-4	Fast transients/burst
			EN61000-4-6	Conducted disturbances
UL	Acquired standards		Applicable standard	File No.
	UL		UL508C	E179775
	UL for Canada			

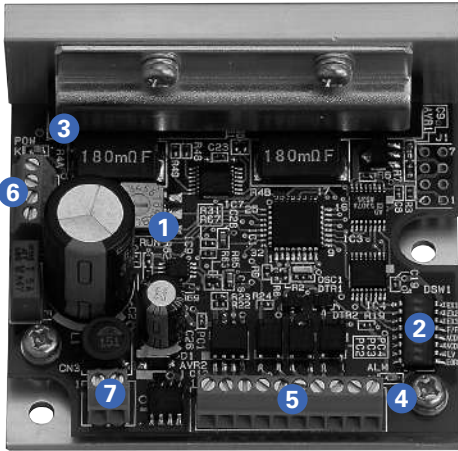
## Dimension

Unit: mm (inch)



# 2-PHASE STEPPING SYSTEMS

## Driver Controls and Connectors



### 1 Operating current selection switch (RUN)

The value of the motor current can be set when operating.

Dial	0	1	2	3	4	5	6	7
Stepping motor current (A)	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3
Dial	8	9	A	B	C	D	E	F
Stepping motor current (A)	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5

- The factory setting is F (0.5 A).  
Select the current after checking the rated current of the combination motor.

### 2 Function selection DIP switchpack

Select the function depending on your specification.

Factory settings

	OFF	ON	
EX1	<input type="checkbox"/>	<input type="checkbox"/>	Partition number: 8
EX2	<input type="checkbox"/>	<input type="checkbox"/>	
EX3	<input type="checkbox"/>	<input type="checkbox"/>	
F/R	<input type="checkbox"/>	<input type="checkbox"/>	Input method 2 (CW/CCW pulse input)
ACD1	<input type="checkbox"/>	<input type="checkbox"/>	Stopping current: 40% of driving current
ACD2	<input type="checkbox"/>	<input type="checkbox"/>	
LV	<input type="checkbox"/>	<input type="checkbox"/>	Micro step operation
EORG	<input type="checkbox"/>	<input type="checkbox"/>	Phase origin

#### 1. Step angle select (EX1, EX2, EX3)

Select the partition number of the basic step angle.

EX1	EX2	EX3	Partition number
ON	ON	ON	1-division
OFF	ON	OFF	2-division
ON	OFF	OFF	4-division
OFF	OFF	OFF	8-division
OFF	OFF	ON	16-division

#### 2. Input method select (F/R)

Select input pulse type.

F/R	Input pulse type
ON	1 input (CK, U/D)
OFF	2 input (CW, CCW)

### 3. Current selection when stopping (ACD1, ACD2)

Select the current value of the motor when stopping.

ACD2	ACD1	Current value of the motor
ON	ON	100% of driving current
ON	OFF	60% of driving current
OFF	ON	50% of driving current
OFF	OFF	40% of driving current

- Initial configuration of factory shipment is set to 40% of rated value. Driver and motor should be operated at around 50% of rated value to reduce heat.

### 4. Low-vibration mode select (LV)

Provides low-vibration, smooth operation even if resolution is coarse (1-division, 2-division, etc.).

LV	Operation
ON	Auto-micro function
OFF	Micro-step

### 5. Excitation select (EORG)

The excitation phase when the power supply is engaged is selected.

EORG	Original excitation phase
ON	Excitation phase at power shut off
OFF	Phase origin

- By turning on the EORG, the excitation phase during power OFF will be saved. Therefore, there will be no shaft displacement when turning the power ON.

### 3 LED for power supply monitor (POW)

Lit up when the main circuit power supply is connected.

### 4 LED for alarm display (ALM)

Lights in the following conditions:

- Motor cable is broken.
- Switching element in driver is faulty.
- The main circuit voltage is out of specifications range (19 VDC max.).

When "ALM" is displayed, the winding current of the stepping motor is cut off and it is in a "non-excitation" state. At the same time, an output signal (photocoupler ON) is transmitted from the alarm output terminal (AL) to an external source. When the alarm circuit is operating, this state is maintained until it is reset by switching on the power supply again. When an alarm condition has occurred, please take corrective actions to rectify the cause of the alarm before switching on the power supply again.

### 5 I/O signal terminal block (CN1)

Connect the I/O signal.

### 6 Motor terminal block (CN2)

Connect the motor's power line.

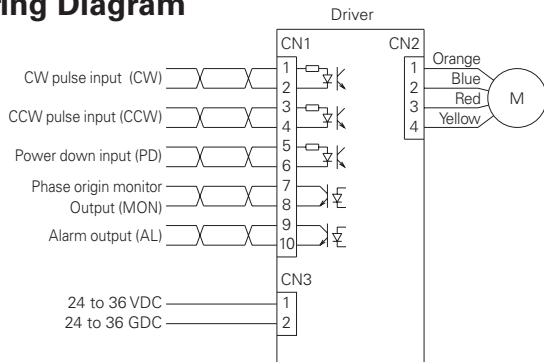
### 7 Power supply terminal block (CN3)

Connect the main circuit power supply.

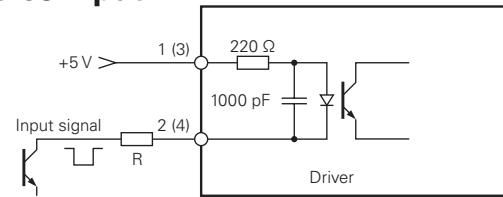


# Connections and Signals

## Wiring Diagram



## Pulse Input



- Pulse duty 50% max.
- Maximum input frequency: 150 kpulse/s
- When the crest value of the input signal exceeds 5 V, use the external limit resistance R to limit the input current to approximately 15 mA.

## Applicable Wire Sizes

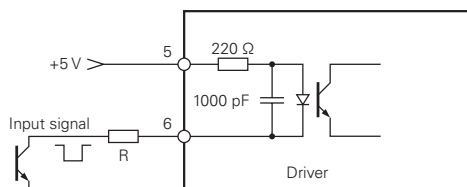
Part	Wire sizes	Allowable wire length
For power supply	22 AWG (0.3 mm <sup>2</sup> )	2 m Max.
For input/output signal	24 AWG (0.2 mm <sup>2</sup> ) to 22 AWG (0.3 mm <sup>2</sup> )	2 m Max.
For motor	22 AWG (0.3 mm <sup>2</sup> )	Under 3 m

## Specification Summary of Input/Output Signals

Signal	CN1 Pin number	Function summary
CW pulse input (CW) (Standard)	1 2	When in "2 input mode", input the drive pulse that rotates in a CW direction.
Pulse train input (CK)	1 2	When in "1 input mode", input the drive pulse train for motor rotation.
CCW pulse input (CCW) (Standard)	3 4	When in "2 input mode", input the drive pulse train that rotates in a CCW direction.
Rotational direction input (U/D)	3 4	When in "1 input mode", input the motor rotational direction signal. Internal photocoupler ON: CW direction Internal photocoupler OFF: CCW direction
Power down input (PD)	5 6	Inputting PD signal will cut off (power off) the current flow to the motor (With DIP switch selected, change to the low power function is possible). PD input signal on (internal photocoupler on): PD function is valid. PD input signal off (internal photocoupler off): PD function is invalid.
Phase origin monitor output (MON)	7 8	When the excitation phase is at the origin (during power on) this function turns on. When FULL step, ON once for 4 pulses; when HALF step, ON once for 8 pulses.
Alarm output (AL)	9 10	When alarm circuits are actuated inside the driver, outputs signals to outside, after which the stepping motor changes to unexcited status.

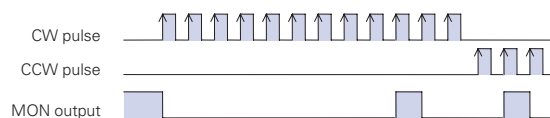
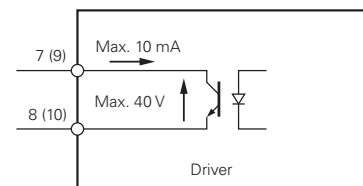
As for the motor rotational direction, CW direction is regarded as the clockwise rotation, and CCW direction is regarded as the counterclockwise rotation by viewing the motor from output shaft side.

## Input Signal



When the crest value of the input signal exceeds 5 V, use the external limit resistance R to limit the input current to approximately 15 mA.

## Output Signal



- Photocoupler is set to ON at phase origin of motor excitation (setting when number of divisions is 2).
- MON output is taken at every 7.2 degrees of motor output shaft from phase origin.

# MOTION CONTROLLER

# SANMOTION C

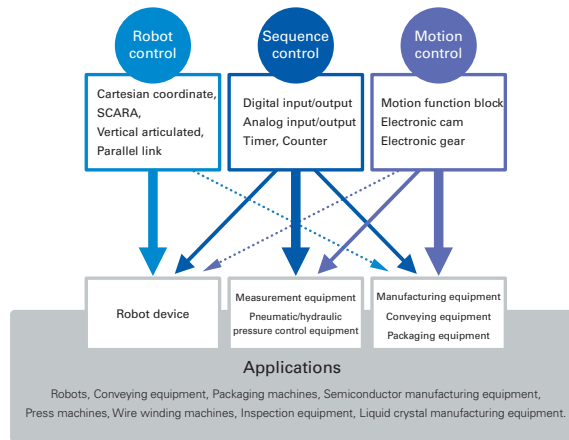
## MOTION CONTROLLER

Equipped with the industry-trusted high-speed fieldbus EtherCAT interface, these models are available in two configurations: a high-performance type (SMC100-A) for controlling robots and a standard type (SMC100-B) that specializes in PTP (Point-to-Point) positioning. They are ideal for applications such as assembly equipment and conveying machines.



### Controller with three control functions

The SANMOTION C has the three functions of motion control, robot control, and sequence control and makes it easy to build a variety of application systems.



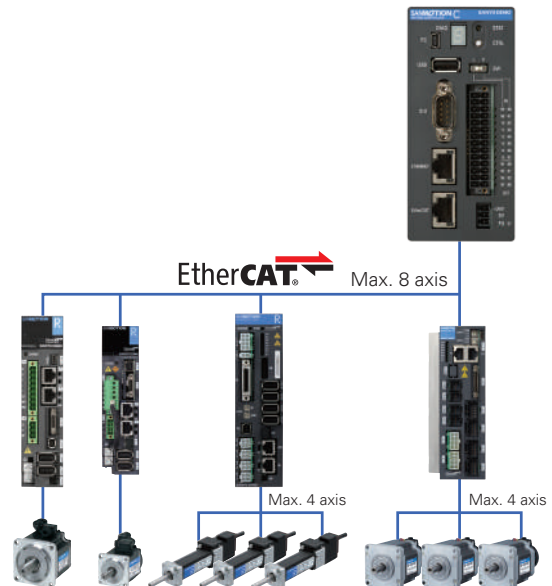
### With high-speed fieldbus EtherCAT interface

EtherCAT interface is provided as standard. With 100 Mbps high-speed and high-reliability communications, this fieldbus speeds up the system control capability and improves responsiveness. The takt time is significantly shortened.

#### SANMOTION EtherCAT Interface Models

- SANMOTION R
  - EtherCAT Interface Type Servo Amplifier ..... P47
  - EtherCAT Interface DC Input Type Servo Amplifier ..... P56
  - EtherCAT Interface DC Input Type Multi Axis Servo Amplifier ... P60

- SANMOTION Model No.PB
  - DC Input Driver EtherCAT Multi-Axis Model ..... P88



## Integrated development software SANMOTION C Software Tool

Software features various functions for system development.

- Programming tool
- Configuration tool
- Simple HMI (human machine interface) tool
- Analysis and diagnostic tool



### ■ Specification

Model number	SMC100-A	SMC100-B
Interface	EtherCAT (100 Mbps) master function	
	Ethernet (10/100/1000 Mbps) protocols (Modbus TCP, OPC-UA)	
	RS-485 (9600 to 115200 bps)	
	USB 2.0 (for data storage and wireless adapter)	
Digital I/O	Digital input: 16 points; rated input voltage: 24 VDC; positive/negative common input	
	Digital output: 8 points; load voltage range: 19.2 to 30 VDC; maximum load current: 0.5 A/point; sink output	
Input power supply	main power supply	Rated voltage: 24 VDC; load voltage range: 19.2 to 30 VDC; Rated current: 0.8 A
	I/O power supply	Rated voltage: 24 VDC; load voltage range: 19.2 to 30 VDC; Rated current: 20 mA
Power consumption	19.2 W	
Cooling method	Passive	
Dimensions	55(W) × 120(H) × 110(D) mm	
Mass	300 g	
Max. no. of controllable axes	8	
Control functions	Sequence control Motion control (Electronic cam, electronic gear, linear interpolation, circular interpolation) Robot control (Cartesian coordinate, SCARA, and parallel link robots)	Sequence control Motion control (PTP control)
	Network functions	
Control language	Web visualization	
Ambient temperature	Programming languages conforming to international standard (IEC 61131-3)	
Storage temperature	G-code (SMC100-A only)	
Operation/storage humidity	0 to 55°C	
Vibration resistance	-40 to 70°C	
Shock resistance	10 to 95% (non-condensing)	
Operation altitude	Constant amplitude: 3.5 mm (5 to 8.4 Hz) conforming to JIS B 3502:2011	
Installation location	Constant acceleration: 10 m/s <sup>2</sup> (8.4 to 150 Hz) conforming to JIS B 3502:2011	
Overvoltage category	Peak acceleration: 147 m/s <sup>2</sup> , duration 11 ms conforming to JIS B 3502:2011	
Degree of pollution	2,000 m max.	
	In control panel	
	II or lower	
	2 or lower	

# MOTION CONTROLLER

## ■ Motion control function

Number of controllable axes	8
Communication cycle	2 to 16 ms
Control system	Position control, speed control, torque control
Acceleration/deceleration profile	Trapezoidal, Sin2, trapezoidal with jerk limit
Unit for positioning control	Arbitrary (pulse, mm, inch, degree)
Programming language	Complies with IEC 61131-3 IL, ST, LD, FBD, SFC, CFC
Function block	Homing, incremental mode, absolute mode, constant speed mode, electronic cam, electronic gear

## ■ Robot control function (SMC100-A only)

Number of controllable axes	Robot: 4 axes max
Communication cycle	8 to 16 ms
Control system	PTP motion, 3D linear interpolation, 3D circular interpolation
Teaching method	Numeric input
Unit for positioning control	Arbitrary (pulse, mm, inch, degree)
Programming language	Motion function block
Supported robots	Cartesian coordinate (3 axes), SCARA (4 axes), parallel link (4 axes)

## ■ Dimension

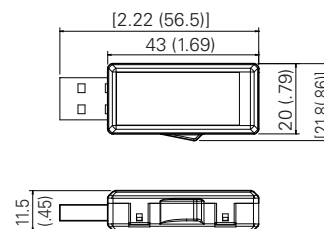
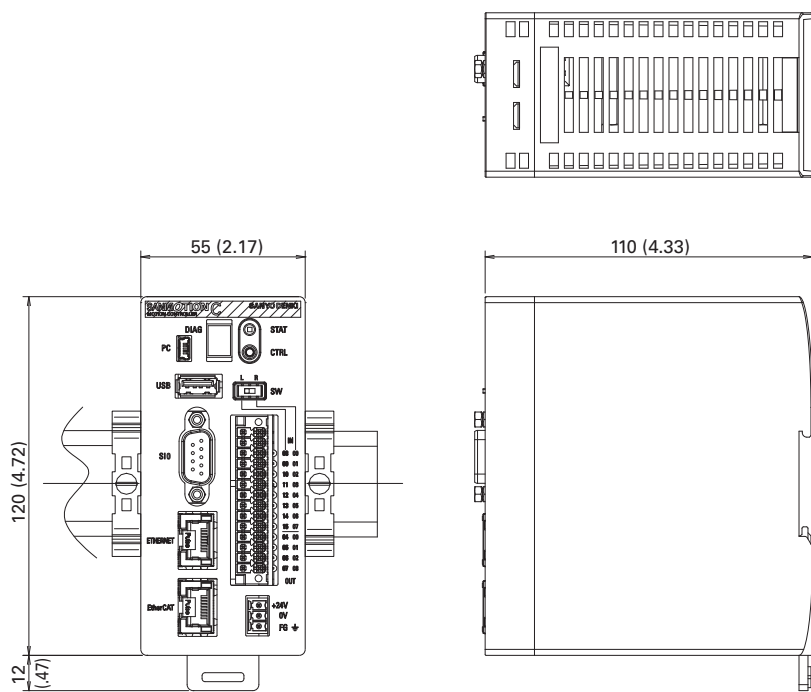
Unit: mm (inch)

### SMC100-A SMC100-B

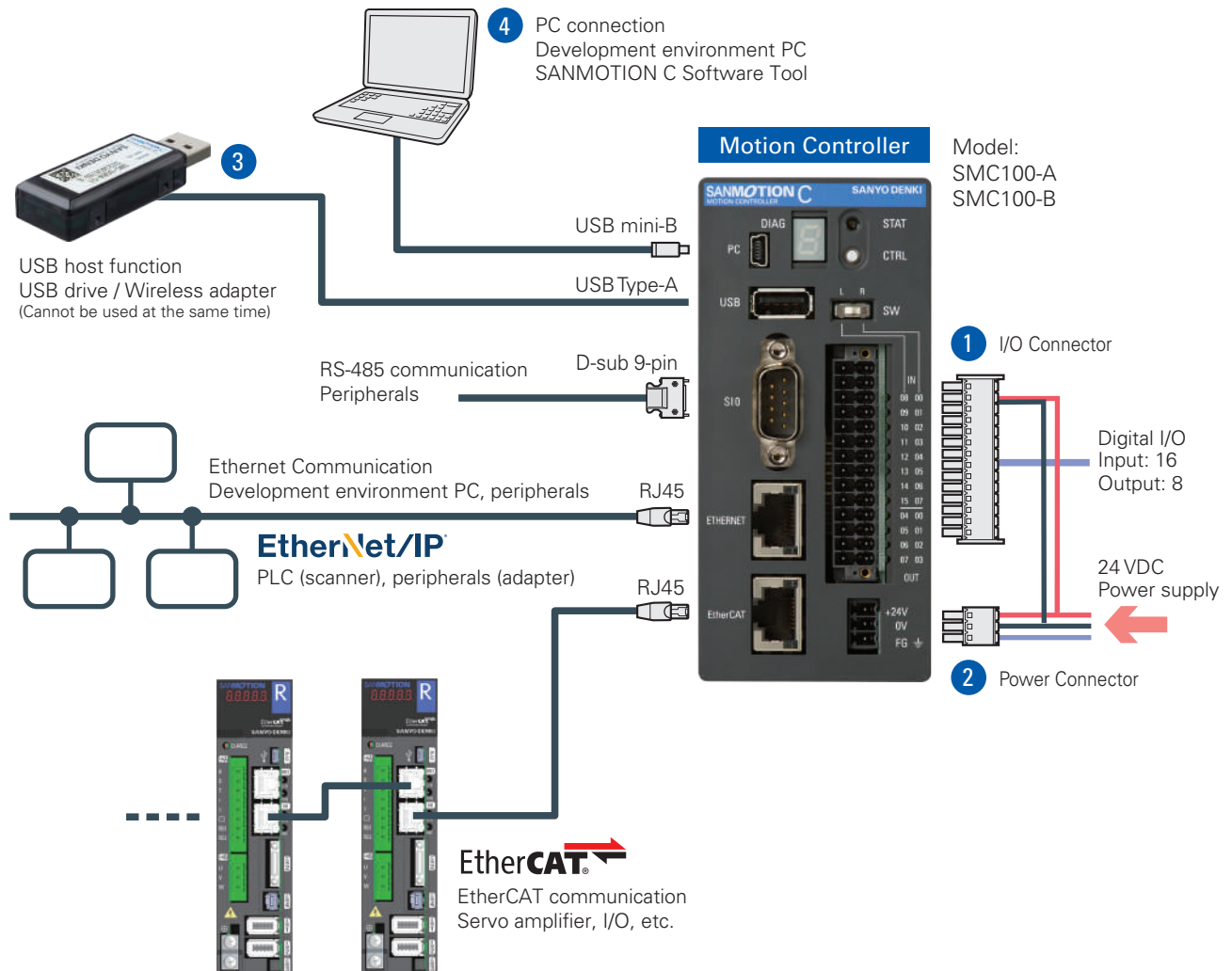
Mass: 300 g (0.66 lb)

### SMC-USBW-01

Mass: 10 g (0.022 lb)



# System Configuration

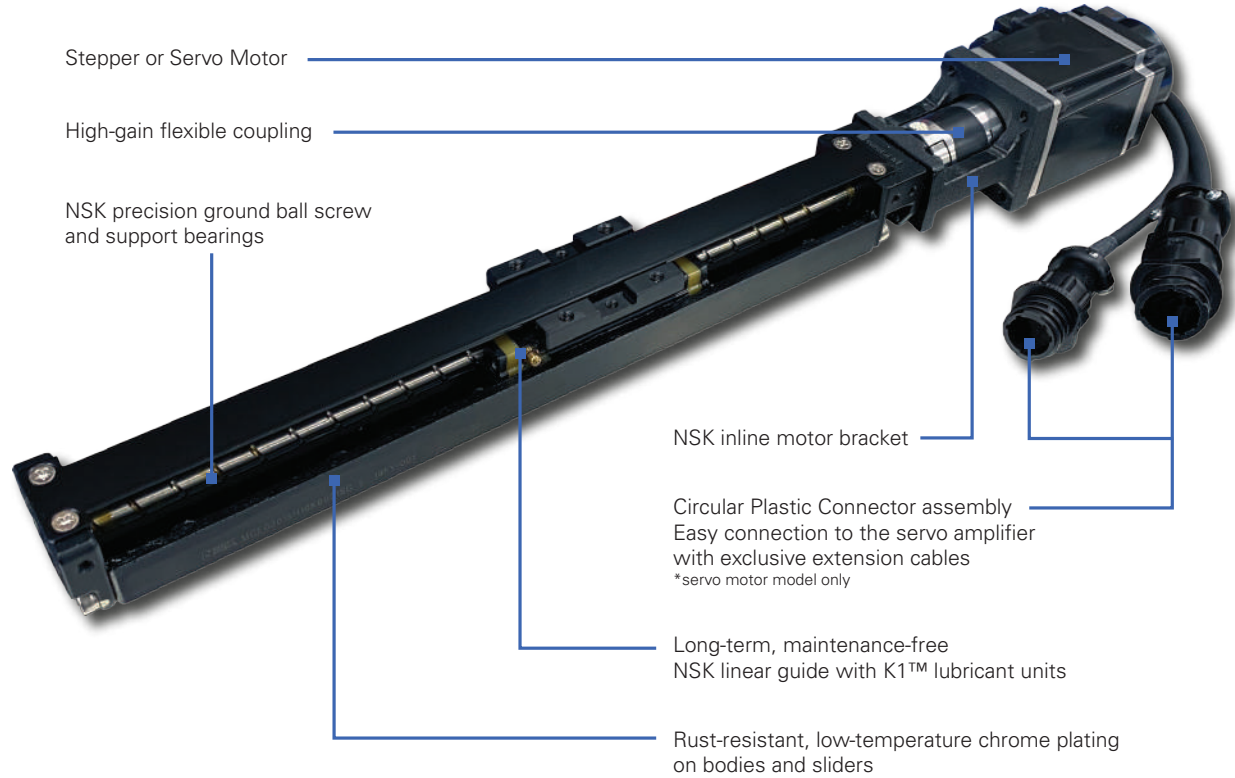


Item	Parts Number	Description
✓ 1 I/O Connector	AL-01005600-02	
✓ 2 Power Connector	AL-01005600-01	
3 Wireless USB adapter	SMC-USBW-01	
✓ 4 SANMOTION C Software Tool	SOFTWARE-SMC100-111	Integrated development software for sequence/motion/robot control

All items marked with a check must be included to build a complete system.

## MCE ELECTRIFIED MONOCARRIER PREASSEMBLED HIGH-PERFORMANCE LINEAR ACTUATOR

MCE actuator integrated a motor, ball screw, linear guide, and support bearings into a single unit is a highly compact and cost-effective alternative to building a linear motion system from multiple, separately-sourced components. Optimally designed for ease and accuracy, MCE Monocarriers are supplied preassembled, pretested, and ready to install.



### Lineup

Series	Model	Lead mm in	Stroke mm in	Peak Thrust N lbf	Peak Speed mm/s	Motor (*1)		
						Model	Size	Page
MCE03	MCE03010P01K0001SKF	1 0.039	100 3.94	1040 234	50	SF2421-10B41	NEMA17 Stepper Motor	103
	MCE03010P02K0001SAF	2 0.079	100 3.94	1040 234	100	R2FA04003FXR03M	24VDC input AC Servo Motor 40mm <sup>2</sup> , 30W	12
	MCE03010P02K0001SBF					w/ Brake		
	MCE03015H10K0001SCF	10	150	704	830	R2AA04010FXP00M	200VAC input AC Servo Motor 40mm <sup>2</sup> , 100W	15 (*2)
	MCE03015H10K0001SDF	0.39	5.91	158		w/ Brake		
MCE05	MCE06030H10K0001SEF	10	300	2626	830	R2AA06020FXP00M	200VAC input AC Servo Motor 60mm <sup>2</sup> , 200W	18 (*2)
	MCE06030H10K0001SFF	0.39	11.8	590		w/ Brake		

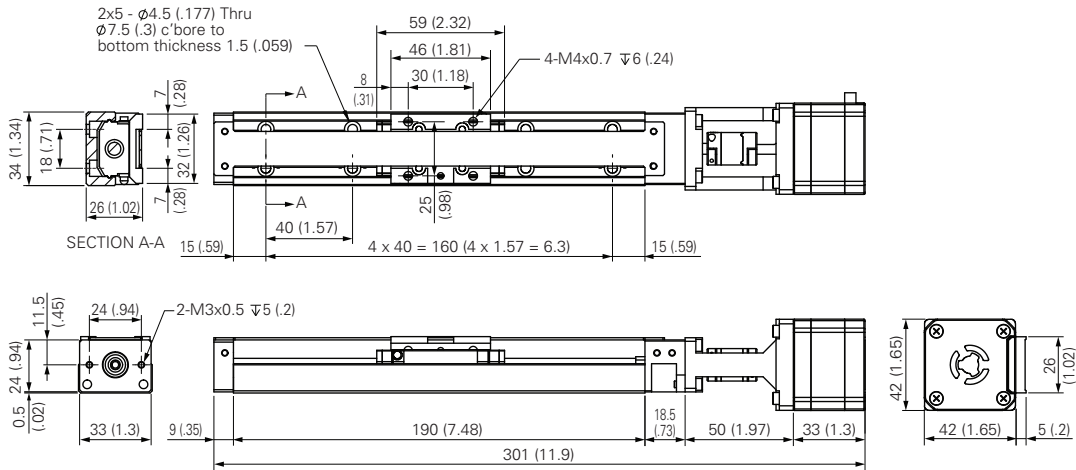
\*1: Refer to the motors for the compatible servo amplifier/ stepper drive.

\*2: The encoder equipped on these motor is different from the one on the reference motor on pages 15 and 18, but the compatible amplifiers are the same.

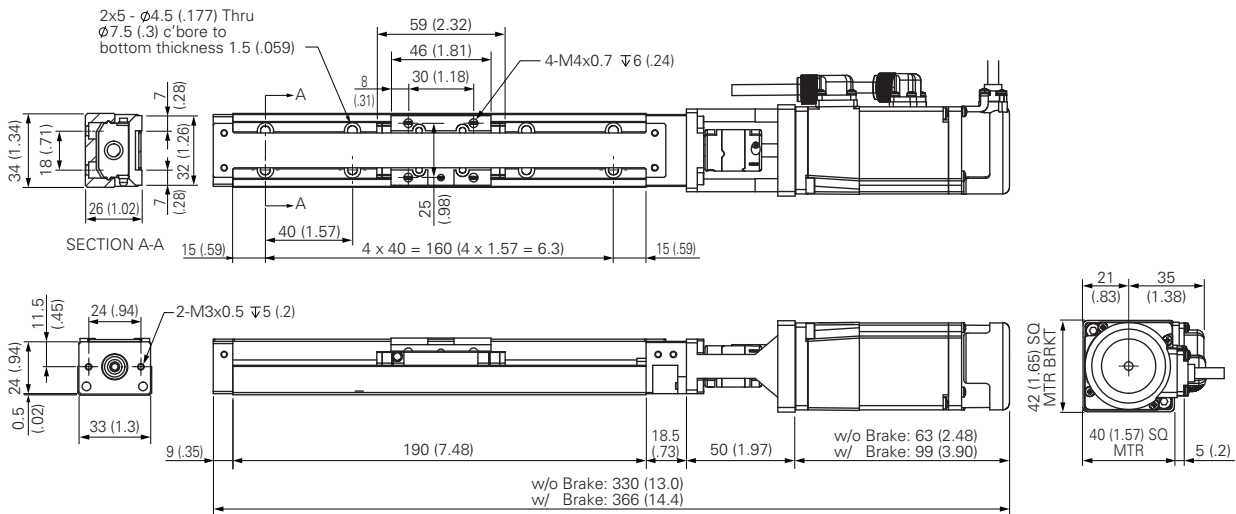
# Dimensions

Unit: mm (inch)

## MCE03010P01K001SKF

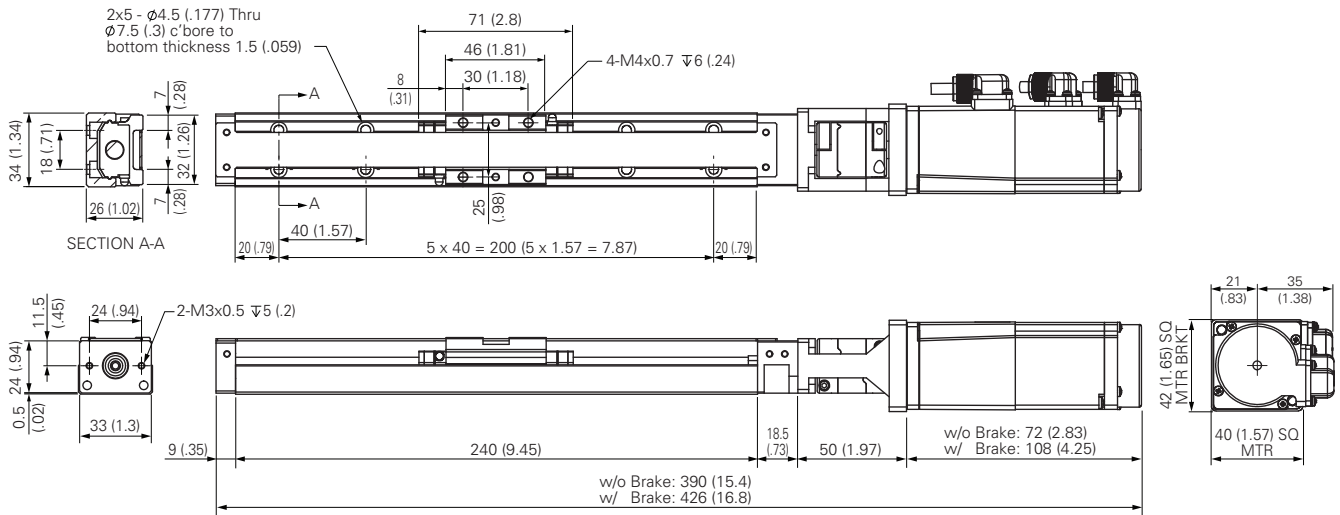


## MCE03010P02K001SAF MCE03010P02K001SBF

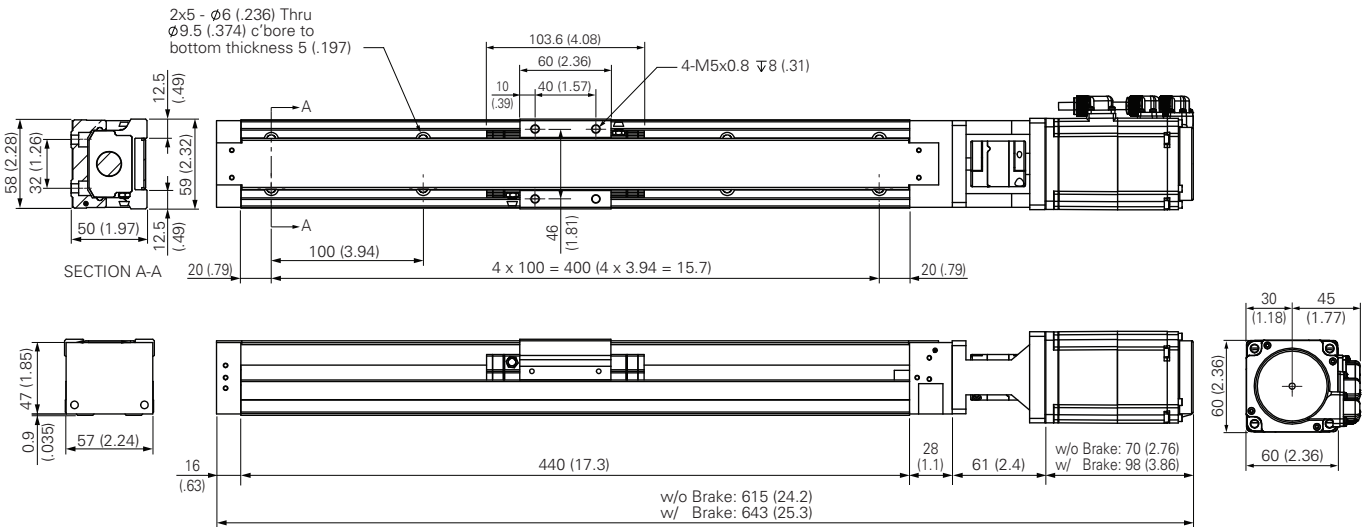


# MCE ACTUATOR

## MCE03015H10K001SCF MCE03015H10K001SDF



## MCE06030H10K001SEF MCE06030H10K001SFF

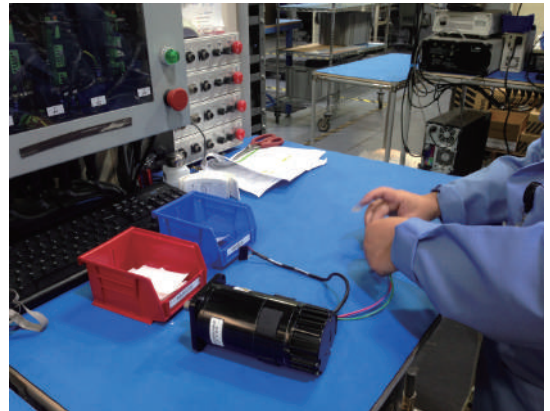
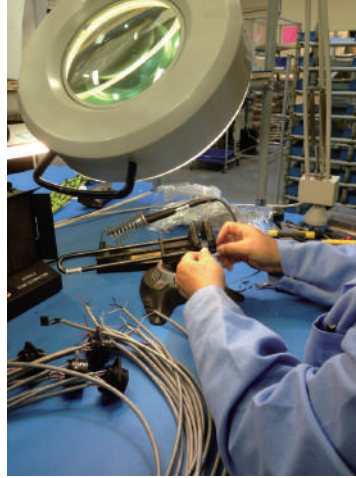




# Value Added Assembly

SANYO DENKI AMERICA provides the total solution for motor drive system.

Depending the requirement, we assemble actuators, gearheads, connectors, cables, harnesses and some other peripheral parts to our product in our ISO 9001 certified factory.



# Repair Service

SANYO DENKI AMERICA provides prompt service of overhaul and repair for legacy SANMOTION products in our official repair department.



## ■ Precautions For Adoption

Failure to follow the precautions on right may cause moderate injury and property damage, or in some circumstances, could lead to a serious accident.

Always follow all listed precautions.

## Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is preset, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The products presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

\* For any question or inquiry regarding the above, contact our Sales Department.

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## SANYO DENKI AMERICA, INC.

Website URL <https://www.sanyodenki.com/america/>

### U.S. Headquarters

Address: 468 Amapola Ave., Torrance, CA 90501

Phone: 800 905 7989

Fax: 310 212 6686

### Silicon Valley Office

Address: 1500 Wyatt Dr. Suite 5, Santa Clara, CA 95054

Phone: 408 988 1700

Fax: 408 982 1700

### Chicago Office

Address: 1340 Remington Road Suite E, Schaumburg, IL 60173

Phone: 224 353 6420

Fax: 224 353 6302

### Detroit Office (Repair Service)

Address: 37511 Schoolcraft Road, Livonia, MI 48150

Phone: 734 525 1806

Fax: 734 525 3367

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## Remarks:

\* Specifications are subject to change without notice.

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