

SANMOTION

SANYO DENKI AMERICA CORE PRODUCTS



MOTION AND CONTROL

5th Edition Rev.2

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.

2.4 W 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.

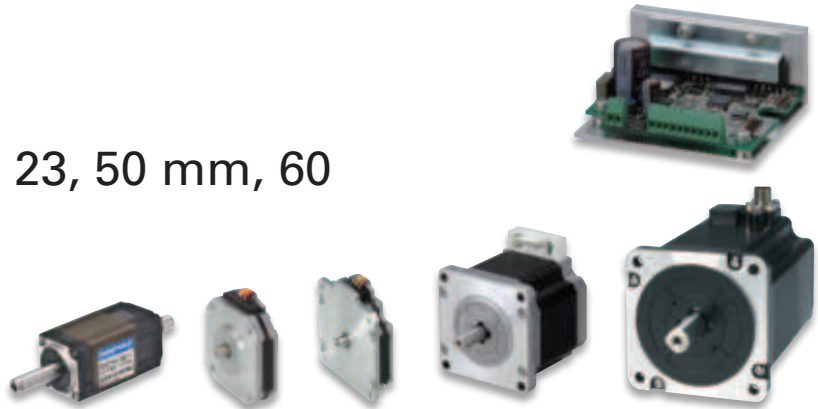
0.0065 to 19 N·m

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 highperformance 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.

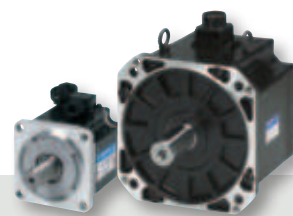


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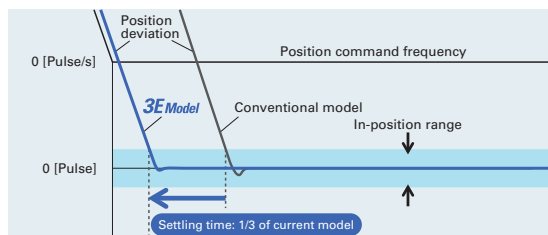
SANMOTION R

AC SERVO SYSTEMS



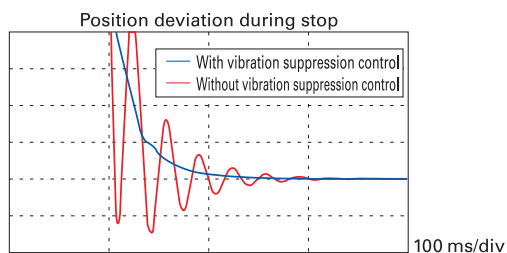
High Response

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

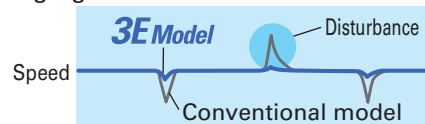
Feed forward vibration suppression control eliminates the typical vibrations seen at stationary positions in a servo system. This noise suppression is easily reduced by using simple on-board tuning procedures.



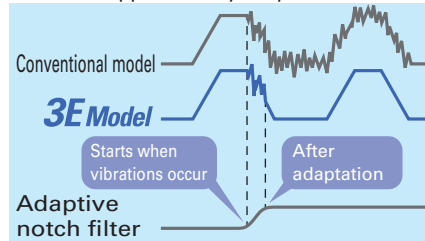
Improved Control Accuracy

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.

High-gain control



Vibration suppression by adaptive notch filter



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

EtherCAT
Conformance tested



Indexer Model

Auto Tuning
Vibration Suppression Control
Disturbance Suppression
Point data: Max. 254 points
Position Command Range: ± 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 ⁻¹	Model	Servo Amplifier Interface										Page
						200 VAC	100 VAC	48 VDC	24 VDC	Indexer 200 VAC	100 VAC	Modbus 200 VAC	100 VAC	Analog / Pulse 200 VAC	48 VDC	
2.4 W	14 0.55	0.023 0.204	0.06 0.53	Max. 1500 Rated 1000	R2GAD102RM			■								9
20 W	20 0.79	0.064 0.57	0.23 2.04	Max. 6000 Rated 3000	R2GA02D20F			■								10
		0.064 0.53	0.18 1.59	Max. 4500 Rated 3000	R2FA02D20D				■							
		0.095 0.84	0.38 3.4	Max. 6000 Rated 3000	R2GA02D30F			■								
30 W	20 0.79	0.095 0.84	0.38 3.4	Max. 3000 Rated 3000	R2FA02D30H				■							11
		0.098 0.87	0.37 3.3	Max. 6000 Rated 3000	R2AA04003F	■				■		■		■		
		0.098 0.87	0.24 2.1	Max. 6000 Rated 3000	R2EA04003F		■				■		■			
	40 1.57	0.098 0.87	0.24 2.1	Max. 6000 Rated 3000	R2GA04003F			■							■	12
		0.098 0.87	0.33 2.9	Max. 6000 Rated 3000	R2FA04003F				■							
		0.159 1.41	0.59 5.2	Max. 6000 Rated 3000	R2AA04005F	■				■		■				
50 W	40 1.57	0.159 1.41	0.54 4.8	Max. 6000 Rated 3000	R2EA04005F		■				■		■			13
		0.159 1.41	0.40 3.5	Max. 4500 Rated 3000	R2GA04005F			■							■	
		0.255 2.27	0.86 7.6	Max. 6000 Rated 3000	R2EA04008F		■				■		■			
		0.255 2.27	0.86 7.6	Max. 5000 Rated 3000	R2GA04008D			■							■	
100 W (90 W)	40 1.57	0.318 2.81	1.18 10.4	Max. 6000 Rated 3000	R2AA04010F	■				■		■		■		15
70 W	60 2.36	0.318 2.81	0.84 7.43	Max. 2500 Rated 2100	R2FA06007R				■							16
100 W	60 2.36	0.318 2.81	1.13 10.0	Max. 6000 Rated 3000	R2AA06010F	■				■		■		■		17
		0.318 2.81	1 8.8	Max. 6000 Rated 3000	R2EA06010F		■				■		■			
		0.318 2.81	0.84 7.43	Max. 5000 Rated 3000	R2GA06010D			■							■	
		0.637 5.64	2.2 19.5	Max. 6000 Rated 3000	R2AA06020F	■				■		■		■		
200 W	60 2.36	0.637 5.64	1.5 13.3	Max. 4500 Rated 3000	R2EA06020F		■				■		■			18
		0.637 5.64	1.5 13.3	Max. 4500 Rated 3000	R2GA06020D			■							■	
		1.27 11.2	4.8 42	Max. 6000 Rated 3000	R2AA06040FX	■				■		■		■		19
400 W (360 W)	60 2.36	1.15 10.2	4.8 42	Max. 6000 Rated 3000	R2AA06040FC	■				■		■		■		
750 W	80 3.15	2.39 21.2	8.5 75	Max. 6000 Rated 3000	R2AA08075F	■				■		■		■		20
1 kW	86 3.39	3.18 28.1	11.6 102.7	Max. 6000 Rated 300	R2AAB8100H	■				■		■		■		21

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 ⁻¹	Model	Servo Amplifier Interface										Page
						200 VAC	100 VAC	48 VDC	24 VDC	Indexer 200 VAC	100 VAC	Modbus 200 VAC	100 VAC	Analog / Pulse 200 VAC	48 VDC	
0.55 kW	130 5.12	2.6 23	7 62	Max. 5000 Rated 2000	R2AA13050D	■				■		■		■		22
1.2 kW	130 5.12	5.7 50	16 142	Max. 5000 Rated 2000	R2AA13120D	■				■		■		■		23
2 kW	130 5.12	9.5 84	30 265	Max. 5000 Rated 2000	R2AA13200D	■				■		■		■		24
5 kW	220 8.67	24 212	75 664	Max. 4000 Rated 2000	R2AA22500L	■				■		■		■		25

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 ⁻¹	Model	Servo Amplifier Interface										Page
						200 VAC	100 VAC	48 VDC	24 VDC	Indexer 200 VAC	100 VAC	Modbus 200 VAC	100 VAC	Analog / Pulse 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

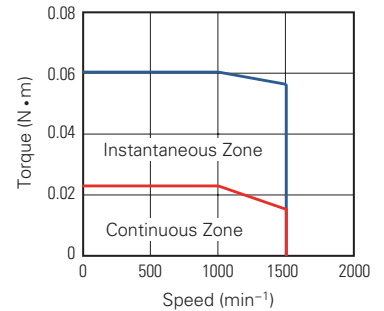
Rated Thrust	Motor Size mm inch	Rated Thrust N lb	Peak Thrust N lb	Speed m/s	Model	Servo Amplifier Interface										Page
						200 VAC	100 VAC	48 VDC	24 VDC	Indexer 200 VAC	100 VAC	Modbus 200 VAC	100 VAC	Analog / Pulse 200 VAC	48 VDC	
5.1 N	12 0.47	5.1 1.15	16.5 3.71	Max. 2.0 Rated 1.0	DE0AC001A03CX00			■								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 ⁻¹	1500
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	0.0023
	lb·in ²	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

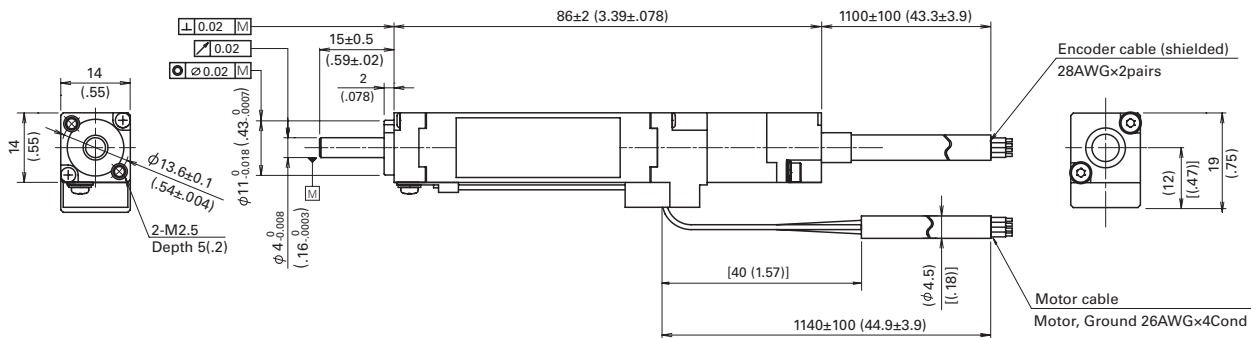
Torque Curve

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

20 w

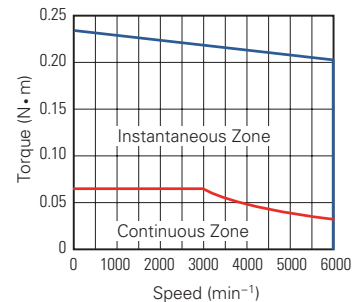
20 mm (0.79 inch)

■ Specifications

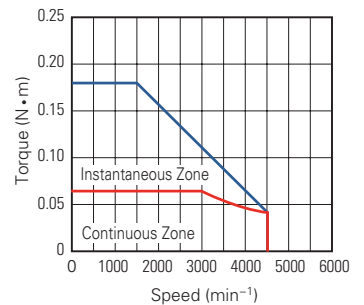
Power Supply		48 VDC	24 VDC
Model		R2GA02D20F	R2FA02D20D
Rated Power	kW	0.02	0.02
Maximum Speed	min ⁻¹	6000	4500
Rated Speed	min ⁻¹	3000	3000
Rated Torque	N•m	0.064	0.064
	lb•in	0.57	0.57
Peak Torque at Stall	N•m	0.23	0.18
	lb•in	2.04	1.59
Rotor Moment of Inertia	x10 ⁻⁴ kg•m ²	0.0033	0.0033
	lb•in ²	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**

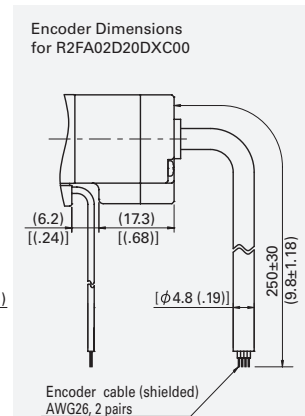
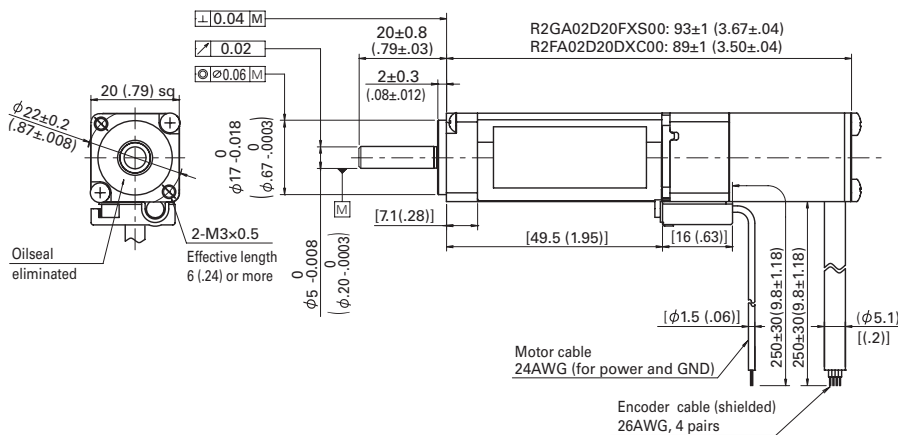


● R2FA02D20D



■ 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			

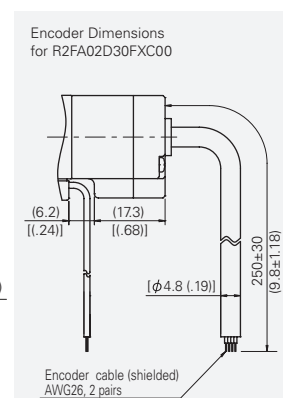
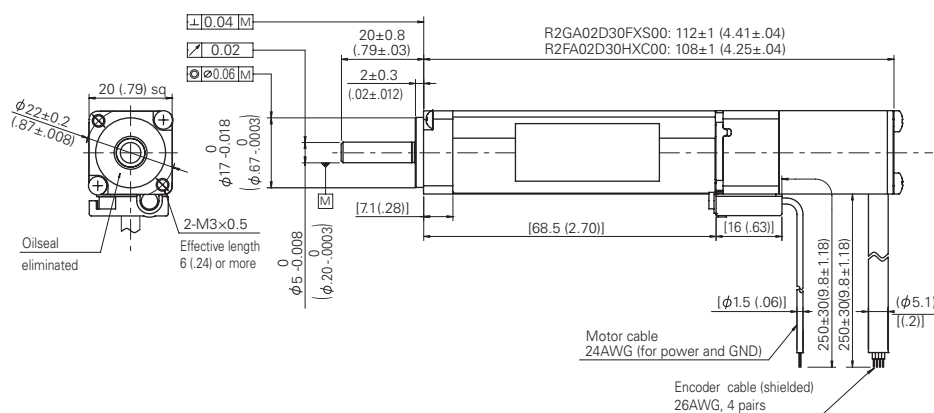
E01: w/ CPC screw lock type connector assembly.

■ Specifications

Power Supply		48 VDC	24 VDC
Model		R2GA02D30F	R2FA02D30H
Rated Power	kW	0.03	0.03
Maximum Speed	min ⁻¹	6000	3000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	0.0046	0.0046
	lb·in ²	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)



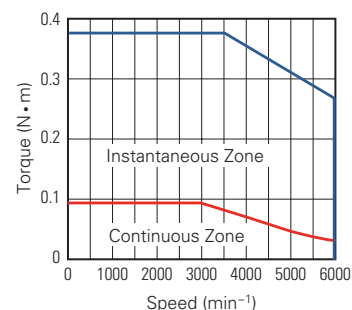
■ Compatible Amplifier

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

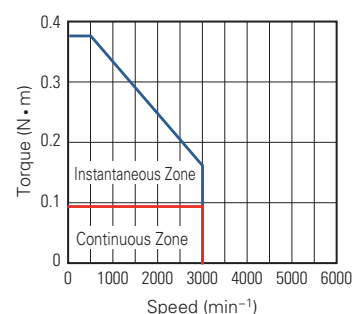
E01: w/ CPC screw lock type connector assembly.

■ Torque Curve

- **R2GA02D30F**



- **R2FA02D30H**



AC SERVO SYSTEMS

R2 MOTOR

30 W

**MOTOR
FLANGE SIZE**

40 mm (1.57 inch)

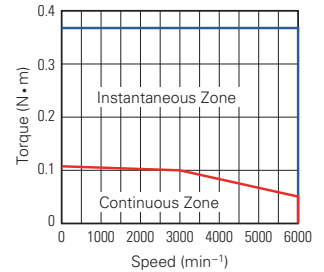
Specifications

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 ⁻¹	6000	6000	6000	6000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	0.028	0.028	0.0247	0.0247
	lb·in ²	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			

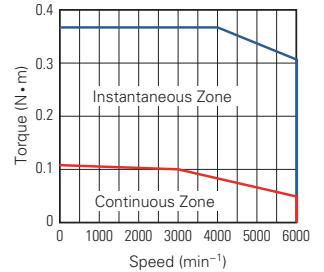


Torque Curve

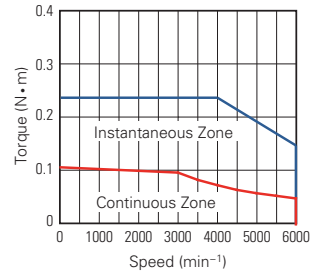
● R2AA04003F



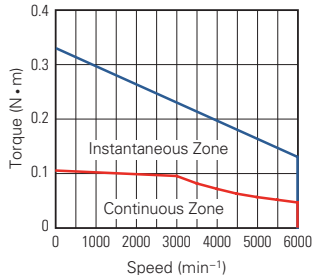
● R2EA04003F



● R2GA04003F

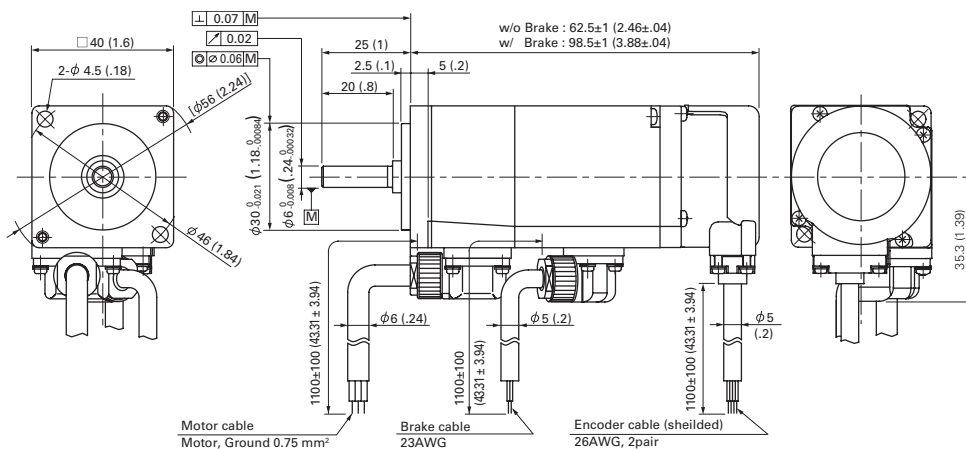


● R2FA04003F



Dimension

Unit: mm (inch)



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.

AC SERVO SYSTEMS

R2 MOTOR

80 W

**MOTOR
FLANGE SIZE**

40 mm (1.57 inch)

Specifications

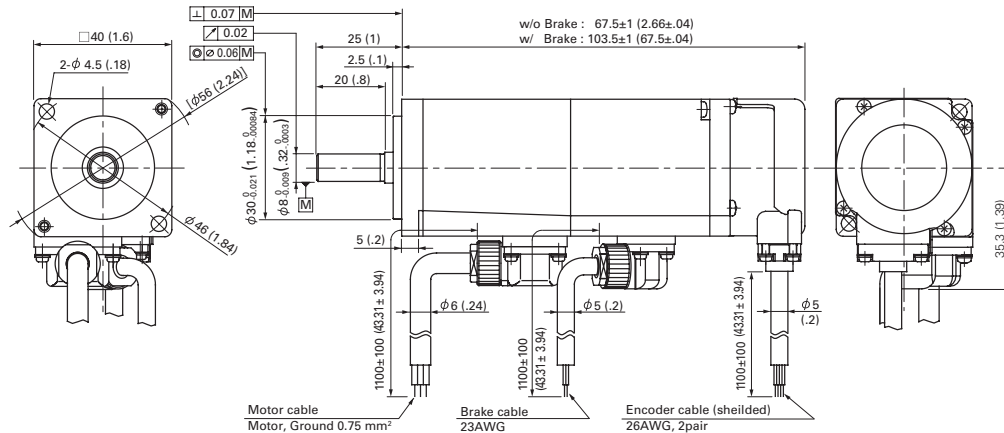


Power Supply		100 VAC	48 VDC
Model		R2EA04008F ^{*2}	R2GA04008D ^{*2}
Rated Power	kW	0.08	0.08
Maximum Speed	min ⁻¹	6000	5000
Rated Speed	min ⁻¹	3000	3000
Rated Torque	N·m	0.255	0.255
	lb·in	2.27	2.27
Peak Torque at Stall	N·m	0.86	0.86
	lb·in	7.6	7.6
Rotor Moment of Inertia	x10 ⁻⁴ kg·m ²	0.066	0.0627
	lb·in ²	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	

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

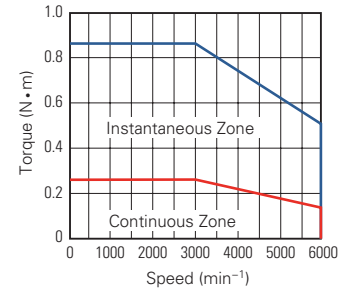
Dimension

Unit: mm (inch)

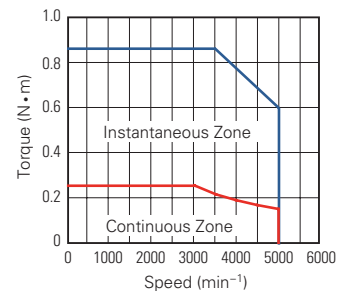


Torque Curve

R2EA04008F



R2GA04008D



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 RS2K24A0HL5			RF2G21A0A00
	R2GA04008DCR03M(E01)					

E01: w/ CPC screw lock type connector assembly.

Specifications



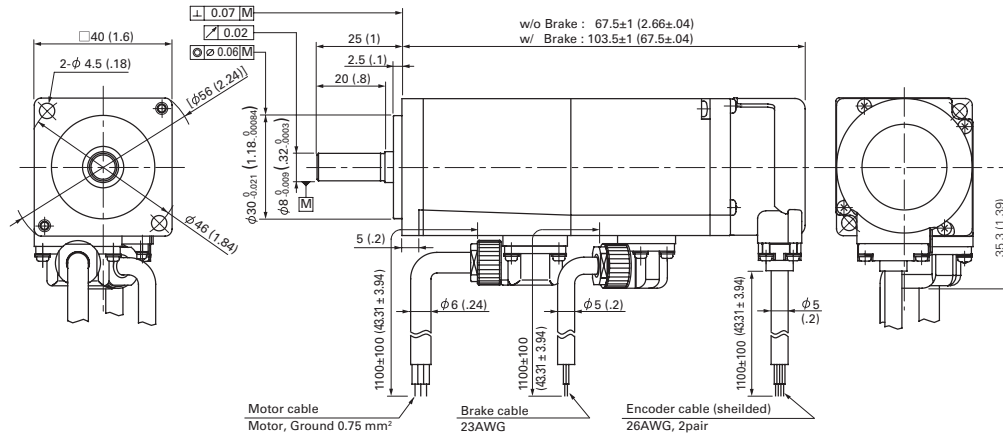
Power Supply		200 VAC
Model		R2AA04010F ^{*2}
Rated Power	kW	0.1 (0.09 ^{*2})
Maximum Speed	min ⁻¹	6000
Rated Speed	min ⁻¹	3000
Rated Torque	N·m	0.318 (0.286 ^{*2})
	lb·in	2.81 (2.04 ^{*2})
Peak Torque at Stall	N·m	1.18
	lb·in	10.4
Rotor Moment of Inertia	x10 ⁻⁴ kg·m ²	0.066
	lb·in ²	0.023
Encoder		17bit 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

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

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

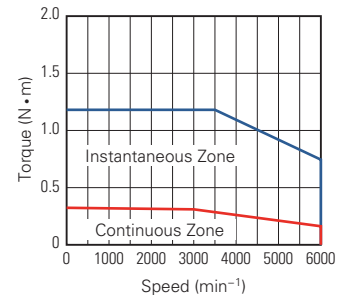
Dimension

Unit: mm (inch)



Torque Curve

● R2AA04010F



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

60 w

60mm (2.36 inch)

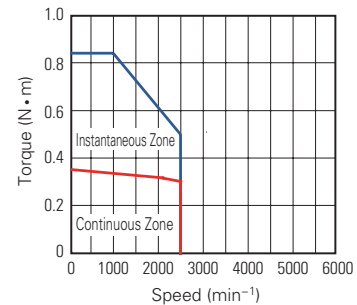
■ Specifications



Power Supply		24 VDC R2FA06007R ^{1,2}
Model		
Rated Power	kW	0.07
Maximum Speed	min ⁻¹	2500
Rated Speed	min ⁻¹	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	x10 ⁻⁴ kg·m ²	0.117
	lb·in ²	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

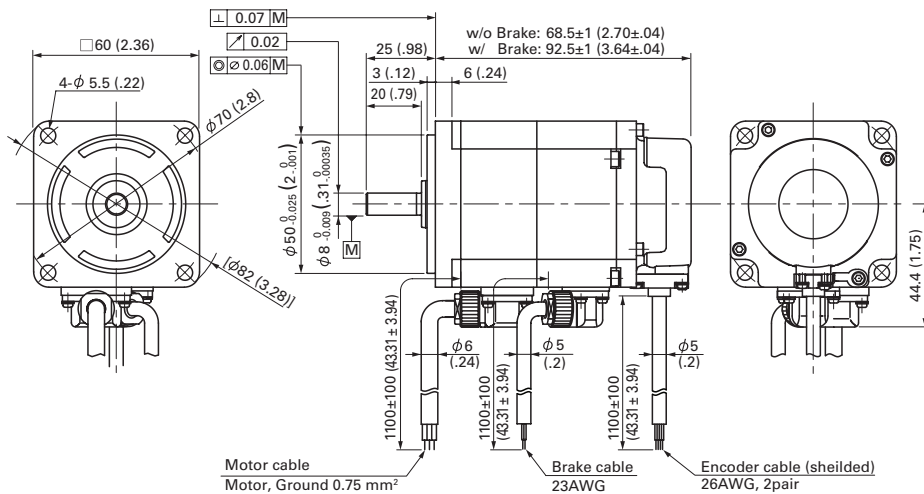
● **R2FA06007R**



*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

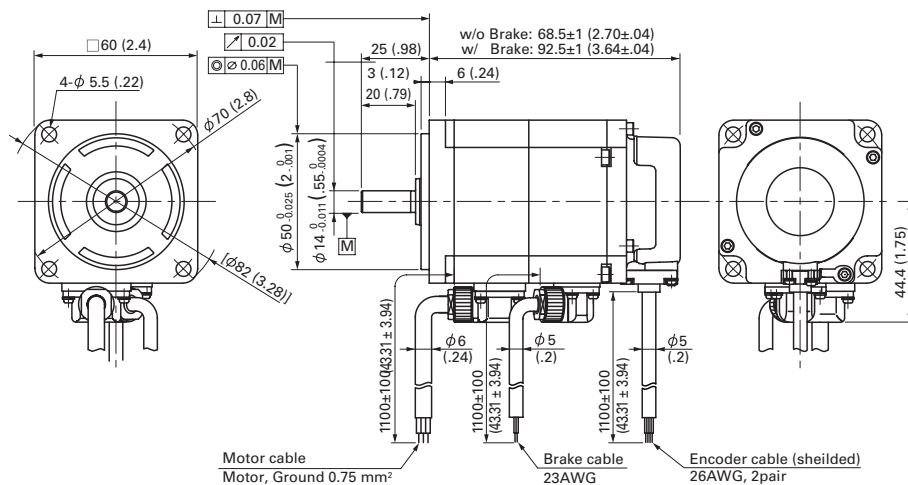


Power Supply		200 VAC	100 VAC	48 VDC
Model		R2AA06010F	R2EA06010F	R2GA06010D
Rated Power	kW	0.1	0.1	0.1
Maximum Speed	min ⁻¹	6000	6000	5000
Rated Speed	min ⁻¹	3000	3000	3000
Rated Torque	N·m	0.318	0.318	0.318
	lb·in	2.81	2.81	2.81
Peak Torque at Stall	N·m	1.13	1	0.84
	lb·in	10.0	8.80	7.43
Rotor Moment of Inertia	x10 ⁻⁴ kg·m ²	0.1203	0.1203	0.117
	lb·in ²	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.

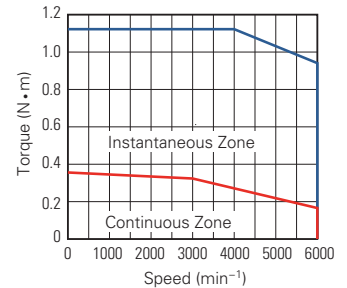
Dimension

Unit: mm (inch)

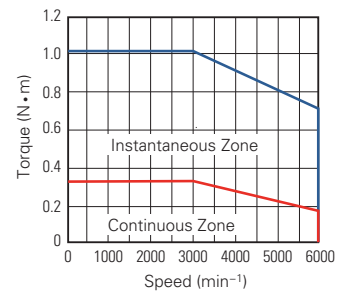


Torque Curve

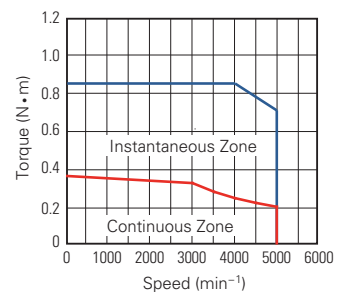
● R2AA06010F



● 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)		RS2E02A0KA4	RS3E02A0CA4	RS3E02A0FA4	
	R2EA06010FCR00M(E01)	w/ Brake				
48 VDC	R2GA06010DXR03M(E01)		RS2K04A2HA5			RF2G21A0A00
	R2GA06010DXR03M(E01)		RF2K24A0HL5			

E01: w/ CPC screw lock type connector assembly.

AC SERVO SYSTEMS

R2 MOTOR

200 W

**MOTOR
FLANGE SIZE**

60 mm (2.36 inch)

Specifications



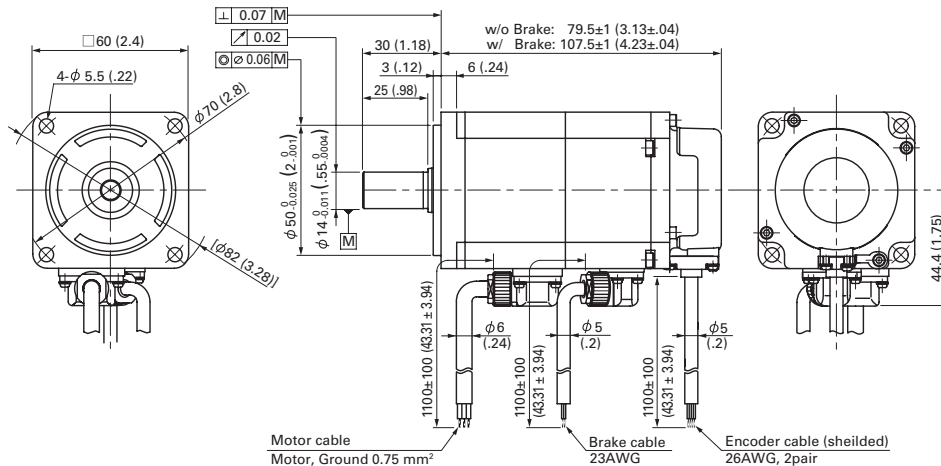
Power Supply		200 VAC	100 VAC	48 VDC
Model		R2AA06020F	R2EA06020F ^{*2}	R2GA06020D ^{*2}
Rated Power	kW	0.2	0.2	0.2
Maximum Speed	min ⁻¹	6000	6000	4500
Rated Speed	min ⁻¹	3000	3000	3000
Rated Torque	N·m	0.637	0.637	0.637
	lb·in	5.64	5.64	5.64
Peak Torque at Stall	N·m	2.2	2.2	1.5
	lb·in	19.5	19.5	13.3
Rotor Moment of Inertia	x10 ⁻⁴ kg·m ²	0.2223	0.2223	0.219
	lb·in ²	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.

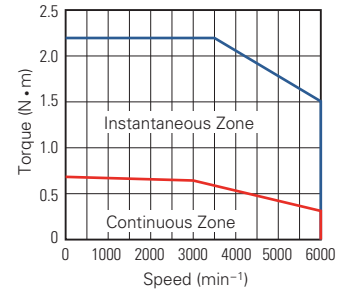
Dimension

Unit: mm (inch)

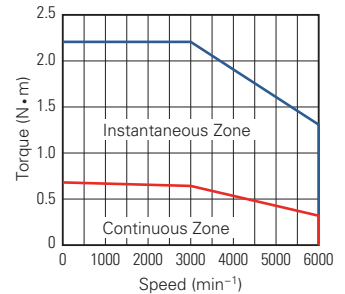


Torque Curve

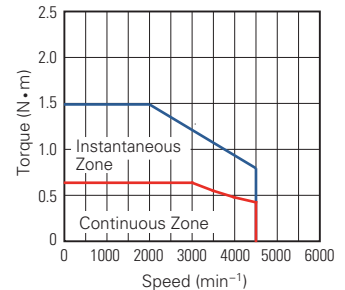
● R2AA06020F



● R2EA06020F



● R2GA06020D



Compatible Amplifier

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

E01: w/ CPC screw lock type connector assembly.

Specifications

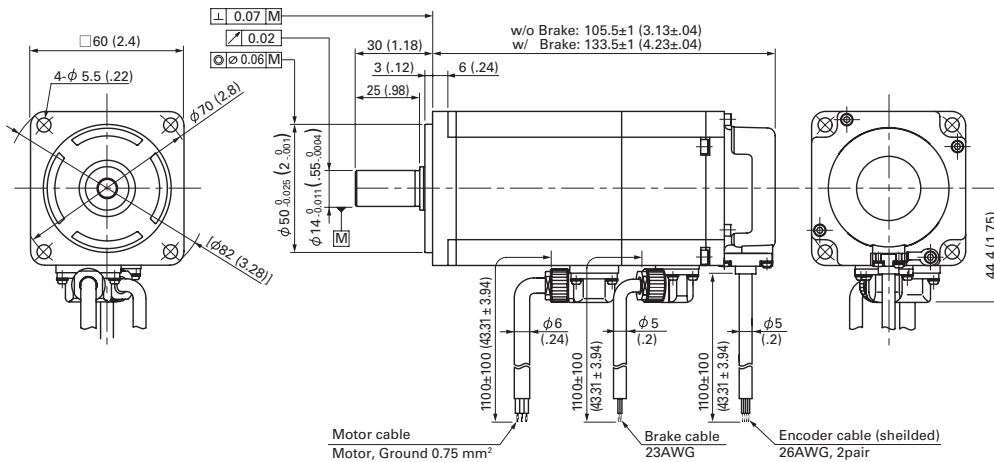
Power Supply	200 VAC	
Model	R2AA06040F	
Rated Power	kW	0.4 (0.36 ^{*2})
Maximum Speed	min ⁻¹	6000
Rated Speed	min ⁻¹	3000
Rated Torque	N·m	1.27 (1.15 ^{*2})
	lb·in	11.2 (10.2 ^{*2})
Peak Torque at Stall	N·m	4.8
	lb·in	42
Rotor Moment of Inertia	x10 ⁻⁴ kg·m ²	0.4153
	lb·in ²	0.142
Encoder	17bit serial absolute ^{*1}	
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)



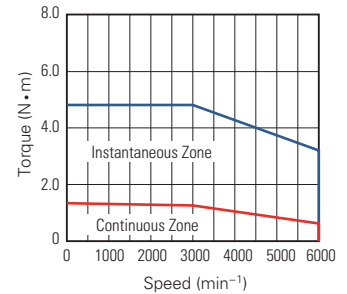
Compatible Amplifier

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.

Torque Curve

R2AA06040F



AC SERVO SYSTEMS

750 w

80 mm (3.15 inch)

■ Specifications

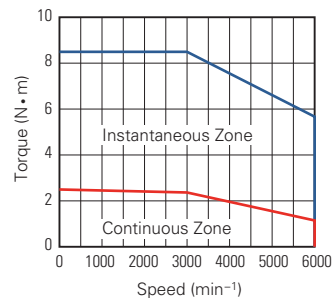


Power Supply		200 VAC R2AA08075F
Model		
Rated Power	kW	0.75
Maximum Speed	min ⁻¹	6000
Rated Speed	min ⁻¹	3000
Rated Torque	N·m	2.39
	lb·in	21.2
Peak Torque at Stall	N·m	8.5
	lb·in	75
Rotor Moment of Inertia	x10 ⁻⁴ kg·m ²	1.8233
	lb·in ²	0.620
Encoder		17bit serial absolute ^{*1}
Motor Mass	kg	2.7
	lb	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.

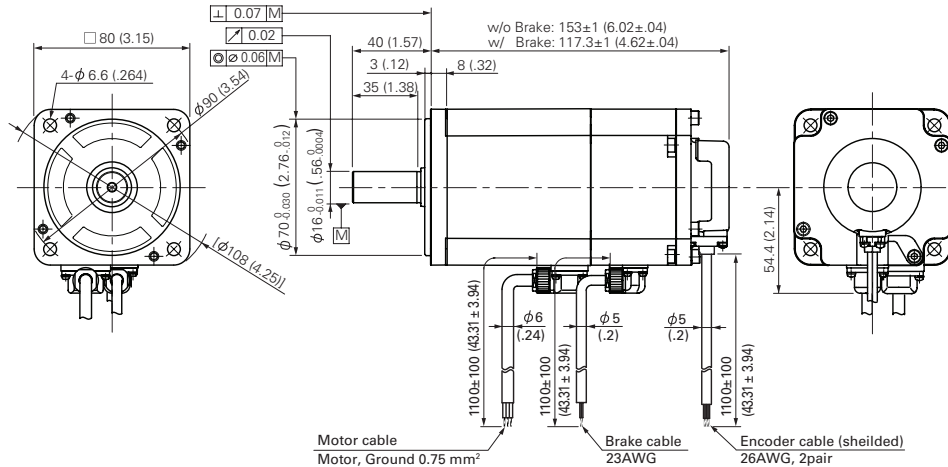
■ Torque Curve

● R2AA08075F



■ Dimension

Unit: mm (inch)



■ Compatible Amplifier

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

E01: w/ CPC screw lock type connector assembly.

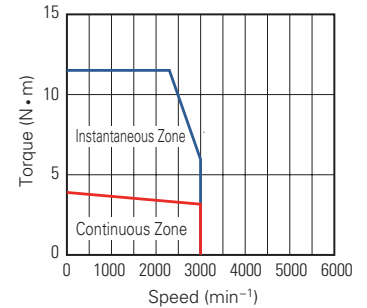
Specifications



Power Supply		200 VAC
Model		R2AAB8100H
Rated Power	kW	1.0
Maximum Speed	min ⁻¹	3000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	2.38
	lb·in ²	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

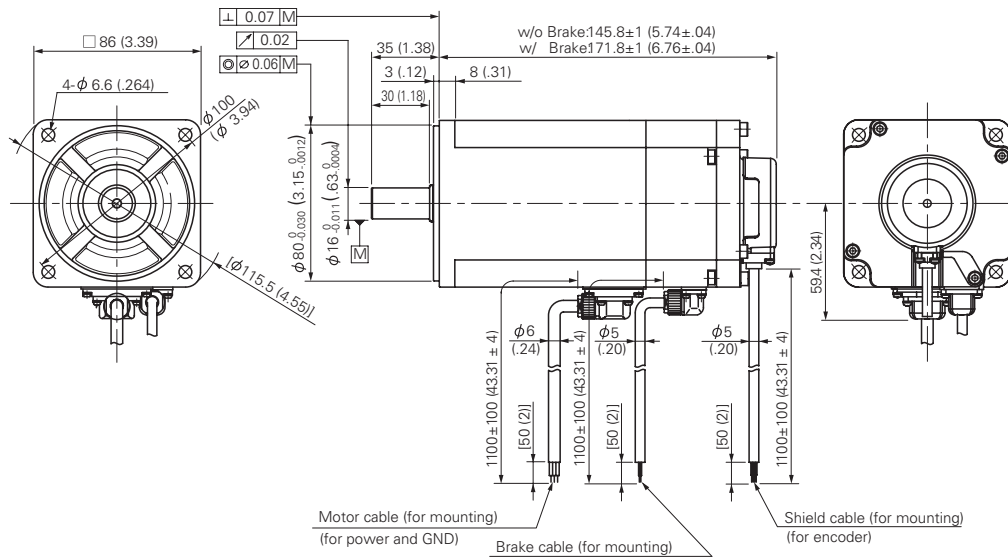
Torque Curve

● R2AAB8100H



Dimension

Unit: mm (inch)



Compatible Amplifier

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

E01: w/ CPC screw lock type connector assembly.

AC SERVO SYSTEMS

0.55 kW

130 mm (5.12 inch)

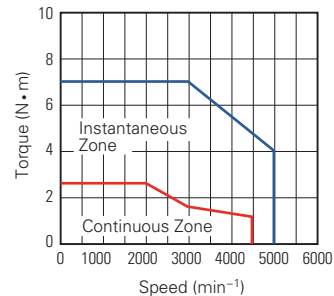
■ Specifications



■ Torque Curve

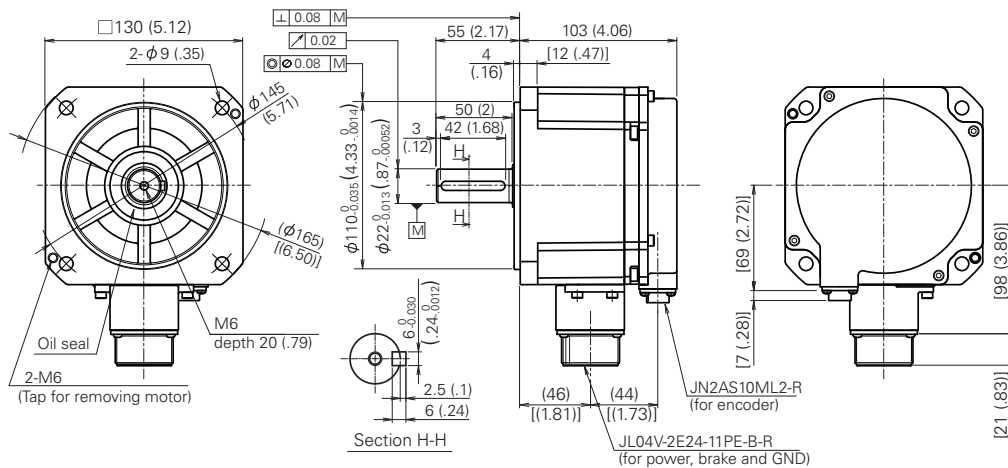
- **R2AA13050D**

Power Supply		200 VAC R2AA13050D
Model		
Rated Power	kW	0.55
Maximum Speed	min ⁻¹	5000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	3.1
	lb·in ²	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



■ Dimension

Unit: mm (inch)



■ Compatible Amplifier

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

AC SERVO SYSTEMS

R2 MOTOR

2 kW

**MOTOR
FLANGE SIZE**

130 mm (5.12 inch)

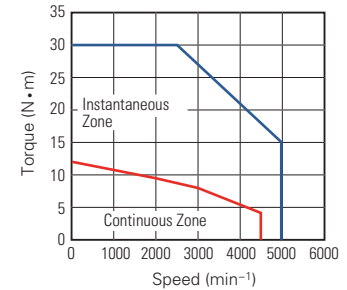
Specifications

Power Supply		200 VAC
Model		R2AA13200D ^{*2}
Rated Power	kW	2
Maximum Speed	min ⁻¹	5000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	12.2
	lb·in ²	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

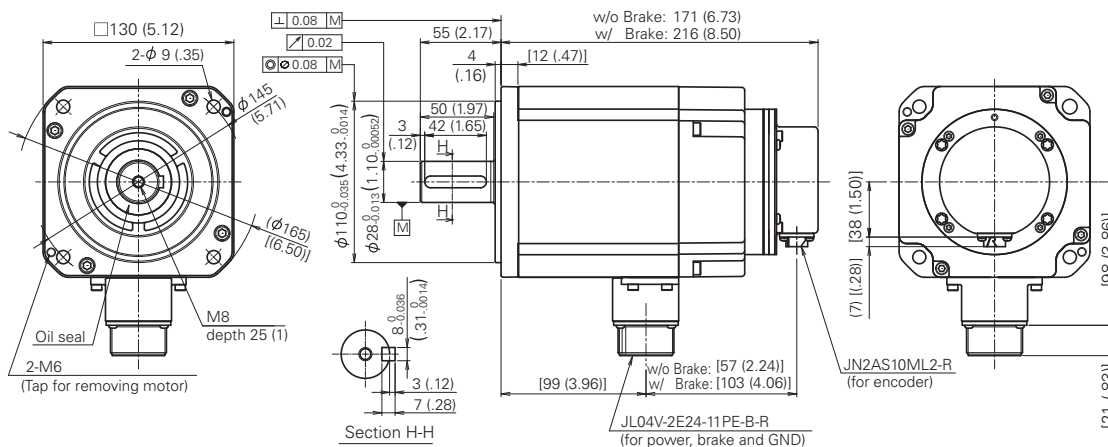
R2AA13200D



*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	w/ Brake

AC SERVO SYSTEMS

R1 MOTOR

100W

**MOTOR
FLANGE SIZE**

40 mm (1.57 inch)

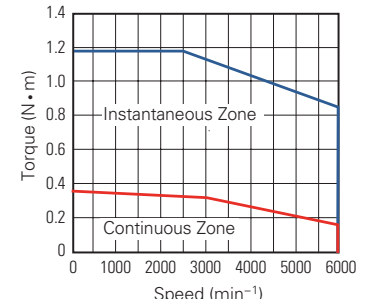
Specifications



Power Supply		200 VAC
Model		R1AA04010F
Rated Power	kW	0.1
Maximum Speed	min ⁻¹	6000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	0.0242
	lb·in ²	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

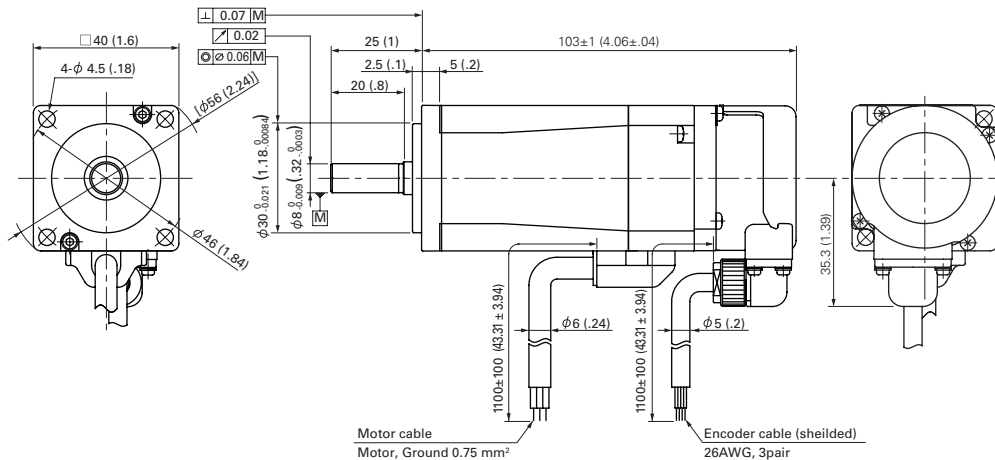
Torque Curve

● R1AA04010F



Dimension

Unit: mm (inch)



Compatible Amplifier

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

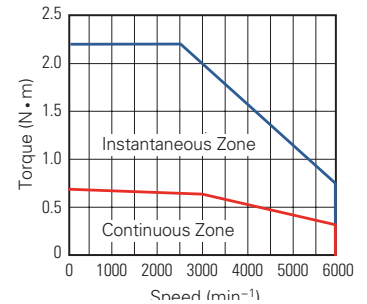
E01: w/ CPC screw lock type connector assembly.

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

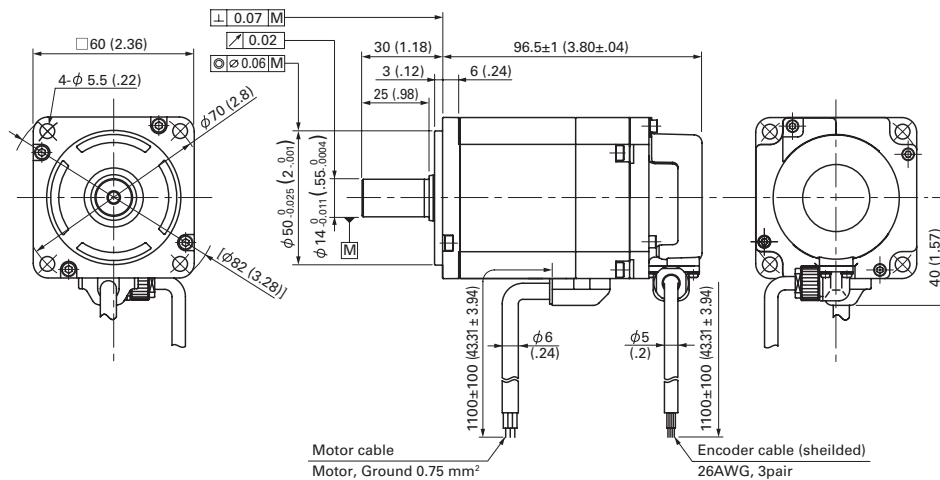
Power Supply		200 VAC
Model		R1AA06020F
Rated Power	kW	0.1
Maximum Speed	min ⁻¹	6000
Rated Speed	min ⁻¹	3000
Rated Torque	N·m	0.637
	lb·in	5.64
Peak Torque at Stall	N·m	2.2
	lb·in	19.5
Rotor Moment of Inertia	x10 ⁻⁴ kg·m ²	0.122
	lb·in ²	0.0417
Encoder		17bit serial absolute
Motor Mass	kg	1.1
	lb	2.43
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

400W

**MOTOR
FLANGE SIZE**

60 mm (2.36 inch)

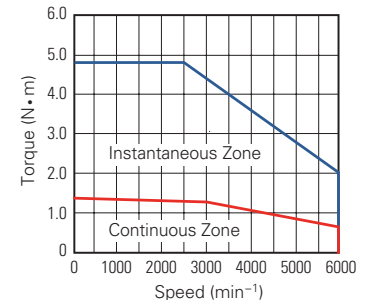
Specifications



Power Supply		200 VAC
Model		R1AA06040F
Rated Power	kW	0.4
Maximum Speed	min ⁻¹	6000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	0.203
	lb·in ²	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

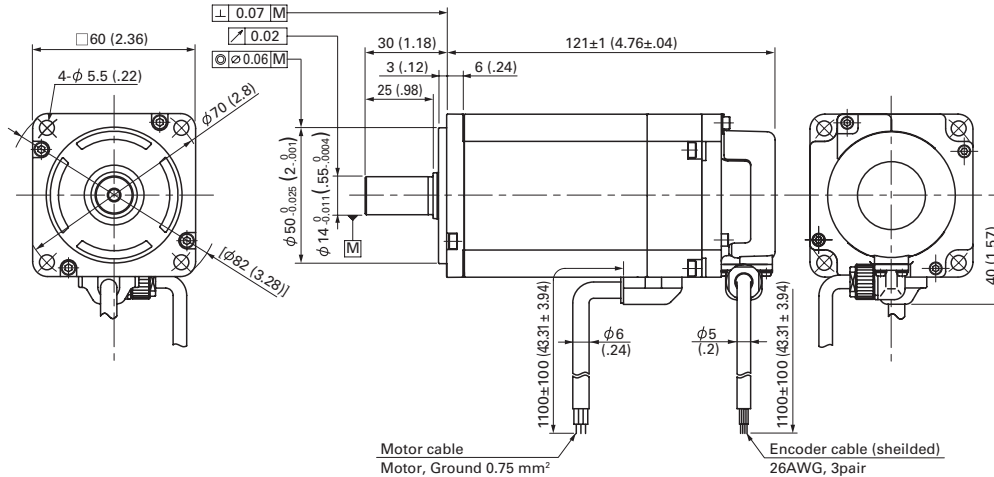
Torque Curve

● R1AA06040F



Dimension

Unit: mm (inch)



Compatible Amplifier

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

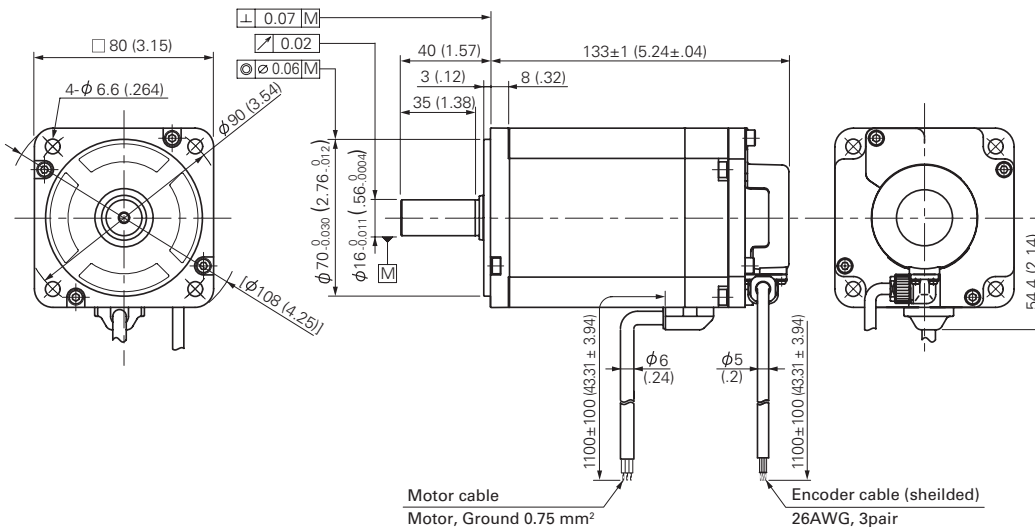
E01: w/ CPC screw lock type connector assembly.

R1 MOTOR**750w****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 ⁻¹	6000	6000
Rated Speed	min ⁻¹	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 ⁻⁴ kg·m ²	0.719	0.719
	lb·in ²	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	

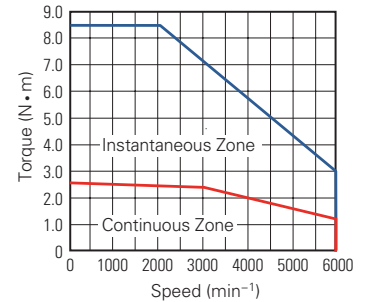
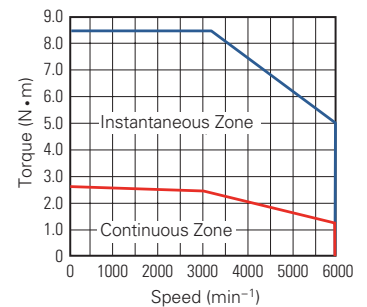
Dimension

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)

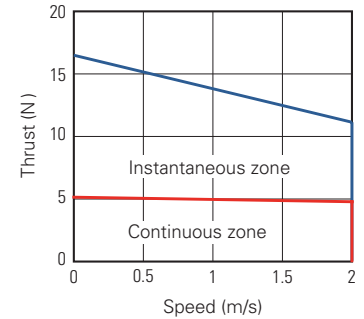
Specifications

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	



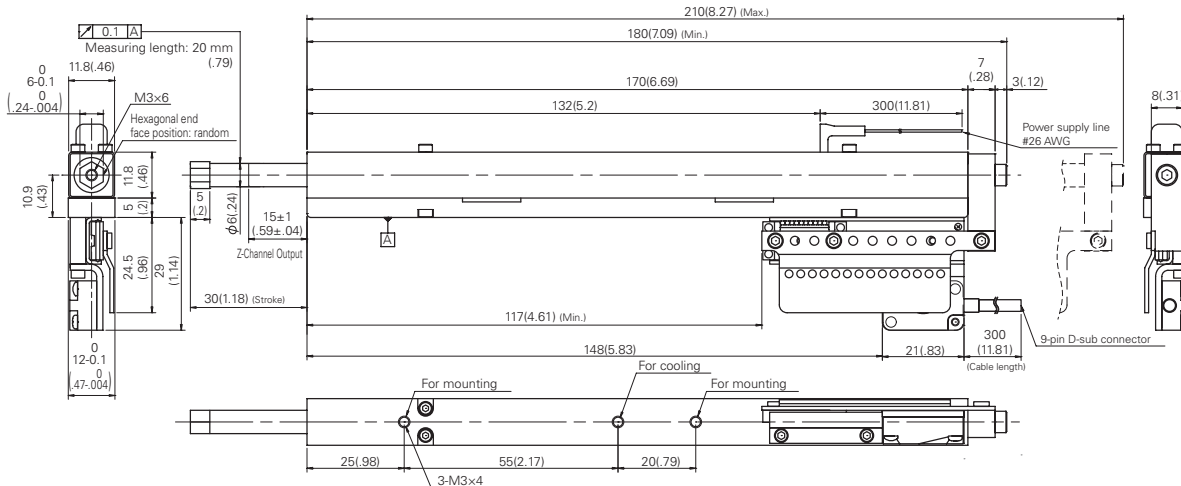
Thrust Curve

● DE0AC001A03MX00



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)
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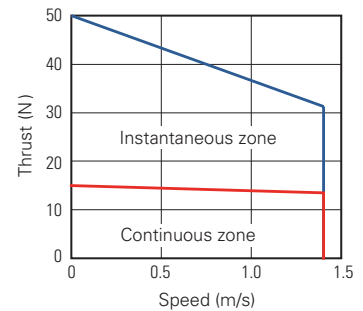
Specifications

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



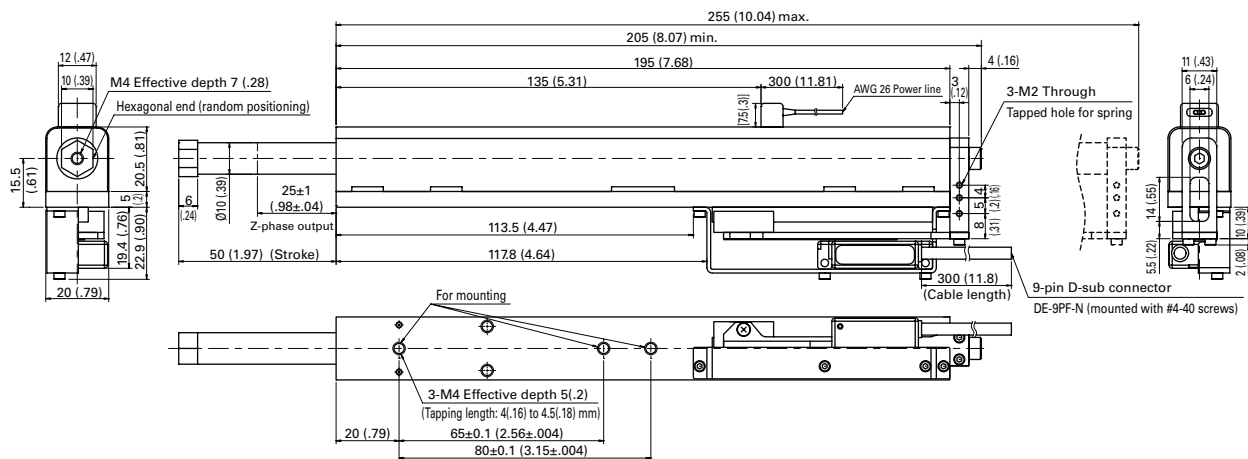
Thrust Curve

DE0AC001A03MX00



Dimension

Unit: mm (inch)



Compatible Amplifier

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

E01: w/ CPC screw lock type connector assembly.

Analog/Pulse Input Type Servo Amplifier



Control function	Position control/Speed control/Torque control (Parameter switching)
Main circuit power (Note 1)	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 (Note 2)
Control power	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz±3 Hz
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 ²
Shock	19.6 m/s ²
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

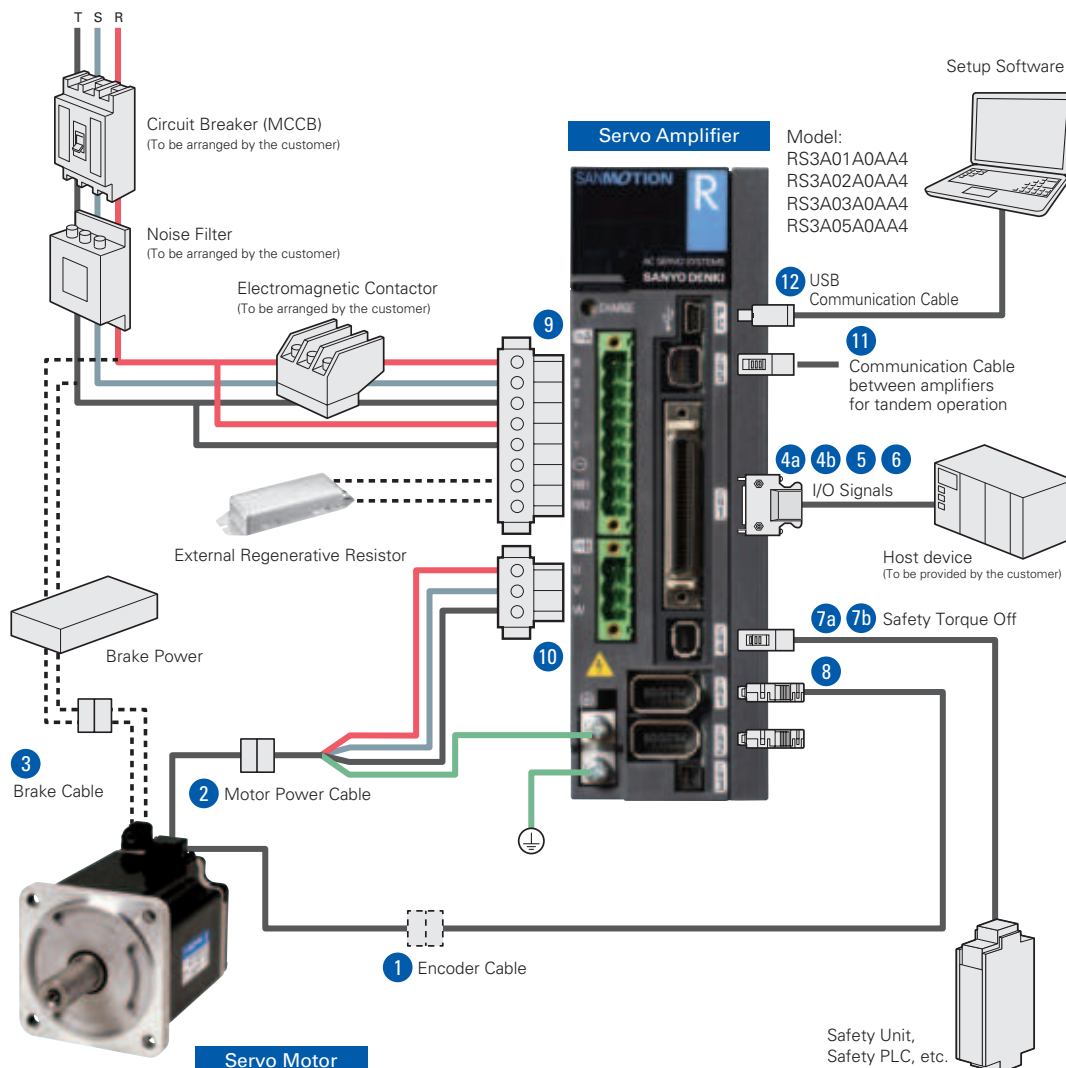
Built-in Functions

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 ⁻¹) 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 ⁻¹ command. Positive command (forward) motor rotation, maximum input voltage ±10V.
	Input impedance	Approximately 10kΩ
Torque command	Command voltage	DC±2.0V at 1000min ⁻¹ command. Positive command (forward) motor rotation, maximum input voltage ±10V.
	Input impedance	Approximately 10kΩ
		Interactive photo coupler (sink, source connection): ×8 input
General input	Sequence 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		±2.0VDC±15% (at rated torque), Input impedance: approximately 10kΩ
		Open collector output: × 8 outputs
		Power supply for general output circuit (CN1-49,OUT-PWR): DC5V±5% / DC12V to DC24V±10%, 20mA or over
General output	Sequence output	Specification of Power supply for general output circuit • DC5V±5% , Maximum current value 10mA (per 1 output) • DC12V~DC15V±10% , Maximum current value 30mA (per 1 output) • DC24V±10% , Maximum current value 50mA (per 1 output)
		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

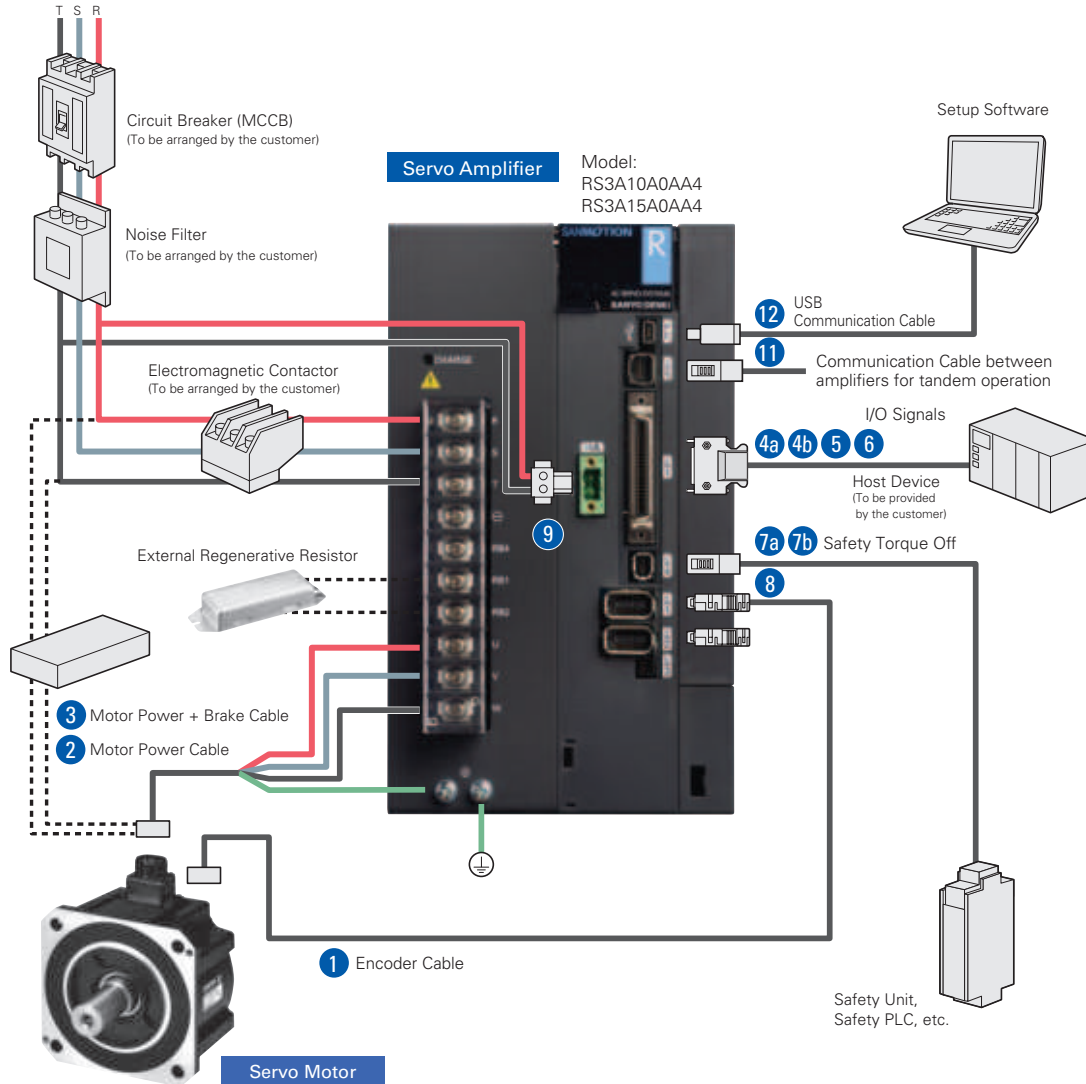


Item		Parts Number	Description
✓ 1	Encoder Cable: 10 ft	EEXTKABS2410FT	
		EEXTKABS24JN10FT	For 0.55 kW and 1.2 kW motor
✓ 2	Motor Power Cable: 10 ft	MEXTK1810FT	
		MEXTK18JN10FT	For 0.55 kW motor
		MEXTK14JN10FT	For 1.2 kW motor
✓ 3	Brake Cable: 10 ft	MEXTBRK2010FT	Only for brake equipped motor
4a	I/O 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 (6b) is selected
7b	Connector [CN4]	AL-00849548-02	For STO cancellation, no need if 6a 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: 1m	AL-00911582-01	For tandem operation
✓ 12	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.

System Configuration: 100A, 150A



Item	Parts Number	Description
✓ 1 Encoder Cable: 10 ft	EEXTKABS24JN10FT	
✓ 2 Motor Power Cable: 10 ft	MEXT10JN10FT	For 2 kW motor
	MEXT08JN10FT	For 5 kW motor
✓ 3 Motor Power + Brake Cable: 10 ft	MEXTB10JN10FT	For brake equipped 2 kW motor
	MEXTB08JN10FT	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
7b Connector [CN4]	AL-00849548-02	For STO cancellation
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.

MCE Actuator

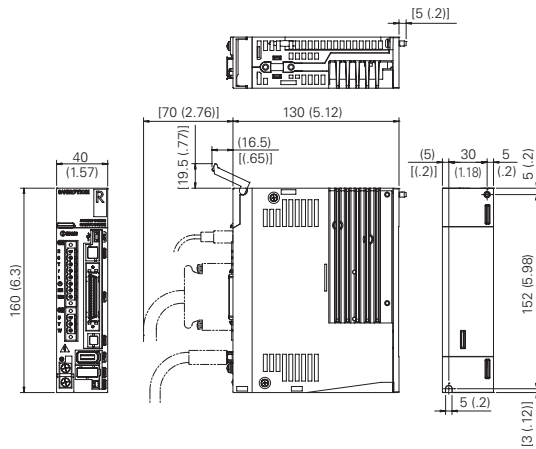


Dimensions

Unit: mm (inch)

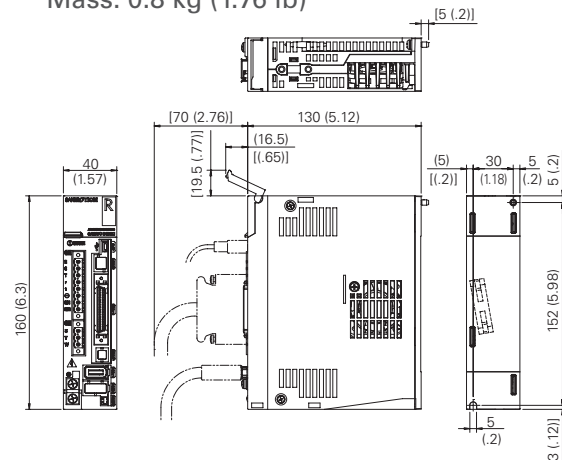
■ RS3A01A0AA4

Mass: 0.8 kg (1.76 lb)



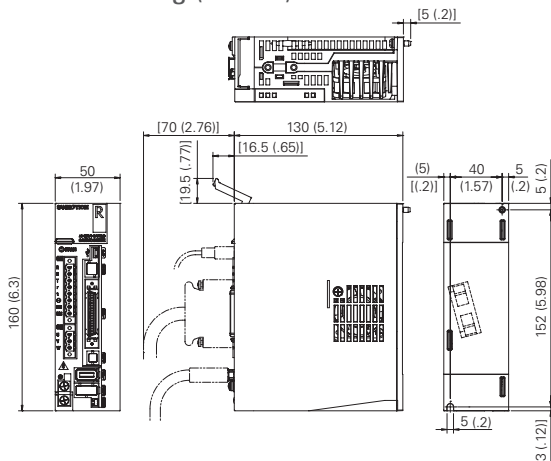
■ RS3A02A0AA4

Mass: 0.8 kg (1.76 lb)



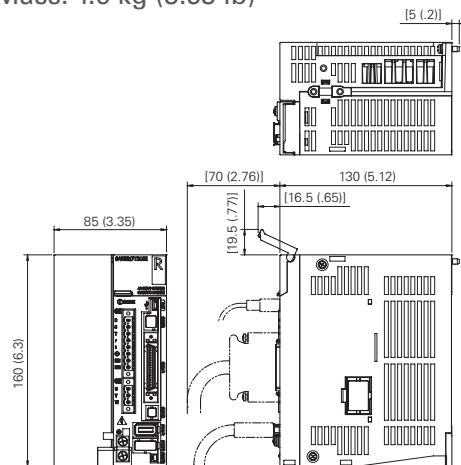
■ RS3A03A0AA4

Mass: 0.9 kg (1.98 lb)



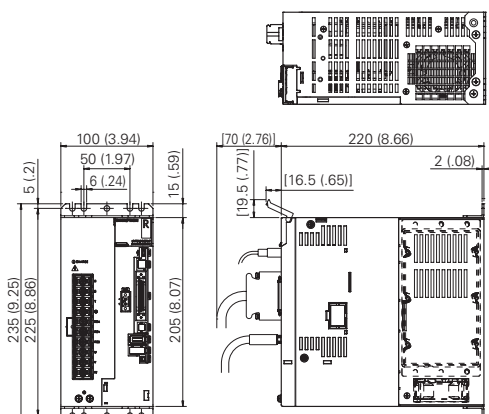
■ RS3A05A0AA4

Mass: 1.6 kg (3.53 lb)



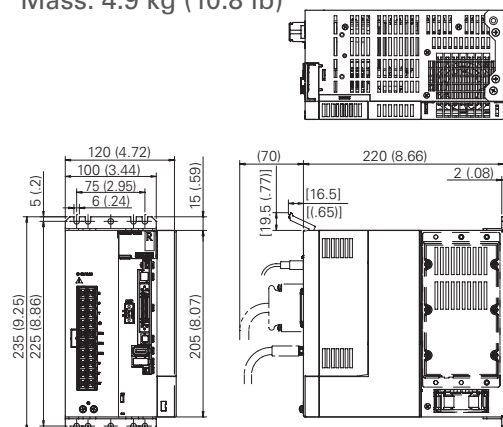
■ RS3A10A0AA4

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 $\pm$ 3Hz Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 1) Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 2)
Control circuit power	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 2)
Environment	Ambient temperature
	Storage temperature
	Operation/Storage humidity
	Operation altitude
	Vibration resistance
Structure	Impact resistance
	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 $\pm$ 10% (at 1000 min ⁻¹)
	Torque (thrust force) command monitor (TCMON) 2.0V $\pm$ 10% (at 100%)

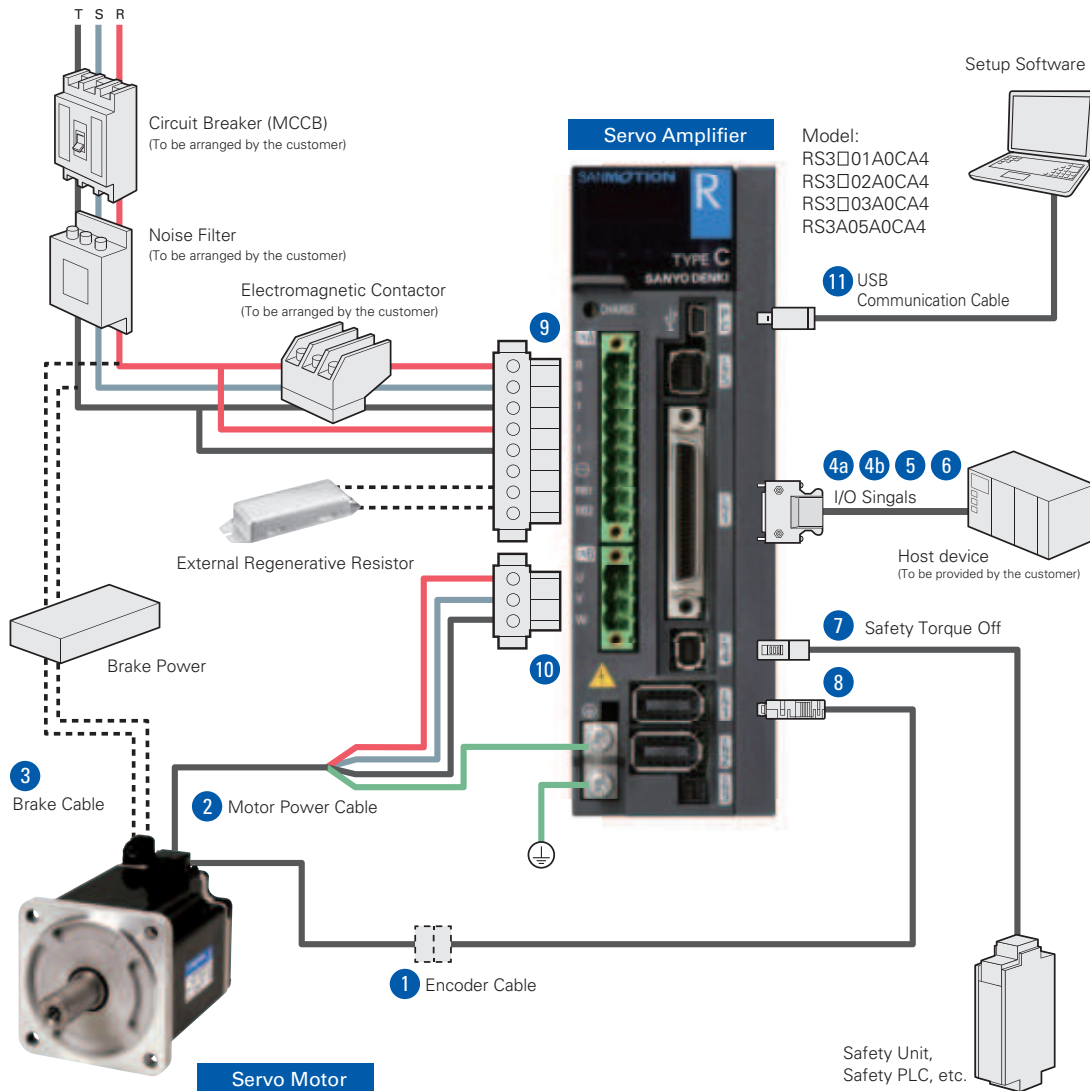
Positioning Function

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)

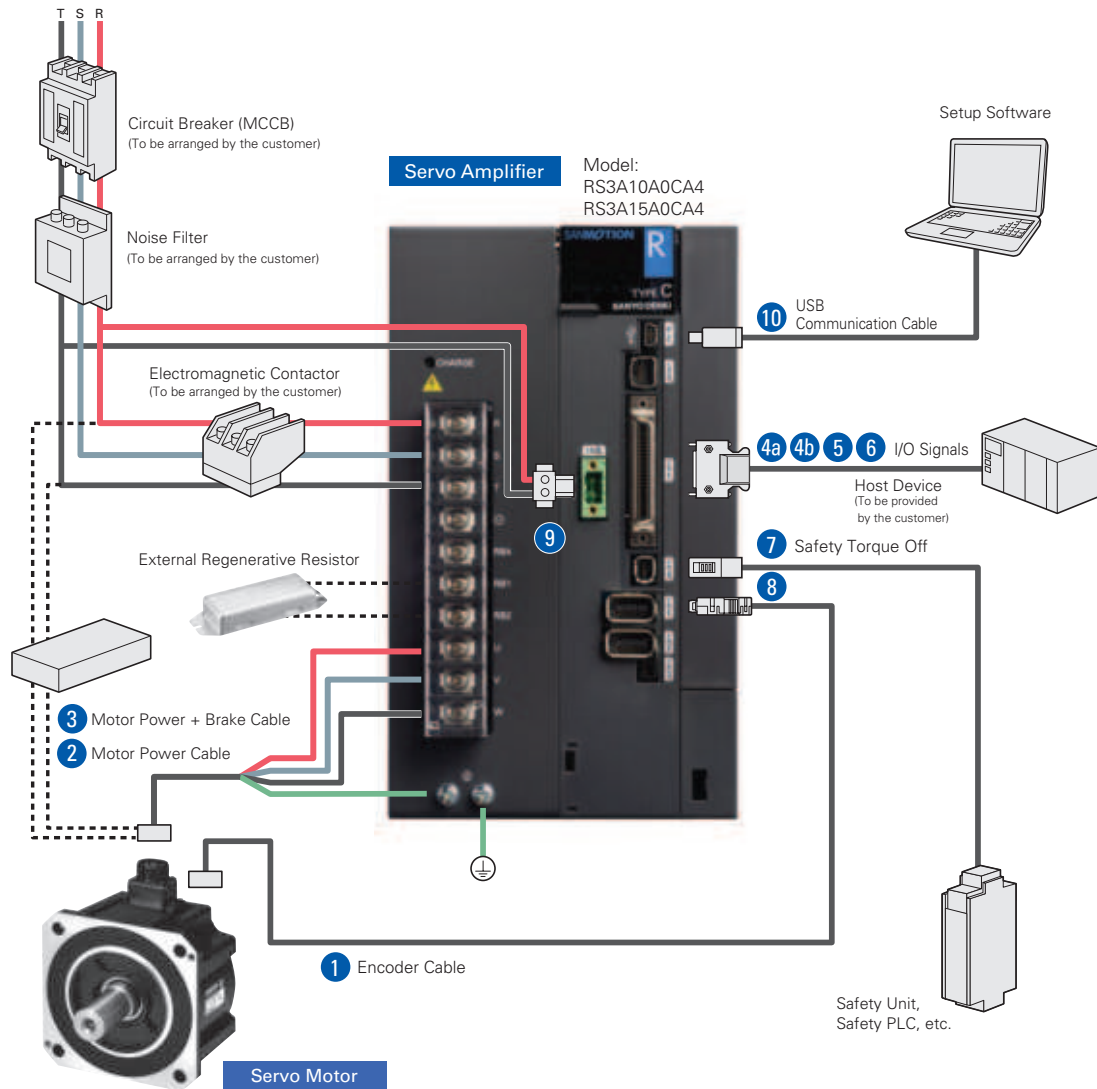
System Configuration: 10A, 20A, 30A, 50A



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 For 0.55 kW motor MEXTK14JN10FT 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
7	Connector [CN4]	AL-00718252-01 For STO
✓ 8	Connector [EN1]	AL-Y0012504-01 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	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.

System Configuration: 100A, 150A



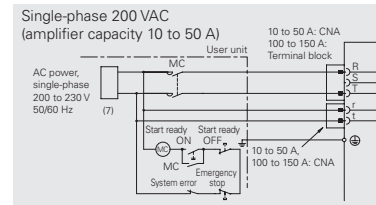
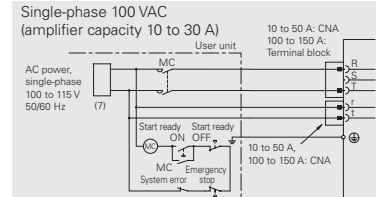
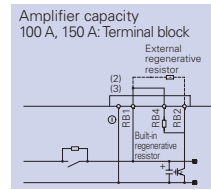
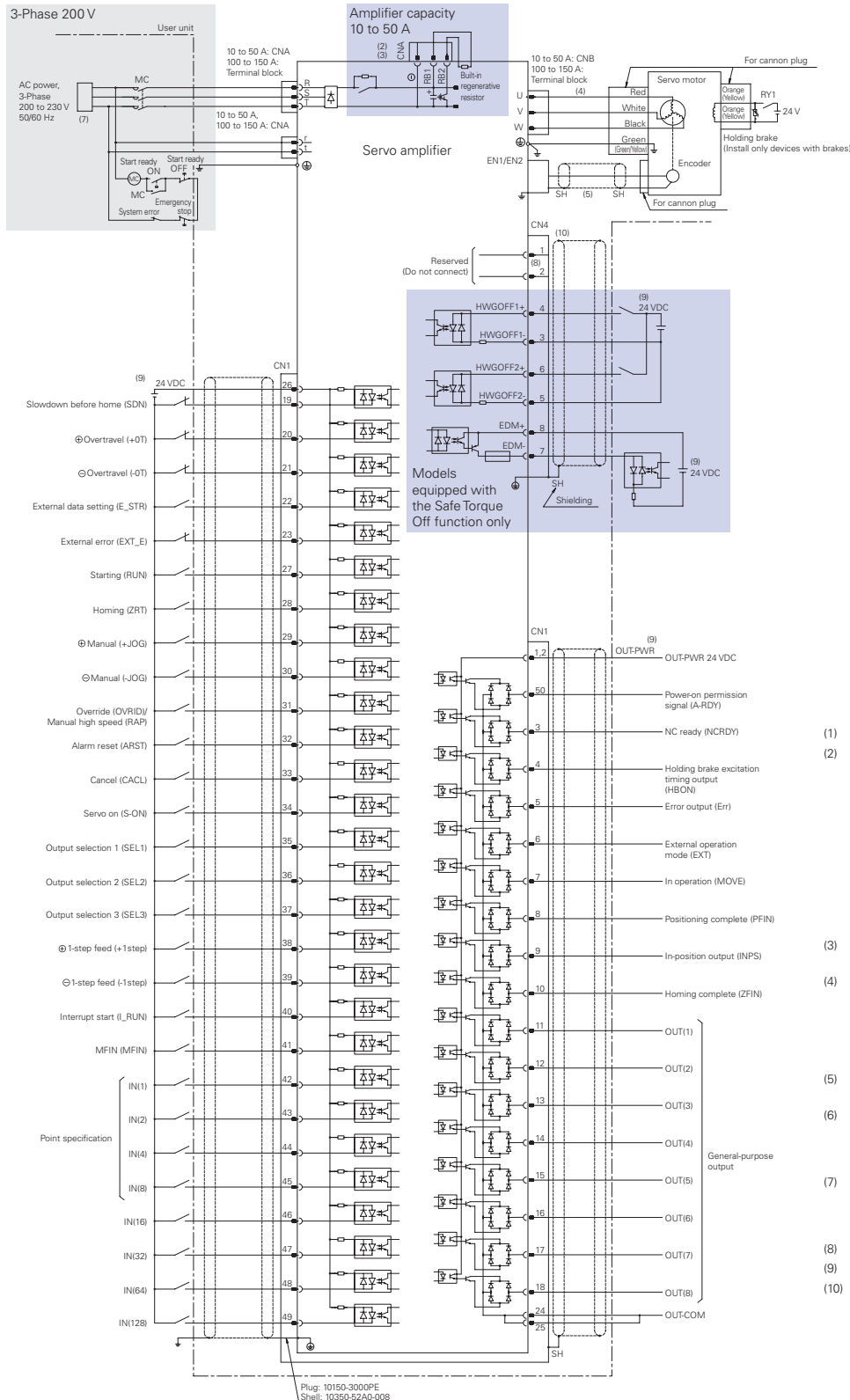
Item		Parts Number	Description
✓ 1	Encoder Cable: 10 ft	EEXTKABS24JN10FT	
✓ 2	Motor Power Cable: 10 ft	MEXT10JN10FT	For 2 kW motor
		MEXT08JN10FT	For 5 kW motor
✓ 3	Motor Power + Brake Cable: 10 ft	MEXTB10JN10FT	For brake equipped 2 kW motor
		MEXTB08JN10FT	For brake equipped 5 kW motor
✓ 4a	I/O Cable: 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
✓ 7	Connector [CN4]	AL-00718252-01	For STO
✓ 8	Connector [EN1]	AL-Y0012504-01	No need if Encoder Cable (1) is selected
✓ 9	Connector [CNA]	AL-00686902-01	
✓ 10	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.

Wiring Diagram

■ Sinking type (NPN) output

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



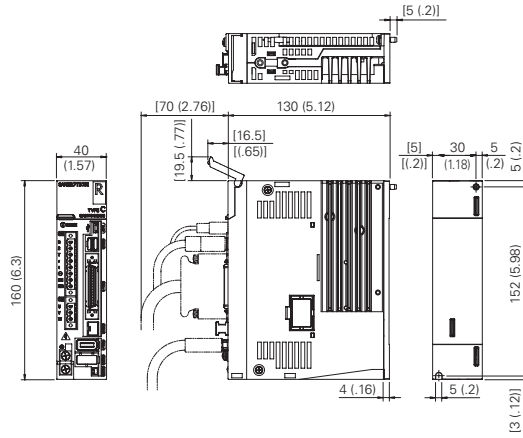
- Use a twisted pair shielded cable.
- For amplifier capacity 10 A, 20 A, 30 A, 50 A:
Connect the regenerative resistor "between the RB1 and RB2 terminals".
When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 terminals 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 IUL, 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)

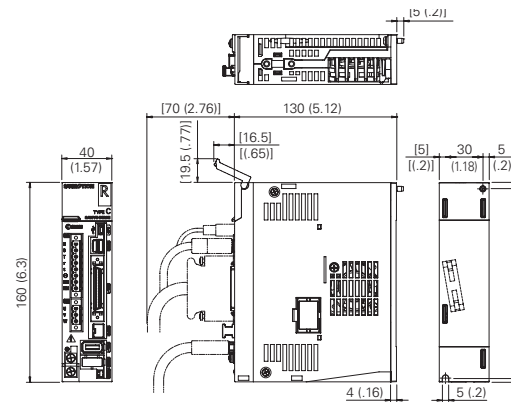
■ RS3□01A0CA4

Mass: 0.8 kg (1.76 lb)



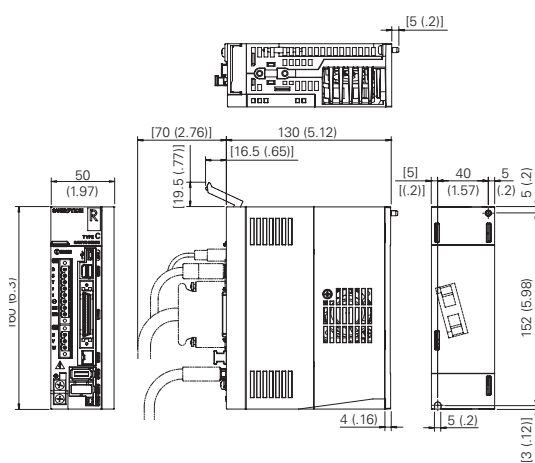
■ RS3□02A0CA4

Mass: 0.8 kg (1.76 lb)



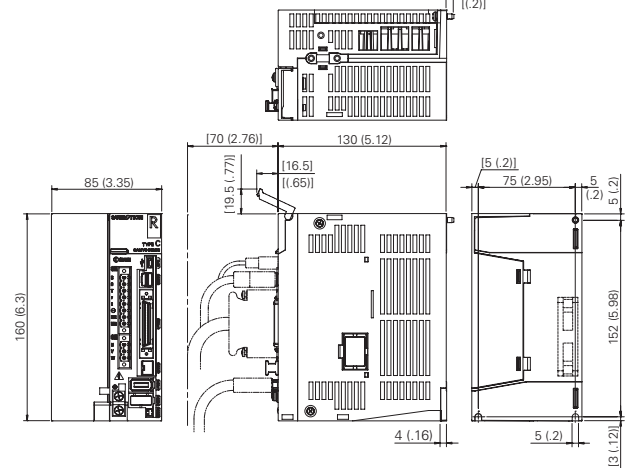
■ RS3□03A0CA4

Mass: 0.9 kg (1.98 lb)



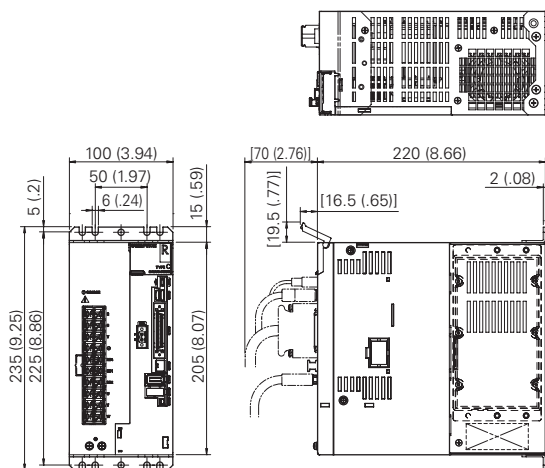
■ RS3A05A0CA4

Mass: 1.6 kg (3.53 lb)



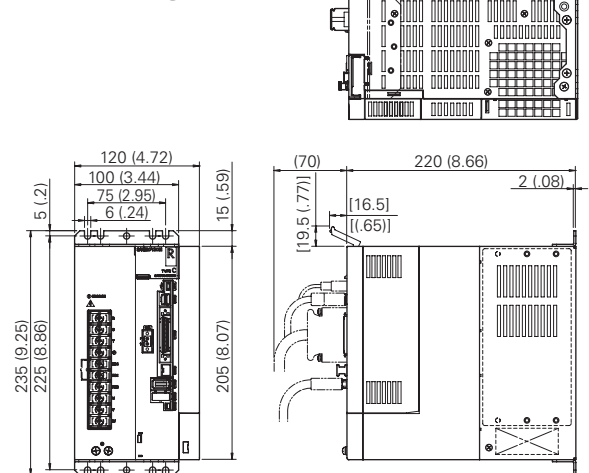
■ RS3A10A0CA4

Mass: 4.2 kg (9.26 lb)



■ RS3A15A0CA4

Mass: 5.0 kg (11.0 lb)



Indexer Modbus Interface Type Servo Amplifier



Control function	Position control
Main circuit power	Three-phase: 200 to 240 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 1) Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 2)
Control circuit power	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 2)
Ambient temperature	0 to +55°C
Storage temperature	-20 to +65°C
Environment	Operation/Storage humidity Below 90% RH (no condensation)
Operation altitude	Below 1000 m
Vibration resistance	4.9 m/s ²
Impact resistance	19.6 m/s ²
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 $\pm$ 10% (at 1000 min ⁻¹) Torque (thrust force) command monitor (TCMON) 2.0V $\pm$ 10% (at 100%)

Positioning Function

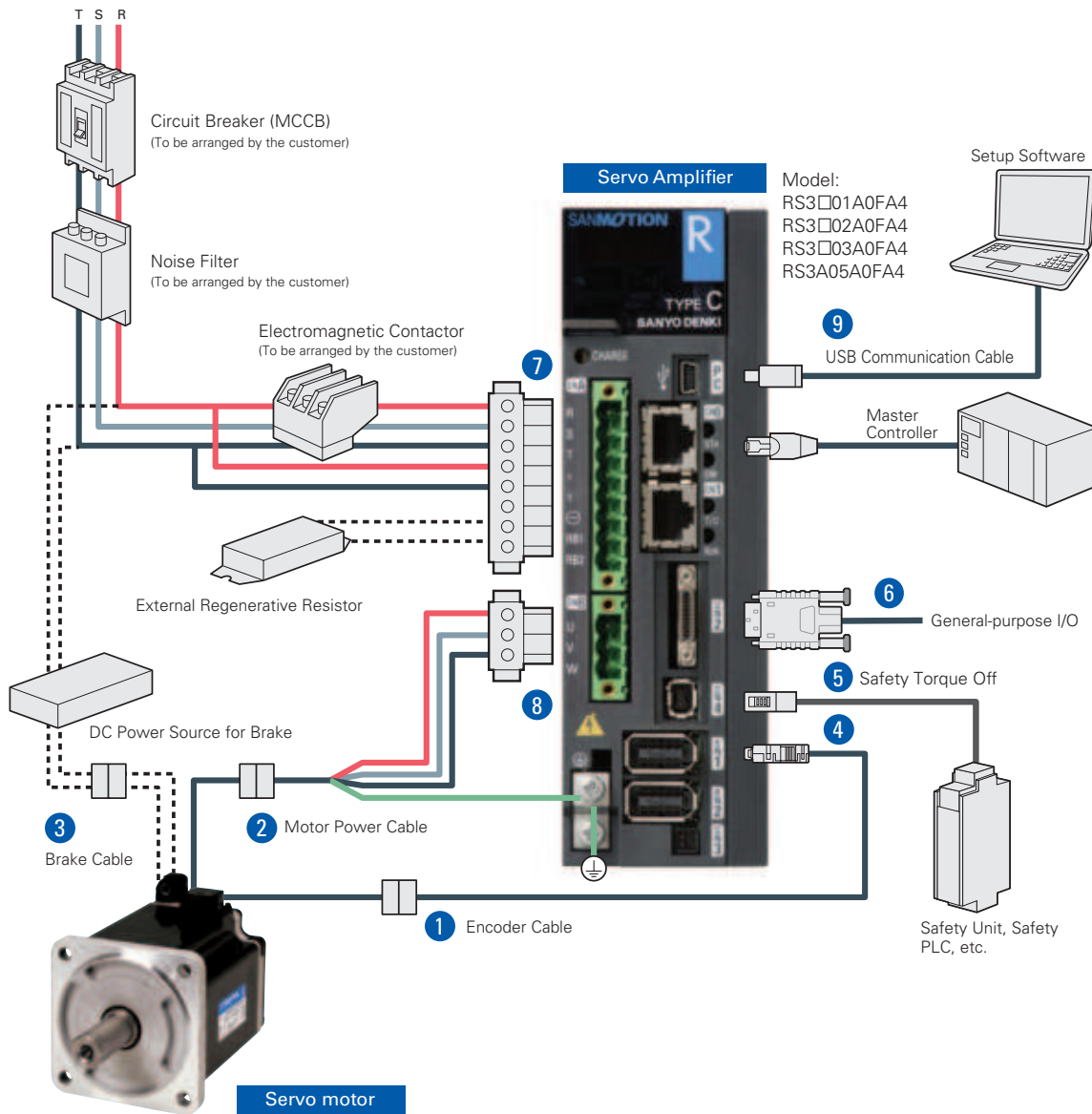
Number of control axis	1 axis
Number of points to be registered	Up to 254 points (P000 to P253) can be set
Max. command amount	-2,147,483,648 to +2,147,483,647
Command unit	mm, deg, or pulse
Rapid feed rate	2,147,483,647 mm/sec (0.001 mm/pulse selected)
Acceleration/deceleration	Automatic acceleration/deceleration (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.

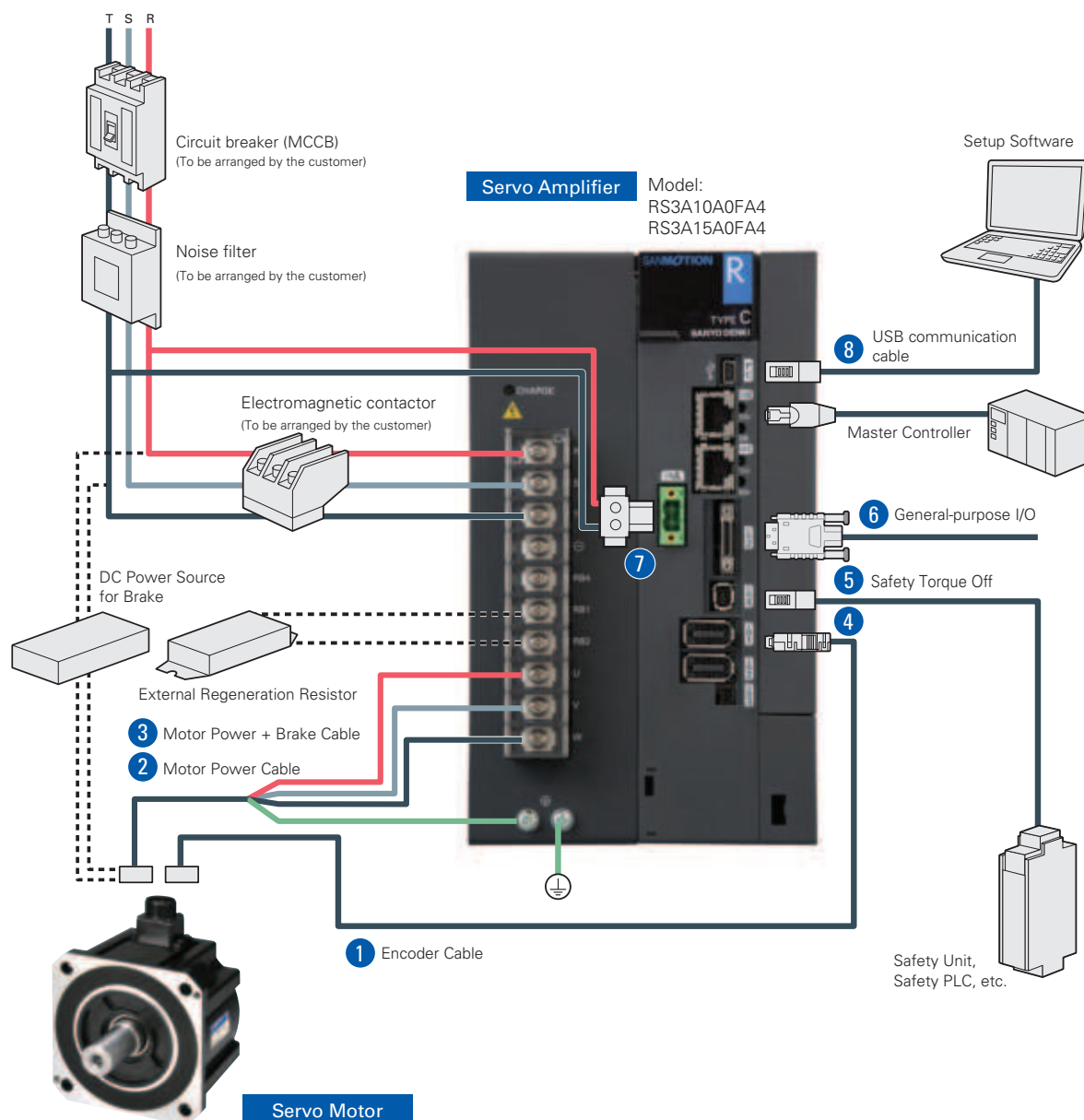
System Configuration: 10A, 20A, 30A, 50A



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.

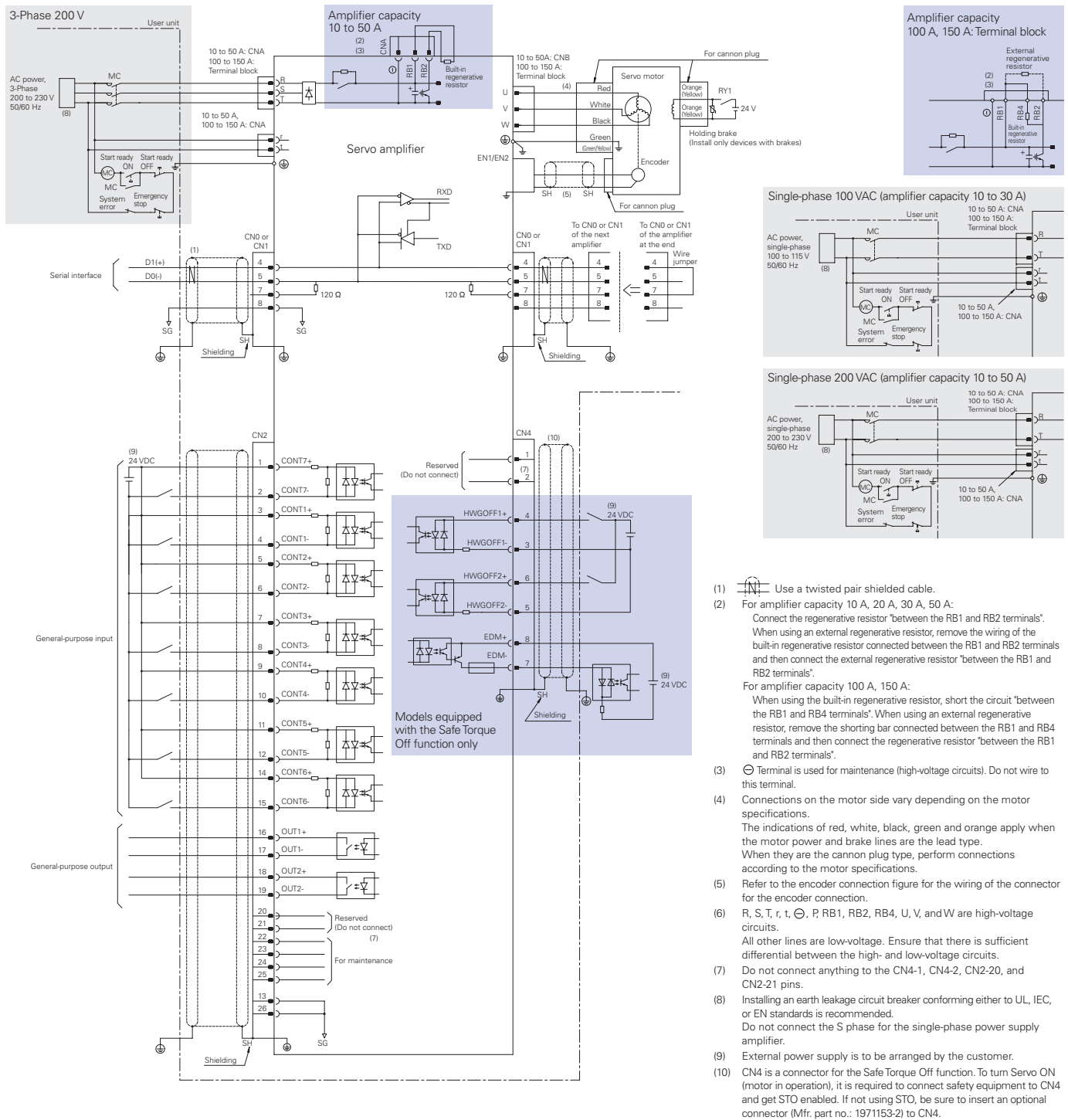
System Configuration: 100A, 150A



Item	Parts Number	Description
✓ 1 Encoder Cable: 10 ft	EEXTKABS24JN10FT	
✓ 2 Motor Power Cable: 10 ft	MEXT10JN10FT	For 2 kW motor
	MEXT08JN10FT	For 5 kW motor
✓ 3 Motor Power + Brake Cable: 10 ft	MEXTB10JN10FT	For brake equipped 2 kW motor
	MEXTB08JN10FT	For brake equipped 5 kW 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	
✓ 8 Connector [CNB]	AL-Y0004079-01	No need if Motor Power Cable (2) is selected
✓ 10 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.

Wiring Diagram



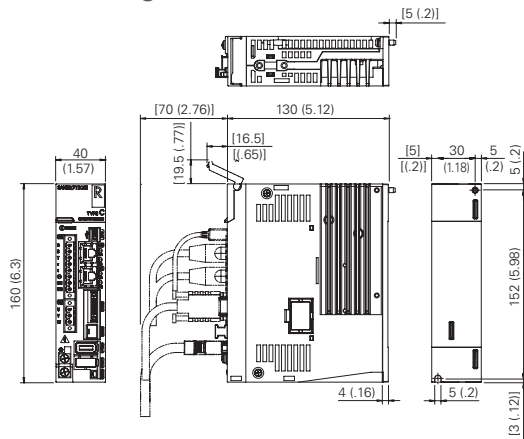
- (1) Use a twisted pair shielded cable.
- (2) For amplifier capacity 10 A, 20 A, 30 A, 50 A:
Connect the regenerative resistor "between the RB1 and RB2 terminals".
When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 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 is 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)

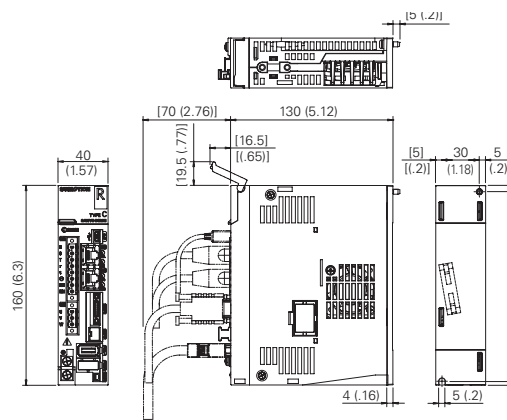
■ RS3□01A0FA4

Mass: 0.8 kg (1.76 lb)



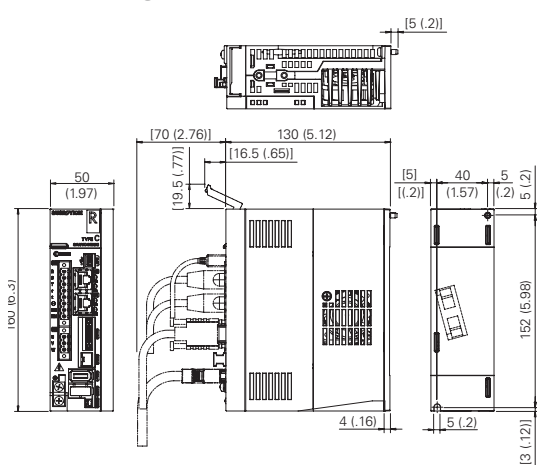
■ RS3□02A0FA4

Mass: 0.8 kg (1.76 lb)



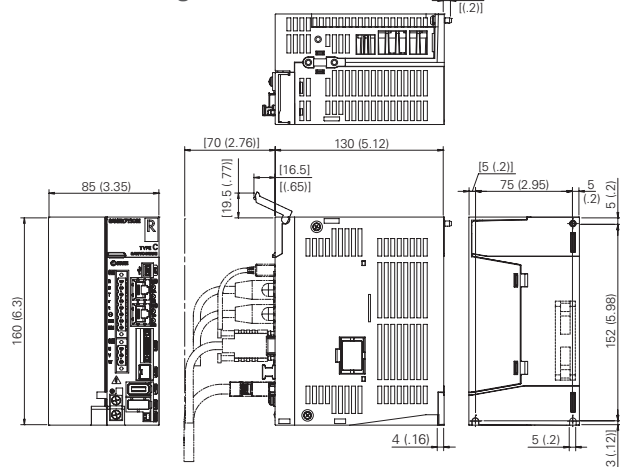
■ RS3□03A0FA4

Mass: 0.9 kg (1.98 lb)



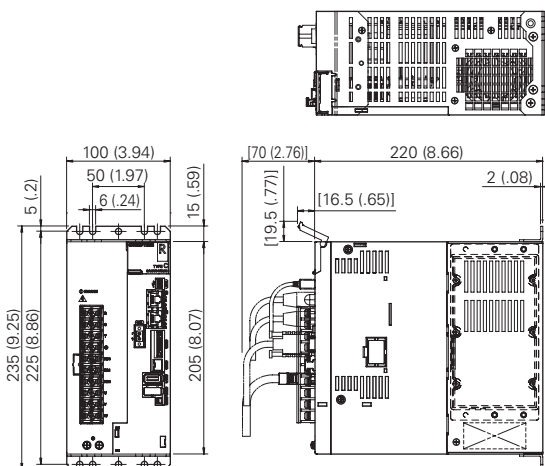
■ RS3A05A0FA4

Mass: 1.6 kg (3.53 lb)



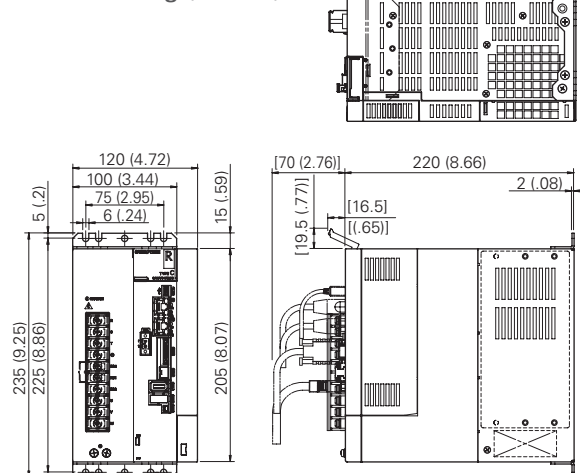
■ RS3A10A0FA4

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 $\pm$ 3Hz Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 1) Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 2)
Control circuit power	Single-phase: 200 to 240 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz Single-phase: 100 to 120 VAC +10, -15%, 50/60 Hz $\pm$ 3Hz (Note 2)
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 ²
Shock	19.6 m/s ²
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 $\pm$ 10% (at 1000 min ⁻¹) Torque (thrust force) command monitor (TCMON) 2.0 V $\pm$ 10% (at 100%)

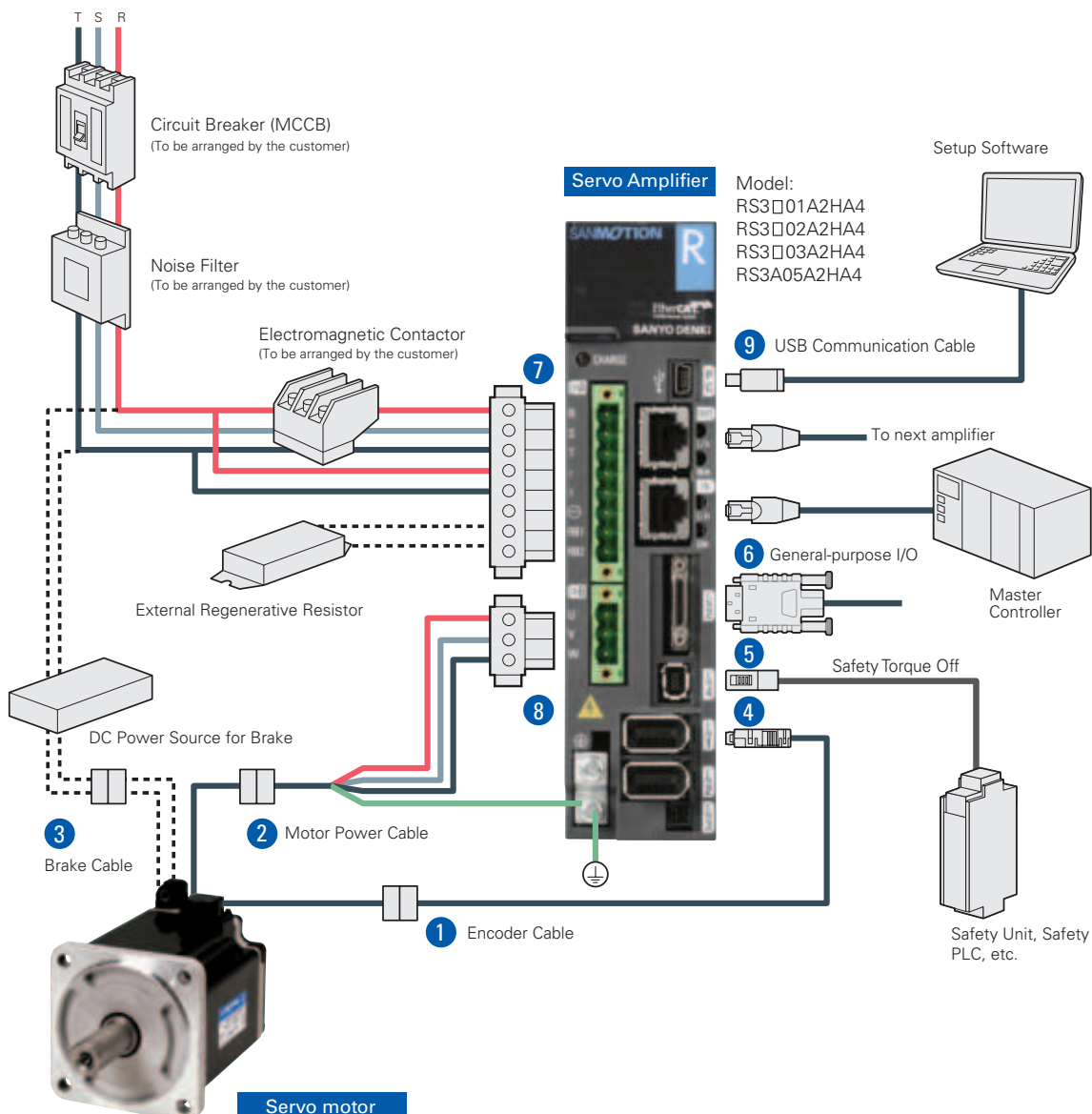
Safety Standard

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	• IEC/EN 61000-6-4 • IEC/EN 61000-6-2 • EN61000-6-7 • IEC/EN 61800-3 • IEC/EN 61326-1
	KC mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4
Model with safety function	Function safety standards		• IEC61508, SIL3 • IEC62061, SILCL3 • ISO13894-1, Cat3, PL=e

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 μ s (62.5 μ s: 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)

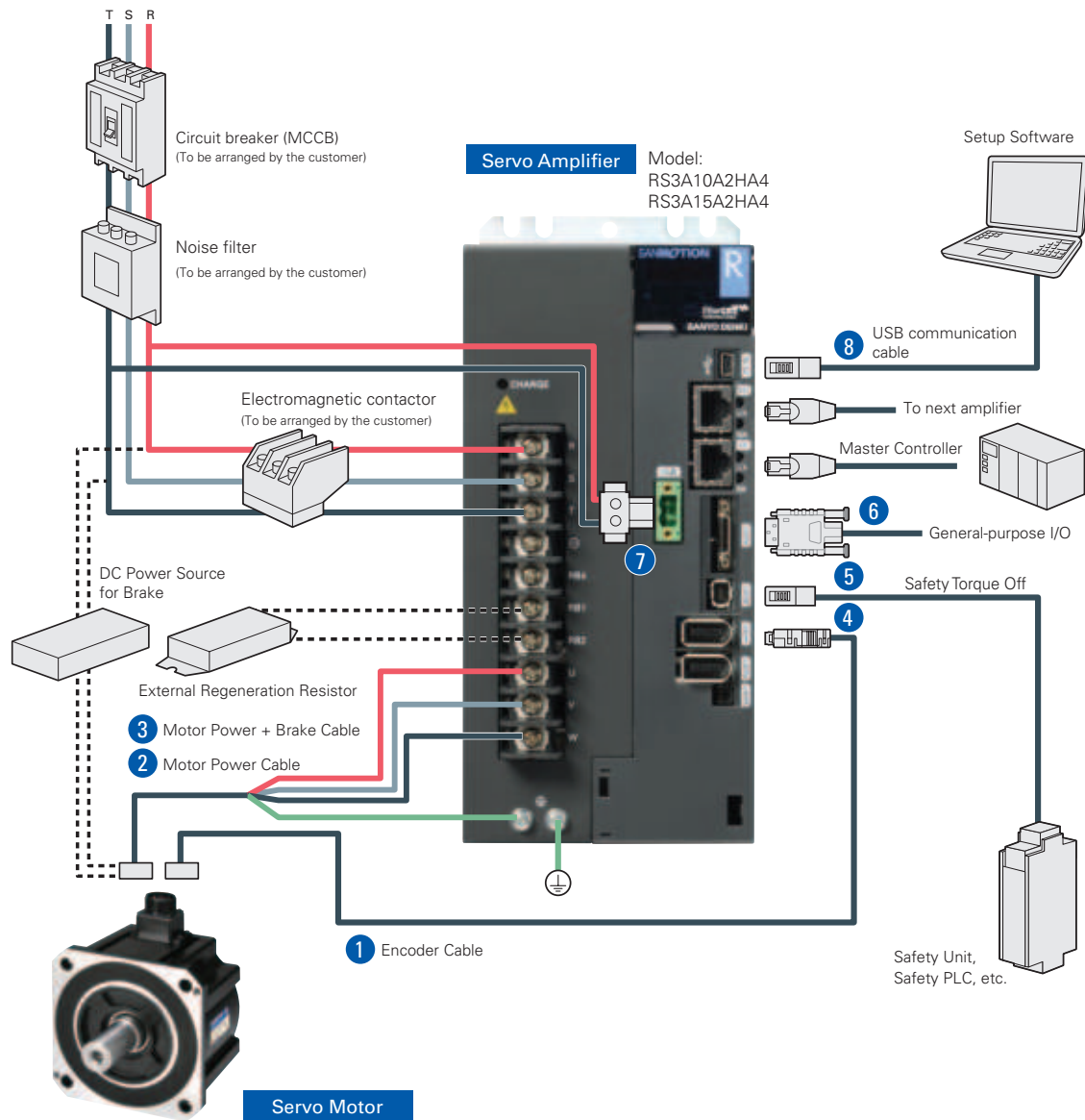
System Configuration: 10A, 20A, 30A, 50A



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

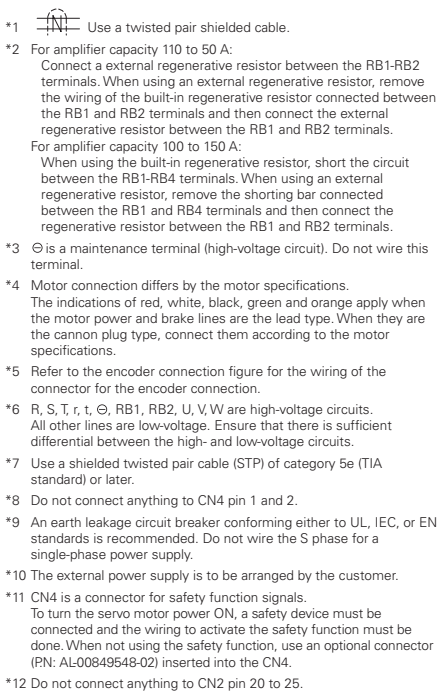
All items marked with a check must be included to build a complete system.

System Configuration: 100A, 150A



Item	Parts Number	Description
✓ 1	Encoder Cable: 10 ft	EEXTKABS24JN10FT
✓ 2	Motor Power Cable: 10 ft	MEXT10JN10FT MEXT08JN10FT
✓ 3	Motor Power + Brake Cable: 10 ft	MEXTB10JN10FT MEXTB08JN10FT
4	Connector [EN1, EN2]	AL-Y0012504-01
5	Connector [CN4]	AL-00718252-01
6	Connector [CN2]	AL-00842383
✓ 7	Connector [CNA]	AL-Y0005159-01
✓ 8	USB Communication Cable: 1m	AL-00896515-01
9	Battery [CN3]	AL-00880402-01

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

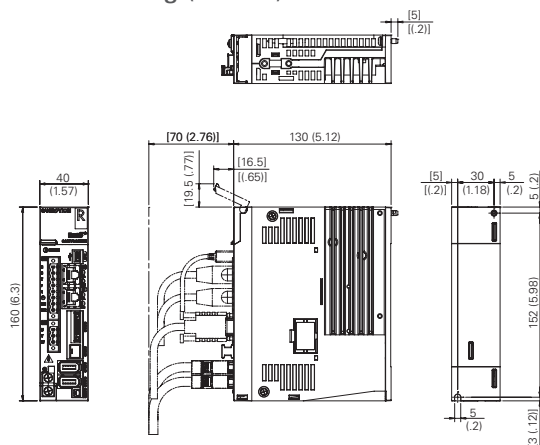


Dimensions

Unit: mm (inch)

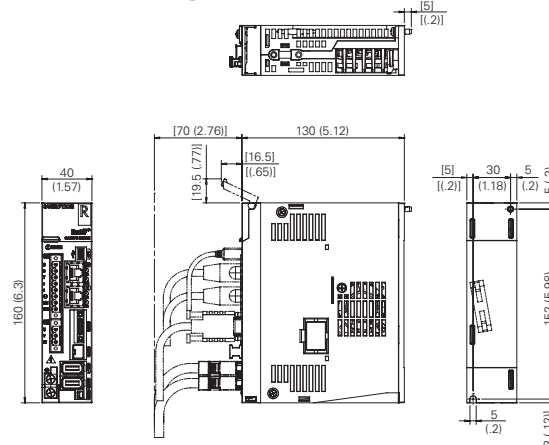
■ RS3□01A2HA4

Mass: 0.8 kg (1.76 lb)



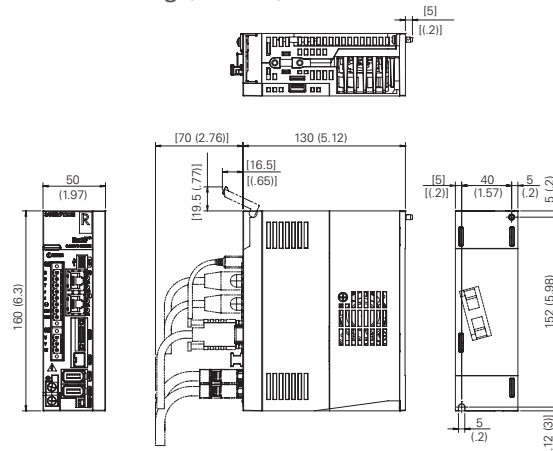
■ RS3□02A2HA4

Mass: 0.8 kg (1.76 lb)



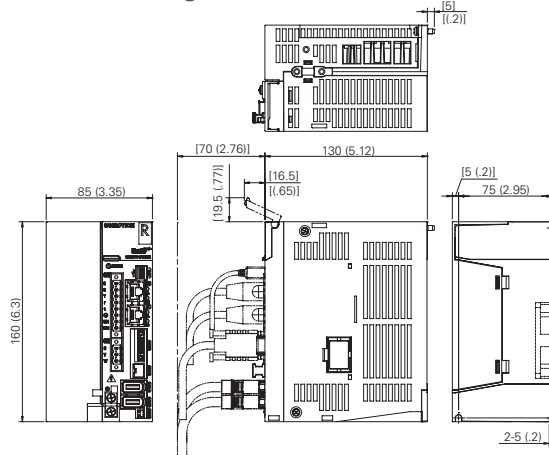
■ RS3□03A2HA4

Mass: 0.9 kg (1.98 lb)



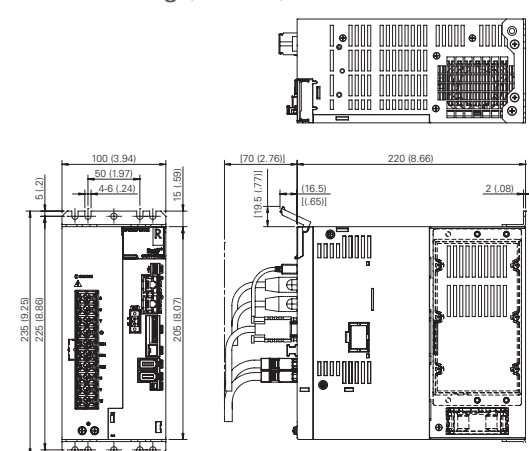
■ RS3A05A2HA4

Mass: 1.6 kg (3.53 lb)



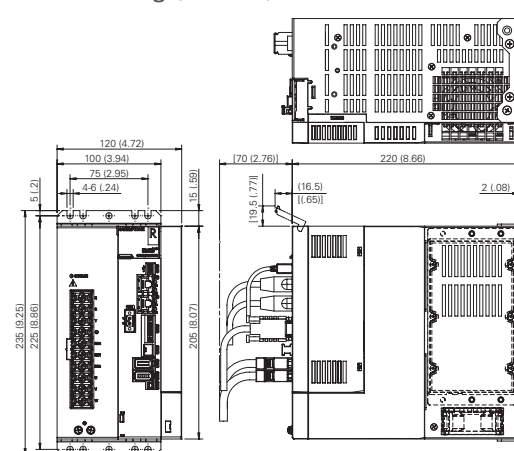
■ RS3A10A2HA4

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)
Ambient temperature	0 to +40°C (Note 3)
Storage temperature	-20 to +65°C
Environment Operation/Storage humidity	Below 90% RH (no condensation)
Elevation	Below 1000 m
Vibration	4.9 m/s ² Frequency range 10 to 55 Hz tested for 2 hours in each direction X.Y.Z
Shock	19.6 m/s ²
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

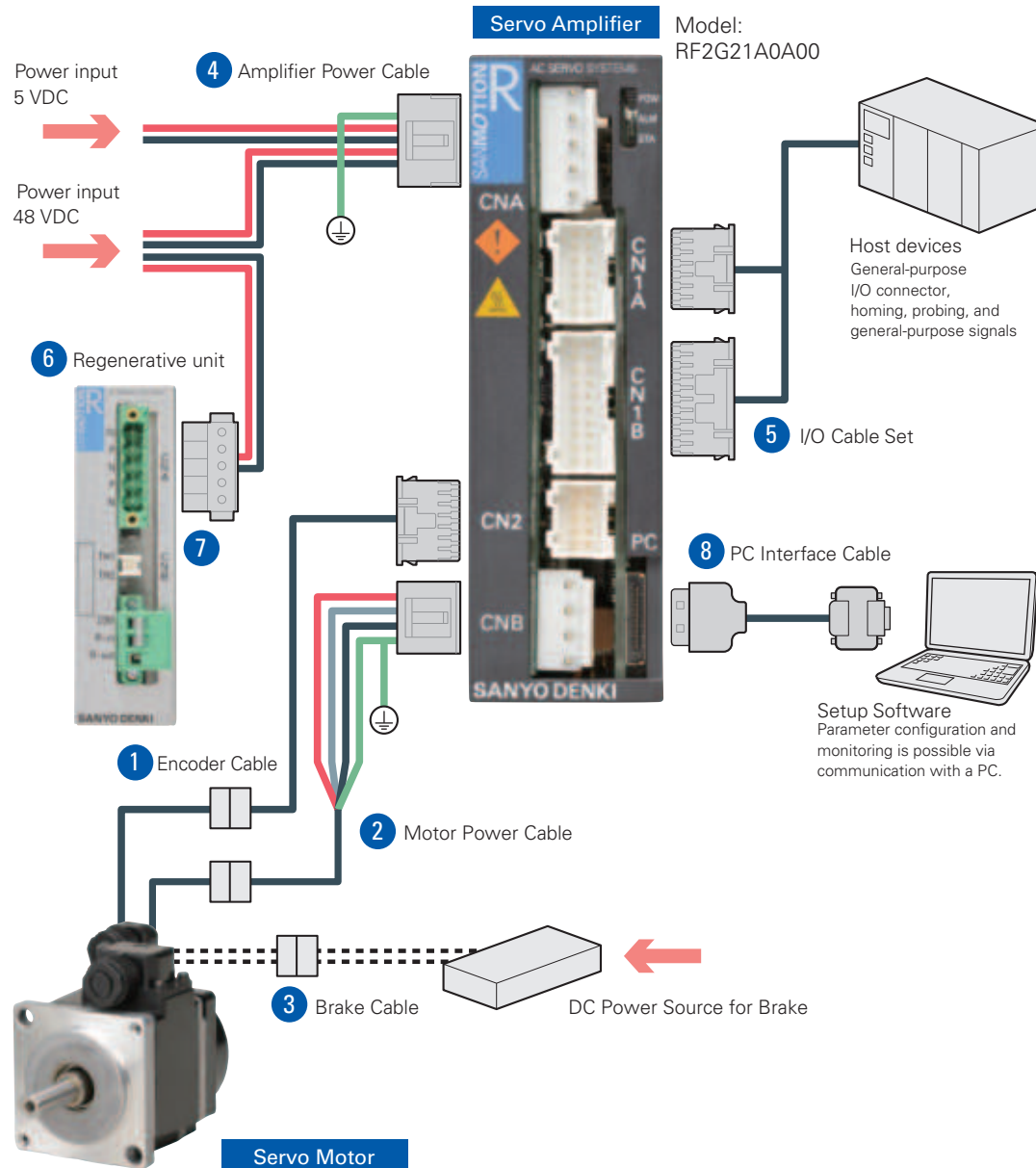
Built-in Functions

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

Maximum input pulse frequency	5M PPS (reverse rotation + normal rotation pulse and code + pulse) 1.25M PPS (90° phase difference, two-phase pulse)
Position command 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)

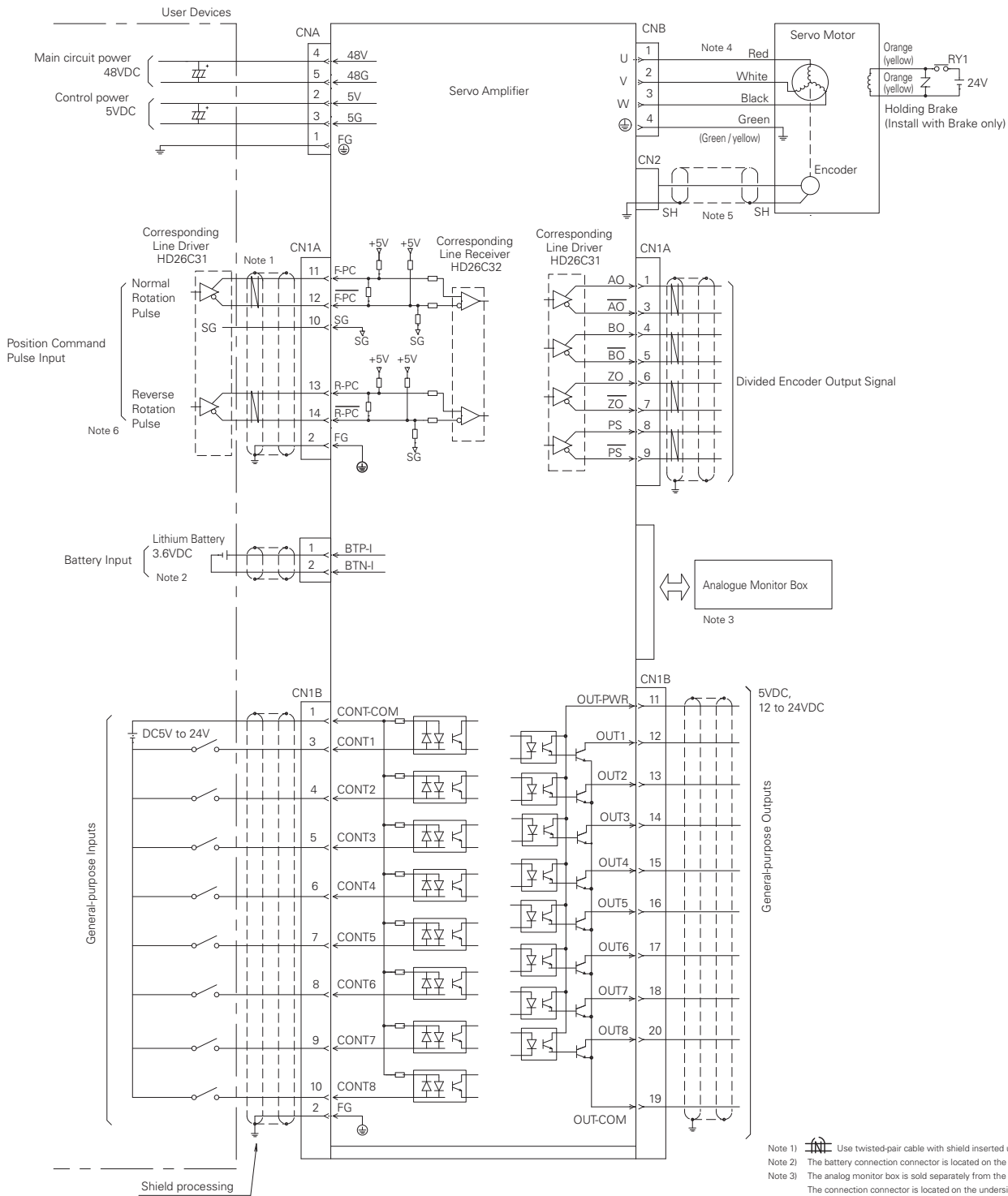
System Configuration



Item	Parts Number	Description
✓ 1	Encoder Cable: 10 ft	EEXTGABS2410FT
✓ 2	Motor Power Cable: 10 ft	MEXTG1810FT
✓ 3	Brake Cable: 10 ft	MEXTGBRK2010FT
✓ 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
7	Connector [CNA]	AL-00329461-01
✓ 8	PC Interface Cable	AL-00490833-01

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

Wiring Diagram



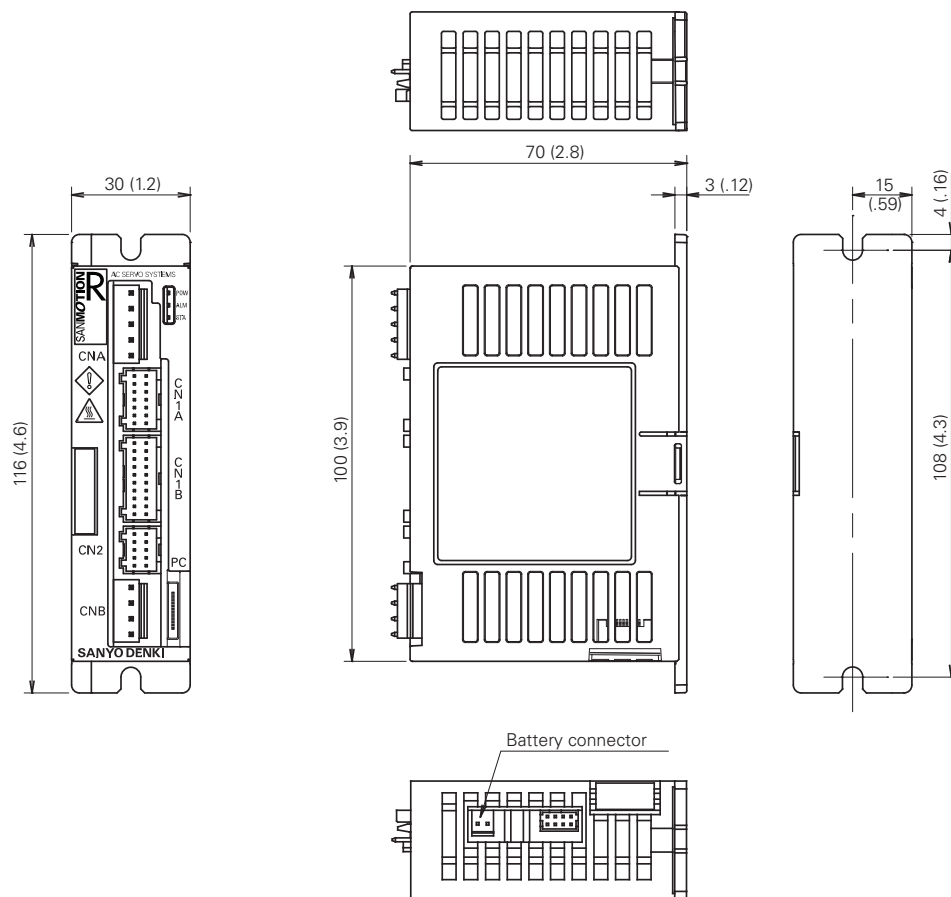
External power sources must be supplied by user.

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 $\pm 10\%$	24 VDC $\pm 10\%$
Control circuit power	24 VDC $\pm 10\%$	
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 ² Frequency range 10 to 55 Hz tested for 2 hours in each direction X.Y.Z
Structure	Shock	20 m/s ²
	Built-in tray type power supply	

Performance

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

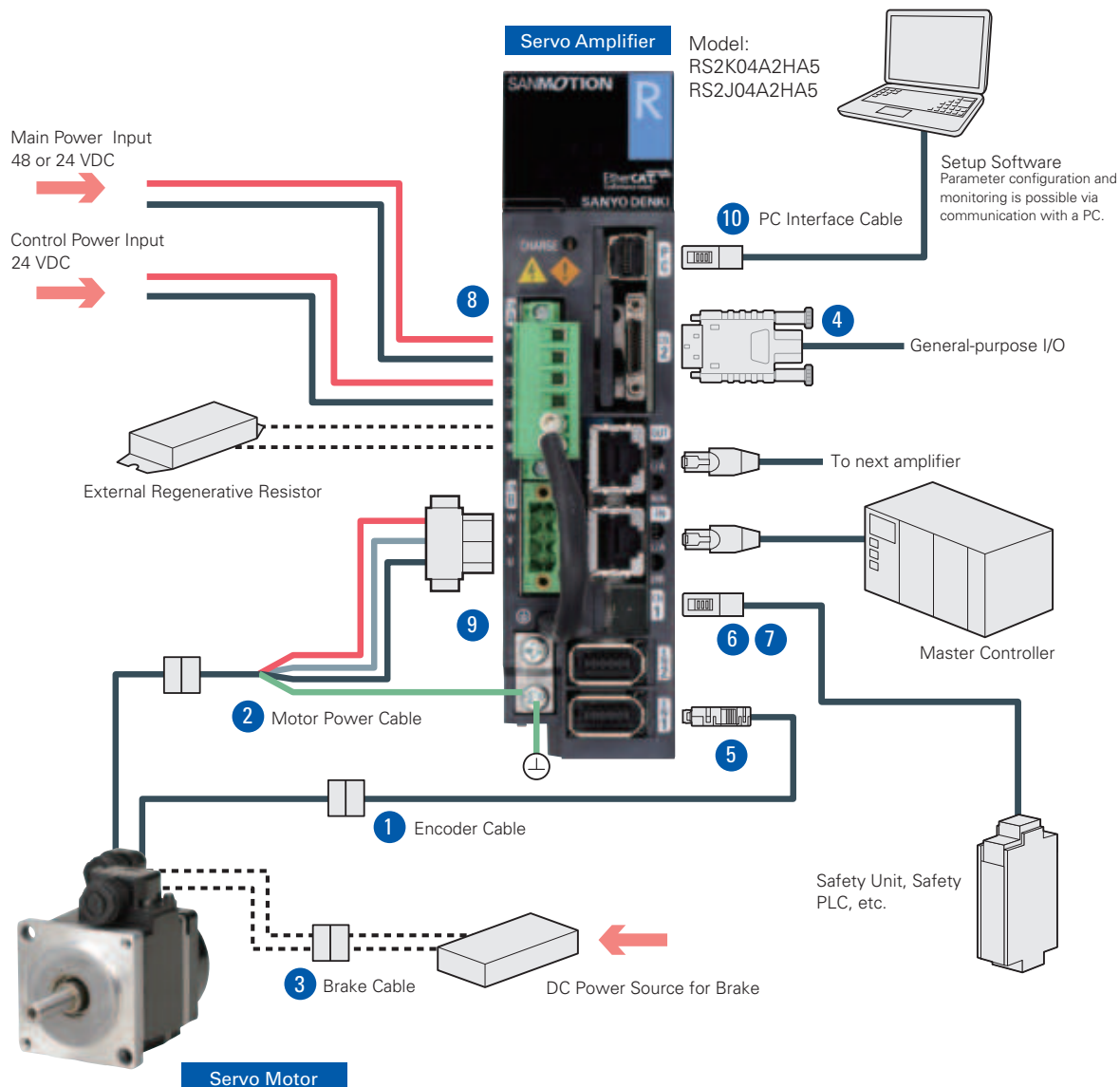
Built-in Functions

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 $\pm 10\%$ (at 1000 min ⁻¹)
	Torque monitor (TCMON) 2.0V $\pm 10\%$ (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)
	• 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)
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)

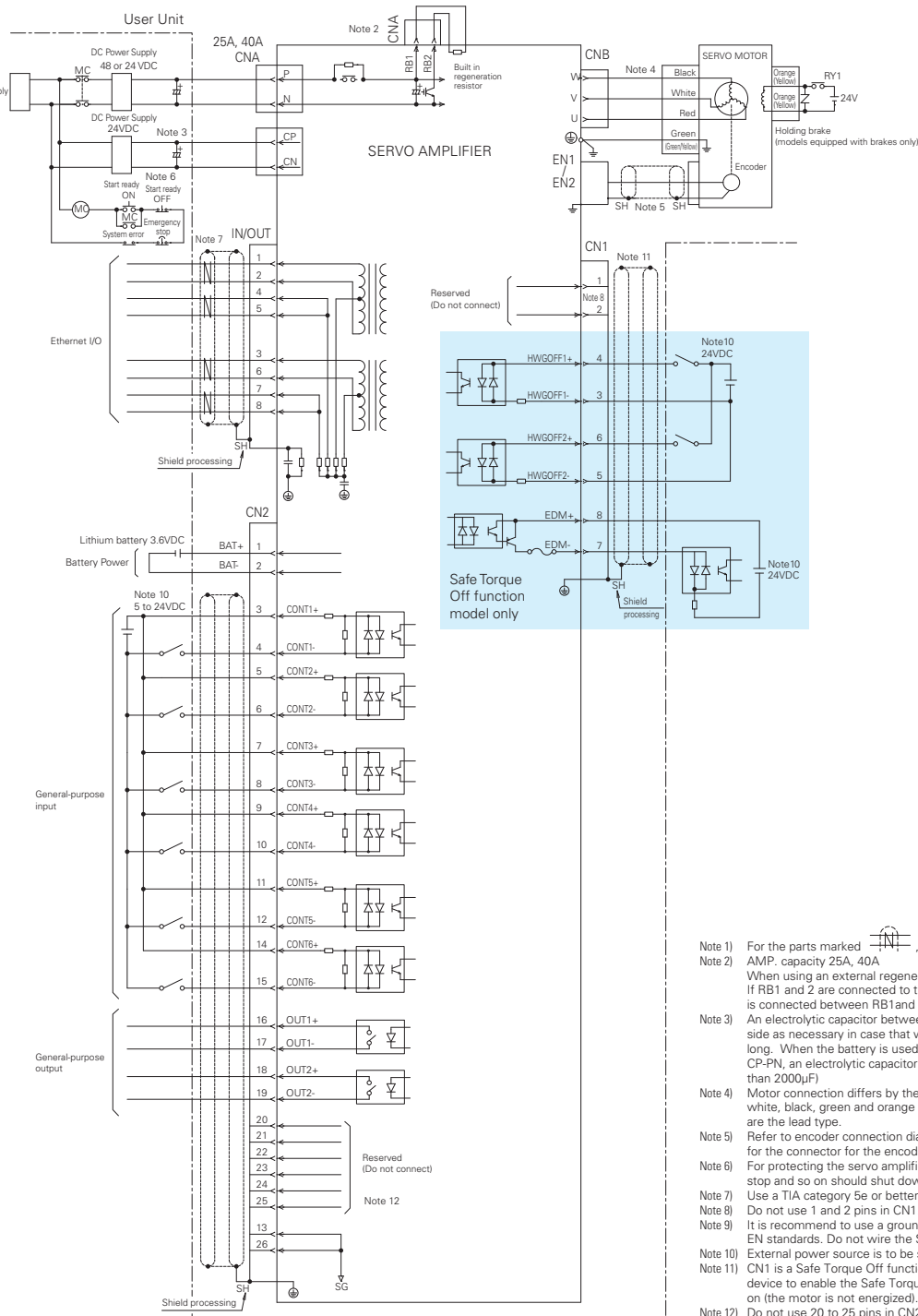
System Configuration



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



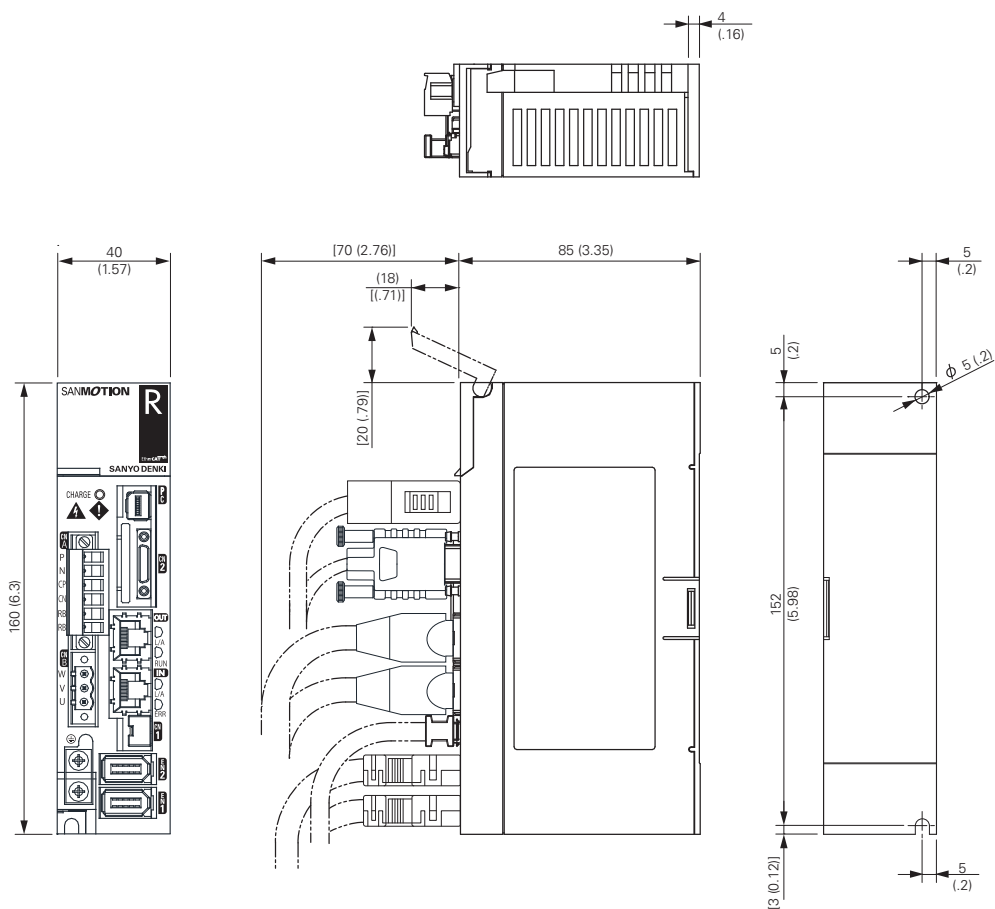
Dimensions

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)		
Ambient temperature	0 to +55°C		
Storage temperature	-20 to +65°C		
Environment Operation/Storage humidity	Below 90% RH (no condensation)		
Elevation	1000 m or lower		
Vibration	4.9 m/s ² freq. range 10 to 55 Hz in X, Y, and Z direction each, within 2 hours		
Shock	19.6 m/s ²		
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

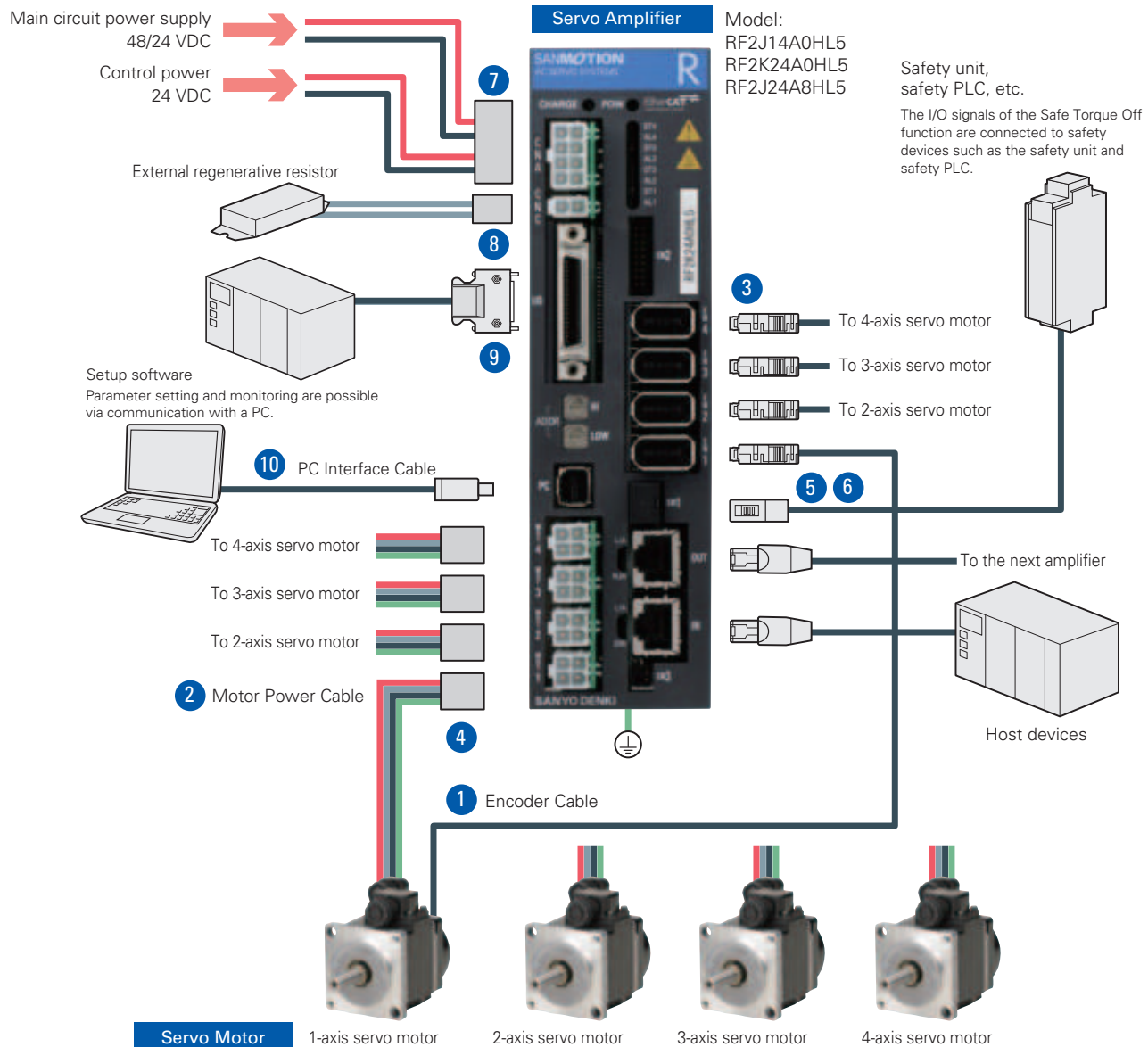
Built-in Functions

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)

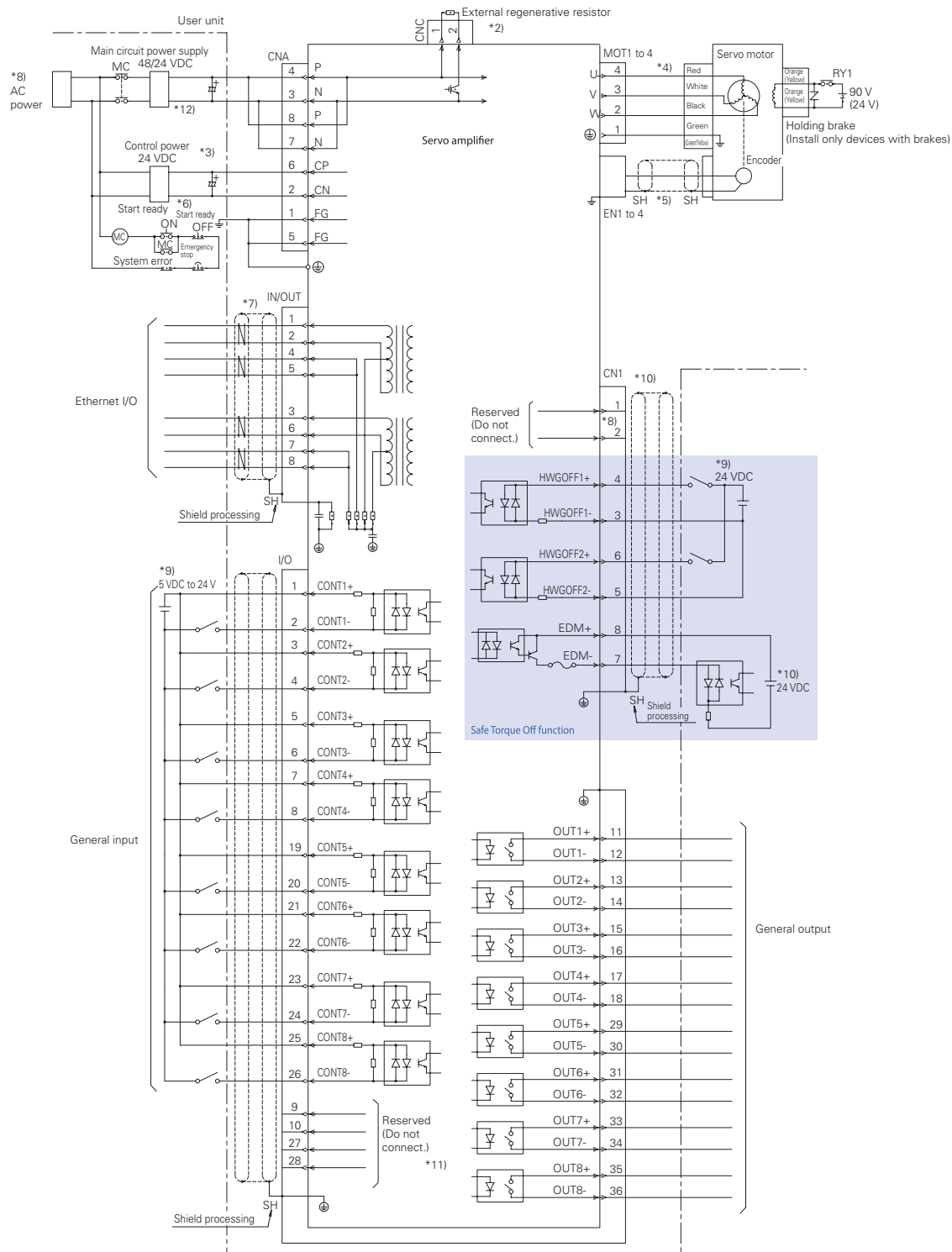
System Configuration



Item	Parts Number		Description
✓ 1	Encoder Cable: 10 ft	EEXTKABS2410FT	
		1026-107008	For 1027-107013 and 1027-107014 motor
		1026-107024	For 1028-107023 motor
✓ 2	Motor Power Cable: 10 ft	1026-107009	
		1026-107025	For 1028-107023 motor
3	Connector [EN1 to 4]	AL-00632607	No need if Encoder Cable (1) is selected
4	Connector [MOT1 to 4]	AL-00922660	No need if Motor Cable (2) is selected
5	Connector [CN1]	AL-00718252-01	For STO, no need if safety device is not installed
6	Connector [CN1]	AL-00849548-02	For STO cancellation, supplied with Amplifier.
✓ 7	Connector [CNA]	AL-00922656	For amplifier power supply
8	Connector [CNC]	AL-00922658	For regenerative resistor connection
9	Connector [I/O]	AL-00922662	For general I/O signal
10	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



*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 μ F 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.

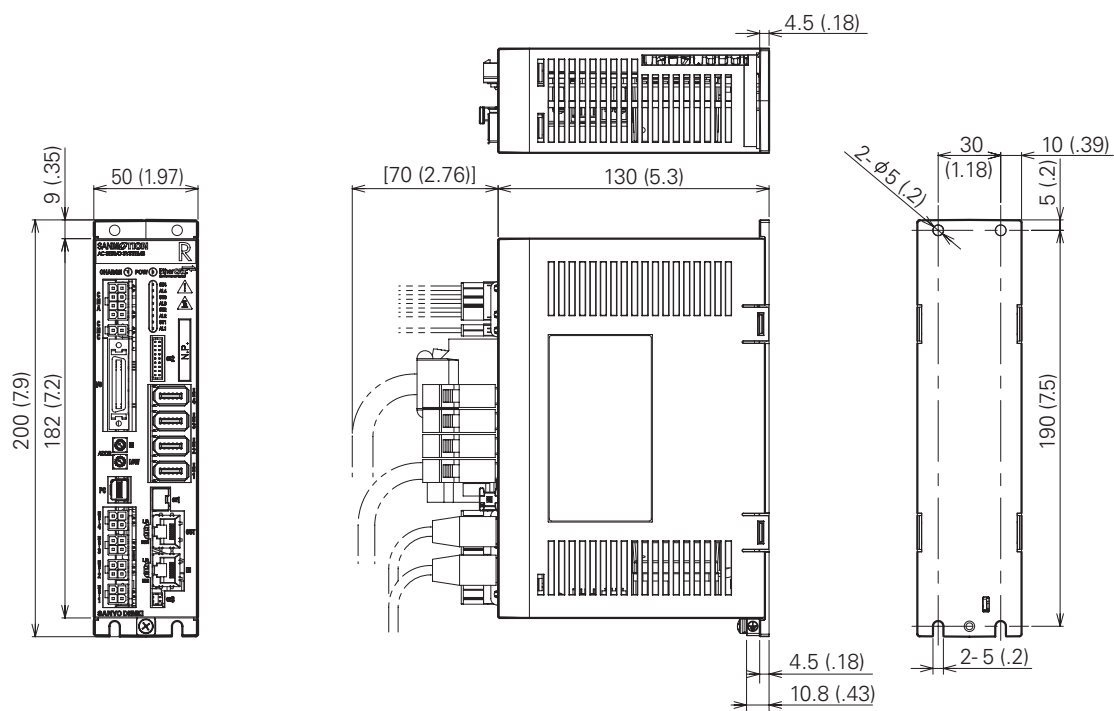
Dimensions

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

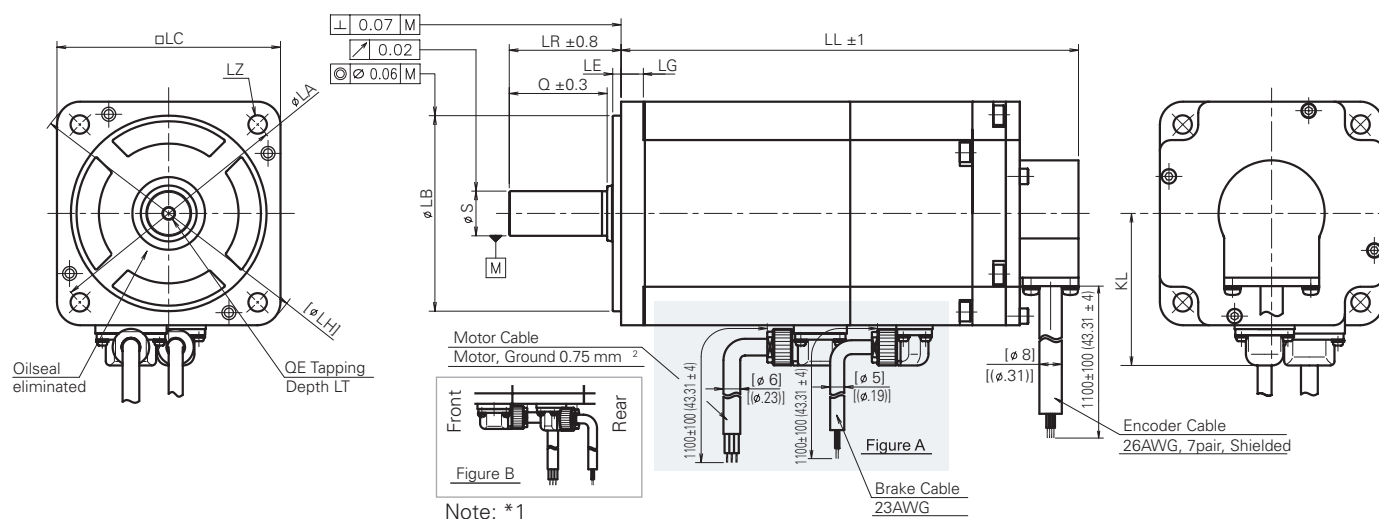
Brake Equipped Motors

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
Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	24 ±10%	24 ±10%
Input Current	Amp	0.27	0.27	0.27	0.27	0.27
Minimum Static Friction	N • m	0.32	0.32	0.32	0.32	0.32
Torque	lb • in	2.8	2.8	2.8	2.8	2.8
Inertia	$\times 10^{-4}$ kg • m ²	0.0078	0.0078	0.0078	0.0078	0.0078
	lb • in ²	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
Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	24 ±10%	24 ±10%
Input Current	Amp	0.27	0.27	0.32	0.32	0.32
Minimum Static Friction	N • m	0.36	0.36	1.37	1.37	1.37
Torque	lb • in	3.2	0.32	12.1	12.1	12.1
Inertia	$\times 10^{-4}$ kg • m ²	0.06	0.06	0.06	0.06	0.06
	lb • in ²	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
Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	24 ±10%
Input Current	Amp	0.37	0.3	0.66	1.2
Minimum Static Friction	N • m	2.55	3.92	12	42
Torque	lb • in	22.6	34.7	106	372
Inertia	$\times 10^{-4}$ kg • m ²	0.25	0.343	0.5	5.1
	lb • in ²	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)

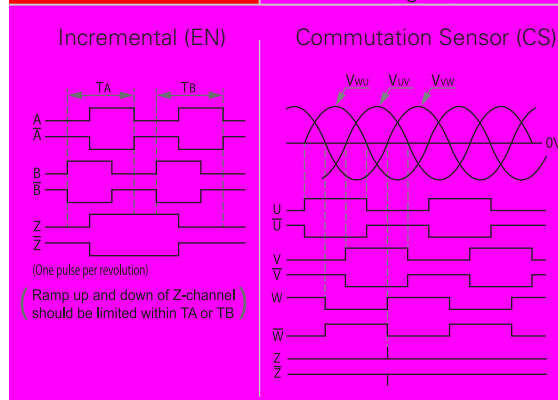
P/N	LL	LG	KL	LA	LB	LE
R2AA04005FXK30M ^{*1}	68.5 (2.70)	5	34.4 (1.35)	46	30 ⁰ _{-0.021}	2.5
R2AA04005FCK30M ^{*1}	104.5 (4.11)		35.3 (1.39)			
R2AA04010FXK00M	84 (3.31)	(2)	34.4 (1.35)	(1.81)	(1.18 ⁰ _{-0.0084})	(1)
R2AA04010FCK00M	120 (4.72)		35.3 (1.39)			
R2AA06010FXK30M ^{*1}	78.2 (3.08)	6	44.6	70	50 ⁰ _{-0.025}	3
R2AA06010FCK30M ^{*1}	106.2 (4.18)					
R2AA06020FXK00M	89.2 (3.51)					
R2AA06020FCK00M	117.2 (4.61)					
R2AA06040FXK00M	115.2 (4.54)	(24)	(1.76)	(2.76)	(1.97 ⁰ _{-0.001})	(1.12)
R2AA06040FCK00M	143.2 (5.64)					
R2AA08075FXK00M	128.3 (5.05)	8	54.4	90	70 ⁰ _{-0.030}	(1.38)
R2AA08075FCK00M	163.7 (6.44)					

P/N	LH	LC	LZ	LR	S	Q	QE	LT
R2AA04005FXK30M ^{*1}	56	40	2-φ4.5	25	8 ⁰ _{-0.009}	20	N/A	N/A
R2AA04005FCK30M ^{*1}								
R2AA04010FXK00M	(2.20)	(1.57)	(2-φ.18)	(1.98)	(0.31 ⁰ _{-0.004})	(0.79)	M5	12
R2AA04010FCK00M								
R2AA06010FXK30M ^{*1}	82	60	4-φ5.5	30	14 ⁰ _{-0.011}	25	M5	(0.47)
R2AA06010FCK30M ^{*1}								
R2AA06020FXK00M								
R2AA06020FCK00M								
R2AA06040FXK00M	(3.23)	(2.36)	(4-φ.22)	(1.18)	(0.55 ⁰ _{-0.004})	(0.98)	M5	(0.47)
R2AA06040FCK00M								
R2AA08075FXK00M	108	80	4-φ6.6	40	16 ⁰ _{-0.011}	35	M5	(0.47)
R2AA08075FCK00M								

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.

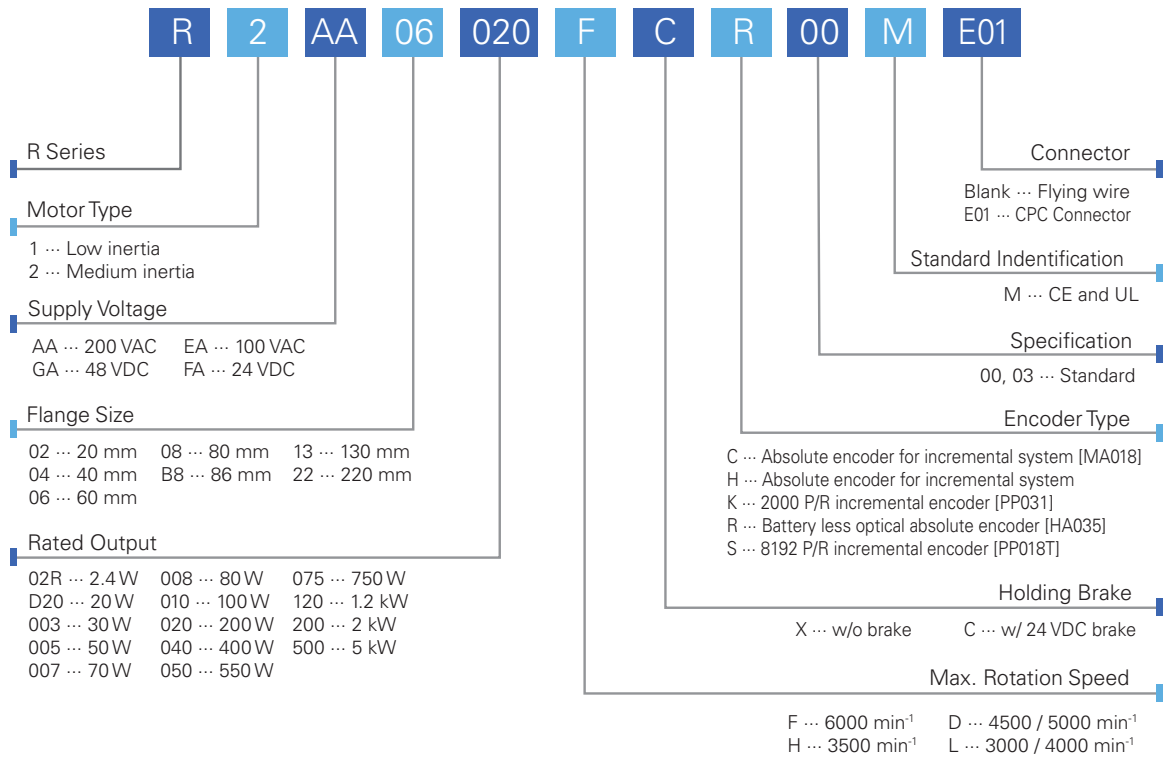
Encoder Specifications

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 ⁻¹
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 ⁻⁴ (kg·m ²)

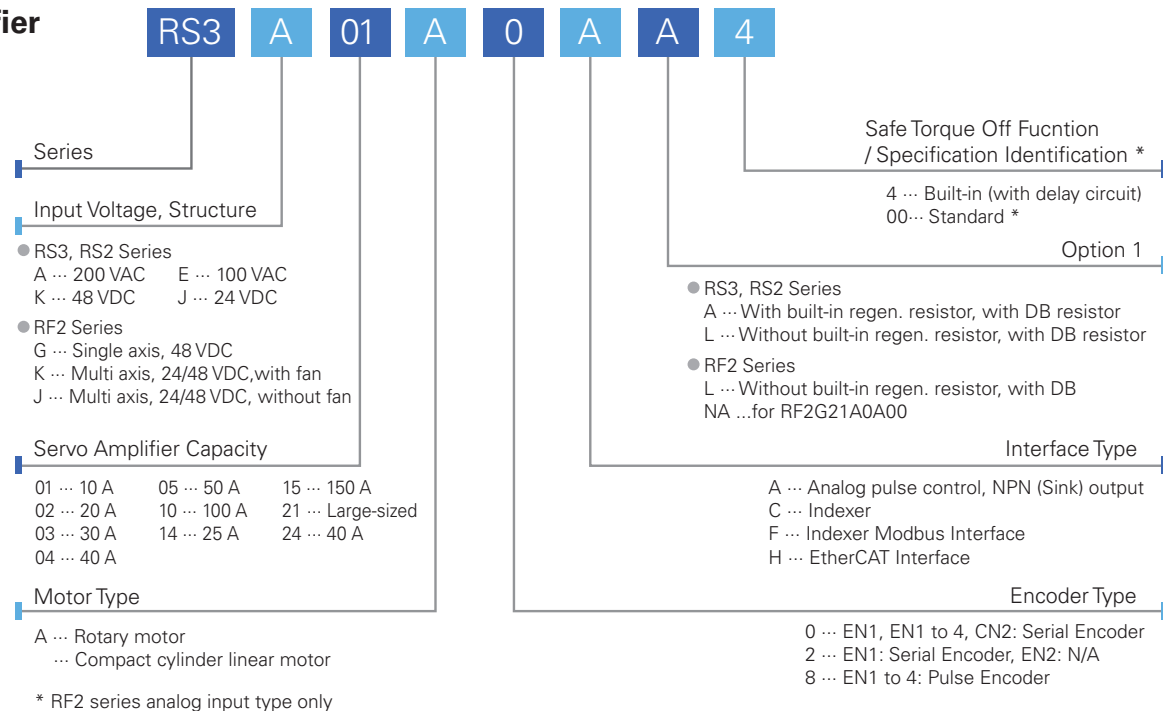


Model Numbering System

Motor



Amplifier



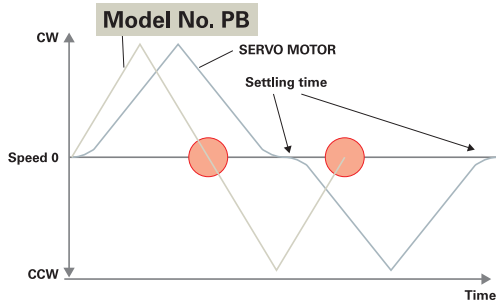
This image shows a full page of a handwriting practice worksheet. It consists of multiple rows of horizontal dashed lines spaced evenly apart, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text on the page.

SANMOTION Model No. PB

CLOSED LOOP STEPPING SYSTEMS

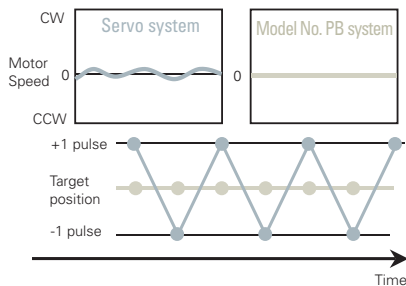
High Speed Positioning

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



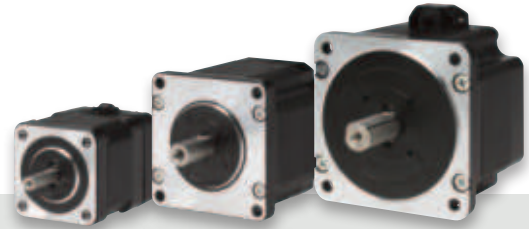
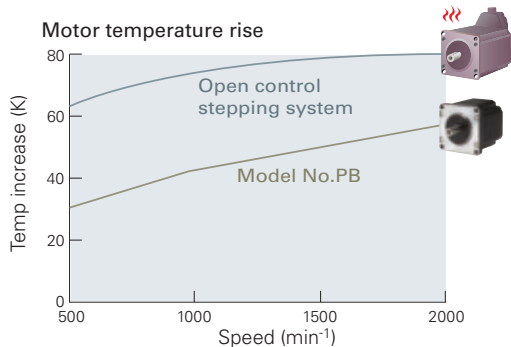
Zero Motor Hunting

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: ± 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		
	mm N•m	inch oz•in		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	
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								76
	102.3 4.03	1.9 269.1	PBM604FXE20								
	100.8 3.97	1.85 262	PBM604DXK50								
86 mm 3.39 inch	79.5 3.13	3.1 439	PBM861FXK30-M								77
	110 4.33	6.1 863.9	PBM862FXK30-M								78

Driver Command Type

	Driver Type	
	AC Input	DC Input
Indexer Model 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
Pulse Input Model Controlled by Pulse Stream Signal Motion is generated by responding to pulse input commands from a host device.	Type P	
EtherCAT Model 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

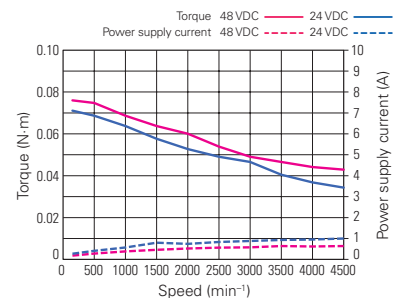
MOTOR FLANGE SIZE 28 mm (1.10 inch) **MOTOR LENGTH** 59.2 mm (2.33 inch)

■ 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	x10 ⁻⁴ kg·m ²	0.01
	oz·in ²	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

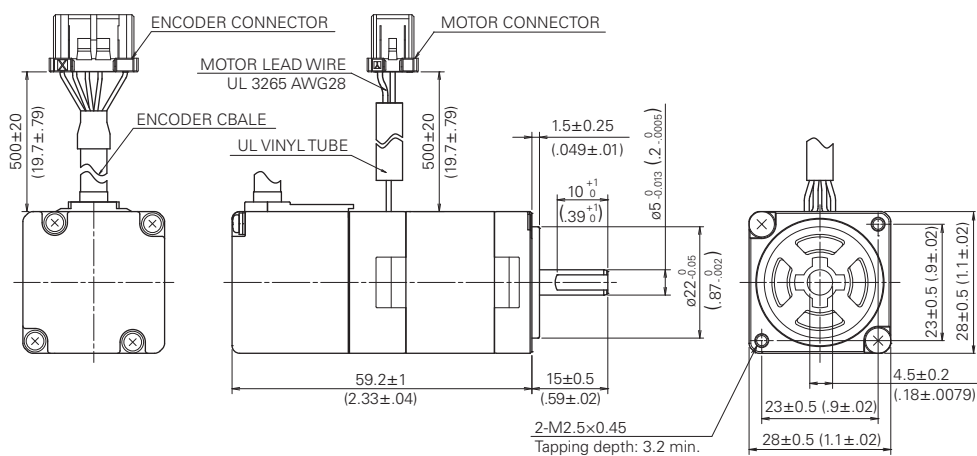
■ Torque Curve

● **PBM281DXE50**



■ Dimension

Unit: mm (inch)



■ Compatible Driver

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

CLOSED LOOP STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

28 mm (1.10 inch)

**MOTOR
LENGTH**

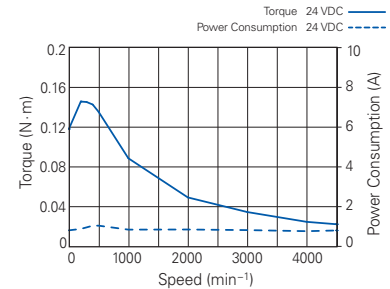
117.1 mm (4.61 inch)

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 ²	0.016
	oz·in ²	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	

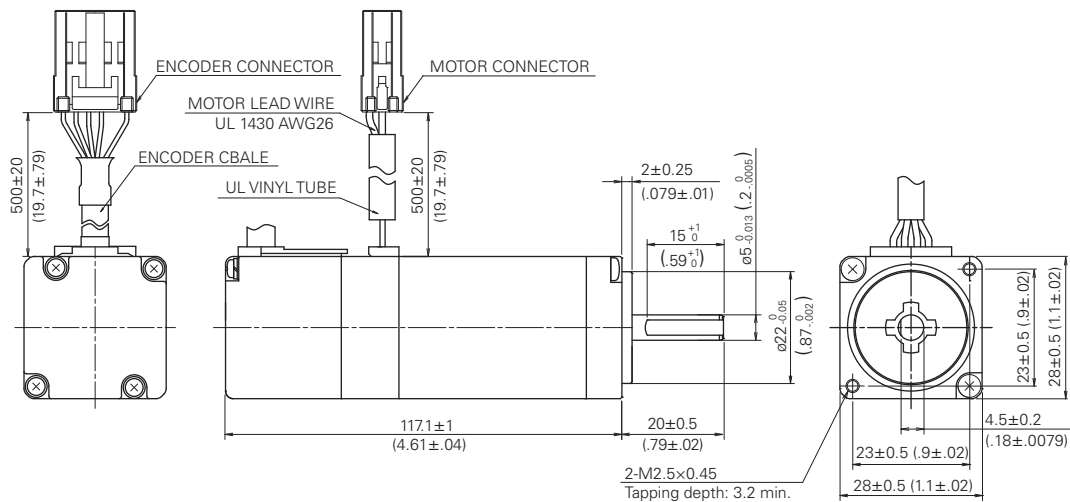
Torque Curve

● PBM284FXE20



Dimension

Unit: mm (inch)



Compatible Driver

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

**MOTOR
FLANGE SIZE**

28 mm (1.10 inch)

**MOTOR
LENGTH**

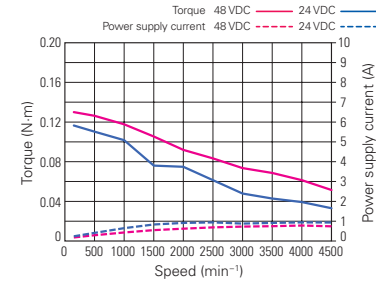
78.5 mm (3.09 inch)

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 ²	0.022
	oz·in ²	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	

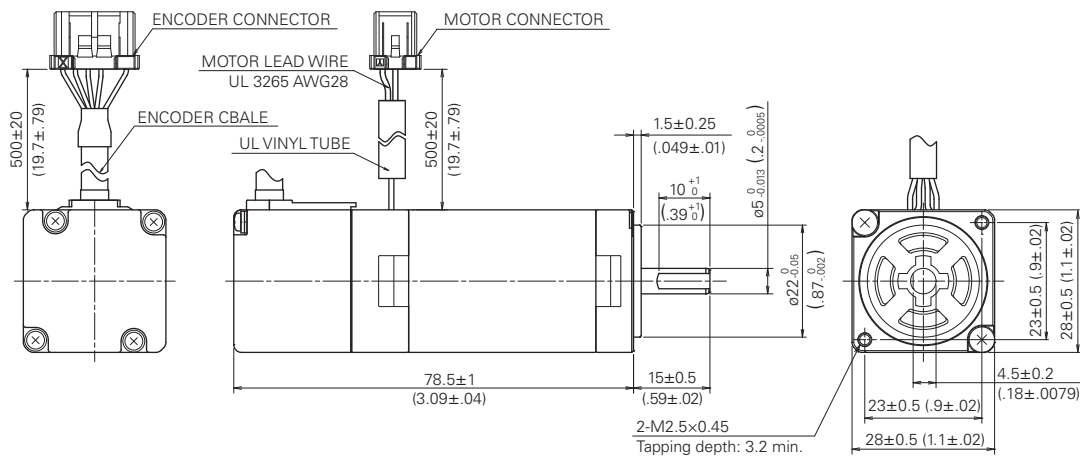
Torque Curve

● PBM285DXE50



Dimension

Unit: mm (inch)



Compatible Driver

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

CLOSED LOOP STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

42 mm (1.65 inch)

**MOTOR
LENGTH**

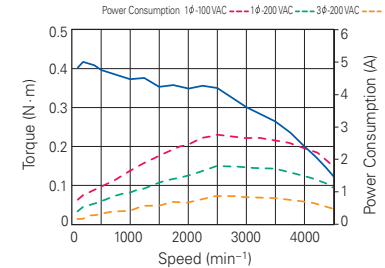
55.9/57.6 mm (2.2/2.27 inch)

Specifications

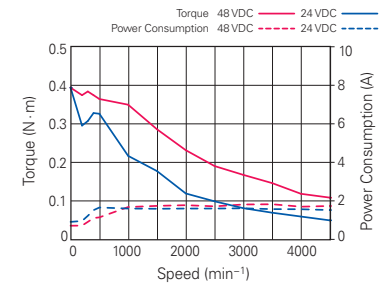
Power Supply		100/200 VAC	24/48 VDC	24/48 VDC
Model		PBM423FXK30-M	PBM423FXE20	PBM423DXK50
Driver Type		Type R, Type P	Type M	Type E Multi-axis
Maximum Stall Torque	N·m	0.35	0.39	0.39
	oz·in	49.6	55.2	55.2
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m ²	0.056	0.056	0.056
	oz·in ²	0.31	0.31	0.31
Incremental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

Torque Curve

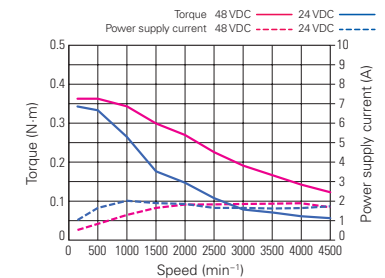
● PBM423FXK30-M



● PBM423FXE20



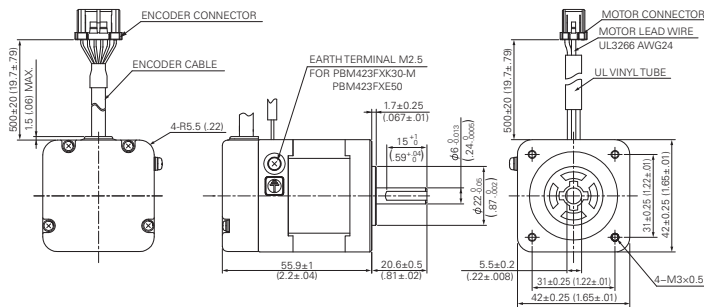
● PBM423DXK50



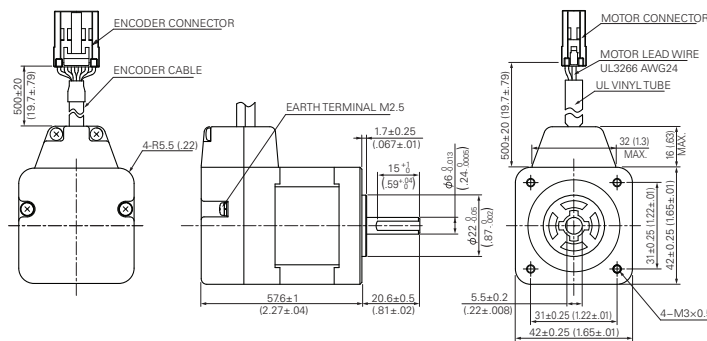
Dimension

Unit: mm (inch)

PBM423FXK30-M PBM423DXK50



PBM423FXE20



Compatible Driver

Power Supply	Motor	Indexer	Driver	
200 VAC	PBM423FXK30-M	PB4A002R301	PB4A002P301	EtherCAT
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)

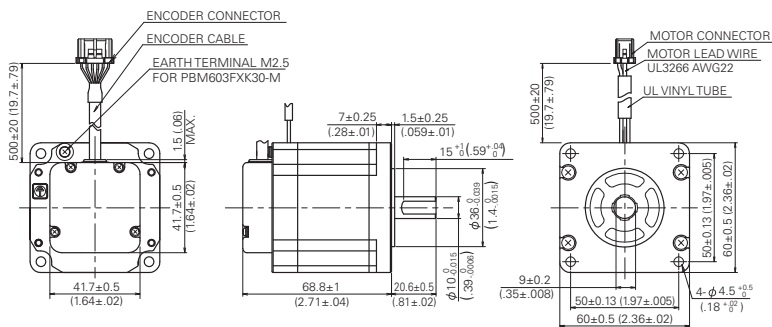
Specifications

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	$\times 10^{-4} \text{ kg} \cdot \text{m}^2$	0.4	0.4	0.4
	oz·in ²	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		

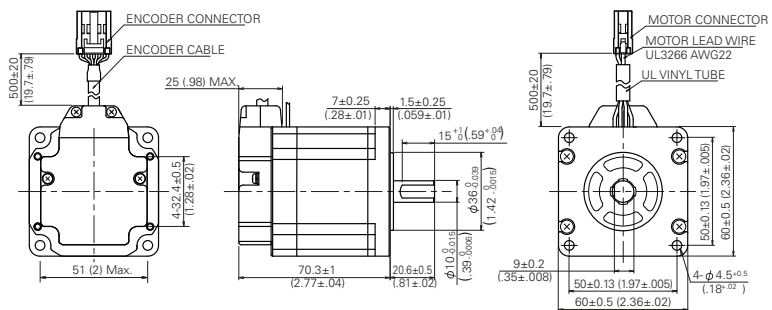
Dimension

Unit: mm (inch)

PBM603FXK30-M PBM603DXK50



PBM603FXE20

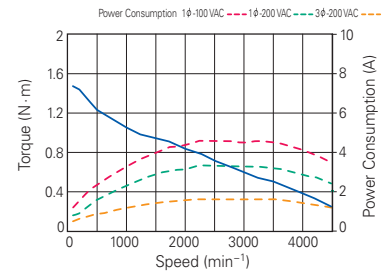


Compatible Driver

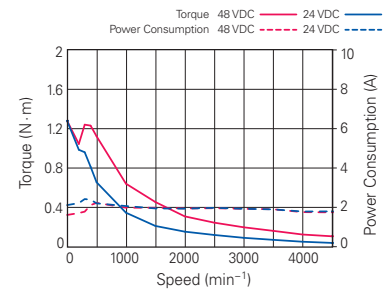
Power Supply	Motor	Indexer	Driver Pulse Input	EtherCAT
200 VAC	PBM603FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM603FXE20	PB3D003M200		
	PBM603DXK50			PB4D003E440

Torque Curve

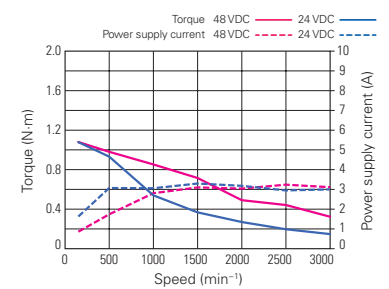
● PBM603FXK30-M



● PBM603FXE20



● PBM603DXK50



CLOSED LOOP STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

60 mm (2.36 inch)

**MOTOR
LENGTH**

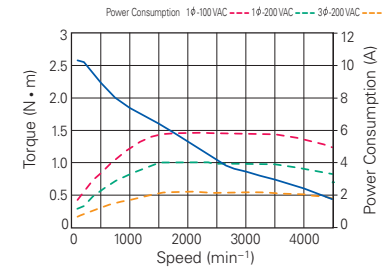
100.8/102.3 mm (3.97/4.03 inch)

Specifications

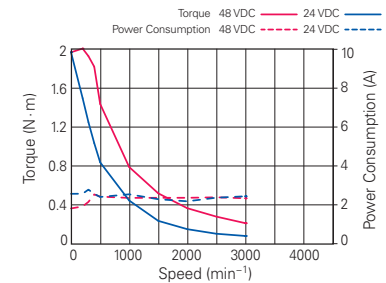
Power Supply		100/200 VAC	24/48 VDC	24/48 VDC
Model		PBM604FXK30-M	PBM604FXE20	PBM604DXK50
Driver Type		Type R, Type P	Type M	Type E Multi-axis
Maximum Stall Torque	N·m	1.9	1.9	1.85
	oz·in	269.1	269.1	262
Rotor Moment of Inertia	$\times 10^{-4}$ kg·m ²	0.84	0.84	0.84
	oz·in ²	4.6	4.6	4.6
Incremental 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

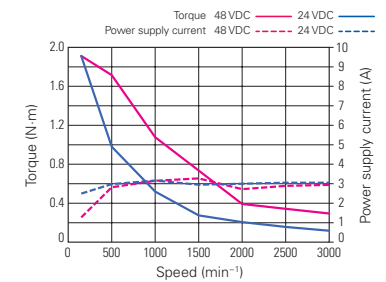
● PBM604FXK30-M



● PBM604FXE20



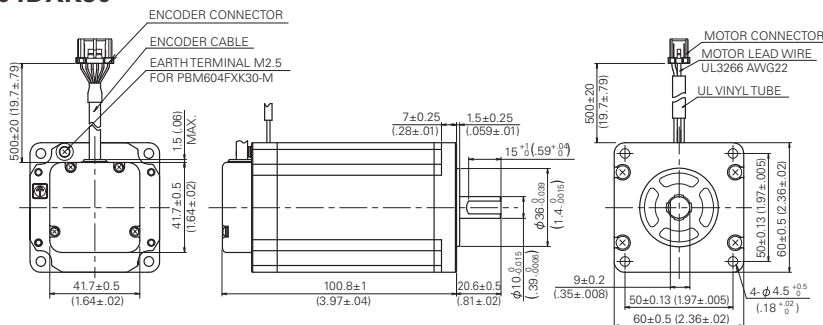
● PBM604DXK50



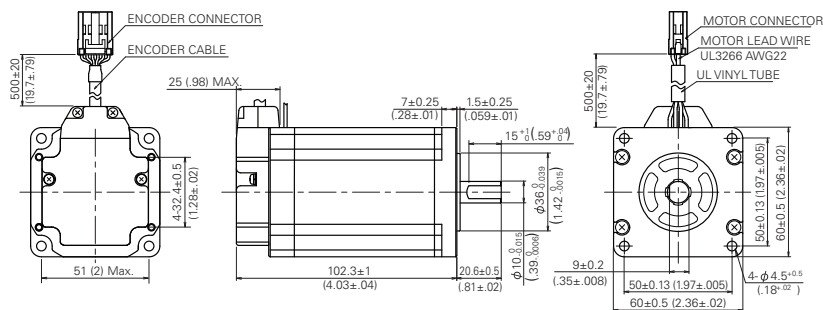
Dimension

Unit: mm (inch)

PBM604FXK30-M PBM604DXK50



PBM604FXE20

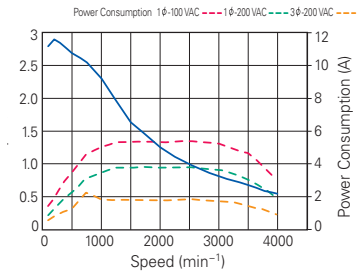


Compatible Driver

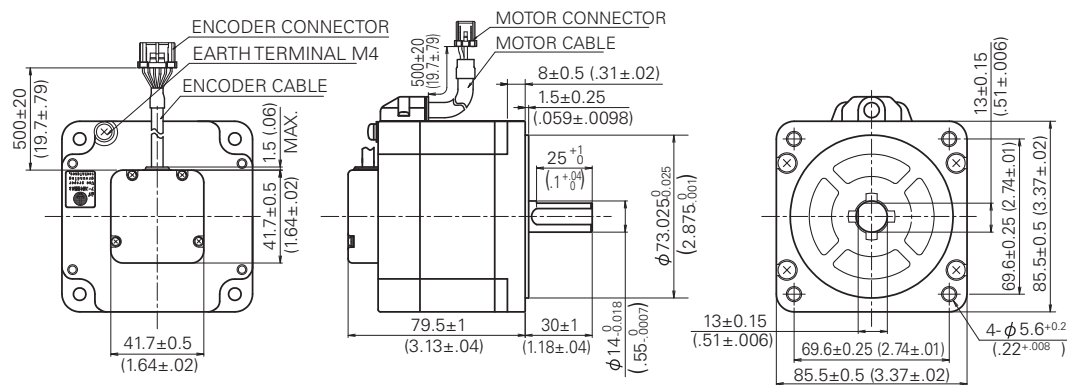
Power Supply	Motor	Indexer	Driver Pulse Input	EtherCAT
200 VAC	PBM604FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM604FXE20	PB3D003M200		
	PBM604DXK50			PB4D003E440

**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 ²	1.48
	oz·in ²	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	Indexer	Driver 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**

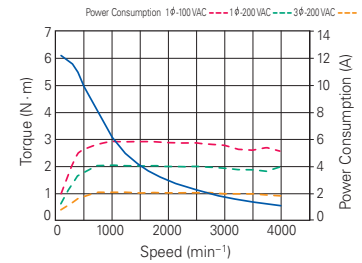
110 mm (4.33 inch)

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 ²	3
	oz·in ²	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	

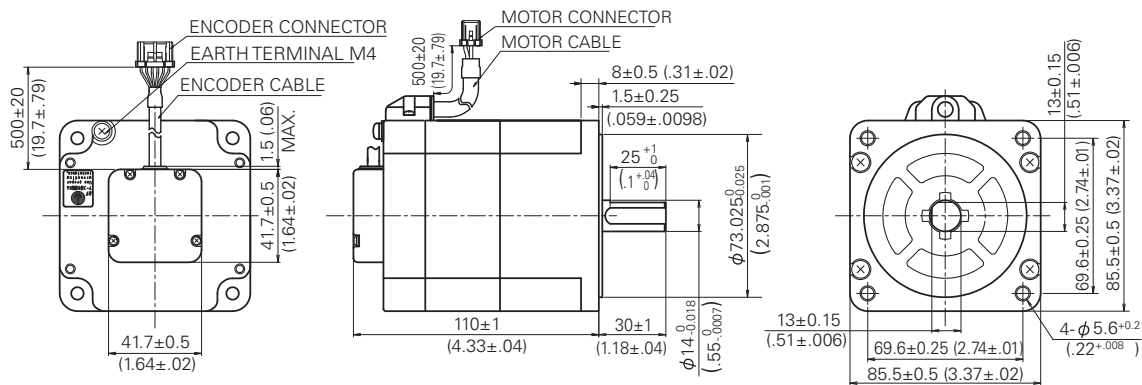
Torque Curve

● PBM862FXK30-M



Dimension

Unit: mm (inch)



Compatible Driver

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

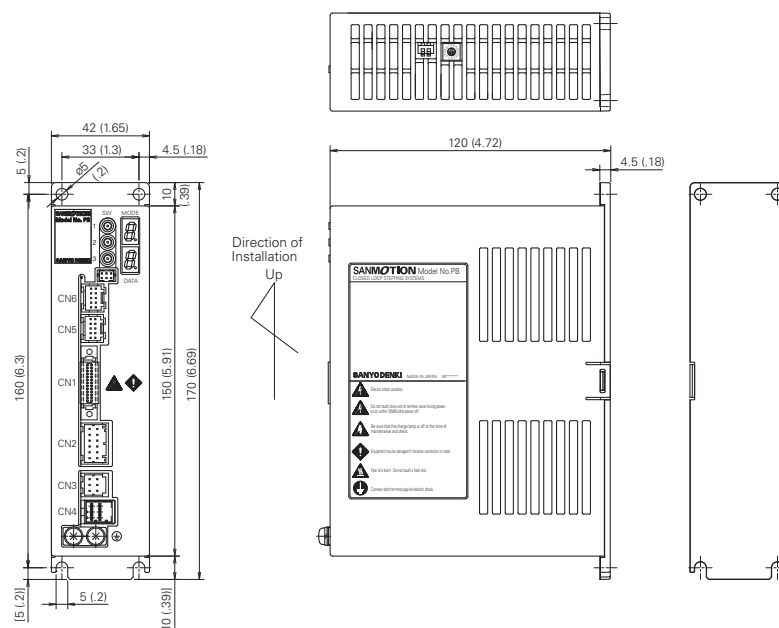
AC Input Driver Indexer Model Type R



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
	Temp.	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 ⁻¹ (86 mm: 0 to 4000 min ⁻¹)	
	Resolution (P/R)	Electronic Gear 100 to 16000	
	Regeneration Process	Internal (software processing)	
	Holding Brake Control Function	Internal	
Input/Output Signals	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)	
Input/Output Signals	Communication Specifications (PCIF)	RS-485 Start-Stop Synchronization, Half Duplex Communication, Trans. Speed: 9600, 38400, 115200, 307200bps	
	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.	

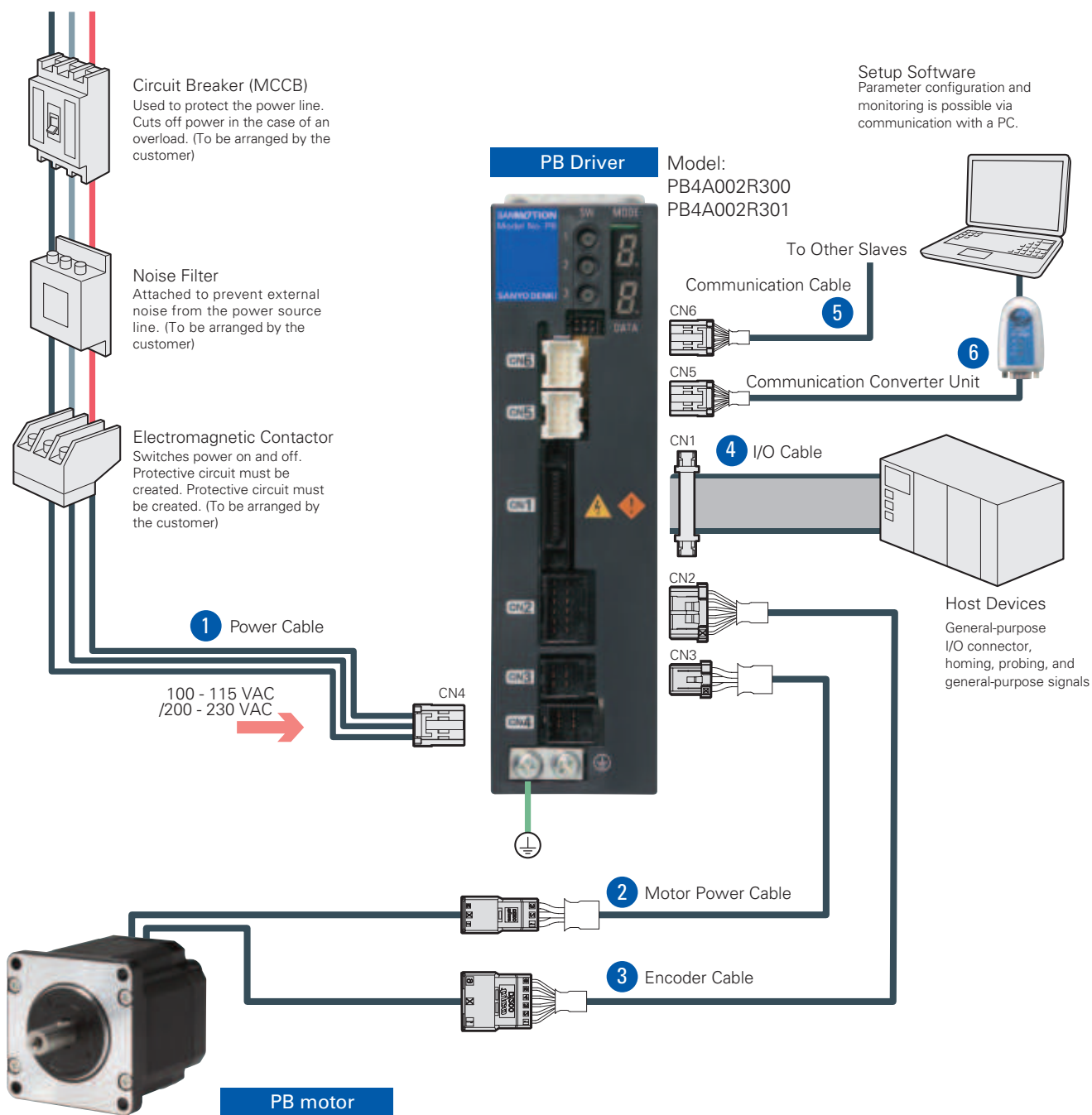
Dimension

Unit: mm (inch)



CLOSED LOOP STEPPING SYSTEMS

System Configuration

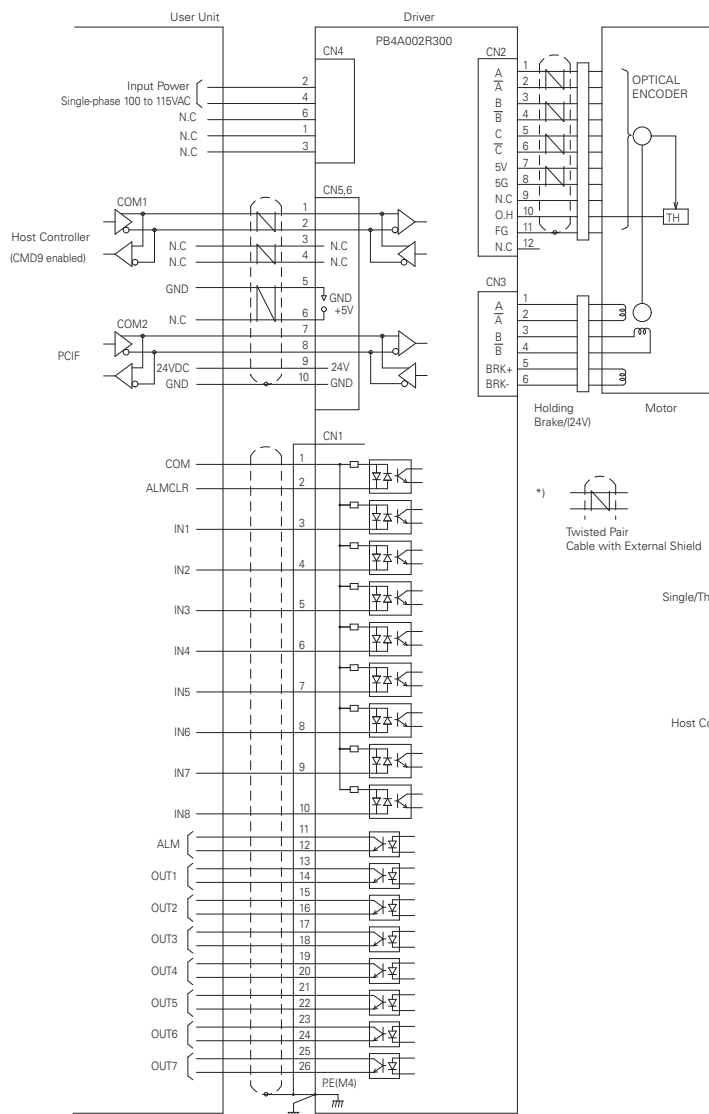


Item	Parts Number		Description
✓ 1	Power Cable: 1 m	PBC8P0010A	
2	Motor Power Cable: 3 m	PBC7M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC7E0030A	Extension Cable
4	I/O Cable (unshielded): 1 m	PBC5S0010A	26 pin, Unshielded Cable
5	Communication Cable: 0.3 m	PBC6C0003A	Both side same connector, for daisy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

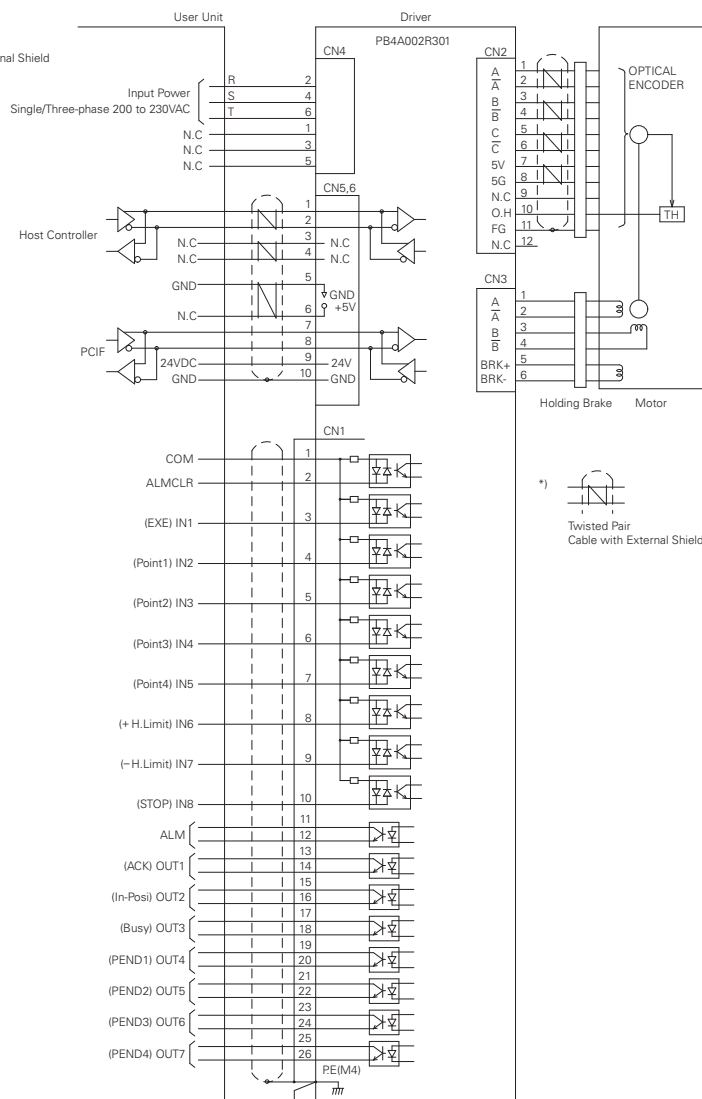
All items marked with a check must be included to build a complete system.

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

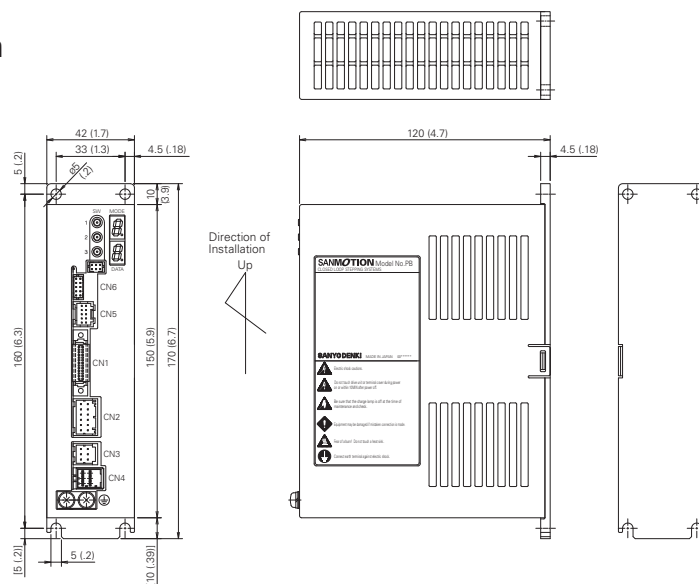


Driver Model	PB4A002P300	PB4A002P301
Power Supply	Single phase AC100V to 115V -15% +10% 50/60Hz	Single phase / 3-phase AC200V to 230V -15% +10% 50/60Hz
Ambient temp.	0 to 55°C	
Operating temp.	-20 to 65°C	
Storage		
Operating/Storage Humidity	90% RH (non-condensing)	
Vibration Resistance	0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2h)	
Structure	Tray Structure, Rear Mounting Type	
Mass	Approx. 0.65kg	
Dimensions	W42xH150xD120 mm	
Rotation Speed	0 to 4500 min ⁻¹ (86 mm: 0 to 4000 min ⁻¹)	
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 Functions	Pulse Input, STOP, ALMCLR	
Input Signals	General-purpose Input x2 (Deviation CLR, HOME, Push, Brake Control, Counter Reset)	
Electric	Pulse Input: Line receiver (1 or 2 input mode)	
General-purpose Input: Interactive Input Photo Coupler	DC5V to 24V	
Encoder Signal (A / B / C)	Encoder Signal (A / B / C)	
ALM, In-position	ALM, In-position	
General-purpose Output x2 (HOME END, Push END, ZONE, Input Monitor)	General-purpose Output x2 (HOME END, Push END, ZONE, Input Monitor)	
Encoder Signal Output: Line Amplifier	Encoder Signal Output: Line Amplifier 4000P/R	
*C-phase / phase origin signal outputs will not be emitted at velocities over 200 min ⁻¹ .		
General-purpose Output: Open collector	General-purpose Output: Open collector DC30V / 15mA Max.	

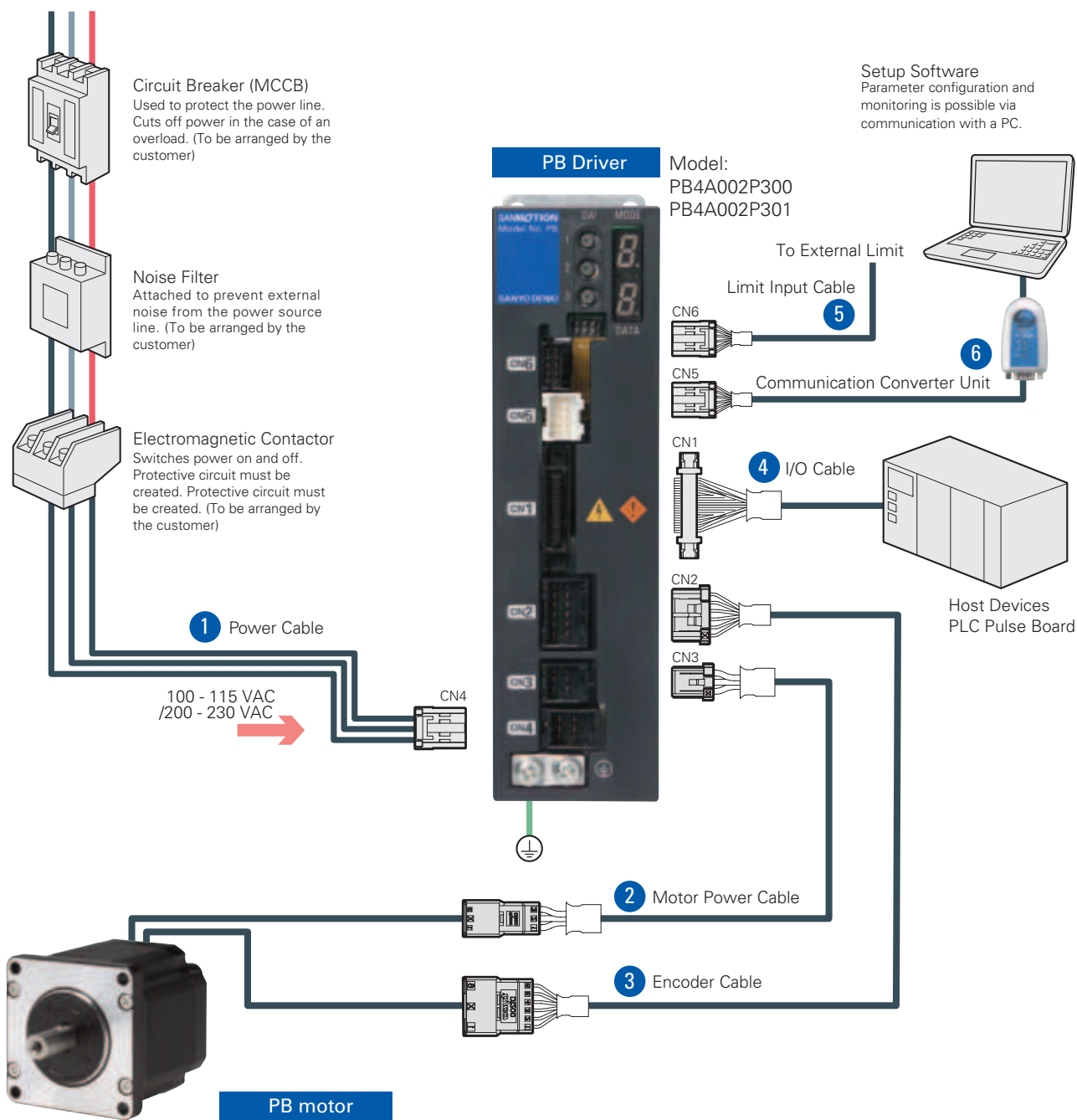
* A function that finely adjusts the unit step angle per pulse parameters. Setup software is required.

Dimension

Unit: mm (inch)



System Configuration



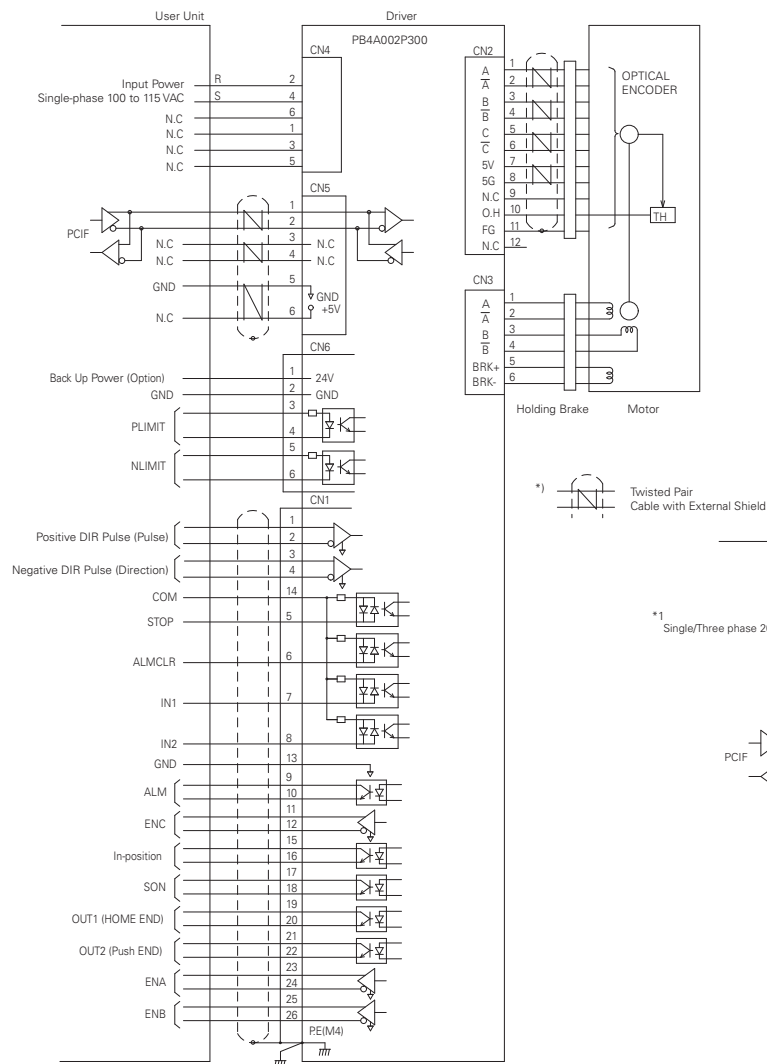
Item	Parts Number	Description
✓ 1	Power Cable: 1 m PBC8P0010A	
2	Motor Power Cable: 3 m PBC7M0030A	Extension Cable
3	Encoder Cable: 3 m PBC7E0030A	Extension Cable
4	I/O Cable: 1 m PBC5S0010C	26 pin, Shielded Cable
5	Limit Input Cable 1 m PBC7S0010A	
✓ 6	Communication Converter Unit PBFM-U6	USB/RS-485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

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

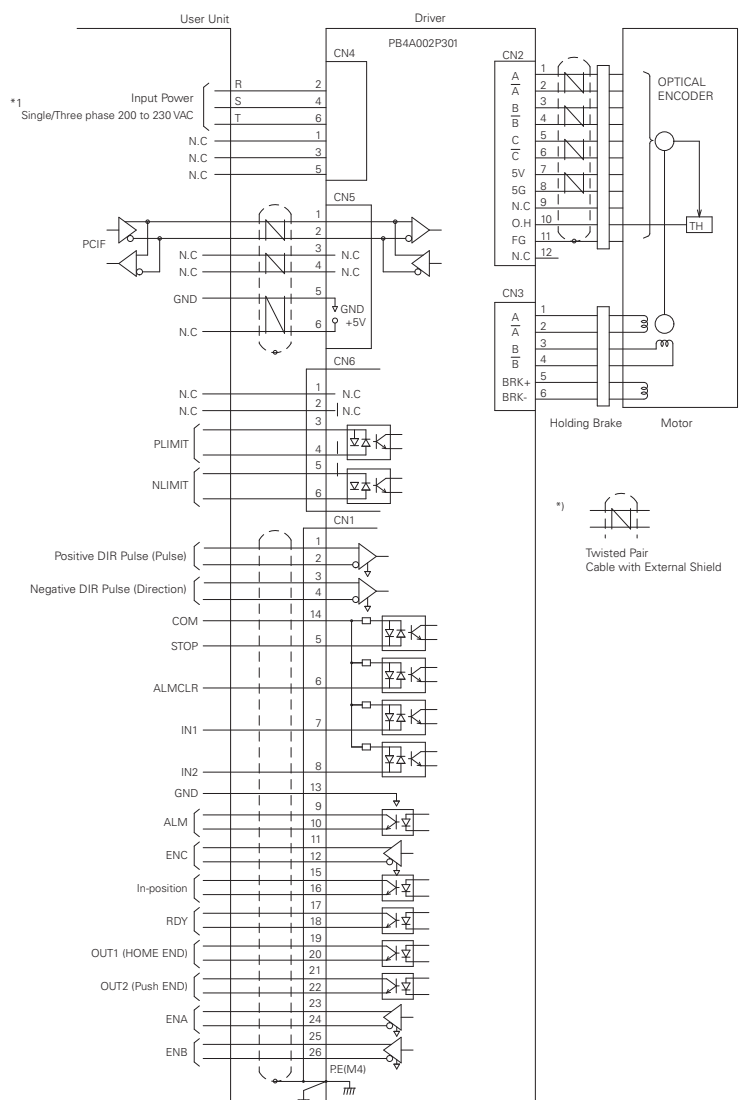
CLOSED LOOP STEPPING SYSTEMS

Wiring Diagram

100 to 115 VAC Input Driver Model: PB4A002P300



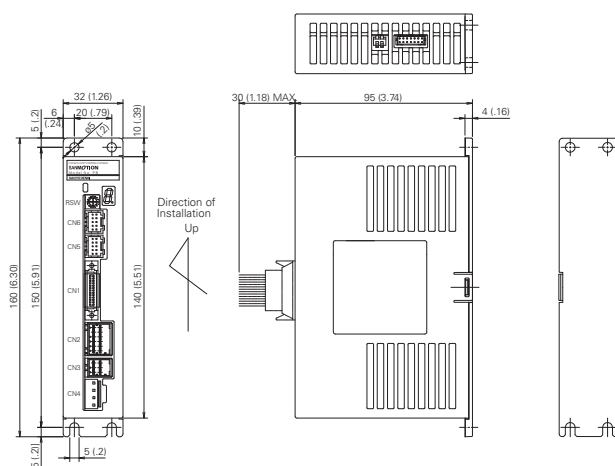
200 to 230 VAC Input Driver Model: PB4A002P301



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

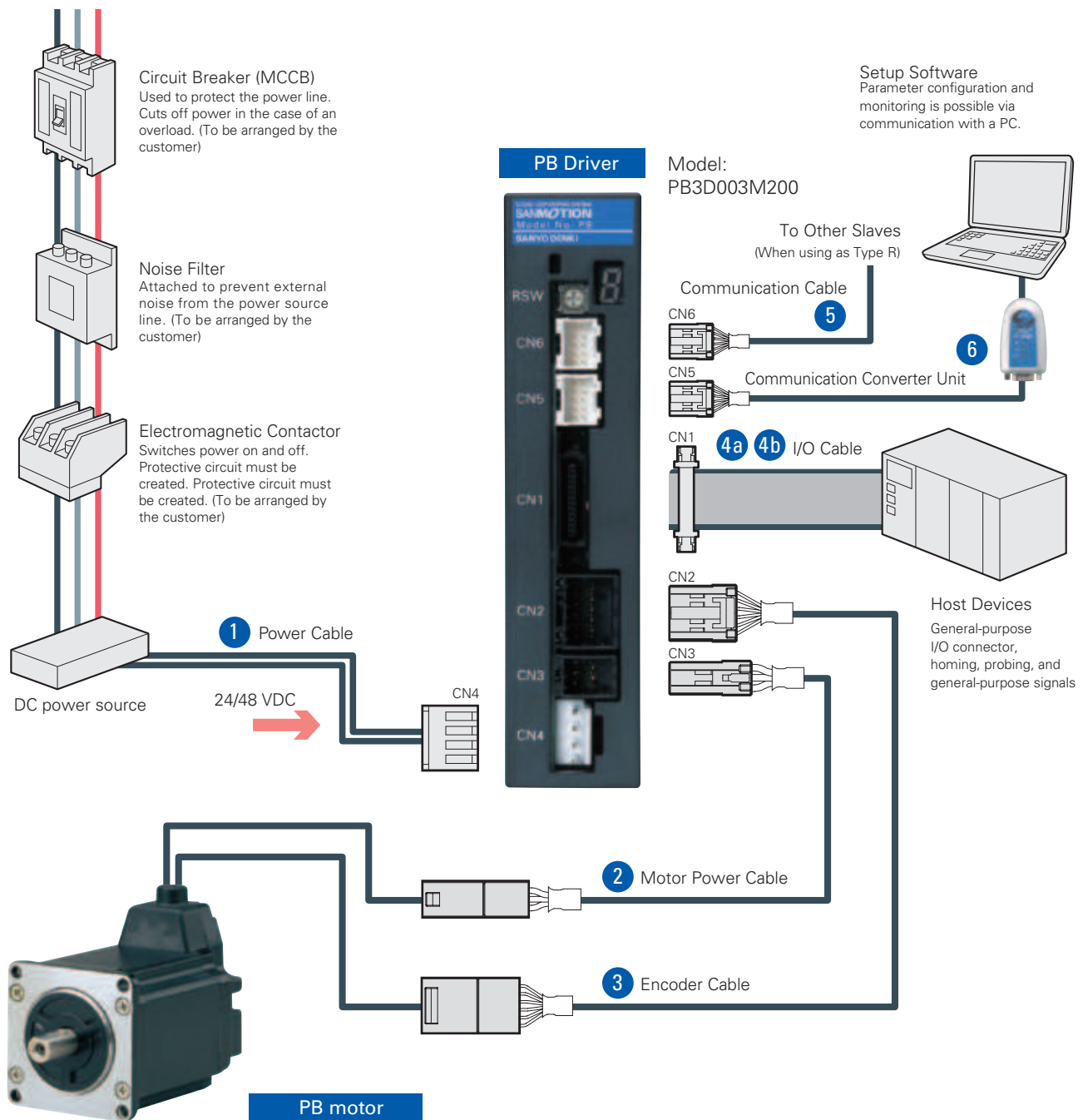
* A function that finely adjusts the unit step angle per pulse parameters. Setup software is required.

Unit: mm (inch)



CLOSED LOOP STEPPING SYSTEMS

System Configuration

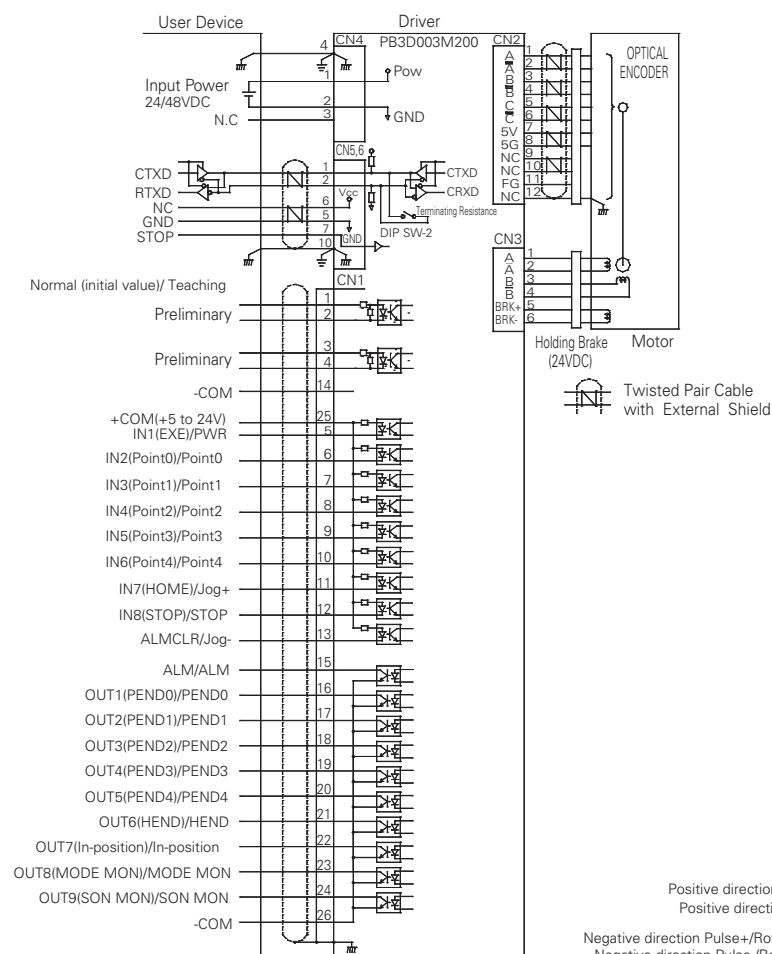


Item	Parts Number		Description
✓ 1	Power Cable: 1 m	PBC6P0010A	
2	Motor Power Cable: 3 m	PBC6M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC6E0030A	Extension Cable
4a	I/O Cable: 1 m	PBC5S0010A	26 pin, Unshielded Cable
4b	I/O Cable: 1 m	PBC5S0010C	26 pin, Shielded Cable
5	Communication Cable: 0.3 m	PBC6C0003A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

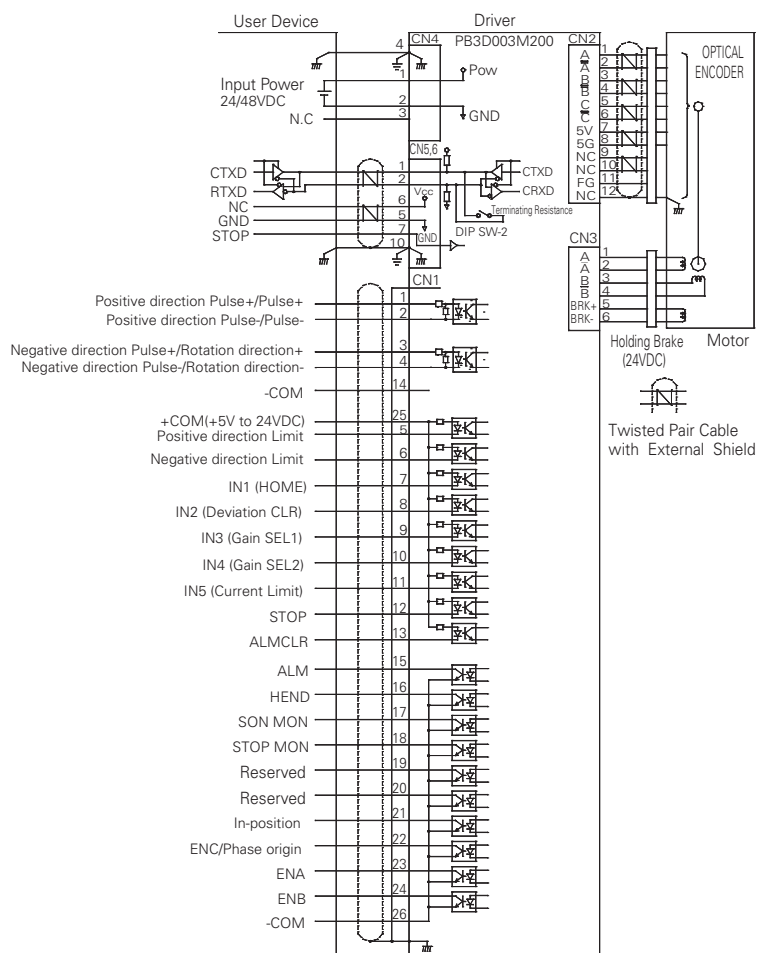
All items marked with a check must be included to build a complete system.

Wiring Diagram

Indexer DIP Switch SW1: ON



Pulse Input DIP Switch SW1: OFF



CLOSED LOOP STEPPING SYSTEMS

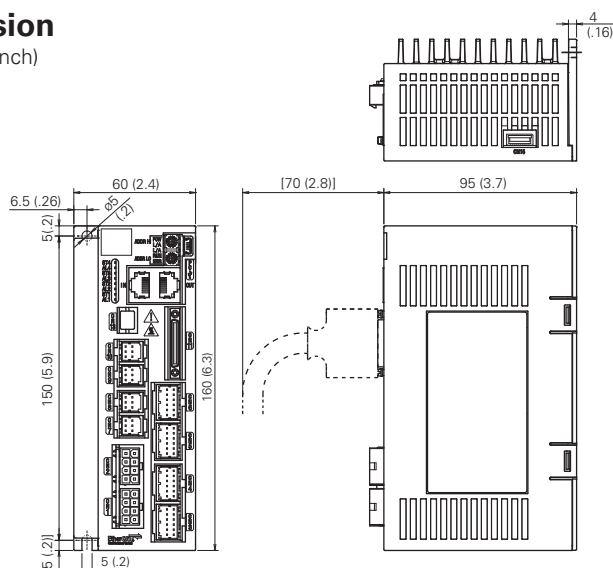
DC Input Driver EtherCAT Multi-Axis Model



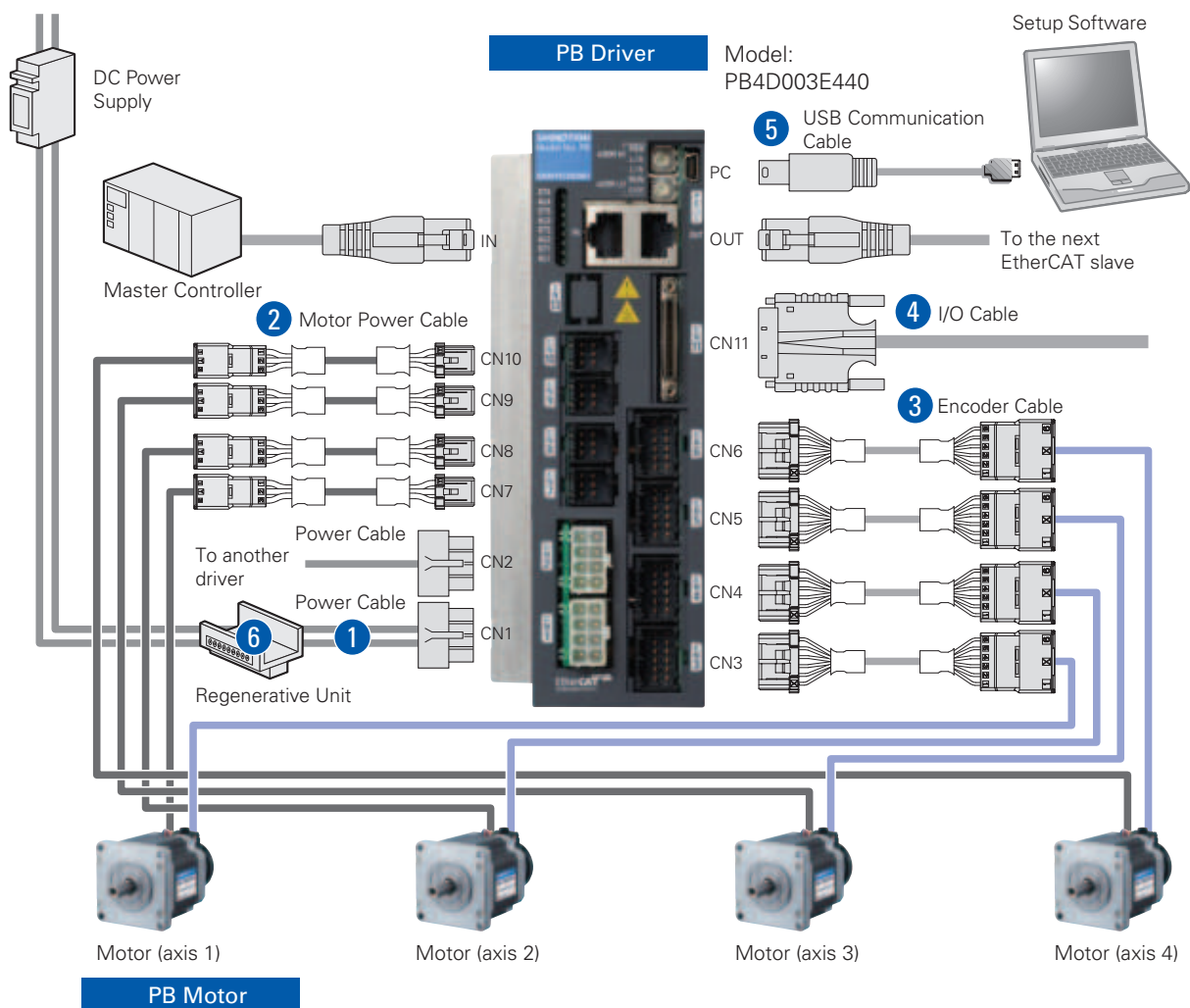
Driver Model	PB4D003E440
Power Supply	Main power supply 24/48VDC $\pm 10\%$ 14A Control power supply 24VDC $\pm 10\%$ 1.5A
Ambient temp.	0 to 55°C
Operating temp.	-20 to 65°C
Operating / Storage Humidity	90% RH (non-condensing)
Vibration Resistance	5m/s ² (Tested X, Y and Z directions for 2 hours in the frequency range between 10 to 55Hz.)
Shock resistance	20m/s ²
Elevation	Below 1,000m above sea level
Mass	0.7kg
Dimensions	W60×H160×D95mm
Rotation Speed	0 to 4500 min ⁻¹ (0 to 3000 min ⁻¹ for 60 mmsq. motor)
Resolution (P/R)	10000
Regeneration Process	Regenerative resistor (Option)
Holding Brake Control Function	Built in
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.
Protective Functions	
Display	Status display, Alarm display
PC interface	USB2.0
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
Input Signal	Photocoupler input type, Number of inputs: 16 Input resistance: 2.2k Ω Input voltage: "H" level: 4.0 to 26.4VDC, "L" level: 0 to 1.0VDC
I/O Signals	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

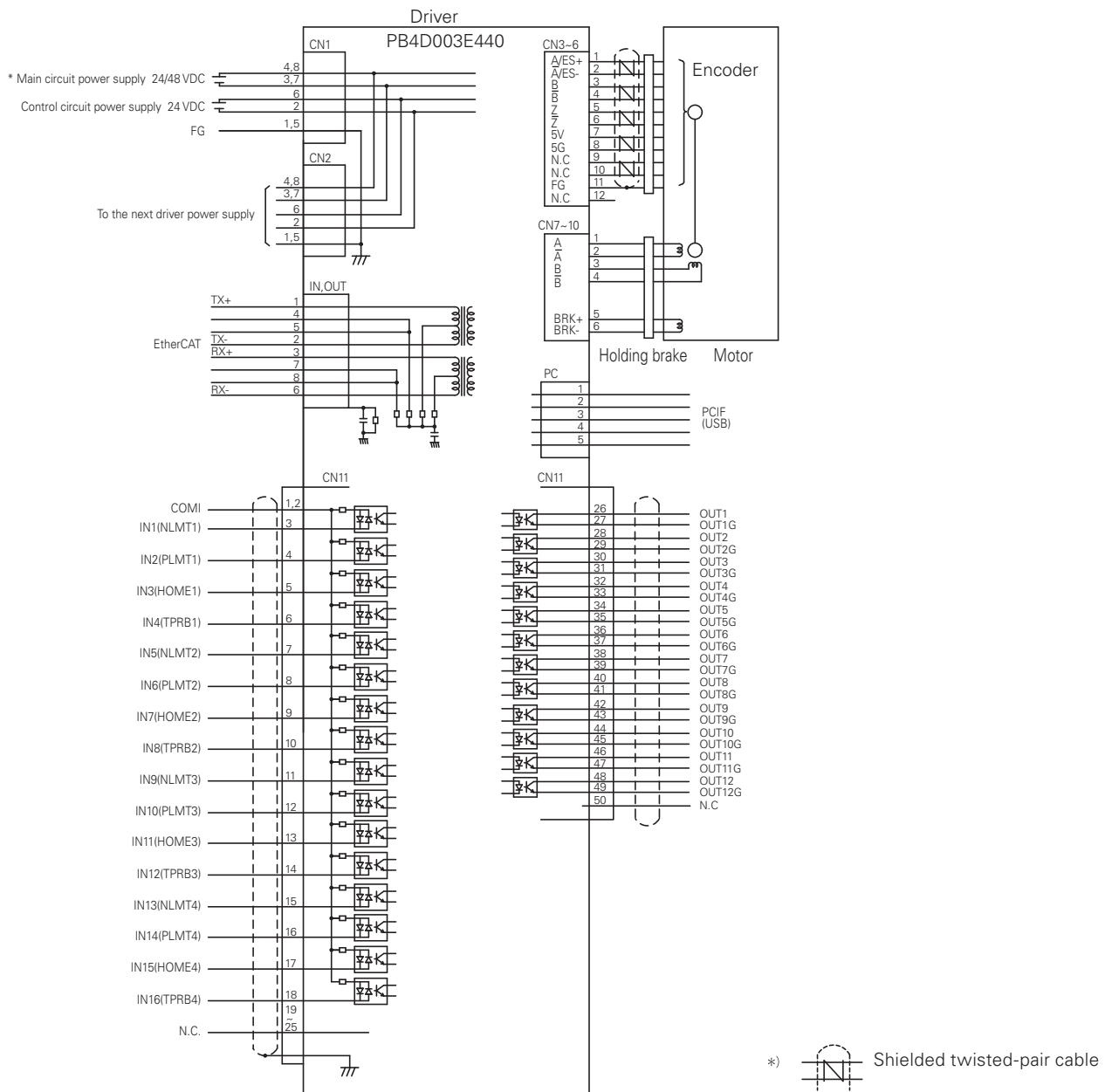


Item	Parts Number		Description
✓ 1	Power Cable: 1 m	PBC10P0010A	
2	Motor Power Cable: 3 m	PBC8M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC7E0030A	Extension Cable
4	I/O Cable: 1 m	PBC9S0010C	
✓ 5	USB Communication Cable: 1 m	AL-00896515-01	Communication with SANMOTION MOTOR Setup Software
6	Regen Unit	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

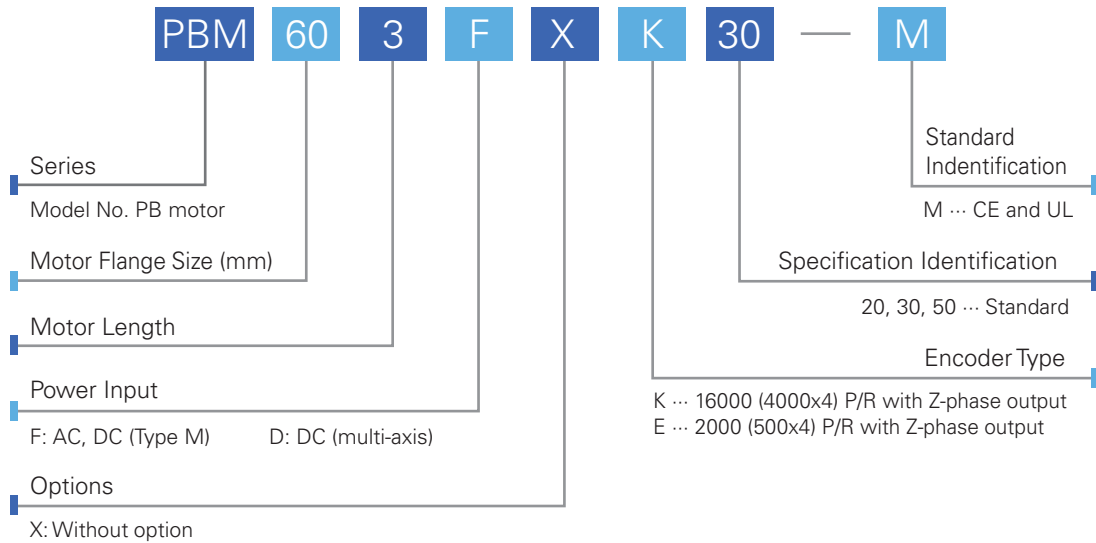
Wiring Diagram



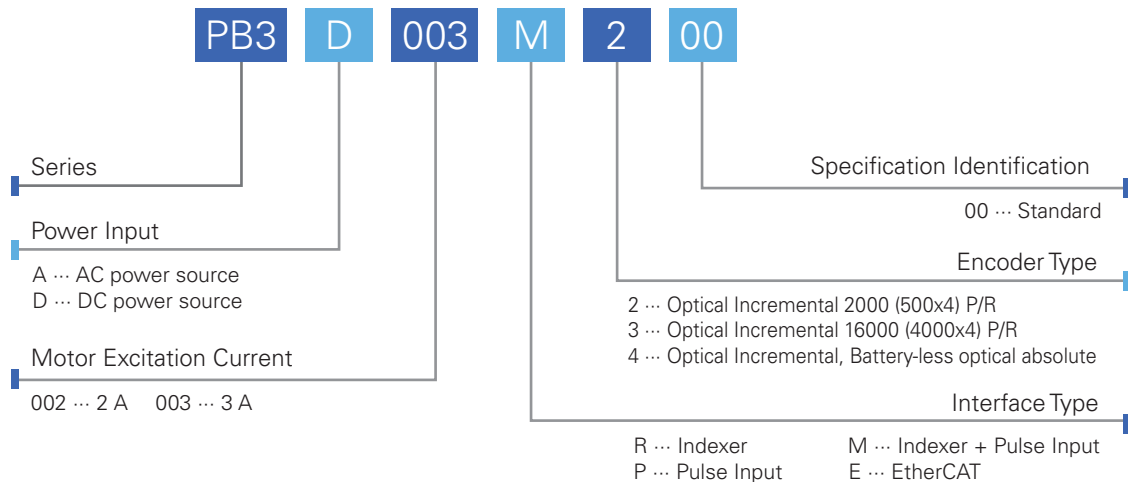
* Keep the max. extended length to 2 m or less and the max. current consumption to 14 A or less (7 A for normal operation) while in use.

Model Numbering System

Motor



Driver



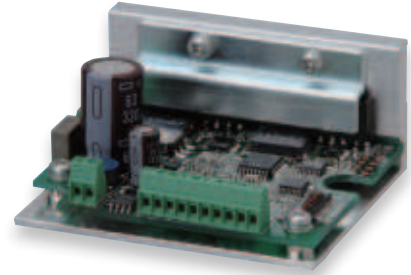
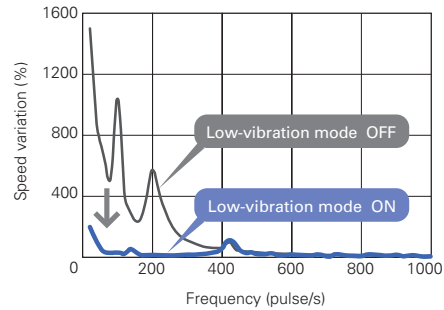
2-PHASE STEPPING SYSTEMS

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

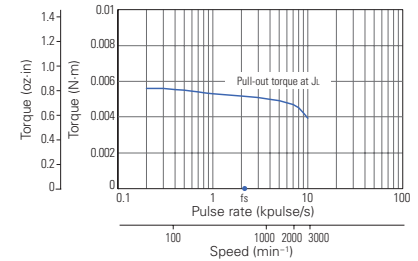
RoHS

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 ²	0.00058	0.0011
	oz·in ²	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	

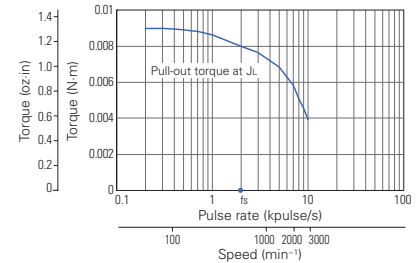
■ Torque Curve

Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL=[0.01 \times 10^{-4} \text{ kg} \cdot \text{m}^2$ (0.05 oz·in²) pulley balancer method] | fs: Maximum self-start frequency when not loaded

● SH2141-55

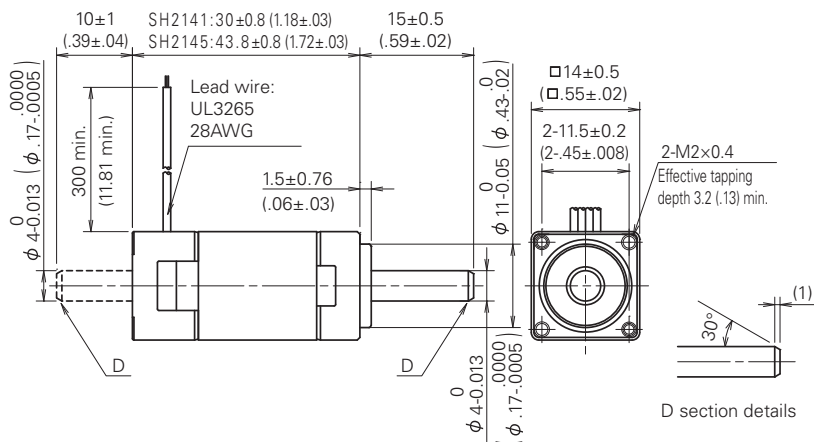


● SH2145-56

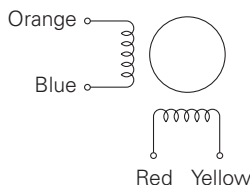


■ Dimension

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	-	+	-

Specification

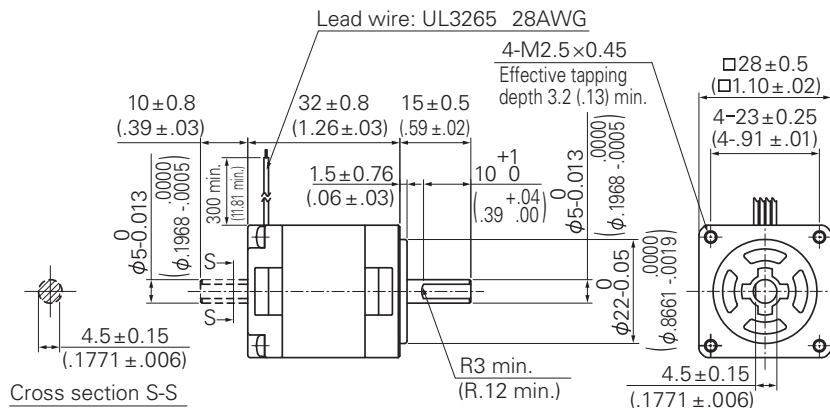
Bipolar winding, 1.8°/step

RoHS

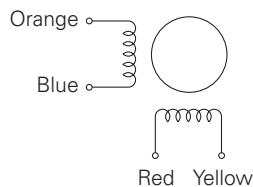
Model	Single Shaft	SH2281-5771
	Double Shaft	SH2281-5731
Holding Torque	N·m	0.07
	oz·in	9.91
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	2.6
Winding Inductance	mH/phase	1.85
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.01
	oz·in ²	0.05
Motor Weight	kg	0.11
	lb	0.24
Operating Temperature	-10 to 50°C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

Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

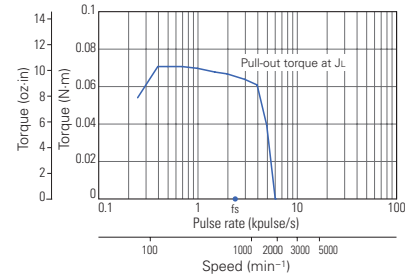
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

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) | $JL=[0.01 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (0.05 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | f_s : Maximum self-start frequency when not loaded

SH2281-57



2-PHASE STEPPING SYSTEMS

28 mm (NEMA 11)

51.5 mm (2.03 inch)

■ Specification

Bipolar winding, 1.8°/step

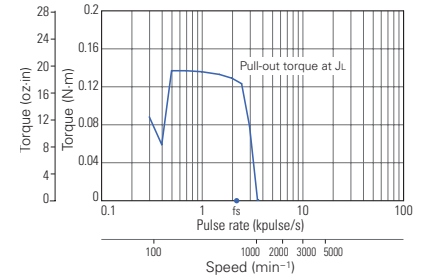
RoHS

Model	Single Shaft	SH2285-5771
	Double Shaft	
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	x10 ⁻⁴ kg·m ²	0.022
	oz·in ²	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

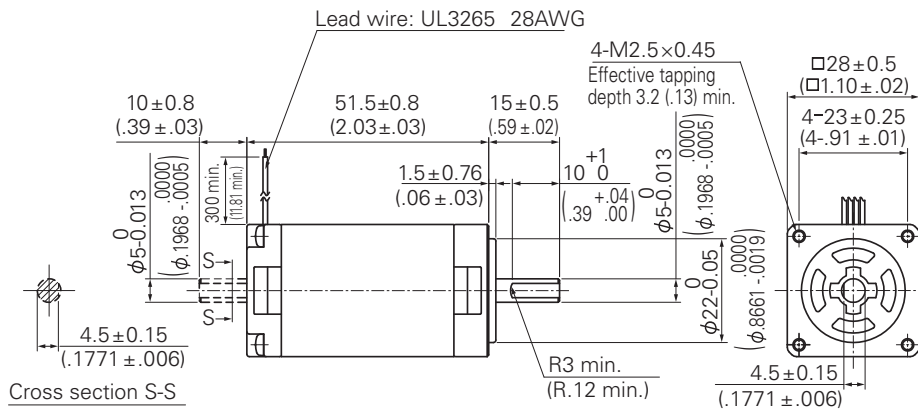
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL=[0.01 \times 10^{-4} \text{kg} \cdot \text{m}^2$ (0.05 oz-in²) pulley balancer method) | fs: Maximum self-start frequency when not loaded

● **SH2281-57**

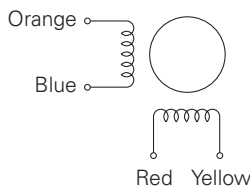


■ Dimension

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 sequence	1	—	—	+	+
	2	+	—	—	+
	3	+	+	—	—
	4	—	+	+	—

Specification

Bipolar winding, 1.8°/step

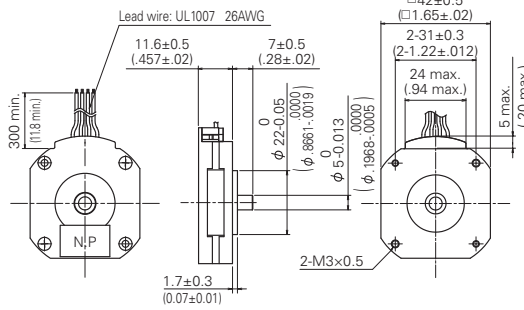
RoHS

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 ²	0.015	0.028
	oz·in ²	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	

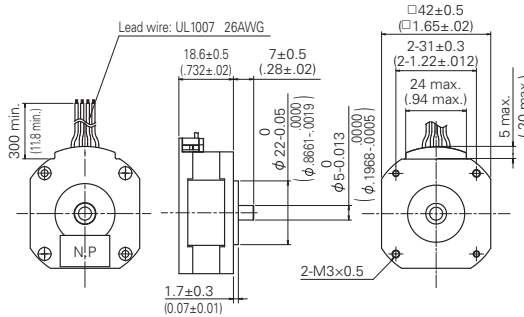
Dimension

Unit: mm (inch)

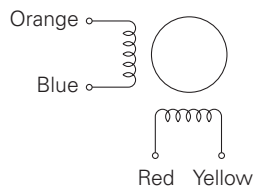
SS2421-5041



SS2422-5041



Internal Wiring



Direction of motor rotation

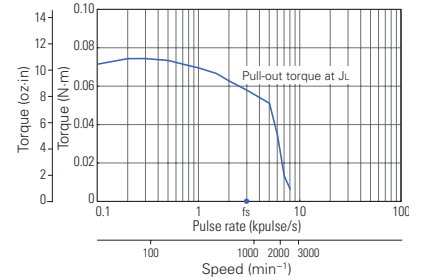
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

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

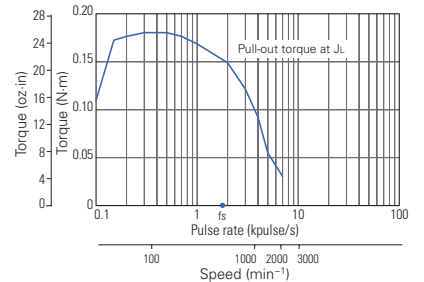
Torque Curve

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

SS2421-5041



SS2422-5041



2-PHASE STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

42 mm (NEMA 17)

**MOTOR
LENGTH**

33 mm (1.30 inch)

■ Specification

Bipolar winding, 1.8°/step

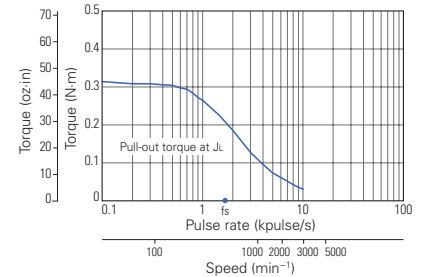
RoHS

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 ²	0.031
	oz·in ²	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

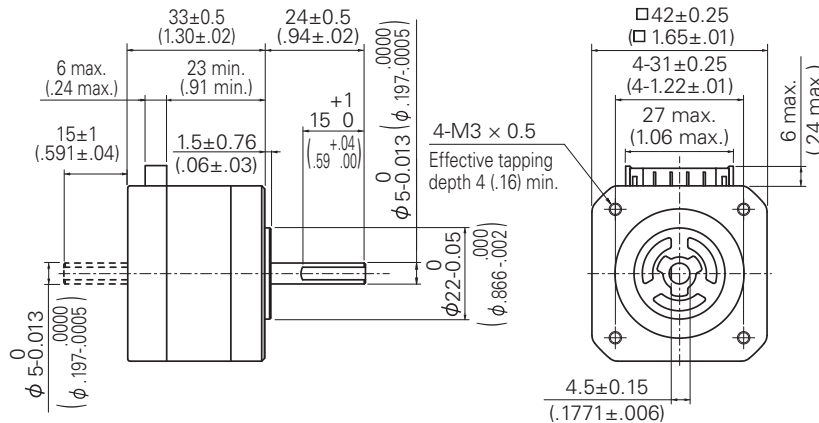
● SF2421-10B



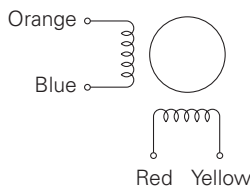
■ Dimension

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	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+

Specification

Bipolar winding, 1.8°/step

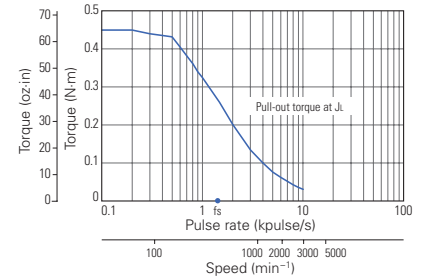
RoHS

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 ²	0.046
	oz·in ²	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) | $JL = [0.94 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (5.14 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

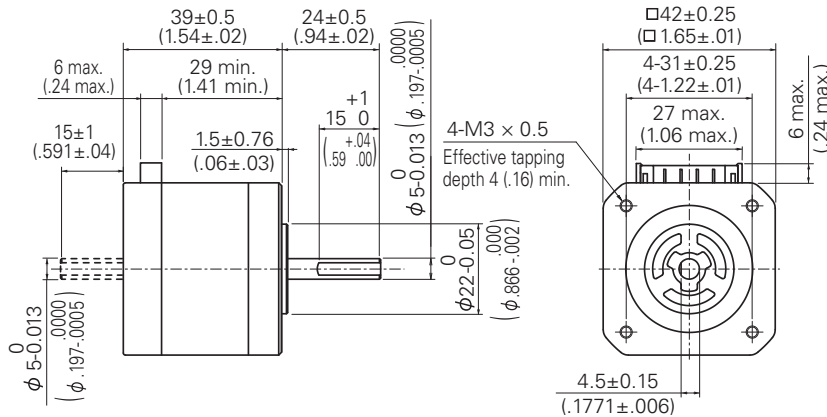
SF2422-10B



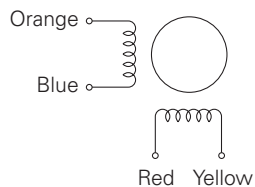
Dimension

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	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+

2-PHASE STEPPING SYSTEMS

42 mm (NEMA 17)

48/81.6 mm (1.89/3.21 inch)

■ Specification

Bipolar winding, $1.8^\circ/\text{step}$

RoHS

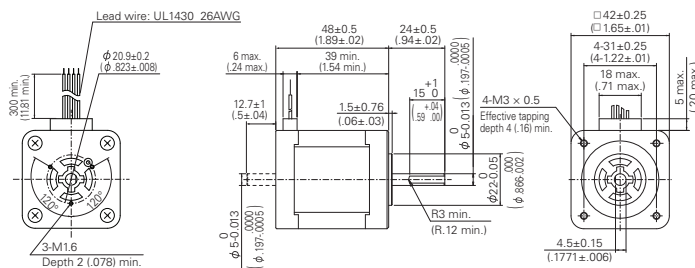
Model		Double Shaft	103H5210-5214 103H5210-52XB12
		w/ Brake	
Holding Torque		N·m	0.51
		oz·in	72.2
Rated Current		A/phase	1
Wiring Resistance		Ω/phase	4.8
Winding Inductance		mH/phase	9.5
Rotor Inertia		x10 ⁻⁴ kg·m ²	0.074 (0.089*)
		oz·in ²	0.405 (0.487*)
Motor Weight		kg	0.37 (0.51*)
		lb	0.82 (1.12*)
Operating Temperature			-10 to 50°C (14 to 122°F)
Humidity			20 to 90% RH, no condensation
Brake	Power Source	VDC / W	24 VDC / 2.4 W
	Static Friction Torque	N·m	0.3 Min.
		oz·in	42.5 Min.

* Specifications for brake motor

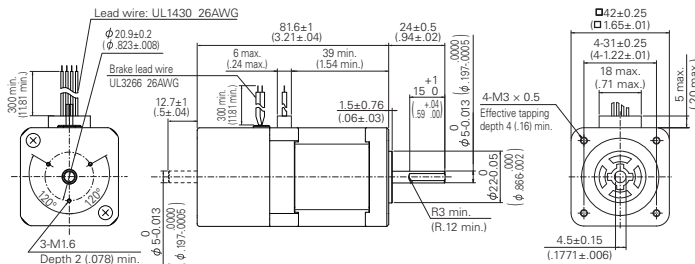
■ Dimension

Unit: mm (inch)

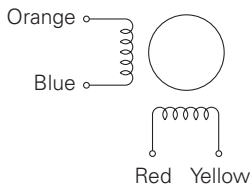
103H5210-5214



103H5210-52XB12



■ Internal Wiring

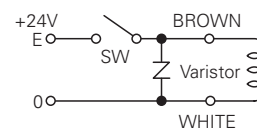


- **Direction of motor rotation**

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



Specification

Bipolar winding, 1.8°/step

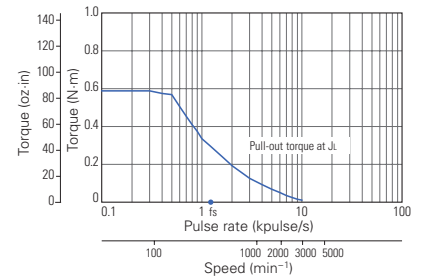
RoHS

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 ²	0.063
	oz·in ²	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·m² (5.14 oz·in²) pulley balancer method | fs: Maximum self-start frequency when not loaded

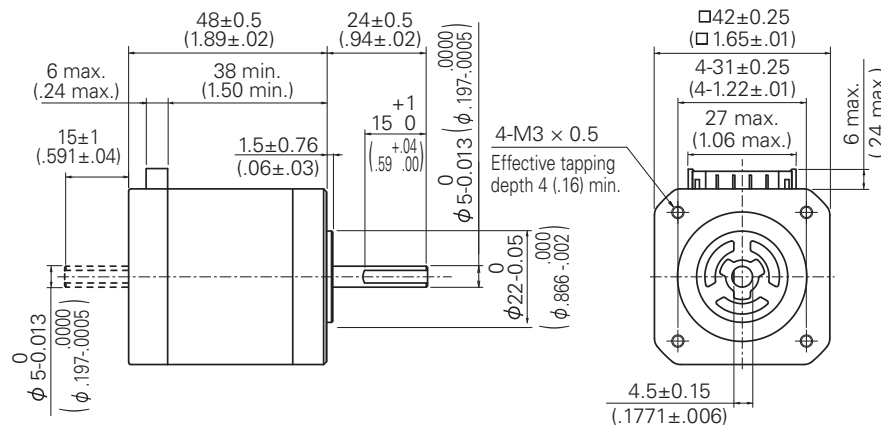
SF2423-10B



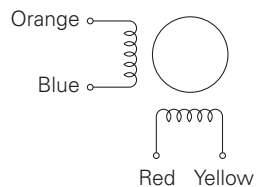
Dimension

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	-	-	+
	2	+	-	-
	3	+	+	-
	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

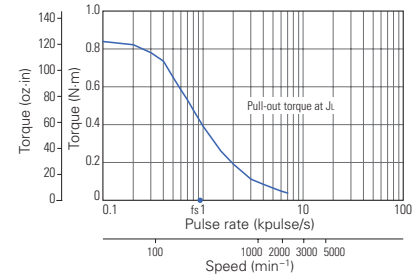
RoHS

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 ²	0.094
	oz·in ²	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) | $JL = [2.6 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (14.2 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | f_s : Maximum self-start frequency when not loaded

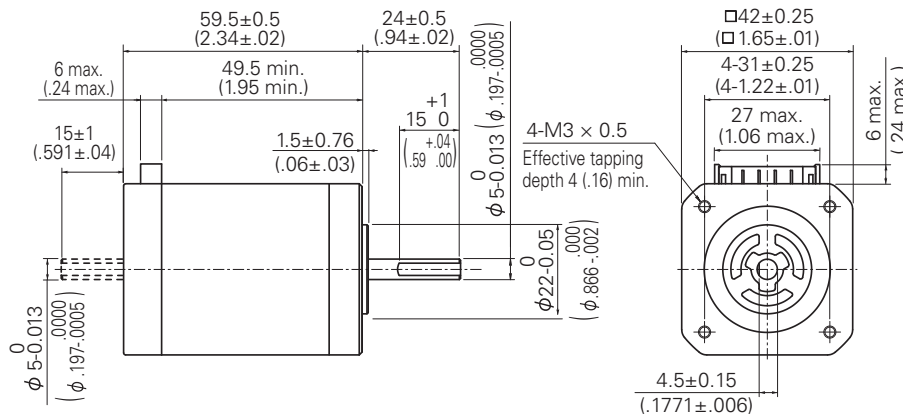
● SF2424-10B



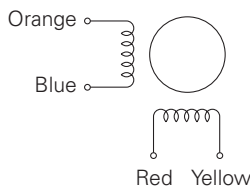
■ Dimension

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	-	-	+
	2	+	-	-
	3	+	+	-
	4	-	+	+

Specification

Bipolar winding, 0.9 °/step

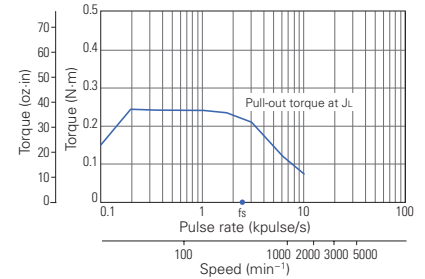
RoHS

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 ²	0.044
	oz·in ²	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

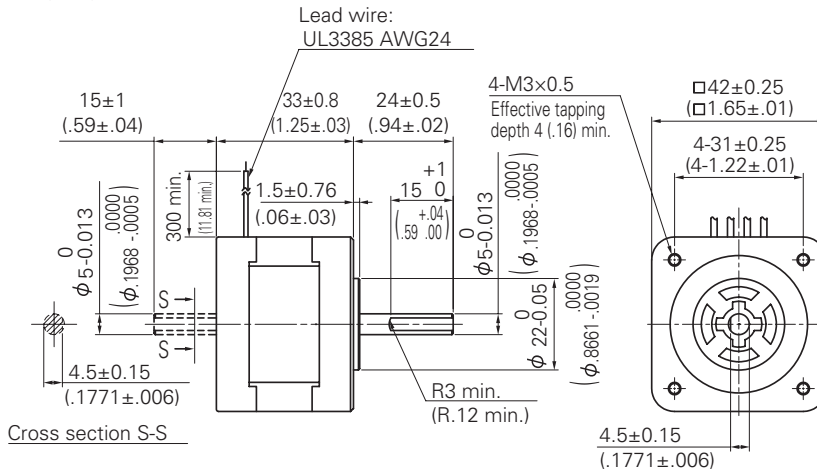
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL = [0.94 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (5.14 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

SH1421-52

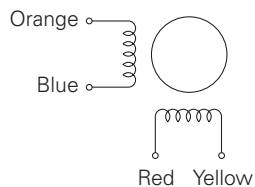


Dimension

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

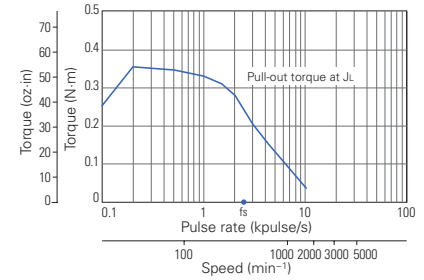
RoHS

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 ²	0.66
	oz·in ²	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

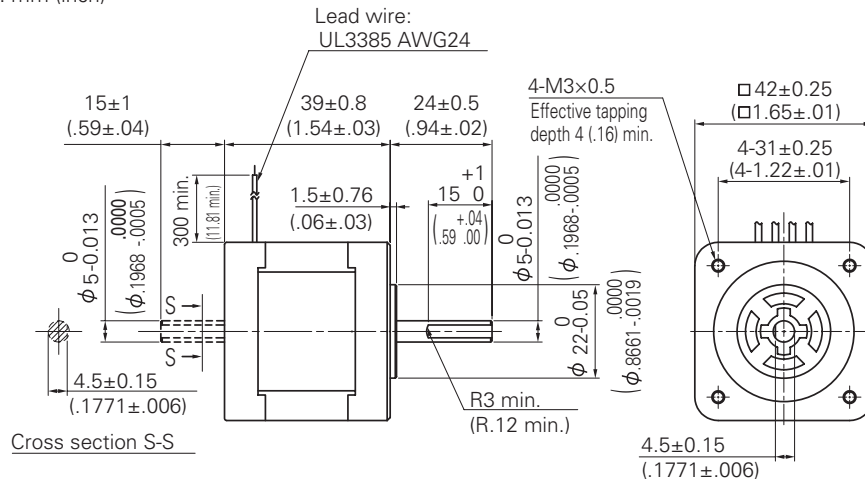
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL=0.94 \times 10^{-4}$ kg·m² (5.14 oz·in²) pulley balancer method | f_s : Maximum self-start frequency when not loaded

● SH1422-52

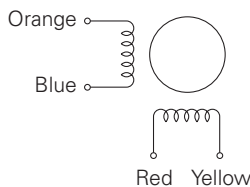


■ Dimension

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 sequence	1	-	-	+
	2	+	-	+
	3	+	+	-
	4	-	+	-

2-PHASE STEPPING SYSTEMS

50 mm (1.97 inch)

11.4/16.4 mm (0.43/0.63 inch)

■ Specification

Bipolar winding, $1.8^\circ/\text{step}$

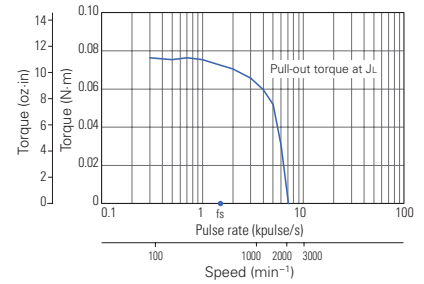
RoHS

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	x10 ⁻⁴ kg·m ²	0.026	0.049
	oz·in ²	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

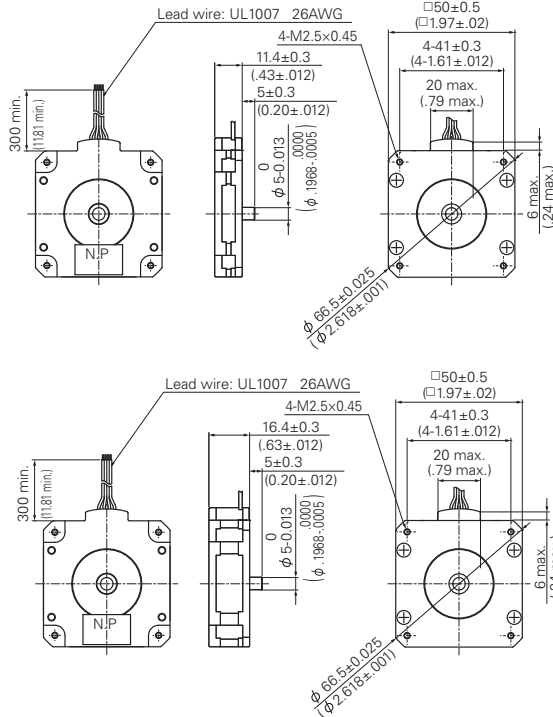
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $J_L = [0.01 \times 10^{-4} \text{ kg} \cdot \text{m}^2 \text{ (1.80 oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

● **SS2501-8040**

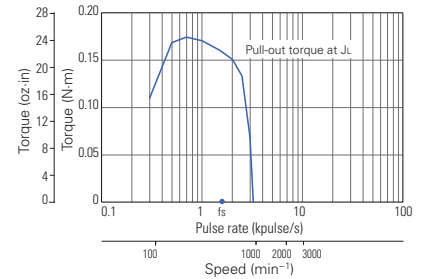


■ Dimension

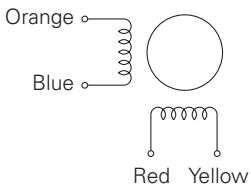
Unit: mm (inch)

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	–	+	+	–

2-PHASE STEPPING SYSTEMS

56 mm (NEMA 23)

41.8 mm (1.65 inch)

■ Specification

Bipolar winding, 1.8°/step

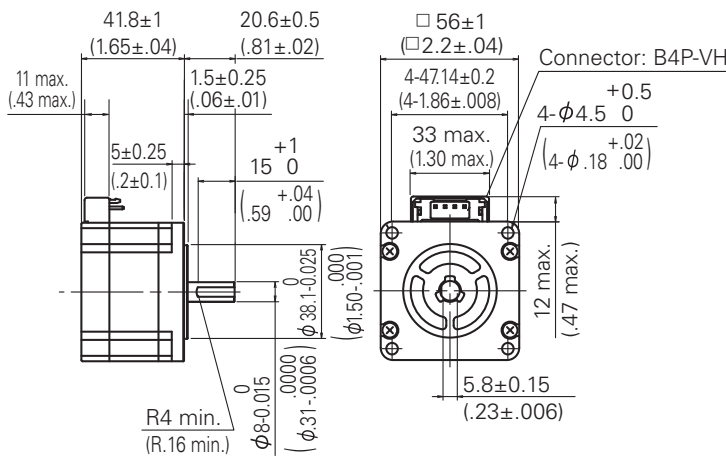


Model	Single Shaft	SM2561C20B41	SM2561C40B41	SM2561C60B41
Holding Torque	N·m	0.75	0.75	0.75
	oz·in	106.2	106.2	106.2
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	1.1	0.28	0.14
Winding Inductance	mH/phase	3.5	0.85	0.38
Rotor Inertia	×10 ⁻⁴ kg·m ²	0.14	0.14	0.14
	oz·in ²	0.77	0.77	0.77
Motor Weight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

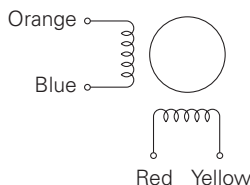
■ Dimension

Unit: mm (inch)

Motor Cable Model Number: 4837961-1



■ Internal Wiring



- **Direction of motor rotation**

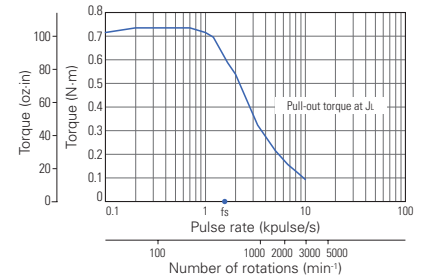
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

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

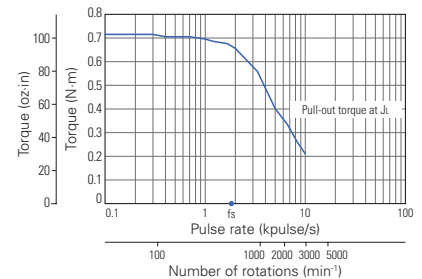
■ Torque Curve

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

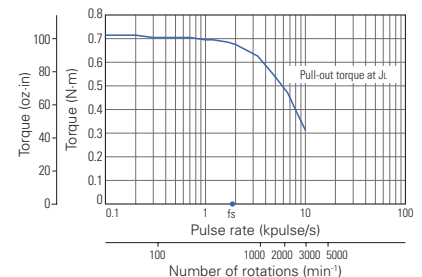
● **SM2561C20B41**



● **SM2561C40B41**



● **SM2561C60B41**



Specification

Bipolar winding, 1.8°/step

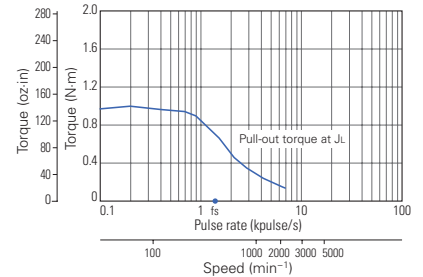
RoHS

Model	Single Shaft	103H7123-5840
Holding Torque	N·m	1
	oz·in	141.6
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	0.7
Winding Inductance	mH/phase	3.5
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.21
	oz·in ²	1.15
Motor Weight	kg	0.65
	lb	1.43
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation

Torque Curve

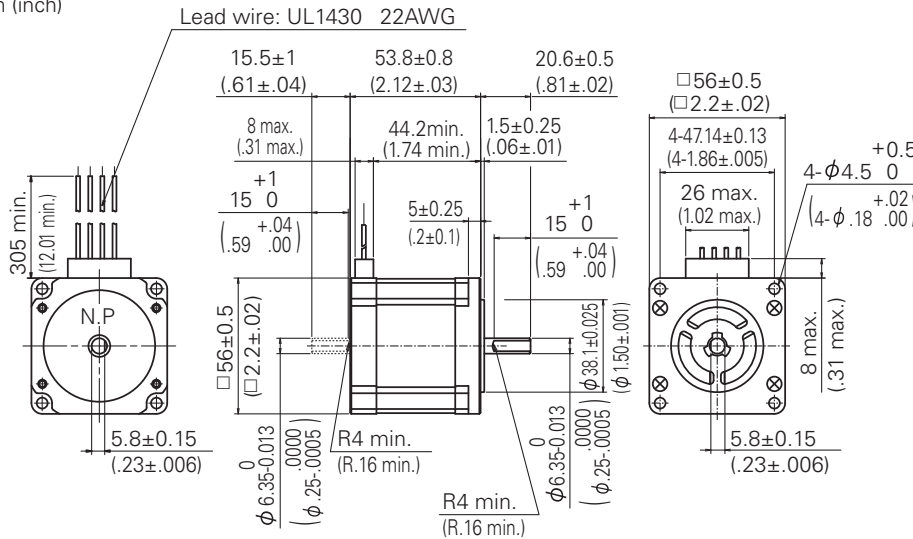
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $J_L = [2.6 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (14.22 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

103H7123-56

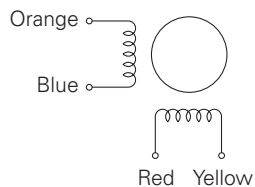


Dimension

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	-	+	-

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

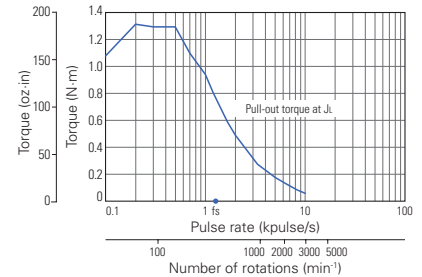
c AU[®] us **RoHS**

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 ²	0.28	0.28	0.28
	oz·in ²	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		

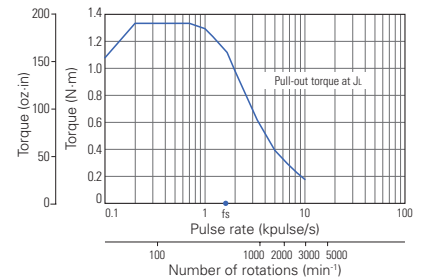
■ Torque Curve

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·m² (14.2 oz·in²) | (with rubber coupling) | fs: Maximum self-start frequency when not loaded

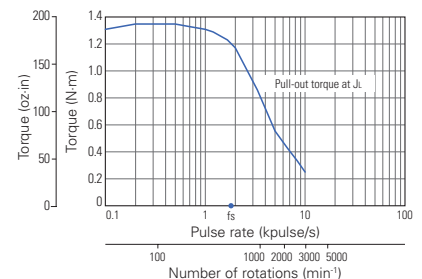
● SM2562C20B41



● SM2562C40B41



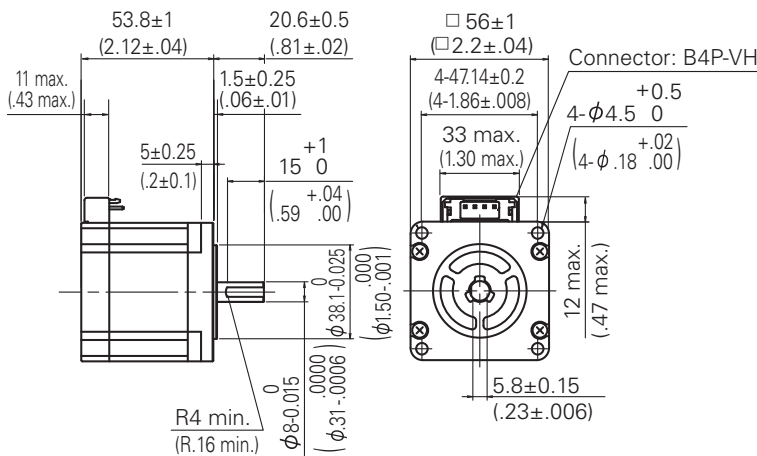
● SM2562C60B41



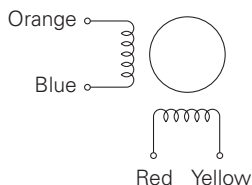
■ Dimension

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	—	+	+	—

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

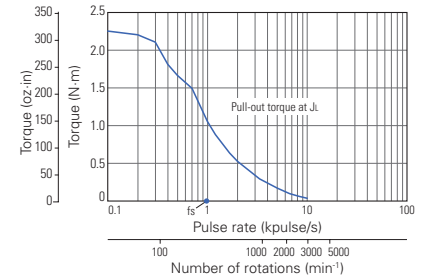
c AU[®] us **RoHS**

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 ²	0.5	0.5	0.5
	oz·in ²	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		

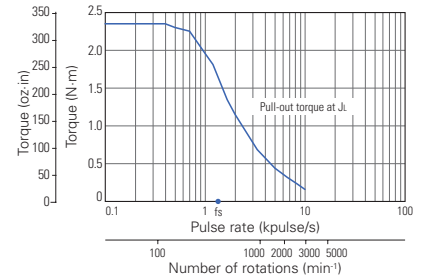
■ Torque Curve

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

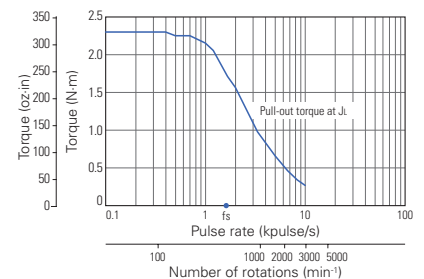
● SM2563C20B41



● SM2563C40B41



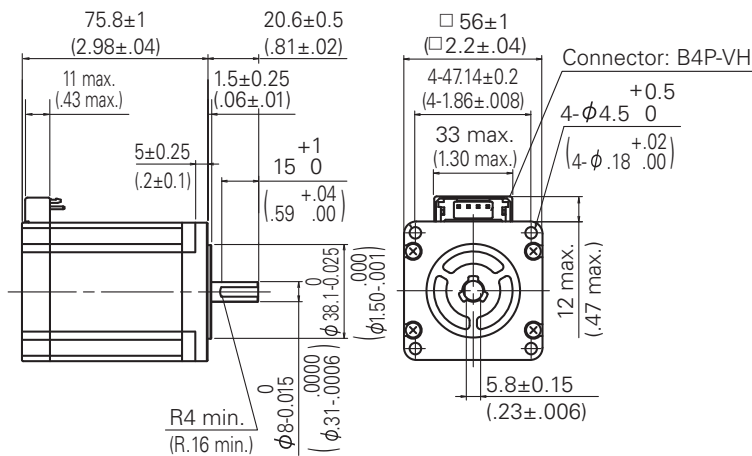
● SM2563C60B41



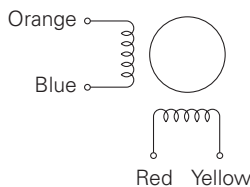
■ Dimension

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	–	+	+	–

Specification

Bipolar winding, 1.8°/step

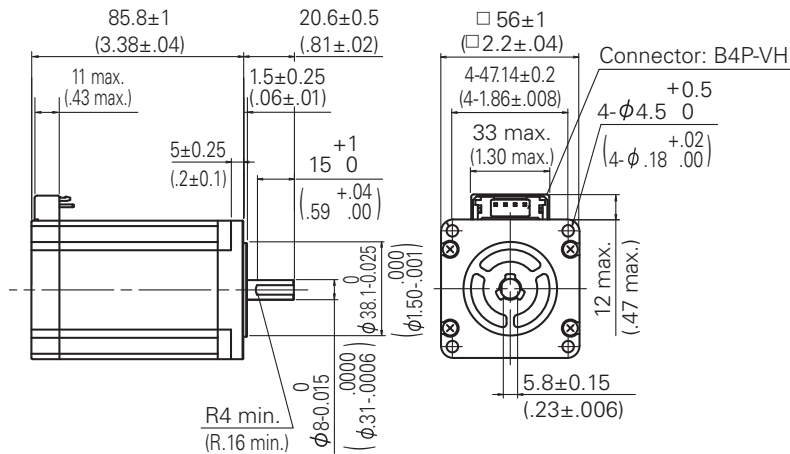


Model	Single Shaft	SM2564C20B41	SM2564C40B41	SM2564C60B41
Holding Torque	N·m	2.5	2.5	2.5
	oz·in	354.0	354.0	354.0
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	2.1	0.59	0.27
Winding Inductance	mH/phase	11	2.8	1.15
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.6	0.6	0.6
	oz·in ²	3.28	3.28	3.28
Motor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

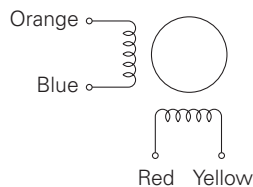
Dimension

Unit: mm (inch)

Motor Cable Model Number: 4837961-1



Internal Wiring



Direction of motor rotation

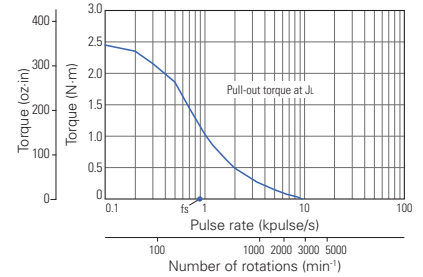
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

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

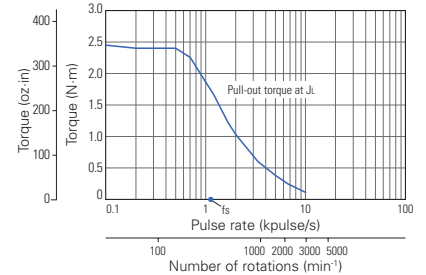
Torque Curve

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

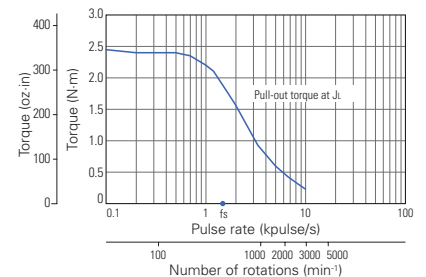
SM2564C20B41



SM2564C40B41



SM2564C60B41



2-PHASE STEPPING SYSTEMS

56 mm (NEMA 23)

94.8 mm (3.73 inch)

■ Specification

Bipolar winding, 1.8°/step

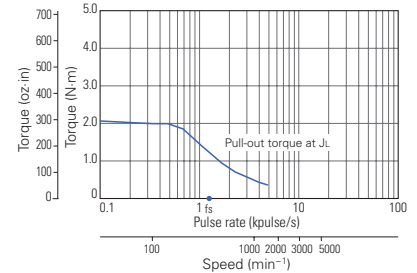
RoHS

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	x10 ⁻⁴ kg·m ²	0.49
	oz·in ²	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) | $JL = [7.4 \times 10^{-4} \text{ kg} \cdot \text{m}^{-2} (40.46 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

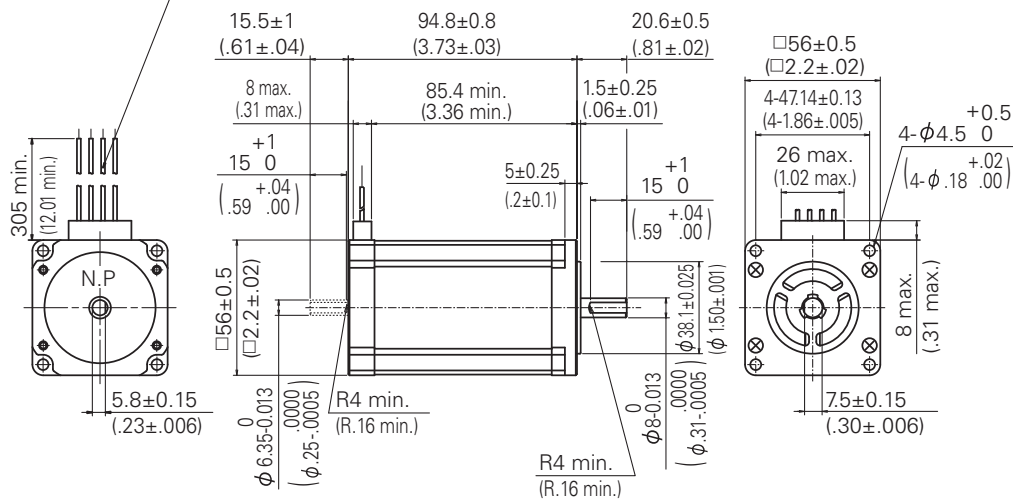
● 103H7128-58



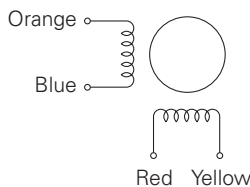
■ Dimension

Unit: mm (inch)

Lead wire: UL1430 22AWG



■ 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	—	+	+	—

Specification

Bipolar winding, 1.8°/step

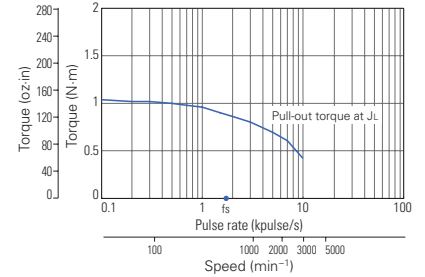


Model	Cable Type	SP2563-5260
	Connector Type	SP2563-5200
Holding Torque	N·m	1
	oz·in	141.6
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	0.75
Winding Inductance	mH/phase	3.4
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.21
	oz·in ²	1.15
Motor Weight	kg	0.9
	lb	2
Operating Temperature	-10 to 40°C (14 to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

Torque Curve

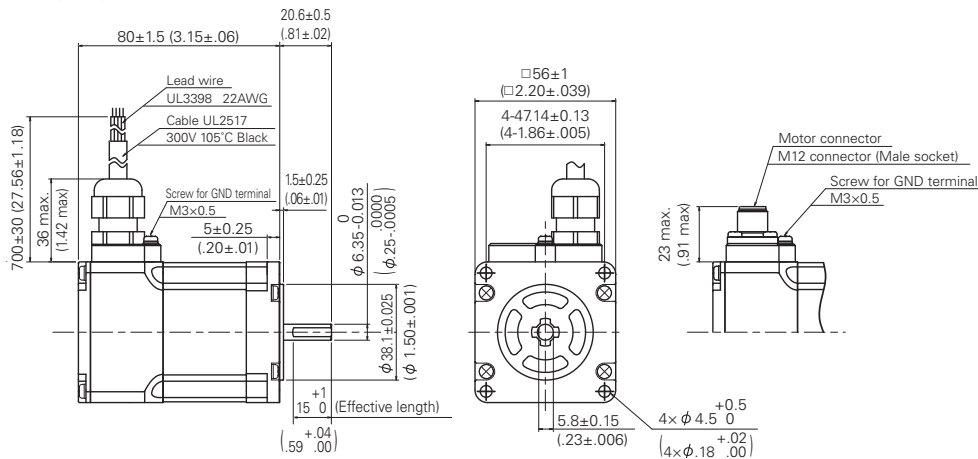
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) | $JL=2.6 \times 10^{-4}$ kg·m² (14.22 oz·in²) pulley balancer method | f_s : Maximum self-start frequency when not loaded

SP2563-52

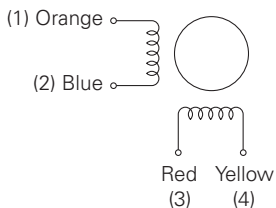


Dimension

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

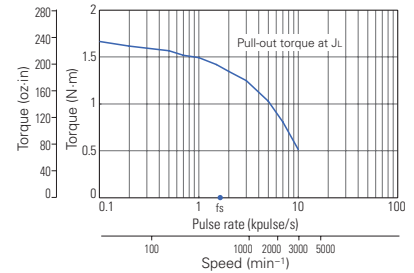


Model	Cable Type	SP2566-5260
	Connector Type	SP2566-5200
Holding Torque	N·m	1.7
	oz·in	240.7
Rated Current	A/phase	3
Wiring Resistance	Ω/phase	1
Winding Inductance	mH/phase	4.4
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.36
	oz·in ²	1.97
Motor Weight	kg	1.2
	lb	2.65
Operating Temperature		-10 to 40°C (14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

■ Torque Curve

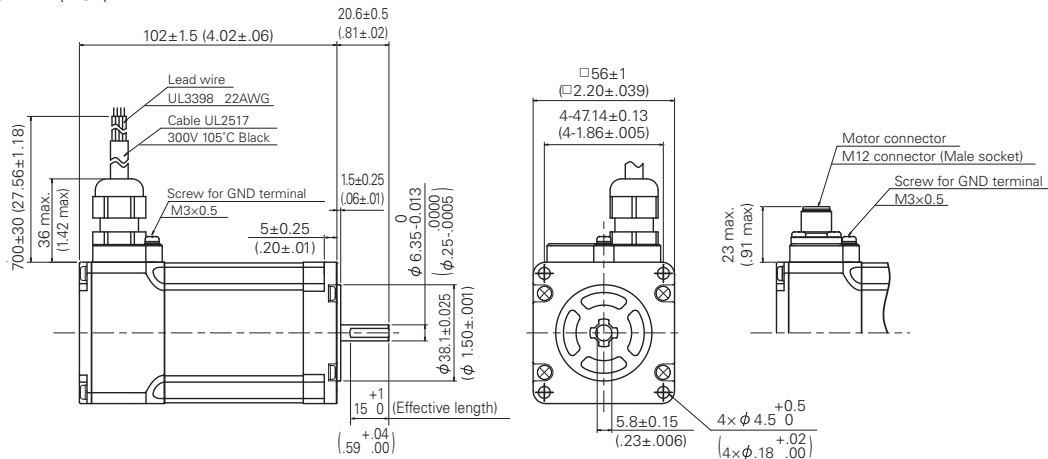
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) | $JL=[7.4 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (40.46 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | f_s : Maximum self-start frequency when not loaded

● SP2566-52

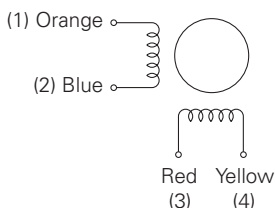


■ Dimension

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	-	+	-

2-PHASE STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

60 mm (2.36 inch)

**MOTOR
LENGTH**

52.5 mm (2.07 inch)

■ Specification

Bipolar winding, 1.8°/step

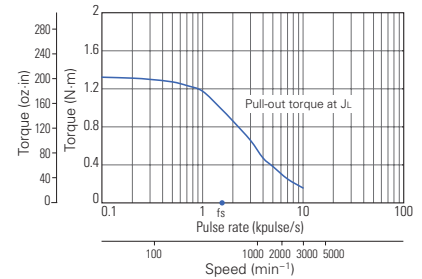
RoHS

Model	Single Shaft	103H7822-1760
	Double Shaft	103H7822-1730
Holding Torque	N·m	1.37
	oz·in	194
Rated Current	A/phase	4
Wiring Resistance	Ω/phase	0.43
Winding Inductance	mH/phase	1.38
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.4
	oz·in ²	2.19
Motor Weight	kg	0.77
	lb	1.7
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation

■ Torque Curve

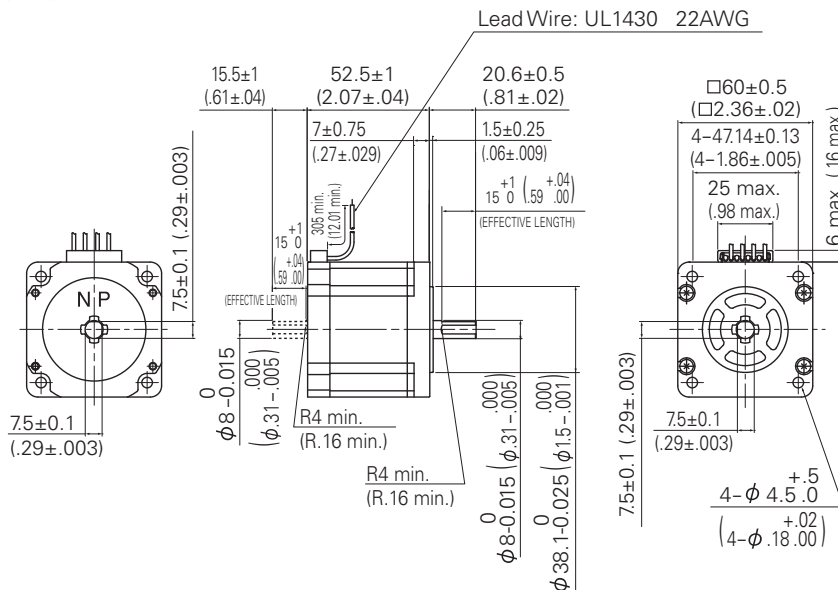
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $J_L = [2.6 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (14.22 \text{ oz} \cdot \text{in}^2) \text{ pulley balancer method}]$ | f_s : Maximum self-start frequency when not loaded

● 103H7822-17

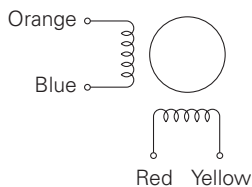


■ Dimension

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	-	+	-

Specification

Unipolar winding, 1.8°/step

RoHS

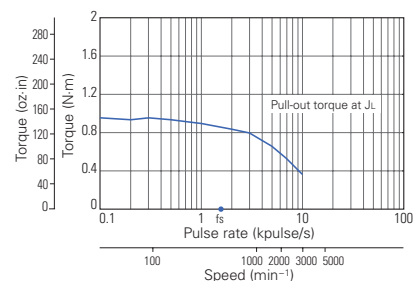
Model	Double Shaft	103H7822-2511
	w/ Brake	103H7822-25XB12
Holding Torque	N·m	1.1
	oz·in	155.8
Rated Current	A/phase	4.4
Wiring Resistance	Ω/phase	0.4
Winding Inductance	mH/phase	0.61
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.4 (0.56*)
	oz·in ²	2.19 (3.06*)
Motor Weight	kg	0.77 (1.2*)
	lb	1.7 (2.6*)
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation
Brake	Power Source	VDC / W
		24 VDC / 6 W
	Static Friction Torque	N·m
		0.8 Min.
		oz·in
		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 | $J_L = [2.6 \times 10^{-4} \text{ kg} \cdot \text{m}^2]$ (14.22 oz·in²) pulley balancer method | fs: Maximum self-start frequency when not loaded

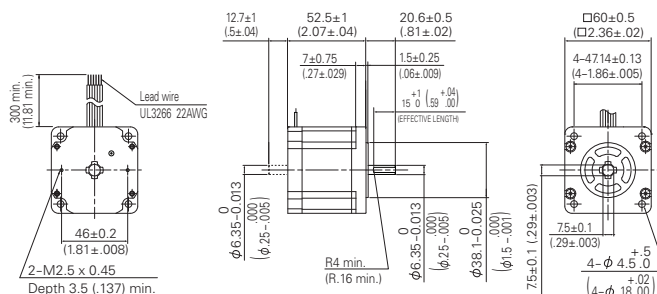
103H7822-25



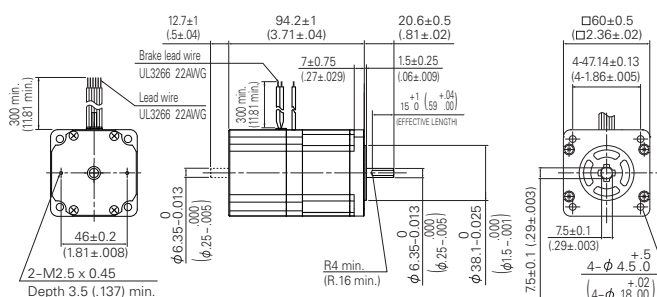
Dimension

Unit: mm (inch)

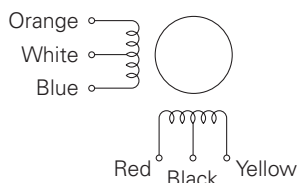
103H7822-2511



103H7822-25XB12



Internal Wiring

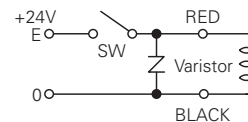


Direction of motor rotation

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



2-PHASE STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

60 mm (2.36 inch)

**MOTOR
LENGTH**

84.5 mm (3.33 inch)

■ Specification

Bipolar winding, 1.8°/step

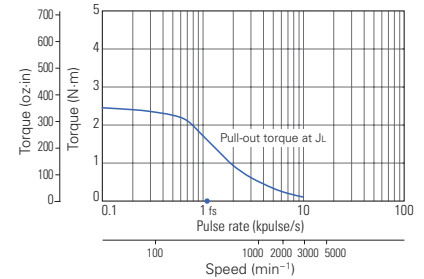
RoHS

Model	Single Shaft	103H7823-1760
	Double Shaft	103H7823-1730
Holding Torque	N·m	2.7
	oz·in	382.3
Rated Current	A/phase	4
Wiring Resistance	Ω/phase	0.65
Winding Inductance	mH/phase	2.4
Rotor Inertia	$\times 10^{-4}$ kg·m ²	0.84
	oz·in ²	4.59
Motor Weight	kg	1.34
	lb	2.95
Operating Temperature	-10 to 50°C (14 to 122°F)	
Humidity	20 to 90% RH, no condensation	

■ Torque Curve

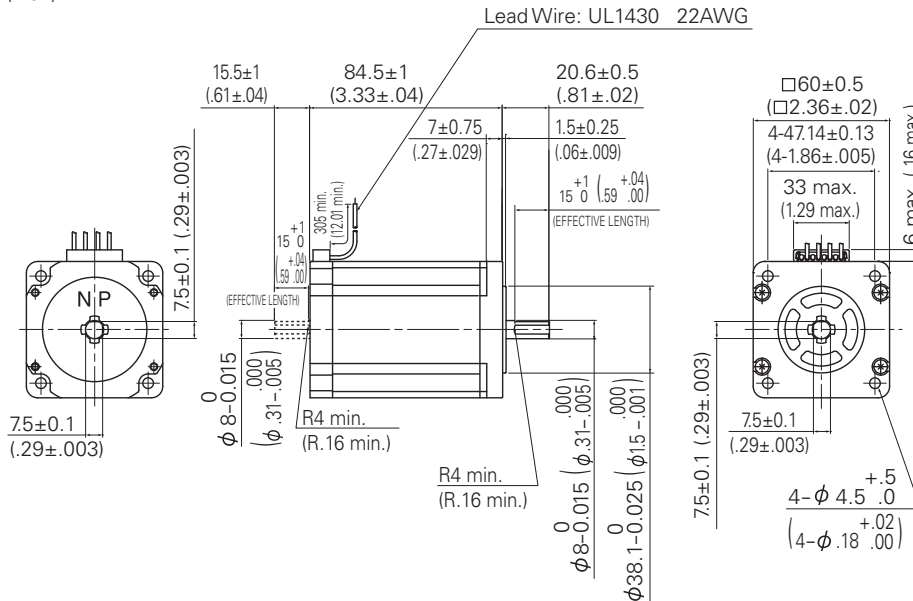
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL=[7.4 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (40.46 \text{ oz} \cdot \text{in}^2) \text{ pulley balancer method}]$ | f_s : Maximum self-start frequency when not loaded

● 103H7823-17

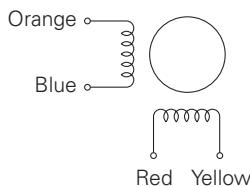


■ Dimension

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	-	+	-

Specification

Bipolar winding, 0.9 °/step

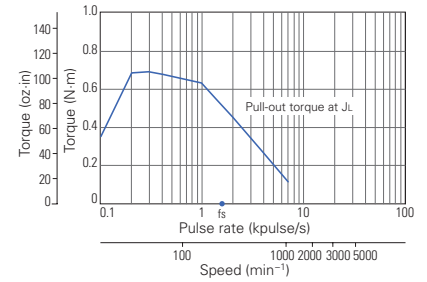
RoHS

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 ²	0.24
	oz·in ²	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

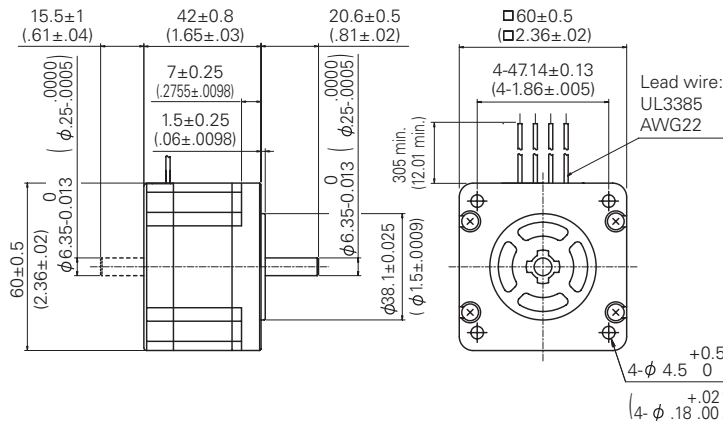
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $J_L = [0.94 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (5.14 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

SH1601-52

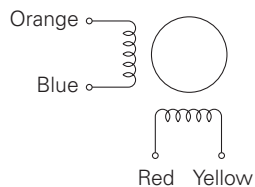


Dimension

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

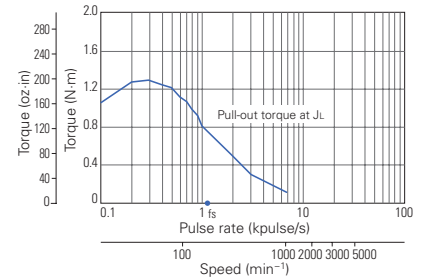
RoHS

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 ²	0.4
	oz·in ²	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

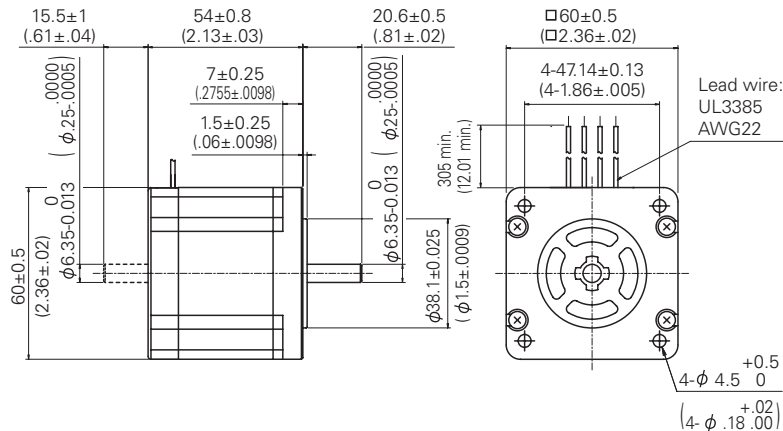
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL=[2.6 \times 10^{-4} \text{ kg} \cdot \text{m}^2$ (14.22 oz·in²) pulley balancer method] | fs: Maximum self-start frequency when not loaded

● SH1602-52

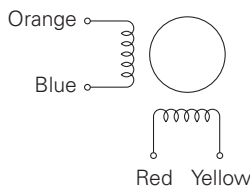


■ Dimension

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	—	+	+	—

Specification

Bipolar winding, 0.9 °/step

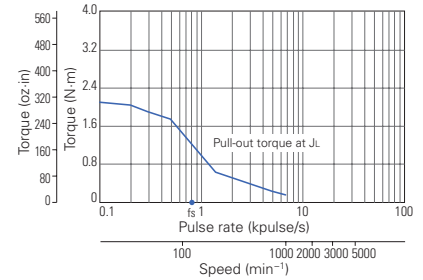
RoHS

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 ²	0.75
	oz·in ²	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

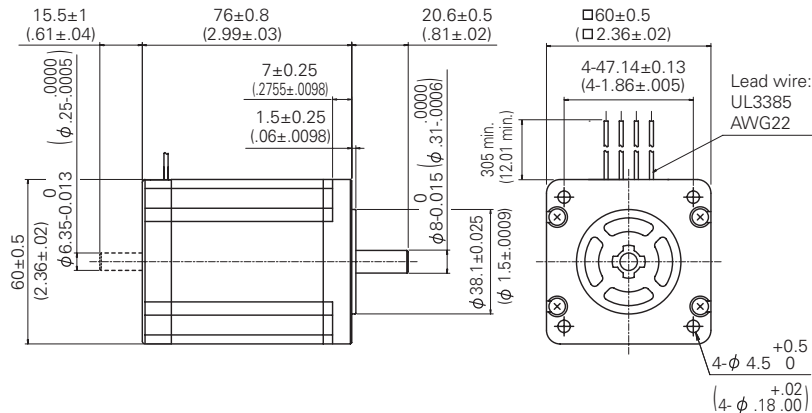
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL = [7.4 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (40.46 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

SH1603-52

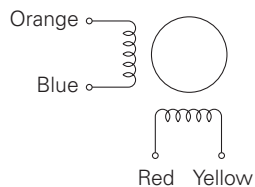


Dimension

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	-	-	+
	2	+	-	+
	3	+	+	-
	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

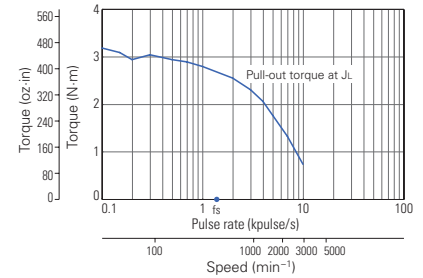


Model	Single Shaft	SM2861-5152	SM2861-5252
	Double Shaft	SM2861-5122	
Holding Torque	N·m	3.3	3.3
	oz·in	467.3	467.3
Rated Current	A/phase	4	6
Wiring Resistance	Ω/phase	0.56	0.29
Winding Inductance	mH/phase	3.7	1.7
Rotor Inertia	$\times 10^{-4}$ kg·m ²	1.48	1.48
	oz·in ²	8.09	8.09
Motor Weight	kg	1.75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

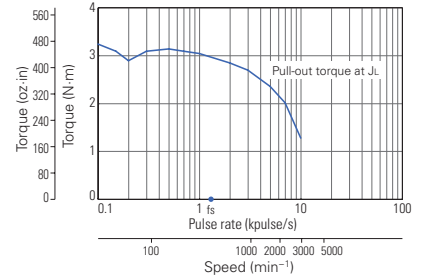
■ Torque Curve

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·in²) pulley balancer method] | fs: Maximum self-start frequency when not loaded

● SM2861-51

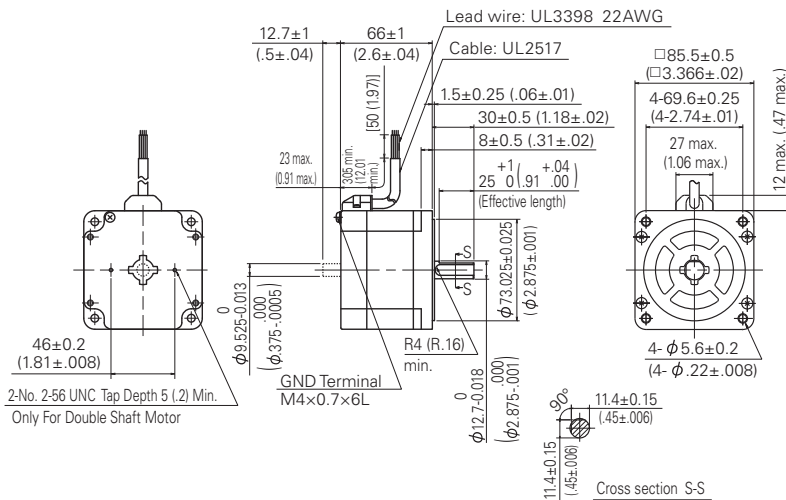


● SM2861-52

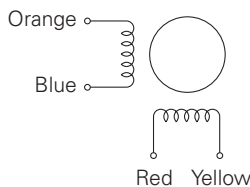


■ Dimension

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**

96.5 mm (3.8 inch)

■ Specification

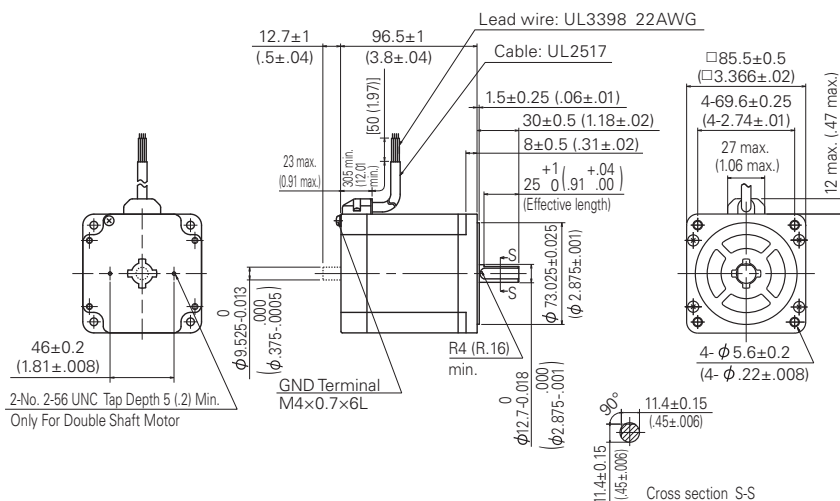
Bipolar winding, 1.8°/step



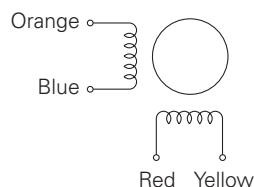
Model	Single Shaft	SM2862-5152	SM2862-5252
	Double Shaft	SM2862-5122	
Holding Torque	N·m	6.4	6.4
	oz·in	906.3	906.3
Rated Current	A/phase	4	6
Wiring Resistance	Ω/phase	0.83	0.36
Winding Inductance	mH/phase	6.4	2.8
Rotor Inertia	$\times 10^{-4}$ kg·m ²	3	3
	oz·in ²	16.4	16.4
Motor Weight	kg	2.9	2.9
	lb	6.5	6.5
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

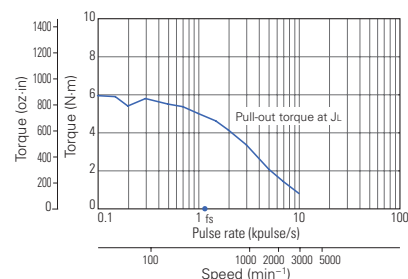
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

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

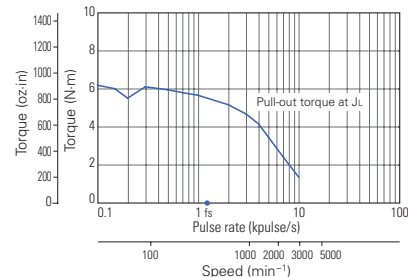
■ Torque Curve

Constant current circuit, Source voltage: 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·in²) pulley balancer method | fs: Maximum self-start frequency when not loaded

● SM2862-51



● SM2862-52



2-PHASE STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

86 mm (NEMA 34)

**MOTOR
LENGTH**

150 mm (5.9 inch)

■ Specification

Bipolar winding, 1.8°/step

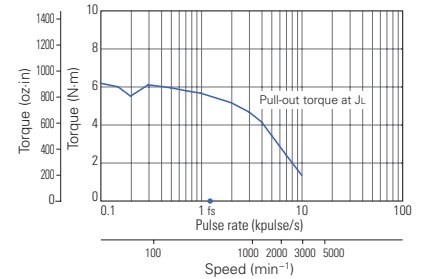
RoHS

Model	Double Shaft w/ Brake	SH2862-52XB12
Holding Torque	N·m	6.4
	oz·in	906.3
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.36
Winding Inductance	mH/phase	2.8
Rotor Inertia	$\times 10^{-4}$ kg·m ²	3.8
	oz·in ²	20.8
Motor Weight	kg	3.7
	lb	8.15
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation
Brake	Power Source	VDC / W
	Static Friction	N·m
	Torque	oz·in
		24 VDC / 10 W
		5 Min.
		708 Min.

■ Torque Curve

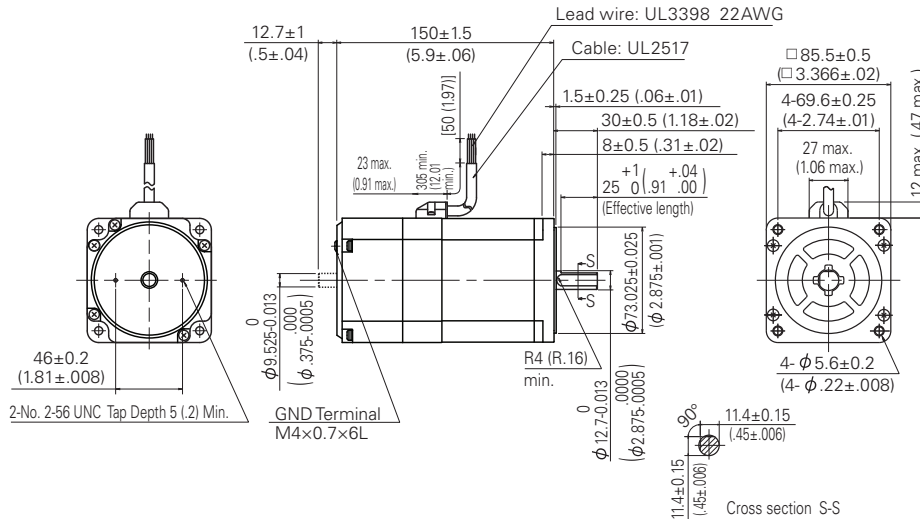
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) | $JL = [15.3 \times 10^{-4} \text{ kg} \cdot \text{m}^2 \text{ (83.65 oz} \cdot \text{in}^2 \text{)}]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

● SH2862-52

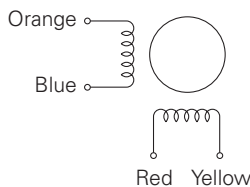


■ Dimension

Unit: mm (inch)



■ Internal Wiring

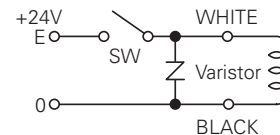


● Direction of motor rotation

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	-	+	+

■ Brake Connection



Specification

Bipolar winding, 1.8°/step

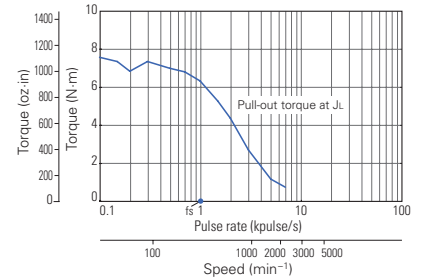


Model	Single Shaft	SM2863-5152	SM2863-5252
	Double Shaft	SM2863-5122	
Holding Torque	N·m	9	9
	oz·in	1274.5	1274.5
Rated Current	A/phase	4	6
Wiring Resistance	Ω/phase	1	0.46
Winding Inductance	mH/phase	7.9	3.8
Rotor Inertia	$\times 10^{-4}$ kg·m ²	4.5	4.5
	oz·in ²	24.6	24.6
Motor Weight	kg	4	4
	lb	8.96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

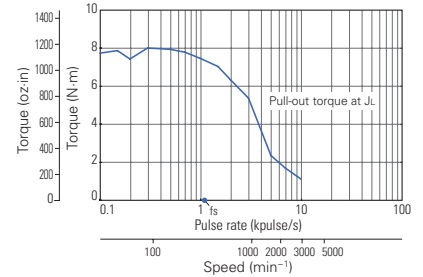
Torque Curve

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·in²) pulley balancer method | fs: Maximum self-start frequency when not loaded

SM2863-51

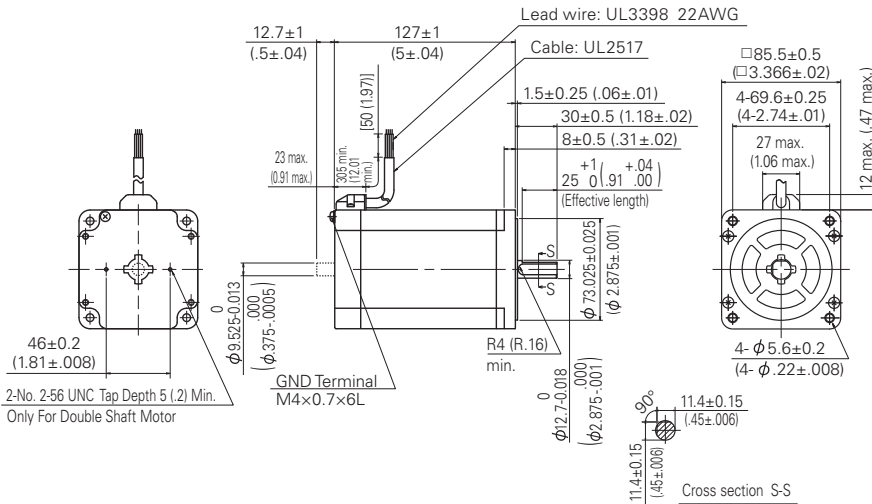


SM2863-52



Dimension

Unit: mm (inch)



2-PHASE STEPPING SYSTEMS

**MOTOR
FLANGE SIZE**

86 mm (NEMA 34)

**MOTOR
LENGTH**

120 mm (4.72 inch)

■ Specification

Bipolar winding, 1.8°/step

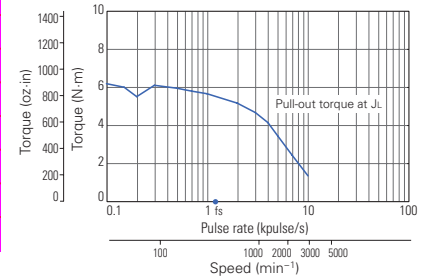


Model	Cable Type	SP2862-5260
Holding Torque	N·m	6.4
	oz·in	906.3
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.41
Winding Inductance	mH/phase	2.8
Rotor Inertia	$\times 10^{-4}$ kg·m ²	3
	oz·in ²	16.4
Motor Weight	kg	3.1
	lb	6.8
Operating Temperature		-10 to 40°C (14 to 104°F)
Humidity		95% Max.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

■ Torque Curve

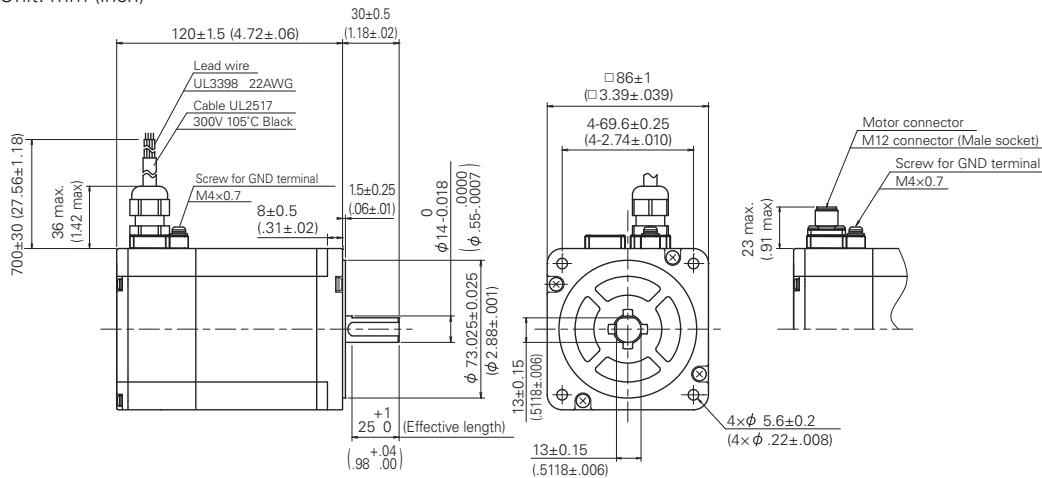
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) | $JL = [15.3 \times 10^{-4} \text{ kg} \cdot \text{m}^2]$ (83.65 oz·in²) pulley balancer method | fs: Maximum self-start frequency when not loaded

● SP2862-52

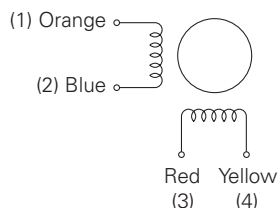


■ Dimension

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	-	+	+

Specification

Bipolar winding, 1.8°/step

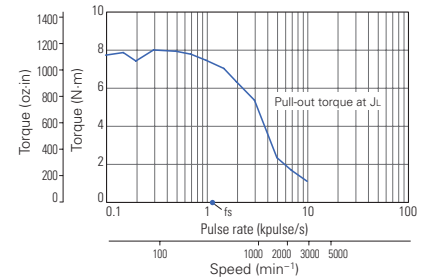


Model	Cable Type	SP2863-5260
Holding Torque	N·m	9
	oz·in	1274.5
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.53
Winding Inductance	mH/phase	3.8
Rotor Inertia	$\times 10^{-4}$ kg·m ²	4.5
	oz·in ²	24.6
Motor Weight	kg	4.2
	lb	9.3
Operating Temperature	-10 to 40°C (14 to 104°F)	
Humidity	95% Max.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

Torque Curve

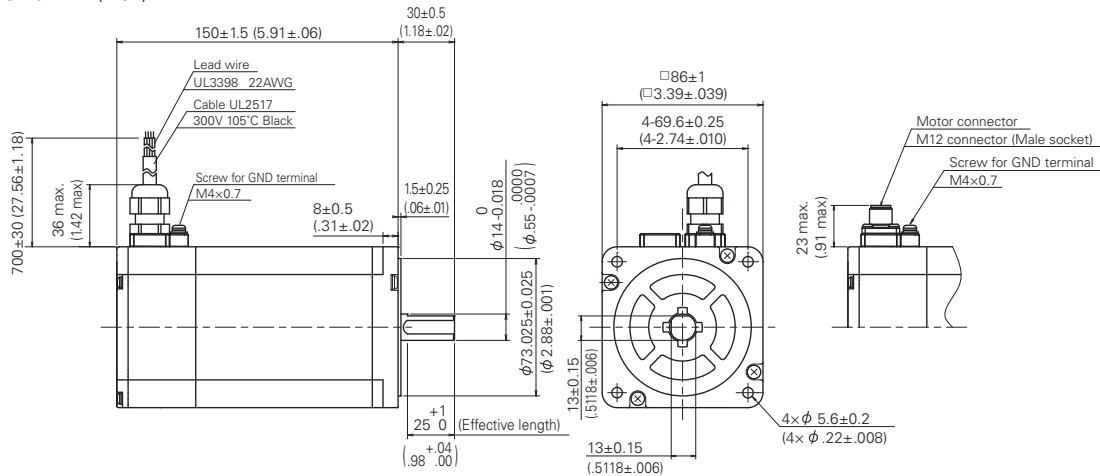
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) | $JL = [44 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (240.56 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

SP2863-52

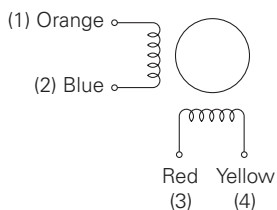


Dimension

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

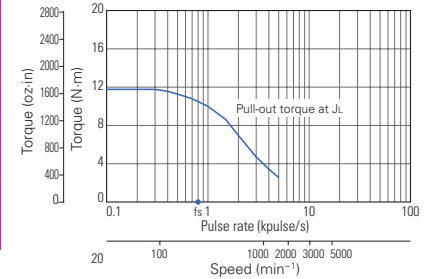
RoHS

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 ²	14.6
	oz·in ²	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

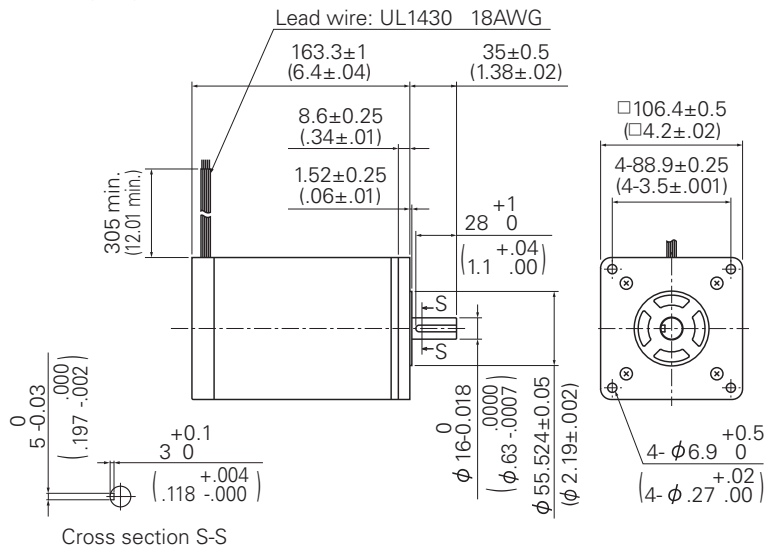
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) | $JL = [44 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (240.56 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

● 103H89222-52

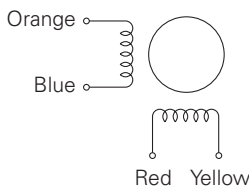


■ Dimension

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	-	+	+

■ Specification

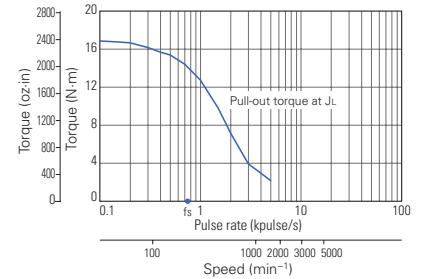
Bipolar winding, 1.8°/step

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 ²	22
	oz·in ²	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

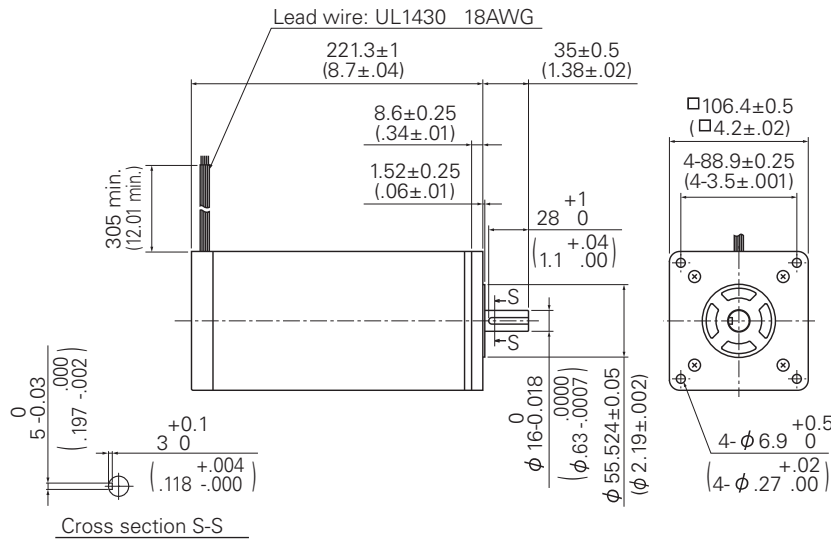
Constant current circuit, Source voltage: 100 VAC | Operating current: Rated Current, 2-phase energization (full-step) | $J_L = [44 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (240.56 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

● 103H89223-52

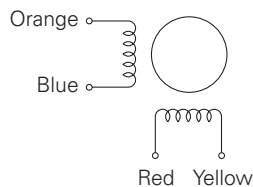


■ Dimension

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

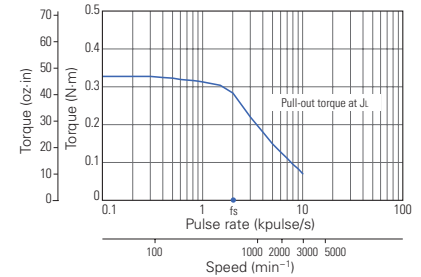
Bipolar winding, 1.8°/step, Vacuum

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 ²	0.056
	oz·in ²	0.306
Motor Weight	kg	0.34
	lb	0.75
Baking Temperature		Less than 200°C (392°F)
Working Pressure Range		1×10^{-5} Pa or more

■ Torque Curve

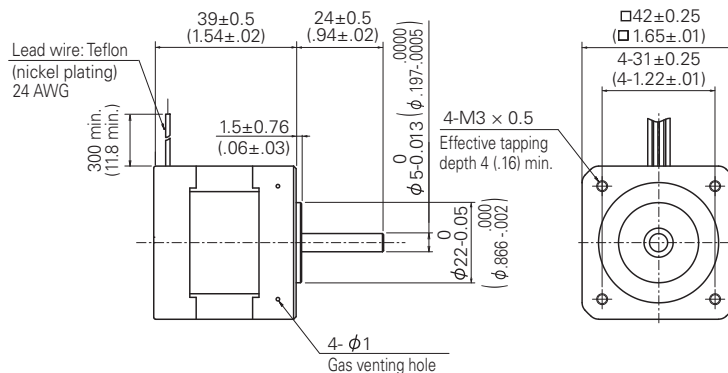
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $JL = [0.94 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (5.14 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

● 103H5208-49V40

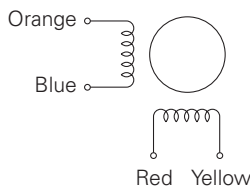


■ Dimension

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	—	+	—

■ Specification

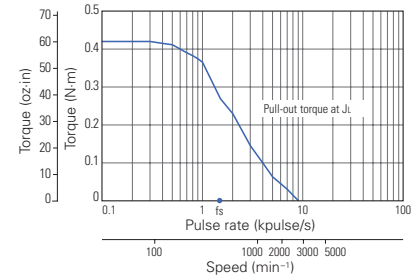
Bipolar winding, 1.8°/step, Vacuum

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 ²	0.1
	oz·in ²	0.547
Motor Weight	kg	0.67
	lb	1.48
Baking Temperature		Less than 200°C (392°F)
Working Pressure Range		1×10^{-5} Pa or more

■ Torque Curve

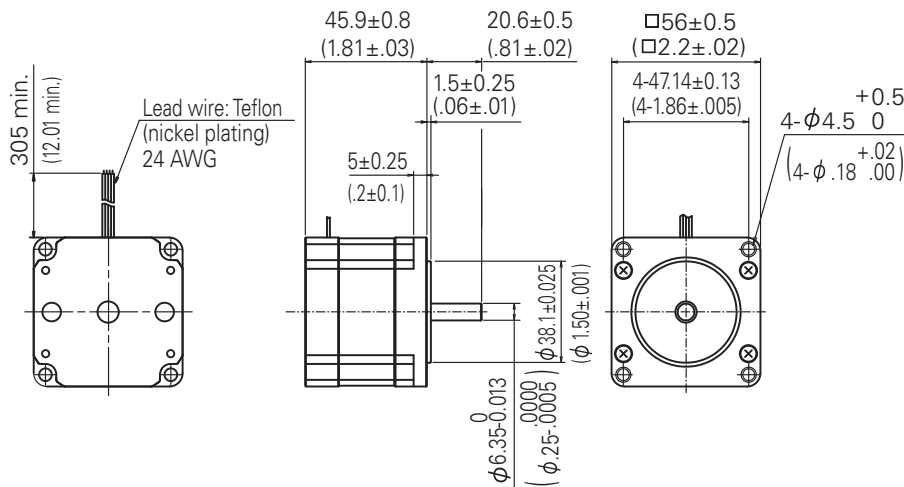
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | $J_L = [0.94 \times 10^{-4} \text{ kg} \cdot \text{m}^2 (5.14 \text{ oz} \cdot \text{in}^2)]$ pulley balancer method | fs: Maximum self-start frequency when not loaded

● 103H7121-47V40

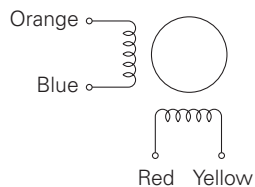


■ Dimension

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 ² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.					
Impact resistance	500 m/s ² 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	At normal temperature and humidity, not less than 100 MΩ between winding and frame by 500 VDC megger.					
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 ² (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 ² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.				
Impact resistance	500 m/s ² 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	0.025 mm	0.025 mm	0.025 mm	0.025 mm (0.001 in) (load: 10 N (1.12 lbs))
	0.001 in	0.001 in	(0.001 in)	(0.001 in)	
	(load: 5 N (1.12 lbs))	(load: 5 N (1.12 lbs))	(load: 5 N (1.12 lbs))	(load: 5 N (2.25 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.

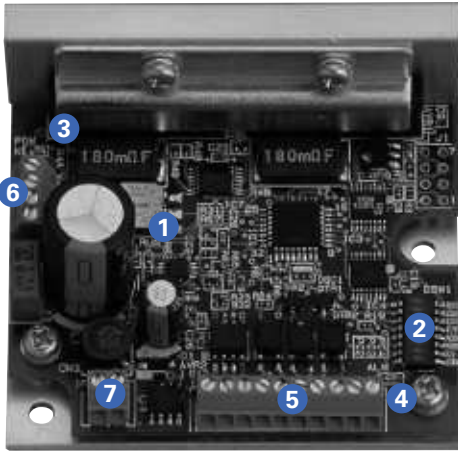
*1 Thrust play: Shaft displacement under axial load.

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

MCE Actuator

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	☐	☐	OFF
EX2	☐	☐	OFF
EX3	☐	☐	OFF
F/R	☐	☐	OFF
ACD1	☐	☐	OFF
ACD2	☐	☐	OFF
LV	☐	☐	OFF
EORG	☐	☐	OFF
			Partition number: 8
			Input method 2 (CW/CCW pulse input)
			Stopping current: 40% of driving current
			Micro step operation
			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)

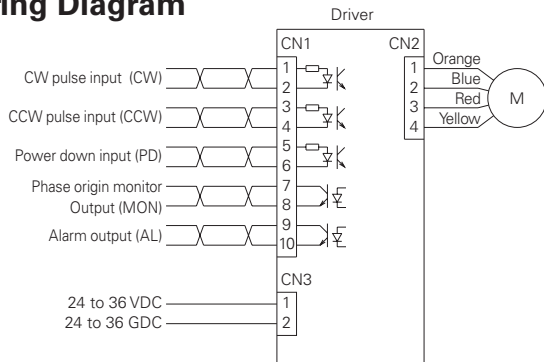
Connect the motor's power line.

7 Power supply terminal block (CN3)

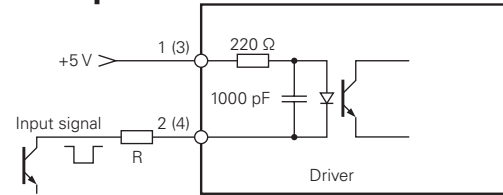
Connect the main circuit power supply.

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

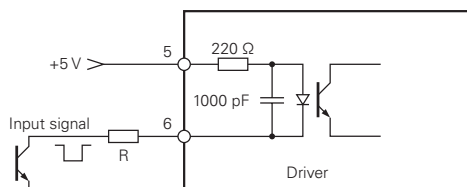
Part	Wire sizes	Allowable wire length
For power supply	22 AWG (0.3 mm ²)	2 m Max.
For input/output signal	24 AWG (0.2 mm ²) to 22 AWG (0.3 mm ²)	2 m Max.
For motor	22 AWG (0.3 mm ²)	Under 3 m

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.

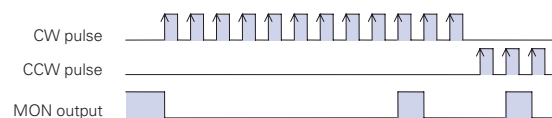
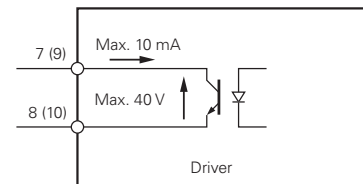
As for the motor rotational direction, CW direction is regarded as the clockwise rotation, and CCW direction is regarded as the counterclockwise rotation by viewing the motor from output shaft side.

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.

SANMOTION C

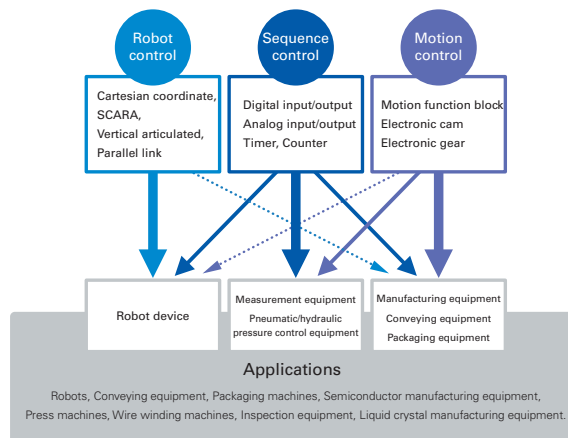
MOTION CONTROLLER

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.



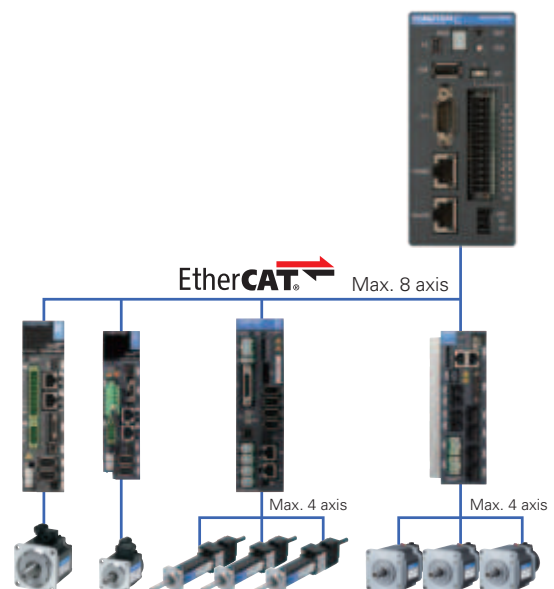
With high-speed fieldbus EtherCAT interface

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 SoftwareTool

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		Web visualization	
Control language		Programming languages conforming to international standard (IEC 61131-3)	
		G-code (SMC100-A only)	
Ambient temperature		0 to 55°C	
Storage temperature		-40 to 70°C	
Operation/storage humidity		10 to 95% (non-condensing)	
Vibration resistance		Constant amplitude: 3.5 mm (5 to 8.4 Hz) conforming to JIS B 3502:2011	
		Constant acceleration: 10 m/s ² (8.4 to 150 Hz) conforming to JIS B 3502:2011	
Shock resistance		Peak acceleration: 147 m/s ² , duration 11 ms conforming to JIS B 3502:2011	
Operation altitude		2,000 m max.	
Installation location		In control panel	
Overvoltage category		II or lower	
Degree of pollution		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

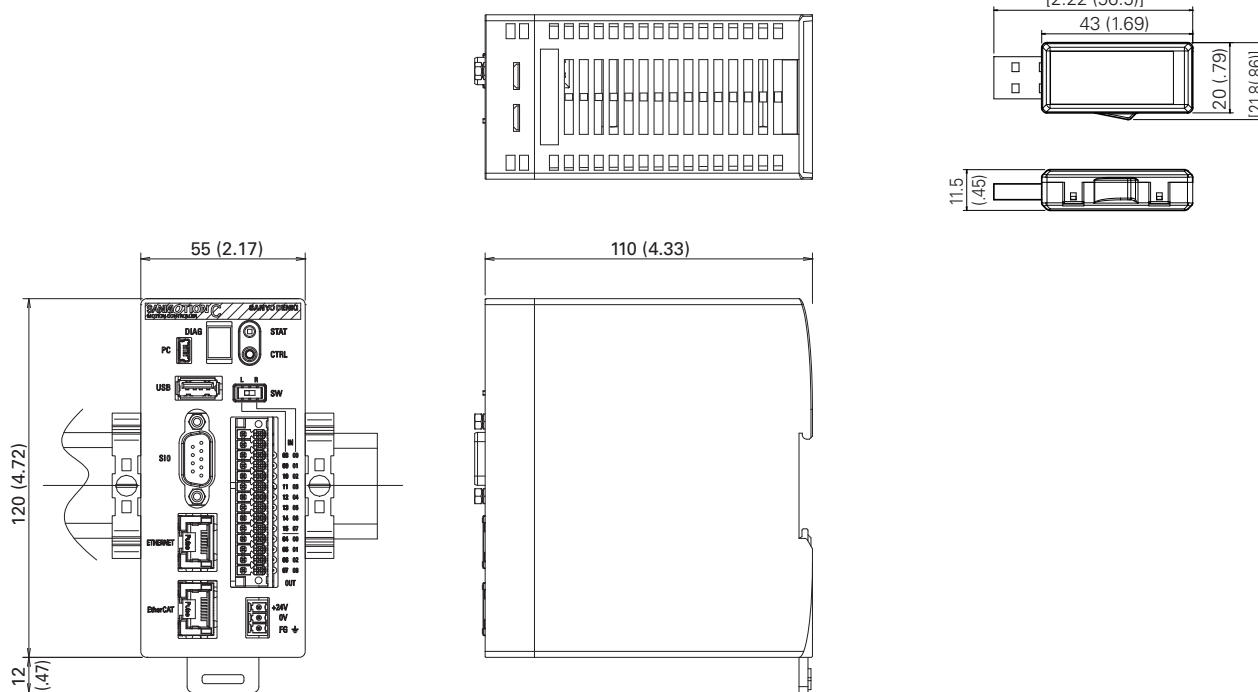
Unit: mm (inch)

SMC100-A SMC100-B

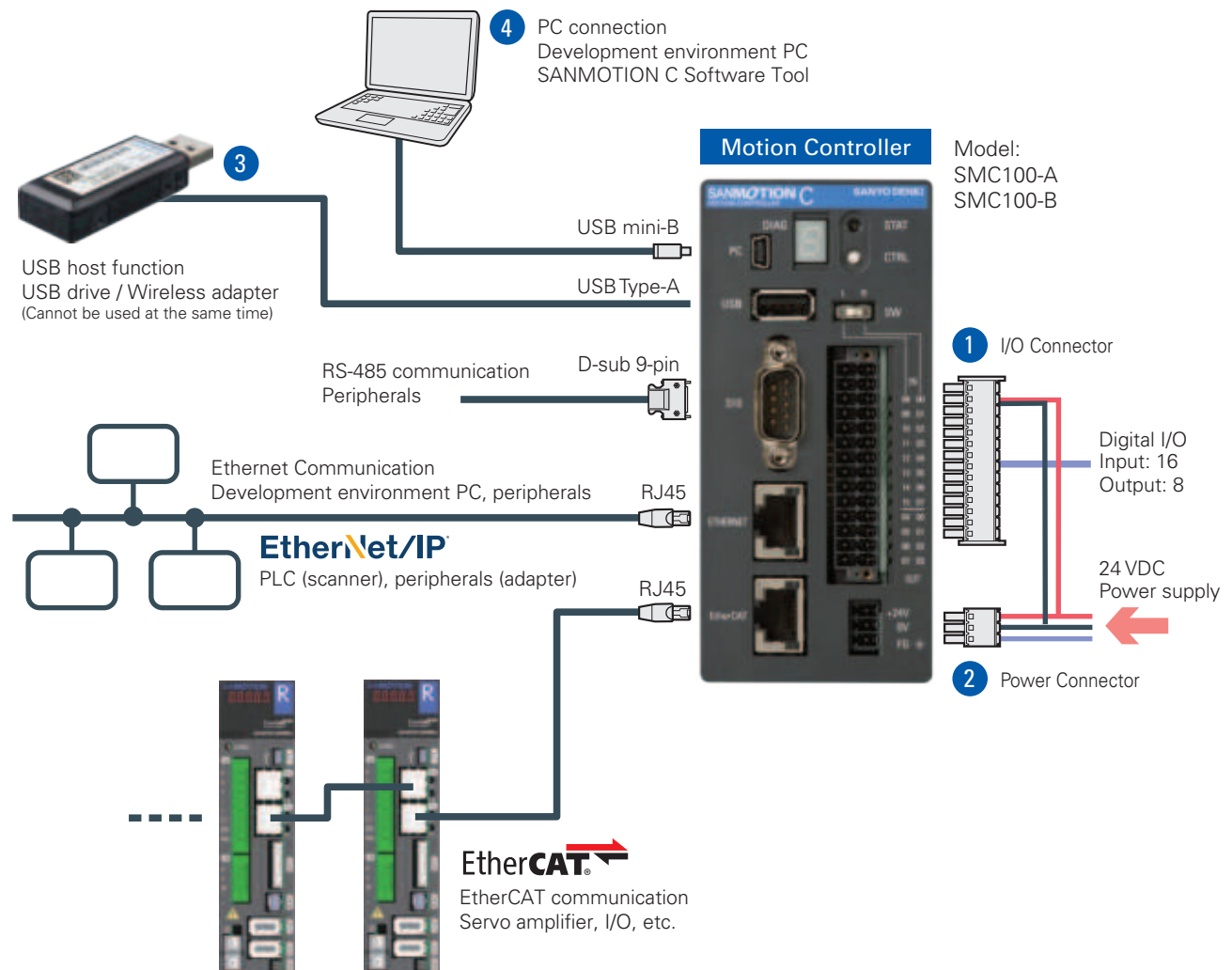
Mass: 300 g (0.66 lb)

SMC-USBW-01

Mass: 10 g (0.022 lb)



System Configuration



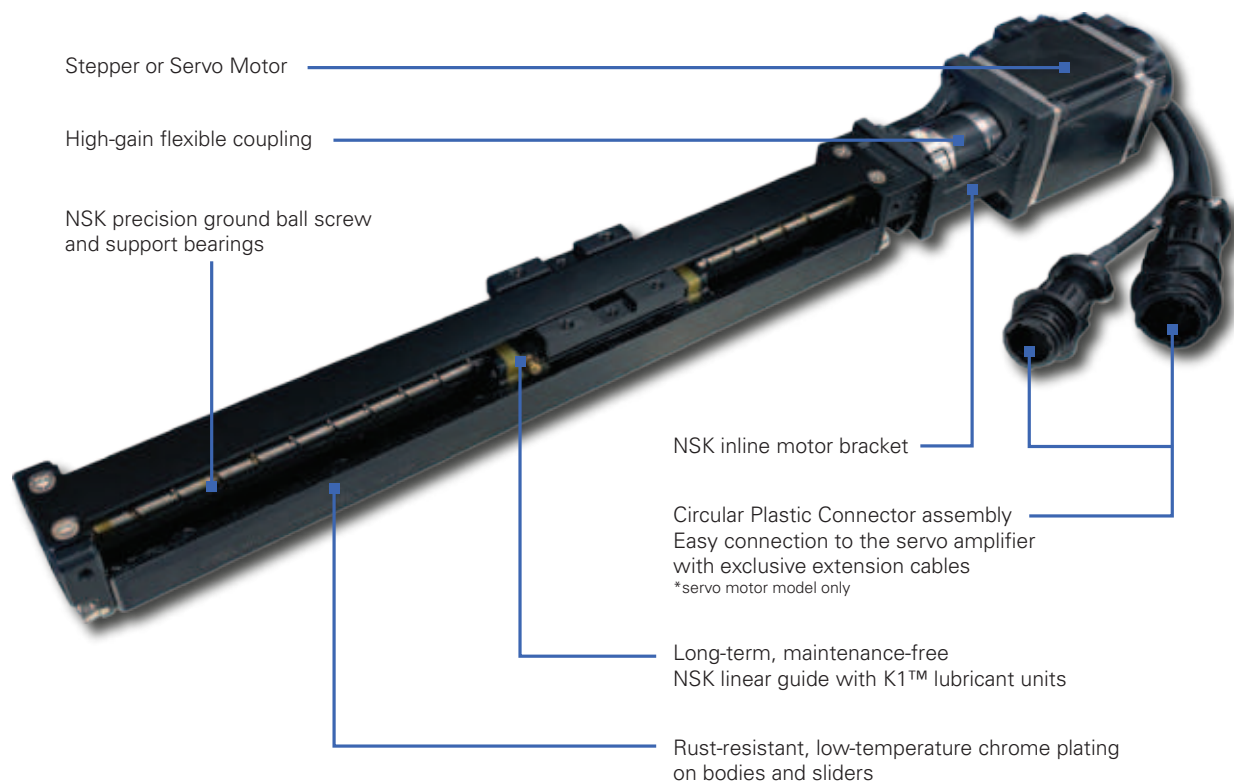
Item	Parts Number	Description
✓ 1	I/O Connector	AL-01005600-02
✓ 2	Power Connector	AL-01005600-01
3	Wireless USB adapter	SMC-USBW-01
✓ 4	SANMOTION C Software Tool	SOFTWARE-SMC100-111
		Integrated development software for sequence/motion/robot control

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	Stroke	Peak Thrust	Peak Speed	Motor (*1)		Page
			mm in	mm in	N lbf	mm/s	Model	Size	
MCE03	MCE03010P01K0001SKF		1 0.039	100 3.94	1040 234	50	SF2421-10B41	NEMA17 Stepper Motor	103
	MCE03010P02K0001SAF		2	100	1040	100	R2FA04003FXR03M	24VDC input AC Servo Motor	12
	MCE03010P02K0001SBF	w/ Brake	0.079	3.94	234		R2FA04003FCR03M	40mm ² , 30W	
	MCE03015H10K0001SCF		10	150	704	830	R2AA04010FXP00M	200VAC input AC Servo Motor	15 (*2)
	MCE03015H10K0001SDF	w/ Brake	0.39	5.91	158		R2AA04010FCP00M6	40mm ² , 100W	
MCE05	MCE06030H10K0001SEF		10	300	2626	830	R2AA06020FXP00M	200VAC input AC Servo Motor	18 (*2)
	MCE06030H10K0001SFF	w/ Brake	0.39	11.8	590		R2AA06020FCP00M	60mm ² , 200W	

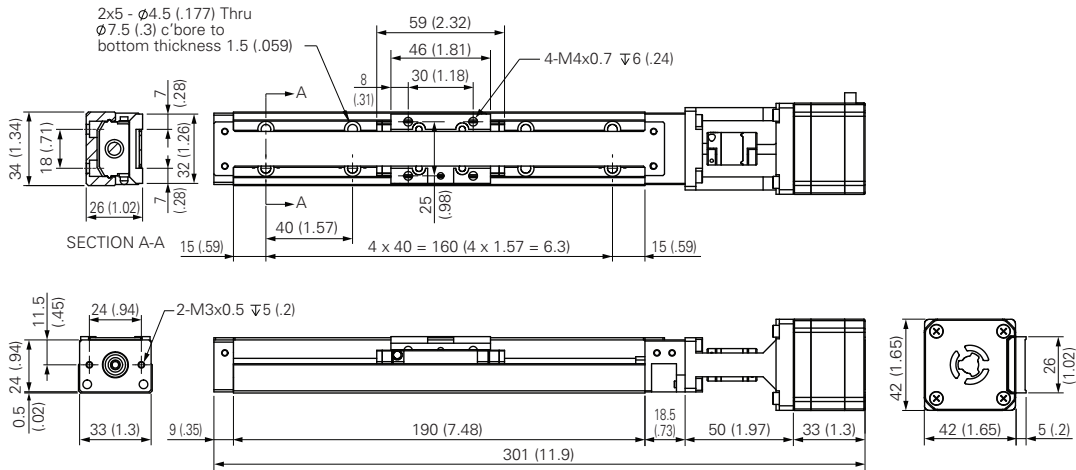
*1: Refer to the motors for the compatible servo amplifier/ stepper drive.

*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.

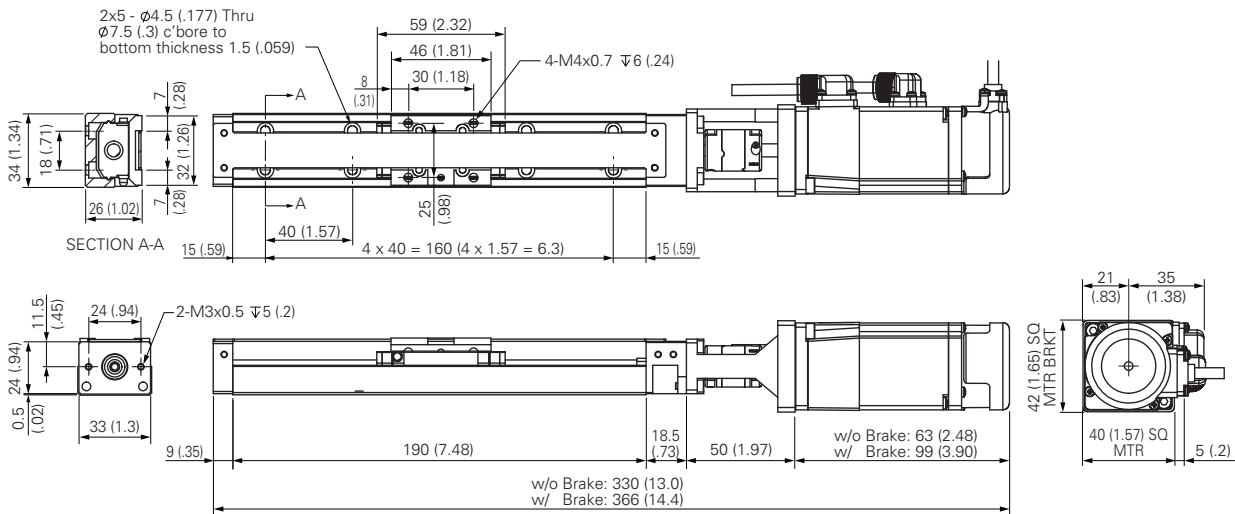
Dimensions

Unit: mm (inch)

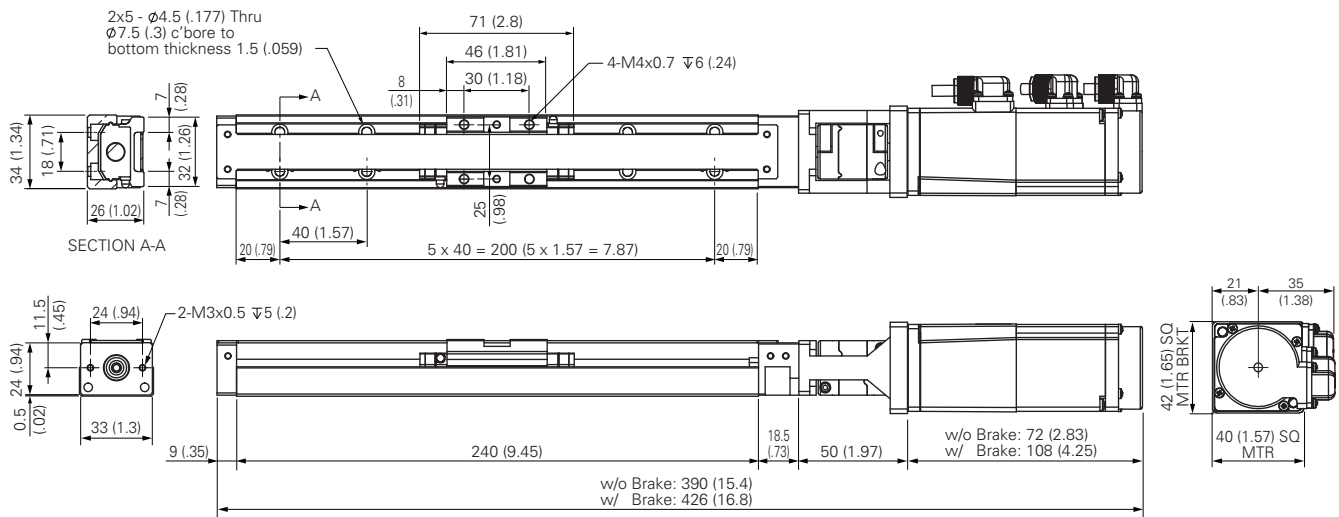
MCE03010P01K001SKF



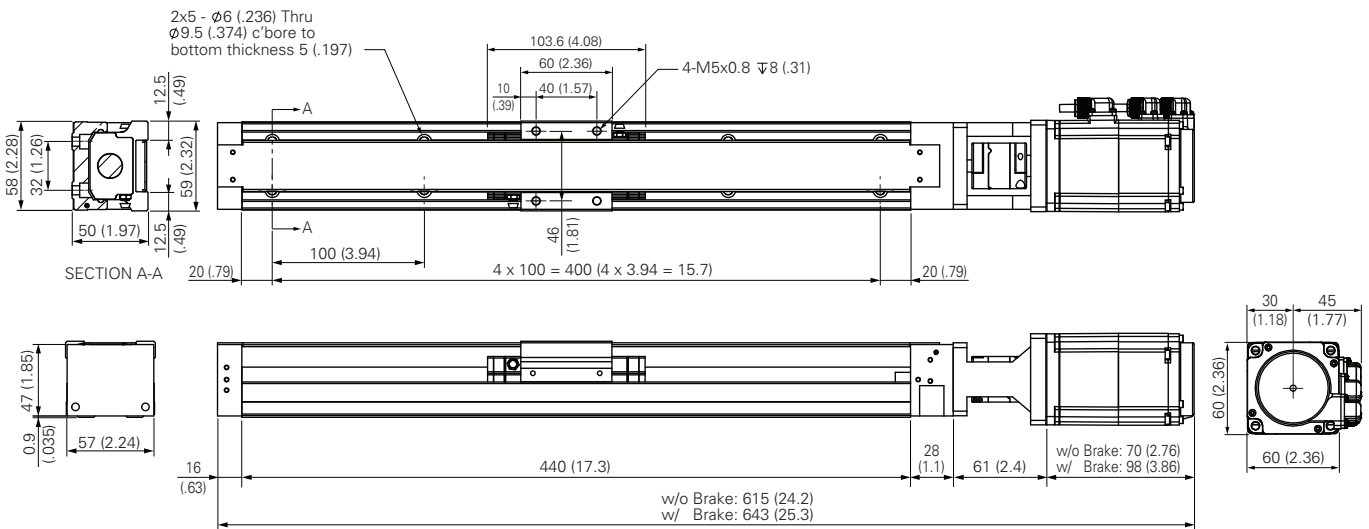
MCE03010P02K001SAF MCE03010P02K001SBF



■ 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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Remarks:

* Specifications are subject to change without notice.

31-January-2022 5th Edition Rev.2