SANMOTION

SANYO DENKI AMERICA CORE PRODUCTS

MOTION AND CONTROL

4th Edition Rev.4

SANYO DENKI

SANMOTION

SANMOTION is the brand name for SANYO DENKI motion control systems.
SANYO DENKI is a worldwide provider of stepping and servo systems. Our products are known for their high quality, reliability and state of the art design. Our systems are used in a variety of industries which include factory automation, semiconductor, medical, and office automation.

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 F5
5-PHASE STEPPING SYSTEMS

High torque bipolar stepping motors and High performance microstep drivers.

0.041 to *4.4* *N·m*

MOTOR SIZE

NEMA 11, 17, 60 mm, 86 mm

INTERFACE

Pulse Input

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
Indexer (RTA Product)
Analog (RTA Product)

SANMOTION C
MOTION CONTROLLER

SANMOTION C integrates motion control, robot control, and sequence control into one unit to provide major advantages in reduced device costs and shorter development times.
For use in material handling robots and general industrial machinery. Image processing devices and a touch panel have also been developed as motion controller peripherals.

INTERFACE

EtherCAT

SANMOTION

New Models

SANMOTION R
AC SERVO SYSTEMS

Evolved, Eco-efficient, and Easy to UseAC Servo Amplifier "SANMOTION R" 3E Model

The 3E Model has a speed frequency response of 2.2 kHz, approximately twice that of our conventional product. The 3E Model is equipped with a gain increase function, a function for suppressing micro-vibrations at settling time, an adaptive notch filter for suppressing mechanical resonance, and a feed-forward vibration control function.

EtherCAT Conformance tested

SANMOTION Model No.PB
CLOSED LOOP STEPPING SYSTEMS

4-Axis Integrated EtherCAT Driver

High speed serial communication enables 4-axis stepping motor operation. In addition to the conventional closed loop control that eliminates step-out, the new model includes a mode that also eliminates delays in position commands. Without any delays in position commands, device takt time is reduced.

EtherCAT Conformance tested

SANMOTION F2
2-PHASE STEPPING SYSTEMS

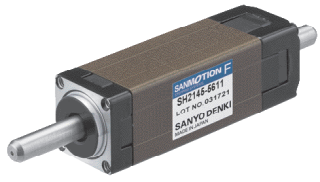
Vacuum Stepping Motor

Vacuum stepping motors can be driven in a vacuum environment without requiring a vacuum feedthrough. Use as vacuum compatible actuators while retaining the stepping motor benefits of easy high-precision open-loop control.

SANMOTION F2
2-PHASE STEPPING SYSTEMS

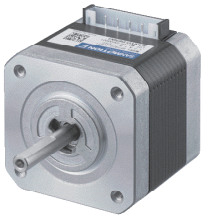
14 mm sq.
Compact Stepping Motor

Longer model in the compact 2-phase stepping motor released. Though small in size, its holding torque is significant at 1.42 oz-in.



42 mm sq.
High Torque Stepping Motor

10%* higher holding torque, 3 dB(A)* lower noise levels, 2.4%* improved efficiency.
This enables precise positioning and thereby shortens positioning time as well.
* Approximate value. Compared with our current model.

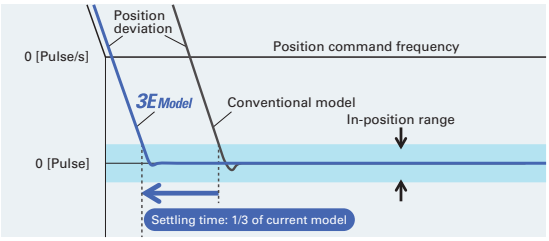


Index

SANMOTION R
AC SERVO SYSTEMS

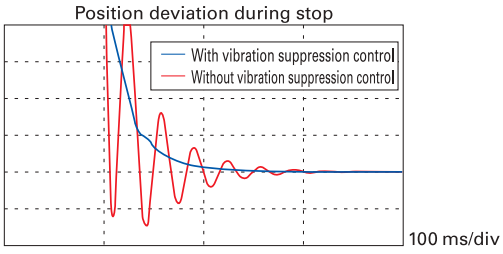
High Response

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



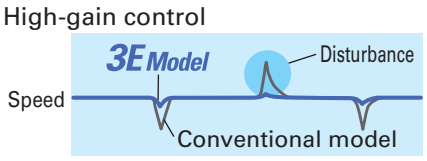
Vibration Suppression Control

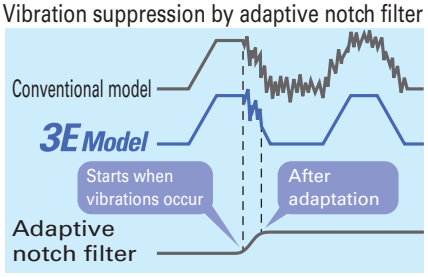
Feed forward vibration suppression control eliminates the typical vibrations seen at stationary positions in a servo system. This noise suppression is easily reduced by using simple on-board tuning procedures.



Improved Control Accuracy

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





EtherCAT Model

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

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. ±12V
  Preset Command: 3 points
Torque Command**
  Analog Voltage: Max. ±12V
**AC input type only

Lineup

Small Capacity Motors

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: EtherCAT 200 VAC	EtherCAT 100 VAC	EtherCAT 48 VDC	EtherCAT 24 VDC	Indexer 200 VAC	Modbus 200 VAC	Analog / Pulse 200 VAC	Analog / Pulse 48 VDC	Page
2.4 W	14 / 0.55	0.023 / 0.204	0.06 / 0.53	Max. 1500 Rated 1000	R2GAD102RM			■						8
20 W	20 / 0.79	0.064 / 0.57	0.23 / 2.04	Max. 6000 Rated 3000	R2GA02D20F			■						9
		0.064 / 0.53	0.18 / 1.59	Max. 4500 Rated 3000	R2FA02D20D				■					
30 W	20 / 0.79	0.095 / 0.84	0.38 / 3.4	Max. 6000 Rated 3000	R2GA02D30F			■						10
		0.095 / 0.84	0.38 / 3.4	Max. 3000 Rated 3000	R2FA02D30H				■					
	40 / 1.57	0.098 / 0.87	0.37 / 3.3	Max. 6000 Rated 3000	R2AA04003F	■				■	■	■		11
					R2EA04003F		■							
		0.098 / 0.87	0.24 / 2.1	Max. 6000 Rated 3000	R2GA04003F			■					■	
		0.098 / 0.87	0.33 / 2.9	Max. 6000 Rated 3000	R2FA04003F				■					
50 W	40 / 1.57	0.159 / 1.41	0.59 / 5.2	Max. 6000 Rated 3000	R2AA04005F	■				■	■	■		12
					R2EA04005F		■							
		0.159 / 1.41	0.54 / 4.8	Max. 6000 Rated 3000	R2GA04005F			■					■	
		0.159 / 1.41	0.40 / 3.5	Max. 4500 Rated 3000	R2FA04005D				■					
80 W	40 / 1.57	0.255 / 2.27	0.86 / 7.6	Max. 6000 Rated 3000	R2EA04008F		■							13
		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	■				■	■	■		14
70 W	60 / 2.36	0.318 / 2.81	0.84 / 7.43	Max. 2500 Rated 2100	R2FA06007R				■					15
100 W	60 / 2.36	0.318 / 2.81	1.13 / 10.0	Max. 6000 Rated 3000	R2AA06010F	■				■	■	■		16
		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			■					■	
200 W	60 / 2.36	0.637 / 5.64	2.2 / 19.5	Max. 6000 Rated 3000	R2AA06020F	■				■	■	■		17
					R2EA06020F		■							
		0.637 / 5.64	1.5 / 13.3	Max. 4500 Rated 3000	R2GA06020D			■					■	
400 W (360 W)	60 / 2.36	1.27 / 11.2	4.8 / 42	Max. 6000 Rated 3000	R2AA06040FX	■				■	■	■		18
		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	■				■	■	■		19
1 kW	86 / 3.39	3.18 / 28.1	11.6 / 102.7	Max. 6000 Rated 3000	R2AAB8100H	■				■	■	■		20

Medium Capacity Motors

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: EtherCAT 200 VAC	EtherCAT 100 VAC	EtherCAT 48 VDC	EtherCAT 24 VDC	Indexer 200 VAC	Modbus 200 VAC	Analog / Pulse 200 VAC	Analog / Pulse 48 VDC	Page
0.55 kW	130 / 5.12	2.6 / 23	7 / 62	Max. 5000 Rated 2000	R2AA13050D	■				■		■		21
1.2 kW	130 / 5.12	5.7 / 50	16 / 142	Max. 5000 Rated 2000	R2AA13120D	■				■		■		22
2 kW	130 / 5.12	9.5 / 84	30 / 265	Max. 5000 Rated 2000	R2AA13200D	■				■		■		23
5 kW	220 / 8.67	24 / 212	75 / 664	Max. 4000 Rated 2000	R2AA22500L	■				■		■		24

Linear Actuator

Rated Thrust	Motor Size mm / inch	Rated Thrust N / lb	Peak Thrust N / lb	Speed m/s	Model	Servo Amplifier Interface: EtherCAT 200 VAC	EtherCAT 100 VAC	EtherCAT 48 VDC	EtherCAT 24 VDC	Indexer 200 VAC	Modbus 200 VAC	Analog / Pulse 200 VAC	Analog / Pulse 48 VDC	Page
5.1 N	12 / 0.47	5.1 / 1.2	16.5 / 3.71	Max. 2.0 Rated 1.0	DE0AC001A03MX00			■						25

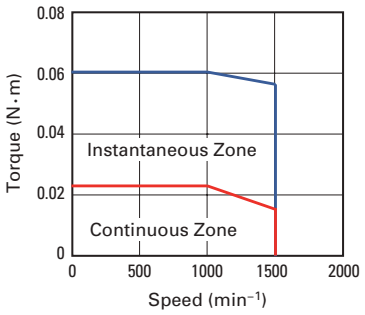
MOTOR POWER	2.4 W	MOTOR FLANGE SIZE	14 mm (0.55 inch)

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

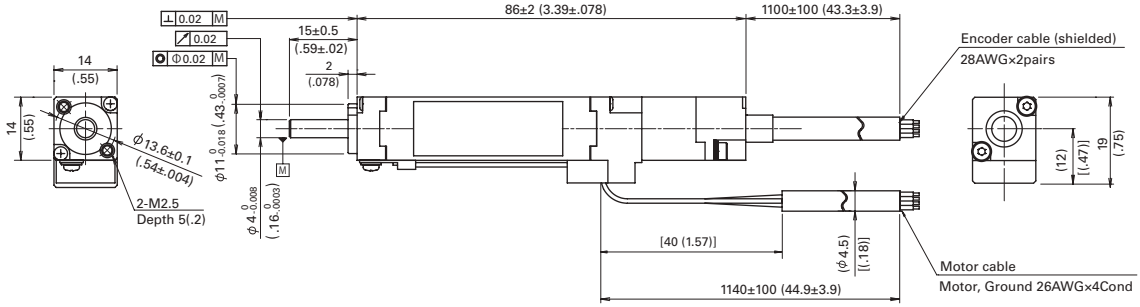
Torque Curve

R2GAD102RM



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	R2GAD102RMXH30 1027-116392*3	RF2J14A0HL5			

*3 1027-: w/ CPC screw lock type connector assembly.

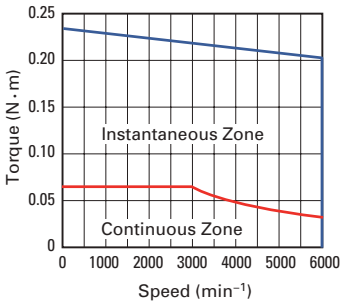
MOTOR POWER	20 W	MOTOR FLANGE SIZE	20 mm (0.79 inch)

Specifications

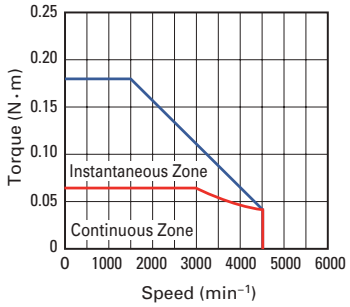
Power Supply		48 VDC	24 VDC
Model		R2GA02D20F	R2FA02D20D
Rated Power	kW	0.02	0.02
Maximum Speed	min^{-1}	6000	4500
Rated Speed	min^{-1}	3000	3000
Rated Torque	N·m	0.064	0.064
	lb·in	0.57	0.57
Peak Torque at Stall	N·m	0.23	0.18
	lb·in	2.04	1.59
Rotor Moment of Inertia	$x10^{-4}$ kg·m^2	0.0033	0.0033
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

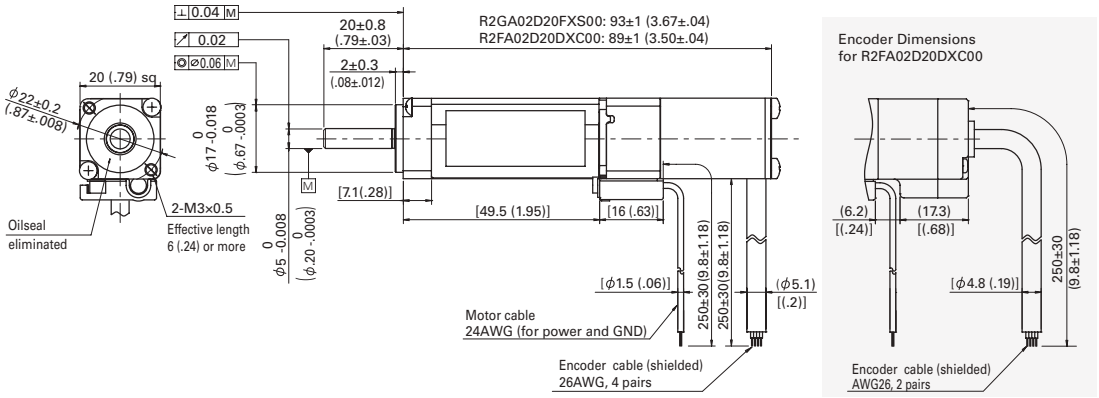


R2FA02D20D



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	R2GA02D20FXS00 1027-107013*3	RS2K04AAHA5 RF2J24A8HL5			
24 VDC	R2FA02D20DXC00 1027-116393*3	RS2J04A2HA5 RF2K24A0HL5			

*3 1027-: w/ CPC screw lock type connector assembly.

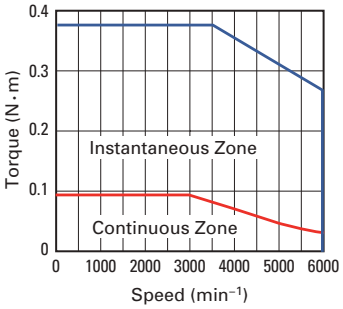
MOTOR POWER 30 W | **MOTOR FLANGE SIZE** 20 mm (0.79 inch)

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	

Torque Curve

R2GA02D30F



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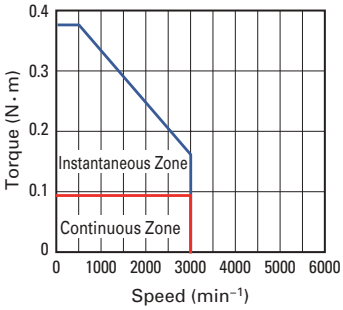
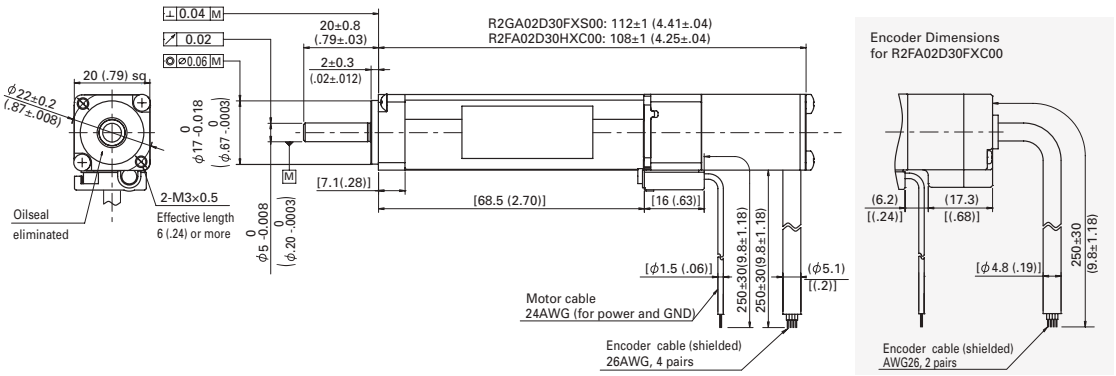


Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	R2GA02D30FXS00 1027-107014*3	RS2K04AAHA5 RF2J24A8HL5			
24 VDC	R2FA02D30HXC00 1027-116394*3	RS2J04A2HA5 RF2K24A0HL5			

*3 1027-: w/ CPC screw lock type connector assembly.

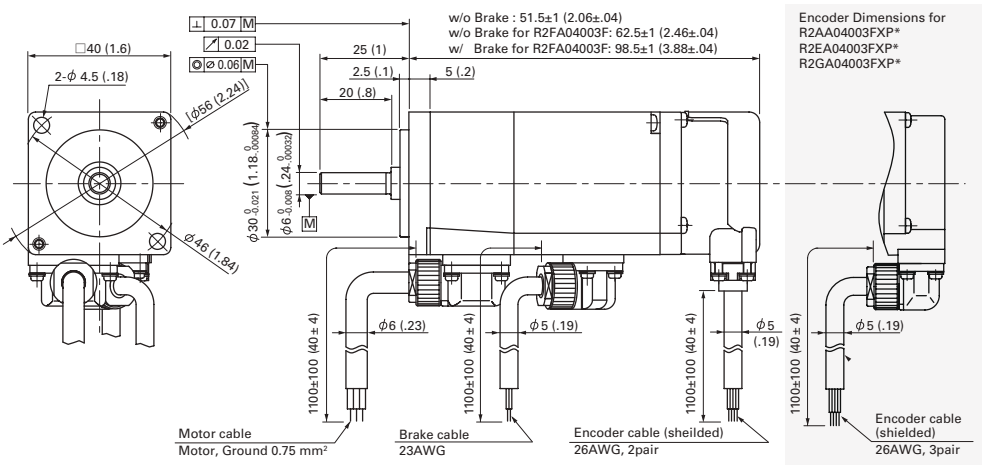
MOTOR POWER	30 W	MOTOR FLANGE SIZE	40 mm (1.57 inch)

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			

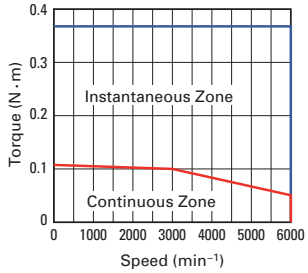
Dimension

Unit: mm (inch)

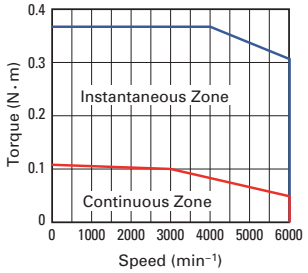


Torque Curve

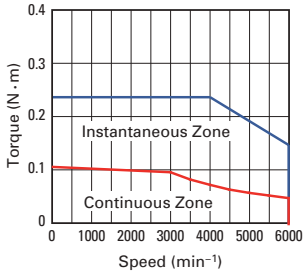
R2AA04003F



R2EA04003F



R2GA04003F



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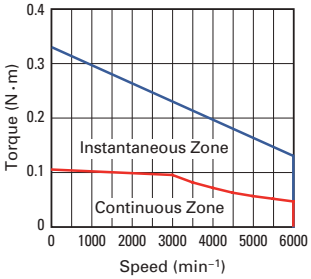


Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA04003FXP00M(E01)*3		RS2A01A0KA4 RS2A01A2HA5	RS1A01AC	RS1A01AF	RS3A01A0AA4
100 VAC	R2EA04003FXP00M(E01)*3		RS2E01A0KA4			
48 VDC	R2GA04003FXP00M 1027-116504*3		RS2K04A2HA5 RF2K24A0HL5			RF2G21A0A00
24 VDC	R2FA04003FXR03M 1027-116396*3		RS2J04A2HA5 RF2K24A0HL5			
	R2FA04003FCR03M 1027-116395*3	w/Brake				

*3 E01 and 1027-: w/ CPC screw lock type connector assembly.

MOTOR POWER	50 W	MOTOR FLANGE SIZE	40 mm (1.57 inch)

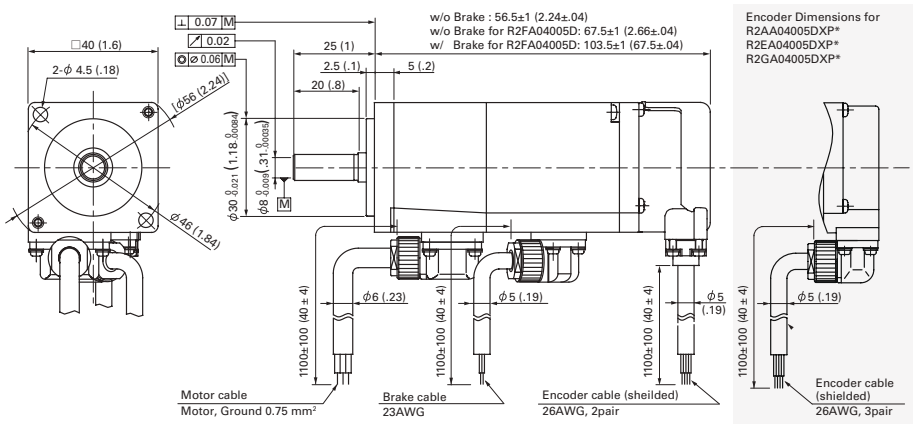
Specifications

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

*1 2000 p/r incremental encoder equipped motor is also available for R2AA04005F.
*2 Brake equipped motor is available. Refer to page 67 for brake specifications.

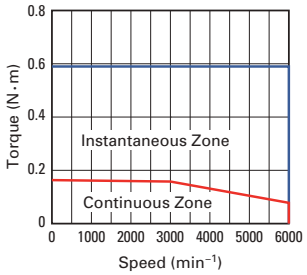
Dimension

Unit: mm (inch)

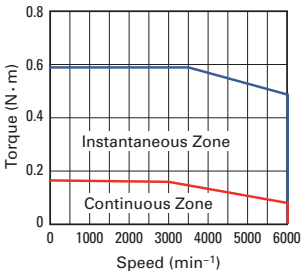


Torque Curve

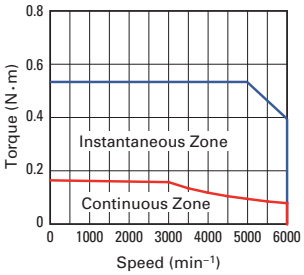
R2AA04005F



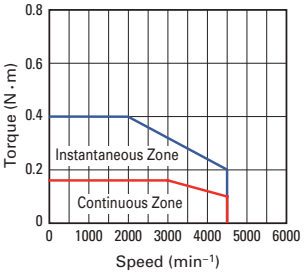
R2EA04005F



R2GA04005F



R2FA04005D



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA04005FXP00M(E01)*3		RS2A01A0KA4 RS2A01A2HA5	RS1A01AC	RS1A01AF	RS3A01A0AA4
100 VAC	R2EA04005FXP00M(E01)*3		RS2E01A0KA4			
48 VDC	R2GA04005FXP00M 1027-116505*3		RS2K04A2HA5 RF2K24A0HL5			RF2G21A0A00
24 VDC	R2FA04005DXR03M 1027-116398*3		RS2J04A2HA5 RF2K24A0HL5			
	R2FA04005DCR03M 1027-116397*3	w/Brake				

*3 E01 and 1027-: w/ CPC screw lock type connector assembly.

MOTOR POWER	80 W	MOTOR FLANGE SIZE	40 mm (1.57 inch)

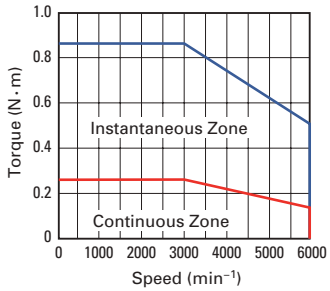
Specifications

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	

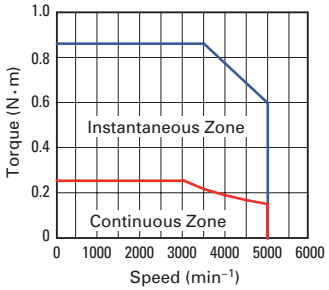
*2 Brake equipped motor is available. Refer to page 67 for brake specifications.

Torque Curve

R2EA04008F

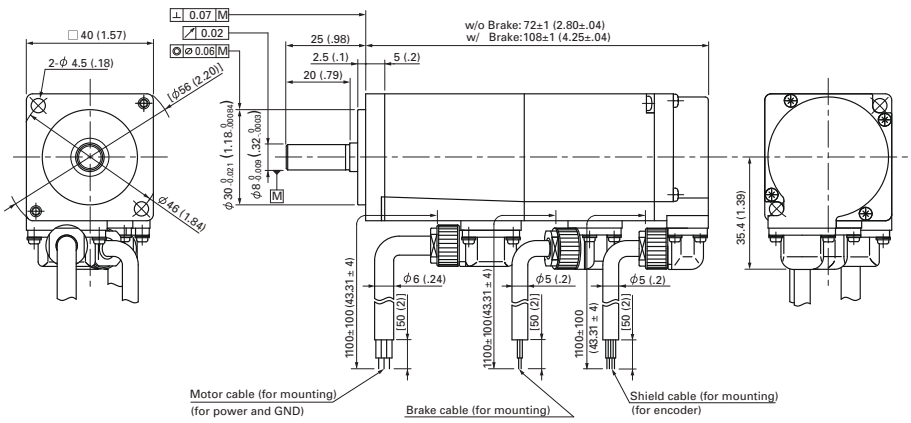


R2GA04008D



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
100 VAC	R2EA04008FXP00M(E01)*3		RS2E01A0KA4			
	R2EA04008FCP00M(E01)*3	w/ Brake				
48 VDC	R2GA04008DXP00M 1027-107016*3		RS2K04A2HA5 RF2K24A0HL5			RF2G21A0A00
	R2GA04008DCP00M 1027-107015*3	w/ Brake				

*3 E01 and 1027-: w/ CPC screw lock type connector assembly.

MOTOR POWER	100 W	MOTOR FLANGE SIZE	40 mm (1.57 inch)

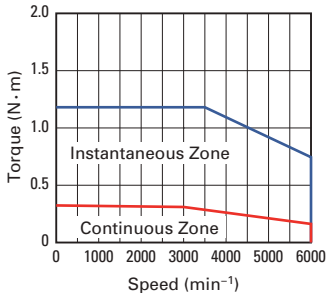
Specifications

Power Supply		200 VAC
Model		R2AA04010F*2
Rated Power	kW	0.1 (0.09 *2)
Maximum Speed	min^{-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.

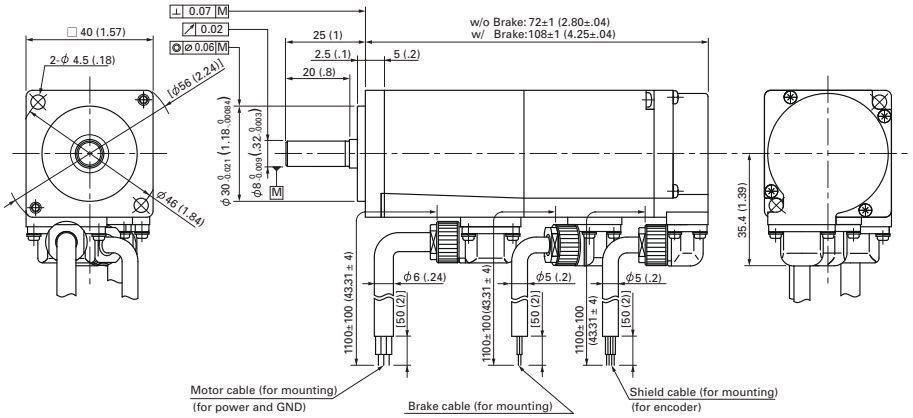
Torque Curve

R2AA04010F



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA04010FXP00M(E01)*3		RS3A01A2HA4 RS2A01A0KA4	RS1A01AC	RS1A01AF	RS3A01A0AA4
	R2AA04010FCP00M6(E01)*3	w/ Brake	RS2A01A2HA5			

*3 E01: w/ CPC screw lock type connector assembly

MOTOR POWER	70 W	MOTOR FLANGE SIZE	60 mm (2.36 inch)

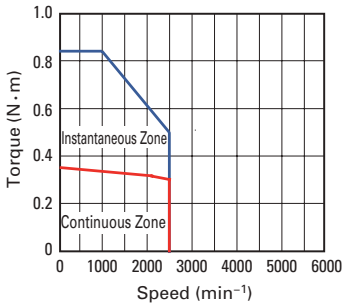
Specifications

Power Supply		24 VDC
Model		R2FA06007R*2
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

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

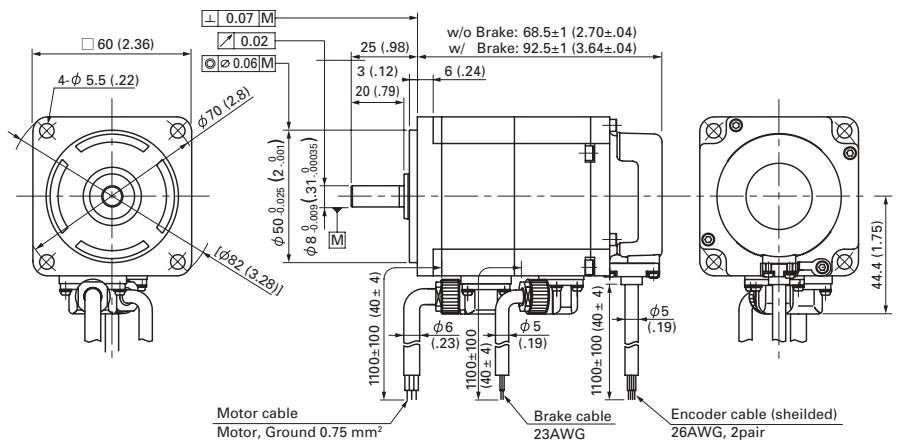
Torque Curve

R2FA06007R



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
24 VDC	R2FA06007RXR03M 1027-116400*3		RS2J04A2HA5			
	R2FA06007RCR03M 1027-116399*3	w/Brake	RF2K24A0HL5			

*3 1027-: w/ CPC screw lock type connector assembly.

MOTOR POWER 100 W | **MOTOR FLANGE SIZE** 60 mm (2.36 inch)

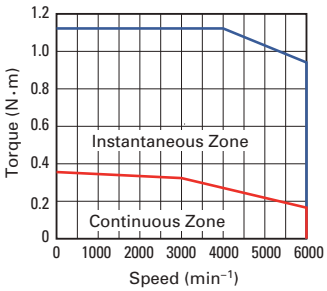
Specifications

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		

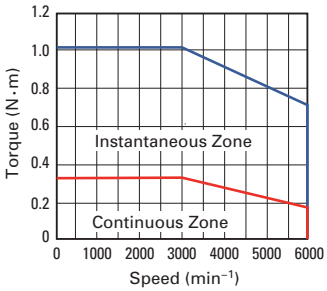
*1 2000 p/r incremental encoder equipped motor is also available for R2AA06010F.

Torque Curve

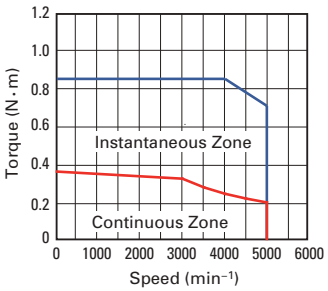
R2AA06010F



R2EA06010F

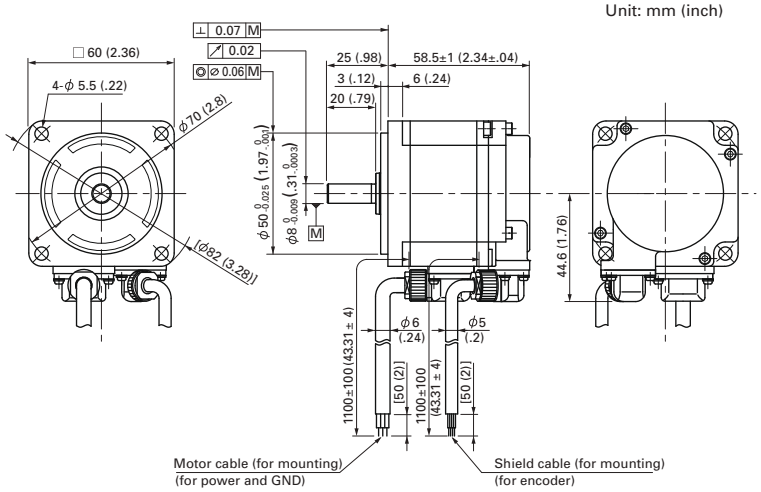


R2GA06010D



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA06010FXP00M(E01)*3		RS3A01A2HA4 RS2A01A0KA4 RS2A01A2HA5	RS1A01AC	RS1A01AF	RS3A01A0AA4
100 VAC	R2EA06010FXP00M(E01)*3		RS2E01A0KA4			
	R2EA06010FCP00M(E01)*3	w/ Brake				
48 VDC	R2GA06010DXP00M 1027-107017*3		RS2K04A2HA5 RF2K24A0HL5			RF2G21A0A00

*3 E01 and 1027-: w/ CPC screw lock type connector assembly

MOTOR POWER	200 W	MOTOR FLANGE SIZE	60 mm (2.36 inch)

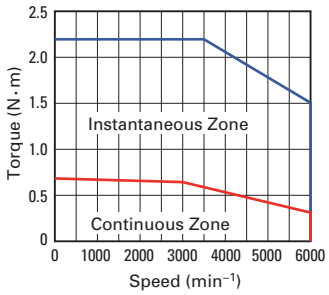
Specifications

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.

Torque Curve

R2AA06020F



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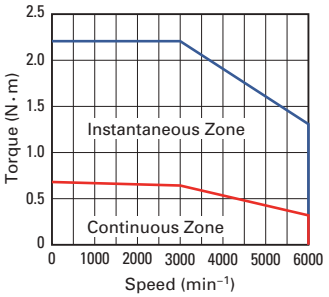
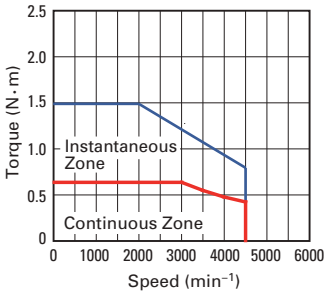
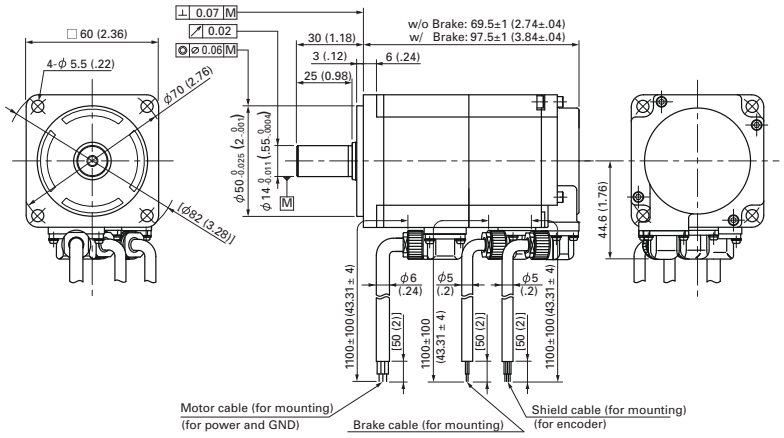


R2GA06020D



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA06020FXP00M(E01)*3		RS3A02A2HA4 RS2A01A0KA4 RS2A01A2HA5	RS1A01AC	RS1A01AF	RS3A02A0AA4
	R2AA06020FCP00M 1027-107010*3	w/ Brake				
100 VAC	R2EA06020FXP00M(E01)*3		RS2E03A0KA4			
	R2EA06020FCP00M(E01)*3	w/ Brake				
48 VDC	R2GA06020DXP00M 1027-107019*3		RS2K04A2HA5 RF2K24A0HL5			RF2G21A0A00
	R2GA06020DCP00M 1027-107018*3	w/ Brake				

*3 E01 and 1027-: w/ CPC screw lock type connector assembly

MOTOR POWER 400 W | **MOTOR FLANGE SIZE** 60 mm (2.36 inch)

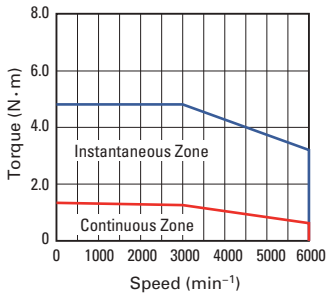
Specifications

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.

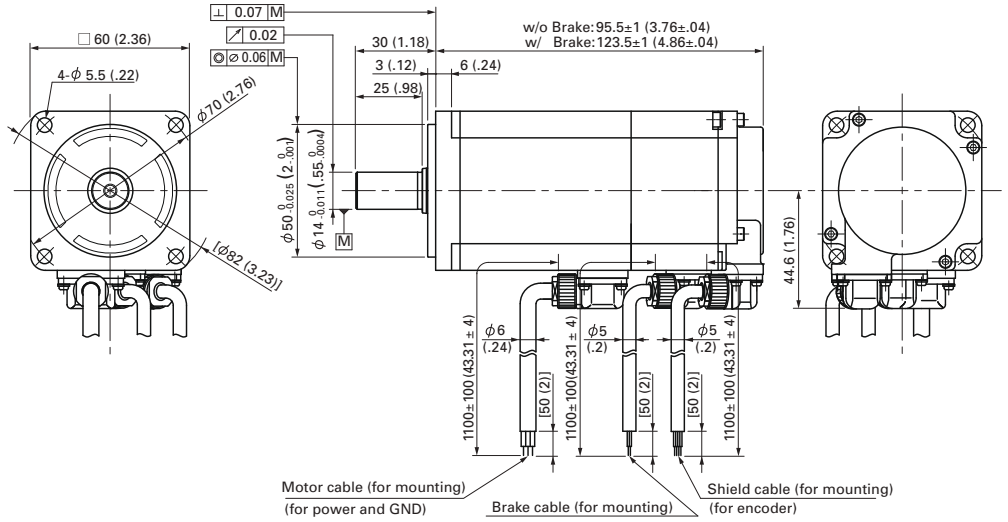
Torque Curve

R2AA06040F



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA06040FXP00M(E01)*3		RS3A02A2HA4 RS2A03A0KA4	RS1A03AC	RS1A03AF	RS3A02A0AA4
	R2AA06040FCP00M6(E01)*3	w/ Brake	RS2A03A2HA5			

*3 E01: w/ CPC screw lock type connector assembly.

MOTOR POWER	750 W	MOTOR FLANGE SIZE	80 mm (3.15 inch)

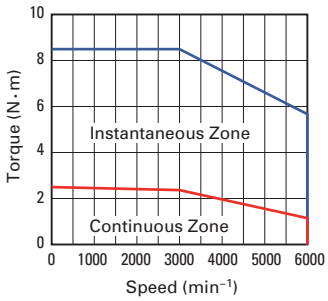
Specifications

Power Supply		200 VAC
Model		R2AA08075F
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.

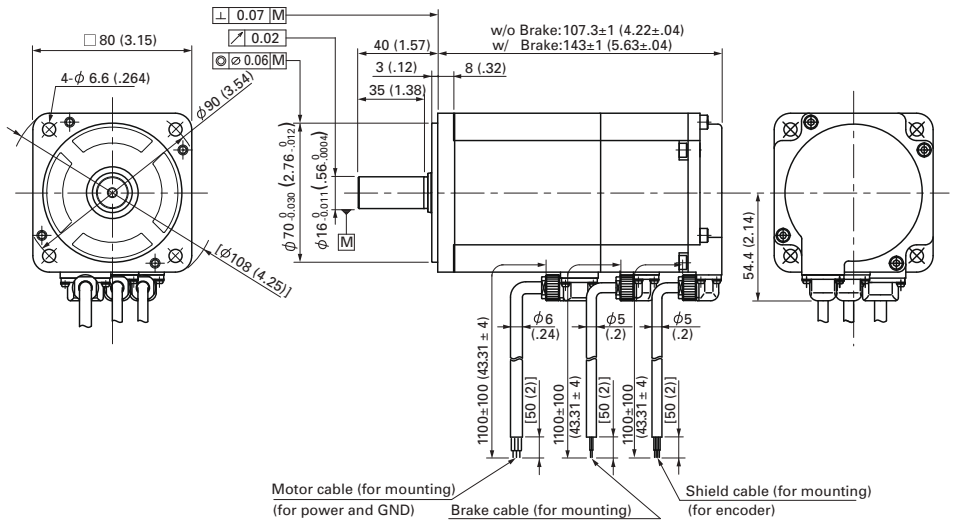
Torque Curve

R2AA08075F



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA08075FXP00M(E01)*3		RS3A03A2HA4 RS2A03A0KA4 RS2A03A2HA5	RS1A03AC	RS1A03AF	RS3A03A0AA4
	R2AA08075FCP00M(E01)*3	w/ Brake				

*3 E01: w/ CPC screw lock type connector assembly.

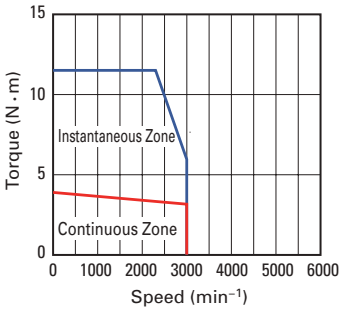
MOTOR POWER	1 kW	MOTOR FLANGE SIZE	86 mm (3.39 inch)

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

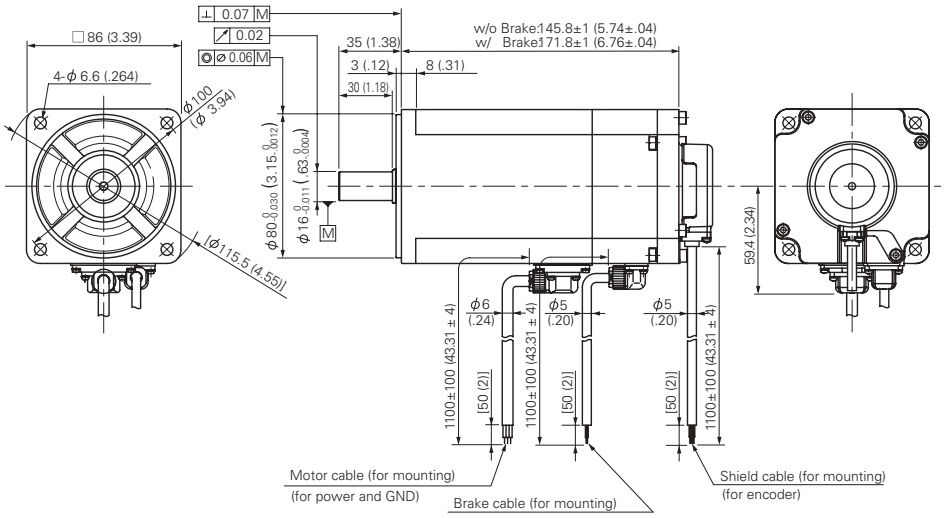
Torque Curve

R2AAB8100H



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AAB8100HXR00M 1027-107012*3		RS3A03A2HA4 RS2A03A0KA4 RS2A03A2HA5	RS1A03AC	RS1A03AF	RS3A03A0AA4
	R2AAB8100HCR00M 1027-107011*3	w/ Brake				

*3 1027-: w/ CPC screw lock type connector assembly

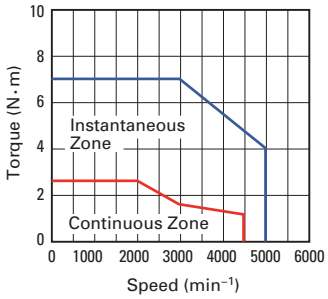
MOTOR POWER	0.55 kW	MOTOR FLANGE SIZE	130 mm (5.12 inch)

Specifications

Power Supply		200 VAC
Model		R2AA13050D
Rated Power	kW	0.55
Maximum Speed	min^{-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

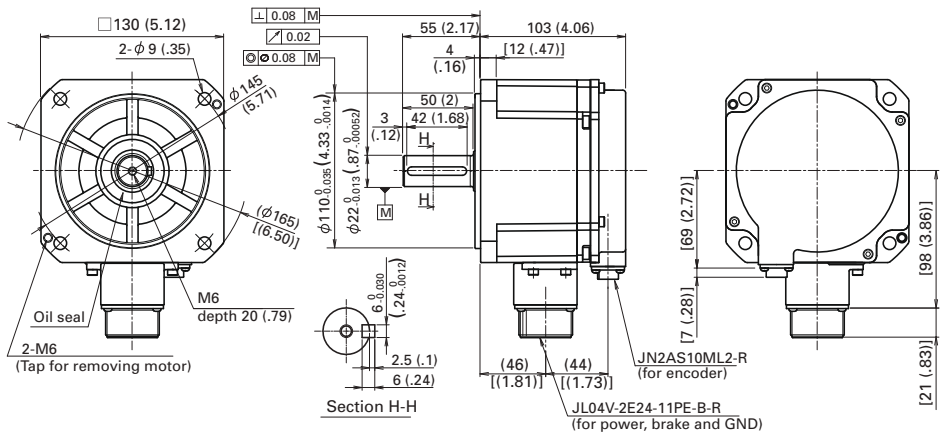
Torque Curve

R2AA13050D



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA13050DXP00M	RS3A03A2HA4 RS2A03A0KA4 RS2A03A2HA5	RS1A03AC		RS3A03A0AA4

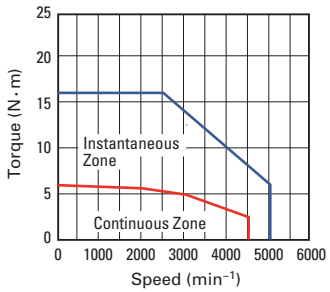
MOTOR POWER	1.2 kW	MOTOR FLANGE SIZE	130 mm (5.12 inch)

Specifications

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

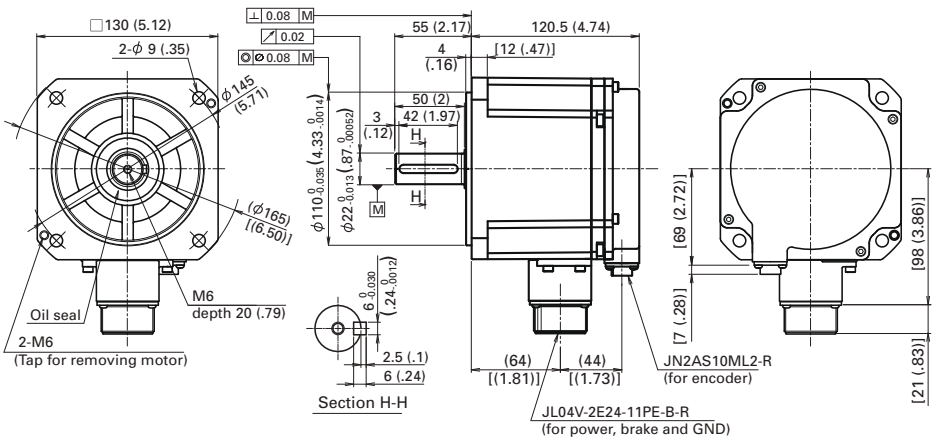
Torque Curve

● **R2AA13120D**



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA13120DXP00M	RS3A05A2HA4 RS2A05A0KA4 RS2A05A2HA5	RS1A05AC		RS3A05A0AA4

MOTOR POWER	2 kW	MOTOR FLANGE SIZE	130 mm (5.12 inch)

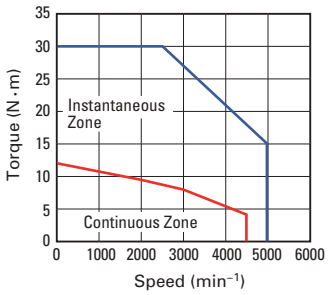
Specifications

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

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

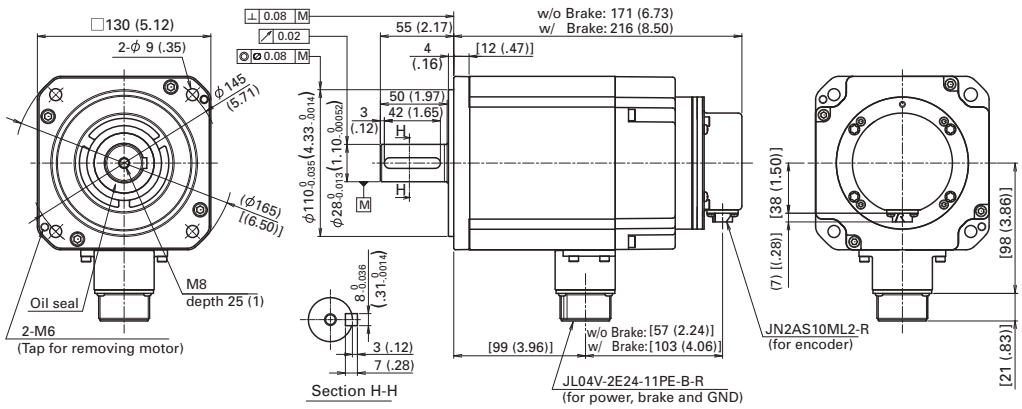
Torque Curve

R2AA13200D



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA13200DXP00M		RS3A10A2HA4 RS2A10A0KA4	RS1A10AC		RS3A10A0AA4
	R2AA13200DCP00M	w/ Brake	RS2A10A2HA5			

MOTOR POWER	5 kW	MOTOR FLANGE SIZE	220 mm (8.66 inch)

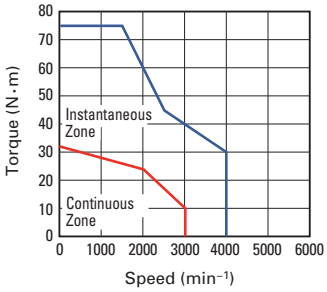
Specifications

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

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

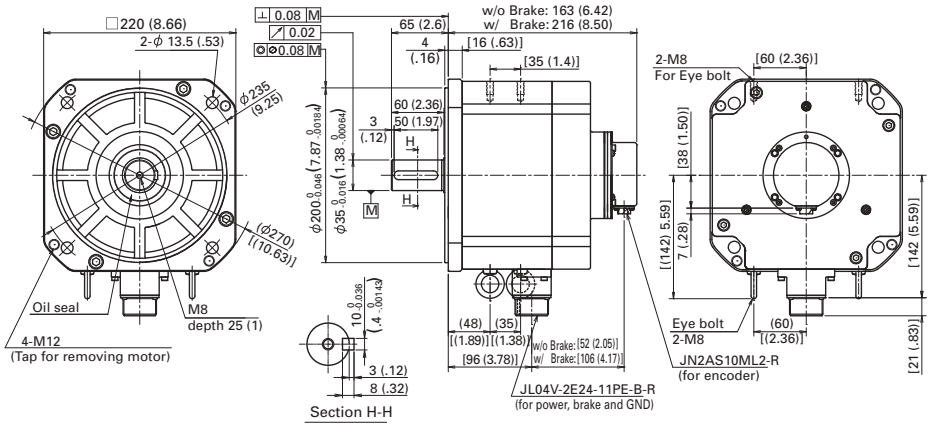
Torque Curve

R2AA22500L



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor		Amplifier			
			EtherCAT	Indexer	Modbus	Analog/Pulse
200 VAC	R2AA22500LXP00M		RS3A15A2HA4 RS2A15A0KA4 RS2A15A2HA5	RS1A15AC		RS3A15A0AA4
	R2AA22500LCP00M	w/ Brake				

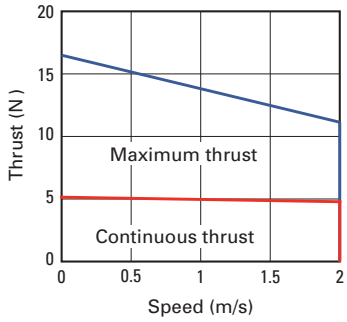
MOTOR THRUST	5.1 N	MOTOR WIDTH	12 mm (0.46 inch)

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

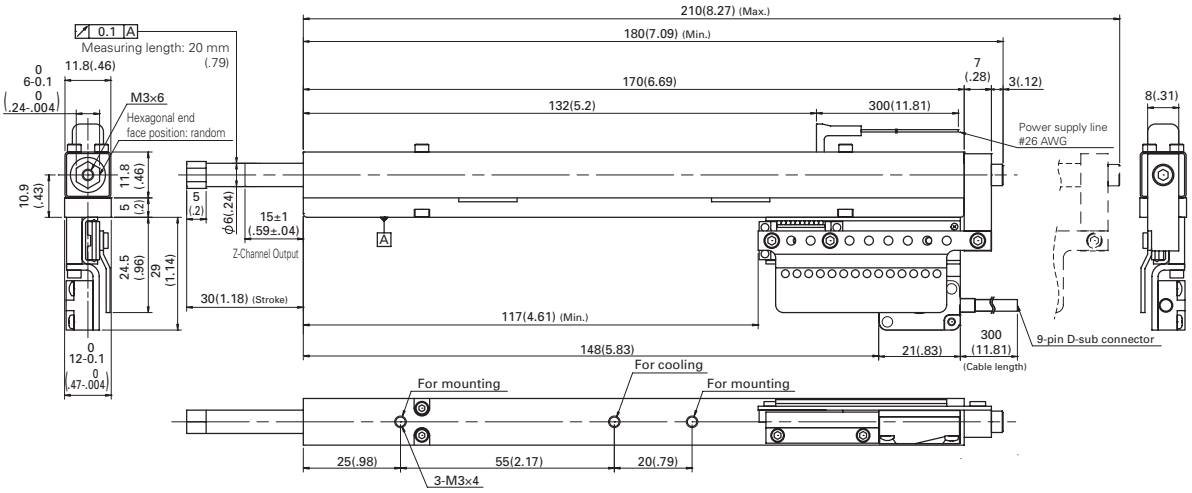
Thrust Curve

DE0AC001A03MX00



Dimension

Unit: mm (inch)



Applicable Amplifier

Power Supply	Motor	Amplifier			
		EtherCAT	Indexer	Modbus	Analog/Pulse
48 VDC	DE0AC001A03MX00 1028-107023*3	RF2J24A8HL5			

*3 1028-: w/ CPC screw lock type connector assembly.

3E Model 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
Environment	Ambient temperature	0 to +55˚C
	Storage temperature	-20 to +65˚C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s^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

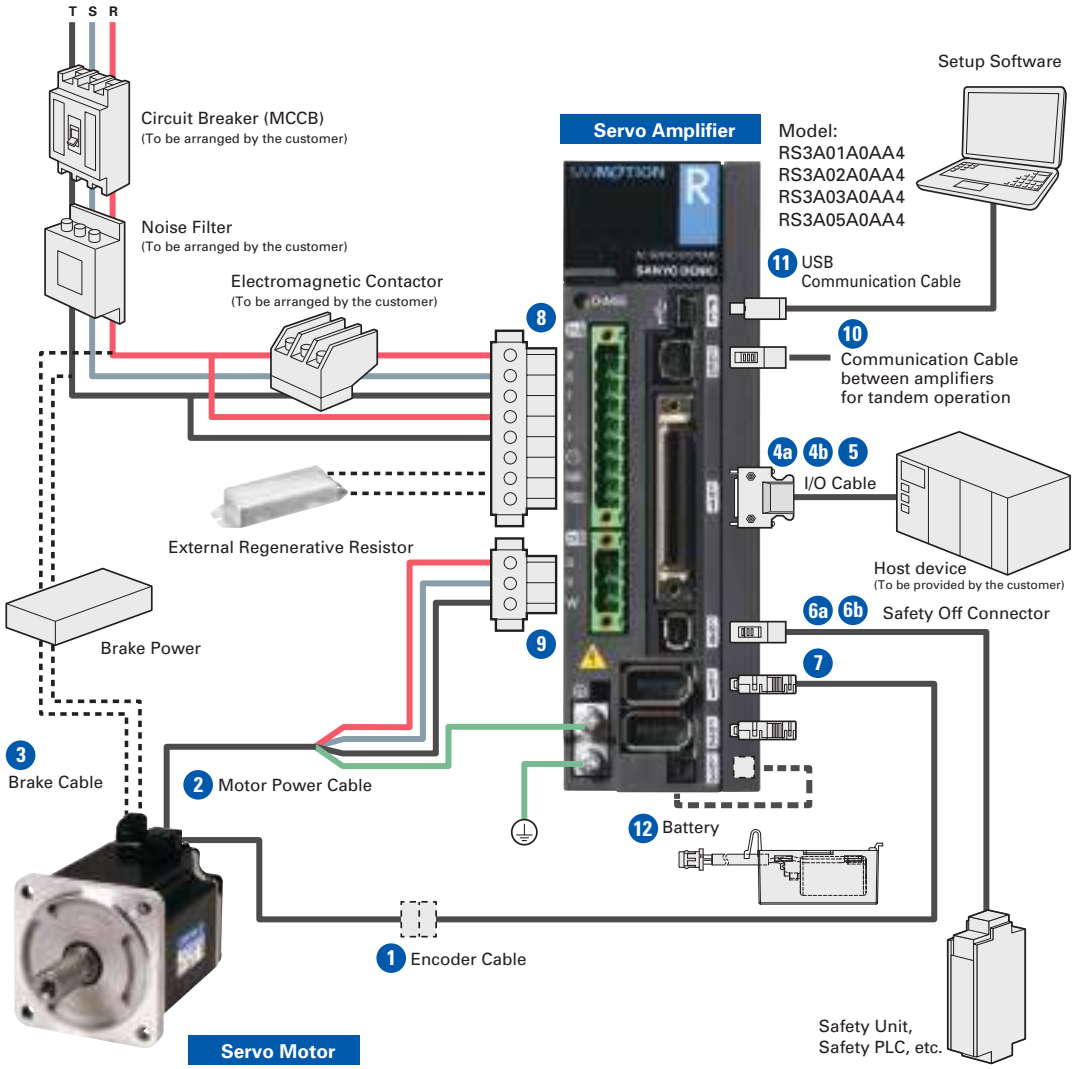
Built-in Functions

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	Approximately10kΩ
Torque command	Command voltage	DC±2.0V at 1000min^{-1} command. Positive command (forward) motor rotation, maximum input voltage ±10V.
	Input impedance	Approximately 10kΩ
General input	Sequence input	Interactive photo coupler (sink, source connection): ×8 input
		Input power voltage range: DC5V±5% / DC12V~DC24V±10%, 100mA or over(DC24V)
		Servo ON, Alarm reset, Torque limit, Encoder clear, Forward rotation prohibit, Command prohibit, Reverse rotation prohibit, Command prohibit, External trip, Forced discharge, Emergency stop, Gain switching, Internal speed setting, etc.
Torque limit input		±2.0VDC±15% (at rated torque), Input impedance: approximately 10kΩ
General output	Sequence output	Open collector output: x 8 outputs
		Power supply for general output circuit (CN1-49,OUT-PWR): DC5V±5% / DC12V to DC24V±10%, 20mA or over
		Specification of Power supply for general output circuit • 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

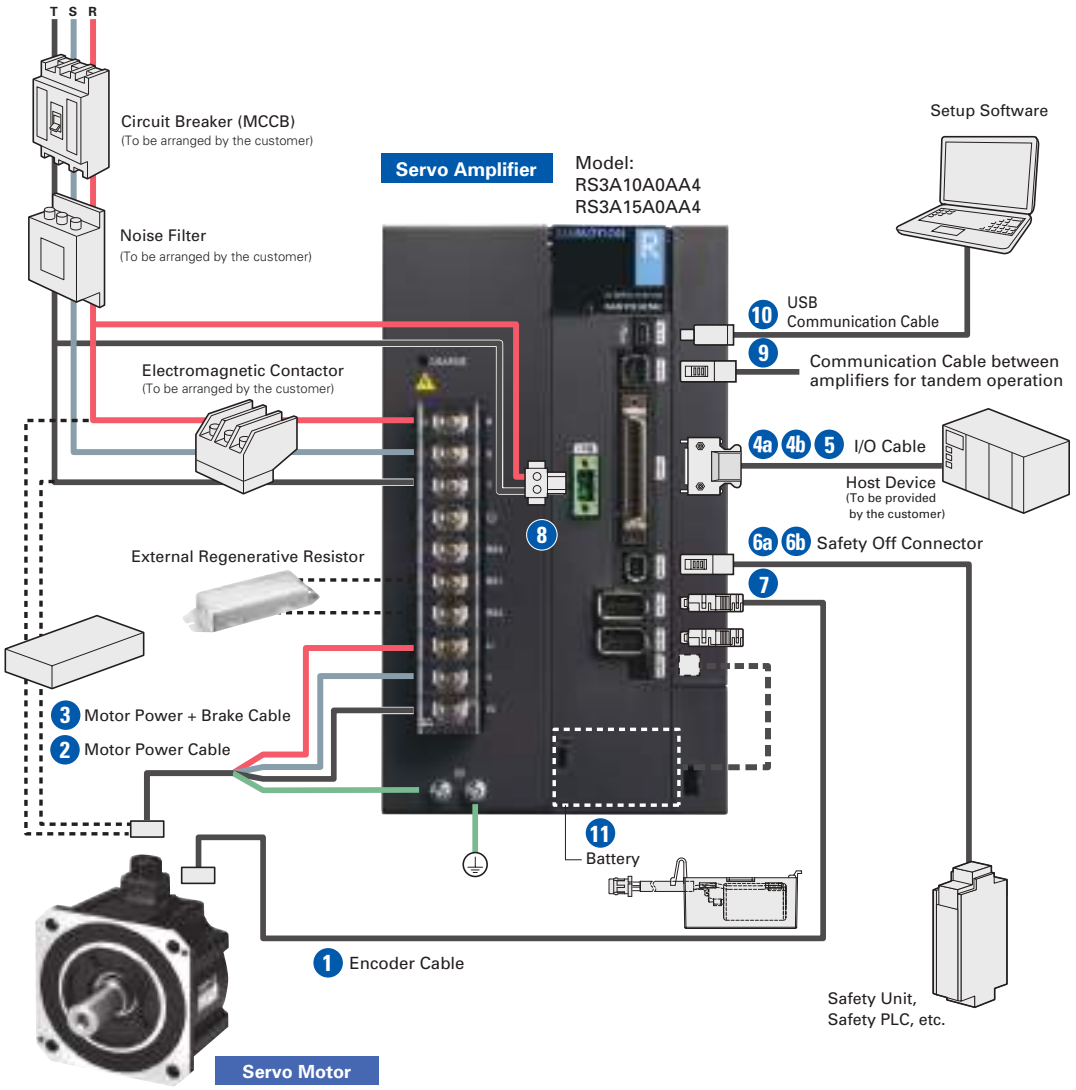
System Configuration: 10A, 20A, 30A, 50A



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
✓ 6a	Connector [CN4]	AL-00718252-01	For STO, no need if (6b) is selected
✓ 6b	Connector [CN4]	AL-00718251-01	For STO cancellation, no need if 6a is selected
7	Connector [EN1, EN2]	AL-00632607	No need if Encoder Cable (1) is selected
8	Connector [CNA]	AL-00686902-01	Supplied with Amplifier
9	Connector [CNB]	AL-Y0004079-01	No need if Motor Power Cable (2) is selected
10	Communication Cable: 1m	AL-00911582-01	For tandem operation
✓ 11	USB Communication Cable: 1m	AL-00896515-01	Communication with SANMOTION MOTOR Setup software
12	Battery [CN3]	AL-00880402-01	Used when using a battery -backup method absolute encoder

To build a complete system, you need to have checked items.
Note: I/O cable can be chosen either 4a or 5. Connector for CN4 can be chosen either 6a or 6b.

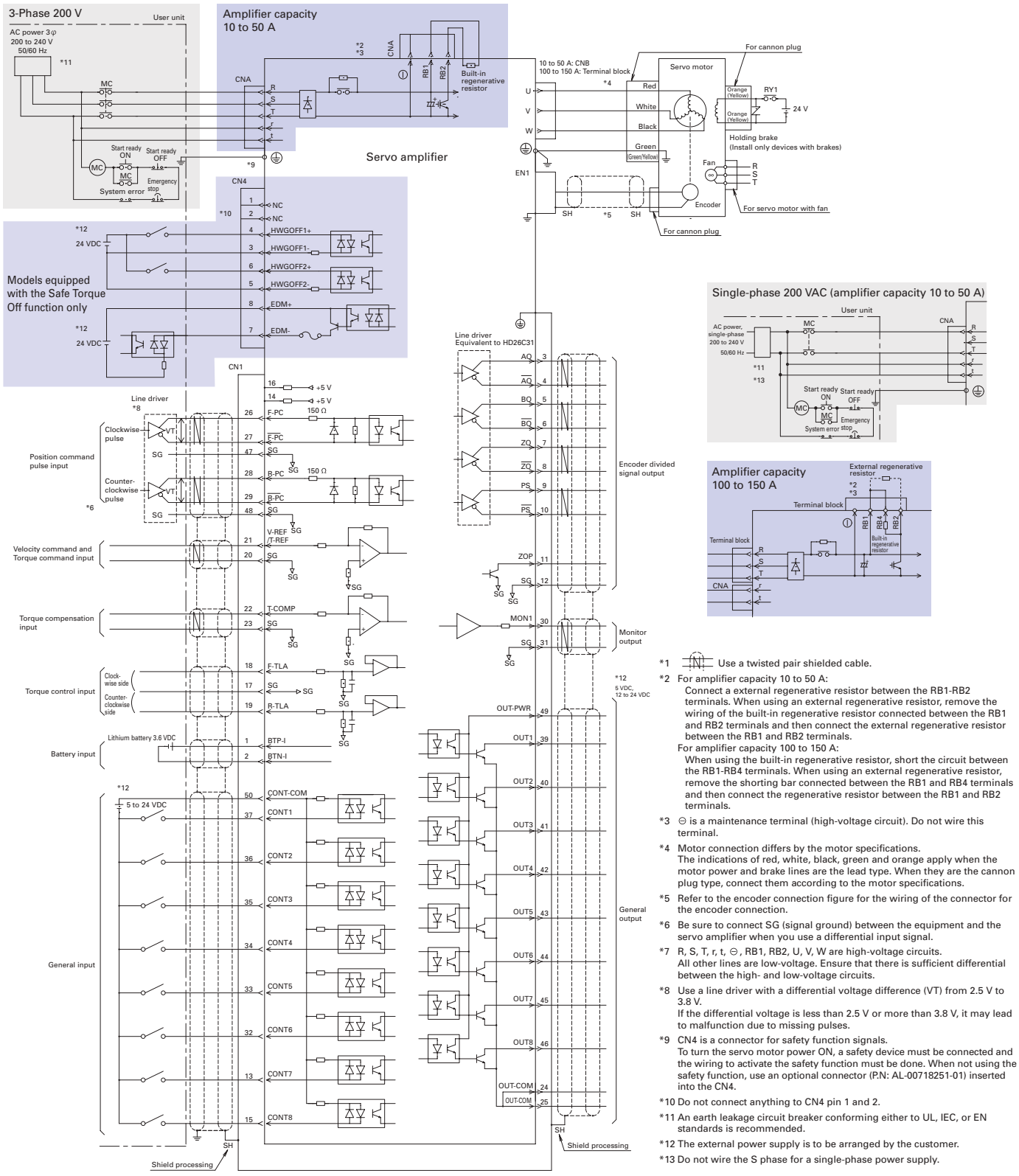
System Configuration: 100A, 150A



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
✓ 6a	Connector [CN4]	AL-00718252-01	For STO
✓ 6b	Connector [CN4]	AL-00718251-01	For STO cancellation
7	Connector [EN1, EN2]	AL-00632607	No need if Encoder Cable (1) is selected
✓ 8	Connector [CNA]	AL-Y0005159-01	
9	Communication Cable: 1m	AL-00911582-01	For tandem operation
✓ 10	USB Communication Cable: 1m	AL-00896515-01	Communication with SANMOTION MOTOR Setup software
11	Battery [CN3]	AL-00880402-01	Used when using a battery -backup method absolute encoder

To build a complete system, you need to have checked items.
Note: I/O cable can be chosen either 4a or 5. Connector for CN4 can be chosen either 6a or 6b.

Wiring Diagram



*1 Use a twisted pair shielded cable.

*2 For amplifier capacity 10 to 50 A:
Connect a external regenerative resistor between the RB1-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 to 150 A:
When using the built-in regenerative resistor, short the circuit between the RB1-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 ⊖ is a maintenance terminal (high-voltage circuit). Do not wire this terminal.

*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. When they are the cannon plug type, connect them according to the motor specifications.

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

*6 Be sure to connect SG (signal ground) between the equipment and the servo amplifier when you use a differential input signal.

*7 R, S, T, r, t, ⊖, RB1, RB2, U, V, W are high-voltage circuits.
All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.

*8 Use a line driver with a differential voltage difference (VT) from 2.5 V to 3.8 V.
If the differential voltage is less than 2.5 V or more than 3.8 V, it may lead to malfunction due to missing pulses.

*9 CN4 is a connector for safety function signals.
To turn the servo motor power ON, a safety device must be connected and the wiring to activate the safety function must be done. When not using the safety function, use an optional connector (P.N: AL-00718251-01) inserted into the CN4.

*10 Do not connect anything to CN4 pin 1 and 2.

*11 An earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended.

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

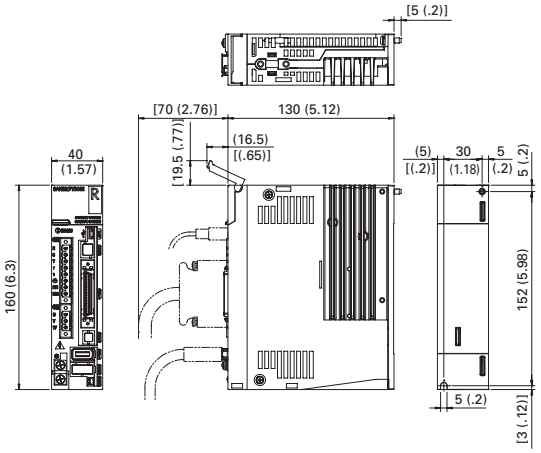
*13 Do not wire the S phase for a single-phase power supply.

Dimensions

■ RS3A01A0AA4

Mass: 0.8 kg (1.76 lb)

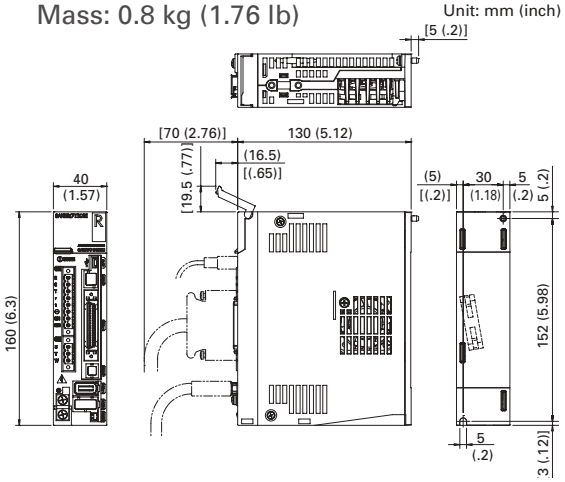
Unit: mm (inch)



■ RS3A02A0AA4

Mass: 0.8 kg (1.76 lb)

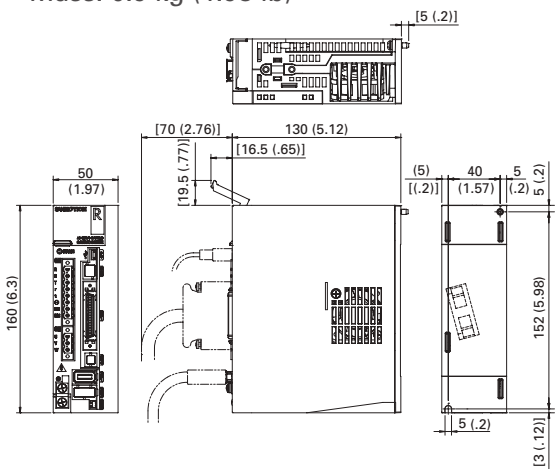
Unit: mm (inch)



■ RS3A03A0AA4

Mass: 0.9 kg (1.98 lb)

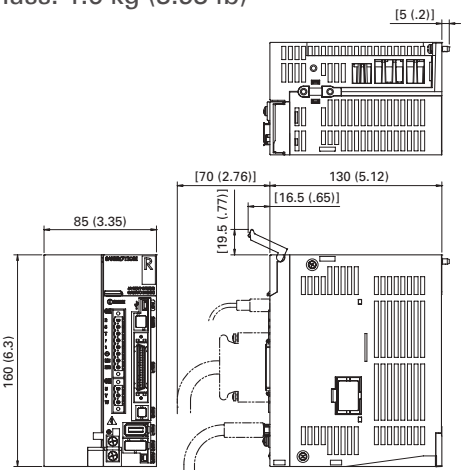
Unit: mm (inch)



■ RS3A05A0AA4

Mass: 1.6 kg (3.53 lb)

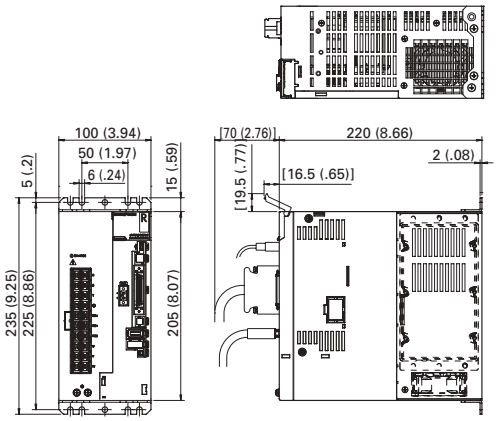
Unit: mm (inch)



■ RS3A10A0AA4

Mass: 4.2 kg (9.26 lb)

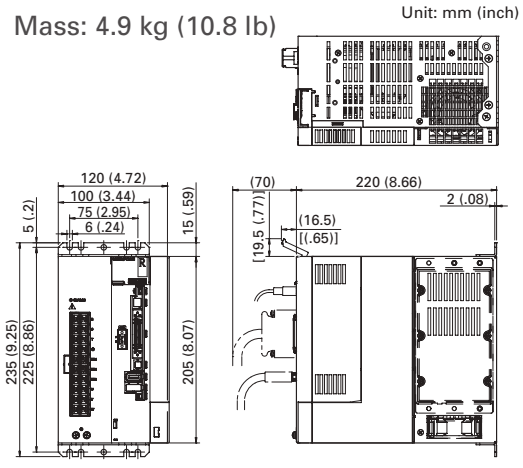
Unit: mm (inch)



■ RS3A15A0AA4

Mass: 4.9 kg (10.8 lb)

Unit: mm (inch)



Indexer Type Servo Amplifier

Control function		Position control
Main circuit power (Note 1)		Three-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)
Control circuit power		Single-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz
Environment	Ambient temperature	0 to +55˚C
	Storage temperature	-20 to +65˚C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s^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) Power source voltage should be within the specified range
200 VAC Power input type: Specified power supply range = 170 to 253 VAC
Note 2) The 200 VAC single-phase input types corresponds only to the RS1A01AC, RS1A03AC, RS1A05AC

Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	600 Hz

Built-in Functions

Protection functions	Over current, Current detection error, Overload, Regeneration error, Amplifier overheating, External overheating, Over voltage, Main circuit low voltage, Main circuit open phase, Control power supply error, Encoder error, Over speed, Speed control error, Speed feedback error, Excessive position error, Position command pulse error, CPU error, Built-in memory error, Battery error, Parameter error
LED display	Status display, Monitor display, Alarm display, Parameter setting, Adjustment mode
Dynamic brake circuit	Built-in
Regeneration process	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min^{-1}) Torque monitor (TCMON) 2.0V±10% (at 100%)

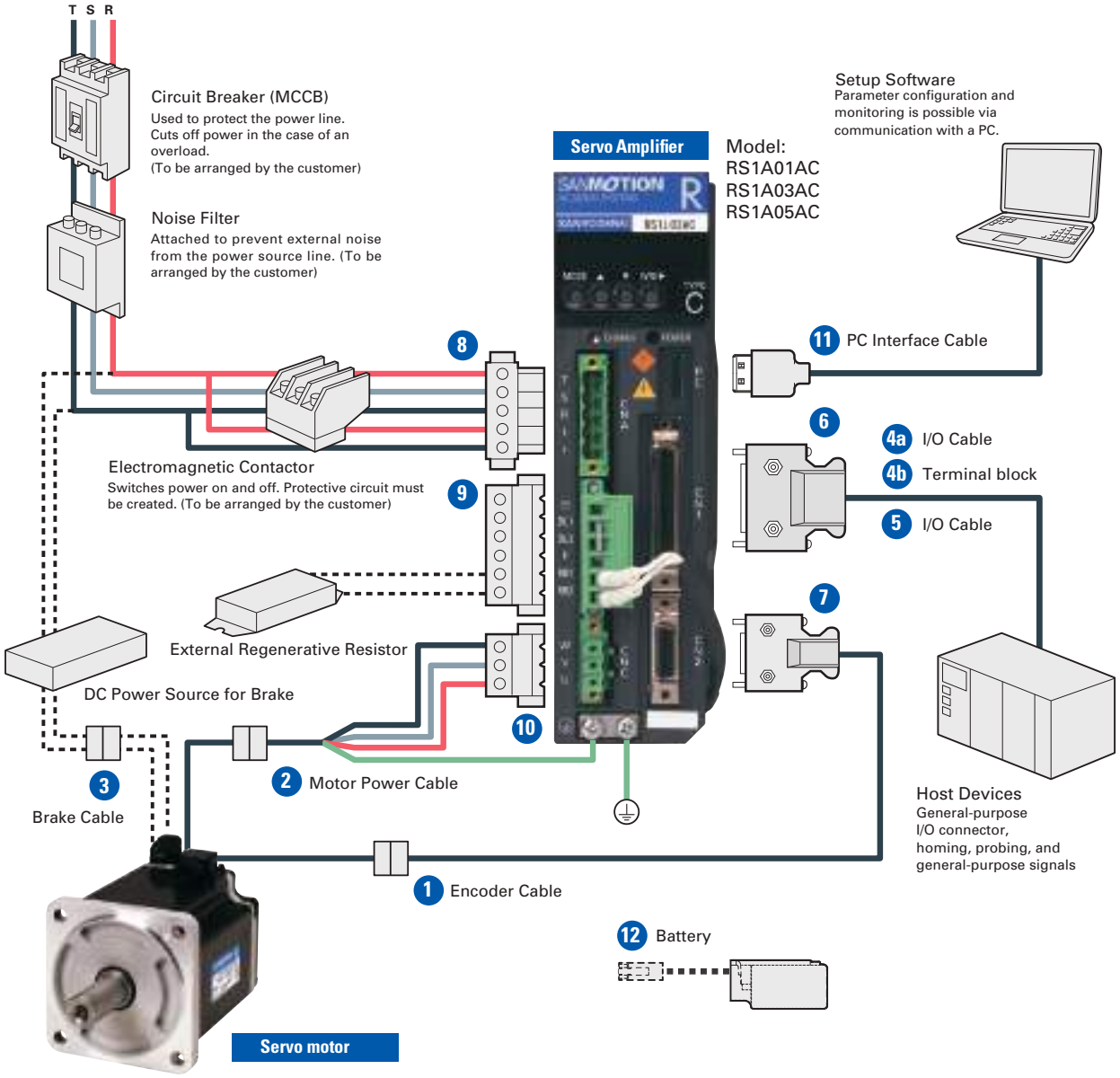
Positioning Function

Number of control axis	1 pc
Number of registration points	It is possible to set it up to 254 points (P000 to P253)
Maximum command amounts	-2,147,483,648 to +2,147,483,647
Command unit	mm or pulse
Fast-forwarding speed	2,147,483.647 mm/sec (0.001 mm/pulse selection)
Addition & Reduction speed	Automatic addition & Reduction speed (Straight line/S curve shift)
Point data setting	Setting by numeric value input with PC or teaching
Traveling point number setting	Parallel 8 bit (Binary code)
Current limitation	0 to 510% (Rating = 100%), however, less than instant maximum stall current
Software limitation	Yes
Traveling mode	Zero-point return, Analog (JOG, 1 Step), Specified point traveling
Area signal	8 zones in maximum

Input/Output Signals

Sequence input signal	Servo ON, Alarm rest, Start-up, Zero-return, Analog, Override/analog high-speed, Cancellation, Speed reduction short of zero-point, External defect, Over-travel, External data setting, 1 step travel, Interrupt start-up, Output selection, MFIN, Point specification input
Sequence output signal	NC-ready, Holding brake timing, Error, Effective external operation, On operation, Positioning completion, In-position output, Zero-return completion, Multiple purpose output (8 bits)

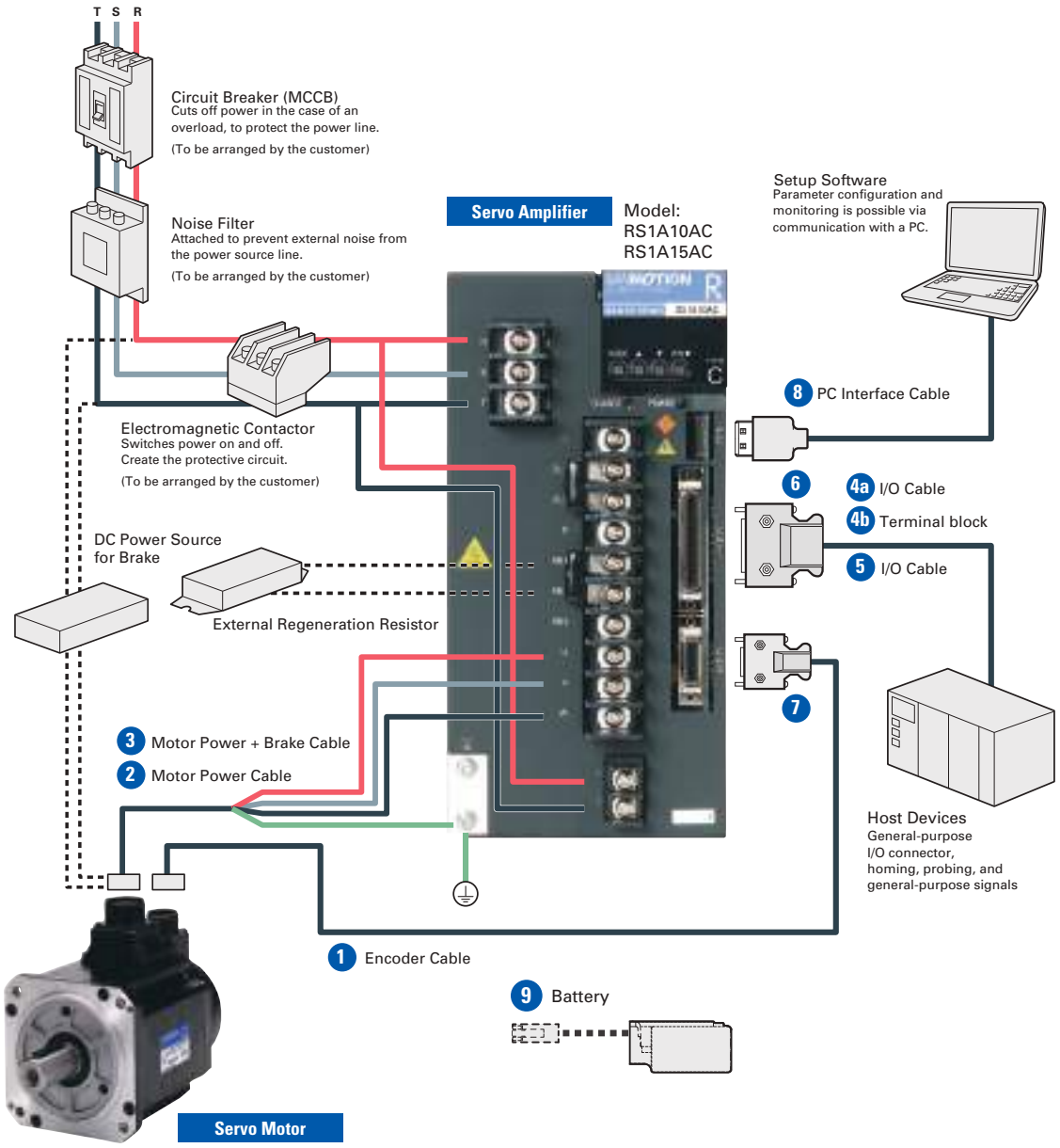
System Configuration: 15A, 30A, 50A



Item		Parts Number	Description
✓	1 Encoder Cable: 10 ft	EEXTABS2410FT	
✓	2 Motor Power Cable: 10 ft	MEXT1810FT	
	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 [CN2]	AL-00385596	No need if Encoder Cable (1) is selected
✓	8 Connector [CNA]	AL-00329461-01	
	9 Connector [CNB]	AL-Y0000988-01	Supplied with Amplifier
	10 Connector [CNC]	AL-00329458-01	No need if Motor Power Cable (2) is selected
	11 PC Interface Cable	AL-00490833-01	Communication with SANMOTION R Setup Software
	12 Battery	AL-00494635-01	

To build a complete system, you need to have checked items.
Note: I/O Cable can be chosen either 4a or 5.

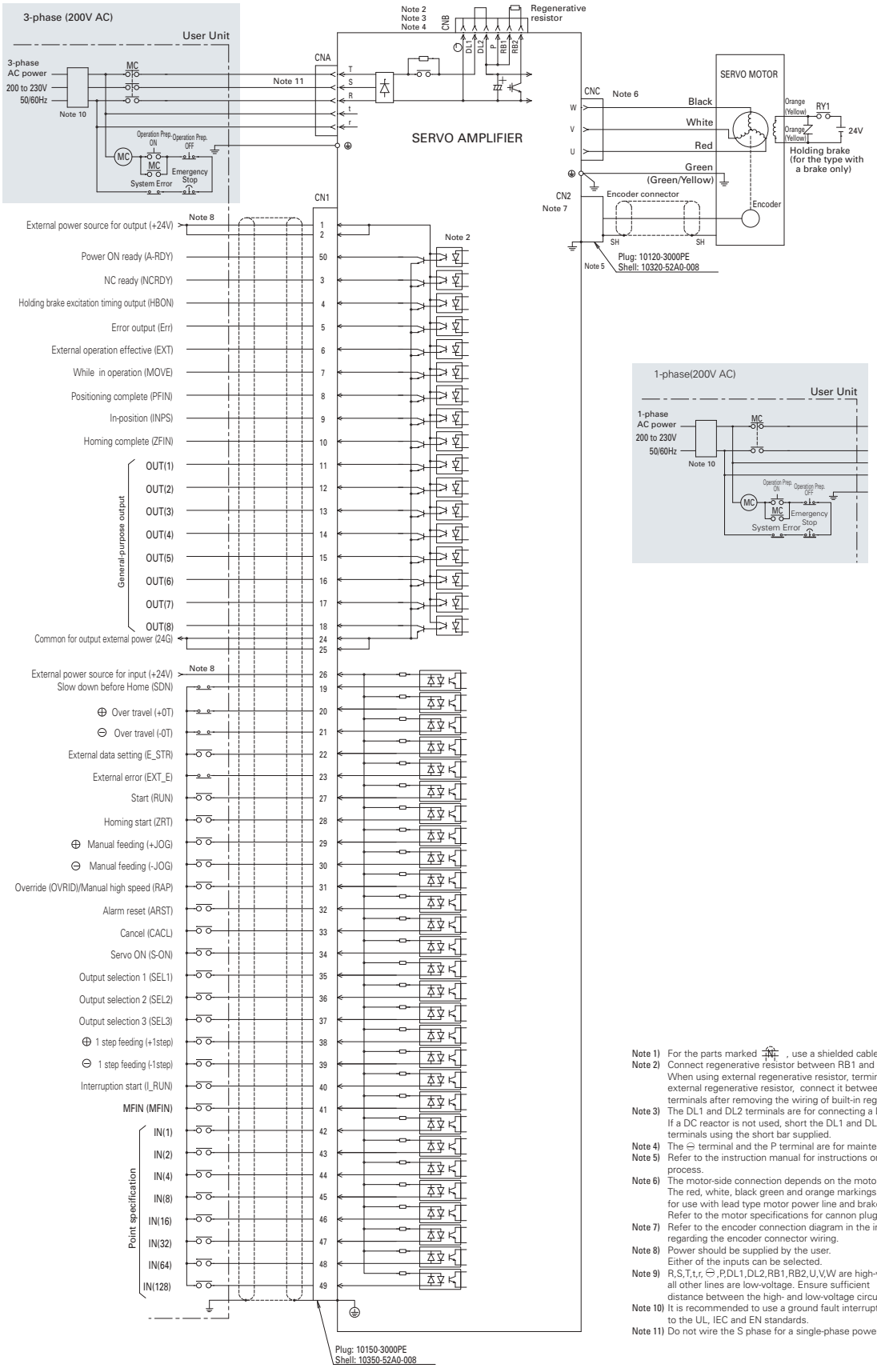
System Configuration: 100A, 150A



Item		Parts Number	Description
✓	1 Encoder Cable: 10 ft	EEXTABS24JN10FT	
✓	2 Motor Power Cable: 10 ft	MEXT18JN10FT	for 0.55 kW
		MEXT12JN10FT	for 1.2 kW
		MEXT10JN10FT	for 2 kW, 5 kW
	3 Motor Power + Brake Cable: 10 ft	MEXTB10JN10FT	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 [CN2]	AL-00385596	No need if Encoder Cable (1) is selected
	8 PC Interface Cable	AL-00490833-01	Communication with SANMOTION R Setup Software
	9 Battery	AL-00494635-01	

To build a complete system, you need to have checked items.
Note: I/O Cable can be chosen either 4a or 5.

Wiring Diagram



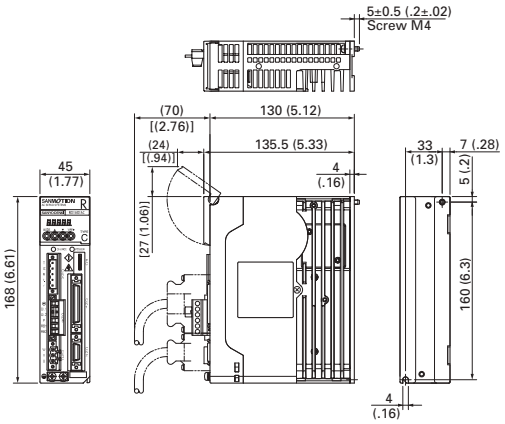
Note 1) For the parts marked , use a shielded cable.
Note 2) Connect regenerative resistor between RB1 and RB2 terminals. When using external regenerative resistor, terminals. When using external regenerative resistor, connect it between RB1 and RB2 terminals after removing the wiring of built-in regenerative resistor.
Note 3) The DL1 and DL2 terminals are for connecting a DC reactor. If a DC reactor is not used, short the DL1 and DL2 terminals using the short bar supplied.
Note 4) The ⊖ terminal and the P terminal are for maintenance.
Note 5) Refer to the instruction manual for instructions on the shielding process.
Note 6) The motor-side connection depends on the motor specification. The red, white, black green and orange markings are for use with lead type motor power line and brake line. Refer to the motor specifications for cannon plug type connections.
Note 7) Refer to the encoder connection diagram in the instruction manual regarding the encoder connector wiring.
Note 8) Power should be supplied by the user. Either of the inputs can be selected.
Note 9) R,S,T,t,r, ⊖ ,P,DL1,DL2,RB1,RB2,U,V,W are high-voltage circuits, all other lines are low-voltage. Ensure sufficient distance between the high- and low-voltage circuits.
Note 10) It is recommended to use a ground fault interrupter conforming to the UL, IEC and EN standards.
Note 11) Do not wire the S phase for a single-phase power amplifier.

Dimensions

■ RS1A01AC

Mass: 0.9 kg (2.0 lb)

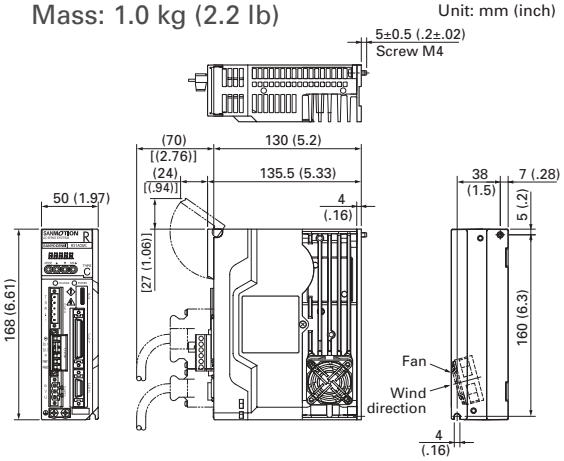
Unit: mm (inch)



■ RS1A03AC

Mass: 1.0 kg (2.2 lb)

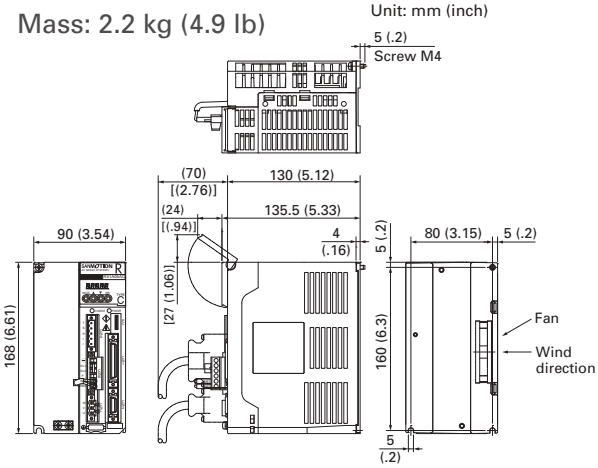
Unit: mm (inch)



■ RS1A05AC

Mass: 2.2 kg (4.9 lb)

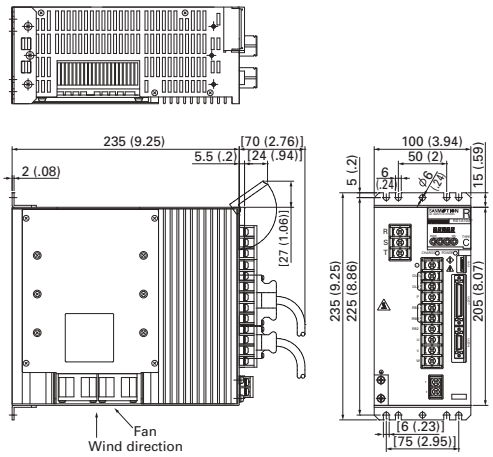
Unit: mm (inch)



■ RS1A10AC

Mass: 5.2 kg (11.5 lb)

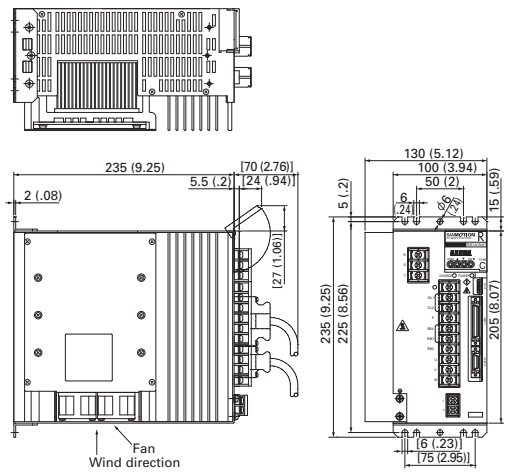
Unit: mm (inch)



■ RS1A15AC

Mass: 6.5 kg (14.3 lb)

Unit: mm (inch)



Indexer Modbus Interface Type Servo Amplifier

Specifications

Control function		Position control
Main circuit power (Note 1)		Three-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2)
Control circuit power		Single-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz
Environment	Ambient temperature	0 to +55˚C
	Storage temperature	-20 to +65˚C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s^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) Power source voltage should be within the specified range. 200 VAC Power input type: Specified power supply range = 170 to 253 VAC
Note 2) The 200 VAC single-phase input types corresponds only to the RS1A01AF, RS1A03AF

Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	600 Hz

Built-in Functions

Protection functions	Over current, Current detection error, Overload, Regeneration error, Amplifier overheating, External overheating, Over voltage, Main circuit low voltage, Main circuit open-phase, Control power supply error, Encoder error, Over speed, Speed control error, Speed feedback error, Excessive position error, Position command pulse error, CPU error, Built-in memory error, Battery error, Parameter error
LED display	Status display, Monitor display, Alarm display, Parameter setting, Adjustment mode
Dynamic brake circuit	Built-in
Regeneration process	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min^{-1}) Torque monitor (TCMON) 2.0V±10% (at 100%)

Positioning Function

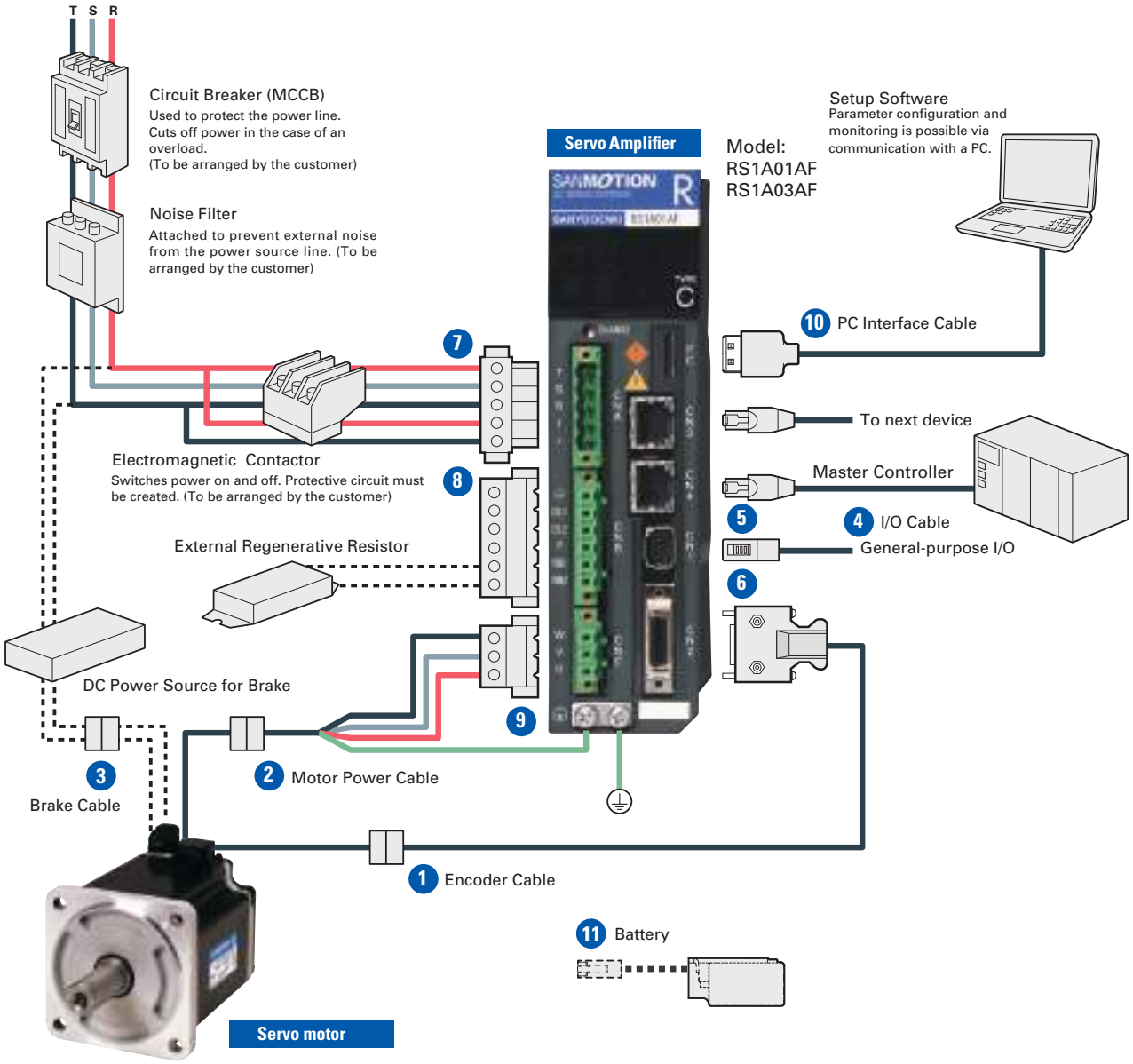
Number of control axis	1 pc
Number of registration points	It is possible to set it up to 254 points (P000 to P253)
Maximum command amounts	-2,147,483,648 to +2,147,483,647
Command unit	mm or pulse
Fast-forwarding speed	2,147,483.647 mm/sec (0.001 mm/pulse selection)
Addition & Reduction speed	Automatic addition & Reduction speed (Straight line/S curve shift)
Point data setting	Setting by numeric value input with PC or teaching
Traveling point number setting	Parallel 8 bit (Binary code)
Current limitation	0 to 510% (Rating = 100%), however, less than instant maximum stall current
Software limitation	Yes
Traveling mode	Zero-point return, analog (JOG, 1 Step), Specified point traveling
Area signal	8 zones in maximum

Modbus Interface

Item	Content	Default Value	Remark
Protocol	Modbus-RTU	-	Binary mode fixed (No compliant with ASCII mode)
Interface	RS-485 (1:N)	-	N=8 (Note 1)
Baud rate (bps)	4800, 9600, 19200, 38400, 57600, 115200	115200	(Note 2)
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 1) From the limitation of general RS-485 physical layer (distance, terminator) specification, connectable amplifier (or other slave units) number is up to 31 per one segment. (Maximum number of devices without repeater.) Set up a node address with the rotary switch front of amplifier or in the R-Setup (personal computer interface) software.
Note 2) Set up a communication setup (access speed) with the rotary switch on the front surface of amplifier or in R-Setup (personal computer interface).
Note 3) Communication setup (transfer speed, and stop bit) is set up by the R-Setup software (interface with PC).

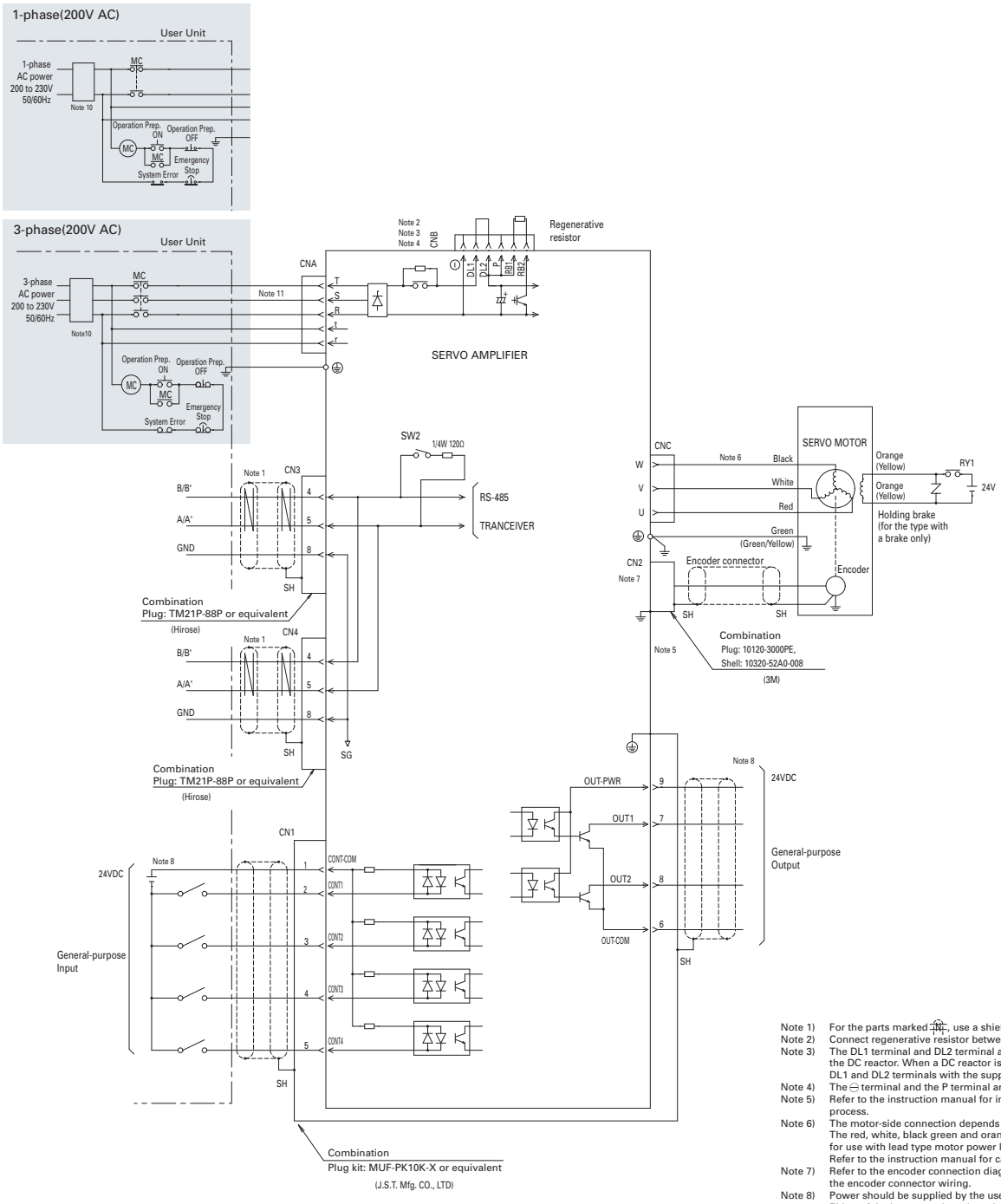
System Configuration



Item		Parts Number	Description
✓ 1	Encoder Cable: 10 ft	EEXTABS2410FT	
✓ 2	Motor Power Cable: 10 ft	MEXT1810FT	
3	Brake Cable: 10 ft	MEXTBRK2010FT	Only for Brake Equipped Motor
✓ 4	I/O Cable: 3 ft	1026-100410	
5	Connector [CN1]	AL-Y0004290	No need if I/O Cable (4) is selected
6	Connector [CN2]	AL-00385596	No need if Encoder Cable (1) is selected
✓ 7	Connector [CNA]	AL-00329461-01	
8	Connector [CNB]	AL-Y0000988-01	Supplied with Amplifier
9	Connector [CNC]	AL-00329458-01	No need if Motor Power Cable (2) is selected
10	PC Interface Cable	AL-00490833-01	Communication with SANMOTION R Setup Software
11	Battery	AL-00494635-01	

To build a complete system, you need to have checked items.

Wiring Diagram

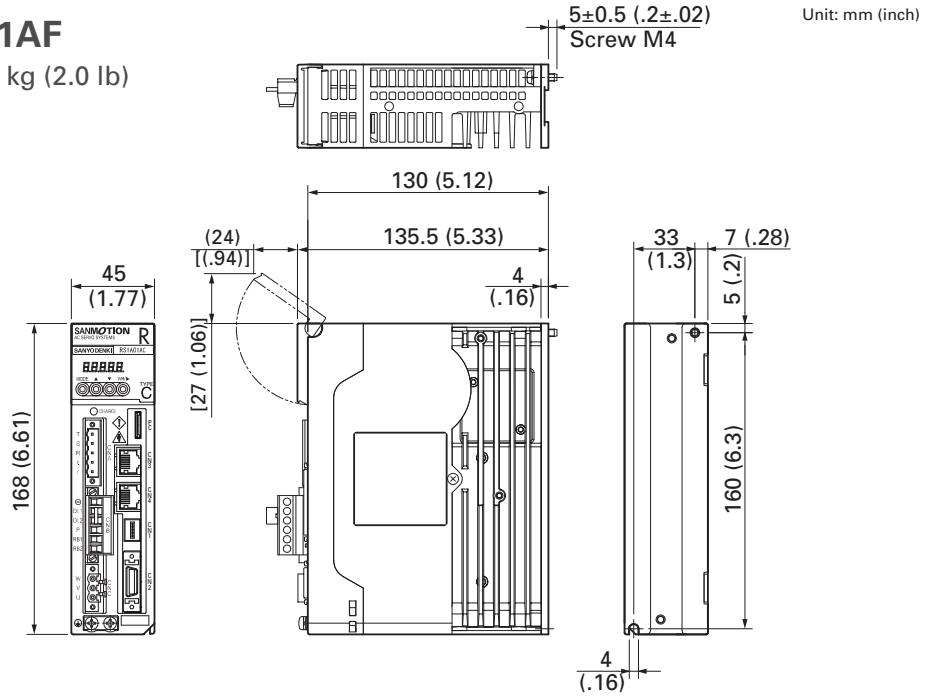


Note 1) For the parts marked, use a shielded cable.
Note 2) Connect regenerative resistor between RB1 and RB2 terminals.
Note 3) The DL1 terminal and DL2 terminal are terminals to connect to the DC reactor. When a DC reactor is not used, short-circuit between DL1 and DL2 terminals with the supplied short-circuit bar.
Note 4) The ⊖ terminal and the P terminal are for maintenance
Note 5) Refer to the instruction manual for instructions on the shielding process.
Note 6) The motor-side connection depends on the motor specification. The red, white, black green and orange markings are for use with lead type motor power line and brake line. Refer to the instruction manual for cannon plug type connections.
Note 7) Refer to the encoder connection diagram regarding the encoder connector wiring.
Note 8) Power should be supplied by the user. Either of the inputs can be selected.
Note 9) R,S,T,t,r, ⊖,P,DL1,DL2,RB1,RB2,U,V,W are high-voltage circuits, all other lines are low-voltage. Ensure sufficient distance between the high- and low-voltage circuits.
Note 10) It is recommended to use a ground fault interrupter conforming to the UL, IEC and EN standards.
Note 11) Do not wire the S phase for a single-phase power amplifier.

Dimensions

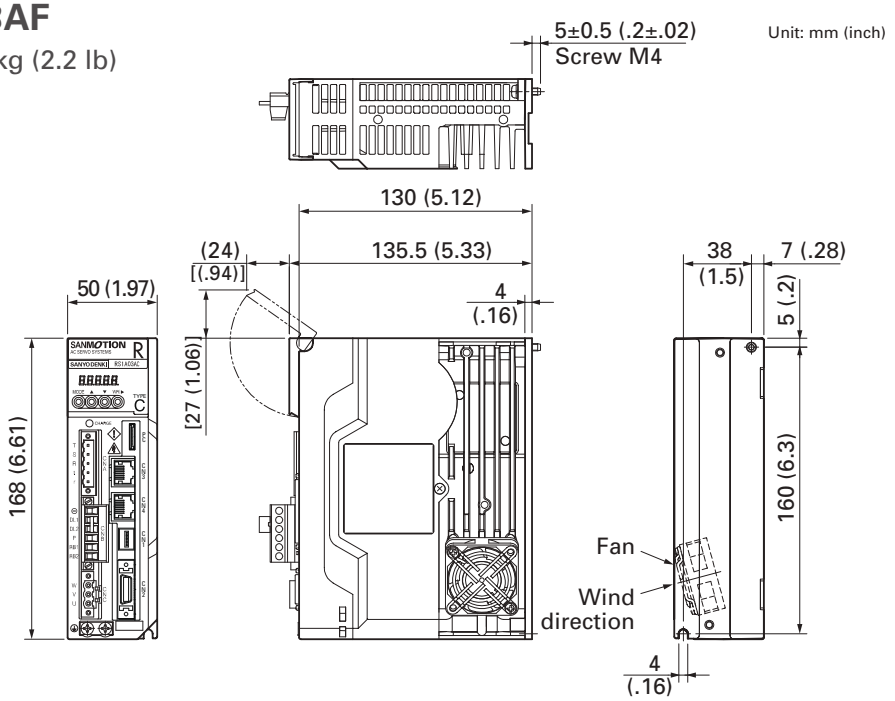
■ RS1A01AF

Mass: 0.9 kg (2.0 lb)



■ RS1A03AF

Mass: 1.0 kg (2.2 lb)



3E Model EtherCAT Interface Servo Amplifier

Control function		Speed control/Torque control/Position control (Parameter changeover)
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
Environment	Ambient temperature	0 to +55˚C
	Storage temperature	-20 to +65˚C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s^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 RS3A01A0HA4/RS3A02A0HA4/RS3A03A0HA4/RS3A05A0HA4.

Performance

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

Built-in Functions

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

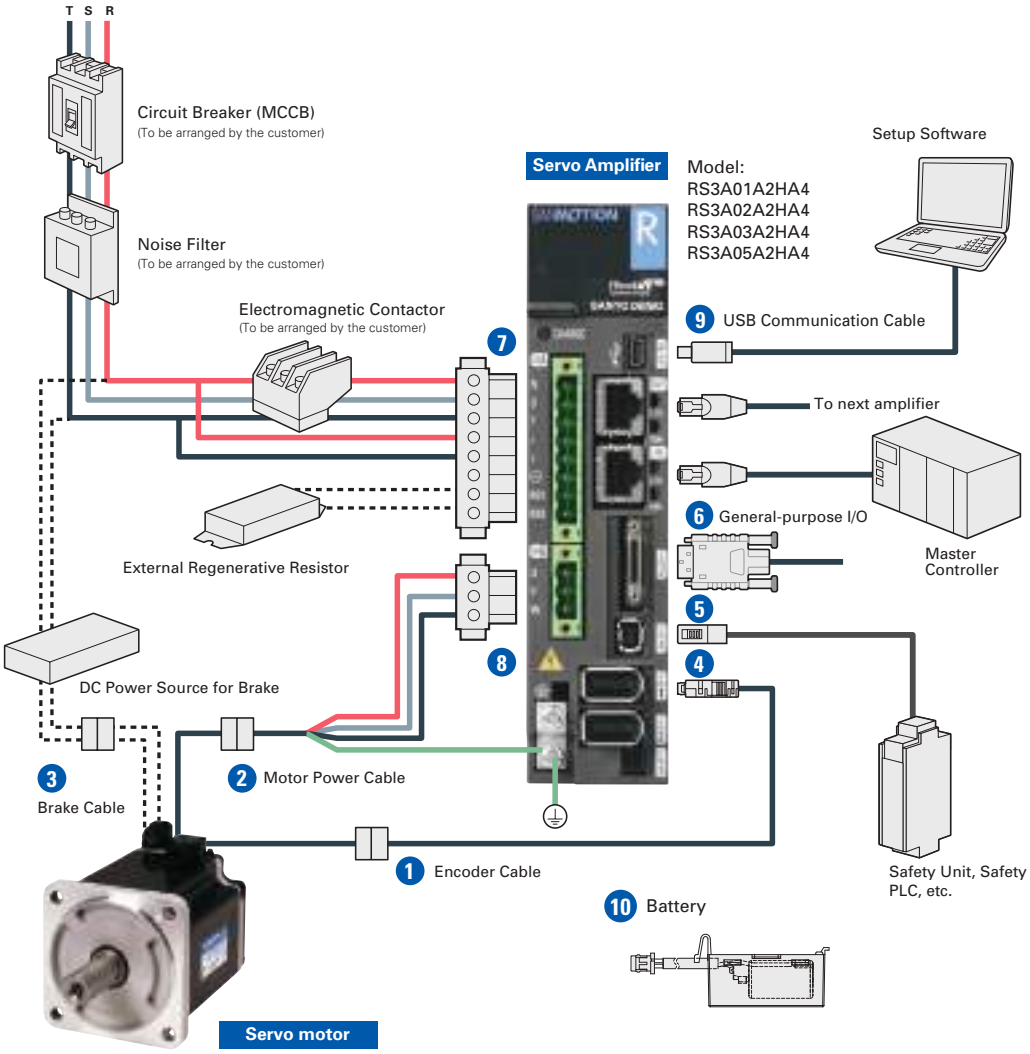
Safety Standard

Servo amplifier type	Safety standards		
All models	UL, c-UL ratings		UL 61800-5-1
	EN standards	Low-voltage directive	IEC/EN 61800-5-1
		EMC directive	• IEC/EN 61000-6-4 • IEC/EN 61800-3 • IEC/EN 61000-6-2 • IEC/EN 61326-1 • EN61000-6-7
	KC mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4
Model with safety function	Function safety standards		• IEC61508, SIL3 • ISO13894-1, Cat3, PL=e • IEC62061, SILCL3

EtherCAT Interface Specifications

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

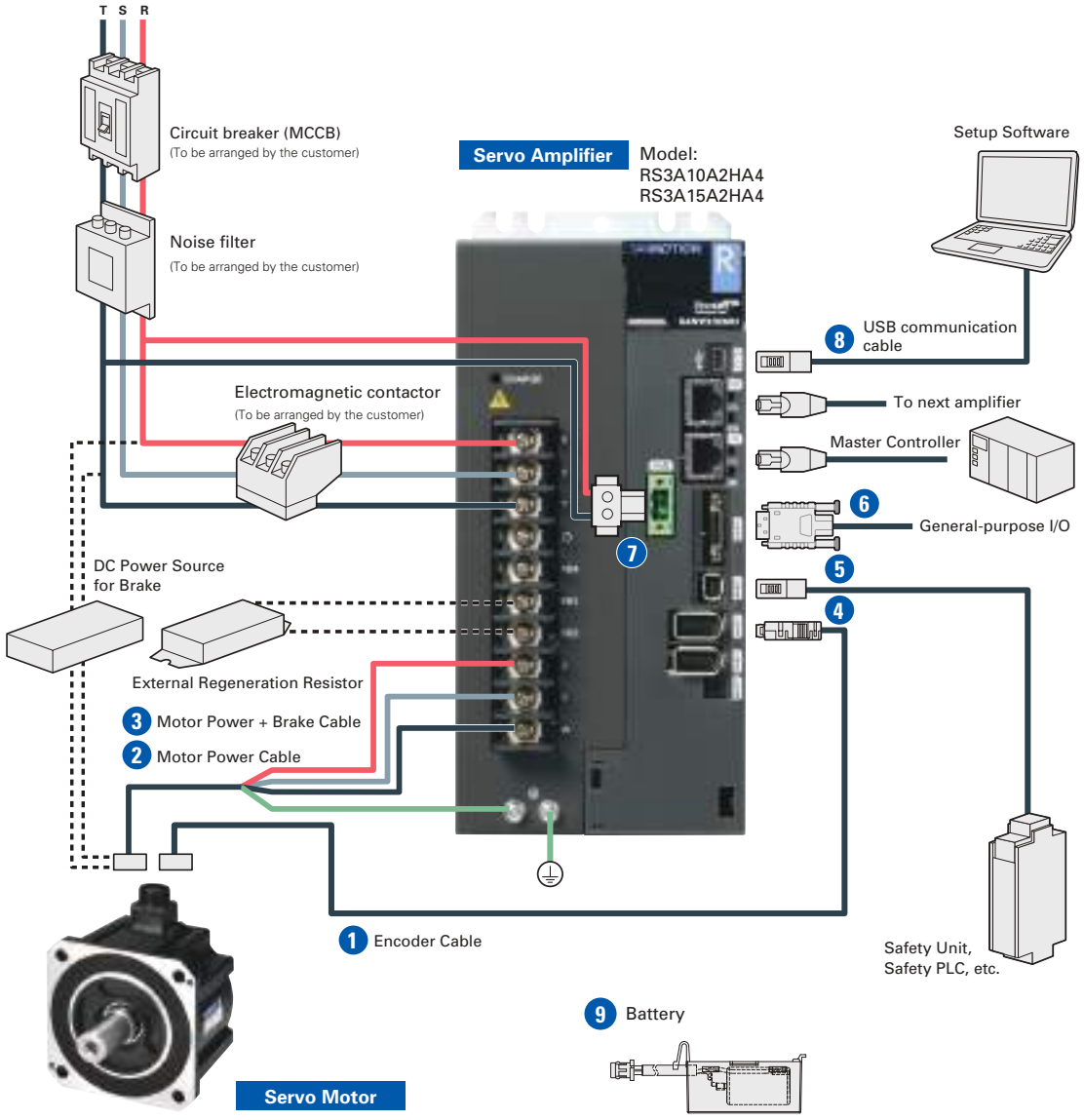
System Configuration: 10A, 20A, 30A, 50A



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
	4	Connector [EN1, EN2]	AL-00632607	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-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
	10	Battery [CN3]	AL-00880402-01	Used when using a battery -backup method absolute encoder

To build a complete system, you need to have checked items.

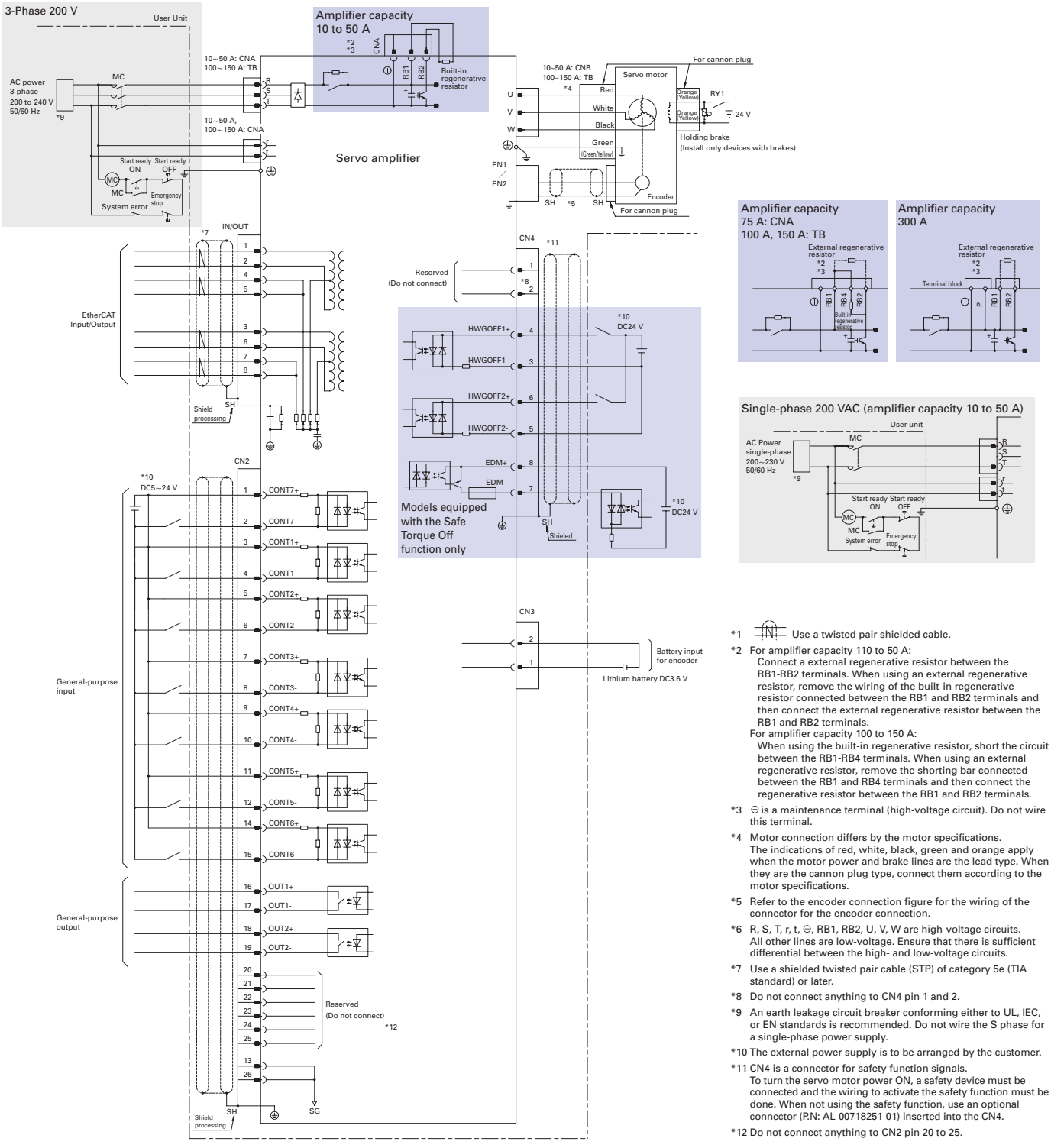
System Configuration: 100A, 150A



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, EN2]	AL-00632607	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	
✓	8	USB Communication Cable: 1m	AL-00896515-01	Communication with SANMOTION MOTOR Setup software
	9	Battery [CN3]	AL-00880402-01	Used when using a battery -backup method absolute encoder

To build a complete system, you need to have checked items.

Wiring Diagram



*1 Use a twisted pair shielded cable.

*2 For amplifier capacity 110 to 50 A:
Connect a external regenerative resistor between the RB1-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 to 150 A:
When using the built-in regenerative resistor, short the circuit between the RB1-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 ⊖ is a maintenance terminal (high-voltage circuit). Do not wire this terminal.

*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. When they are the cannon plug type, connect them 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, ⊖, RB1, RB2, U, V, 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 Use a shielded twisted pair cable (STP) of category 5e (TIA standard) or later.

*8 Do not connect anything to CN4 pin 1 and 2.

*9 An earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended. Do not wire the S phase for a single-phase power supply.

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

*11 CN4 is a connector for safety function signals.
To turn the servo motor power ON, a safety device must be connected and the wiring to activate the safety function must be done. When not using the safety function, use an optional connector (P.N: AL-00718251-01) inserted into the CN4.

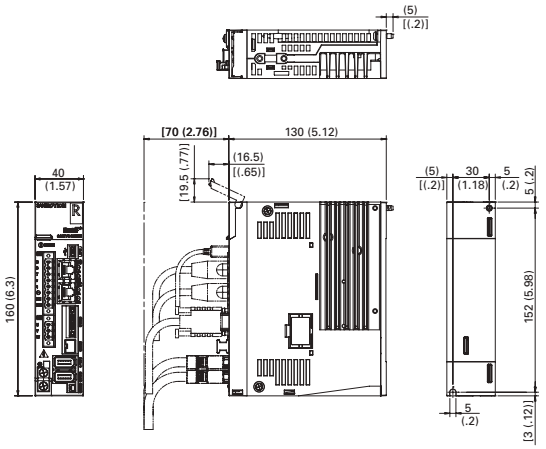
*12 Do not connect anything to CN2 pin 20 to 25.

Dimensions

■ RS3A01A2HA4

Mass: 0.8 kg (1.76 lb)

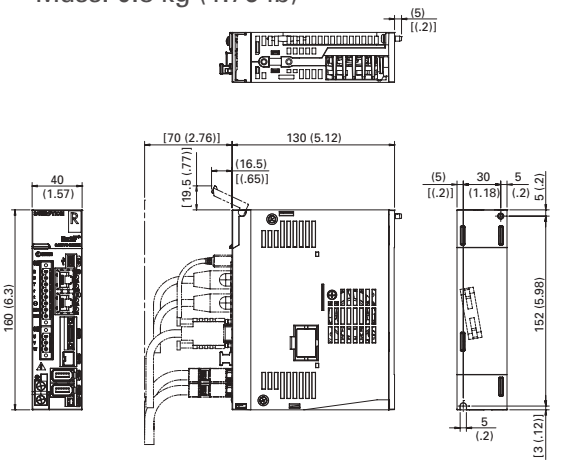
Unit: mm (inch)



■ RS3A02A2HA4

Mass: 0.8 kg (1.76 lb)

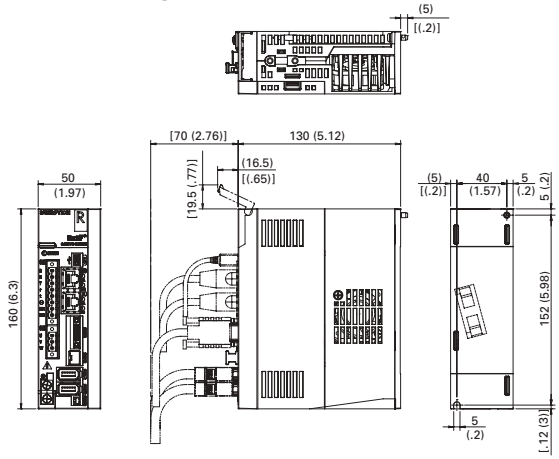
Unit: mm (inch)



■ RS3A03A2HA4

Mass: 0.9 kg (1.98 lb)

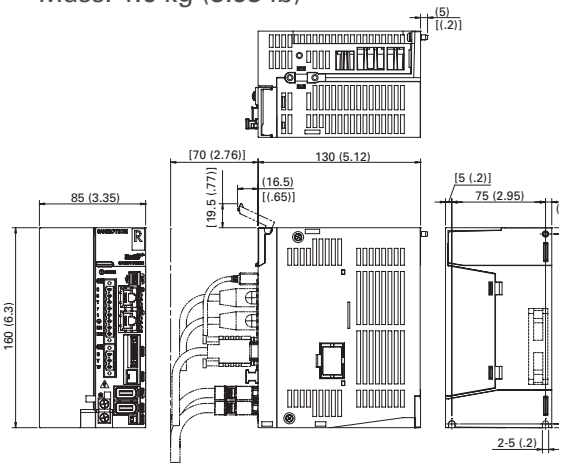
Unit: mm (inch)



■ RS3A05A2HA4

Mass: 1.6 kg (3.53 lb)

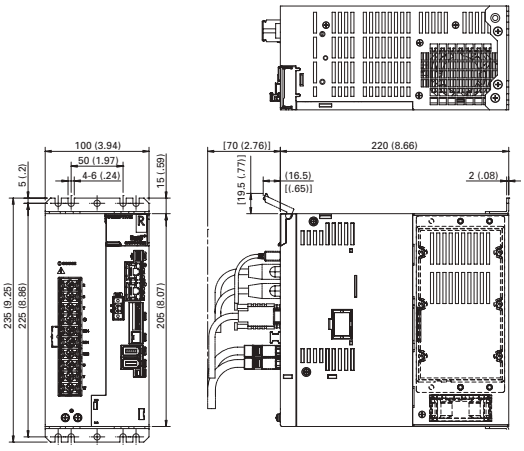
Unit: mm (inch)



■ RS3A10A2HA4

Mass: 4.2 kg (9.26 lb)

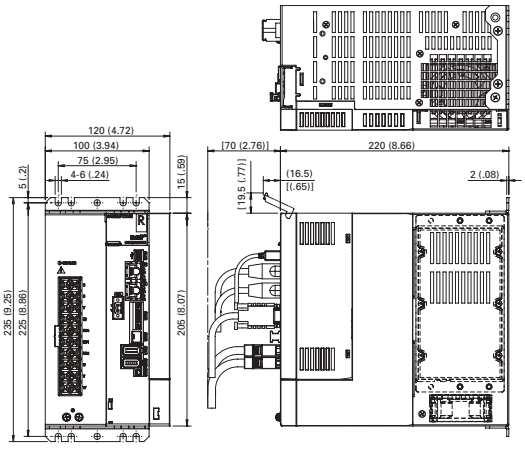
Unit: mm (inch)



■ RS3A15A2HA4

Mass: 4.9 kg (10.8 lb)

Unit: mm (inch)



EtherCAT Interface Type Servo Amplifier

Specifications

Control function		Position control/Speed control/Torque control (Parameter changeover)
Main circuit power (Note 1)		Three-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 2) Single-phase: 100 to 115 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 3)
Control circuit power		Single-phase: 200 to 230 VAC +10, -15%, 50/60 Hz ± 3Hz Single-phase: 100 to 115 VAC +10, -15%, 50/60 Hz ± 3Hz (Note 3)
Environment	Ambient temperature	0 to +55˚C
	Storage temperature	-20 to +65˚C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s^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) Power source voltage should be within the specified range
200 VAC Power input type: Specified power supply range = 170 to 253 VAC
100 VAC Power input type: Specified power supply range = 85 to 127 VAC
Note 2) 200 VAC single-phase input type corresponds only to the RS2A01A0KA4, RS2A03A0KA4 and RS2A05A0KA4
Note 3) 100 VAC single-phase input type corresponds only to the RS2E01A0KA4 and RS2E03A0KA4

Performance

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

Built-in Functions

Protection functions	Over current, Current detection error, Overload, Regeneration 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 pulse error, Built-in memory error, Parameter error
LED display	Status display, Monitor display, Alarm display, Parameter setting, Adjustment mode
Dynamic brake circuit	Built-in
Regeneration process	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min^{-1}) Torque monitor (TCMON) 2.0V±10% (at 100%)

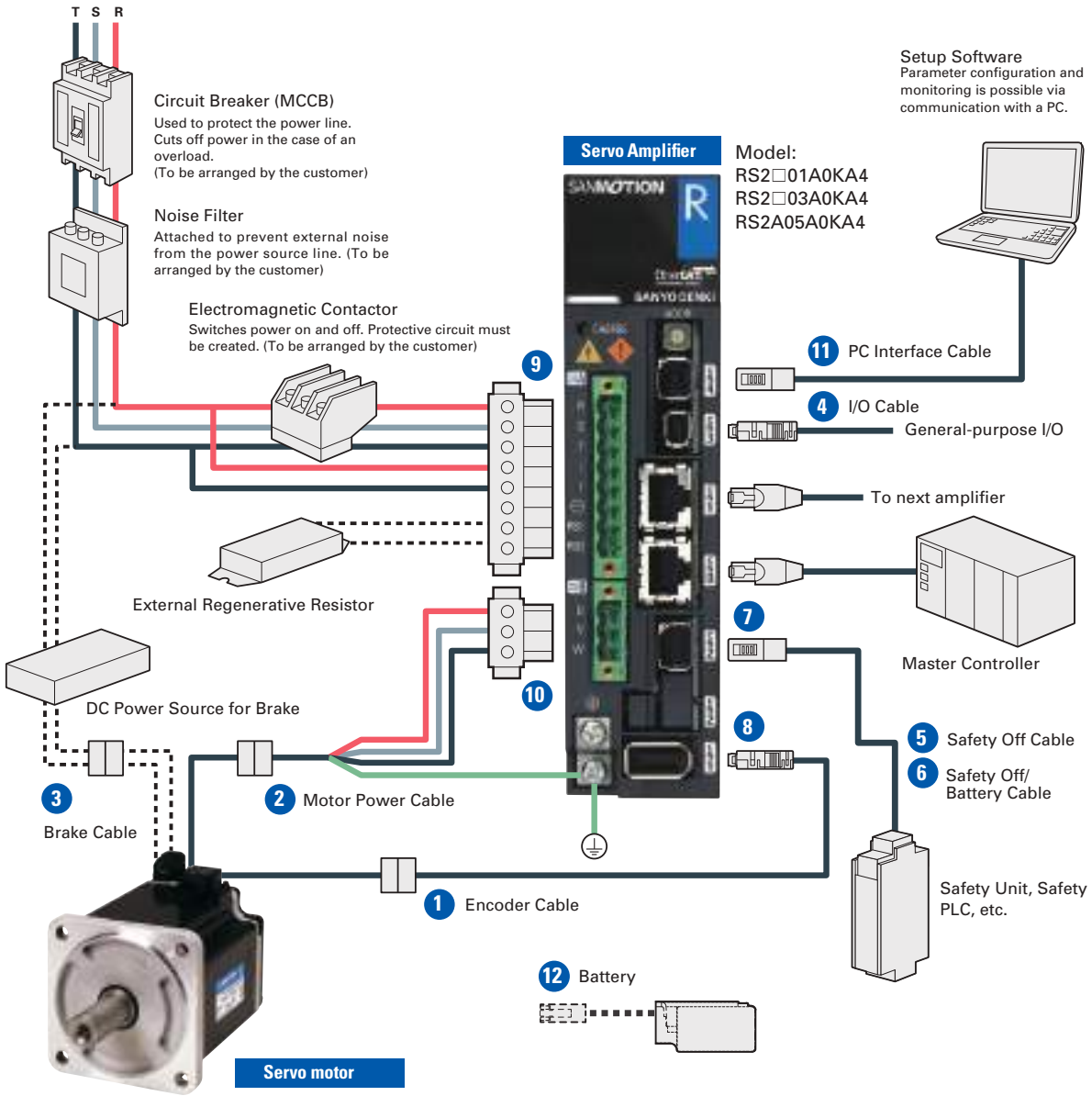
Safety Standard

Servo amplifier type	Safety standards		
All models	UL ratings	UL508C	
	EN standards	Low-voltage directive	• EN61800–5–1
		EMC directive	• EN55011, G1, ClassA • EN61000–6–2 • EN61800–3
Model with safety function	Function safety standards	• IEC61508, SIL2 • ISO13849–1, Cat.3, PL = d	• IEC62061, SILCL2 • EN954–1, Cat. 3

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.64Byte Input: Max.64Byte Total: Max. 128 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	2 inputs, 2 outputs (4 total)

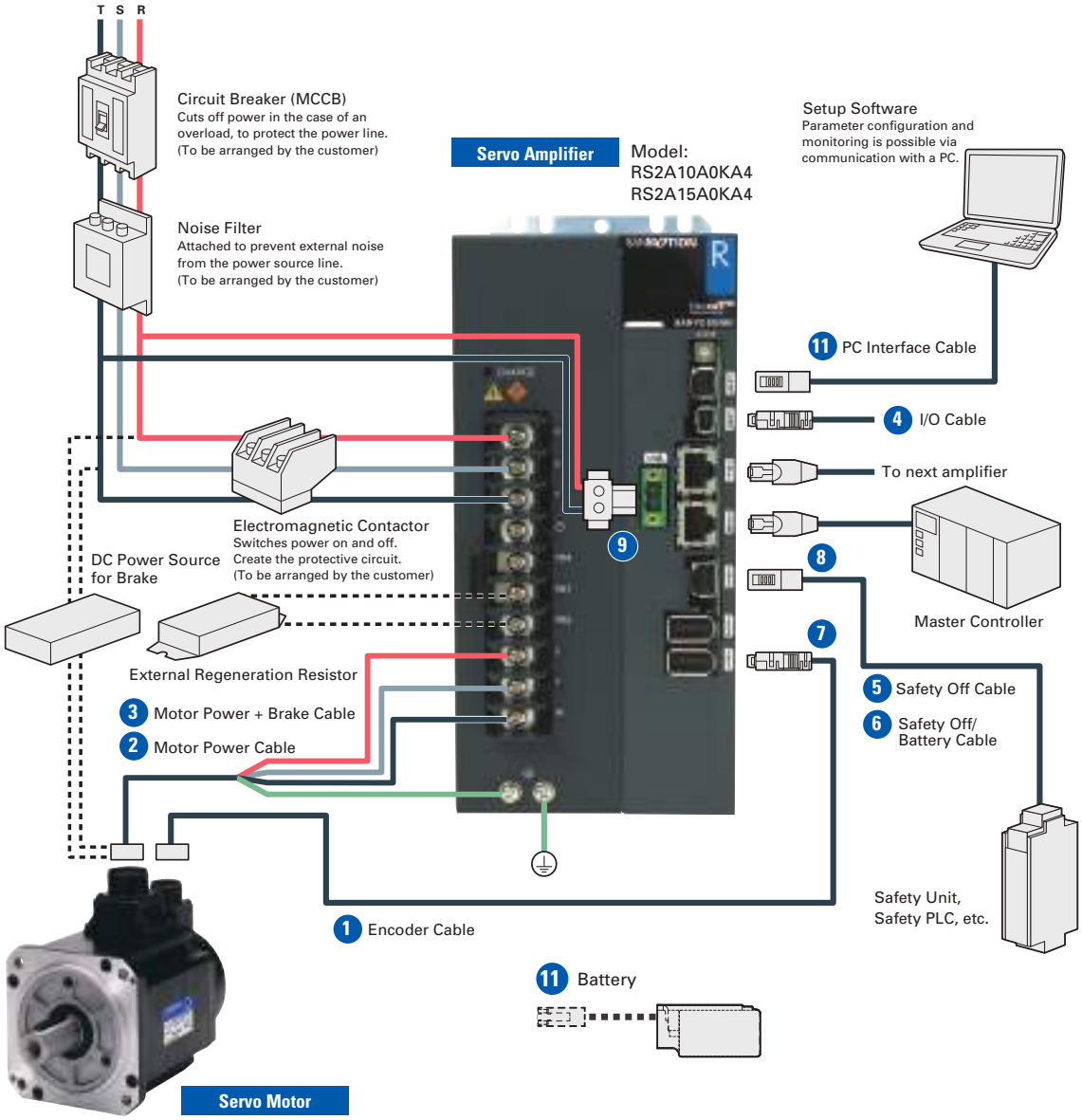
System Configuration: 15A, 30A, 50A



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 Cable: 3 ft	1026-100407	
✓	5 Safety Off Cable: 3 ft	1026-100410	One side flying leads
	6 Safety Off / Battery Cable: 3 ft	1026-100416	One side flying leads + Battery + Holder
	7 Connector [CN2]	AL-Y0004290-02	No need if Safety Off Cable (5) is selected
	8 Connector [EN1]	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 PC Interface Cable	AL-00689703-01	Communication with SANMOTION MOTOR Setup Software
	12 Battery	1025-106187	Battery + Holder (ask us)

To build a complete system, you need to have checked items.

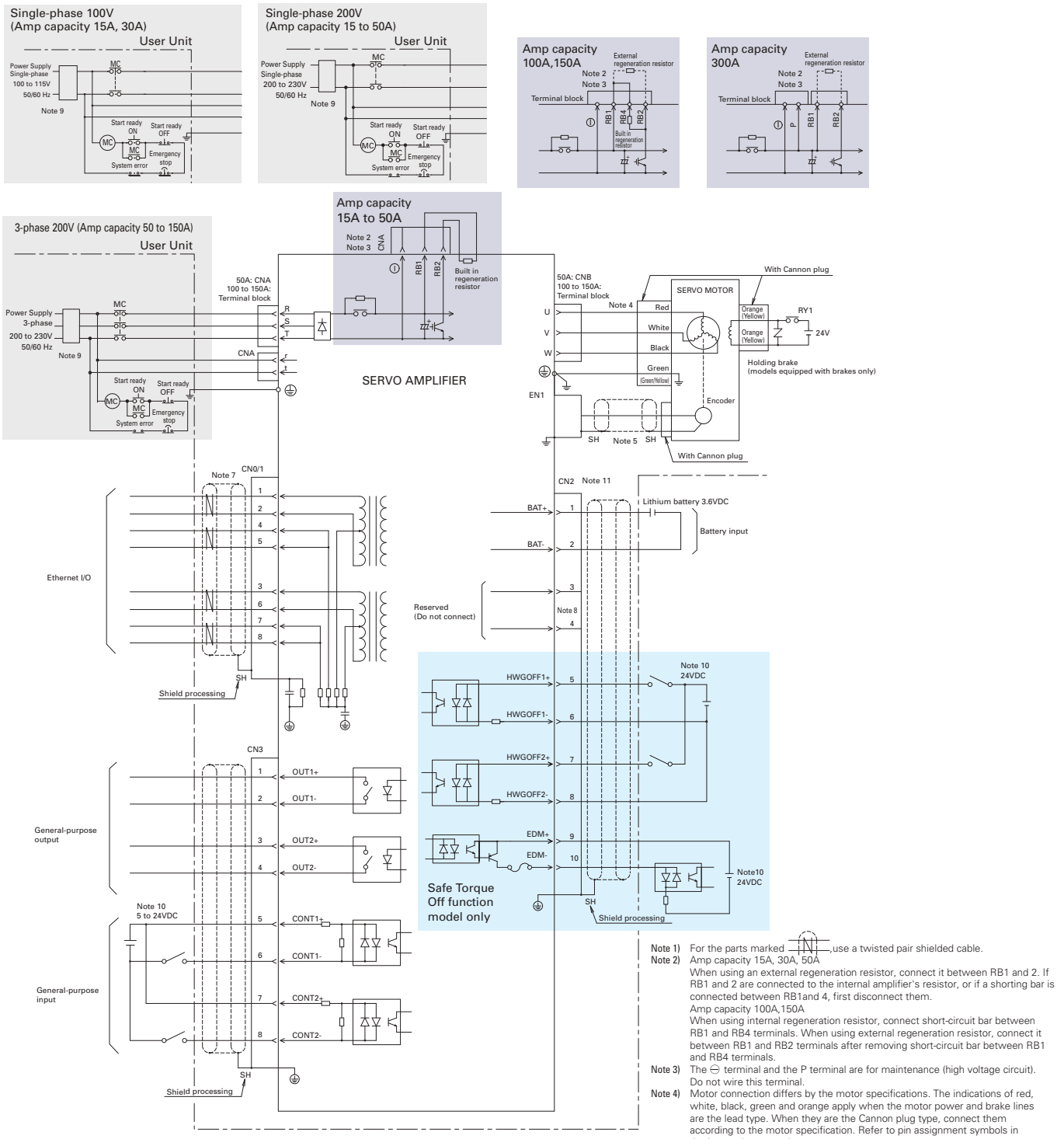
System Configuration: 100A, 150A



Item		Parts Number	Description
✓	1 Encoder Cable: 10 ft	EEXTKABS24JN10FT	
✓	2 Motor Power Cable: 10 ft	MEXTK18JN10FT	For 0.5 kW motor
		MEXTK14JN10FT	For 1.2 kW motor
		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 I/O Cable: 3 ft	1026-100407	
✓	5 Safety Off Cable: 3 ft	1026-100410	One side flying leads
	6 Safety Off / Battery Cable: 3 ft	1026-100416	One side flying leads + Battery + Holder
	7 Connector [EN1]	AL-00632607	No need if Encoder Cable (1) is selected
	8 Connector [CN2]	AL-Y0004290-02	No need if Safety Off Cable (5) is selected
✓	9 Connector [CNA]	AL-Y0005159-01	
	10 PC Interface Cable	AL-00689703-01	Communication with SANMOTION MOTOR Setup Software
	11 Battery	1025-106187	Battery + Holder (ask us)

To build a complete system, you need to have checked items.

Wiring Diagram



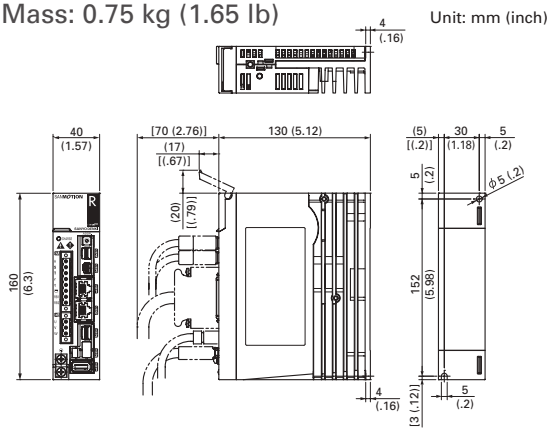
Note 1) For the parts marked ⏚, use a twisted pair shielded cable.
Note 2) Amp capacity 15A, 30A, 50A
When using an external regeneration resistor, connect it between RB1 and 2. If RB1 and 2 are connected to the internal amplifier's resistor, or if a shorting bar is connected between RB1and 4, first disconnect them.
Amp capacity 100A,150A
When using internal regeneration resistor, connect short-circuit bar between RB1 and RB4 terminals. When using external regeneration resistor, connect it between RB1 and RB2 terminals after removing short-circuit bar between RB1 and RB4 terminals.
Note 3) The ⊖ terminal and the P terminal are for maintenance (high voltage circuit). Do not wire this terminal.
Note 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. When they are the Cannon plug type, connect them according to the motor specification. Refer to pin assignment symbols in the instruction manual.
Note 5) Refer to encoder connection diagram in instruction manual for the wiring for the connector for the encoder connection.
Note 6) R,S,T,t,r, ⊖,P,DL1,DL2,RB1,RB2, RB4 (100A, 150A only), U,V,W are high-voltage circuits, all other lines are low-voltage. Ensure sufficient distance between the high- and low-voltage circuits.
Note 7) Use a TIA category 5e or better shielded twisted pair (STP) cable.
Note 8) Nothing should connect with CN2-3 and 4 pin.
Note 9) It is recommend to use a ground fault interrupter conforming to the UL, IEC and EN standards. Do not wire the S phase for a single-phase power amplifier.
Note 10) External power is to be supplied by user.
Note 11) CN2 is a Safe Torque Off function connector. If it is not connected to the safety device to enable the Safe Torque Off function to work, the servo does not turn on (the motor is not energized).

Dimensions

■ RS2A01A0KA4
■ RS2E01A0KA4

Mass: 0.75 kg (1.65 lb)

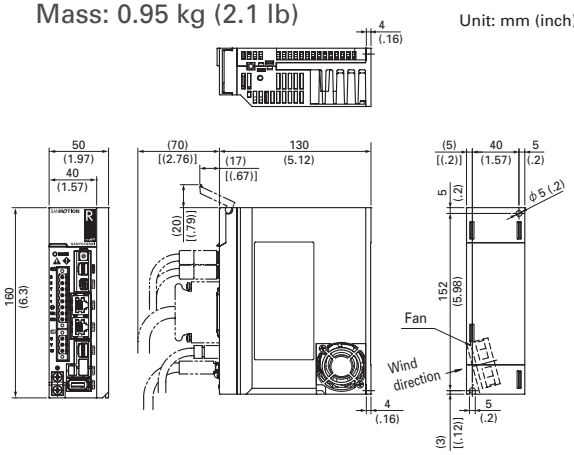
Unit: mm (inch)



■ RS2A03A0KA4
■ RS2E03A0KA4

Mass: 0.95 kg (2.1 lb)

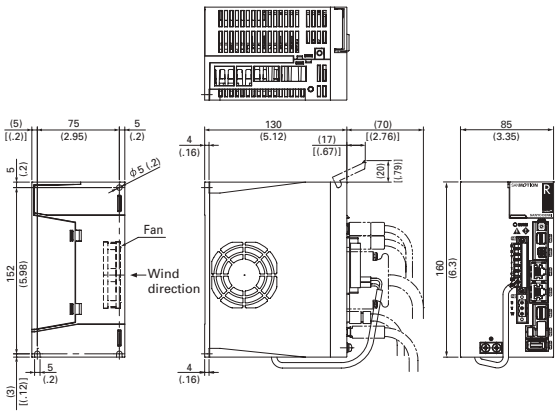
Unit: mm (inch)



■ RS2A05A0KA4

Mass: 1.65 kg (3.6 lb)

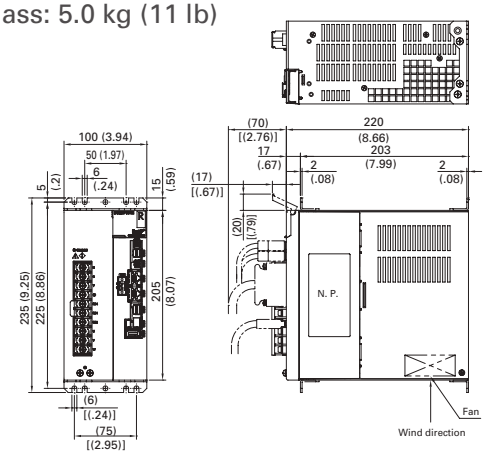
Unit: mm (inch)



■ RS2A10A0KA4

Mass: 5.0 kg (11 lb)

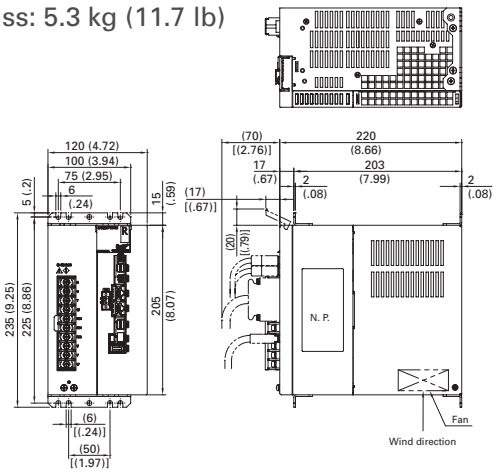
Unit: mm (inch)



■ RS2A15A0KA4

Mass: 5.3 kg (11.7 lb)

Unit: mm (inch)



EtherCAT Interface High Speed Type Servo Amplifier

Specifications

Control function		Position control/Speed control/Torque control (Parameter changeover)
Main circuit power (Note 1)		Three-phase: 200 to 230 VAC +10, -15%, 50/60Hz±3Hz Single-phase: 200 to 230 VAC +10, -15%, 50/60Hz±3Hz (Note 2)
Control circuit power		Single-phase: 200 to 230 VAC +10, -15%, 50/60Hz±3Hz
Environment	Ambient temperature	0 to +55˚C
	Storage temperature	-20 to +65˚C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	5 m/s^2 Frequency range 10 to 55Hz tested for 2h in each direction X.Y.Z
	Shock	20m/s^2
Structure		Built-in tray type power supply

Note 1) Power source voltage should be within the specified range
200 VAC Power input type: Specified power supply range = 170 to 253 VAC
Note 2) 200 VAC single-phase input type corresponds only to the RS2A01A0KA4, RS2A03A0KA4, RS2A05A0KA4

Performance

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

Built-in Functions

Protection functions	Over current, Current detection error, Overload, 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	Built-in
Monitor	Speed monitor (VMON) 2.0V±10% (at 1000 min^{-1}) Torque monitor (TCMON) 2.0V±10% (at 100%)

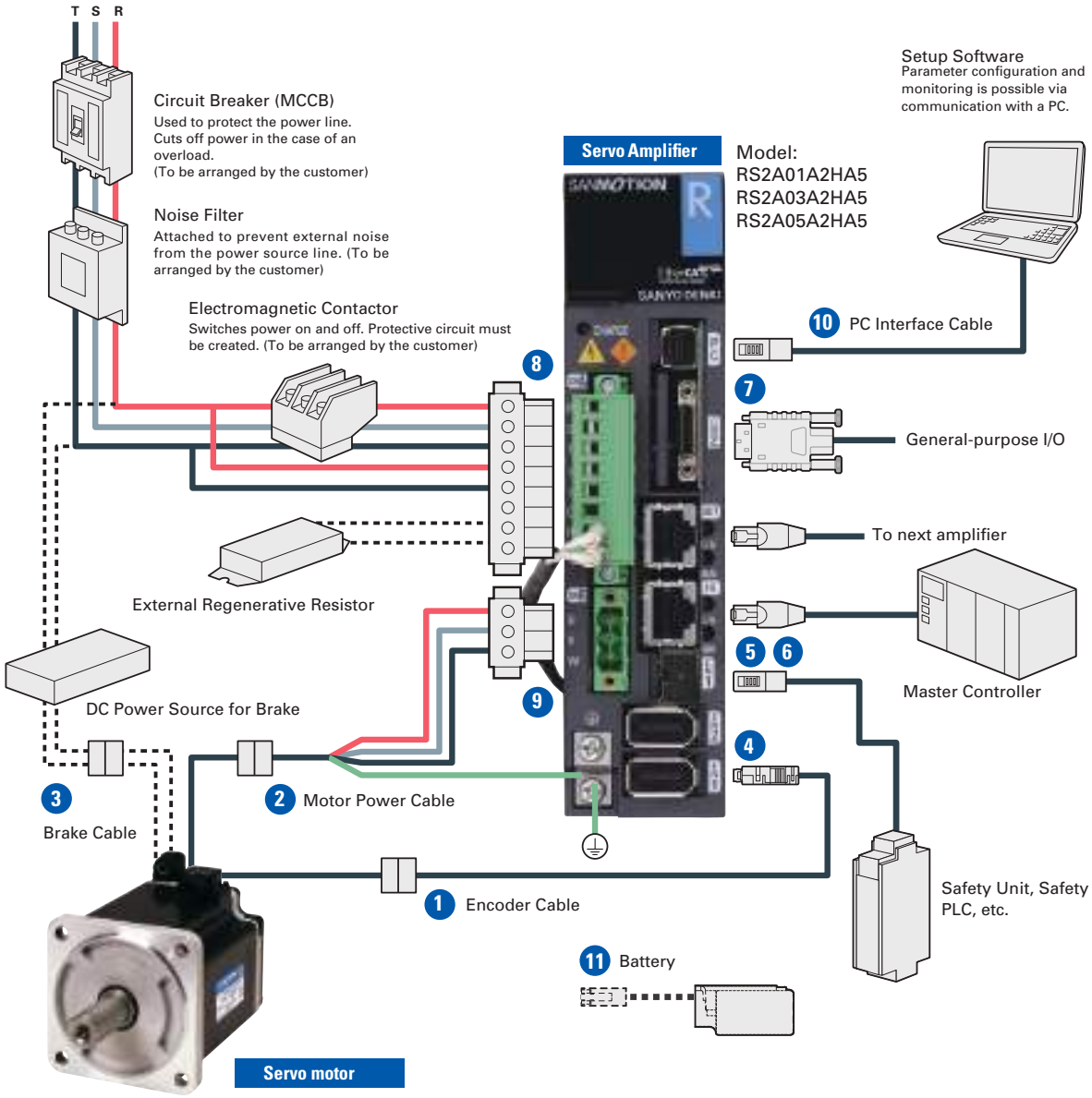
Safety Standard

Servo amplifier type	Safety standards		
All models	UL ratings	UL508C	
	EN standards	Low-voltage directive	• EN61800–5–1
		EMC directive	• EN61000-6-2 • EN61800-3 • EN61326-3-1
Model with safety function	Function safety standards	• IEC61508, SIL2 • IEC62061, SILCL2	• ISO13894-1, Cat3, PL=d

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 objects
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)

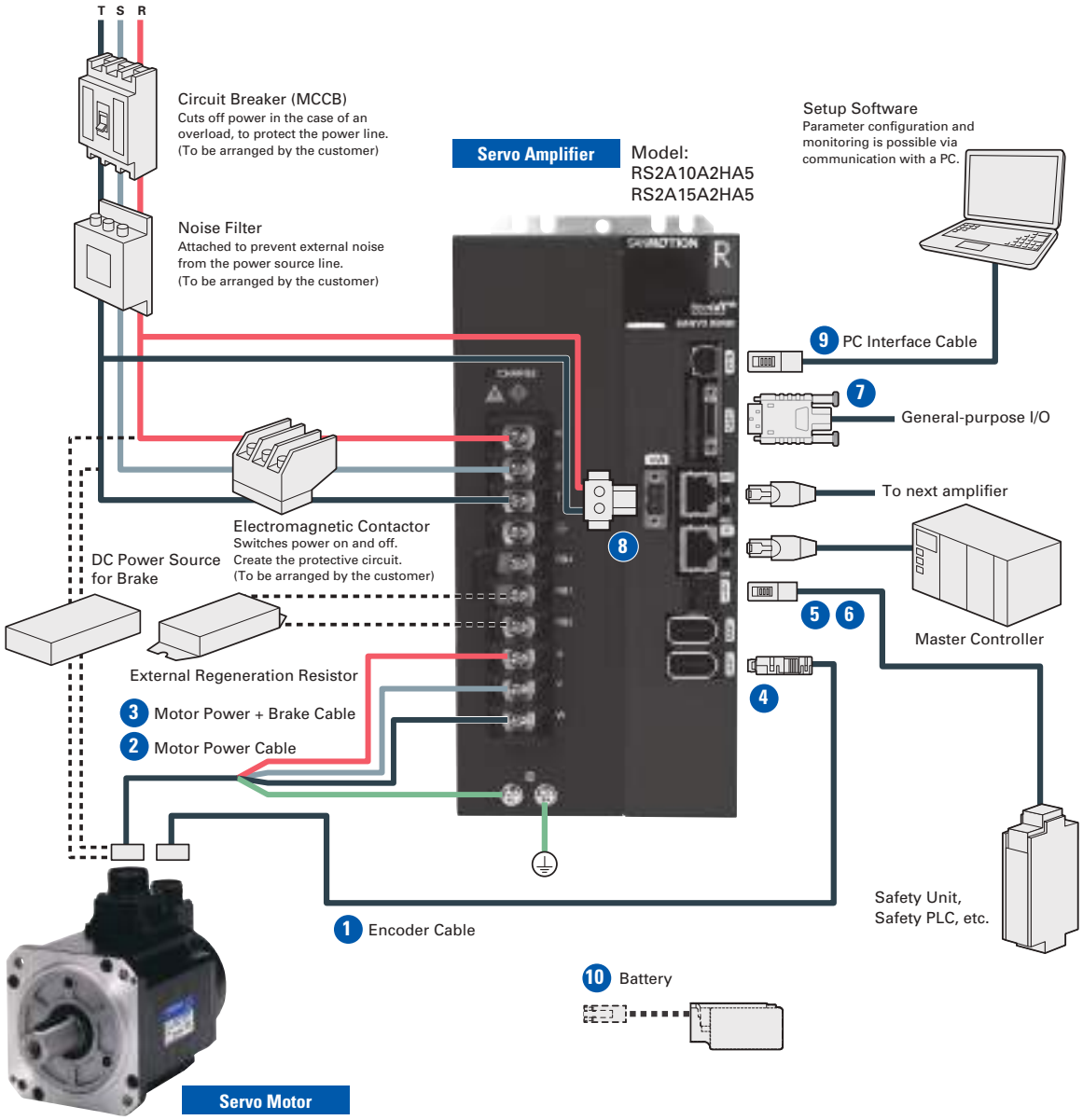
System Configuration: 15A, 30A, 50A



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 Connector [EN1, EN2]	AL-00632607	No need if Encoder Cable (1) 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 [CN2]	AL-00842383	For general I/O signal
	8 Connector [CNA]	AL-00686902-01	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
	11 Battery	1025-106187	Battery + Holder (ask us)

To build a complete system, you need to have checked items.

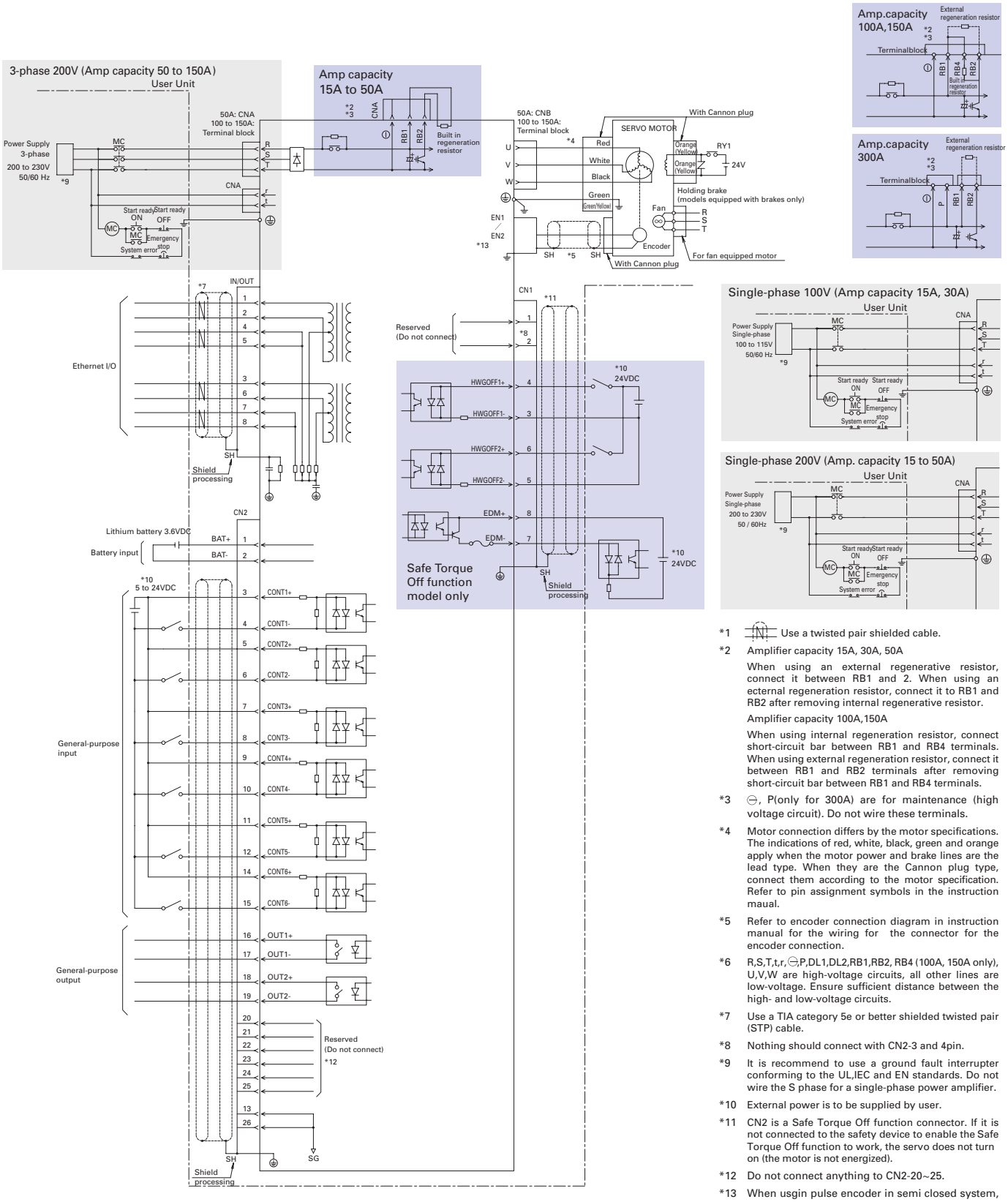
System Configuration: 100A, 150A



Item		Parts Number	Description
✓	1 Encoder Cable: 10 ft	EEXTKABS24JN10FT	
✓	2 Motor Power Cable: 10 ft	MEXTK18JN10FT	For 0.55 kW motor
		MEXTK14JN10FT	For 1.2 kW motor
		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, EN2]	AL-00632607	No need if Encoder Cable (1) 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 [CN2]	AL-00842383	For general I/O signal
✓	8 Connector [CNA]	AL-Y0005159-01	
	9 PC Interface Cable	AL-00689703-01	Communication with SANMOTION MOTOR Setup software
	10 Battery	1025-106187	Battery + Holder (ask us)

To build a complete system, you need to have checked items.

Wiring Diagram



*1 Use a twisted pair shielded cable.

*2 Amplifier capacity 15A, 30A, 50A

When using an external regenerative resistor, connect it between RB1 and 2. When using an ecternal regeneration resistor, connect it to RB1 and RB2 after removing internal regenerative resistor.

Amplifier capacity 100A,150A

When using internal regeneration resistor, connect short-circuit bar between RB1 and RB4 terminals. When using external regeneration resistor, connect it between RB1 and RB2 terminals after removing short-circuit bar between RB1 and RB4 terminals.

*3 ⊖, P(only for 300A) are for maintenance (high voltage circuit). Do not wire these terminals.

*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. When they are the Cannon plug type, connect them according to the motor specification. Refer to pin assignment symbols in the instruction maual.

*5 Refer to encoder connection diagram in instruction manual for the wiring for the connector for the encoder connection.

*6 R,S,T,t,r,⊖,P,DL1,DL2,RB1,RB2, RB4 (100A, 150A only), U,V,W are high-voltage circuits, all other lines are low-voltage. Ensure sufficient distance between the high- and low-voltage circuits.

*7 Use a TIA category 5e or better shielded twisted pair (STP) cable.

*8 Nothing should connect with CN2-3 and 4pin.

*9 It is recommend to use a ground fault interrupter conforming to the UL,IEC and EN standards. Do not wire the S phase for a single-phase power amplifier.

*10 External power is to be supplied by user.

*11 CN2 is a Safe Torque Off function connector. If it is not connected to the safety device to enable the Safe Torque Off function to work, the servo does not turn on (the motor is not energized).

*12 Do not connect anything to CN2-20~25.

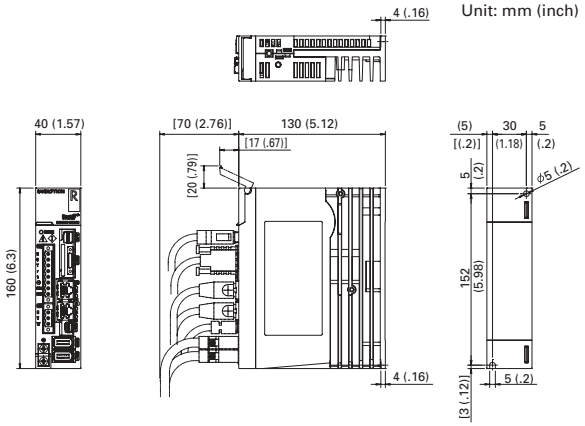
*13 When usgin pulse encoder in semi closed system, connect it to EN2.

Dimensions

■ RS2A01A2HA5

Mass: 0.75 kg (1.65 lb)

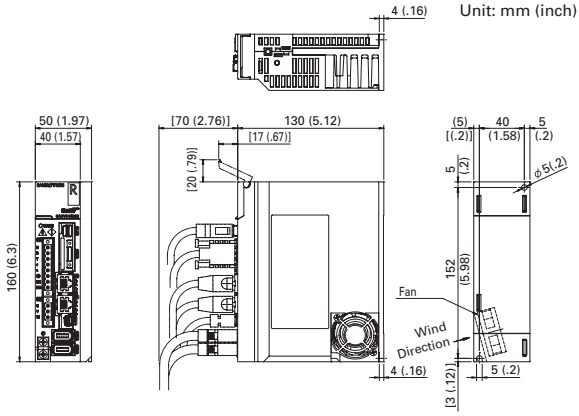
Unit: mm (inch)



■ RS2A03A2HA5

Mass: 0.95 kg (2.1 lb)

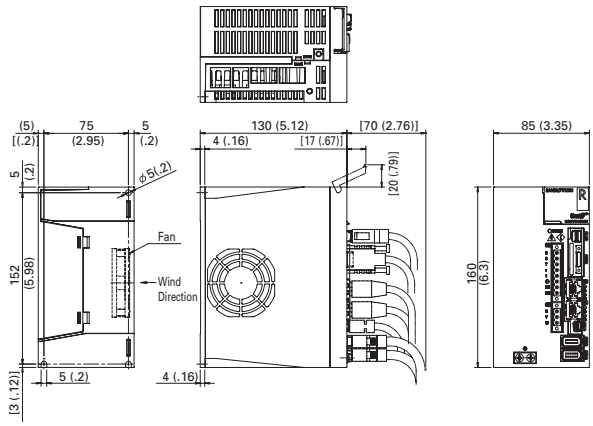
Unit: mm (inch)



■ RS2A05A2HA5

Mass: 1.65 kg (3.6 lb)

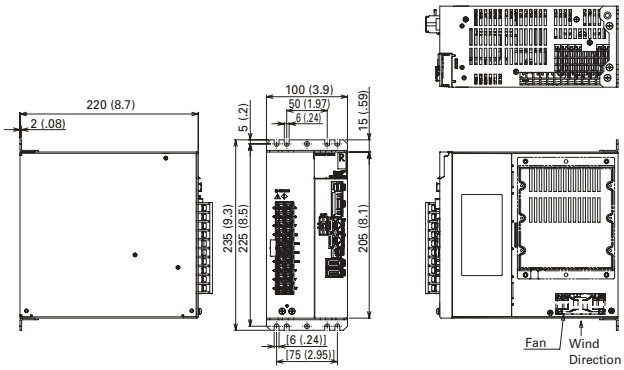
Unit: mm (inch)



■ RS2A10A2HA5

Mass: 5.0 kg (11 lb)

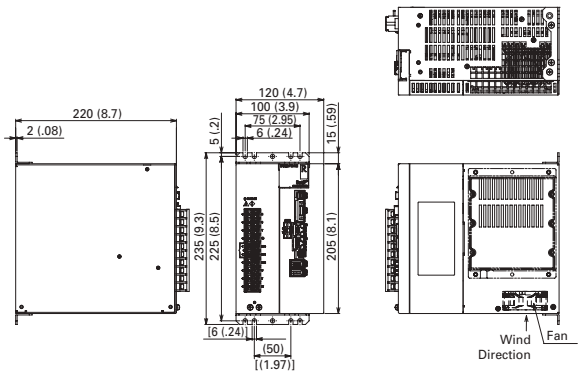
Unit: mm (inch)



■ RS2A15A2HA5

Mass: 5.3 kg (11.7 lb)

Unit: mm (inch)



Analog DC Input Type Servo Amplifier

Specifications

Control function		Position control
Main circuit power		48 VDC ±10% (Note 1)
Control circuit power		5 VDC ±5% (Note 2)
Environment	Ambient temperature	0 to +40˚C (Note 3)
	Storage temperature	-20 to +65˚C
	Operation/Storage humidity	Below 90% RH (no condensation)
	Elevation	Below 1000 m
	Vibration	4.9 m/s^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

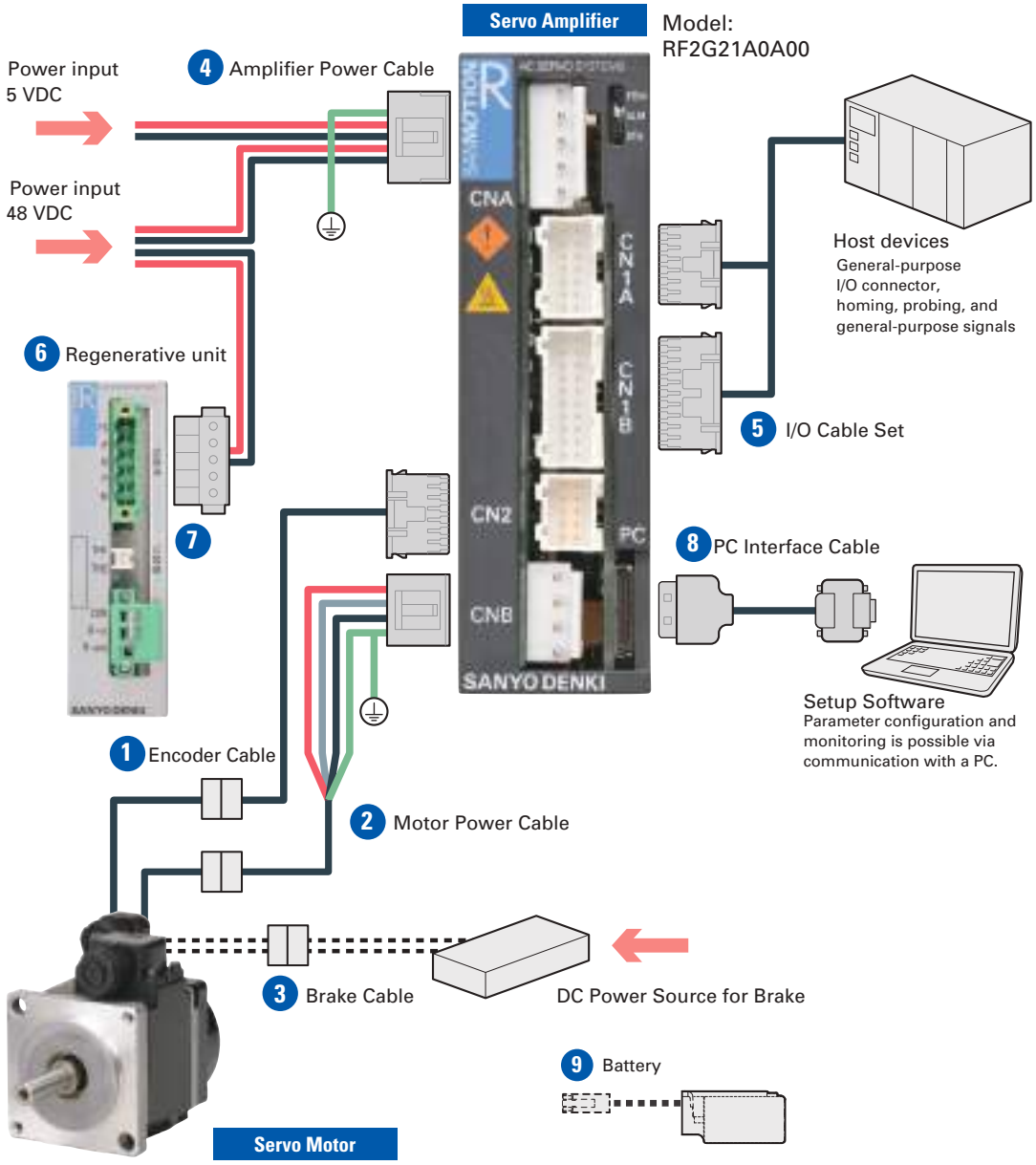
Built-in Functions

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

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

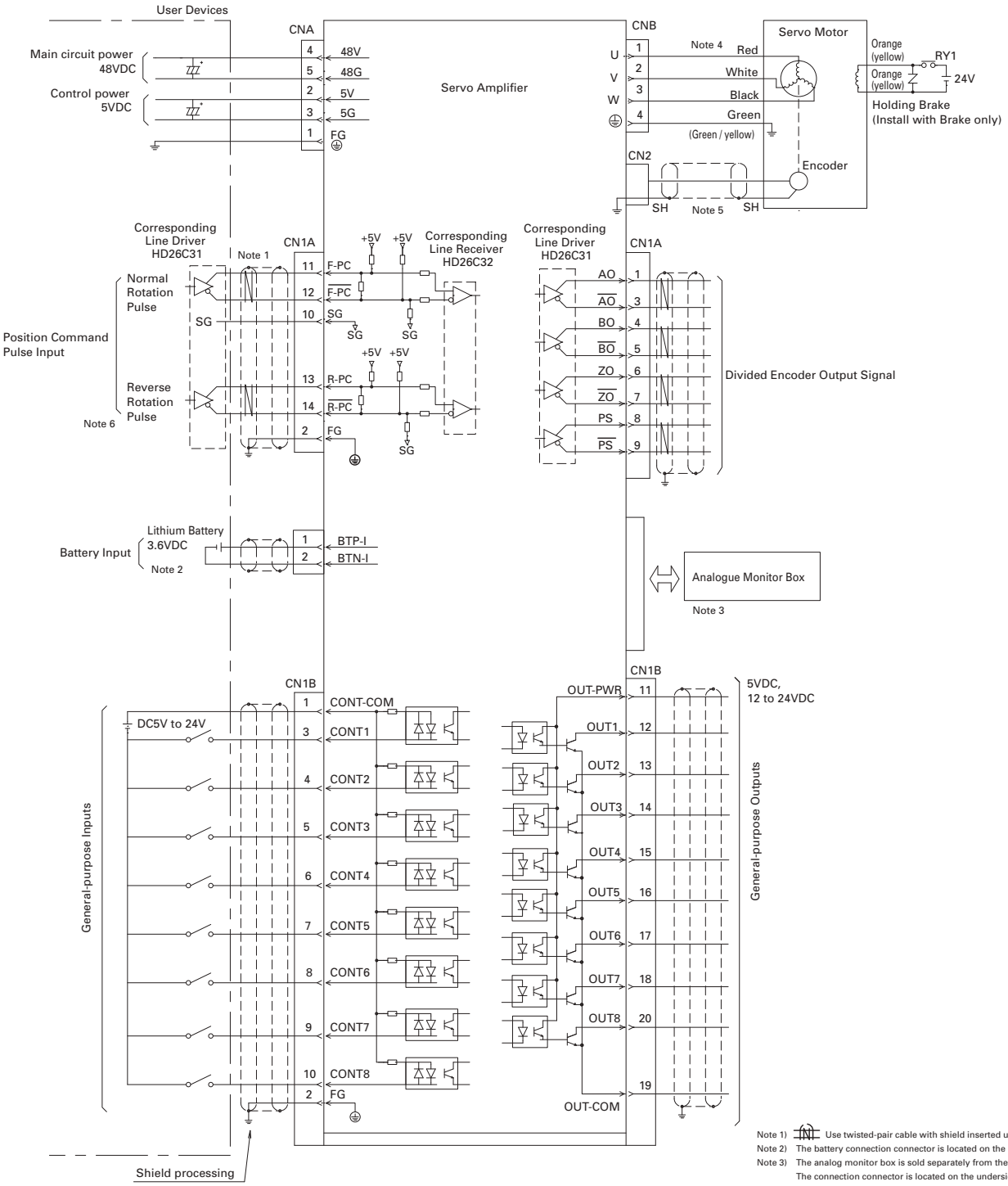
System Configuration



Item		Parts Number	Description
✓ 1	Encoder Cable: 10 ft	EEXTGABS2410FT	
✓ 2	Motor Power Cable: 10 ft	MEXTG1810FT	
3	Brake Cable: 10 ft	MEXTGBRK2010FT	Only for Brake Equipped Motor
✓ 4	Amplifier Power Cable: 2 m	AL-00745943-01	
✓ 5	I/O Cable Set, for CN1A and CN1B	AL-00745949-01	
6	Regenerative Unit	RF1BB00	No need if I/O Cable (5) is selected
7	Connector [CNA]	AL-00329461-01	
✓ 8	PC Interface Cable	AL-00490833-01	Communication with SANMOTION MOTOR Setup Software
9	Battery	AL-00494635-01	

To build a complete system, you need to have checked items.

Wiring Diagram



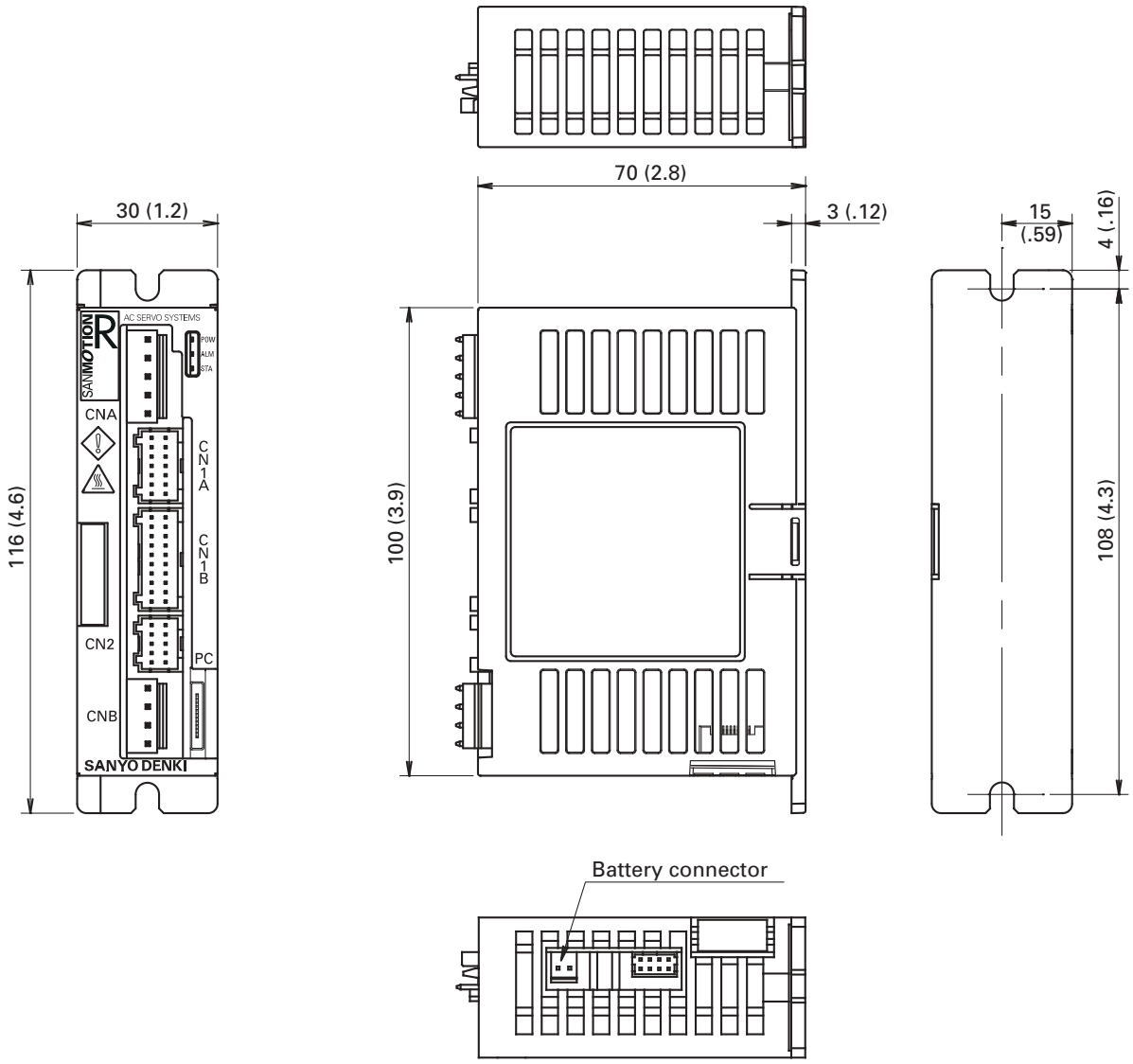
Note 1) Use twisted-pair cable with shield inserted under jacket.
Note 2) The battery connection connector is located on the underside of the amplifier.
Note 3) The analog monitor box is sold separately from the servo amplifier. The connection connector is located on the underside of the amplifier.
Note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

Dimensions

■ RF2G21A0A00

Mass: 0.23 kg (0.51 lb)

Unit: mm (inch)



EtherCAT Interface DC Input Type Servo Amplifier

Specifications

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

Performance

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

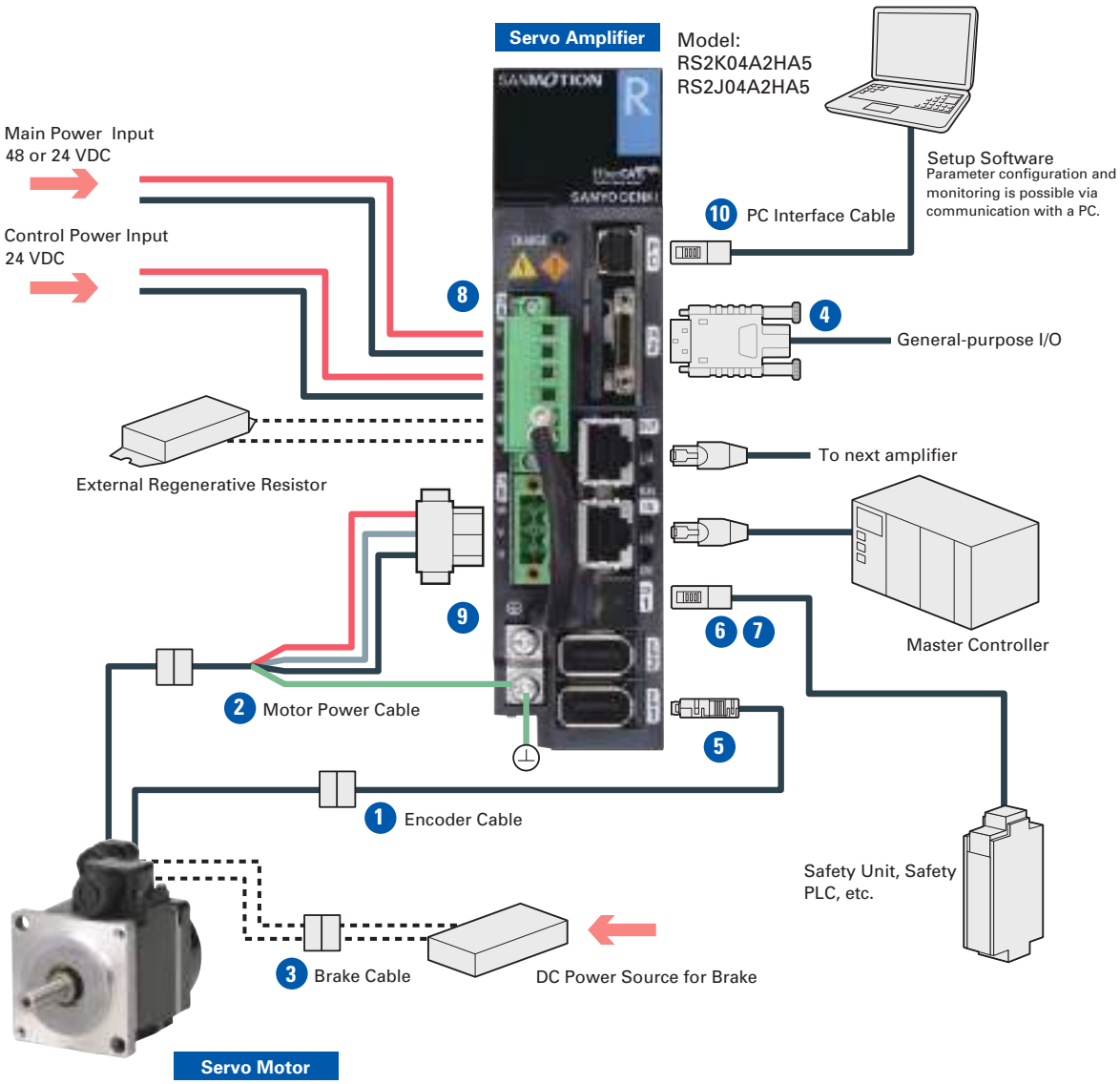
Built-in Functions

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

EtherCAT Interface Specifications

Physical layer	IEC61158-2 IEEE802.3u 100BASE-TX
Data link layer	IEC61158-3,-4 Type12
Application layer	IEC61158-5,-6 Type12
Device profile	IEC61800-7 Profile type1(CiA402) • 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)

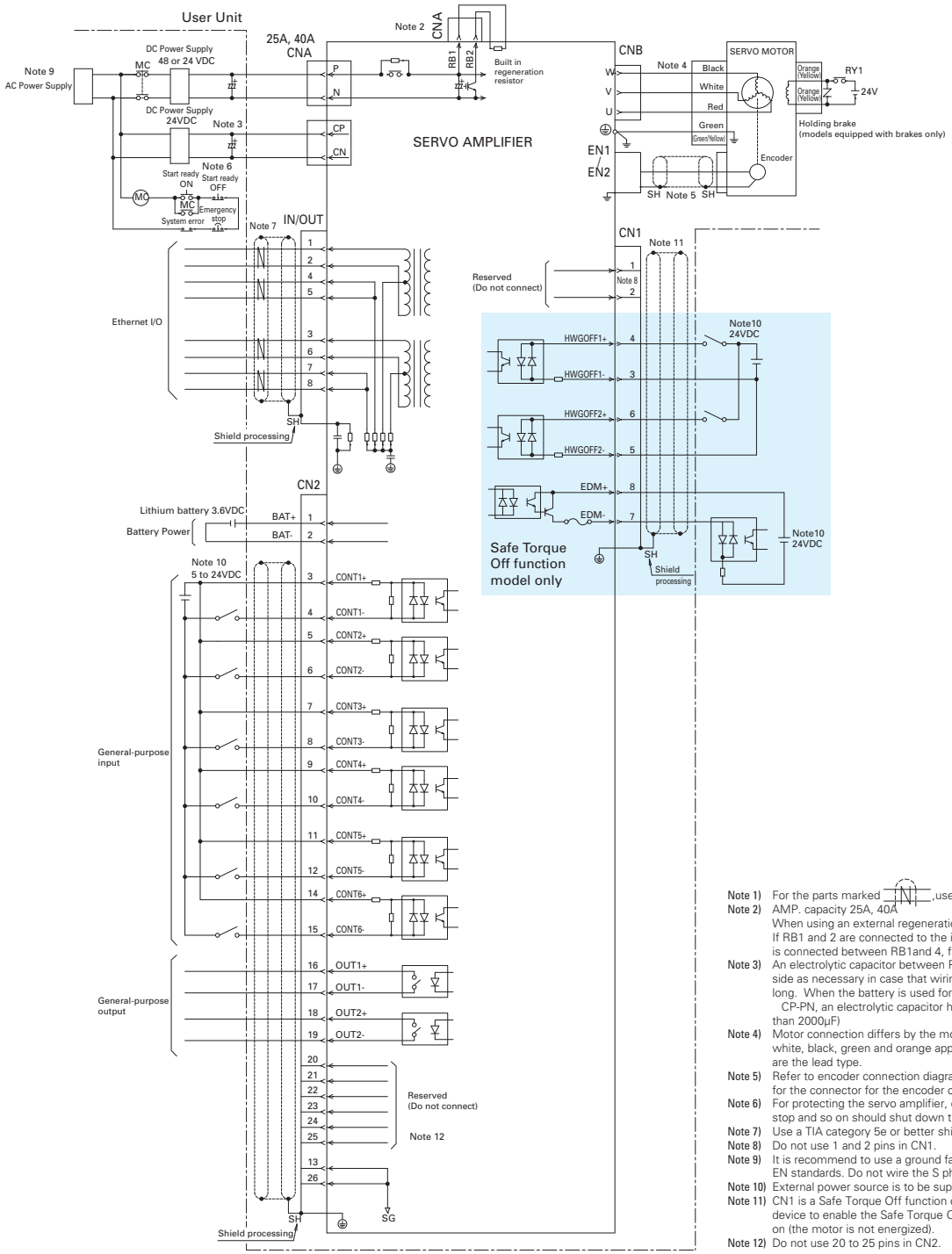
System Configuration



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 function, no need if connector (7) is selected
✓ 7	Connector [CN1]	AL-00849548-02	For STO function 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

To build a complete system, you need to have checked items.

Wiring Diagram



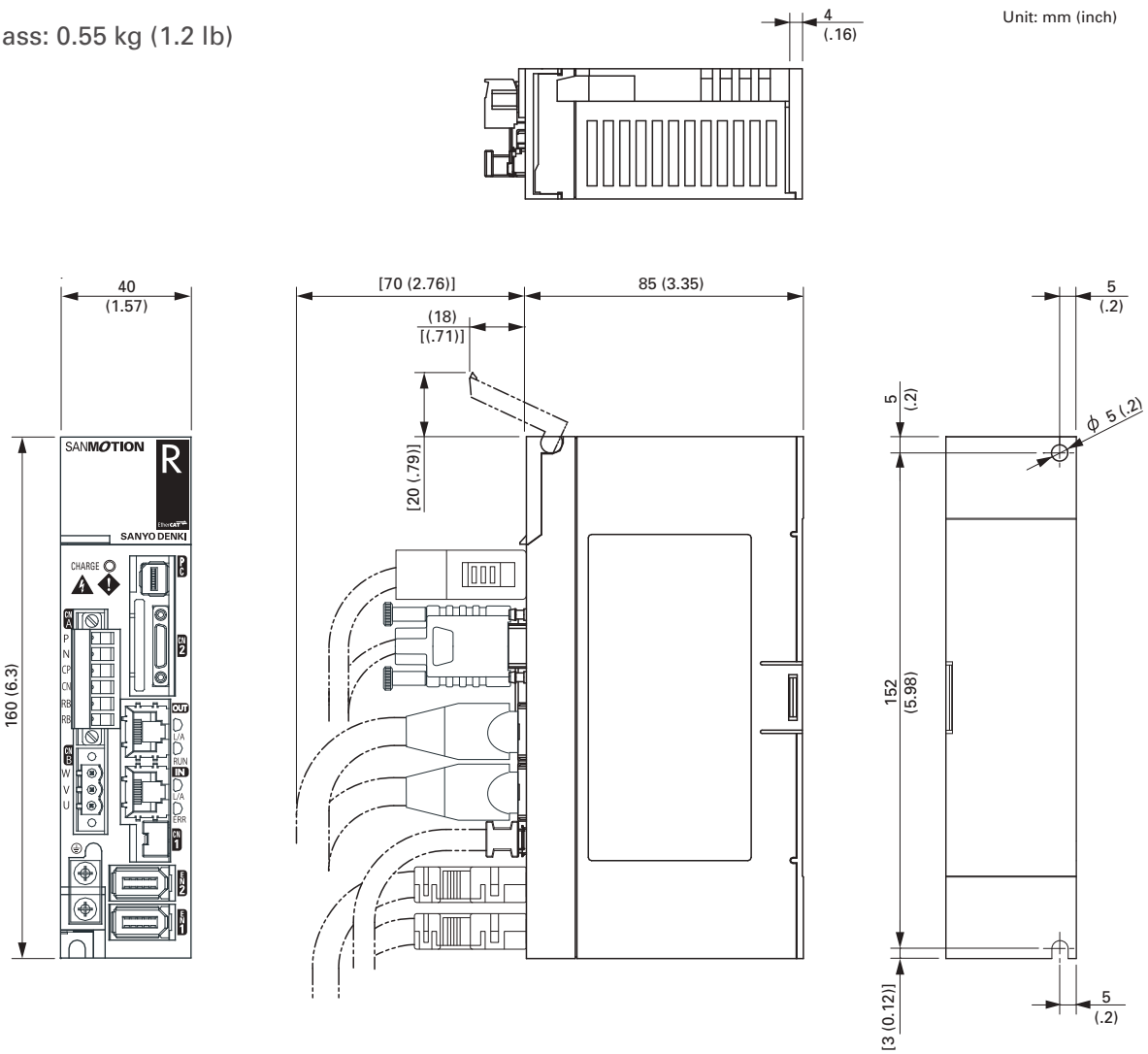
Note 1) For the parts marked , use a twisted pair shielded cable.
Note 2) AMP. capacity 25A, 40A
When using an external regeneration resistor, connect it between RB1 and 2.
If RB1 and 2 are connected to the internal amplifier's resistor, or if a shorting bar is connected between RB1and 4, first disconnect them.
Note 3) An electrolytic capacitor between P-N and CP-CN is installed to the amplifier side as necessary in case that wiring from DC power source to the amplifier is long. When the battery is used for the DC power source between P-N and CP-PN, an electrolytic capacitor has to be installed. (Recommendation: more than 2000μF)
Note 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.
Note 5) Refer to encoder connection diagram in the instruction manual for the wiring for the connector for the encoder connection.
Note 6) For protecting the servo amplifier, ensure the power-off system like emergency stop and so on should shut down the DC power input.
Note 7) Use a TIA category 5e or better shielded twisted pair (STP) cable.
Note 8) Do not use 1 and 2 pins in CN1.
Note 9) It is recommend to use a ground fault interrupter conforming to the UL, IEC and EN standards. Do not wire the S phase for a single-phase power amplifier.
Note 10) External power source is to be supplied by user.
Note 11) CN1 is a Safe Torque Off function connector. If it is not connected to the safety device to enable the Safe Torque Off function to work, the servo does not turn on (the motor is not energized).
Note 12) Do not use 20 to 25 pins in CN2.

Dimensions

■ RS2K04A2HA5
■ RS2J04A2HA5

Mass: 0.55 kg (1.2 lb)

Unit: mm (inch)



EtherCAT Interface DC Input Type Multi Axis Servo Amplifier

Specificaitons

Amplifier Model		RF2J14A0HL5	RF2K24A0HL5	RF2J24A8HL5
Combined Motor		2.4 W	20 to 200 W	Linear actuator
Total 4 axes output limitation		9.6 W	300 W	120 W
Control function		Position control/Speed control/Torque control (Parameter switching)		
Main circuit power (Note 1)		48/24 VDC±10% (Note 1)		
Control circuit power		24 VDC±10% (Note 1)		
Environment	Ambient temperature	0 to +55˚C		
	Storage temperature	-20 to +65˚C		
	Operation/Storage humidity	Below 90% RH (no condensation)		
	Elevation	1000 m or lower		
	Vibration	4.9 m/s^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

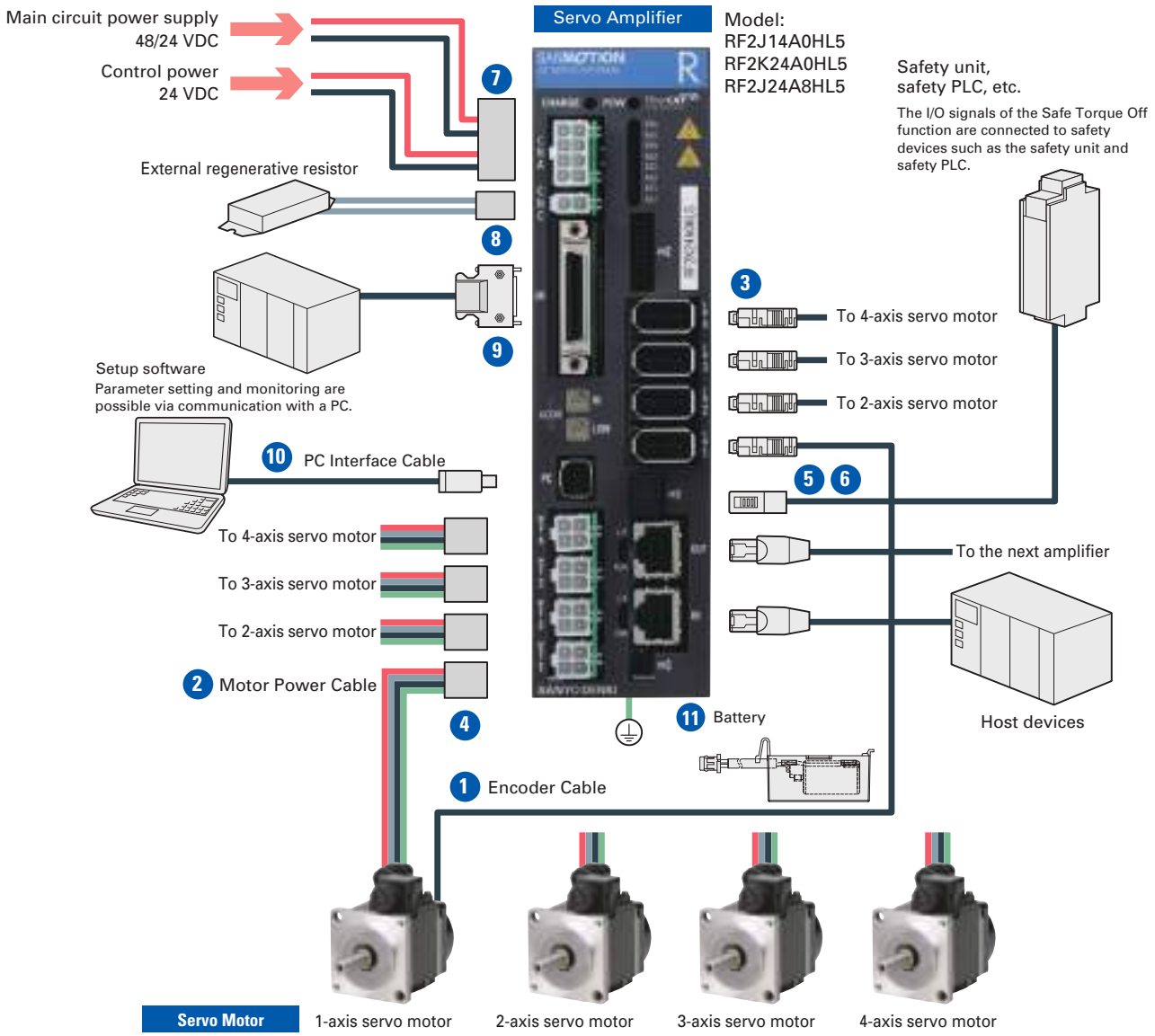
Built-in Functions

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)

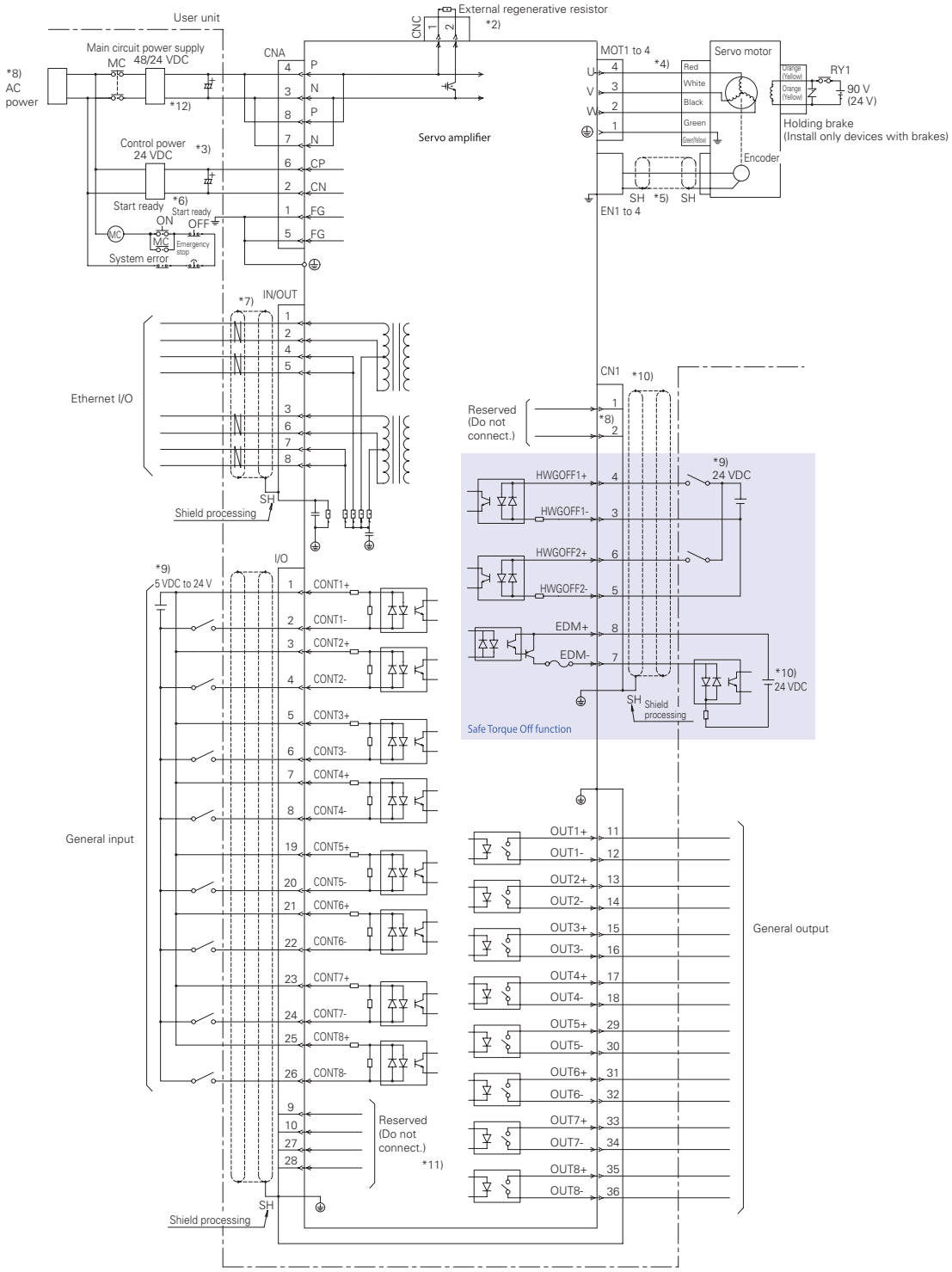
System Configuration



Item		Parts Number	Description
		EEXTKABS2410FT	
✓ 1	Encoder Cable: 10 ft	1026-107008	For 1027-107013 and 1027-107014 motor
		1026-107024	For 1028-107023 motor
		1026-107009	
✓ 2	Motor Power Cable: 10 ft	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 amplifierr power supply
8	Connector [CNC]	AL-00922658	For refenerative resistor connection
9	Connector [I/O]	AL-00922662	For general I/O singal
10	PC Interface Cable	AL-00689703-01	Communication with SANMOTION MOTOR Setup software
11	Battery [CN3]	AL-00880402-01	Used when using a battery-backup method absolute encoder

To build a complete system, you need to have checked items.

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 occuring when the motor is stopped, connect a regenerative resistor.

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

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

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

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

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

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

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

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

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

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

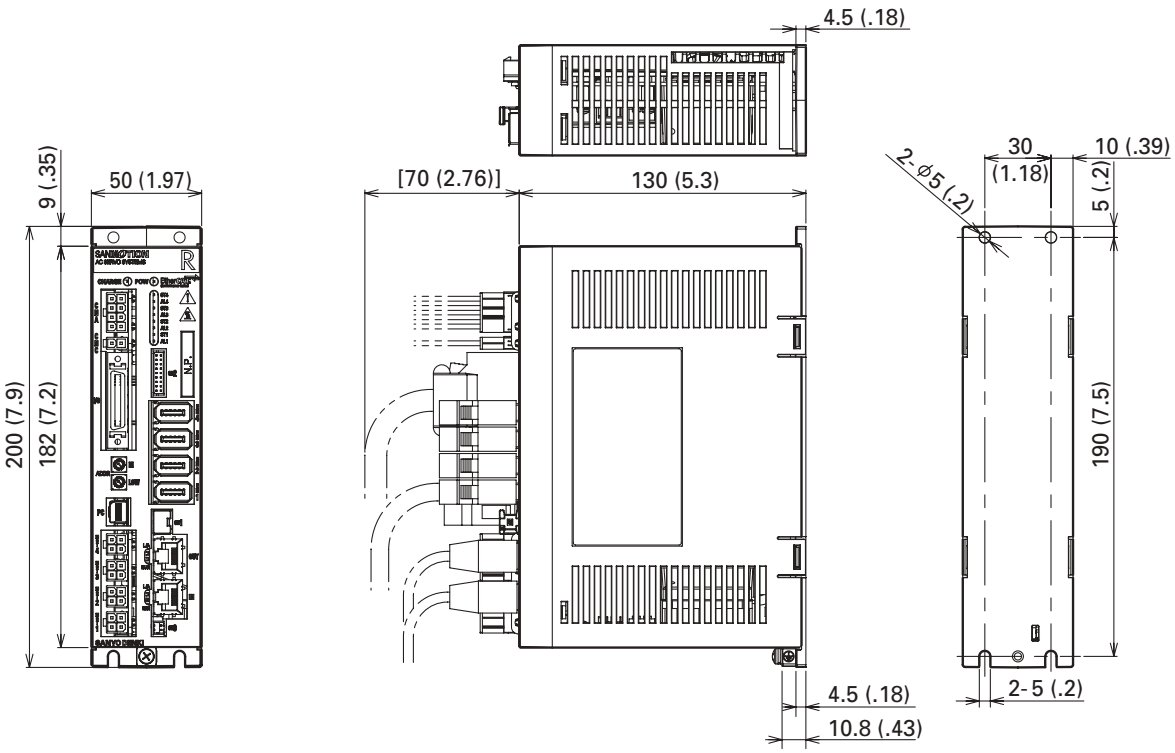
Dimensions

■ **RF2J14A0HL5** Mass: 0.75 kg (1.65 lb)

■ **RF2K24A0HL5** Mass: 0.8 kg (1.76 lb)

■ **RF2J24A8HL5** Mass: 0.75 kg (1.65 lb)

Unit: mm (inch)



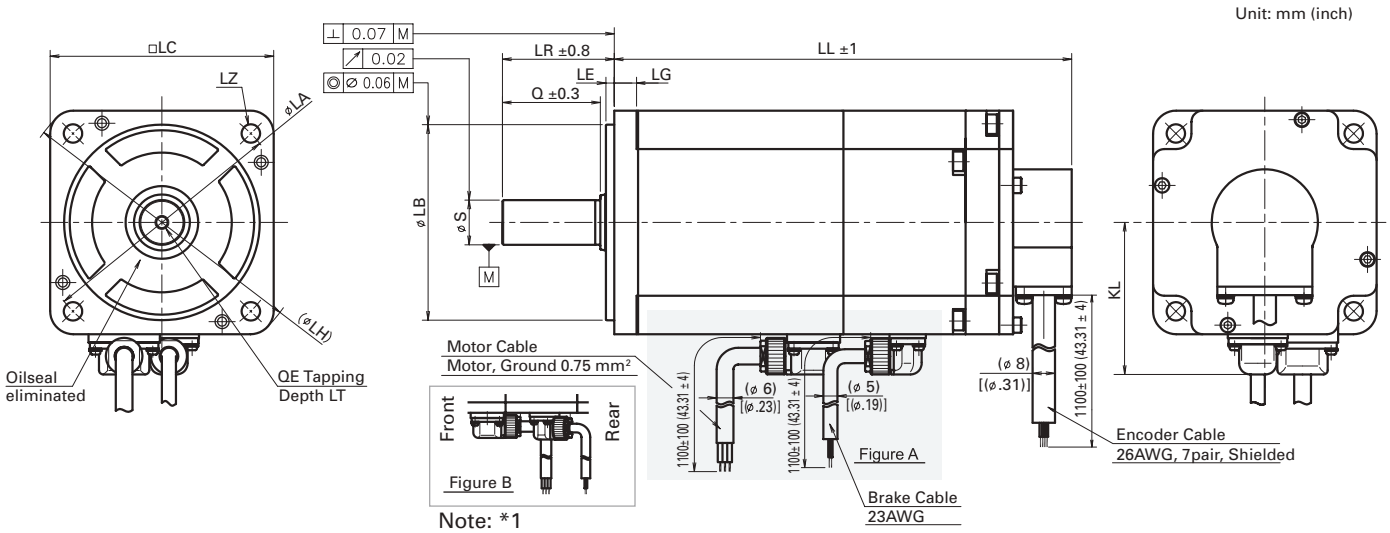
Brake Equipped Motors

Motor Model			R2FA04003F	R2FA04005D	R2EA04008F	R2GA04008D	R2AA04010F
Rated Power			30 W	50 W	80 W	80 W	90 W
Power Supply			24 VDC	24 VDC	100 VAC	48 VDC	200 VAC
Brake	Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	24 ±10%	24 ±10%
	Input Current	Amp	0.27	0.27	0.27	0.27	0.27
	Minimum Static Friction Torque	N • m	0.32	0.32	0.32	0.32	0.32
		lb • in	2.8	2.8	2.8	2.8	2.8
	Inertia	x10^{-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	R2EA06020F	R2GA06020D	R2AA06040F	R2AA08075F
Rated Power			70 W	200 W	200 W	400 W	750 W
Power Supply			24 VDC	100 VAC	48 VDC	200 VAC	200 VAC
Brake	Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%	24 ±10%	24 ±10%
	Input Current	Amp	0.27	0.32	0.32	0.32	0.37
	Minimum Static Friction Torque	N • m	0.36	1.37	1.37	1.37	2.55
		lb • in	3.2	12.1	12.1	12.1	22.6
	Inertia	x10^{-4} kg • m^2	0.06	0.06	0.06	0.06	0.25
		lb • in^2	0.021	0.021	0.021	0.021	0.085
	Mass	kg	0.36	0.39	0.35	0.39	0.89
		lb	0.80	0.86	0.78	0.86	2.0

Motor Model			R2AAB8100H	R2AA13200D	R2AA22500L
Rated Power			1 kW	2 kW	5 kW
Power Supply			200 VAC	200 VAC	200 VAC
Brake	Input Voltage	VDC	24 ±10%	24 ±10%	24 ±10%
	Input Current	Amp	0.3	0.66	1.2
	Minimum Static Friction Torque	N • m	3.92	12	42
		lb • in	34.7	106	372
	Inertia	x10^{-4} kg • m^2	0.343	0.5	5.1
		lb • in^2	0.117	0.17	1.7
	Mass	kg	0.84	1.5	5.5
		lb	1.9	3.3	12

Incremental Encoder with Hall Sensor Equipped Motor



Dimensions

Unit: mm (inch)

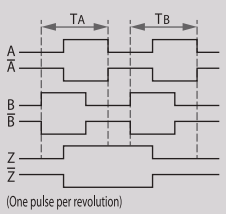
P/N	LL	LG	KL	LA	LB	LE
R2AA04005FXK30M*1	68.5 (2.70)		34.4 (1.35)			
R2AA04005FCK30M*1	104.5 (4.11)	5	35.3 (1.39)	46	30 $^{0}_{-0.021}$	2.5
R2AA04010FXK00M	84 (3.31)	(.2)	34.4 (1.35)	(1.81)	(1.18 $^{0}_{-.00084}$)	(.1)
R2AA04010FCK00M	120 (4.72)		35.3 (1.39)			
R2AA06010FXK30M*1	78.2 (3.08)					
R2AA06010FCK30M*1	106.2 (4.18)					
R2AA06020FXK00M	89.2 (3.51)	6	44.6	70	50 $^{0}_{-0.025}$	
R2AA06020FCK00M	117.2 (4.61)	(.24)	(1.76)	(2.76)	(1.97 $^{0}_{-.001}$)	3
R2AA06040FXK00M	115.2 (4.54)					(.12)
R2AA06040FCK00M	143.2 (5.64)					
R2AA08075FXK00M	128.3 (5.05)	8	54.4	90	70 $^{0}_{-0.030}$	
R2AA08075FCK00M	163.7 (6.44)	(.31)	(2.14)	(3.54)	(2.76 $^{0}_{-.0012}$)	

P/N	LH	LC	LZ	LR	S	Q	QE	LT
R2AA04005FXK30M*1								
R2AA04005FCK30M*1	56	40	2-ø4.5					
R2AA04010FXK00M	(2.20)	(1.57)	(2-ø.18)	25	8 $^{0}_{-0.009}$	20	N/A	N/A
R2AA04010FCK00M				(.98)	(.31 $^{0}_{-.004}$)	(.79)		
R2AA06010FXK30M*1								
R2AA06010FCK30M*1								
R2AA06020FXK00M	82	60	4-ø5.5					
R2AA06020FCK00M	(3.23)	(2.36)	(4-ø.22)	30	14 $^{0}_{-0.011}$	25		
R2AA06040FXK00M				(1.18)	(.55 $^{0}_{-.004}$)	(.98)	M5	12
R2AA06040FCK00M								(.47)
R2AA08075FXK00M	108	80	4-ø6.6	40	16 $^{0}_{-0.011}$	35		
R2AA08075FCK00M	(4.25)	(3.15)	(4-ø.26)	(1.57)	(.63 $^{0}_{-.004}$)	(1.38)		

Encoder Specifications

Item	Specification
Pulse per Revolution	2000 P/R
Channel	3 (A, B, Z Channel)
CS Pulse per Revolution	5 Pulse/Rate
CS Channel	3 (U, V, W Channel)
Frequency Response	0 to 7200 min^{-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)

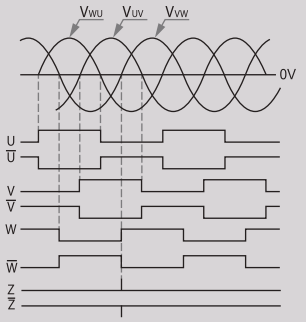
Incremental (EN)



(One pulse per revolution)

(Ramp up and down of Z-channel should be limited within TA or TB)

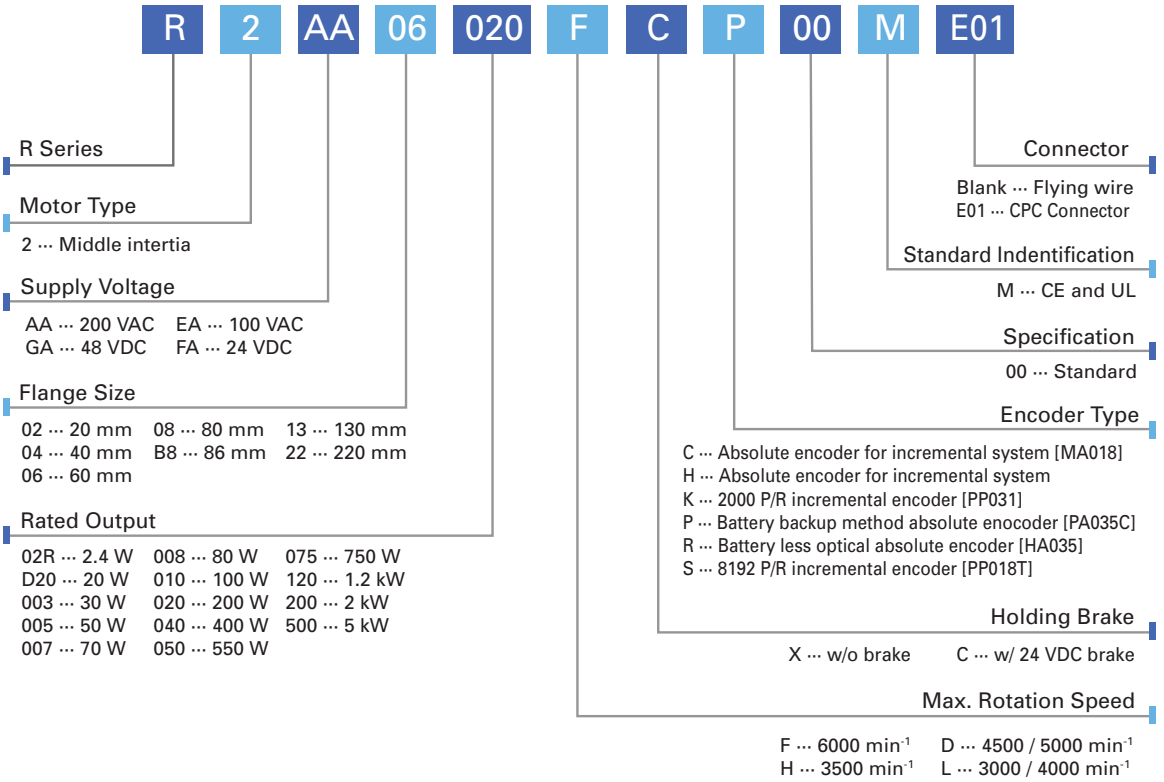
Commutation Sensor (CS)



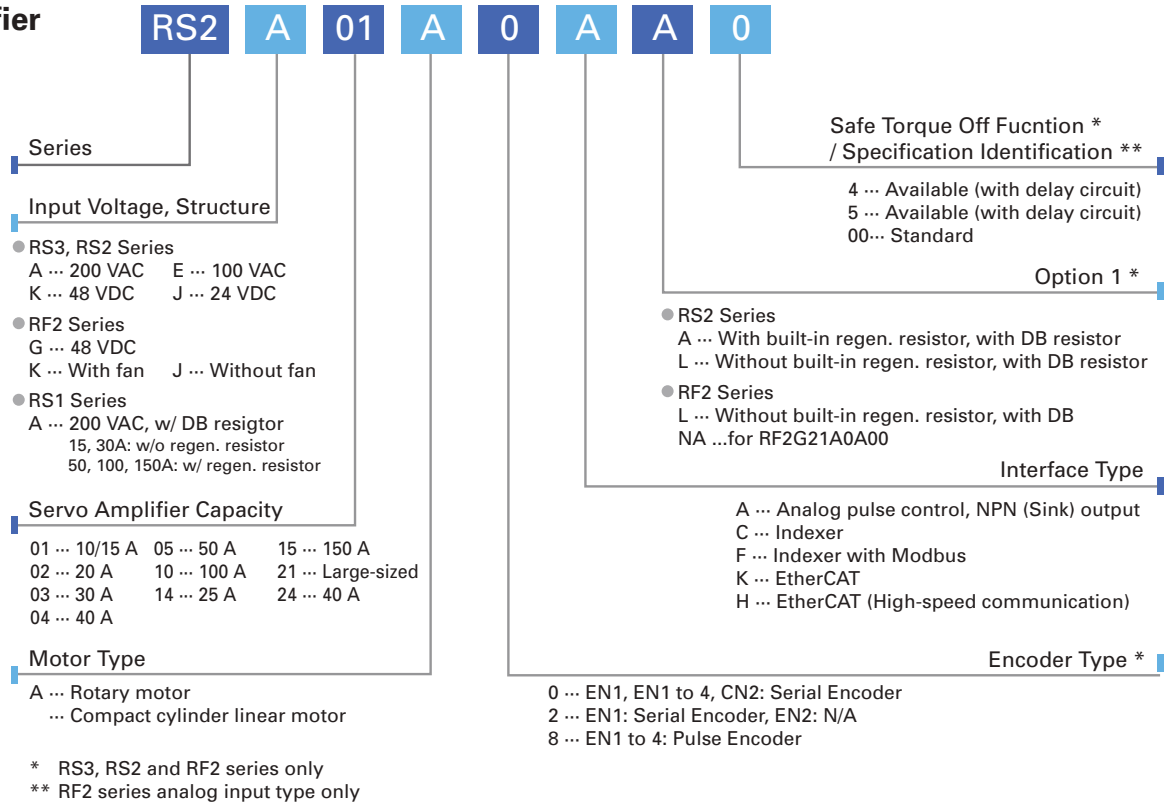
Note: *1 - The motor and encoder connectors of R2AA04005F and R2AA06010F are mounted towared the rear side of motor (Figure B). Other motos have Figure A.

Model Numbering System

Motor



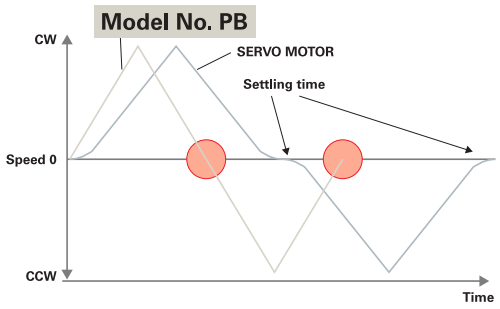
Amplifier



SANMOTION CLOSED LOOP STEPPING SYSTEMS Model No.PB

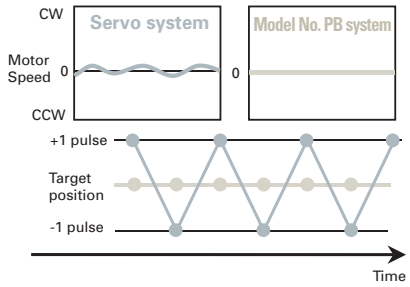
High Speed Positioning

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



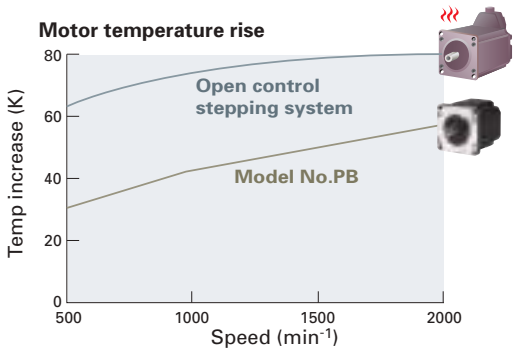
Zero Motor Hunting

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/ ±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

EtherCAT Conformance tested

Two Axis Control
Homing Mode
Position Mode (PP, CSV)
Velocity Mode (PV, CSV)
Jogging Function
Holding Brake Control

Lineup

Flange Size	Motor Length mm / inch	Max. Stall Torque N·m / oz·in	Model	Driver: Indexer Type R 100 VAC	Indexer Type R 200 VAC	Indexer Type M 24/48 VDC	Pulse Input Type P 100 VAC	Pulse Input Type P 200 VAC	Pulse Input Type M 24/48 VDC	EtherCAT Type E 24/48 VDC	EtherCAT Type E Multi-axis 24/48 VDC	Page
28 mm 1.1 inch	59.2 2.33	0.055 7.79	PBM281DXE50								■	72
	58.5 2.30	0.05 7.08	PBM282FXE20			■			■			73
	117.1 4.61	0.155 22.0	PBM284FXE20			■			■			74
	117.1 4.61	0.115 16.3	PBM284FXE50							■		
	78.5 3.09	0.115 16.3	PBM285DXE50								■	75
42 mm 1.7 inch	55.9 2.20	0.35 49.6	PBM423FXK30-M	■	■		■	■				76
	57.6 2.27	0.39 55.2	PBM423FXE20			■			■			
	55.9 2.20	0.39 55.2	PBM423FXE50							■		
	55.9 2.20	0.39 55.2	PBM423DXK50								■	
60 mm 2.4 inch	68.8 2.71	1.3 184.1	PBM603FXK30-M	■	■		■	■				77
	70.3 2.77	1.3 184.1	PBM603FXE20			■			■			
	68.8 2.71	1.3 184.1	PBM603FXE50							■		
	68.8 2.71	1.05 148.7	PBM603DXK50								■	
	100.8 3.97	1.9 269.1	PBM604FXK30-M	■	■		■	■				78
	102.3 4.03	1.9 269.1	PBM604FXE20			■			■			
	100.8 3.97	1.9 269.1	PBM604FXE50							■		
	100.8 3.97	1.85 262	PBM604DXK50								■	
86 mm 3.4 inch	79.5 3.13	3.1 439	PBM861FXK30-M	■	■		■	■				79
	110 4.33	6.1 863.9	PBM862FXK30-M	■	■		■	■				80

Driver Command Type

	Driver Type: AC Input	Driver Type: 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.		Type E

CLOSED LOOP STEPPING SYSTEMS

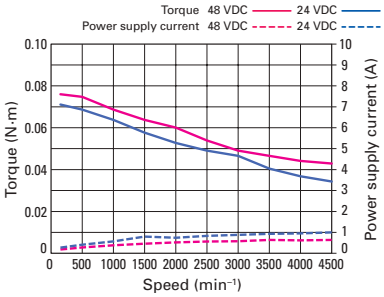
MOTOR FLANGE SIZE	28 mm (1.10 inch)	MOTOR LENGTH	59.2 mm (2.33 inch)

Specifications

Power Supply		24/48 VDC
Model		PBM281DXE50
Driver Type		Type E Multi
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

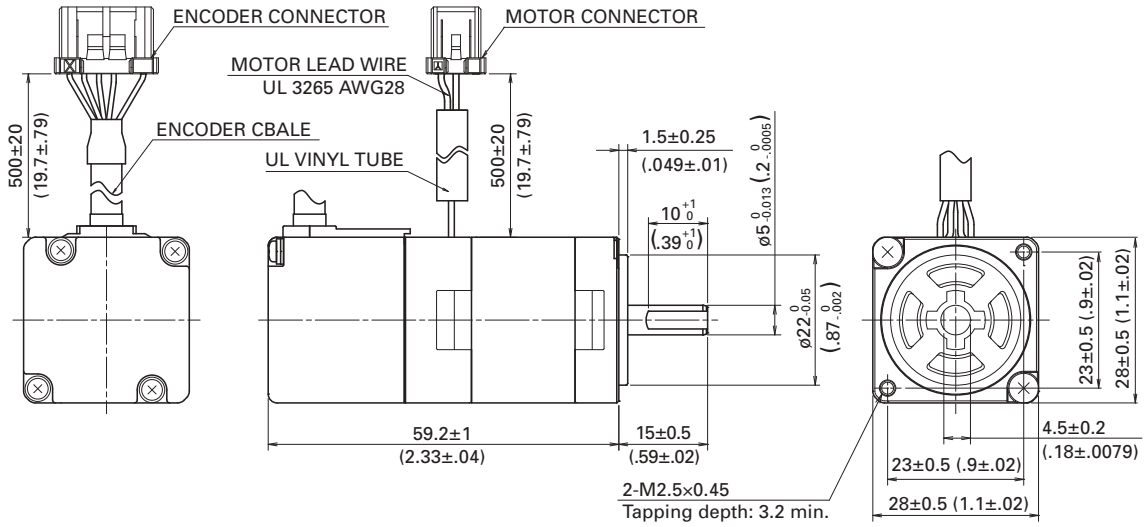
Torque Curve

PBM281DXE50



Dimension

Unit: mm (inch)



Applicable Driver

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

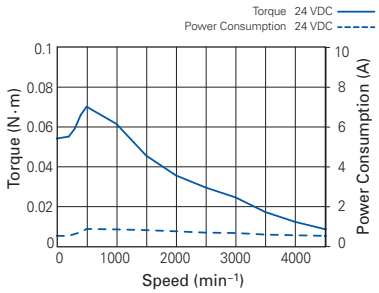
MOTOR FLANGE SIZE	28 mm (1.10 inch)	MOTOR LENGTH	58.5 mm (2.30 inch)

Specifications

Power Supply		24/48 VDC
Model		PBM282FXE20
Driver Type		Type M
Maximum Stall Torque	N·m	0.05
	oz·in	7.08
Rotor Moment of Inertia	x10^{-4} kg·m^2	0.008
	oz·in^2	0.044
Incremental Encoder		2000 P/R (500 P/R x4)
Motor Weight	kg	0.16
	lb	0.35
Operating Temperature		-10 to 40°C (16 to 104°F)
Humidity		20 to 90% RH, no condensation

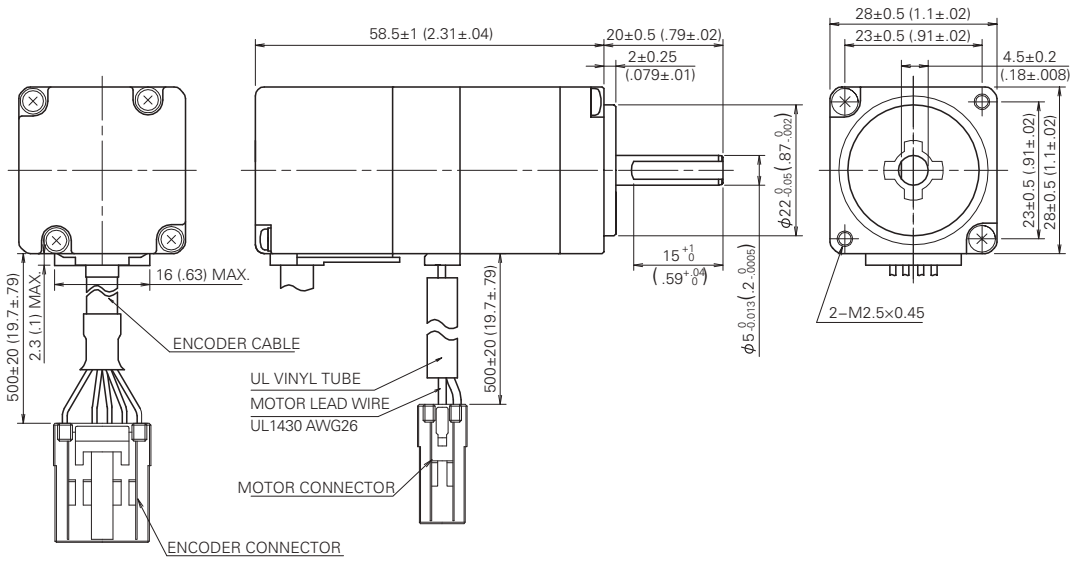
Torque Curve

PBM282FXE20



Dimension

Unit: mm (inch)



Applicable Driver

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

CLOSED LOOP STEPPING SYSTEMS

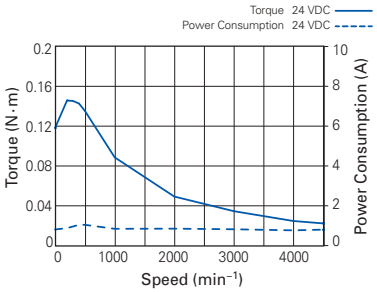
MOTOR FLANGE SIZE	28 mm (1.10 inch)	MOTOR LENGTH	117.1 mm (4.61 inch)

Specifications

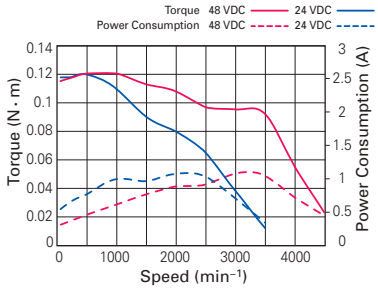
Power Supply		24/48 VDC	48 VDC
Model		PBM284FXE20	PBM284FXE50
Driver Type		Type M	EtherCAT
Maximum Stall Torque	N·m	0.155	0.115
	oz·in	22.0	16.3
Rotor Moment of Inertia	x10^{-4} kg·m^2	0.016	0.016
	oz·in^2	0.088	0.088
Incremental Encoder		2000 P/R (500 P/R x4)	500 P/R
Motor Weight	kg	0.23	0.23
	lb	0.51	0.51
Operating Temperature		-10 to 40°C (16 to 104°F)	
Humidity		20 to 90% RH, no condensation	

Torque Curve

PBM284FXE20



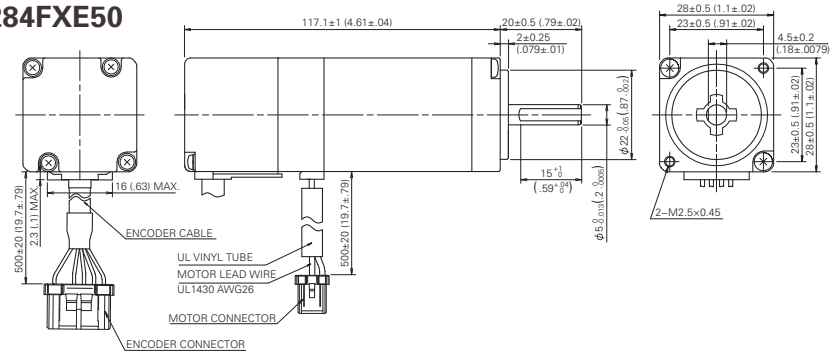
PBM284FXE50



Dimension

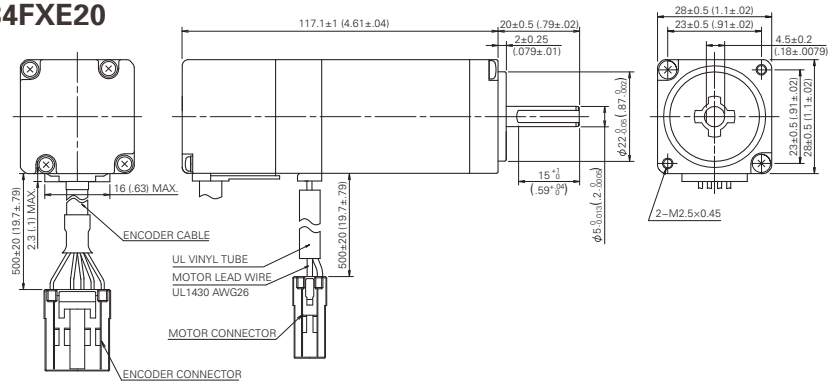
Unit: mm (inch)

PBM284FXE50



Unit: mm (inch)

PBM284FXE20



Applicable Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
24/48 VDC	PBM284FXE20	PB3D003M200		
48 VDC	PBM284FXE50			PB4D003E2D0

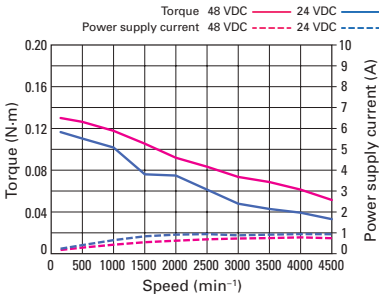
MOTOR FLANGE SIZE	28 mm (1.10 inch)	MOTOR LENGTH	78.5 mm (3.09 inch)

Specifications

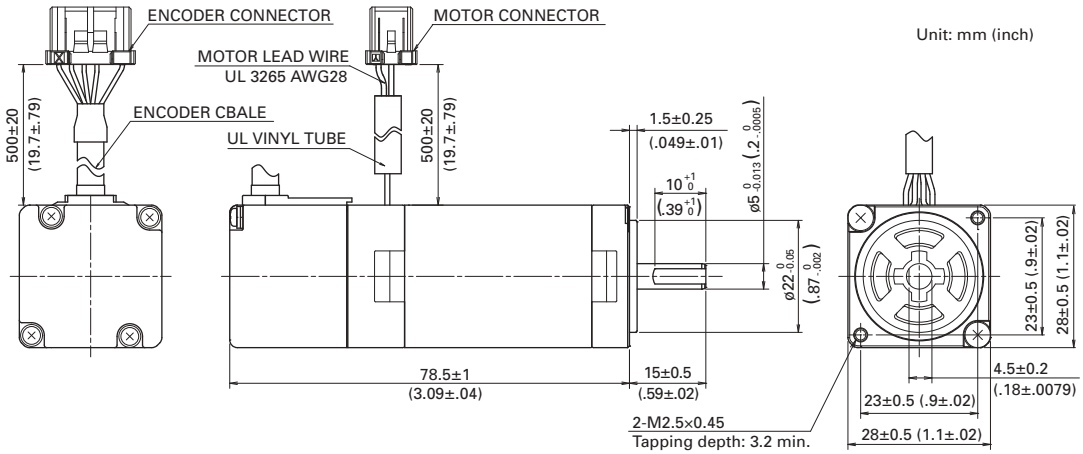
Power Supply		24/48 VDC
Model		PBM285DXE50
Driver Type		Type E Multi
Maximum Stall Torque	N·m	0.115
	oz·in	16.3
Rotor Moment of Inertia	$x10^{-4}$ kg·m^2	0.022
	oz·in^2	0.12
Incremental Encoder		2000 P/R (500 P/R x4)
Motor Weight	kg	0.26
	lb	0.57
Operating Temperature		-10 to 40°C (16 to 104°F)
Humidity		20 to 90% RH, no condensation

Torque Curve

PBM285DXE50



Dimension



Unit: mm (inch)

Applicable Driver

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

CLOSED LOOP STEPPING SYSTEMS

MOTOR FLANGE SIZE **42 mm (1.65 inch)** **MOTOR LENGTH** **55.9/57.6 mm (2.2/2.27 inch)**

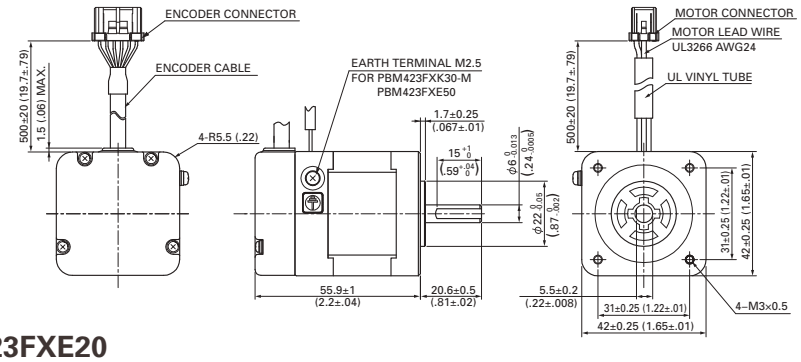
Specifications

Power Supply		100/200 VAC	24/48 VDC	24/48 VDC	24/48 VDC
Model		PBM423FXK30-M	PBM423FXE20	PBM423FXE50	PBM423DXK50
Driver Type		Type R, Type P	Type M	Type E	Type E Multi
Maximum Stall Torque	N·m	0.35	0.39	0.39	0.39
	oz·in	49.6	55.2	55.2	55.2
Rotor Moment of Inertia	x10^{-4} kg·m^2	0.056	0.056	0.056	0.056
	oz·in^2	0.31	0.31	0.31	0.31
Incremental Encoder		16000 P/R (4000 P/R x4)	2000 P/R (500 P/R x4)	500 P/R	16000 P/R (4000 P/R x4)
Motor Weight	kg	0.35	0.35	0.35	0.35
	lb	0.77	0.77	0.77	0.77
Operating Temperature		-10 to 40°C (16 to 104°F)			
Humidity		20 to 90% RH, no condensation			

Dimension

PBM423FXK30-M
PBM423FXE50
PBM423DXK50

Unit: mm (inch)



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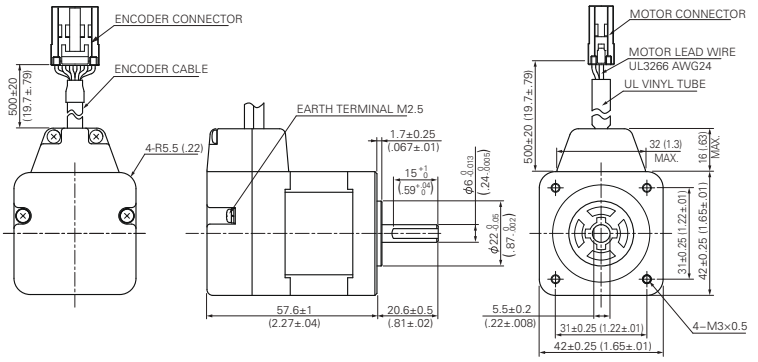
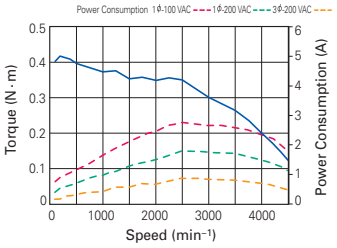


Torque Curve

PBM423FXK30-M



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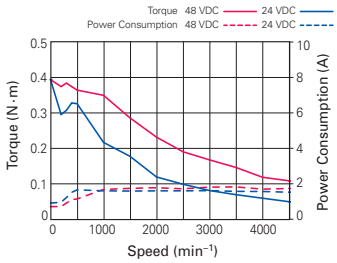
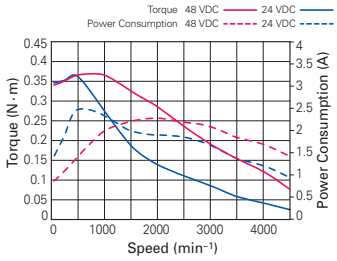


PBM423FXE50



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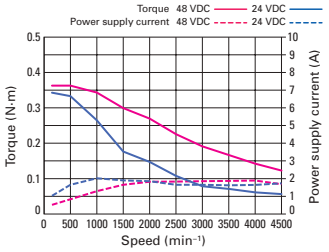


Applicable Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM423FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM423FXE20	PB3D003M200		
	PBM423FXE50			PB4D003E2D0
	PBM423DXK50			PB4D003E440

MOTOR FLANGE SIZE **60 mm (2.36 inch)** **MOTOR LENGTH** **68.8/70.3 mm (2.71/2.77 inch)**

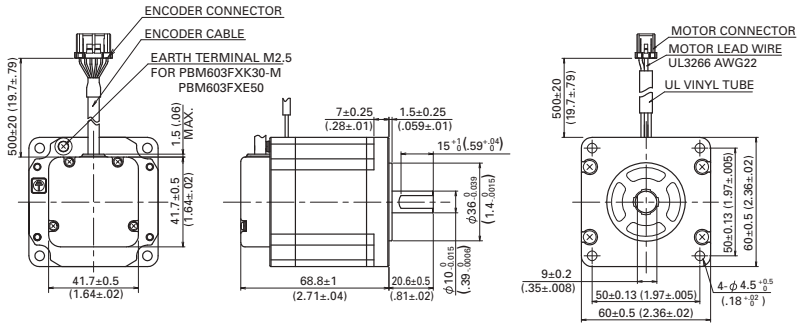
Specifications

Power Supply		100/200 VAC	24/48 VDC	24/48 VDC	24/48 VDC
Model		PBM603FXK30-M	PBM603FXE20	PBM603FXE50	PBM603DXK50
Driver Type		Type R, Type P	Type M	Type E	Type E Multi
Maximum Stall Torque	N·m	1.3	1.3	1.3	1.05
	oz·in	184.1	184.1	184.1	148.7
Rotor Moment of Inertia	$x10^{-4}$ kg·m^2	0.4	0.4	0.4	0.4
	oz·in^2	2.2	2.2	2.2	2.19
Incremental Encoder		16000 P/R (4000 P/R x4)	2000 P/R (500 P/R x4)	500 P/R	16000 P/R (4000 P/R x4)
Motor Weight	kg	0.85	0.85	0.85	0.85
	lb	1.87	1.87	1.87	1.87
Operating Temperature		-10 to 40°C (16 to 104°F)			
Humidity		20 to 90% RH, no condensation			

Dimension

PBM603FXK30-M
PBM603FXE50
PBM603DXK50

Unit: mm (inch)



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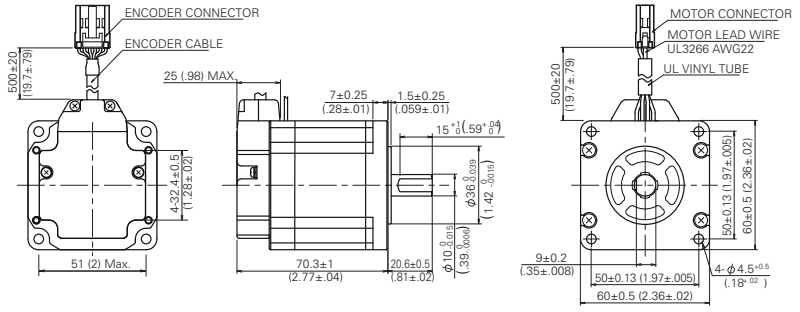
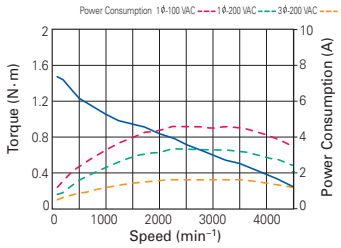
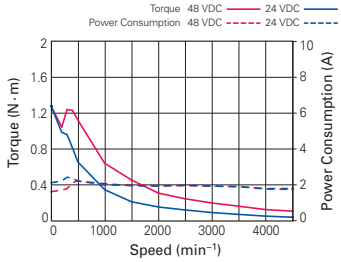


Torque Curve

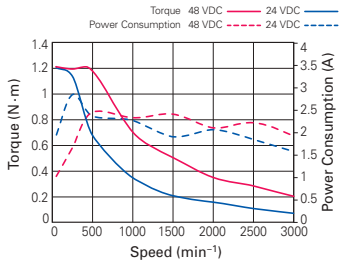
PBM603FXK30-M



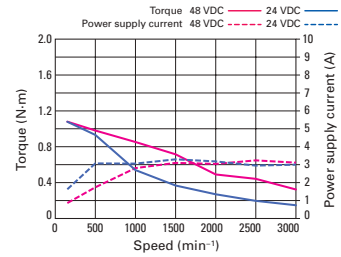
PBM603FXE20



PBM603FXE50



PBM603DXK50



Applicable Driver

Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM603FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM603FXE20	PB3D003M200		
	PBM603FXE50			PB4D003E2D0
	PBM603DXK50			PB4D003E440

CLOSED LOOP STEPPING SYSTEMS

MOTOR FLANGE SIZE **60 mm (2.36 inch)** **MOTOR LENGTH** **100.8/102.3 mm (3.97/4.03 inch)**

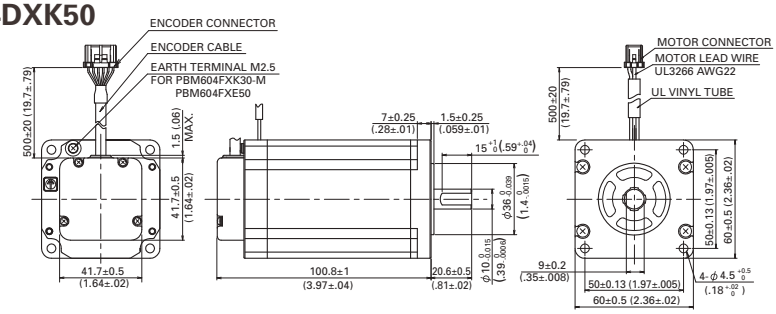
Specifications

Power Supply		100/200 VAC	24/48 VDC	24/48 VDC	24/48 VDC
Model		PBM604FXK30-M	PBM604FXE20	PBM604FXE50	PBM603DXK50
Driver Type		Type R, Type P	Type M	Type E	Type E Multi
Maximum Stall Torque	N·m	1.9	1.9	1.9	1.85
	oz·in	269.1	269.1	269.1	262
Rotor Moment of Inertia	$x10^{-4}$ kg·m^2	0.84	0.84	0.84	0.84
	oz·in^2	4.6	4.6	4.6	4.6
Incremental Encoder		1600 P/R (4000 P/R x4)	2000 P/R (500 P/R x4)	500 P/R	1600 P/R (4000 P/R x4)
Motor Weight	kg	1.42	1.42	1.42	1.42
	lb	3.13	3.13	3.13	3.13
Operating Temperature		-10 to 40°C (16 to 104°F)			
Humidity		20 to 90% RH, no condensation			

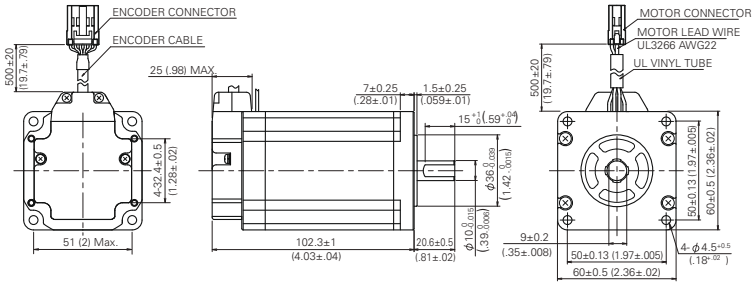
Dimension

PBM604FXK30-M
PBM604FXE50
PBM604DXK50

Unit: mm (inch)

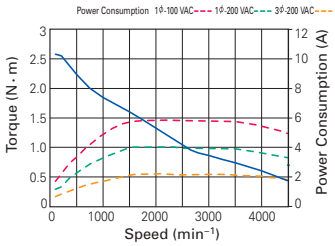


PBM604FXE20



Torque Curve

PBM604FXK30-M



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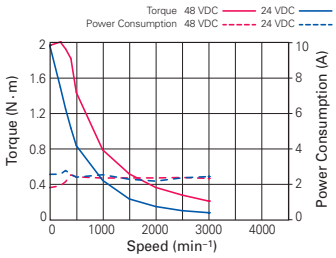
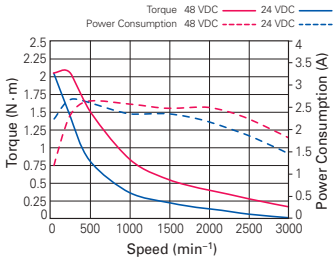
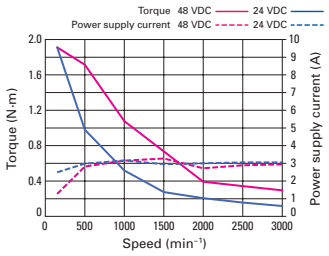


PBM604FXE50



PBM604DXK50



Applicable Driver

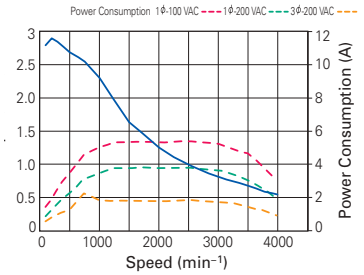
Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM604FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	
24/48 VDC	PBM604FXE20	PB3D003M200		
	PBM604FXE50			PB4D003E2D0
	PBM604DXK50			PB4D003E440

MOTOR FLANGE SIZE	86 mm (3.37 inch)	MOTOR LENGTH	79.5 mm (3.13 inch)

Specifications

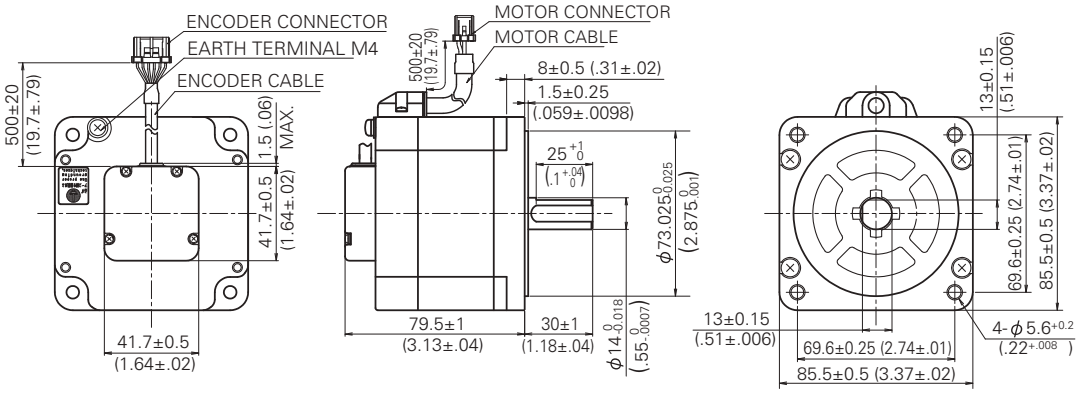
Power Supply		100/200 VAC
Model		PBM861FXK30-M
Driver Type		Type R, Type P
Maximum Stall Torque	N·m	3.1
	oz·in	439.0
Rotor Moment of Inertia	$x10^{-4}$ kg·m^2	1.48
	oz·in^2	8.1
Incremental Encoder		16000 P/R (4000 P/R x4)
Motor Weight	kg	1.9
	lb	4.2
Operating Temperature		-10 to 40°C (16 to 104°F)
Humidity		20 to 90% RH, no condensation

Torque Curve



Dimension

Unit: mm (inch)



Applicable Driver

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

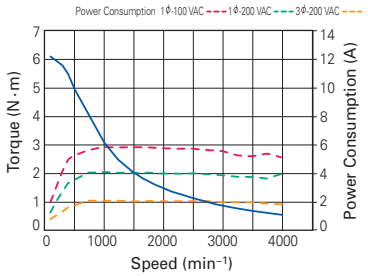
CLOSED LOOP STEPPING SYSTEMS

MOTOR FLANGE SIZE **86 mm (3.37 inch)** | **MOTOR LENGTH** **110 mm (4.33 inch)**

Specifications

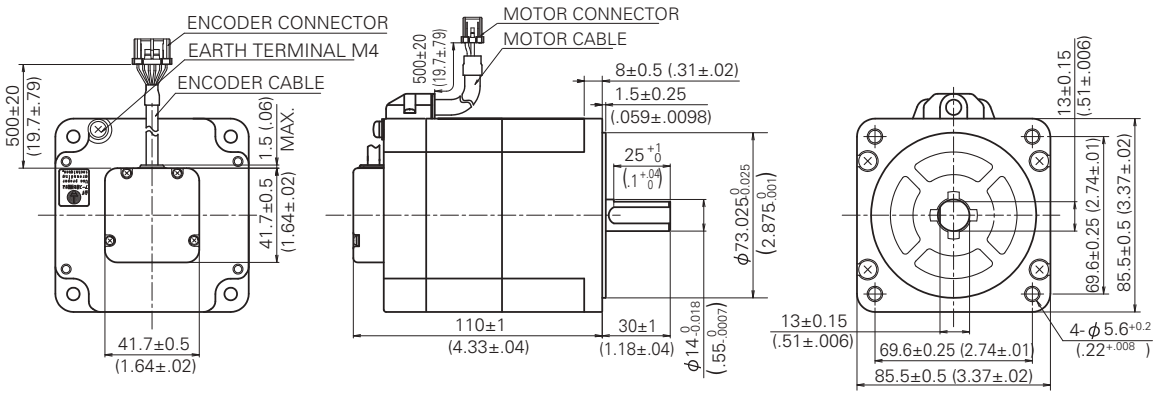
Power Supply		100/200 VAC
Model		PBM862FXK30-M
Driver Type		Type R, Type P
Maximum Stall Torque	N·m	6.1
	oz·in	863.8
Rotor Moment of Inertia	$x10^{-4}$ kg·m^2	3
	oz·in^2	16
Incremental Encoder		16000 P/R (4000 P/R x4)
Motor Weight	kg	3.1
	lb	6.8
Operating Temperature		-10 to 40°C (16 to 104°F)
Humidity		20 to 90% RH, no condensation

Torque Curve



Dimension

Unit: mm (inch)



Applicable Driver

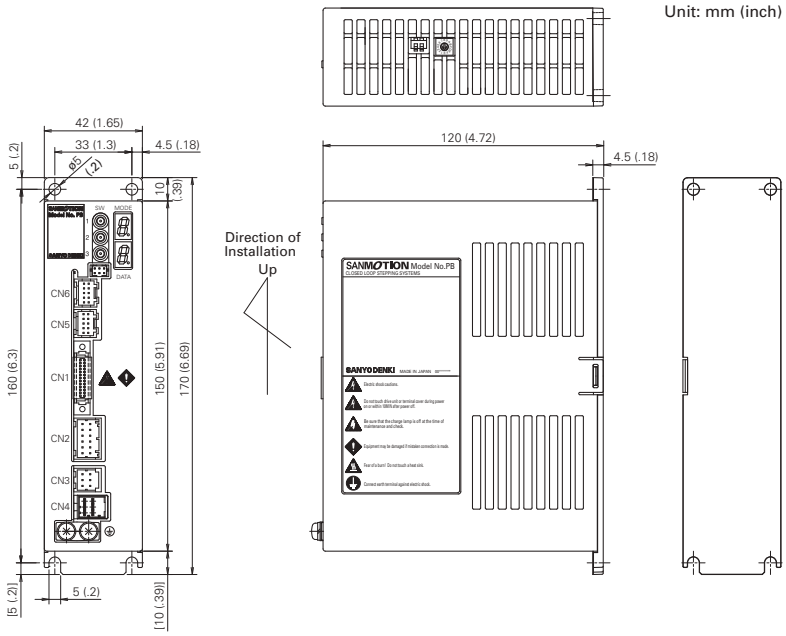
Power Supply	Motor	Driver		
		Indexer	Pulse Input	EtherCAT
200 VAC	PBM862FXK30-M	PB4A002R301	PB4A002P301	
100 VAC		PB4A002R300	PB4A002P300	

AC Input Driver Indexer Model Type R

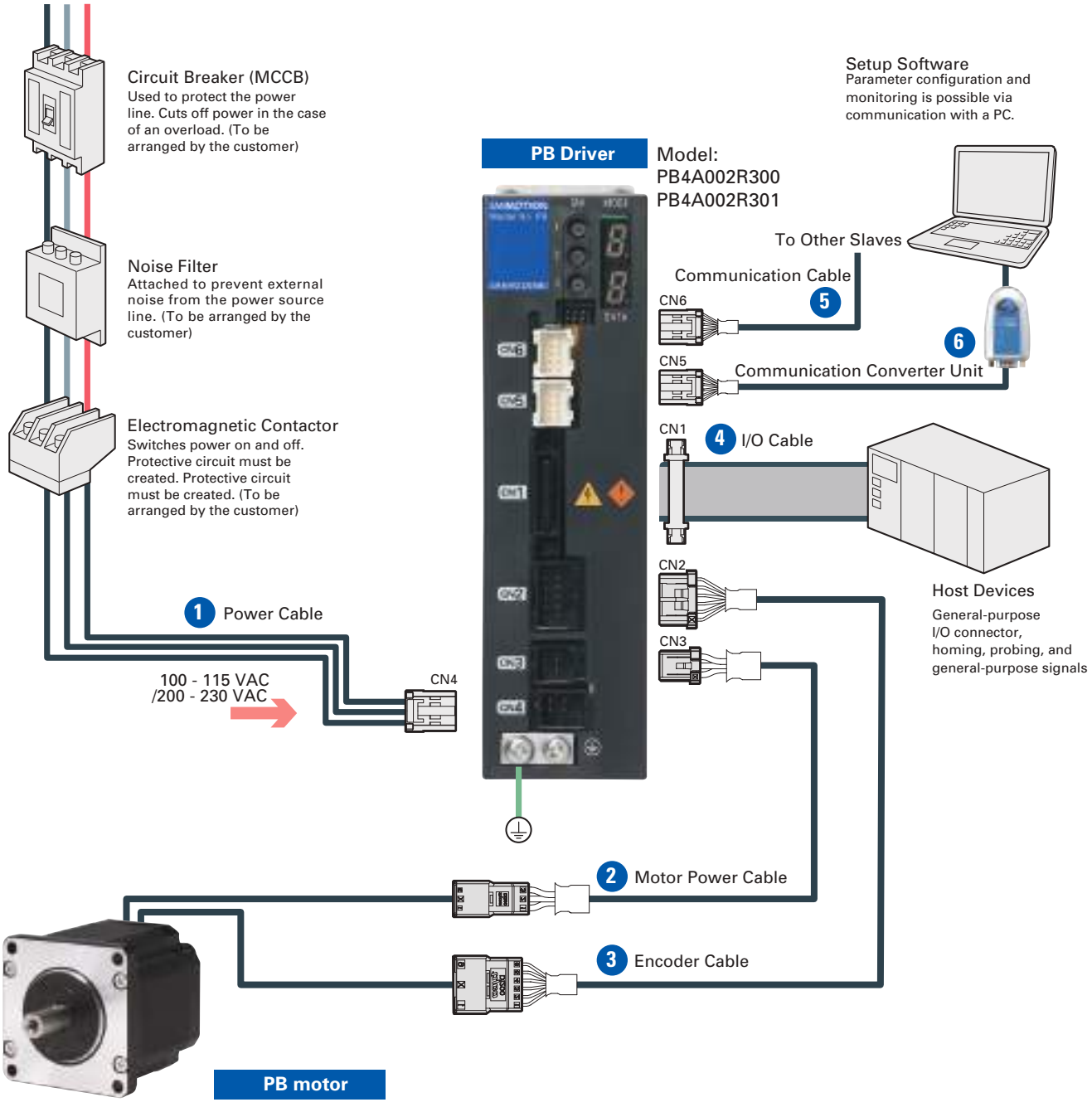
Driver Model			PB4A002R300	PB4A002R301
Power Supply			Single phase AC100V to 115V −15% +10% 50/60Hz	Single phase / 3-phase AC200V to 230V −15% +10% 50/60Hz
Environment	Ambient Temp.	Operating	0 to 55°C	
		Storage	−20 to 65°C	
	Operating / Storage Humidity		90% RH (non-condensing)	
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2h)	
Structure			Tray Structure, Rear Mounting Type	
Mass			Approx. 0.65kg	
Dimensions			W42×H150×D120 mm	
Functions	Rotation Speed		0 to 4500 min^{-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: 9600, 38400, 115200, 307200bps	
Input/Output Signals	Input Signals	Functions	ALMCLR General-purpose Input ×8 (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 ×7 (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)



System Configuration

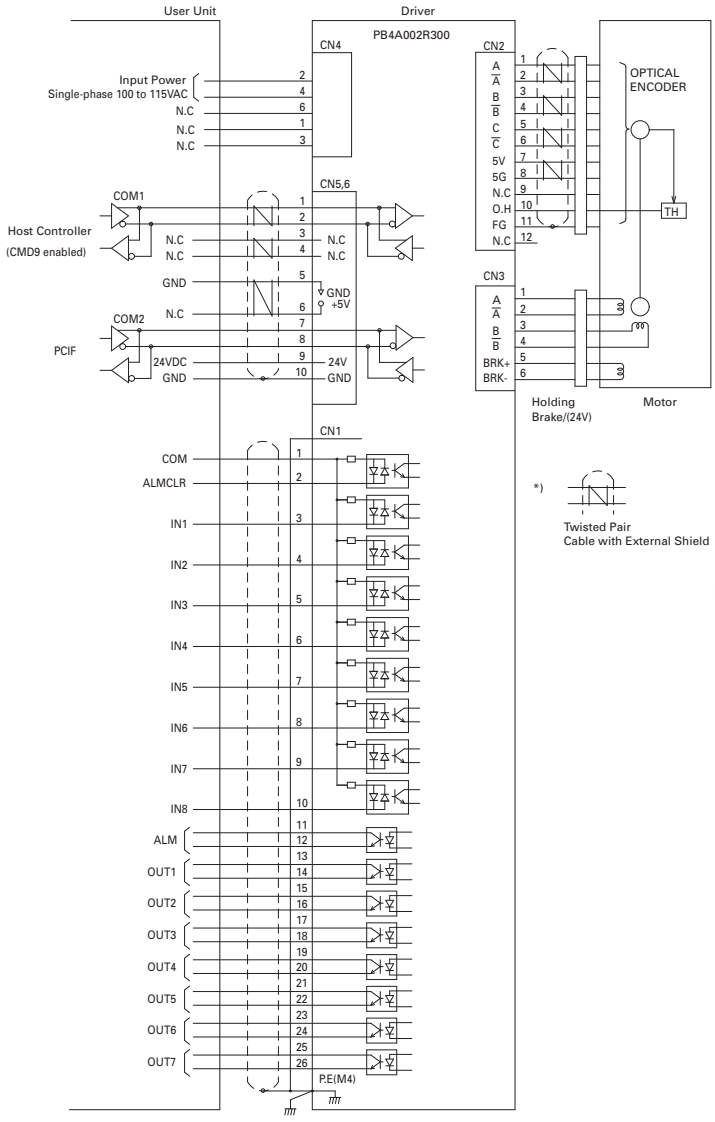


Item		Parts Number	Description
✓ 1	Power Cable: 1 m	PBC8P0010A	
2	Motor Power Cable: 3 m	PBC7M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC7E0030A	Extension Cable
4	I/O Cable (unshielded): 1 m	PBC5S0010A	26 pin, Unshielded Cable
5	Communication Cable: 0.3 m	PBC6C0003A	
✓ 6	Communication Converter Unit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

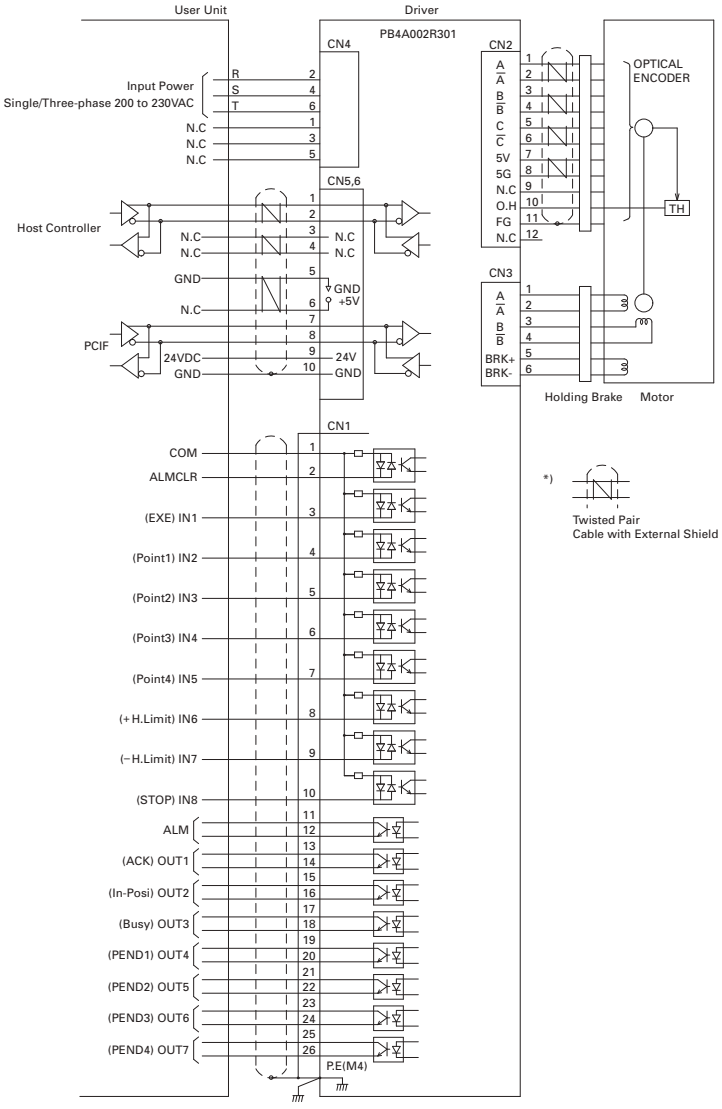
To build a complete system, you need to have checked items.

Wiring Diagram

100 to 115 VAC Input
Driver Model: PB4A002R300



200 to 230 VAC Input
Driver Model: PB4A002R301



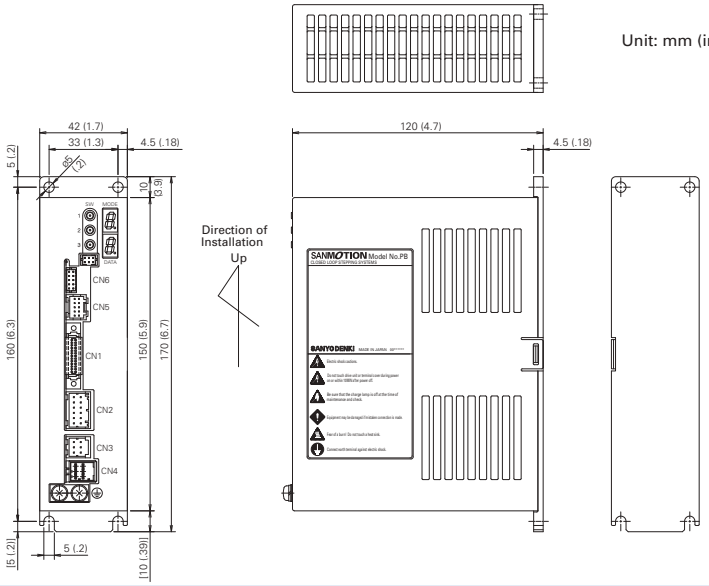
AC Input Driver Pulse Input Model Type P

Driver Model			PB4A002P300	PB4A002P301
Power Supply			Single phase AC100V to 115V −15% +10% 50/60Hz	Single phase / 3-phase AC200V to 230V −15% +10% 50/60Hz
Environment	Ambient temp.	Operating	0 to 55°C	
		Storage	−20 to 65°C	
	Operating / Storage Humidity		90% RH (non-condensing)	
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2h)	
Structure			Tray Structure, Rear Mounting Type	
Mass			Approx. 0.65kg	
Dimensions			W42×H150×D120 mm	
Functions	Rotation Speed		0 to 4500 min-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/Output Signals	Input Signals	Functions	Pulse Input, STOP, ALMCLR General-purpose Input ×2 (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	
	Output Signals	Functions	Encoder Signal (A / B / C) ALM, In-position General-purpose Output ×2 (HOME END, Push END, ZONE, Input Monitor)	
		Electric	Encoder Signal Output: Line Amplifier 4000P/R *C-phase / phase origin signal outputs will not be emitted at velocities over 200 min-1. General-purpose Output: Open collector DC30V / 15mA Max.	

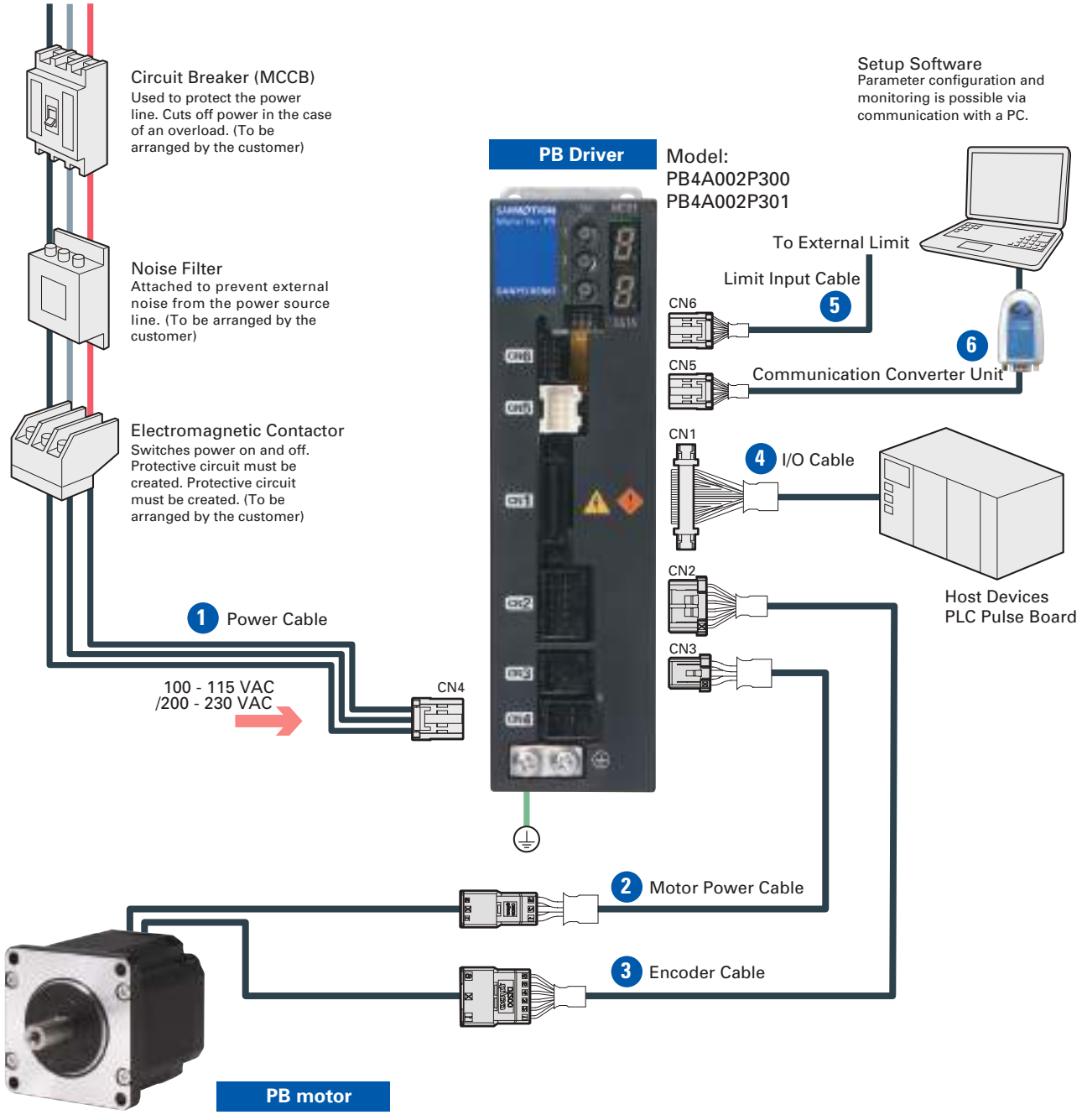
* A function that finely adjusts the unit step angle per pulse parameters. Setup software is required.

Dimension

Unit: mm (inch)



System Configuration

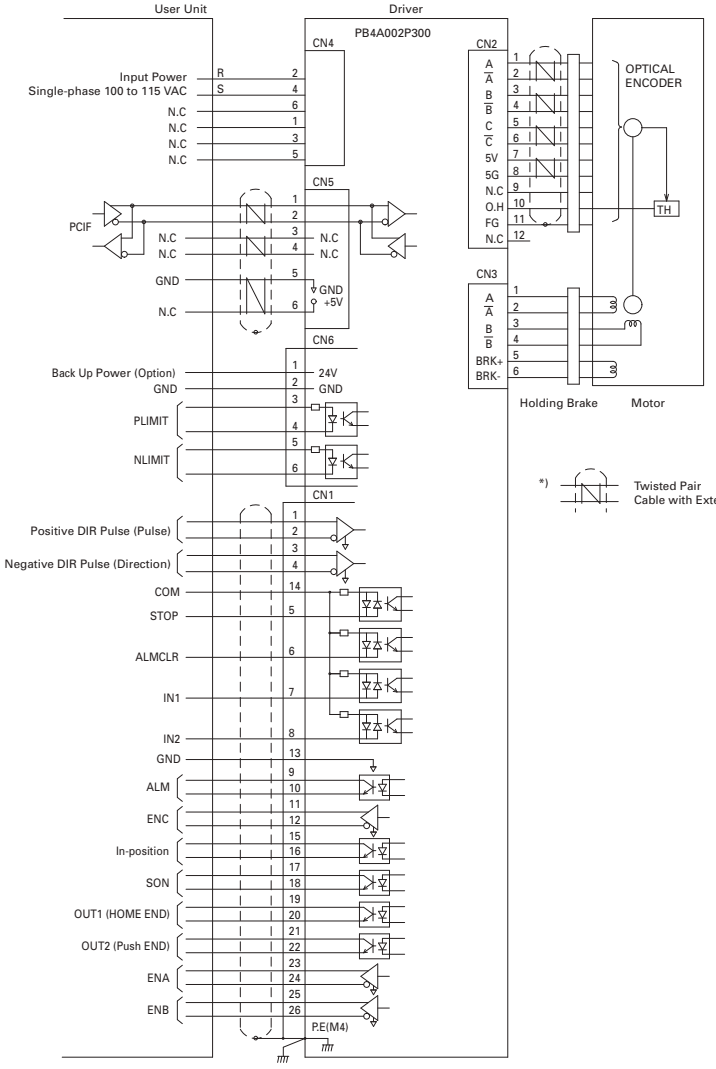


Item		Parts Number	Description
✓ 1	Power Cable: 1 m	PBC8P0010A	
2	Motor Power Cable: 3 m	PBC7M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC7E0030A	Extension Cable
4	I/O Cable: 1 m	PBC5S0010C	26 pin, Shielded Cable
5	Limit Input Cable 1 m	PBC7S0010A	
✓ 6	Communication Converter Unit	PBFM-U6	USB/RS-485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

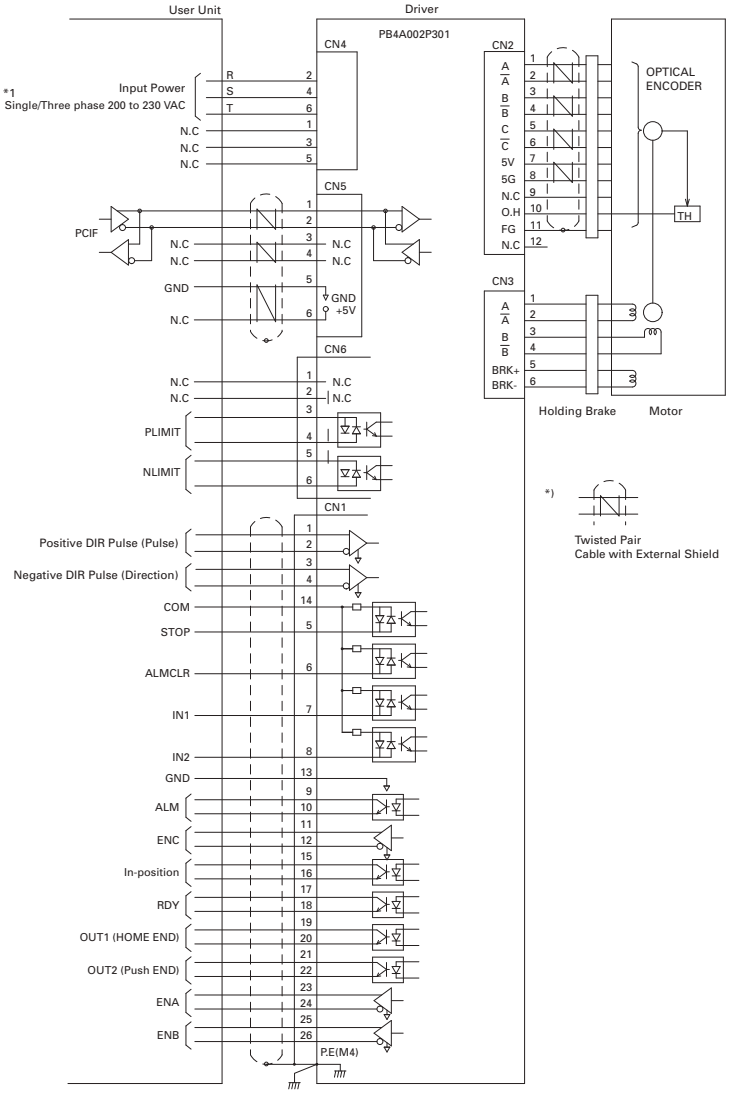
To build a complete system, you need to have checked items.

Wiring Diagram

100 to 115 VAC Input
Driver Model: PB4A002P300



200 to 230 VAC Input
Driver Model: PB4A002P301



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

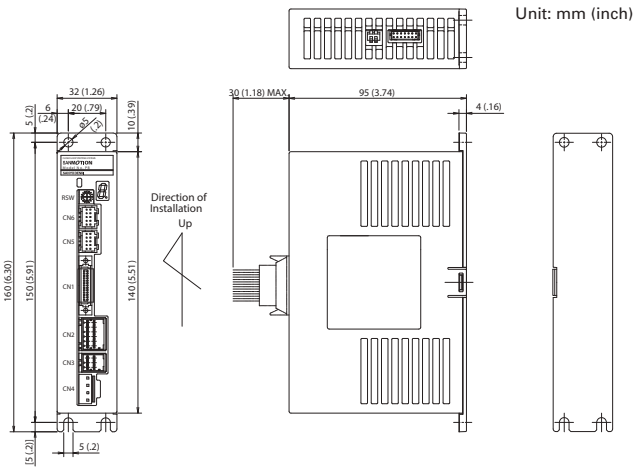
DC Input Driver Indexer / Pulse Input Model Type M

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

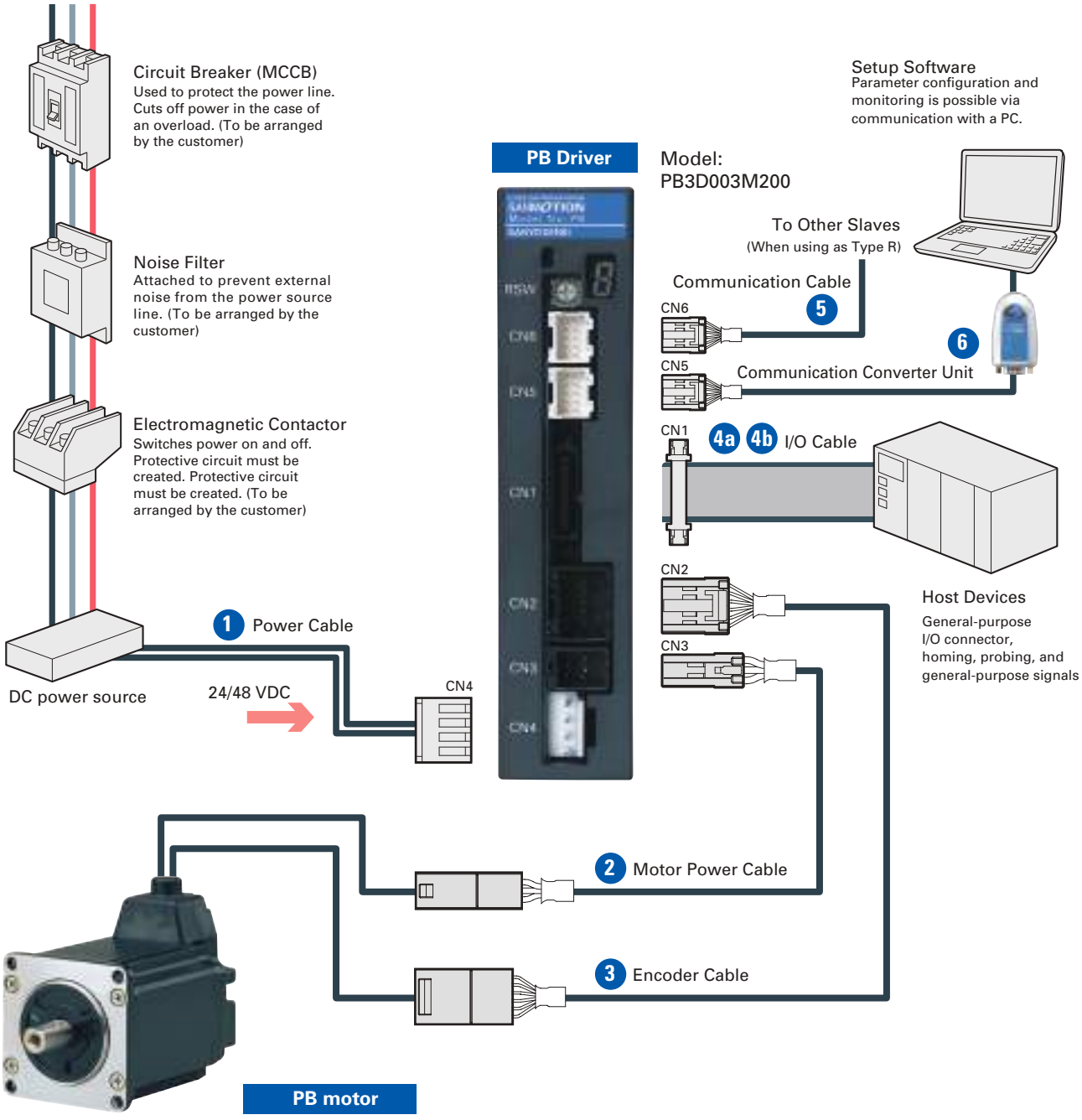
* A function that finely adjusts the unit step angle per pulse parameters. Setup software is required.

Dimension

Unit: mm (inch)



System Configuration

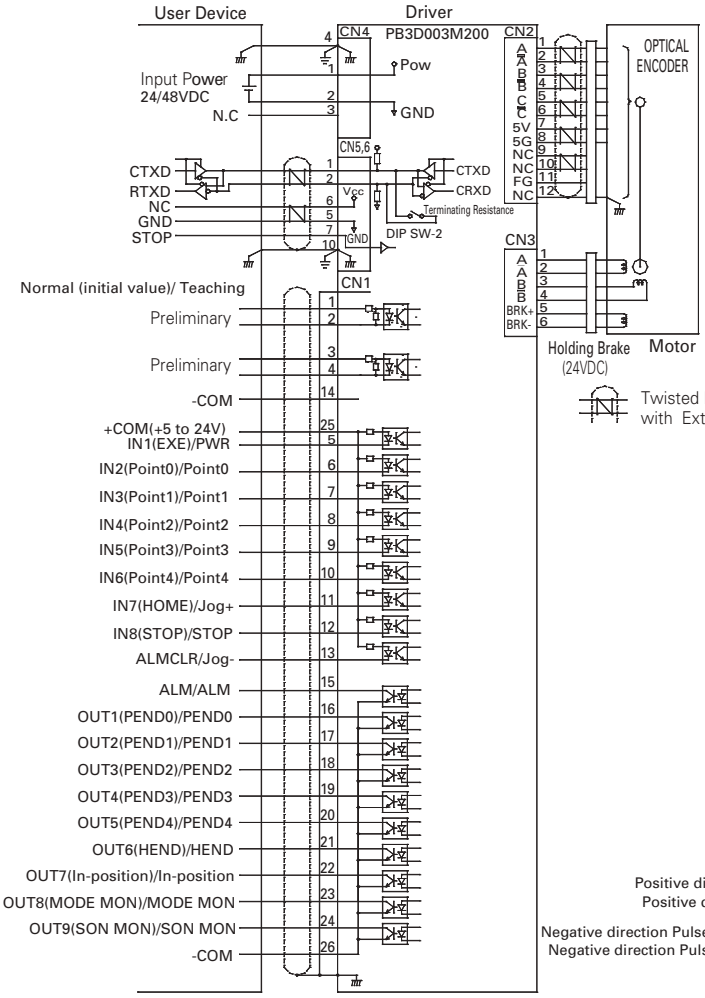


Item		Parts Number	Description
✓ 1	Power Cable: 1 m	PBC6P0010A	
2	Motor Power Cable: 3 m	PBC6M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC6E0030A	Extension Cable
4a	I/O Cable: 1 m	PBC5S0010A	26 pin, Unshielded Cable
4b	I/O Cable: 1 m	PBC5S0010C	26 pin, Shielded Cable
5	Communication Cable: 0.3 m	PBC6C0003A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

To build a complete system, you need to have checked items.

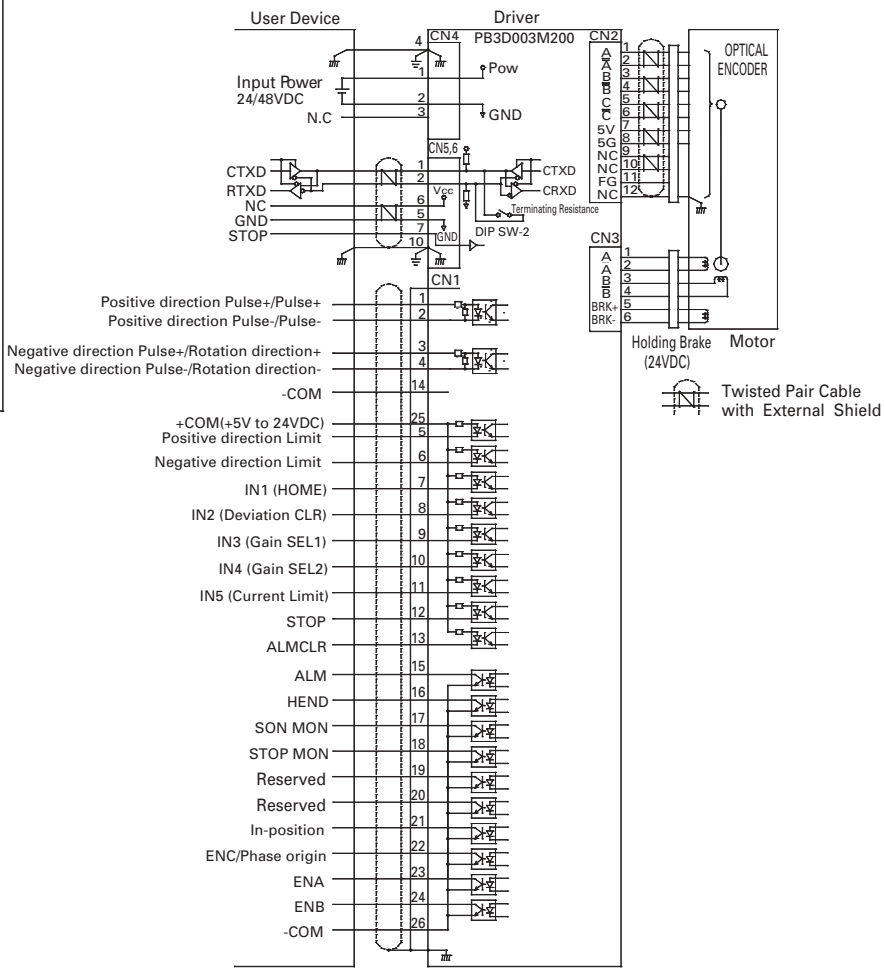
Wiring Diagram

Indexer DIP Switch SW1: ON



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

Pulse Input DIP Switch SW1: OFF



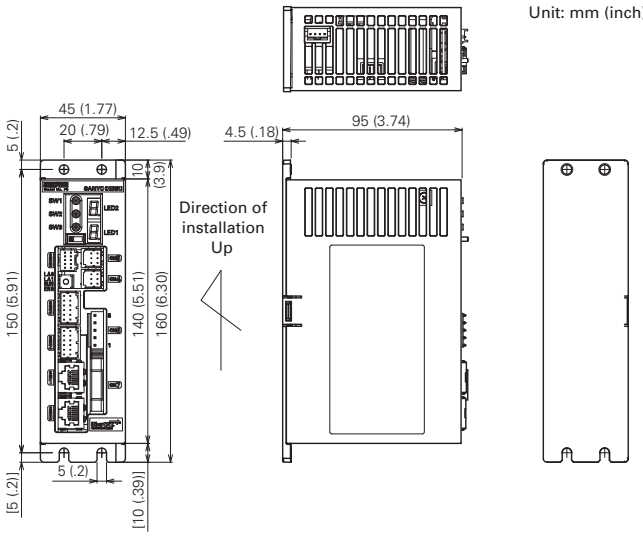
Note: The CN1 general-purpose input/output signal function is selected through communication. Please see the basic specifications for details.

DC Input Driver EtherCAT Model

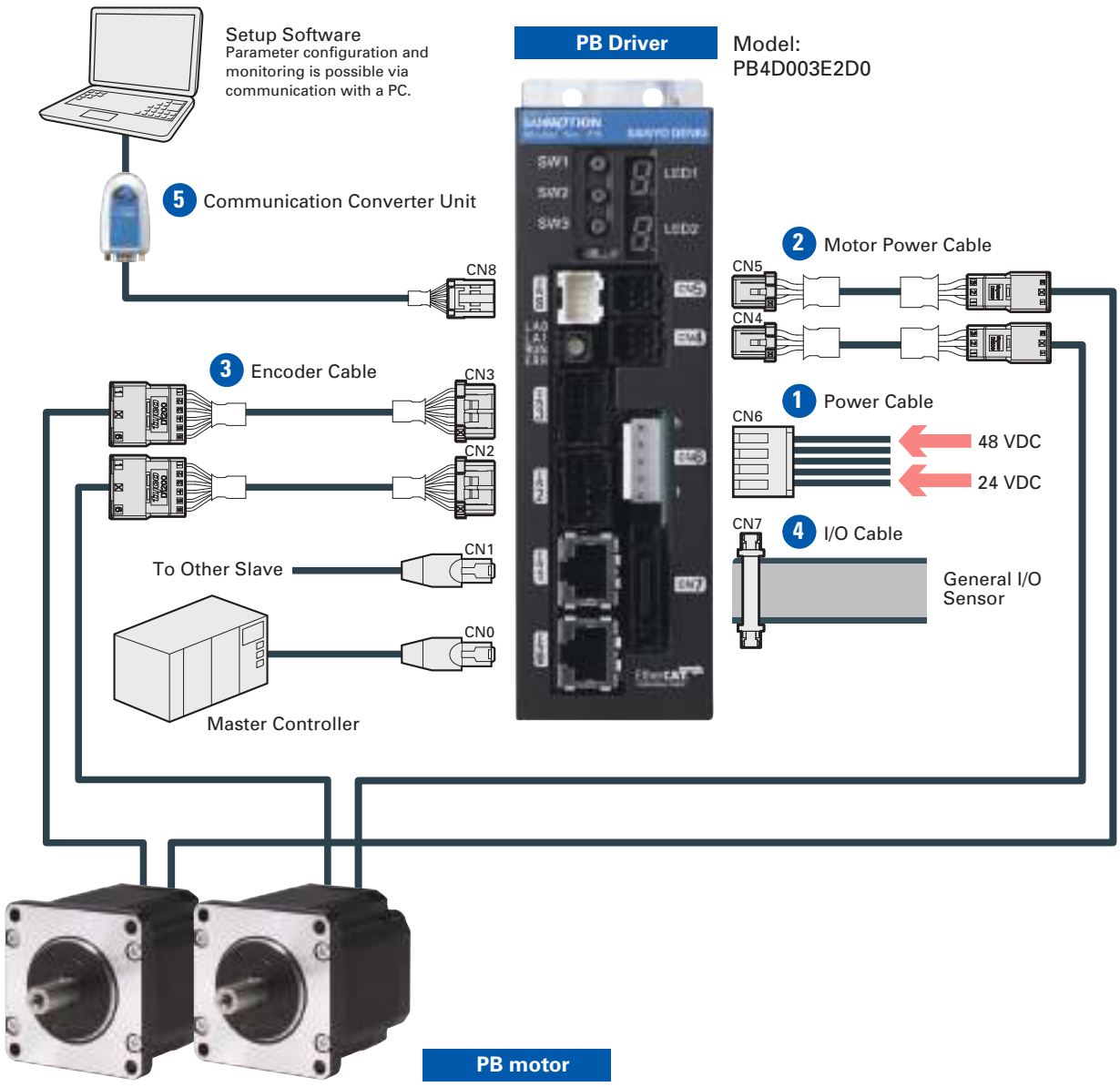
Driver Model			PB4D003E2D0
Power Supply			Main power supply DC24 / 48V ±10% 5A
			Control power supply DC24V ±10% 0.5A
Environment	Ambient temp.	Operating	0 to 55°C
		Storage	−20 to 65°C
	Operating / Storage Humidity		90% RH (non-condensing)
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2h)
	Impact resistance		5G
	Elevation		Maximum 2000 m above sea level
Structure			Tray structure rear mounting type
Mass			Approx. 0.5 kg
Dimensions			W45×H160×D95 mm
Functions	Rotation Speed		0 to 4500 min^{-1}
	Resolution (P/R)		10000
	Regeneration Process		Regenerative resistor (Option)
	Holding Brake Control Function		Internal
	Protective Functions		Power voltage error, Regeneration voltage error, Over-speed, Sensor error, Wrap around, CPU error, Overload stop, Zero-return error, Nonvolatile memory error, Deviation counter overflow, Initialization error, Over-current, Amplifier overheat, Servo error, Push abnormality, Communications abnormality, etc.
	Display		7SEG LED display (2 pieces)
	Digital Operator		Related motor (Absolute encoder is automatically recognized), Jog driving, Node address, Holding brake control
Interface	Physical layer / Protocol		100BASE-TX / IEEE802.3 compliant Ethernet
	Transmission speed		100 Megabits 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 *0x1C32,0x05: Shortest cycle time = 1 ms
Input/Output Signals	Input Signals	Functions	Interactive input photo coupler 5 to 24 VDC
		Electric	Positive & negative direction limit, HOME input: each axis
	Output Signals	Functions	Open collector, 30 VDC / 15mA Max.
		Electric	2 general purpose outputs (each axis), hardware gate OFF input

Dimension

Unit: mm (inch)



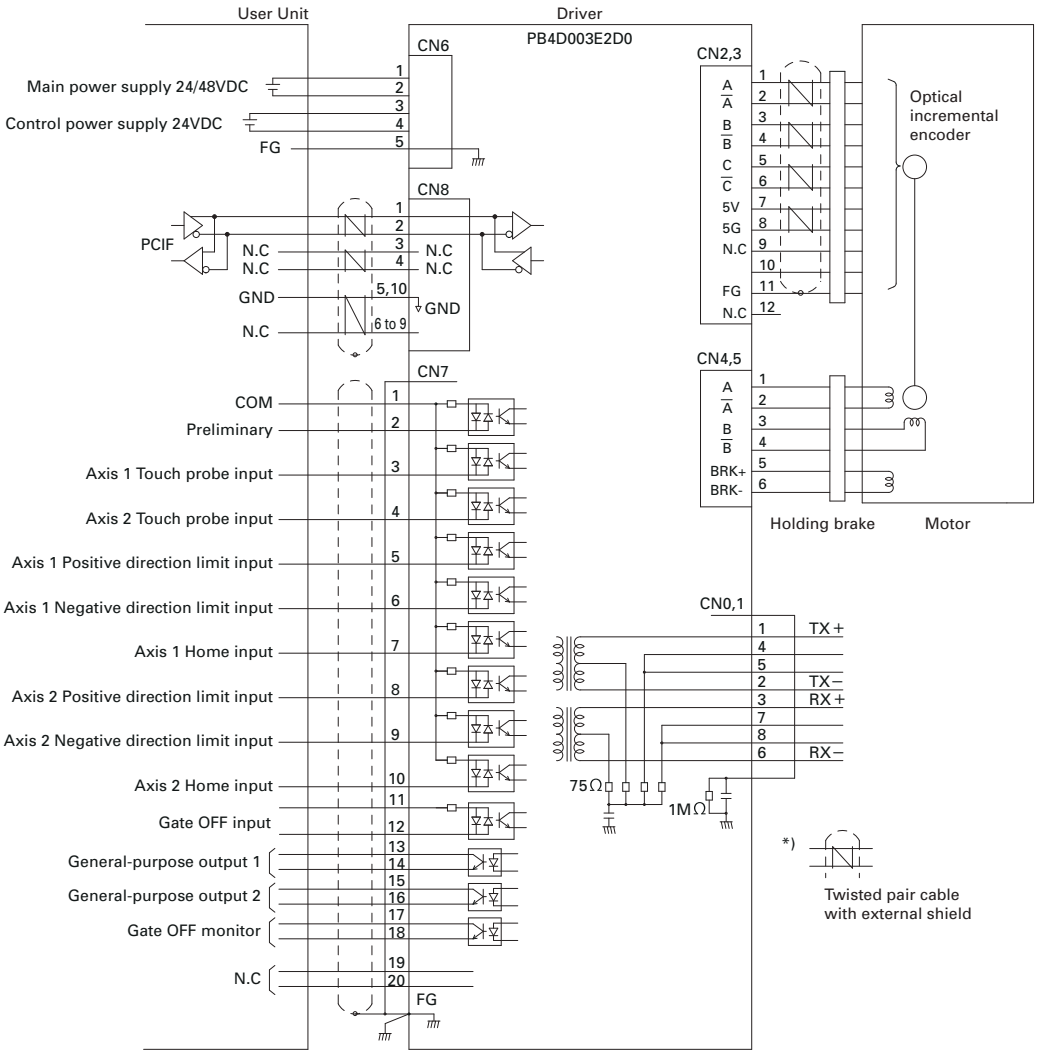
System Configuration



Item		Parts Number	Description
✓ 1	Power Cable: 1 m	PBC9P0020A	
2	Motor Power Cable: 3 m	PBC8M0030A	Extension Cable
3	Encoder Cable: 3 m	PBC7E0030A	Extension Cable
4	I/O Cable: 1 m	PBC1S0010A	20 pin, Unshielded Cable
✓ 6	Communication Converter Unit	PBFM-U6	USB/RS-485 conversion Communication with SANMOTION MOTOR Setup Software

To build a complete system, you need to have checked items.

Wiring Diagram

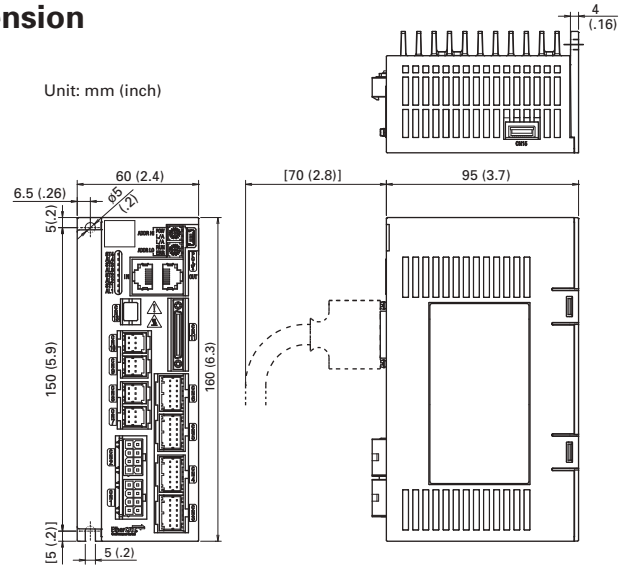


DC Input Driver EtherCAT Multi-Axis Model

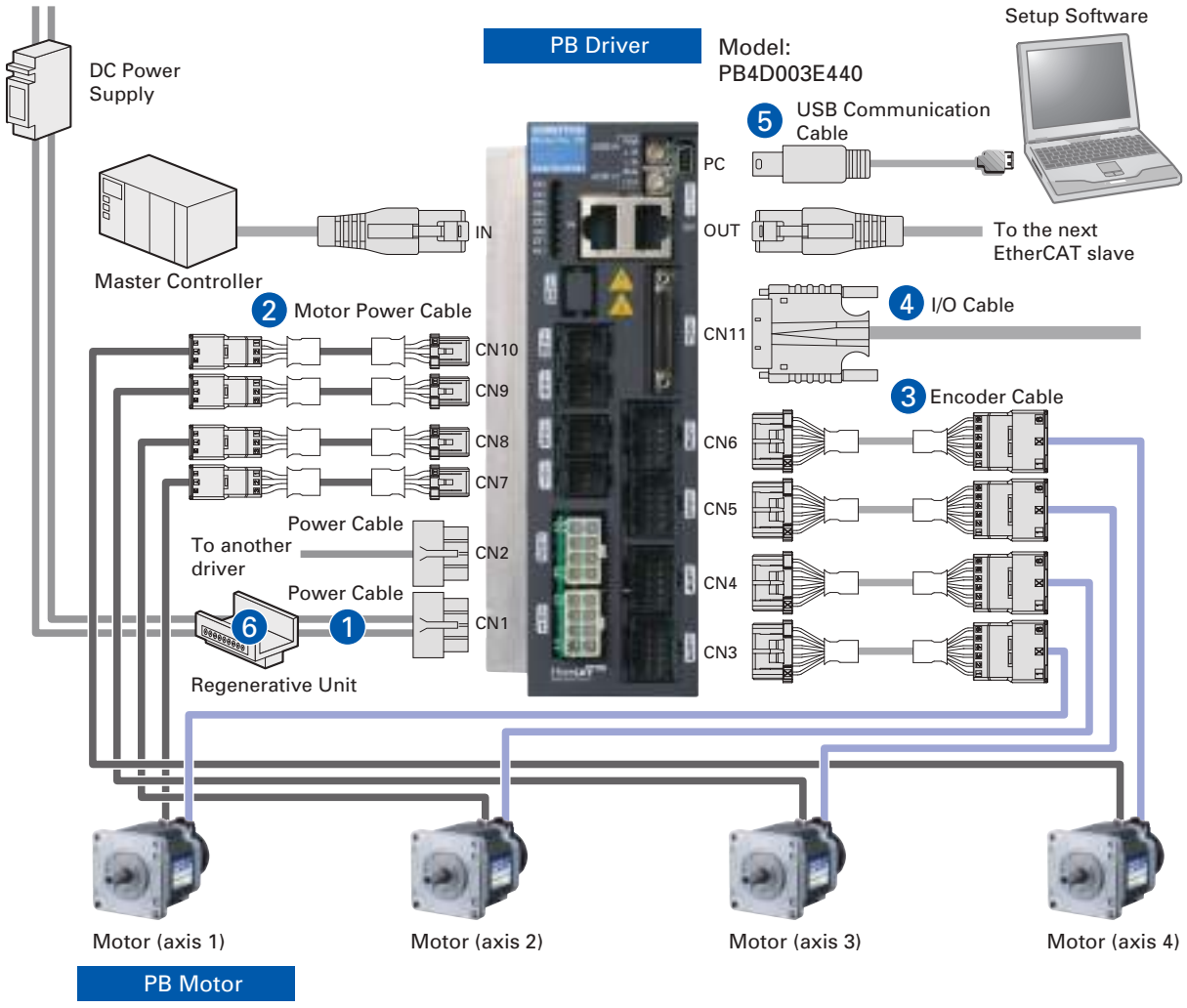
Driver Model			PB4D003E440
Power Supply			Main power supply 24/48VDC ±10% 14A Control power supply 24VDC ±10% 1.5A
	Ambient temp.	Operating	0 to 55°C
		Storage	−20 to 65°C
	Operating / Storage Humidity		90% RH (non-condensing)
	Vibration Resistance		5m/s^2 (Tested X, Y and Z directions for 2 hours in 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
Functions	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
	Protective Functions		Main circuit overcurrent, Overload, Initializing operation error, Driver overheat, Main circuit overvoltage, Regeneration error, Main circuit voltage lack, Control circuit voltage lack, Encoder disconnection, Overspeed, Position deviation error, Wrap around, Memory error, CPU and around circuit error, Communication error.
	Display		Status display, Alarm display
	PC interface		USB2.0
Interface	Physical layer / Protocol		100BASE-TX / IEEE802.3 compliant ethernet
	Transmission speed		100Mbit/s, Full duplex
	Communication port / Topology		2 ports (RJ45) / Daisy-chain (Max. 65535 nodes)
	Device profile		CoE (IEC61800-7-201), FoE (ASCII code access)
	Synchronization		SM2 event synchronization, DC synchronization (SYNC0 / SYNC1), Asynchronous Minimum Cycle Time 0.25ms
I/O Signals	Input Signal		Photocoupler input type, Number of inputs: 16 Input resistance: 2.2kΩ Input voltage: "H" level: 4.0 to 26.4VDC, "L" level: 0 to 1.0VDC
	Output Signal		Open-collector output via photocoupler, Number of outputs: 12 Output signal standards: VCEO: 4.75 to 26.4V IC: 50mA or less (In use of 24VDC.)

Dimension

Unit: mm (inch)



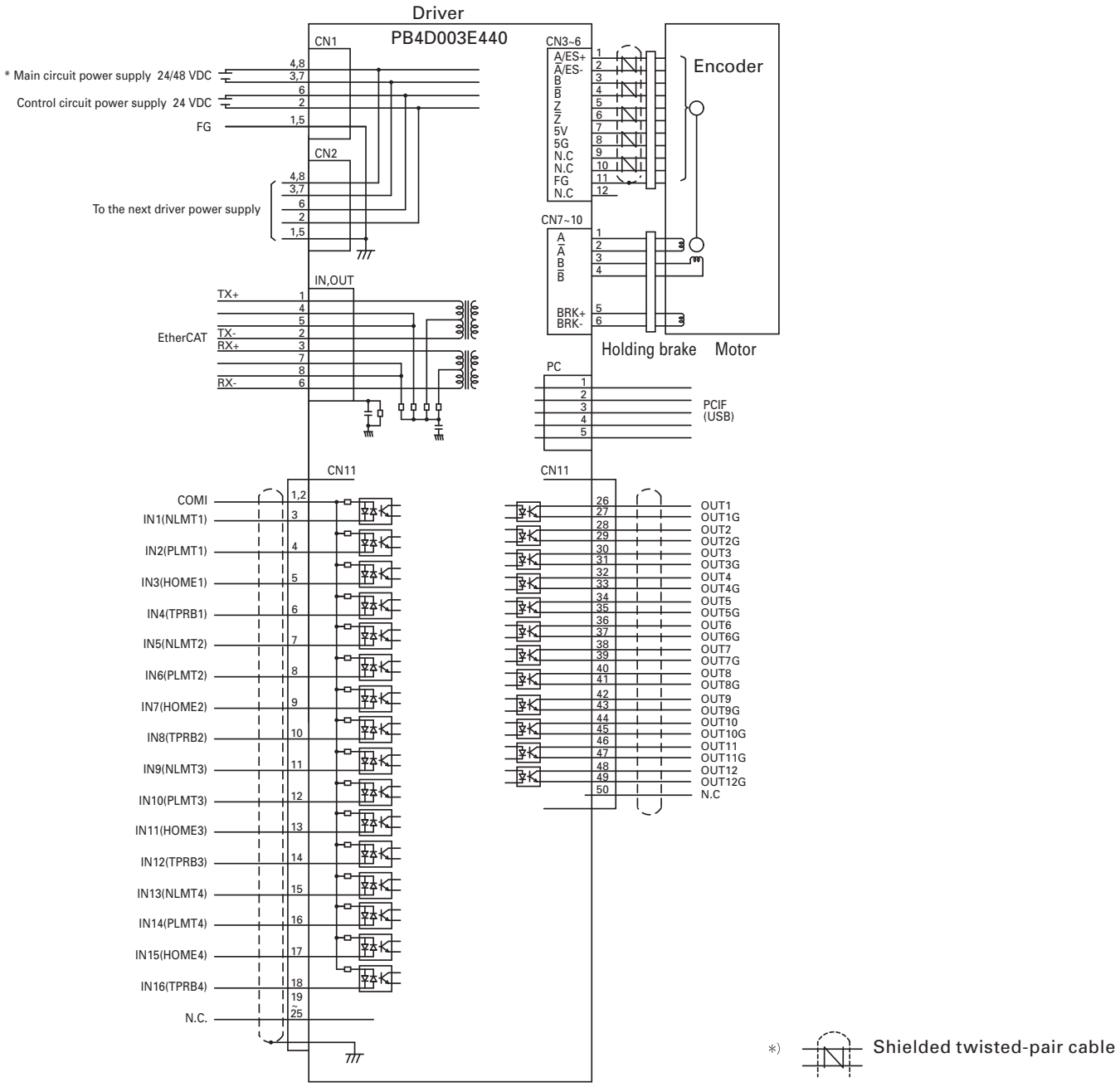
System Configuration



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

To build a complete system, you need to have checked items.

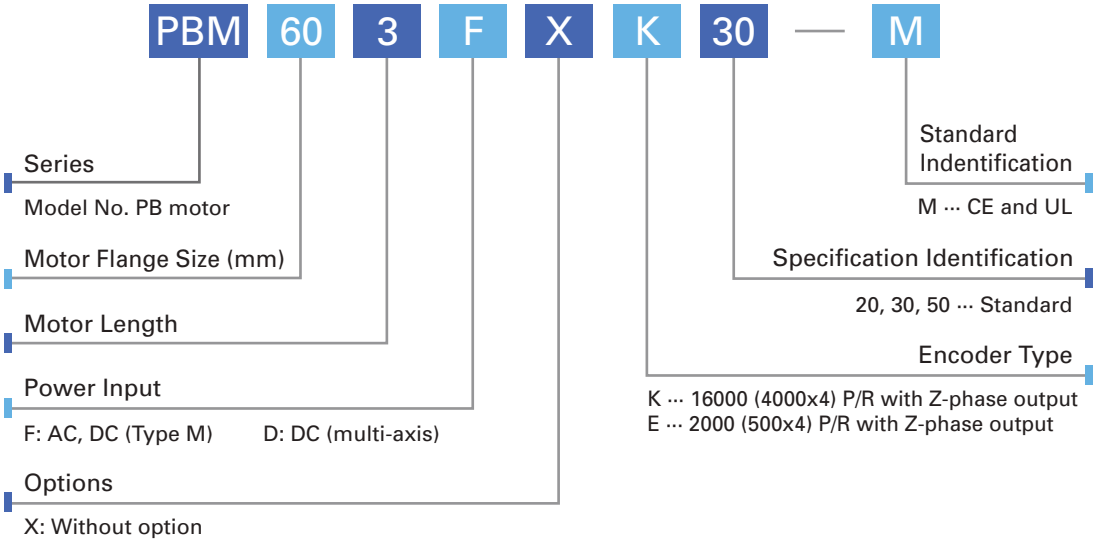
Wiring Diagram



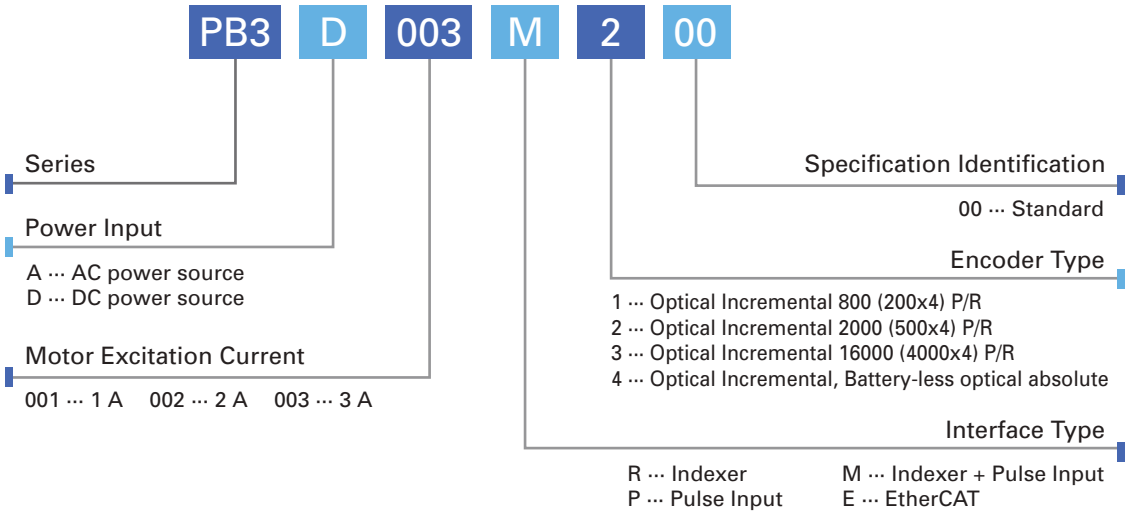
* Keep the max. extended length to 2 m or less and the max. current consumption to 14 A or less (7 A for normal operation) while in use.

Model Numbering System

Motor



Driver



MEMO

SANMOTION F5
5-PHASE STEPPING SYSTEMS

The SANMOTION F5 is a five-phase stepping system that provides precise positioning with simple control. The typical basic step angle is 0.72°, precisely controlled by pulse signals.The products can be used in a wide variety of applications, including fixed-speed drive synchronized to a command pulse, accurate positioning, and stable stopping.

Low Vibration

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.

Microstep drive

The basic step angle of 0.72° can be set to a resolution of up to 250 divisions in 16 levels. This allows for smooth operation with minimal vibrations.

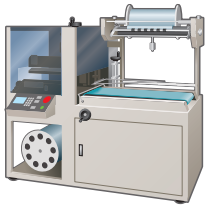
Application Examples

The SANMOTION F5 can be used in a wide variety of applications, including fixed-speed drive synchronized to a command pulse, accurate positioning, and stable stopping.
• Semiconductor devices, analytical and testing devices used in medical and environmental fields, ATMs, monitoring cameras and spotlights, packaging machines, embroidering machines, automatic ticket gates and more

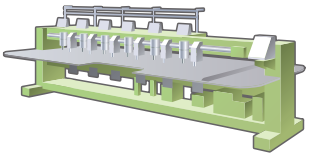
ATMs

Blood analyzers

Wafer cleaners



Food packaging machines



Embroidering machines

All model numbers in this catalog are compliant with the tolerances for specified toxic substances (cadmium, lead, mercury, hexavalent chromium, PBB, and PBDE) found in supplement II of the EU RoHS directive (2011/65/EU), as of the October 2012 production lot. Also, SANMOTION F5 drivers and motors whose model numbers start with "SM" feature standard specifications that are compliant with CE (European Norm) and UL standards.

Lineup

5-Phase Stepping Motor

Motor Size	Holding Torque N·m oz·in	Current Amp	Model	Shape	Motor Length mm inch	Driver 24/48 VDC input	Page
28 mm NEMA 11	0.041 5.81	0.75	**SH5281-7241**	S	32 1.26	F5PAE140P100	100
	0.078 11	0.75	**SH5285-7241**	S	51.5 2.03	F5PAE140P100	101
42 mm NEMA 17	0.125 17.7	1.4	**SF5421-8241**	S	35 1.38	F5PAE140P100	102
	0.185 26.2	1.4	**SF5422-8241**	S	41 1.61	F5PAE140P100	103
	0.245 34.7	1.4	**SF5423-8241**	S	49 1.93	F5PAE140P100	104
60 mm 2.36 inch	0.57 80.7	1.4	**SM5601-8241**	S	49 1.93	F5PAE140P100	105
	0.9 127	1.4	**SM5602-8241**	S	60 2.36	F5PAE140P100	106
	1.55 219	1.4	**SM5603-8241**	S	89 3.50	F5PAE140P100	107
86 mm 3.39 inch	2.1 297	1.4	**SM5861-8241**	S	66 2.60	F5PAE140P100	108
	4.4 623	1.4	**SM5862-8241**	S	96.5 3.80	F5PAE140P100	109

Shape S: Single Shaft

Linear Actuator

Motor Size	Holding Torque N (lb)	Current Amp	Model	Shape	Motor Length mm (inch)	Driver 24/48 VDC input	Page
42 mm 1.65 inch	370 83.2	0.75	**SL5421-7241**	S	87 3.43	F5PAE140P100	110
			SL5421-72XB41	S, BRK	117 4.61		
60 mm 2.36 inch	450 101	1.4	**SL5601-8241**	S	135.6 5.34	F5PAE140P100	111
			SL5601-82XB41	S, BRK			

Shape S: Single Shaft BRK: Electrical Magnetic Brake Equipped

5-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **28 mm (NEMA 11)** | **MOTOR LENGTH** **32 mm (1.26 inch)**

Specification

New pentagon winding, 0.72 °/step

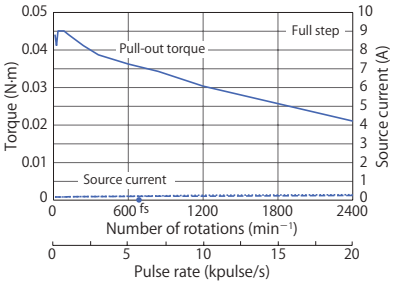
RoHS

Model	Single Shaft	SH5281-7241
Holding Torque	N·m	0.041
	oz·in	5.81
Rated Current	A/phase	0.75
Wiring Resistance	Ω/phase	1.05
Winding Inductance	mH/phase	0.44
Rotor Inertia	x10^{-4} kg·m^2	0.01
	oz·in^2	0.055
Motor Weight	kg	0.11
	lb	0.24
Operating Temperature		-10 to 50°C (14 to 122 °F)
Humidity		20 to 90% RH, no condensation

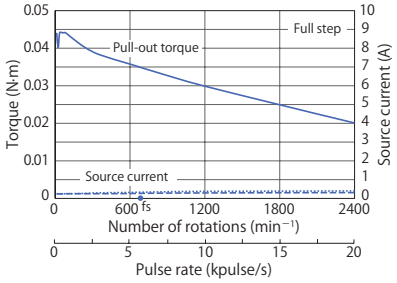
Torque Curve

Pull-out torque ——
Source current (no load) - - - - -
Source current (load applied) .....
fs: Maximum self-start frequency when not loaded ●
With rubber coupling
Driver: F5PAE140P100

● SH5281-72
48 VDC Input

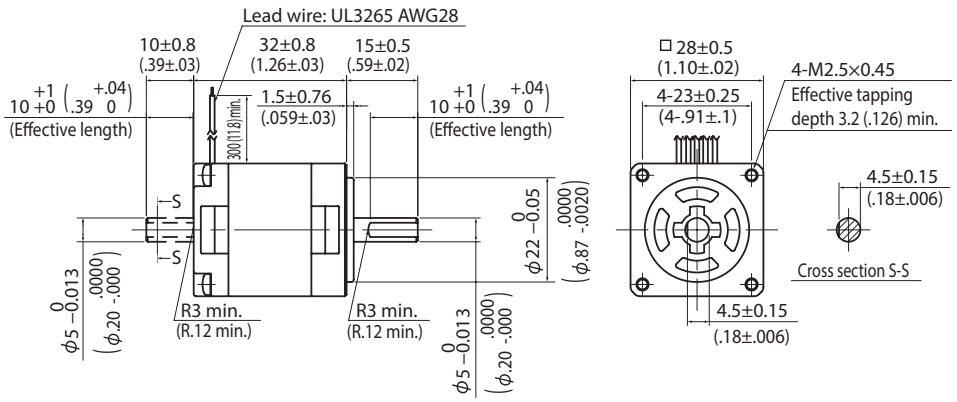


24 VDC Input



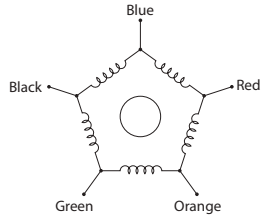
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



● 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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			–	–	–
Red	–	–			+	+	+			–
Orange		–	–	–			+	+	+	
Green	+			–	–	–			+	+
Black	+	+	+			–	–	–		

MOTOR FLANGE SIZE **28 mm (NEMA 11)** **MOTOR LENGTH** **51.5 mm (2.03 inch)**

Specification

New pentagon winding, 0.72 °/step

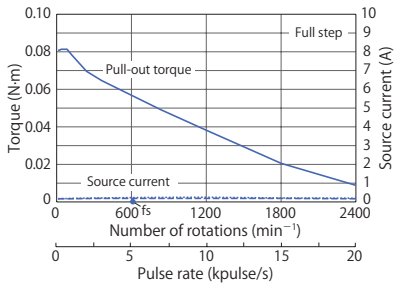
RoHS

Model	Single Shaft	SH5285-7241
Holding Torque	N·m	0.078
	oz·in	11
Rated Current	A/phase	0.75
Wiring Resistance	Ω/phase	1.15
Winding Inductance	mH/phase	0.64
Rotor Inertia	x10^{-4} kg·m^2	0.022
	oz·in^2	0.12
Motor Weight	kg	0.2
	lb	0.44
Operating Temperature		-10 to 50°C (14 to 122 °F)
Humidity		20 to 90% RH, no condensation

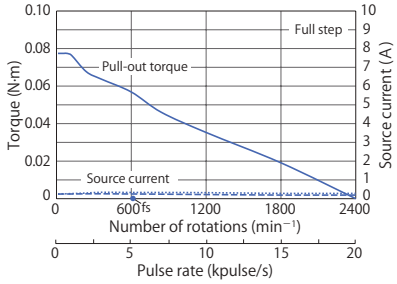
Torque Curve

Pull-out torque
Source current (no load)
Source current (load applied)
fs: Maximum self-start frequency when not loaded
With rubber coupling
Driver: F5PAE140P100

SH5285-72
48 VDC Input

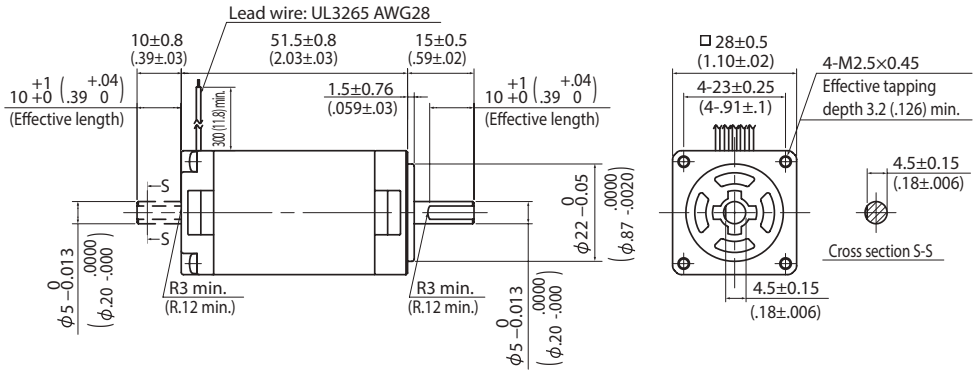


24 VDC Input



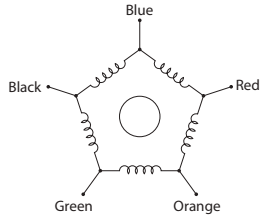
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			−	−	−
Red	−	−			+	+	+			−
Orange		−	−	−			+	+	+	
Green	+			−	−	−			+	+
Black	+	+	+			−	−	−		

5-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **42 mm (NEMA 17)** | **MOTOR LENGTH** **35 mm (1.38 inch)**

Specification

New pentagon winding, 0.72 °/step

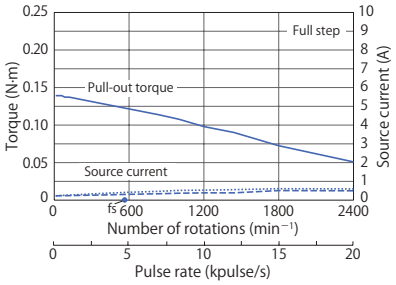
RoHS

Model	Single Shaft	SF5421-8241
Holding Torque	N·m	0.125
	oz·in	17.7
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	0.47
Winding Inductance	mH/phase	0.37
Rotor Inertia	x10^{-4} kg·m^2	0.028
	oz·in^2	0.153
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

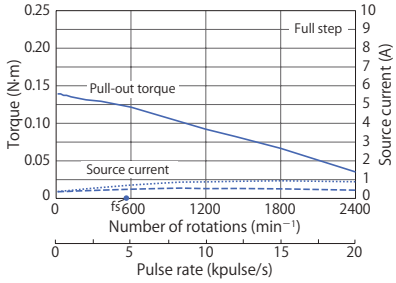
Torque Curve

Pull-out torque ———
Source current (no load) – – – –
Source current (load applied) ·····
fs: Maximum self-start frequency when not loaded ●
With rubber coupling
Driver: F5PAE140P100

● SF5421-82
48 VDC Input

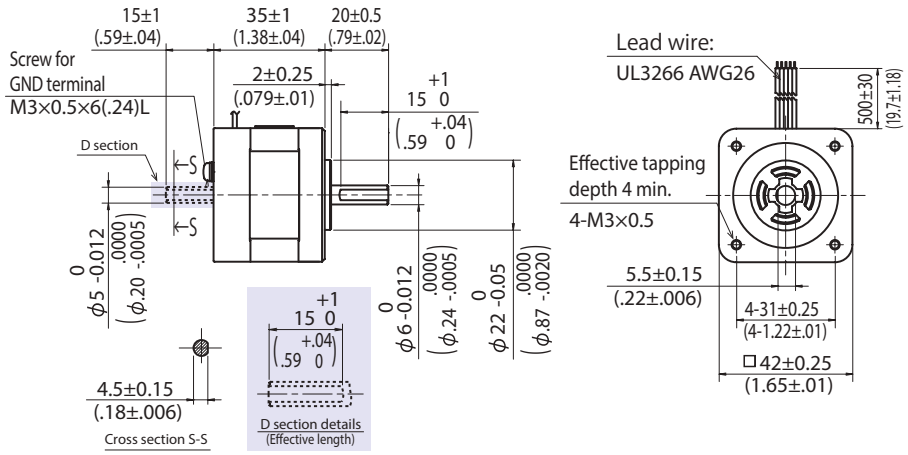


24 VDC Input



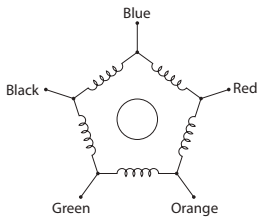
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



● 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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			–	–	–
Red	–	–			+	+	+			–
Orange		–	–	–			+	+	+	
Green	+			–	–	–			+	+
Black	+	+	+			–	–	–		

Specification

New pentagon winding, 0.72 °/step

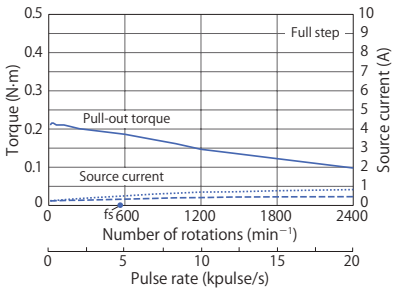
RoHS

Model	Single Shaft	SF5422-8241
Holding Torque	N·m	0.185
	oz·in	26.2
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	0.55
Winding Inductance	mH/phase	0.66
Rotor Inertia	x10^{-4} kg·m^2	0.045
	oz·in^2	0.246
Motor Weight	kg	0.31
	lb	0.68
Operating Temperature		-10 to 50°C (14 to 122 °F)
Humidity		20 to 90% RH, no condensation

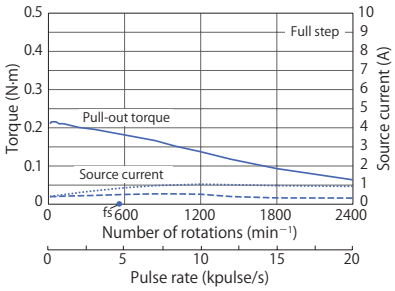
Torque Curve

Pull-out torque
Source current (no load)
Source current (load applied)
fs: Maximum self-start frequency when not loaded
With rubber coupling
Driver: F5PAE140P100

SF5422-82
48 VDC Input

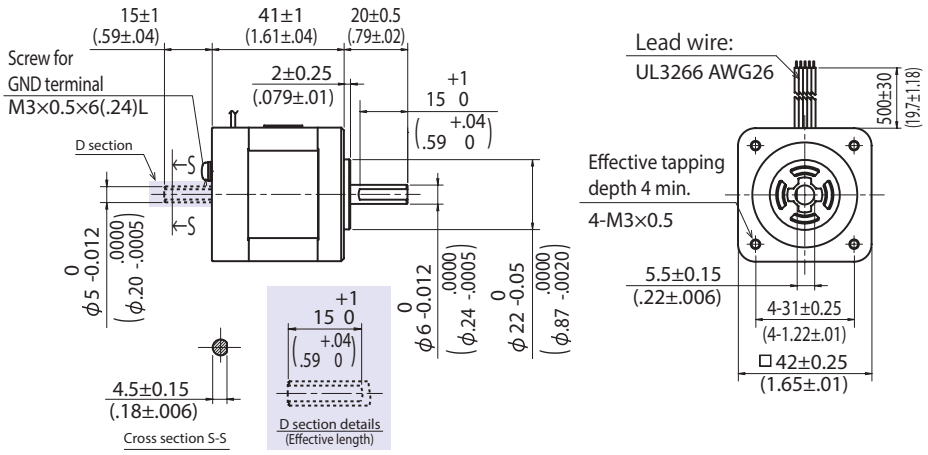


24 VDC Input



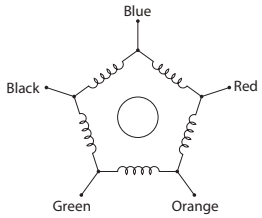
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			−	−	−
Red	−	−			+	+	+			−
Orange		−	−	−			+	+	+	
Green	+			−	−	−			+	+
Black	+	+	+			−	−	−		

5-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **42 mm (NEMA 17)** | **MOTOR LENGTH** **49 mm (1.93 inch)**

Specification

New pentagon winding, 0.72 °/step

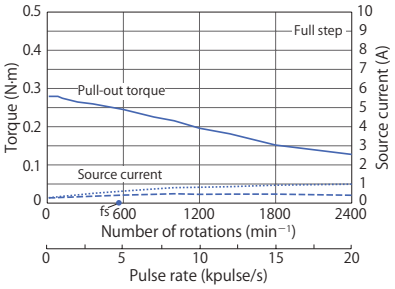
RoHS

Model	Single Shaft	SF5423-8241
Holding Torque	N·m	0.245
	oz·in	34.7
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	0.65
Winding Inductance	mH/phase	0.75
Rotor Inertia	x10^{-4} kg·m^2	0.056
	oz·in^2	0.306
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

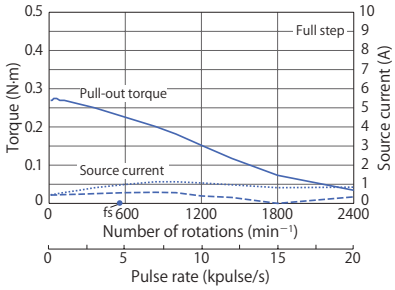
Torque Curve

Pull-out torque ——
Source current (no load) - - - - -
Source current (load applied) ·····
fs: Maximum self-start frequency when not loaded ●
With rubber coupling
Driver: F5PAE140P100

SF5423-82
48 VDC Input

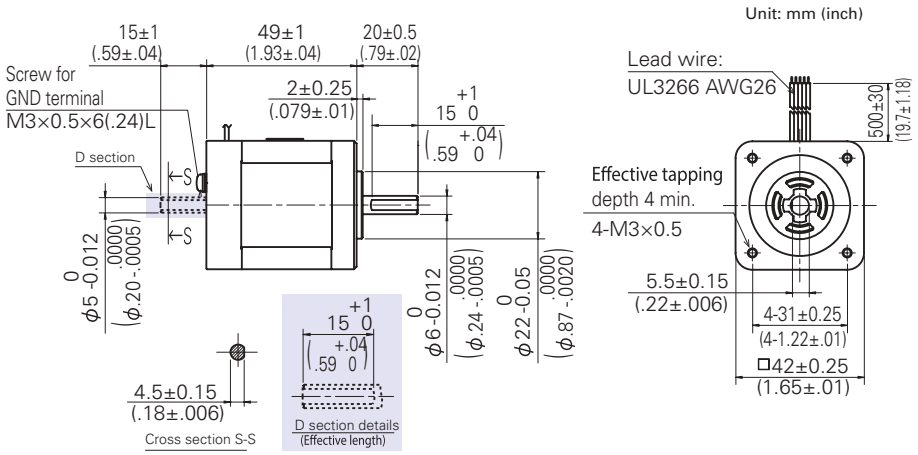


24 VDC Input



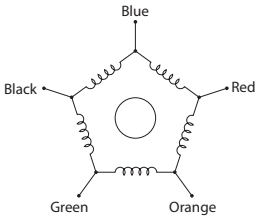
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			–	–	–
Red	–	–			+	+	+			–
Orange		–	–	–			+	+	+	
Green	+			–	–	–			+	+
Black	+	+	+			–	–	–		

MOTOR FLANGE SIZE **60 mm (2.36 inch)** **MOTOR LENGTH** **49 mm (1.93 inch)**

Specification

New pentagon winding, 0.72 °/step

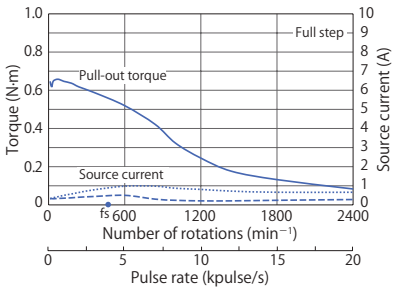
CE cULus RoHS

Model	Single Shaft	SM5601-8241
Holding Torque	N·m	0.57
	oz·in	80.7
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	0.9
Winding Inductance	mH/phase	2.7
Rotor Inertia	$x10^{-4}$ kg·m^2	0.2
	oz·in^2	1.093
Motor Weight	kg	0.62
	lb	1.37
Operating Temperature		-10 to 40°C (14 to 104 °F)
Humidity		95% RH max.: under 40°C, no condensation

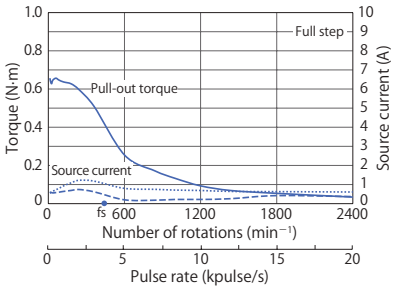
Torque Curve

Pull-out torque
Source current (no load)
Source current (load applied)
fs: Maximum self-start frequency when not loaded
With rubber coupling
Driver: F5PAE140P100

SM5601-82 48 VDC Input

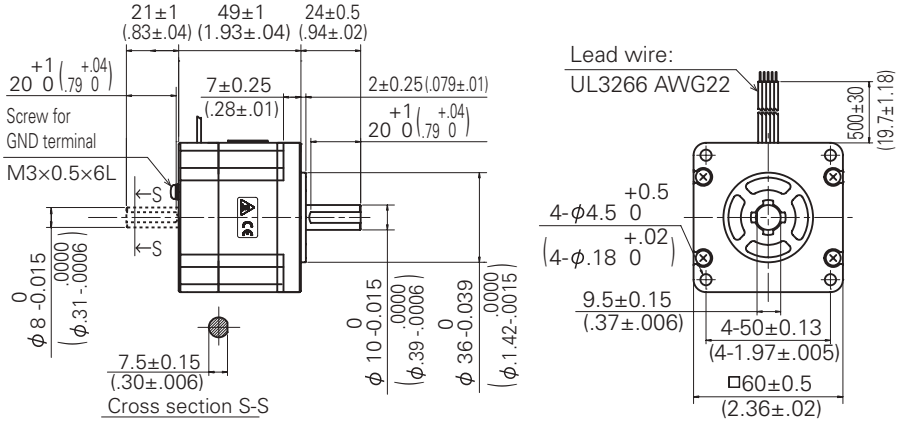


24 VDC Input



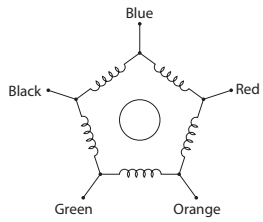
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			−	−	−
Red	−	−			+	+	+			−
Orange		−	−	−			+	+	+	
Green	+			−	−	−			+	+
Black	+	+	+			−	−	−		

5-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **60 mm (2.36 inch)** | **MOTOR LENGTH** **60 mm (2.36 inch)**

Specification

New pentagon winding, 0.72 °/step

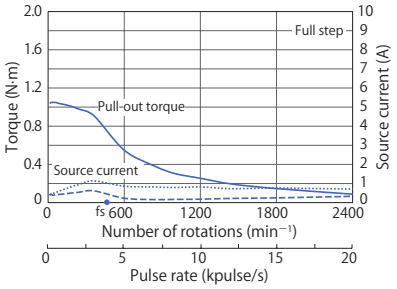
CE cULus RoHS

Model	Single Shaft	SM5602-8241
Holding Torque	N·m	0.9
	oz·in	127
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	1.15
Winding Inductance	mH/phase	4.7
Rotor Inertia	x10^{-4} kg·m^2	0.31
	oz·in^2	0.106
Motor Weight	kg	0.8
	lb	1.76
Operating Temperature		-10 to 40°C (14 to 104 °F)
Humidity		95% RH max.: under 40°C, no condensation

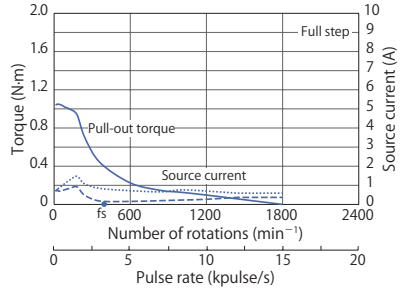
Torque Curve

Pull-out torque ——
Source current (no load) - - - - -
Source current (load applied) .....
fs: Maximum self-start frequency when not loaded ●
With rubber coupling
Driver: F5PAE140P100

SM5602-82 48 VDC Input

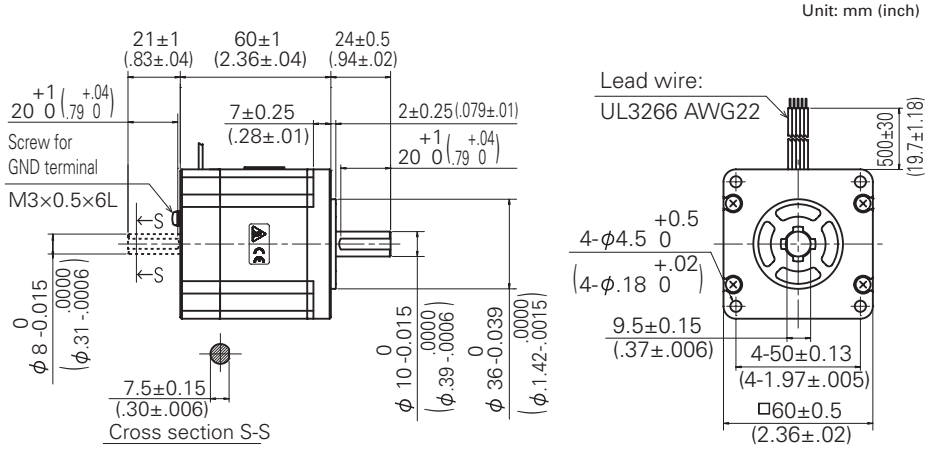


24 VDC Input



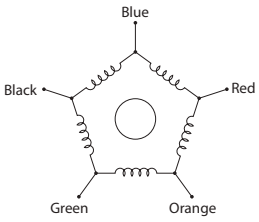
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			−	−	−
Red	−	−			+	+	+			−
Orange		−	−	−			+	+	+	
Green	+			−	−	−			+	+
Black	+	+	+			−	−	−		

MOTOR FLANGE SIZE **60 mm (2.36 inch)** **MOTOR LENGTH** **89 mm (3.50 inch)**

Specification

New pentagon winding, 0.72 °/step

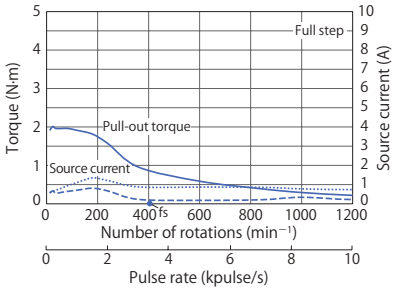
CE cULus RoHS

Model	Single Shaft	SM5603-8241
Holding Torque	N·m	1.7
	oz·in	241
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	1.85
Winding Inductance	mH/phase	8.1
Rotor Inertia	x10^{-4} kg·m^2	0.6
	oz·in^2	3.28
Motor Weight	kg	1.27
	lb	2.8
Operating Temperature		-10 to 40°C (14 to 104 °F)
Humidity		95% RH max.: under 40°C, no condensation

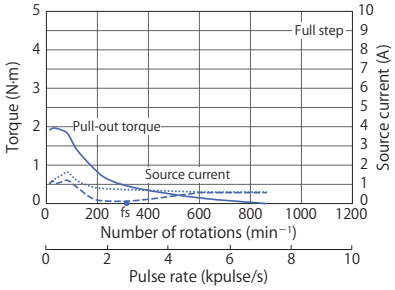
Torque Curve

Pull-out torque
Source current (no load)
Source current (load applied)
fs: Maximum self-start frequency when not loaded
With rubber coupling
Driver: F5PAE140P100

SM5603-82 48 VDC Input

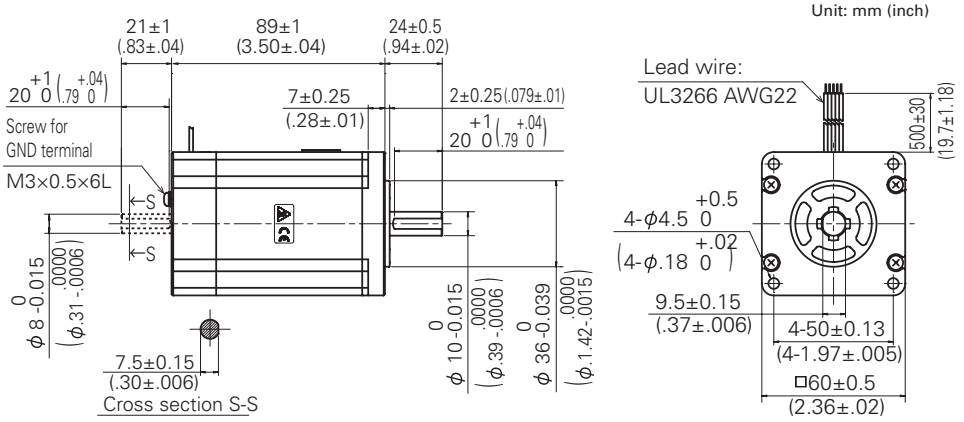


24 VDC Input



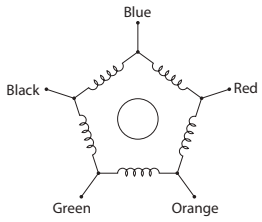
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			−	−	−
Red	−	−			+	+	+			−
Orange		−	−	−			+	+	+	
Green	+			−	−	−			+	+
Black	+	+	+			−	−	−		

5-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **86 mm (3.39 inch)** | **MOTOR LENGTH** **66 mm (2.60 inch)**

Specification

New pentagon winding, 0.72 °/step

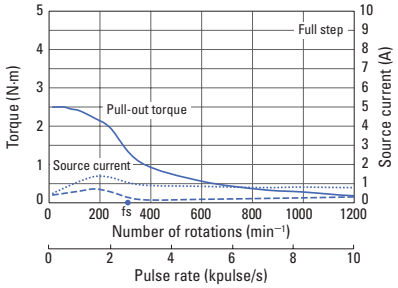
CE cULus RoHS

Model	Single Shaft	SM5861-8241
Holding Torque	N·m	2.3
	oz·in	297
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	1.3
Winding Inductance	mH/phase	7
Rotor Inertia	x10^{-4} kg·m^2	1.48
	oz·in^2	8.09
Motor Weight	kg	1.75
	lb	3.86
Operating Temperature		-10 to 40°C (14 to 104 °F)
Humidity		95% RH max.: under 40°C, no condensation

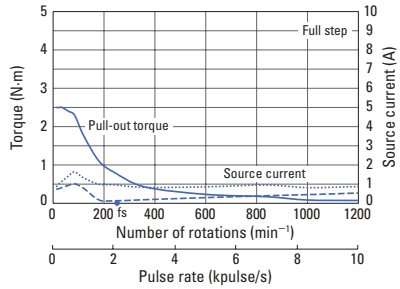
Torque Curve

Pull-out torque
Source current (no load)
Source current (load applied)
fs: Maximum self-start frequency when not loaded
With rubber coupling
Driver: F5PAE140P100

SM5861-82 48 VDC Input

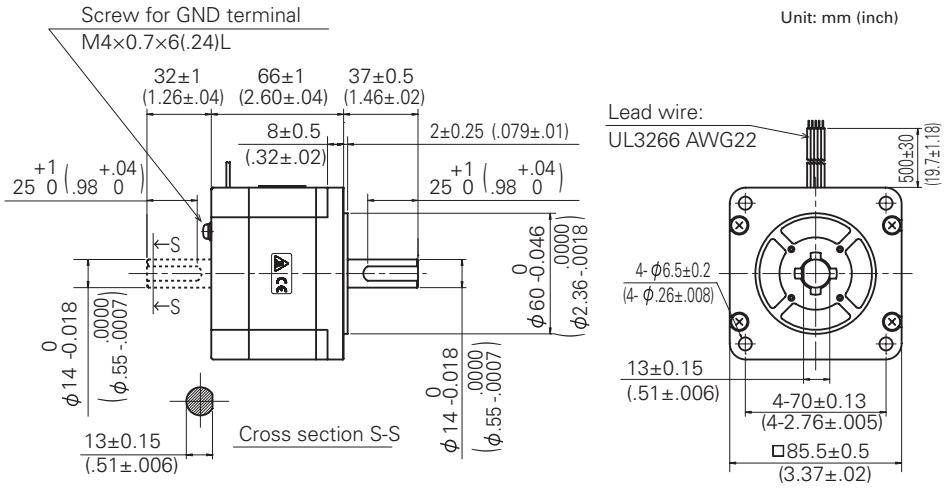


24 VDC Input



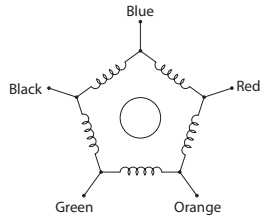
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			−	−	−
Red	−	−			+	+	+			−
Orange		−	−	−			+	+	+	
Green	+			−	−	−			+	+
Black	+	+	+			−	−	−		

MOTOR FLANGE SIZE **86 mm (3.39 inch)** **MOTOR LENGTH** **96.5 mm (3.80 inch)**

Specification

New pentagon winding, 0.72 °/step

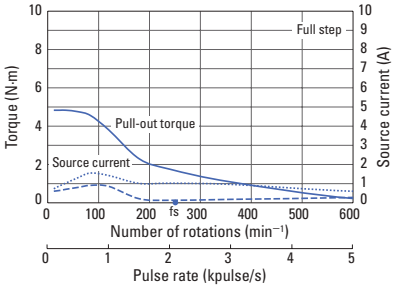
CE cULus RoHS

Model	Single Shaft	SM5862-8241
Holding Torque	N·m	4.4
	oz·in	623
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	2
Winding Inductance	mH/phase	13
Rotor Inertia	x10^{-4} kg·m^2	3
	oz·in^2	16.4
Motor Weight	kg	2.9
	lb	6.39
Operating Temperature		-10 to 40°C (14 to 104 °F)
Humidity		95% RH max.: under 40°C, no condensation

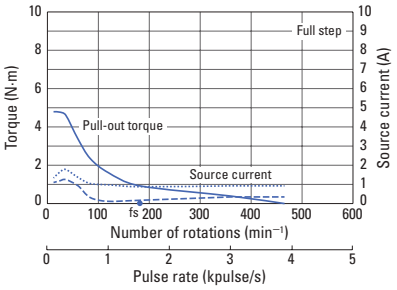
Torque Curve

Pull-out torque
Source current (no load)
Source current (load applied)
fs: Maximum self-start frequency when not loaded
With rubber coupling
Driver: F5PAE140P100

SM5862-82 48 VDC Input

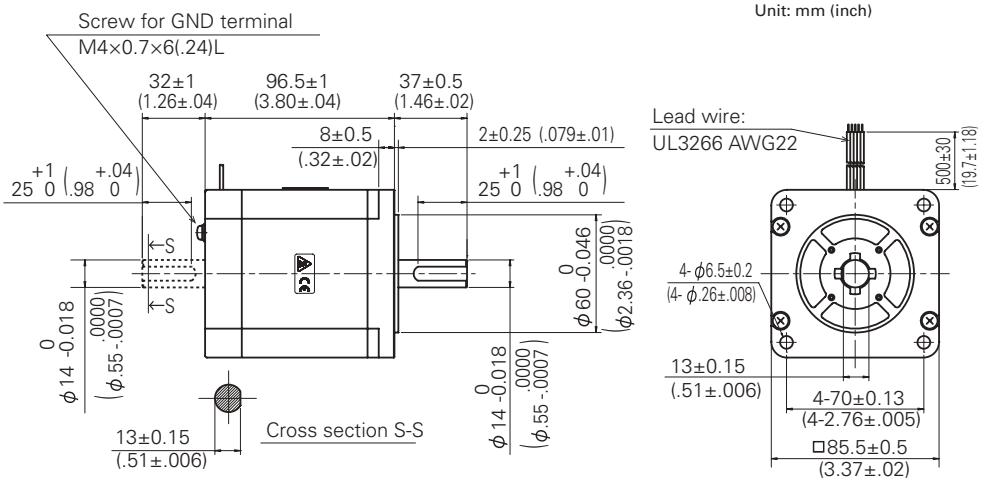


24 VDC Input



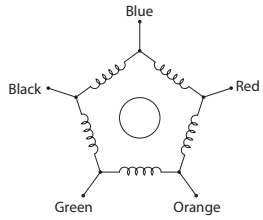
Dimension

Unit: mm (inch)



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			−	−	−
Red	−	−			+	+	+			−
Orange		−	−	−			+	+	+	
Green	+			−	−	−			+	+
Black	+	+	+			−	−	−		

5-PHASE STEPPING SYSTEMS

CYLINDER FLANGE SIZE **42 mm (1.65 inch)** **CYLINDER LENGTH** **87/117 mm (3.43/4.61 inch)**

Specification

New pentagon winding

RoHS

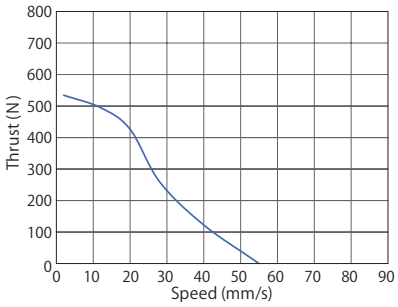
Model	Double Shaft	SL5421-7241
	w/ Brake	SL5421-72XB41
Stroke	mm	50
	in	1.97
Thrust	N	370
	lb	83.2
Rated Current	A/phase	0.75
Wiring Resistance	Ω/phase	1.9
Winding Inductance	mH/phase	2.3
Resolution	mm	0.004
	in	0.00016
Motor Weight	kg	0.65 (0.8*)
	lb	1.43 (1.8*)
Brake — Power Source	VDC / W	24 VDC / 2.4 W
Brake — Static Friction Torque	N	370
	lbs	83.2

* Specifications for brake motor

Torque Curve

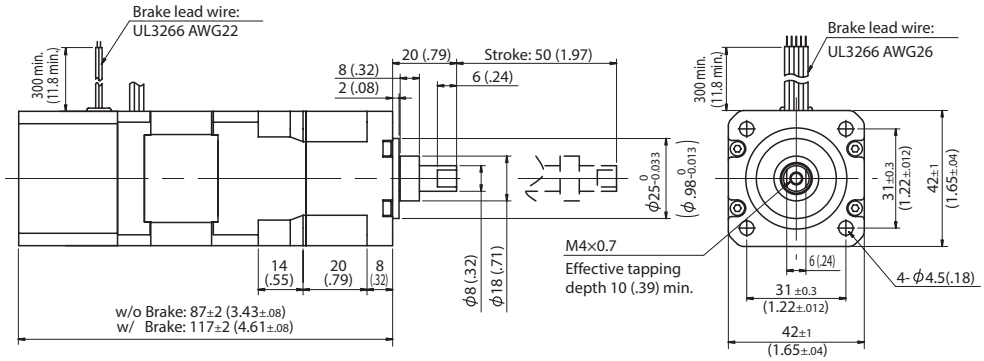
Driver: FS1D140P10
Source current: 24 VDC
Excitation current: 0.75 A/phase
Excitation mode: 4-phase excitation (Full step)

SL5421-72

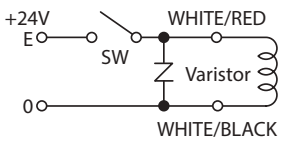


Dimension

Unit: mm (inch)

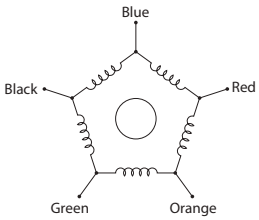


Brake Connection



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			–	–	–
Red	–	–			+	+	+			–
Orange		–	–	–			+	+	+	
Green	+			–	–	–			+	+
Black	+	+	+			–	–	–		

CYLINDER FLANGE SIZE **60 mm (2.36 inch)** **CYLINDER LENGTH** **135.6 mm (5.34 inch)**

Specification

New pentagon winding

RoHS

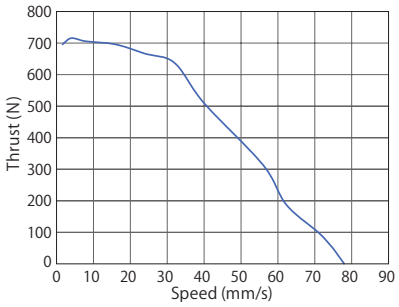
Model	Double Shaft	SL5601-8241
	w/ Brake	SL5601-82XB41
Stroke	mm	80
	in	3.15
Thrust	N	450
	lbs	101
Rated Current	A/phase	1.4
Wiring Resistance	Ω/phase	0.77
Winding Inductance	mH/phase	1.65
Resolution	mm	0.008
	in	0.00032
Motor Weight	kg	1.4 (1.7*)
	lb	3.09 (3.75*)
Brake – Power Source	VDC / W	24 VDC / 6 W
Brake – Static Friction Torque	N	450
	lbs	101

* Specifications for brake motor

Torque Curve

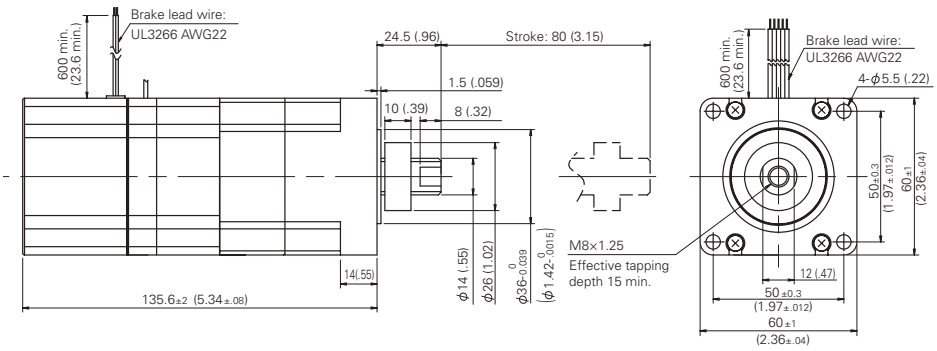
Driver: FS1D140P10
Source current: 24 VDC
Excitation current: 1.4 A/phase
Excitation mode: 4-phase excitation (Full step)

SL5601-82

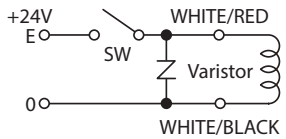


Dimension

Unit: mm (inch)

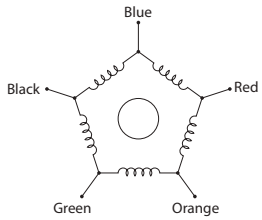


Brake Connection



Internal Wiring

Connection method:
New pentagon connection



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.

	Excitation sequence									
Lead wire color	1	2	3	4	5	6	7	8	9	10
Blue			+	+	+			–	–	–
Red	–	–			+	+	+			–
Orange		–	–	–			+	+	+	
Green	+			–	–	–			+	+
Black	+	+	+			–	–	–		

5-Phase DC Input Micro-step Driver

Specification

Basic specifications		Model number	F5PAE140P100
		Main circuit power	24 VDC/48 VDC ±10% *1
		Main circuit power supply current	3 A
	Environment	Protection class	Class III
		Operation environment	Installation category (over-voltage category): I (CE) Pollution level: 2
		Operating ambient temperature	0 to +50°C
		Storage temperature	−20 to +70°C
		Operating ambient humidity	35 to 85% RH (no condensation)
		Storage humidity	10 to 90% RH (no condensation)
		Operation altitude	1000 m or less above sea level
		Vibration resistance	Tested under the following conditions; 5 m/s², frequency range 10 to 55 Hz, direction along X, Y and Z axes, for 2 hours each
		Impact resistance	20 m/s²
		Withstandable voltage	Not influenced when 0.5 kVAC is applied between power input terminal and cabinet for one minute.
		Insulation resistance	10 MΩ min. when measured with 500 VDC megohmmeter between input terminal and cabinet.
		Mass	0.23 kg
Functions		Selection function	Pulse input type (1-input type/2-input type), low-vibration mode (low-vibration drive/ microstep drive), resolution (2-phase mode/5-phase mode), output signal (phase origin monitor/alarm), operating current, step-angle
		Protection functions	Overcurrent protection
		LED indication	Power supply monitor, alarm display (main power supply under- and overvoltage, regenerative fault, overcurrent fault, ardware fault)
I/O signals		Auto-Current-Down canceling input signal	Photocoupler input system; input resistance: 330 Ω Input-signal"H"level: 4.5 to 5.5 V; input-signal"L"level: 0 to 0.5 V
		Step-angle selection input	Photocoupler input system; input resistance: 330 Ω Input-signal"H"level: 4.5 to 5.5 V; input-signal"L"level: 0 to 0.5 V
		Command pulse input signal	Photocoupler input system; input resistance: 330 Ω Input-signal"H"level: 4.5 to 5.5 V; input-signal"L"level: 0 to 0.5 V Provided that voltage between Level H to L shall be 4.5 V or over. Maximum input frequency: 400 kpulse/s
		Power down input signal	Photocoupler input system; input resistance: 330 Ω Input-signal"H"level: 4.5 to 5.5 V; input-signal"L"level: 0 to 0.5 V
		Phase origin monitor output signal/ Alarm output signal	Open collector output via photocoupler Output signal standard Vceo: 30 V or less *2, Ic: 5 mA or less, Vce (sat): 1.0 V or less

*1 Use either 24 VDC±10% or 48 VDC±10% for main circuit power supply. Make sure never exceed 60 VDC, even if power supply voltage increases due to counter-electromotive force after misstep occurs. If there are any possibilities of exceeding 60 VDC, connect optional regenerative resistor. Regenerative resistor use is recommended if you operate with 60 mm sq. or 86 mm sq. motor.

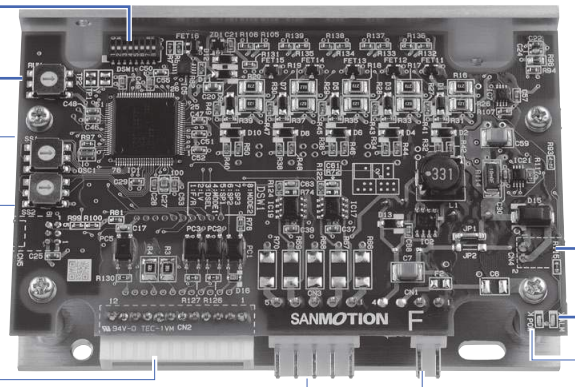
*2 Make sure the voltage used for output signal is 5 VDC or over.

Safety Standards

	Directives	Category	Standard	Name
CE (TÜV)	Low-voltage directives	–	EN61800-5-1	–
	EMC directives	Emission	EN61000-6-4	Conducted emissions test
			EN61000-6-4	Electromagnetic radiation disturbance
		Immunity	EN61000-4-2	ESD (Electrostatic discharge)
			EN61000-4-3	RS (Radio-frequency amplitude modulated electromagnetic field)
			EN61000-4-4	Fast transionts
			EN61000-4-5	CS (Radio-frequency common mode)
			EN61000-4-6	Surges
UL	Acquired standards		Applicable standard	File No.
	UL UL for Canada (c-UL)		UL508C	E179775

- EMC characteristics may vary depending on the configuration of the users' control panel, which contains the driver or stepping motor, or the arrangement and wiring of other electrical devices.
  Parts for EMC noise suppression like noise filters and toroidal type ferrite cores may be required depending on circumstances.
- Validation test of driver has been performed for low-voltage EMC directives at TÜV (TÜV product service) for self-declaration of CE marking.

Driver Controls and Connectors



2 Function select DIP switch (DSW1)

1 Operating current select switch (RUN)

3 Step angle select switch (SS1, SS2)

I/O signal interface connector (CN2)
- I/O Cable 1m P/N: FC3S0010A
- I/O Cable 2m P/N: FC5S0020A
- I/O Connector P/N: FC5S0000A

Connector for regeneration resistor* (CN4)

5 LED for alarm display (ALM)

4 LED for power supply monitor (POW)

Motor connector port (CN3)
Motor Cable 1m P/N: FC3M0010A

Power supply connector port (CN1)
Power Cable 1m P/N: FC3P0010A

1 Operating current select switch (RUN)

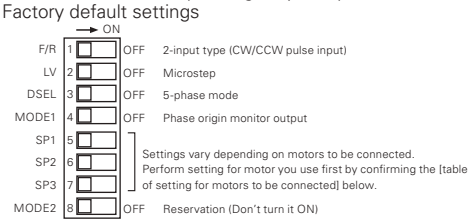
Operating motor current value can be set with the rotary switch.

Dial	0	1	2	3	4	5	6	7
Stepping motor current (A)	1.4	1.35	1.3	1.25	1.2	1.15	1.1	1.05
Dial	8	9	A	B	C	D	E	F
Stepping motor current (A)	1.0	0.95	0.9	0.85	0.8	0.75	0.7	0.65

- The factory default value is F (0.65 A). Please check the rated current of the motor to be combined before selecting the operation current.
- If there are sufficient margin of motor torque, decreasing operating current value becomes effective for vibration reduction. Motor output torque is approximately proportional to current.
- Make sure to confirm there are sufficient operation margin before determining motor current value to adjust operating current.

2 Function select DIP switch (DSW1)

Select the function depending on your specification.
Factory default settings



- Perform setting for motor to be connected first.
- Make sure to turn off power supply of the driver when changing setting s of function select DIP switch.

[Table of setting for motors to be connected]

SP1	SP2	SP3	Motor to be connected
OFF	OFF	OFF	SH5281-72□□, SH5285-72□□, SF5421-82□□
OFF	OFF	ON	SF5422-82□□
OFF	ON	OFF	SF5423-82□□
OFF	ON	ON	SM5601-82□□
ON	OFF	OFF	SM5602-82□□
ON	OFF	ON	SM5603-82□□, SM5861-82□□
ON	ON	OFF	SM5862-82□□

1. Pulse input type selection (F/R)

Select the input pulse type.

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

2. Low-vibration mode select (LV)

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

LV	Operation
ON	Low-vibration drive
OFF	Microstep

3. Resolution selection (DSEL)

Select the step angle select switch (SS1, SS2) mode.

DSEL	Resolution mode
ON	2-phase mode: Operation as normal 2-phase stepping system at 1.8° to 0.00703125°-step angle is available.
OFF	5-phase mode: Operation as normal 5-phase stepping system at 0.72° to 0.00288°-step angle is available.

4. Output signal selection (MODE1)

Select the output signal

MODE1	Output signal
ON	Alarm output
OFF	Phase origin monitor output

5 to 7. Motor selection (SP1, SP2, SP3)
Perform setting for motor you use first by confirming the [table of setting for motors to be connected].

8. (MODE2)
Do not turn ON this switch.

3 Step angle select switch (SS1, SS2)

The number of divisions of the stepping motor basic step angle can be set with the rotary switch.
After selecting 2- or 5-phase mode by function select DIP switch 3 (DSEL), set the step angle select switches for the desired step angle.

5-Phase Mode: DSW1 function select DIP switch 3 = OFF				2-Phase Mode: DSW1 function select DIP switch 3 = ON			
SS1, SS2	Number of divisions	Resolution	Basic step angle	SS1, SS2	Number of divisions	Resolution	Basic step angle
0	1	500	0.72°	0	0.4	200	1.8°
1	2	1000	0.36°	1	0.8	400	0.9°
2	2.5	1250	0.288°	2	1.6	800	0.45°
3	4	2000	0.18°	3	2	1000	0.36°
4	5	2500	0.144°	4	3.2	1600	0.225°
5	8	4000	0.09°	5	4	2000	0.18°
6	10	5000	0.072°	6	6.4	3200	0.1125°
7	20	10000	0.036°	7	10	5000	0.072°
8	25	12500	0.0288°	8	12.8	6400	0.05625°
9	40	20000	0.018°	9	20	10000	0.036°
A	50	25000	0.0144°	A	25.6	12800	0.028125°
B	80	40000	0.009°	B	40	20000	0.018°
C	100	50000	0.0072°	C	50	25000	0.0144°
D	125	62500	0.00576°	D	51.2	25600	0.0140625°
E	200	100000	0.0036°	E	100	50000	0.0072°
F	250	125000	0.00288°	F	102.4	51200	0.00703125°

- Factory default setting: SS1 = 1 and SS2 = 0
- Set the step angle select input (DSEL) to select SS1 or SS2, then set the rotary switch.

4 LED for power supply monitor (POW)

Lights up when the control power and main circuit power supply are connected.

5 LED for alarm display (ALM)

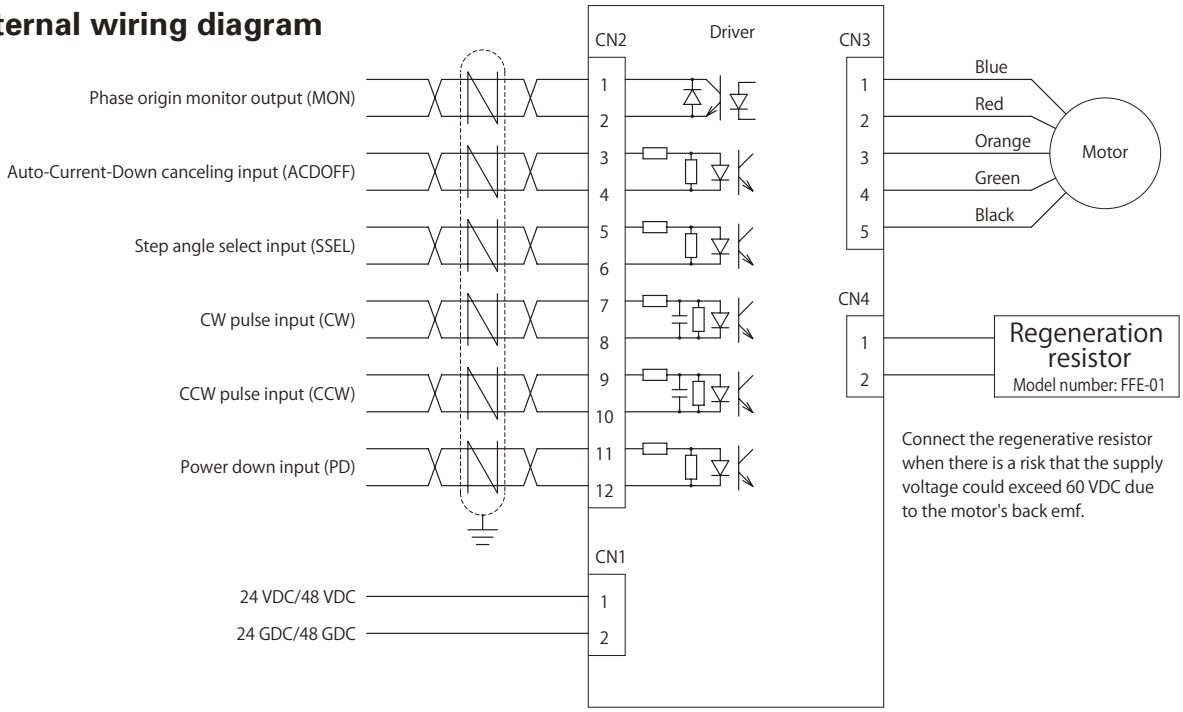
Flashes repeatedly when an alarm is generated.

Indication	Explanation
"ALM" repeats single-flashing.	Main power supply voltage drop (Detected when excitation is on.)
"ALM" repeats double-flashing.	Overvoltage of main power supply (Detected when motor stops.)
"ALM" repeats triple-flashing.	Regeneration error (Detected when motor is operating.)
"ALM" repeats quadruple-flashing.	Overcurrent error
"ALM" repeats five-times-flashing.	Hardware error

- When alarm activated, stepping motor winding current is interrupted and then the state becomes"not-excited" at the same time that LED"ALM" flahes. When "DSW1: MODE1" is set to ON, signal is output outward from alarm output terminal (AL). (Photocoupler is turned on.) This state is maintained until the power supply is turned off. Please re-turn on the power supply after eliminating alarm cause.

Connections Signals

External wiring diagram



Applicable Wire Sizes

Part	Applicable wire	Insulation diameter	Wiring length
For power supply	AWG20 (0.5 mm^2) to AWG18 (0.75 mm^2)	ø1.7 to ø3.0 mm	Under 3 m
For input/output signal	AWG24 (0.2 mm^2) to AWG22 (0.3 mm^2)	ø1.15 to ø1.8 mm	Under 3 m
For motor	AWG20 (0.5 mm^2) to AWG18 (0.75 mm^2)	ø1.7 to ø3.0 mm	10 m max.

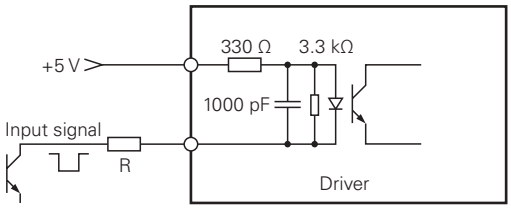
When bundling wire together or running wires through duct, take reduction rate of each wire allowable current into consideration. When ambient temperature is relatively high, wire product lifetime is reduced due to heat deterioration. In this case, please use Heat resistant Indoor PVC (HIV).

Specification summary of I/O signals

Signal name	CN2 Pin number	Function summary
Phase origin monitor output (standard)	1 2	DSW1 MODE1=OFF Photocoupler is turned on when excitation phase is the origin (the state power supply is turned on).
Alarm output	1 2	DSW1 MODE1=ON Photocoupler is turned on when the driver is in the state of alarm being activated.
Auto-Current-Down canceling input	3 4	Inputting this signal (internal photpcoupler is turned on) disables Auto-Current-Down function.
Step angle select input	5 6	Division numbers can be switched via SSEL-signal. Internal photocoupler is OFF … Setting via rotary switch SS1 enabled Internal photocoupler is ON … Setting via rotary switch SS2 enabled
CW pulse input (standard)	7 8	When in "2-input type", input the drive pulse that rotates in a CW direction.
Pulse train input	7 8	When in "1-input type", input the drive pulse train for motor rotation.
CCW pulse input (standard)	9 10	When in "2-input type", input the drive pulse that rotates in a CCW direction.
Rotational direction input	9 10	When in "1-input type", input the motor rotational direction signal. Internal photocoupler ON … CW direction Internal photocoupler OFF … CCW direction
Power down input	11 12	Inputting this signal (internal photocoupler is turned on) shuts off the current carried to motor.

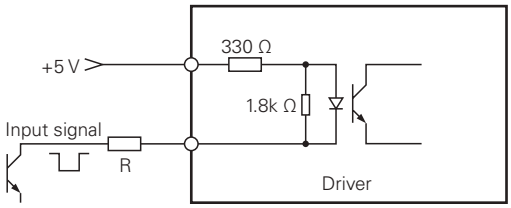
· As for the motor rotational direction, CW direction is regarded as the clockwise rotation, and CCW direction is regarded as the counterclockwise rotation by viewing the motor from output shaft side.

Pulse Input



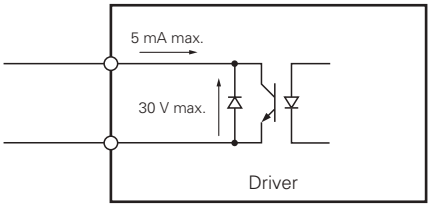
- Pulse duty 50% max.
- Maximum input frequency: 400 kpulse/s
- When the crest value of the input signal exceeds 5 V, use the external limit resistance R to limit the input current to approximately 10 mA. (Take the photocoupler forward voltage (1.5 V) into consideration.)

Input Circuit Configuration of ACDOFF, SSEL, PD

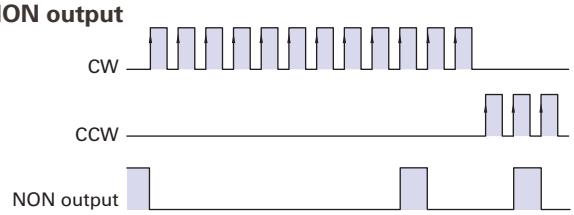


- When the crest value of the input signal exceeds 5 V, use the external limit resistance R to limit the input current to approximately 10 mA. (Take the photocoupler forward voltage (1.5 V) into consideration.)

Output Signal Configuration of MON, AL



MON output

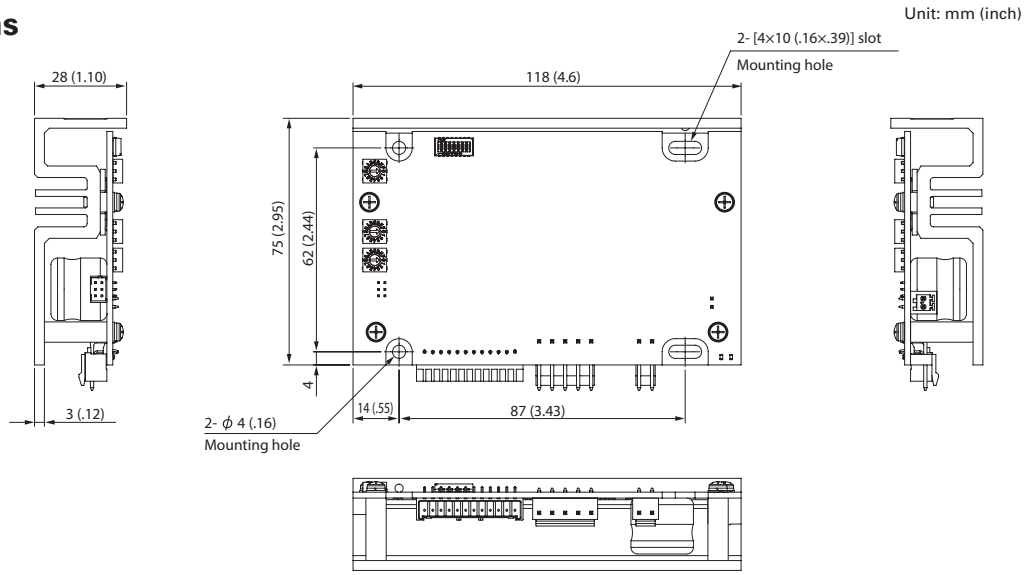


Example: 5-phase mode, 1 division (Full step)

- When the motor excitation phase is at the phase origin (power ON status), the photocoupler is ON.
- Inputting pulse turns on photocoupler every 7.2° of motor output axis from phase origin.
- Set command frequency to 50 kpulse/s or less to use phase origin monitor.
- Perform switching of division number via step-angle selection input signal (SSEL) with phase origin monitor output turned on and motor being stopped.
- Switching division number at the point other than excitation origin may cause that phase origin monitor output is not correctly output.

Dimensions

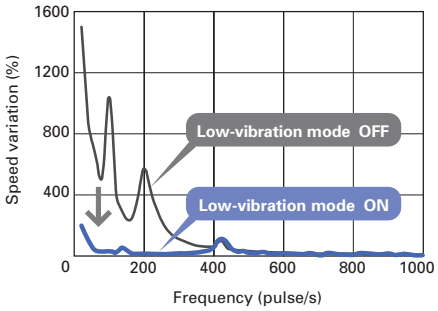
Unit: mm (inch)



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	N·m oz·in	Amp	Model	Shape	Driver: DC Input: BS1D200P10 24/36 VDC	Driver: DC Input: A-CSD 02.V 24 to 45 VDC	Driver: DC Input: A-CSD 04.V 24 to 45 VDC	Driver: DC Input: CSD J4 24 to 45 VDC	Driver: DC Input: A-NDC 06.V 24 to 85 VDC	Driver: DC Input: ADW 24 to 75 VDC	Driver: AC Input: X-PLUS B4 110 - 230 VAC	Driver: AC Input: X-MIND B6 110 - 230 VAC	Driver: AC Input: X-MIND K6 110 -230 VAC	Page
14 mm 0.55 inch	0.0065 0.92	0.3	**SH2141-5541** **SH2141-5511**	S D										118
	0.01 1.42	0.4	**SH2145-5641** **SH2145-5611**	S D										
28 mm NEMA 11	0.07 9.91	0.5	**SH2281-5671** **SH2281-5631**	S D	■	■								119
	0.07 9.91	1	**SH2281-5771** **SH2281-5731**	S D	■	■								
	0.145 20.53	0.5	**SH2285-5671** **SH2285-5631**	S D	■									120
	0.145 20.53	1	**SH2285-5771** **SH2285-5731**	S D	■	■								
42 mm NEMA 17	0.083 11.75	1	**SS2421-5041**	S	■	■								121
	0.186 26.33	1	**SS2422-5041**	S	■	■								
	0.25 35.4	0.5	**103H5205-5140**	S	■									122
	0.29 41.07	1	**SF2421-10B41** **SF2421-10B11**	S D	■	■								123
	0.38 53.81	0.5	**103H5208-5140**	S	■									124
	0.43 60.89	1	**SF2422-10B41** **SF2422-10B11**	S D	■	■								125
	0.49 69.39	0.5	**103H5210-5140**	S	■									126
	0.51 72.22	1	**103H5210-5214** **103H5210-52XB12**	D, TAP D, BRK, TAP	■	■								127
	0.8 113.3	1	**SF2423-10B41** **SF2423-10B11**	S D	■									128
	0.37 52.39	1	**SF2424-10B41** **SF2424-10B11**	S D	■									129
42 mm NEMA 17 0.9°/step	0.23 32.5	2	**SH1421-5241**	S	■	■								130
	0.35 48.1	2	**SH1422-5241**	S	■	■								131
	0.48 37.9	2	**SH1424-5241**	S	■	■								132
50 mm 1.97 inch	0.1 14.16	1	**SS2501-8040**	S	■	■								133
	0.215 30.44	1	**SS2502-8040**	S	■	■								

Lineup

Motor Size	N·m oz·in	Amp	Model	Shape	Driver									Page
					DC Input						AC Input			
					BS1D200P10 24/36 VDC	A-CSD 02.V 24 to 45 VDC	A-CSD 04.V 24 to 45 VDC	CSD J4 24 to 45 VDC	A-NDC 06.V 24 to 85 VDC	ADW 24 to 75 VDC	X-PLUS B4 110 - 230 VAC	X-MIND B6 110 - 230 VAC	X-MIND K6 110 -230 VAC	
56 mm NEMA 23	0.55 77.9	2	**103H7121-5740** **103H7121-5710**	S D	■	■			■	■				134
	0.55 77.9	3	**103H7121-5840**	S			■	■	■	■				
	1 141.6	2	**103H7123-5740** **103H7123-5710**	S D	■	■			■	■				135
	1 141.6	3	**103H7123-5840**	S			■	■	■	■				
	1.6 226.6	2	**103H7126-5740** **103H7126-5710**	S D	■	■			■	■				136
	1.6 226.6	3	**103H7126-5840**	S			■	■	■	■				
	2 283.2	2	**103H7128-5740** **103H7128-5710**	S D	■	■			■	■				137
	2 283.2	3	**103H7128-5840**	S			■	■	■	■				
	1 141.6	3	**SP2563-5260** **SP2563-5200**	S, CBL S, CONN			■	■	■	■				138
	1.7 240.7	3	**SP2566-5260** **SP2566-5200**	S, CBL S, CONN			■	■	■	■				139
60 mm 2.36 inch w/ NEMA 23 mounting	0.88 124.6	2	**103H7821-5760** **103H7821-5730**	S D	■	■			■	■				140
	0.88 124.6	4	**103H7821-1760** **103H7821-1730**	S D			■	■	■	■				
	1.37 194	2	**103H7822-5760** **103H7822-5730**	S D	■	■			■	■				141
	1.37 194	4	**103H7822-1760** **103H7822-1730**	S D			■	■	■	■				
	1.1 155.8	4.4	**103H7822-2511** **103H7822-25XB12**	D D, BRK					■	■				142
	2.7 382.3	2	**103H7823-5760** **103H7823-5730**	S D	■	■			■	■				143
	2.7 382.3	4	**103H7823-1760** **103H7823-1730**	S D			■	■	■	■				
60 mm 2.36 inch 0.9˚/step	0.69 97.7	2	**SH1601-5240**	S	■	■			■	■				144
	1.28 181.2	2	**SH1602-5240**	S	■	■			■	■				145
	2.15 304.4	2	**SH1603-5240**	S	■	■			■	■				146
86 mm NEMA 34	3.3 467.3	2	**SM2861-5052**	S							■			147
	3.3 467.3	4	**SM2861-5152** **SM2861-5122**	S D					■	■	■	■	■	
	3.3 467.3	6	**SM2861-5252**	S					■	■		■	■	
	6.4 906.3	2	**SM2862-5052**	S										148
	6.4 906.3	4	**SM2862-5152** **SM2862-5122**	S D					■	■	■	■	■	
	6.4 906.3	6	**SM2862-5252** **SH2862-52XB12**	S D, BRK					■	■		■	■	149
	9 1274.5	2	**SM2863-5052**	S										150
	9 1274.5	4	**SM2863-5152** **SM2863-5122**	S D					■	■	■	■	■	
	9 1274.5	6	**SM2863-5252**	S					■	■		■	■	
	6.4 906.3	6	**SP2862-5260**	S, CBL					■	■		■	■	151
	9 1274.5	6	**SP2863-5260**	S, CBL					■	■		■	■	152
106 mm NEMA 42	13.2 1869.2	6	**103H89222-5241**	S								■	■	153
	19 2690.5	6	**103H89223-5241**	S									■	154
42 mm NEMA 17 Vacuum	0.37 52.39	2	**103H5208-49V40**	S, CBL	■	■			■	■				155
56 mm NEMA 23 Vacuum	0.45 63.72	2	**103H7121-47V40**	S, CBL	■	■			■	■				156

Shape S: Single Shaft D: Double Shaft 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

RoHS

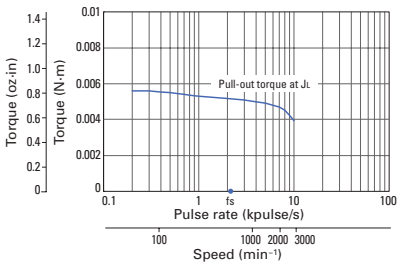
Bipolar winding, 1.8°/step

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	x10^{-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	

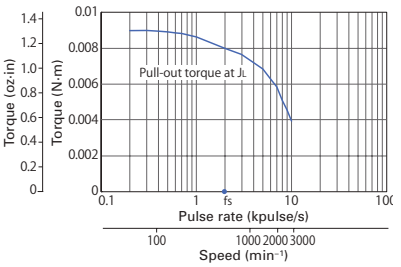
Torque Curve

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

SH2141-55

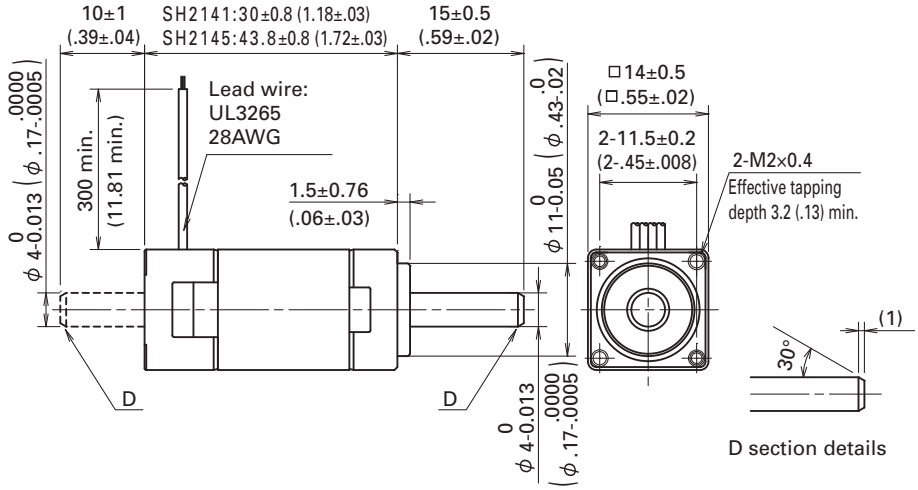


SH2145-56

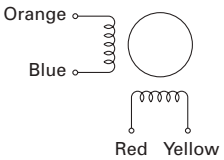


Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

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

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

Specification

Bipolar winding, 1.8°/step

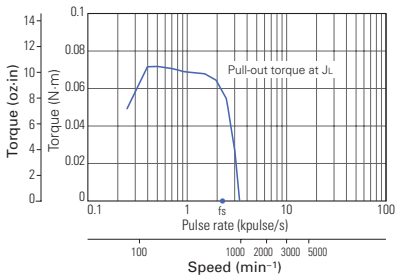
RoHS

Model			
	Single Shaft	SH2281-5671	SH2281-5771
	Double Shaft	SH2281-5631	SH2281-5731
Holding Torque	N·m	0.07	0.07
	oz·in	9.91	9.91
Rated Current	A/phase	0.5	1
Wiring Resistance	Ω/phase	10.5	2.6
Winding Inductance	mH/phase	7.2	1.85
Rotor Inertia	$x10^{-4}$ kg·m^2	0.01	0.01
	oz·in^2	0.05	0.05
Motor Weight	kg	0.11	0.11
	lb	0.24	0.24
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

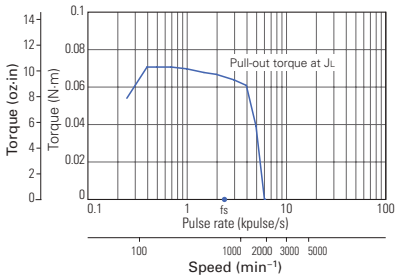
Torque Curve

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

SH2281-56

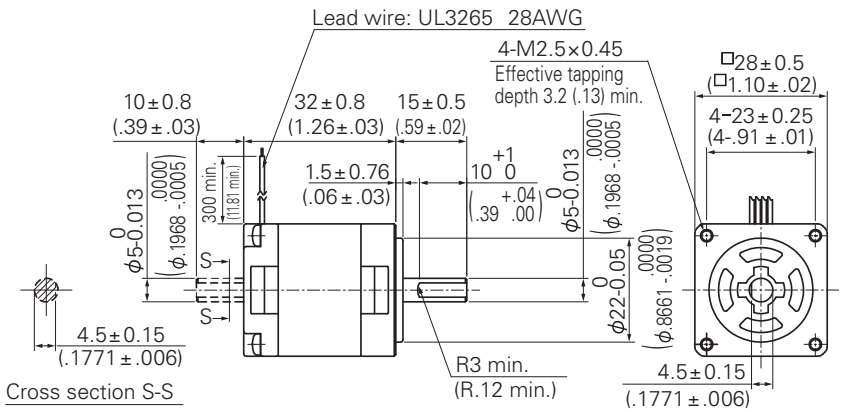


SH2281-57

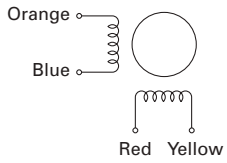


Dimension

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	–	+	+	–

2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **28 mm (NEMA 11)** | **MOTOR LENGTH** **51.5 mm (2.03 inch)**

Specification

RoHS

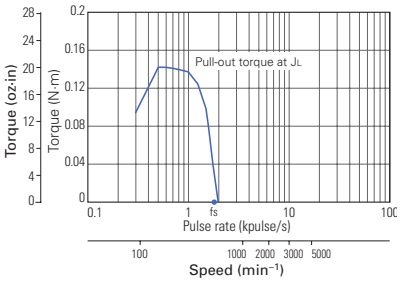
Bipolar winding, 1.8°/step

Model	Single Shaft	SH2285-5671	SH2285-5771
	Double Shaft	SH2285-5631	SH2285-5731
Holding Torque	N·m	0.145	0.145
	oz·in	20.53	20.53
Rated Current	A/phase	0.5	1
Wiring Resistance	Ω/phase	15	3.75
Winding Inductance	mH/phase	13.5	3.4
Rotor Inertia	x10^{-4} kg·m^2	0.022	0.022
	oz·in^2	0.12	0.12
Motor Weight	kg	0.20	0.20
	lb	0.44	0.44
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

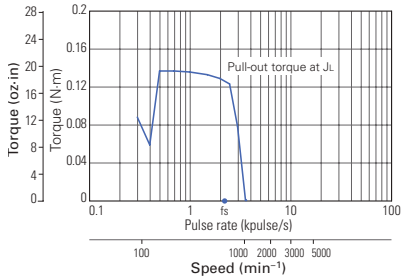
Torque Curve

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

SH2281-56

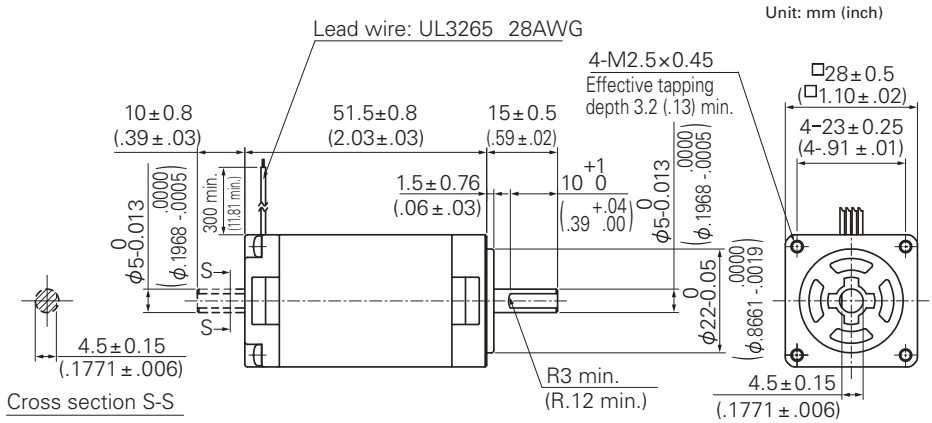


SH2281-57

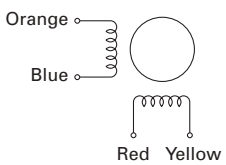


Dimension

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

RoHS

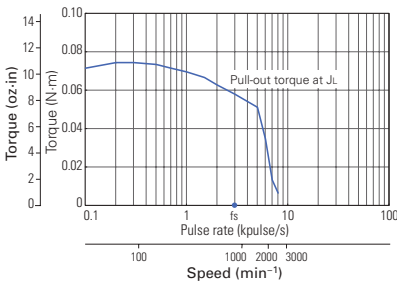
Bipolar winding, 1.8°/step

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	$x10^{-4}$ 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	

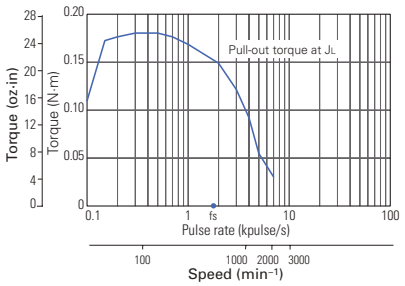
Torque Curve

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

SS2421-5041



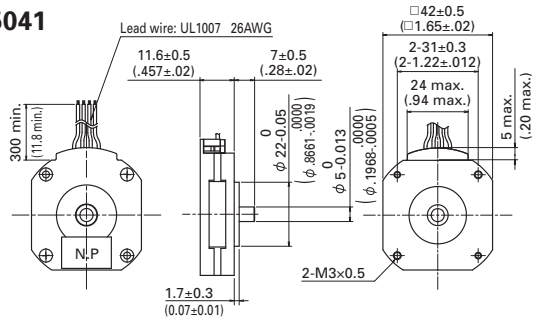
SS2422-5041



Dimension

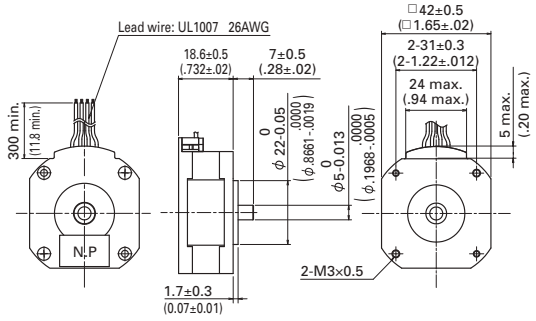
Unit: mm (inch)

SS2421-5041

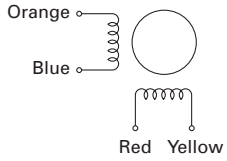


SS2422-5041

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** **33 mm (1.25 inch)**

Specification

RoHS

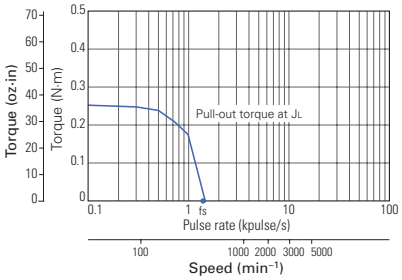
Bipolar winding, 1.8°/step

Model	Single Shaft	103H5205-5140
Holding Torque	N·m	0.25
	oz·in	35.4
Rated Current	A/phase	0.5
Wiring Resistance	Ω/phase	13.4
Winding Inductance	mH/phase	23.4
Rotor Inertia	$x10^{-4}$ kg·m^2	0.036
	oz·in^2	0.20
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

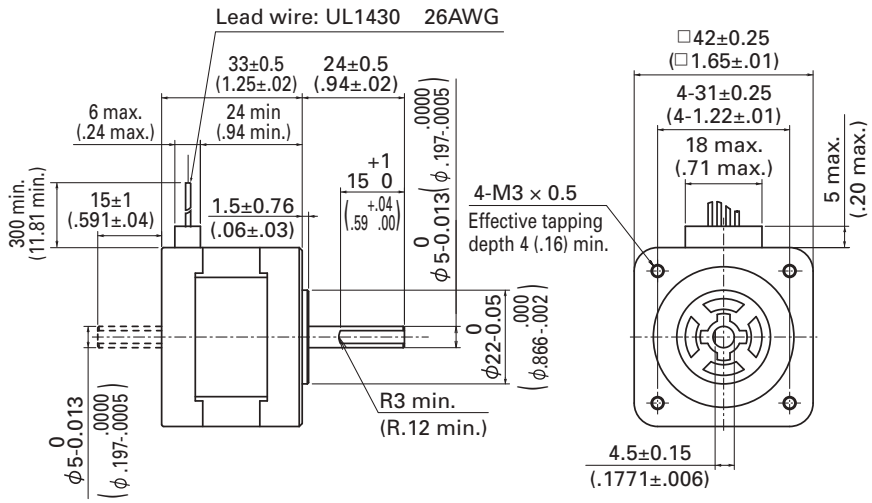
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] | fs: Maximum self-start frequency when not loaded

103H5205-51

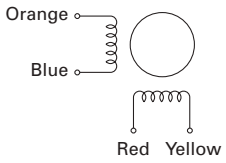


Dimension

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

RoHS

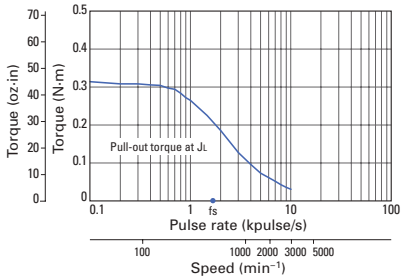
Bipolar winding, 1.8°/step

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	x10^{-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 I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

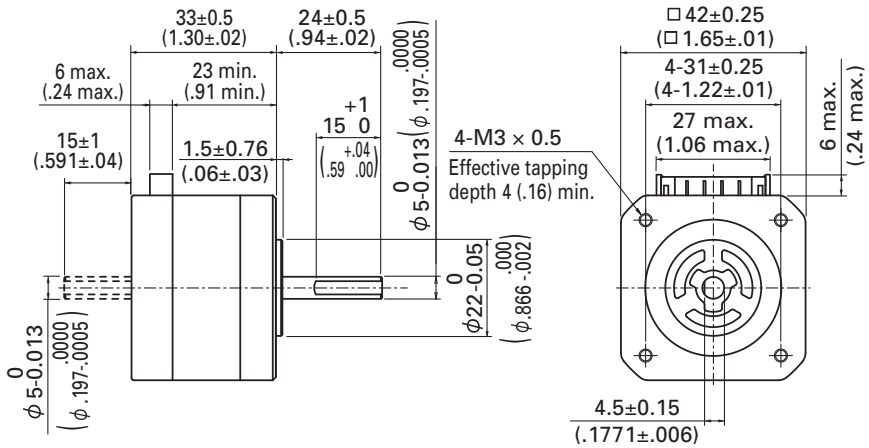
SF2421-10B



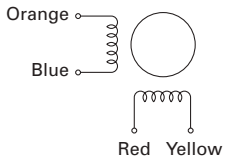
Dimension

Motor Cable Model Number: 4835775-1

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.

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** **39 mm (1.54 inch)**

Specification

RoHS

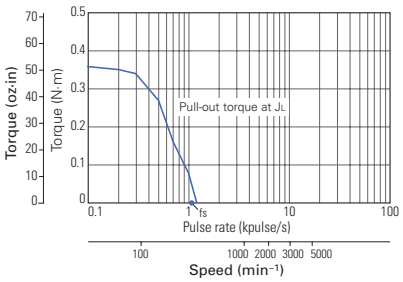
Bipolar winding, 1.8°/step

Model	Single Shaft	103H5208-5140
Holding Torque	N·m	0.38
	oz·in	53.81
Rated Current	A/phase	0.5
Wiring Resistance	Ω/phase	16.5
Winding Inductance	mH/phase	34
Rotor Inertia	$x10^{-4}$ kg·m^2	0.056
	oz·in^2	0.31
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

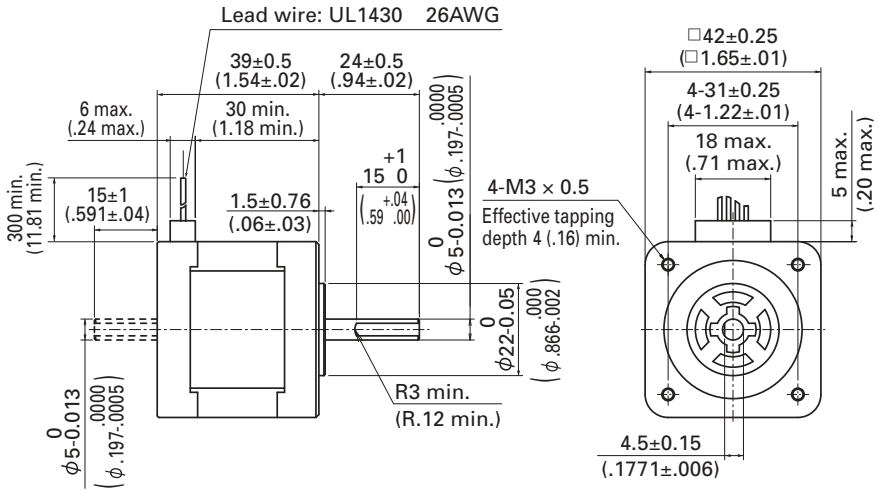
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

103H5208-51

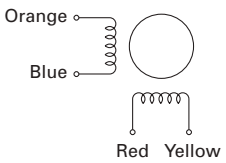


Dimension

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

RoHS

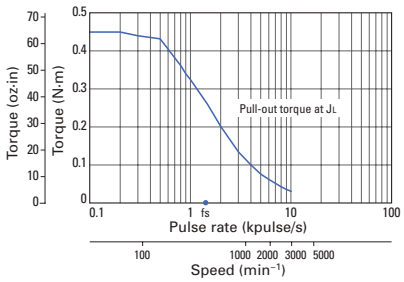
Bipolar winding, 1.8°/step

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	x10^{-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 I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

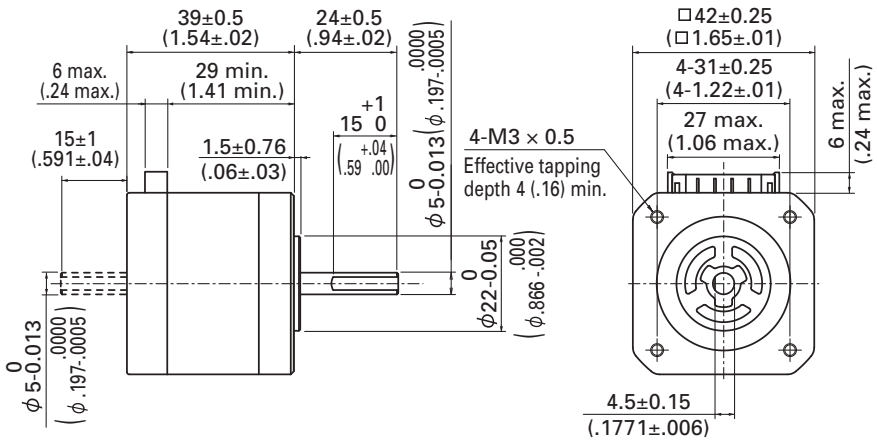
SF2422-10B



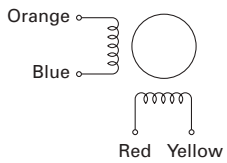
Dimension

Motor Cable Model Number: 4835775-1

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.

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

MOTOR FLANGE SIZE **42 mm (NEMA 17)** | **MOTOR LENGTH** **48 mm (1.89 inch)**

Specification

RoHS

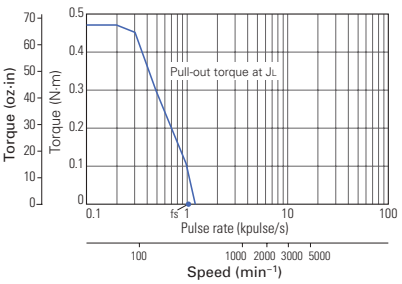
Bipolar winding, 1.8°/step

Model	Single Shaft	103H5210-5140
Holding Torque	N·m	0.49
	oz·in	69.39
Rated Current	A/phase	0.5
Wiring Resistance	Ω/phase	20
Winding Inductance	mH/phase	35
Rotor Inertia	x10^{-4} kg·m^2	0.074
	oz·in^2	0.40
Motor Weight	kg	0.37
	lb	0.82
Operating Temperature		-10 to 50°C (14 to 122°F)
Humidity		20 to 90% RH, no condensation

Torque Curve

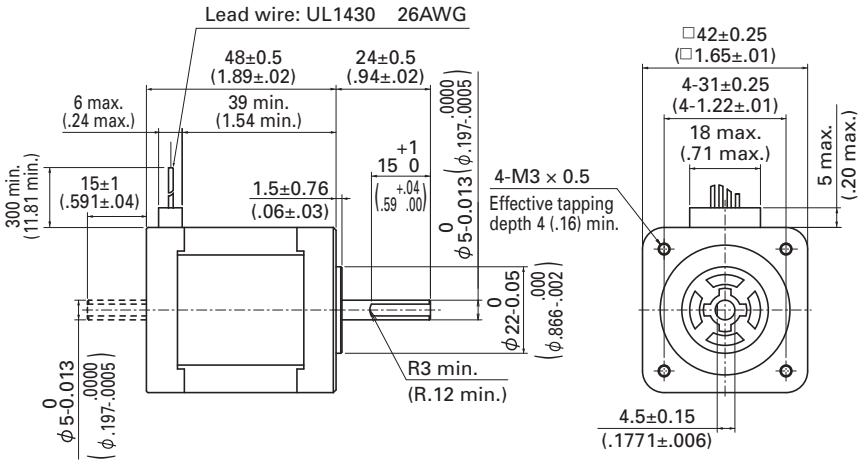
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

103H5210-51

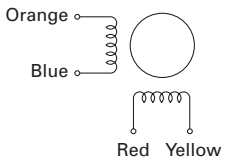


Dimension

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

RoHS

Bipolar winding, 1.8°/step

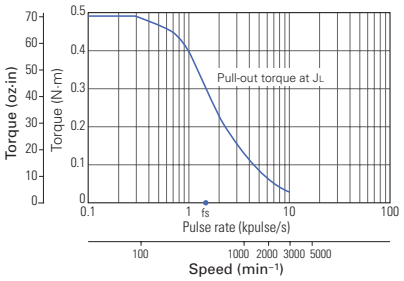
Model	Double Shaft	103H5210-5214
	w/ Brake	103H5210-52XB12
Holding Torque	N·m	0.51
	oz·in	72.2
Rated Current	A/phase	1
Wiring Resistance	Ω/phase	4.8
Winding Inductance	mH/phase	9.5
Rotor Inertia	x10^{-4} kg·m^2	0.074 (0.089*)
	oz·in^2	0.405 (0.487*)
Motor Weight	kg	0.37 (0.51*)
	lb	0.82 (1.12*)
Operating 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
Brake — Static Friction Torque	N·m	0.3 Min.
	oz·in	42.5 Min.

* Specifications for brake motor

Torque Curve

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

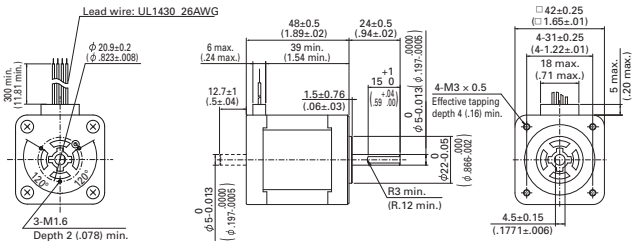
103H5210-52



Dimension

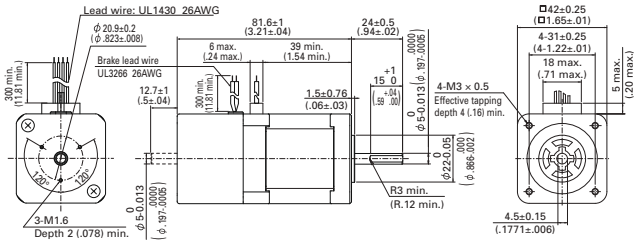
103H5210-5214

Unit: mm (inch)

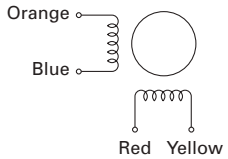


103H5210-52XB12

Unit: mm (inch)



Internal Wiring

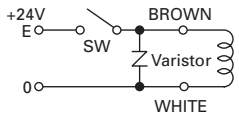


Direction of motor rotation

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



2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **42 mm (NEMA 17)** | **MOTOR LENGTH** **48 mm (1.89 inch)**

Specification

RoHS

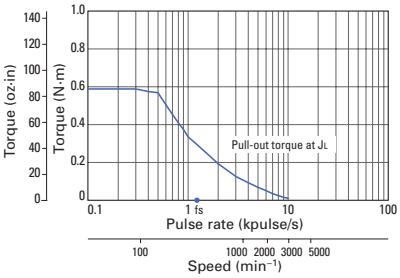
Bipolar winding, 1.8°/step

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	x10^{-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 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] | fs: Maximum self-start frequency when not loaded

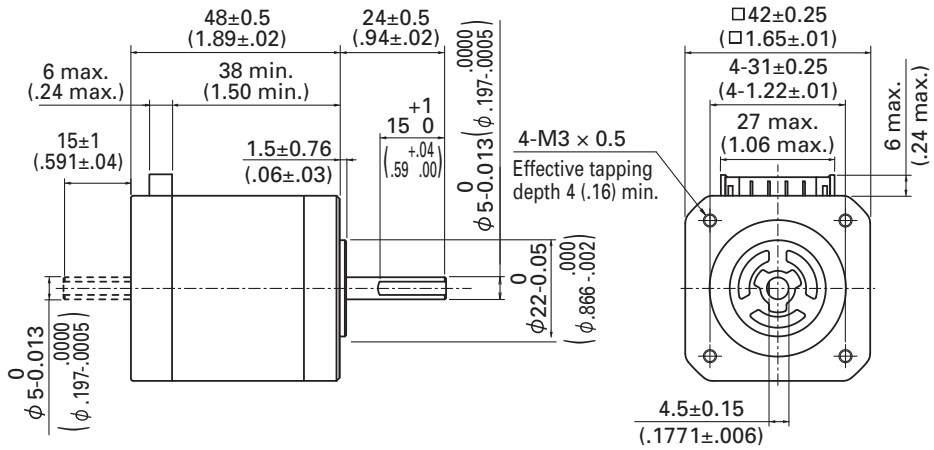
SF2423-10B



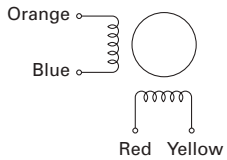
Dimension

Motor Cable Model Number: 4835775-1

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.

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

MOTOR FLANGE SIZE **42 mm (NEMA 17)** | **MOTOR LENGTH** **59.5 mm (2.34 inch)**

Specification

RoHS

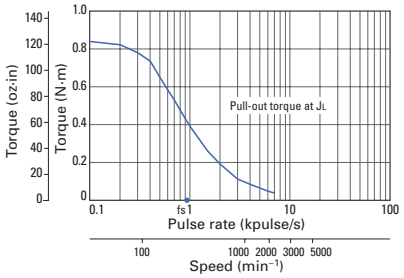
Bipolar winding, 1.8°/step

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	x10^{-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 I Operating current: Rated Current, 2-phase energization (full-step) I JL=[2.6 × 10^{-4}kg·m^2 (14.2 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

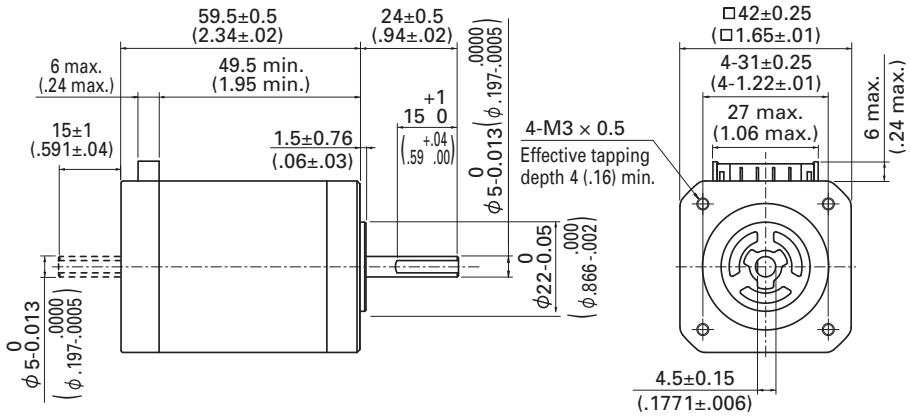
SF2424-10B



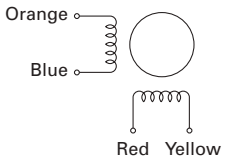
Dimension

Motor Cable Model Number: 4835775-1

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.

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** **33 mm (1.25 inch)**

Specification

Bipolar winding, 0.9 °/step

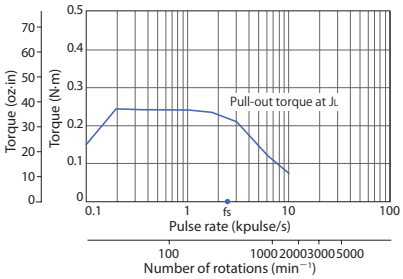
RoHS

Model	Single Shaft	SH1421-5241
Holding Torque	N·m	0.23
	oz·in	32.5
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	0.85
Winding Inductance	mH/phase	2.1
Rotor Inertia	x10^{-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

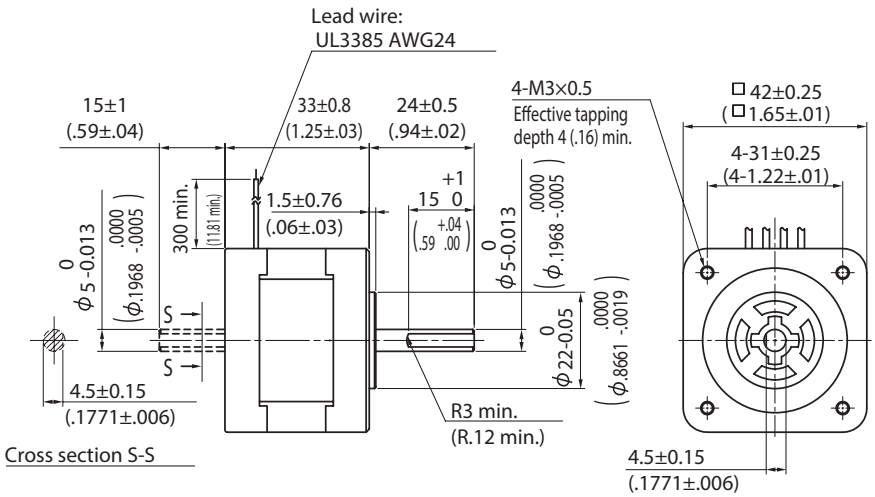
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SH1421-52

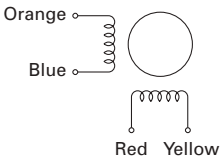


Dimension

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	–	+	+	–

Specification

Bipolar winding, 0.9 °/step

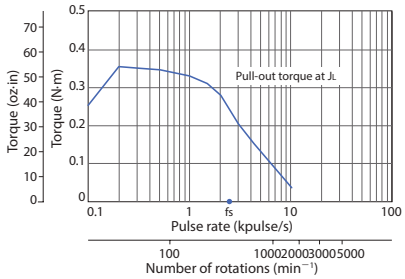
RoHS

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	x10^{-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

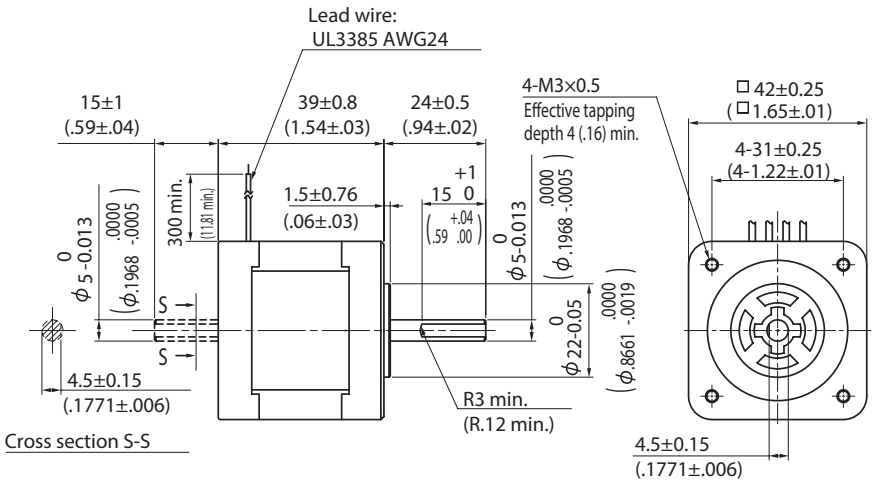
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SH1422-52

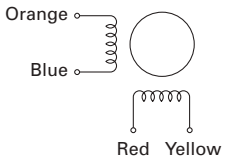


Dimension

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

MOTOR FLANGE SIZE **42 mm (NEMA 17)** | **MOTOR LENGTH** **48 mm (1.89 inch)**

Specification

RoHS

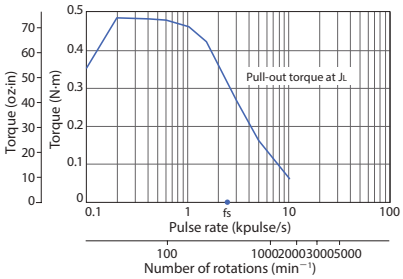
Bipolar winding, 0.9 °/step

Model	Single Shaft	SH1424-5241
Holding Torque	N·m	0.48
	oz·in	67.9
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	1.25
Winding Inductance	mH/phase	3.75
Rotor Inertia	x10^{-4} kg·m^2	0.089
	oz·in^2	0.49
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

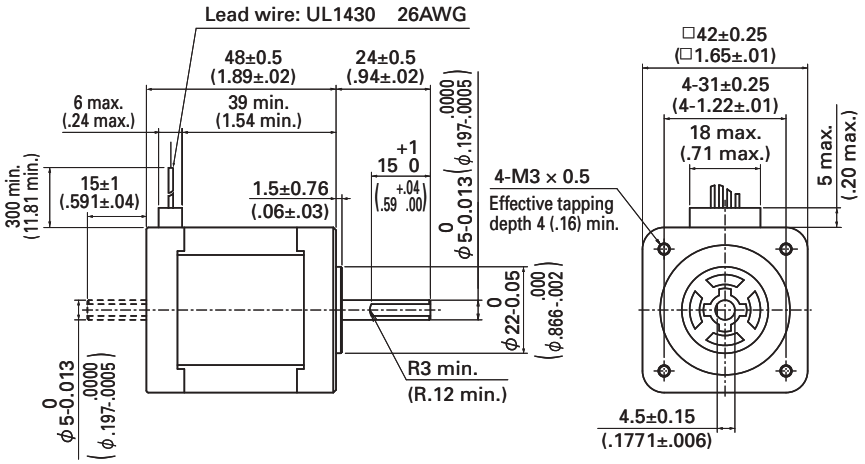
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SH1424-52

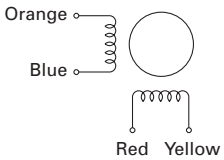


Dimension

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

RoHS

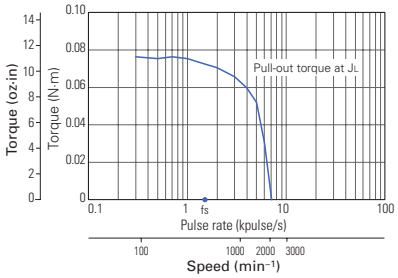
Bipolar winding, 1.8°/step

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	

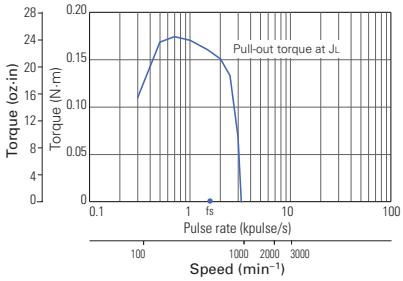
Torque Curve

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

SS2501-8040



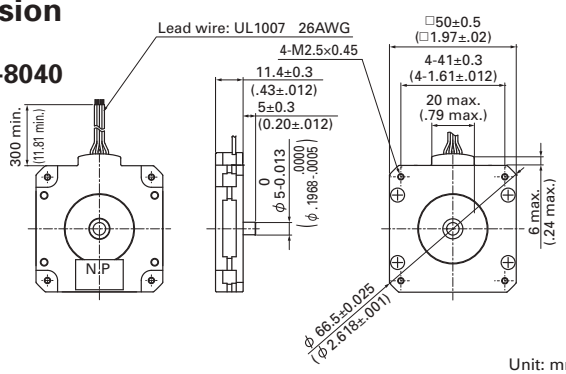
SS2502-8040



Dimension

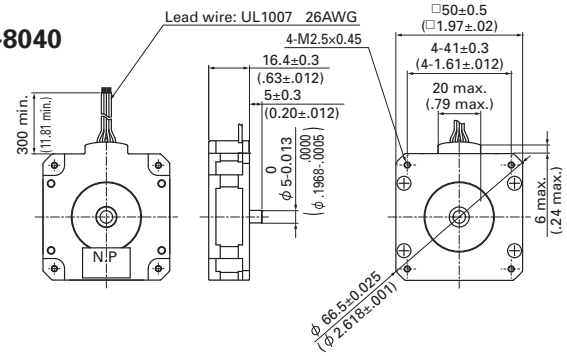
Unit: mm (inch)

SS2501-8040

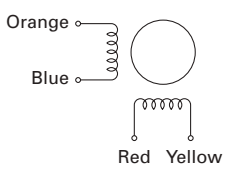


Unit: mm (inch)

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

MOTOR FLANGE SIZE **56 mm (NEMA 23)** | **MOTOR LENGTH** **41.8 mm (1.65 inch)**

Specification

RoHS

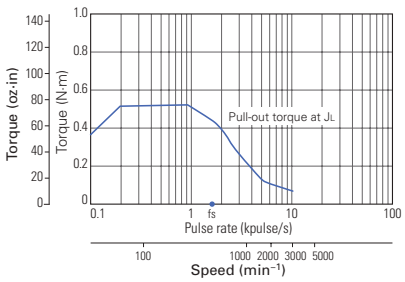
Bipolar winding, 1.8°/step

Model	Single Shaft	103H7121-5740	103H7121-5840
	Double Shaft	103H7121-5710	
Holding Torque	N·m	0.55	0.55
	oz·in	77.9	77.9
Rated Current	A/phase	2	3
Wiring Resistance	Ω/phase	1.1	0.54
Winding Inductance	mH/phase	3.7	1.74
Rotor Inertia	x10^{-4} kg·m^2	0.1	0.1
	oz·in^2	0.55	0.55
Motor Weight	kg	0.47	0.47
	lb	1.04	1.04
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

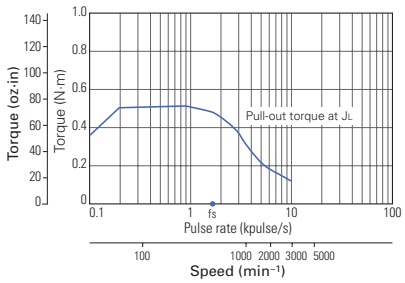
Torque Curve

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

103H7121-57

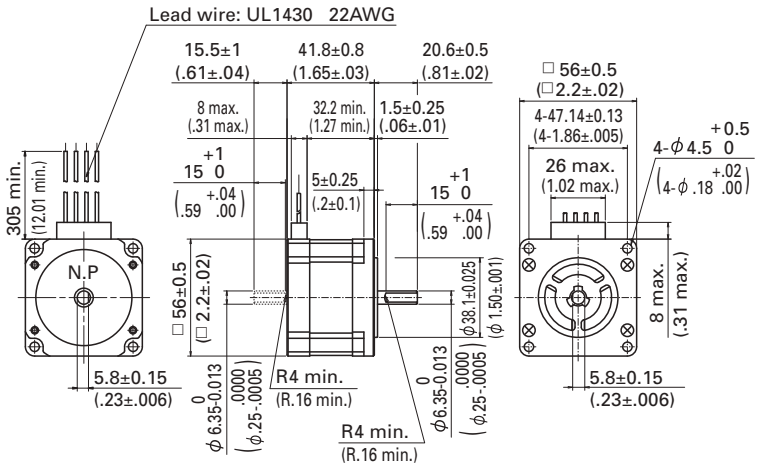


103H7121-58

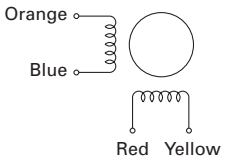


Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

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

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

MOTOR FLANGE SIZE **56 mm (NEMA 23)** **MOTOR LENGTH** **53.8 mm (2.12 inch)**

Specification

Bipolar winding, 1.8°/step

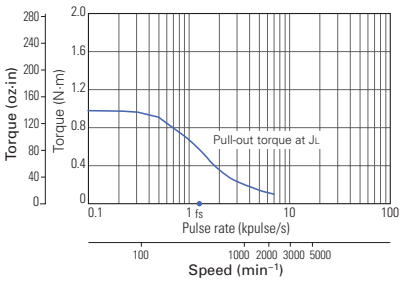
RoHS

Model	Single Shaft	103H7123-5740	103H7123-5840
	Double Shaft	103H7123-5710	
Holding Torque	N·m	1	1
	oz·in	141.6	141.6
Rated Current	A/phase	2	3
Wiring Resistance	Ω/phase	1.5	0.7
Winding Inductance	mH/phase	7.5	3.5
Rotor Inertia	$x10^{-4}$ kg·m^2	0.21	0.21
	oz·in^2	1.15	1.15
Motor Weight	kg	0.65	0.65
	lb	1.43	1.43
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

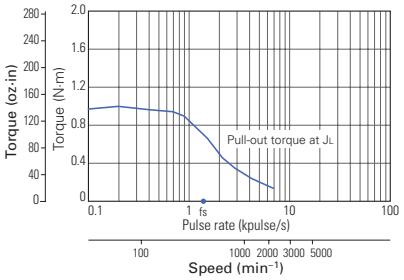
Torque Curve

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

103H7123-57

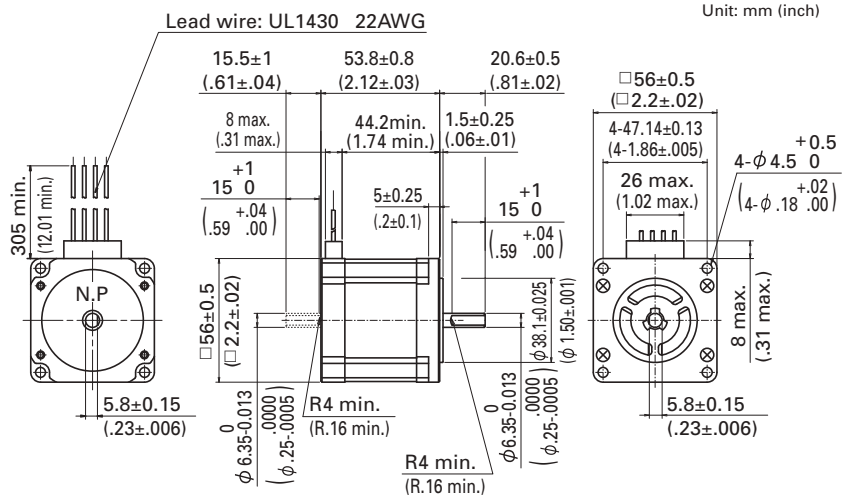


103H7123-58

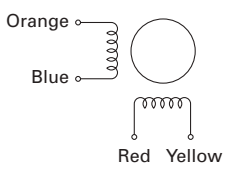


Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

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

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

2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **56 mm (NEMA 23)** | **MOTOR LENGTH** **75.8 mm (2.98 inch)**

Specification

RoHS

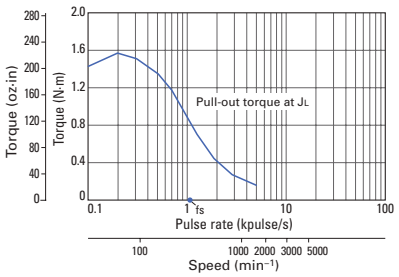
Bipolar winding, 1.8°/step

Model	Single Shaft	103H7126-5740	103H7126-5840
	Double Shaft	103H7126-5710	
Holding Torque	N·m	1.6	1.6
	oz·in	226.6	226.6
Rated Current	A/phase	2	3
Wiring Resistance	Ω/phase	2	0.94
Winding Inductance	mH/phase	9.1	4
Rotor Inertia	x10^{-4} kg·m^2	0.36	0.36
	oz·in^2	1.97	1.97
Motor Weight	kg	0.98	0.98
	lb	2.16	2.16
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

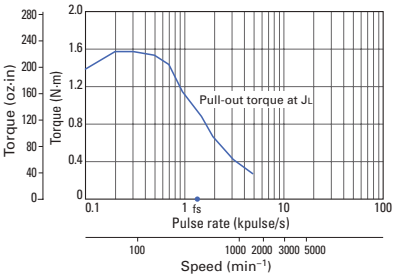
Torque Curve

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

103H7126-57

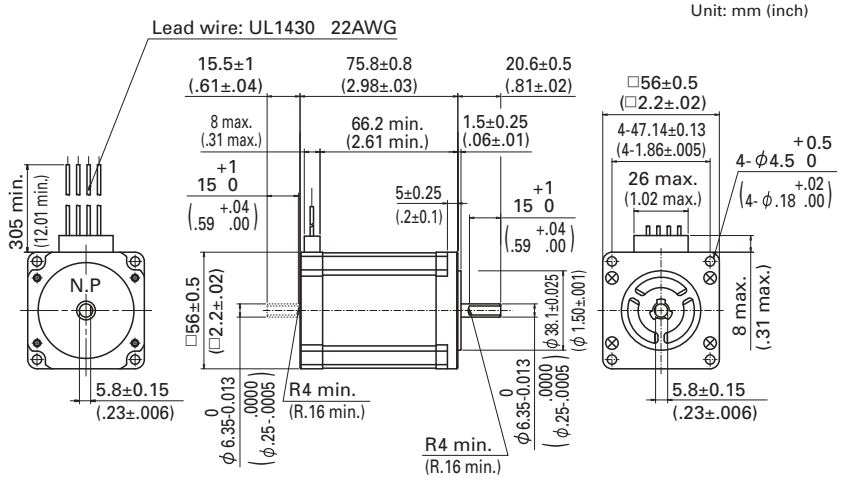


103H7126-58

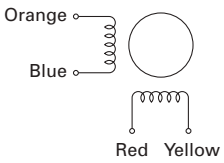


Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

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

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

Specification

Bipolar winding, 1.8°/step

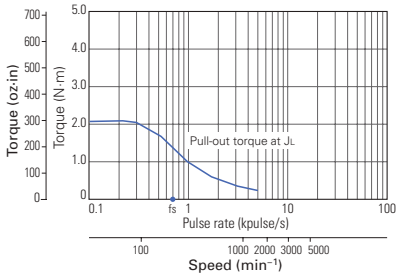
RoHS

Model	Single Shaft	103H7128-5740	103H7128-5840
	Double Shaft	103H7128-5710	
Holding Torque	N·m	2	2
	oz·in	283.2	283.2
Rated Current	A/phase	2	3
Wiring Resistance	Ω/phase	2.3	1.03
Winding Inductance	mH/phase	10.4	4.3
Rotor Inertia	x10^{-4} kg·m^2	0.49	0.49
	oz·in^2	2.68	2.68
Motor Weight	kg	1.3	1.3
	lb	2.87	2.87
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

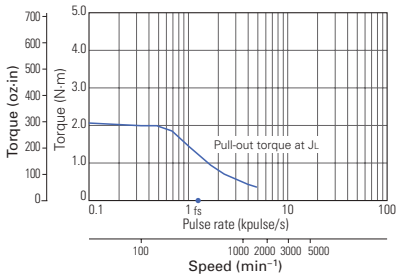
Torque Curve

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

103H7128-57

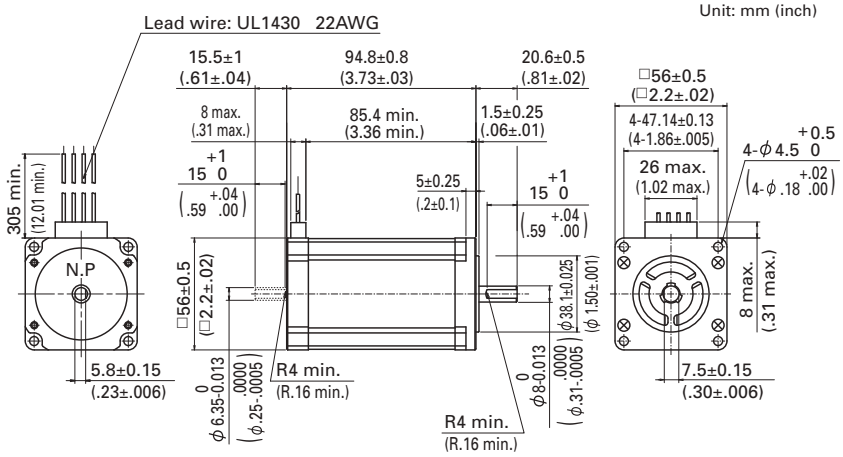


103H7128-58

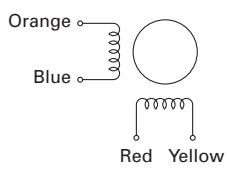


Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

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

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

Specification

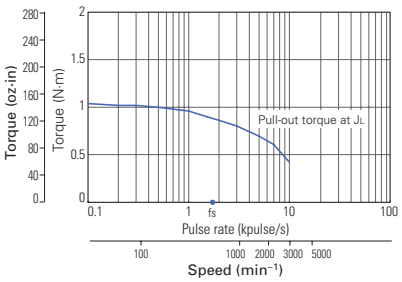
Bipolar winding, 1.8°/step

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	x10^{-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

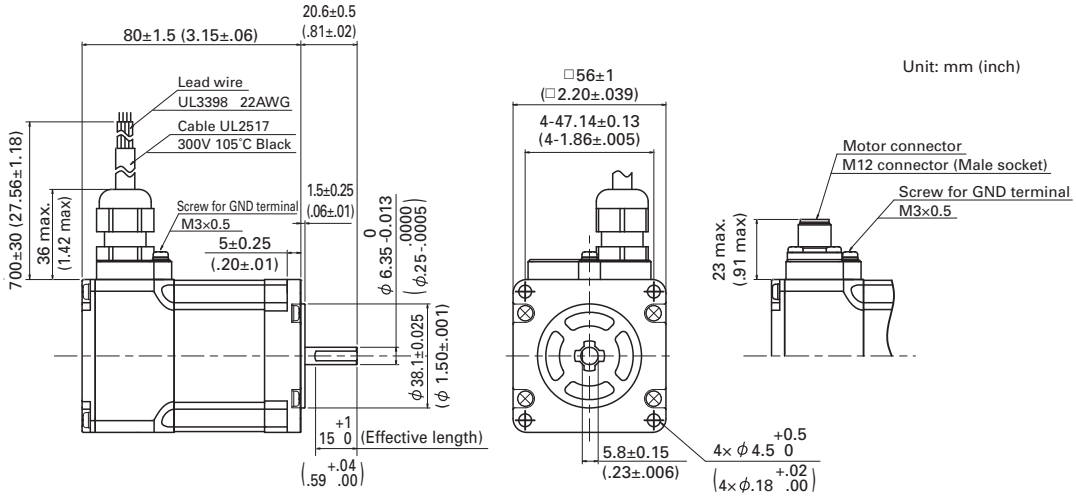
Torque Curve

Constant current circuit, Source voltage: 100 VAC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

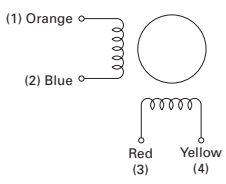
SP2563-52



Dimension



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	–	+	+	–

Specification

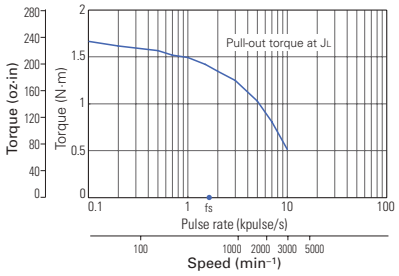
Bipolar winding, 1.8°/step

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	x10^{-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

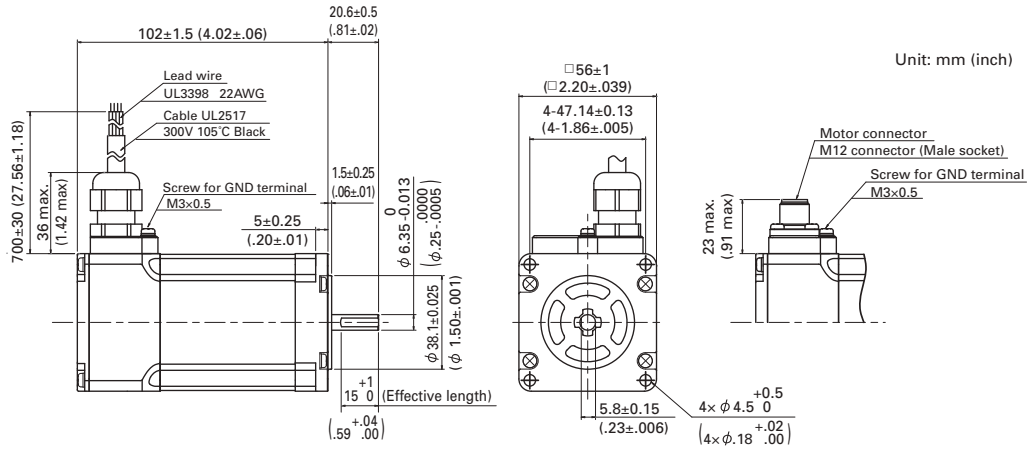
Constant current circuit, Source voltage: 100 VAC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SP2566-52

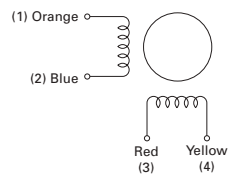


Dimension

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** **43.5 mm (1.71 inch)**

Specification

RoHS

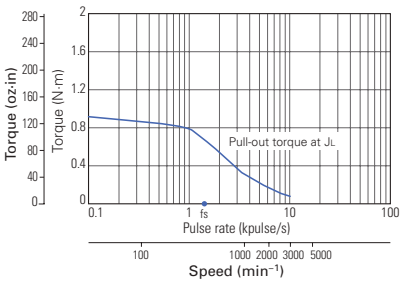
Bipolar winding, 1.8°/step

Model	Single Shaft	103H7821-5760	103H7821-1760
	Double Shaft	103H7821-5730	103H7821-1730
Holding Torque	N·m	0.88	0.88
	oz·in	124.6	124.6
Rated Current	A/phase	2	4
Wiring Resistance	Ω/phase	1.27	0.35
Winding Inductance	mH/phase	3.3	0.8
Rotor Inertia	x10^{-4} kg·m^2	0.275	0.275
	oz·in^2	1.5	1.5
Motor Weight	kg	0.6	0.6
	lb	1.32	1.32
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

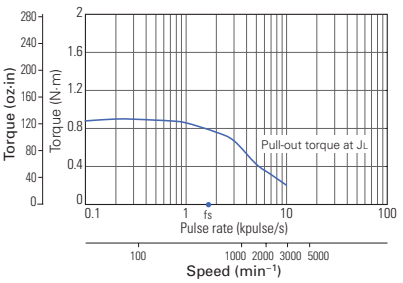
Torque Curve

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

103H7821-57

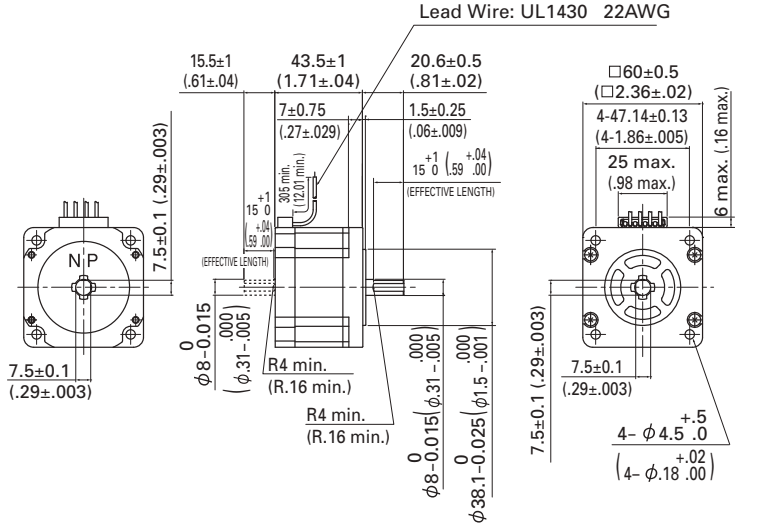


103H7821-17

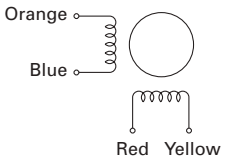


Dimension

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	–	+	+	–

MOTOR FLANGE SIZE **60 mm (2.36 inch)** **MOTOR LENGTH** **52.5 mm (2.07 inch)**

Specification

Bipolar winding, 1.8°/step

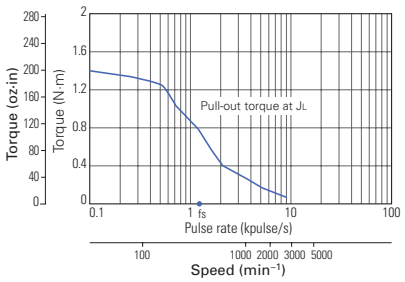
RoHS

Model	Single Shaft	103H7822-5760	103H7822-1760
	Double Shaft	103H7822-5730	103H7822-1730
Holding Torque	N·m	1.37	1.37
	oz·in	194	194
Rated Current	A/phase	2	4
Wiring Resistance	Ω/phase	1.55	0.43
Winding Inductance	mH/phase	5.5	1.38
Rotor Inertia	x10^{-4} kg·m^2	0.4	0.4
	oz·in^2	2.19	2.19
Motor Weight	kg	0.77	0.77
	lb	1.7	1.7
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

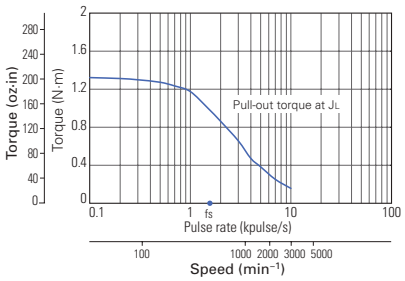
Torque Curve

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

103H7822-57

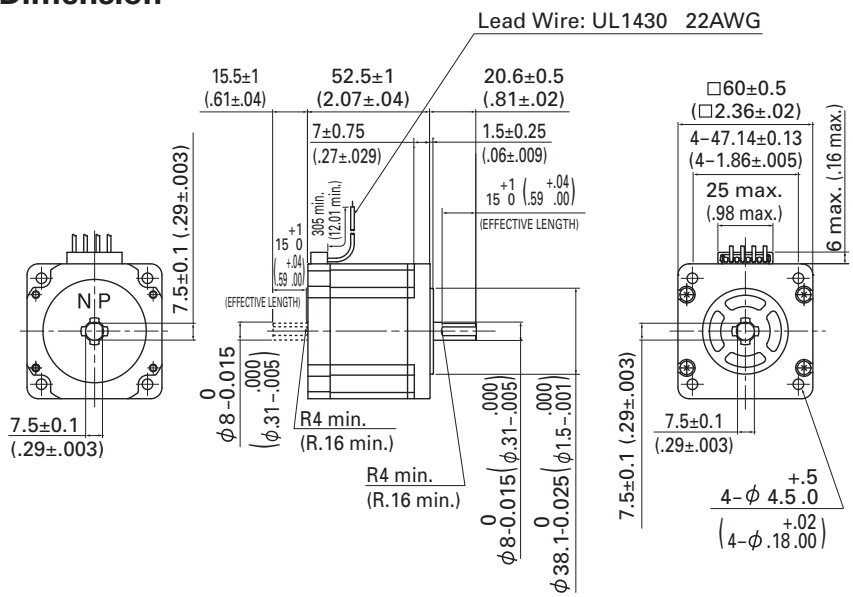


103H7822-17

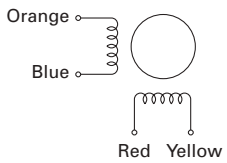


Dimension

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	–	+	+	–

2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **60 mm (2.36 inch)** | **MOTOR LENGTH** **52.5/94.2 mm (2.07/3.71 inch)**

Specification

Unipolar winding, 1.8°/step

RoHS

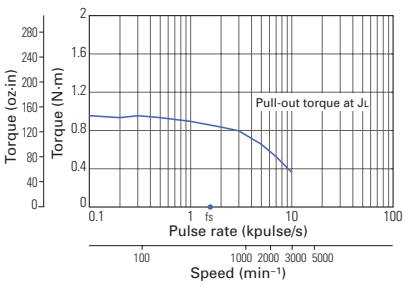
Model	Double Shaft	103H7822-2511
	w/ Brake	103H7822-25XB12
Holding Torque	N·m	1.1
	oz·in	155.8
Rated Current	A/phase	4.4
Wiring Resistance	Ω/phase	0.4
Winding Inductance	mH/phase	0.61
Rotor Inertia	x10^{-4} kg·m^2	0.4 (0.56*)
	oz·in^2	2.19 (3.06*)
Motor Weight	kg	0.77 (1.2*)
	lb	1.7 (2.6*)
Operating 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
Brake — 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 I Operating current: 6 A/Phase (RTA A-NDC06.V set value), half-step I JL=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

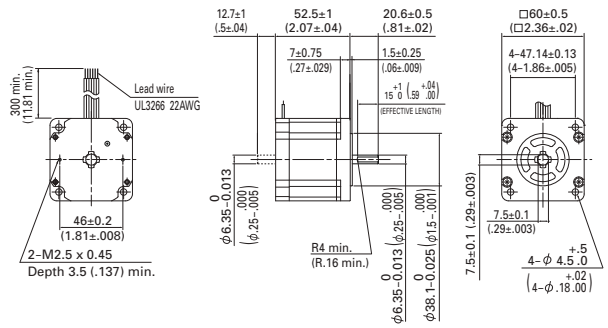
103H7822-25



Dimension

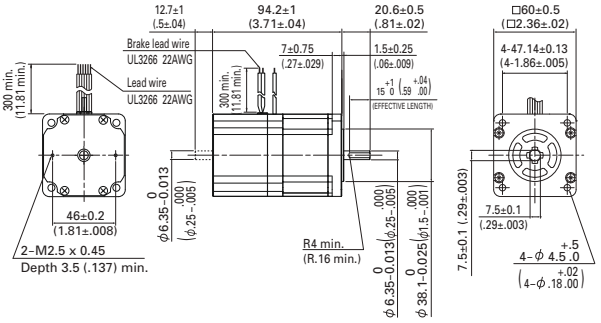
103H7822-2511

Unit: mm (inch)

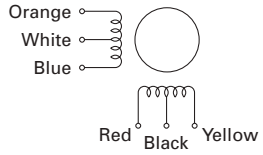


103H7822-25XB12

Unit: mm (inch)



Internal Wiring

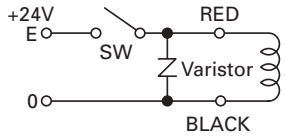


Direction of motor rotation

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		WHT & BLK	RED	BLU	YEL	ORG
Excitation sequence	1	+	–	–		
	2	+		–	–	
	3	+			–	–
	4	+	–			–

Brake Connection



MOTOR FLANGE SIZE **60 mm (2.36 inch)** **MOTOR LENGTH** **84.5 mm (3.33 inch)**

Specification

Bipolar winding, 1.8°/step

RoHS

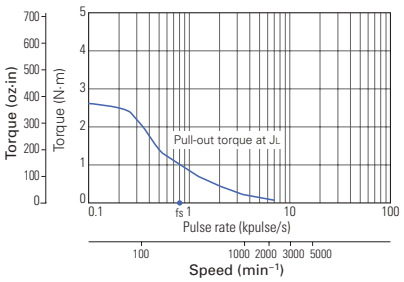
Model	Single Shaft	103H7823-5760	103H7823-1760
	Double Shaft	103H7823-5730	103H7823-1730
Holding Torque	N·m	2.7	2.7
	oz·in	382.3	382.3
Rated Current	A/phase	2	4
Wiring Resistance	Ω/phase	2.4	0.65
Winding Inductance	mH/phase	9.5	2.4
Rotor Inertia	x10^{-4} kg·m^2	0.84	0.84
	oz·in^2	4.59	4.59
Motor Weight	kg	1.34	1.34
	lb	2.95	2.95
Operating Temperature		-10 to 50°C (14 to 122°F)	
Humidity		20 to 90% RH, no condensation	

Unit: mm (inch)

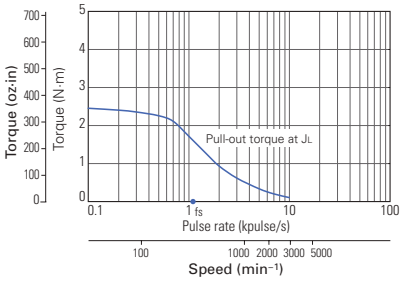
Torque Curve

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

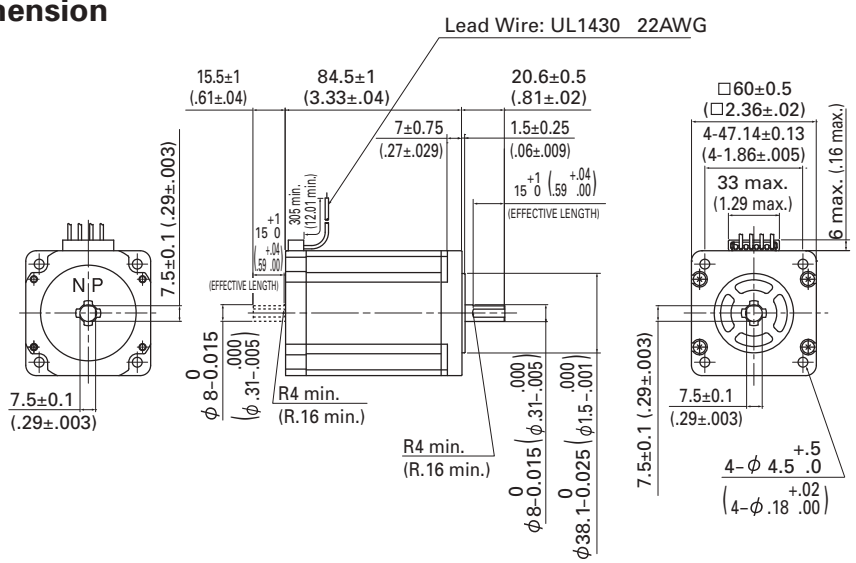
103H7823-57



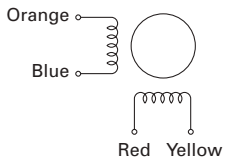
103H7823-17



Dimension



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** **42 mm (1.65 inch)**

Specification

RoHS

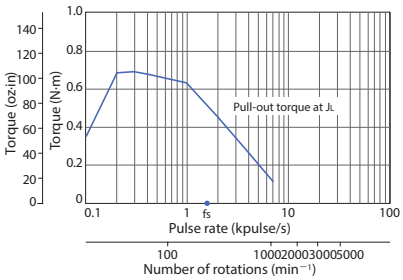
Bipolar winding, 0.9 °/step

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	x10^{-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

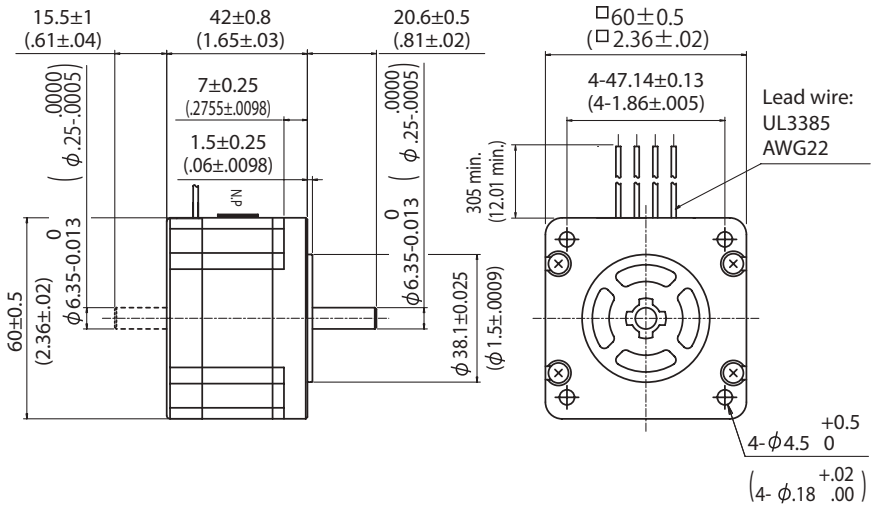
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SH1601-52

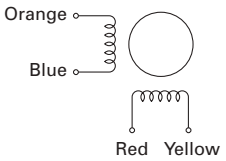


Dimension

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	–	+	+	–

Specification

Bipolar winding, 0.9 °/step

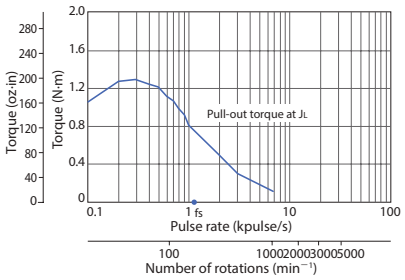
RoHS

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	x10^{-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

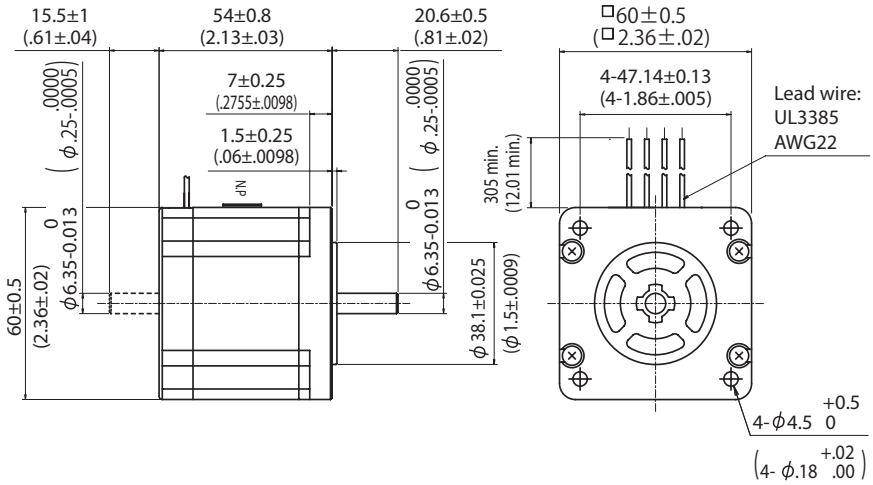
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[2.6×10^{-4}kg·m^2 (14.22 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SH1602-52

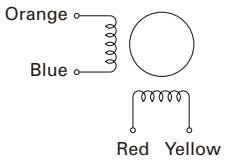


Dimension

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	–	+	+	–

2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **60 mm (2.36 inch)** | **MOTOR LENGTH** **76 mm (2.99 inch)**

Specification

Bipolar winding, 0.9 °/step

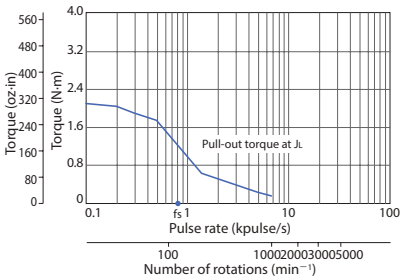
RoHS

Model	Single Shaft	SH1603-5240
Holding Torque	N·m	2.15
	oz·in	304.4
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	2.3
Winding Inductance	mH/phase	8.8
Rotor Inertia	x10^{-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

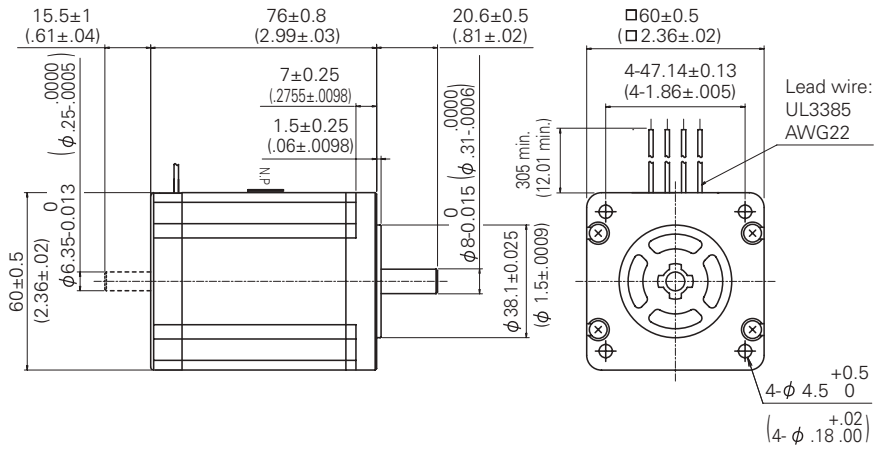
Constant current circuit, Source voltage: 24 VDC | Operating current: Rated Current, 2-phase energization (full-step) | JL=[7.4×10^{-4}kg·m^2 (40.46 oz·in^2) pulley balancer method] | fs: Maximum self-start frequency when not loaded

SH1603-52

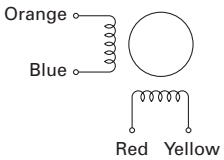


Dimension

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	–	+	+	–

Specification

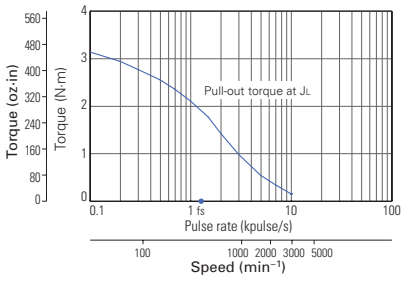
Bipolar winding, 1.8°/step

Model		SM2861-5052	SM2861-5152	SM2861-5252
	Double Shaft	SM2861-5122		
Holding Torque	N·m	3.3	3.3	3.3
	oz·in	467.3	467.3	467.3
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	2.2	0.56	0.29
Winding Inductance	mH/phase	15	3.7	1.7
Rotor Inertia	x10^{-4} kg·m^2	1.48	1.48	1.48
	oz·in^2	8.09	8.09	8.09
Motor Weight	kg	1.75	1.75	1.75
	lb	3.92	3.92	3.92
Operating Temperature		-10 to 50°C (14 to 122°F)		
Humidity		20 to 90% RH, no condensation		

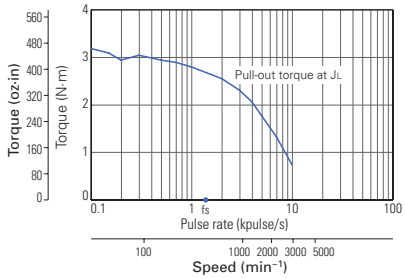
Torque Curve

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

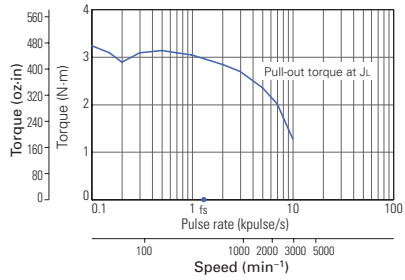
SM2861-50



SM2861-51

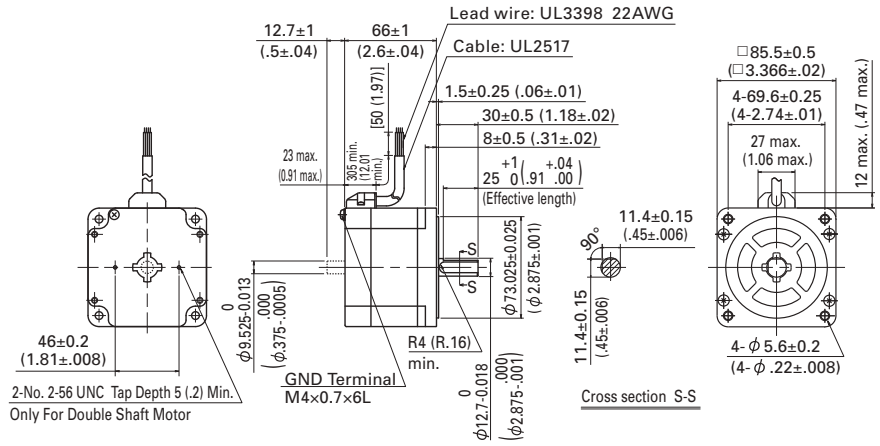


SM2861-52

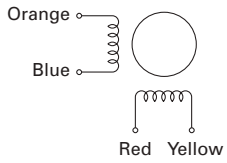


Dimension

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	–	+	+	–

2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **86 mm (NEMA 34)** | **MOTOR LENGTH** **96.5 mm (3.8 inch)**

Specification

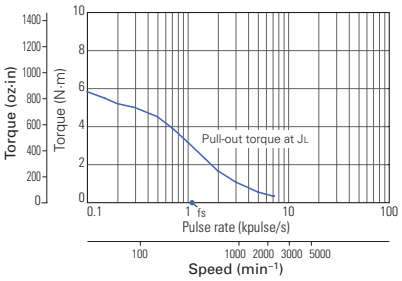
Bipolar winding, 1.8°/step

Model		SM2862-5052	SM2862-5152	SM2862-5252
	Double Shaft		SM2862-5122	
Holding Torque	N·m	6.4	6.4	6.4
	oz·in	906.3	906.3	906.3
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	3.2	0.83	0.36
Winding Inductance	mH/phase	25	6.4	2.8
Rotor Inertia	x10^{-4} kg·m^2	3	3	3
	oz·in^2	16.4	16.4	16.4
Motor Weight	kg	2.9	2.9	2.9
	lb	6.5	6.5	6.5
Operating Temperature		-10 to 50°C (14 to 122°F)		
Humidity		20 to 90% RH, no condensation		

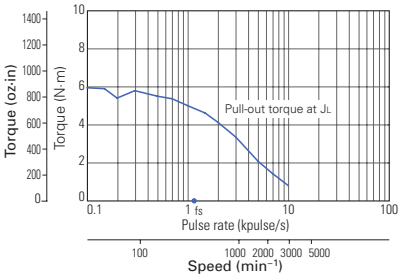
Torque Curve

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

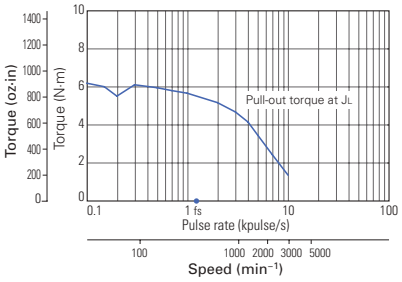
SM2862-50



SM2862-51

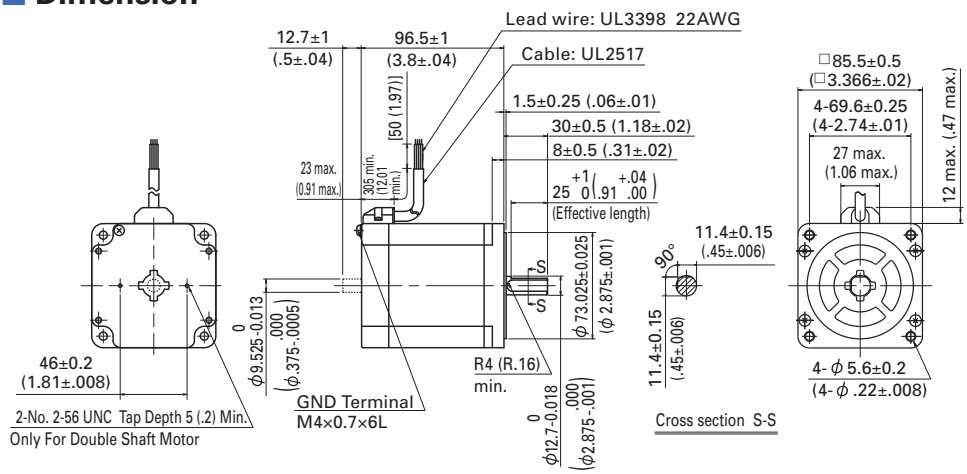


SM2862-52

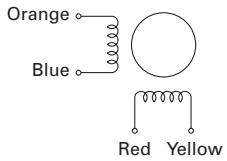


Dimension

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

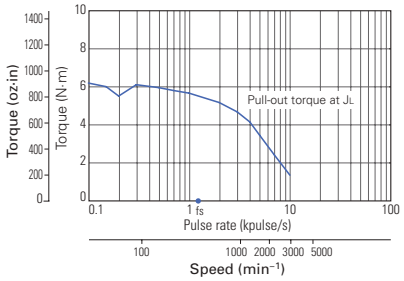
RoHS

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		x10^{-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	24 VDC / 10 W
	Static Friction Torque	N·m	5 Min.
		oz·in	708 Min.

Torque Curve

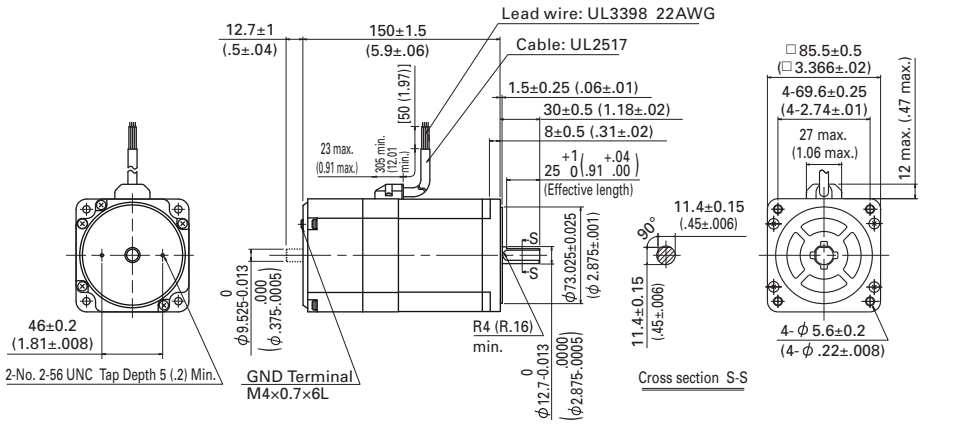
Constant current circuit, Source voltage: 100 VAC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[15.3 × 10^{-4}kg·m^2 (83.65 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SH2862-52

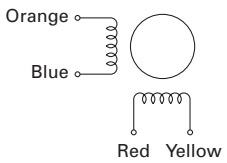


Dimension

Unit: mm (inch)



Internal Wiring

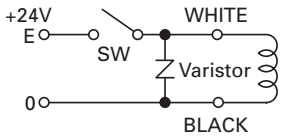


Direction of motor rotation

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



2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **86 mm (NEMA 34)** | **MOTOR LENGTH** **127 mm (5 inch)**

Specification

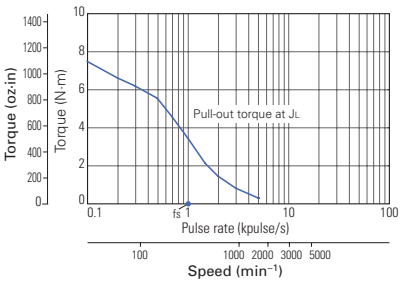
Bipolar winding, 1.8°/step

Model		SM2863-5052	SM2863-5152	SM2863-5252
	Double Shaft	SM2863-5122		
Holding Torque	N·m	9	9	9
	oz·in	1274.5	1274.5	1274.5
Rated Current	A/phase	2	4	6
Wiring Resistance	Ω/phase	4	1	0.46
Winding Inductance	mH/phase	32	7.9	3.8
Rotor Inertia	x10^{-4} kg·m^2	4.5	4.5	4.5
	oz·in^2	24.6	24.6	24.6
Motor Weight	kg	4	4	4
	lb	8.96	8.96	8.96
Operating Temperature		-10 to 50°C (14 to 122°F)		
Humidity		20 to 90% RH, no condensation		

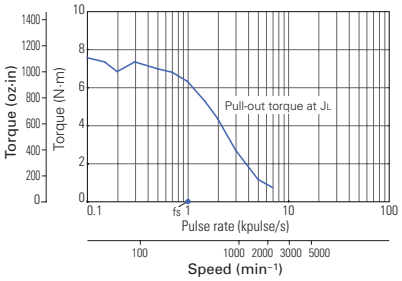
Torque Curve

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

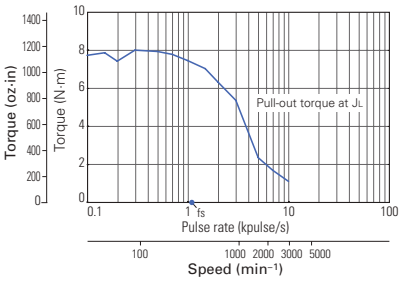
SM2863-50



SM2863-51

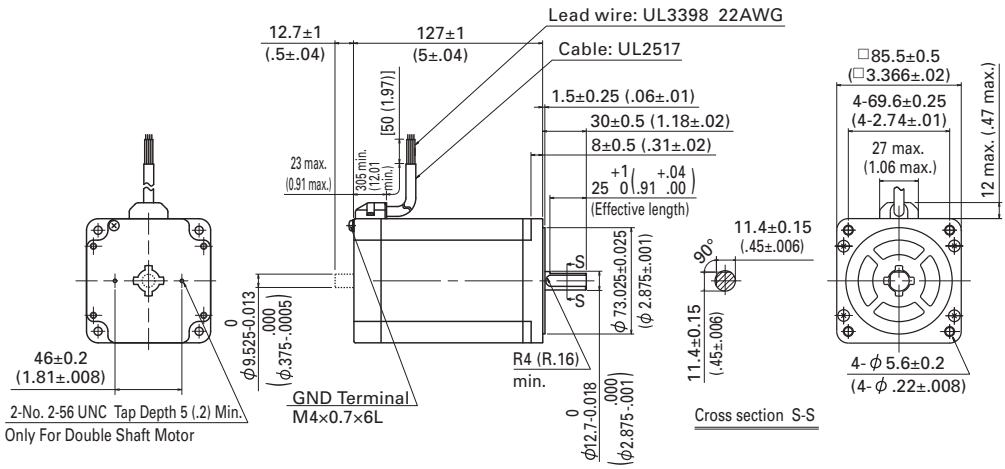


SM2863-52

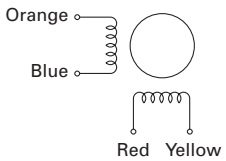


Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

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

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

Specification

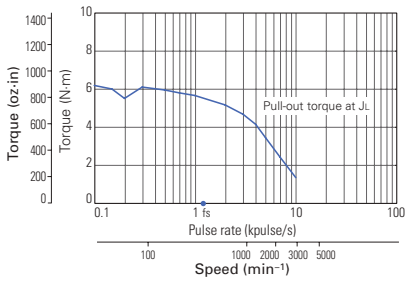
Bipolar winding, 1.8°/step

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	x10^{-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

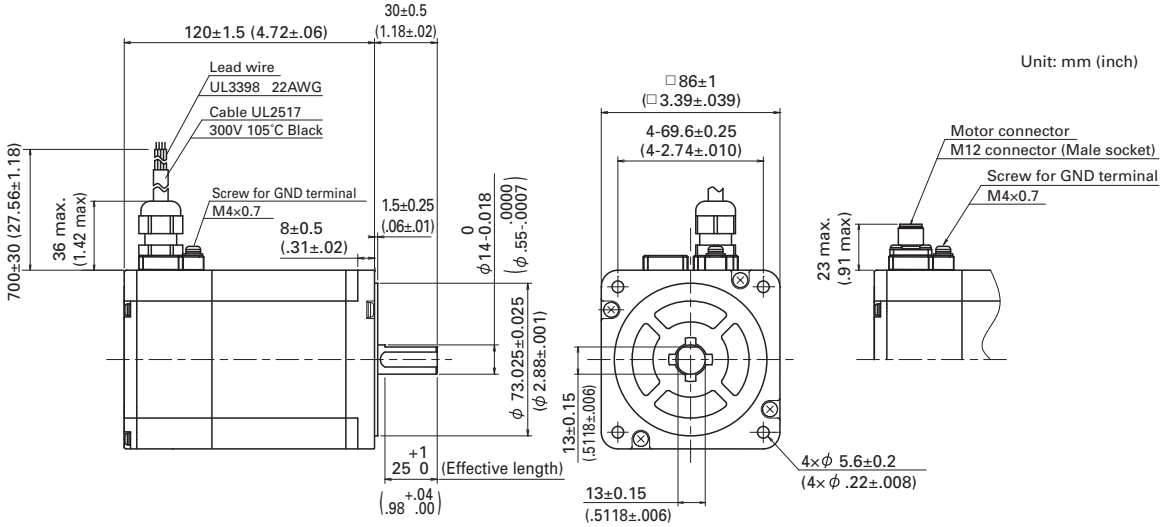
Torque Curve

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

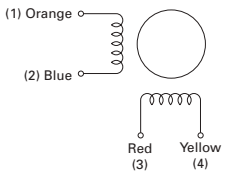
SP2862-52



Dimension



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 **86 mm (NEMA 34)** | **MOTOR LENGTH** **150 mm (5.91 inch)**

Specification

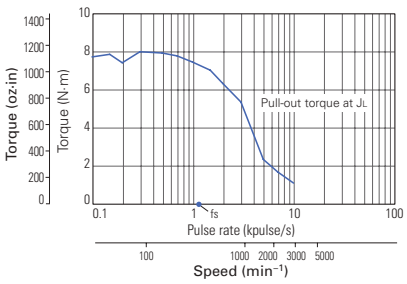
Bipolar winding, 1.8°/step

Model	Cable Type	SP2863-5260
Holding Torque	N·m	9
	oz·in	1274.5
Rated Current	A/phase	6
Wiring Resistance	Ω/phase	0.53
Winding Inductance	mH/phase	3.8
Rotor Inertia	x10^{-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

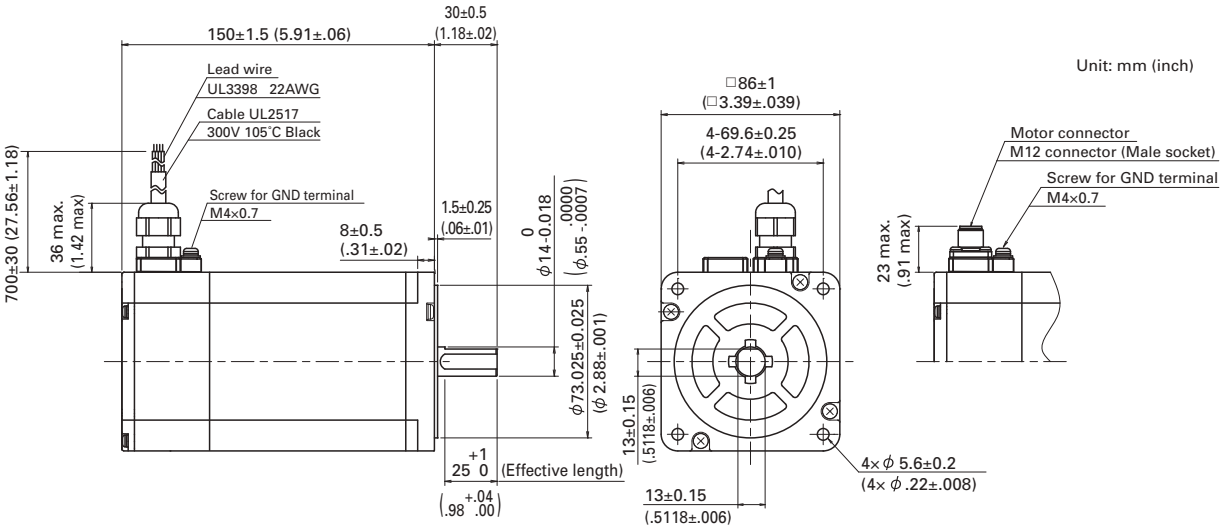
Constant current circuit, Source voltage: 100 VAC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[44 × 10^{-4}kg·m^2 (240.56 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

SP2863-52

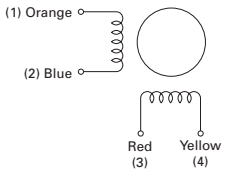


Dimension

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	−	+	+	−

Specification

RoHS

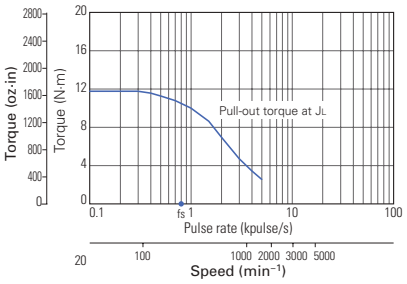
Bipolar winding, 1.8°/step

Model	Single Type	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	x10^{-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

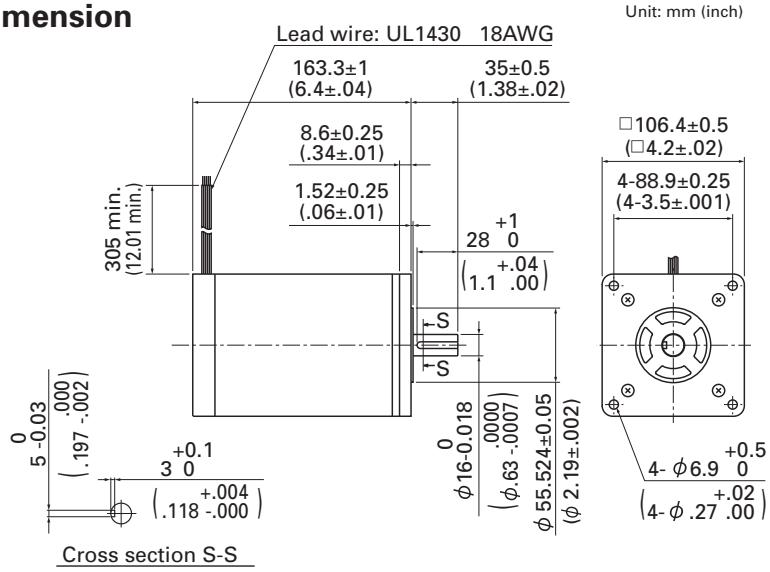
Constant current circuit, Source voltage: 100 VAC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[44 × 10^{-4}kg·m^2 (240.56 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

103H89222-52

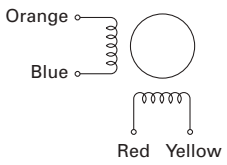


Dimension

Unit: mm (inch)



Internal Wiring



Direction of motor rotation

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

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

MOTOR FLANGE SIZE 106 mm (NEMA 42) | **MOTOR LENGTH** 221.3 mm (8.7 inch)

Specification

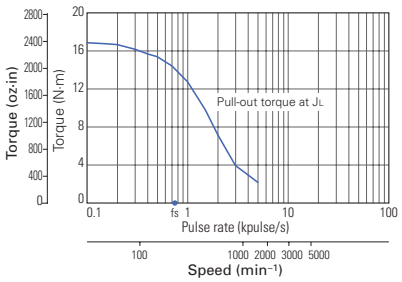
Bipolar winding, 1.8°/step

Model	Single Type	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	x10^{-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

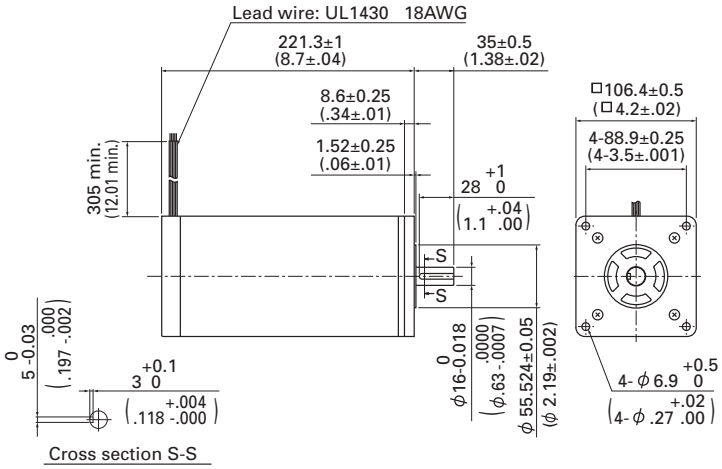
Constant current circuit, Source voltage: 100 VAC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[44 × 10^{-4}kg·m^2 (240.56 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

103H89223-52

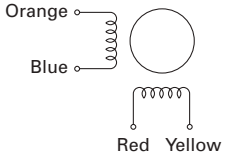


Dimension

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	–	+	+	–

Specification

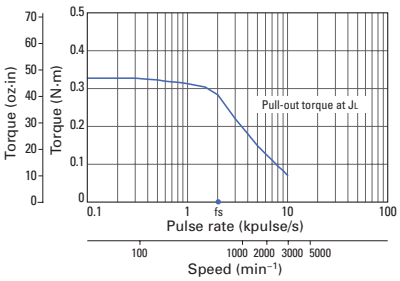
Bipolar winding, 1.8°/step, Vacuum

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	x10^{-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 x 10^{-5} Pa or more

Torque Curve

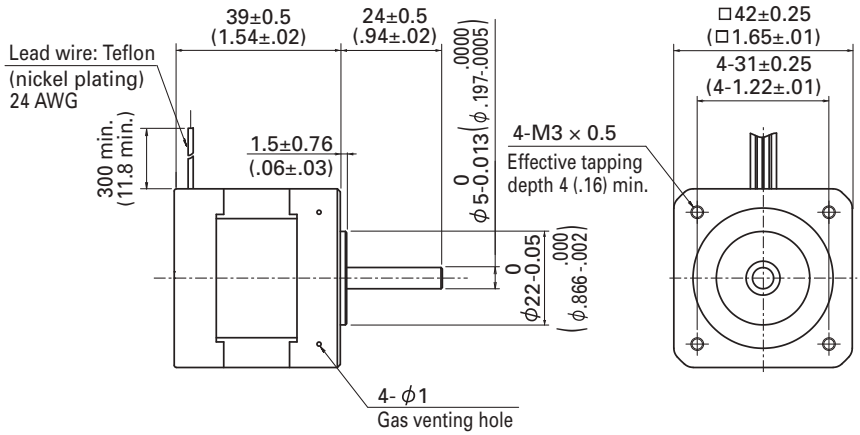
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

103H5208-49V40

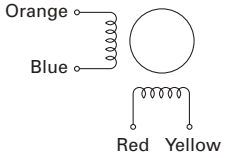


Dimension

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	–	+	+	–

2-PHASE STEPPING SYSTEMS

MOTOR FLANGE SIZE **56 mm (NEMA 23)** | **MOTOR LENGTH** **45.9 mm (1.81 inch)**

Specification

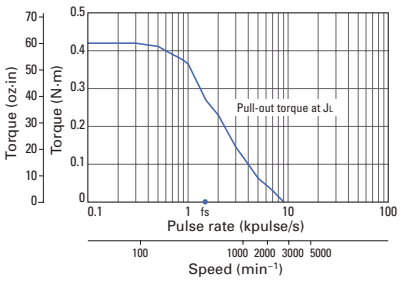
Bipolar winding, 1.8°/step, Vacuum

Model	Single Shaft	103H7121-47V40
Holding Torque	N·m	0.45
	oz·in	63.72
Rated Current	A/phase	2
Wiring Resistance	Ω/phase	0.94
Winding Inductance	mH/phase	3.4
Rotor Inertia	x10^{-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 x 10^{-5} Pa or more

Torque Curve

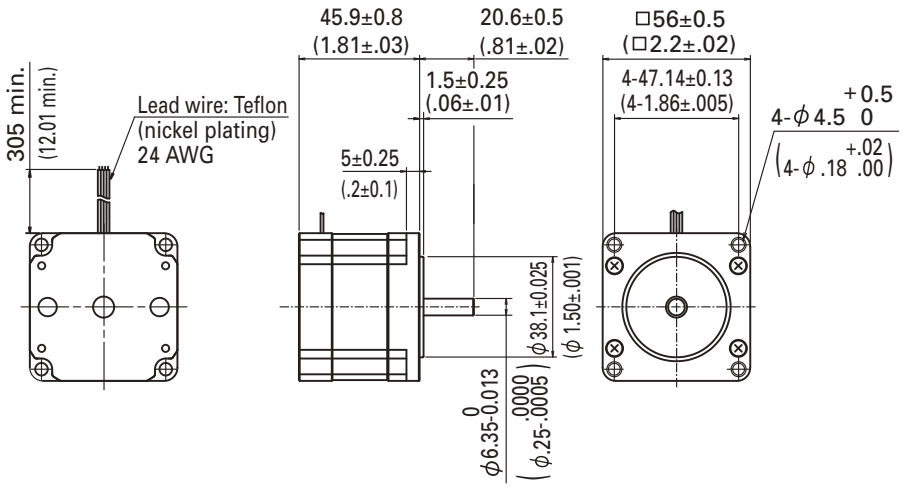
Constant current circuit, Source voltage: 24 VDC I Operating current: Rated Current, 2-phase energization (full-step) I JL=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) pulley balancer method] I fs: Maximum self-start frequency when not loaded

103H7121-47V40

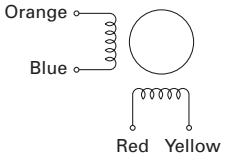


Dimension

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	–	+	+	–

Motor General Specifications

Motor model number	SH2141	SH228□	SS242□	SH142□	103H52□□	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 then 100 MΩ between winding and frame by 500 VDC megger.				
Protection grade	IP40				IP43
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)				
Static angle error	±0.054°	± 0.054°	±0.09°		
Thrust play *1	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))				
Radial play *2	0.025 mm 0.001 in) (load: 5 N (1.12 lbs))	0.025 mm 0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (2.25 lbs))	0.025 mm (0.001 in) (load: 10 N (1.12 lbs))
Shaft runout	0.025 mm (0.001 in)				
Concentricity of mounting pilot relative to shaft	ø0.075 mm (ø0.003 in)				
Squareness of mounting surface relative to shaft	0.075 mm (0.003 in)	0.1 mm (0.004 in)	0.075 mm (0.003 in)	0.15 mm (0.006 in)	0.075 mm (0.003 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally				

Regarding the SH2145, SF242□, 103H5208-49V40 and 103H7121-47V40, please ask us.
*1 Thrust play: Shaft displacement under axial load.
*2 Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

2-Phase Bipolar DC Input Micro-step Driver

Specification

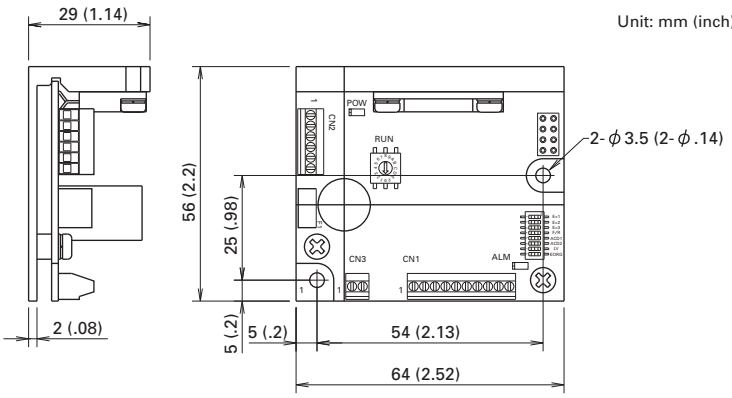
Driver model			BS1D200P10
Basic specifications	Input source		24/36 VDC ± 10%
	Source current		3 A
	Environment	Protection class	Class III
		Operation environment	Installation category (over-voltage category) : I, pollution degree: 2
		Ambient operation temperature	0 to + 50˚C
		Storage temperature	–20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

Safety Standards

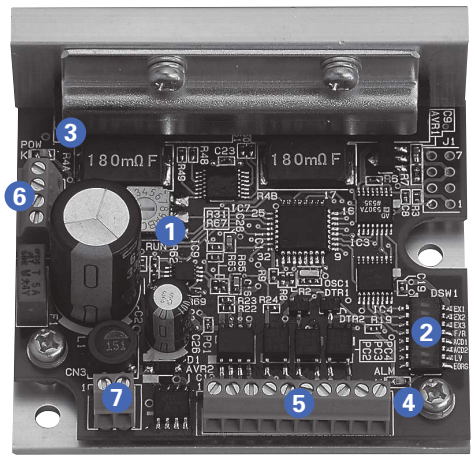
	Directives	Category	Standard	Name
CE (TÜV)	Low-voltage directives	–	EN61010-1	–
	EMC directives	Emission	EN55011-A	Terminal disturbance voltage
			EN55011-A	Electromagnetic radiation disturbance
		Immunity	EN61000-4-2	ESD (Electrostatic discharge)
			EN61000-4-3	RS (Radio-frequency amplitude modulated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

Dimension

Unit: mm (inch)



Driver Controls and Connectors



1 Operating current selection switch (RUN)

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

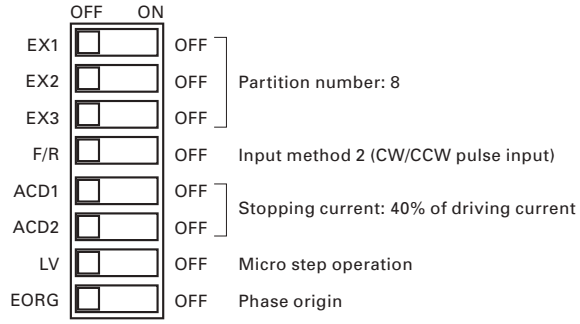
Dial	0	1	2	3	4	5	6	7
Stepping motor current (A)	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3
Dial	8	9	A	B	C	D	E	F
Stepping motor current (A)	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5

- 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



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)

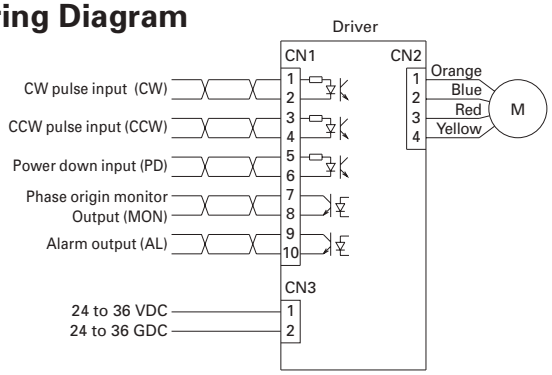
Connect the motor's power line.

7 Power supply terminal block (CN3)

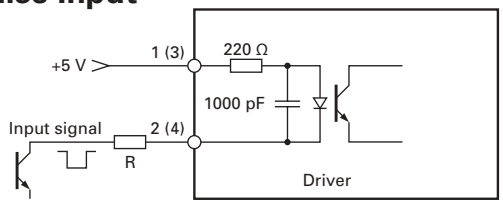
Connect the main circuit power supply.

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

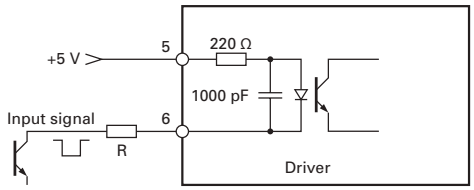
Part	Wire sizes	Allowable wire length
For power supply	22 AWG (0.3 mm²)	2 m Max.
For input/output signal	24 AWG (0.2 mm²) to 22 AWG (0.3 mm²)	2 m Max.
For motor	22 AWG (0.3 mm²)	Under 3 m

Specification Summary of Input/Output Signals

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

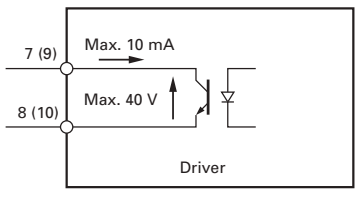
As for the motor rotational direction, CW direction is regarded as the clockwise rotation, and CCW direction is regarded as the counterclockwise rotation by viewing the motor from output shaft side.

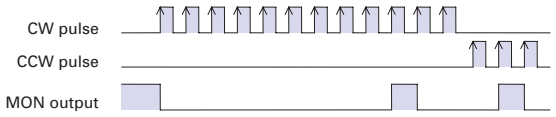
Input Signal



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

Output Signal





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

Motion Control Systems

R.T.A. is a leading company in the motion control industry and it is number one in Italy in the stepper system segment. Over the years, the partnership among R.T.A. and SANYO DENKI has achieved a strong market penetration, through the introduction of high technology products and innovative solutions.

Pulse Input

Driver Series	Model	Voltage Range	Current Range	Dimension
A-CSD	02.V	24 to 48 VDC	0.7 to 2.4 Amps	92 x 85 x 23 mm
	04.V	24 to 48 VDC	2.6 to 4.4 Amps	92 x 85 x 23 mm
A-NDC	06.V	24 to 85 VDC	1.9 to 6.0 Amps	94 x 101 x 25 mm
X-PLUS	B4	110 to 230 VAC	2.4 to 4.0 Amps	152 x 129 x 46 mm
X-MIND	B6	110 to 230 VAC	3.4 to 6.0 Amps	180 x 53 x 173 mm

Indexer, RS485 Serial Communication

Driver Series	Model	Voltage Range	Current Range	Dimension
CSD	J4	24 to 48 VDC	2.6 to 4.4 Amps	90 x 99 x 30 mm
X-MIND	K6	110 to 230 VAC	3.4 to 6.0 Amps	180 x 53 x 173 mm

Analog Input

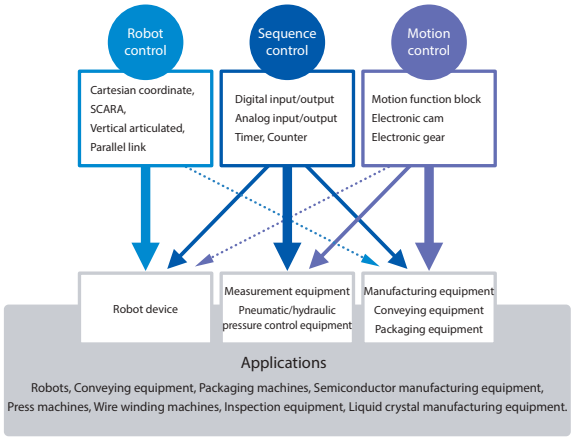
Driver Series	Model	Voltage Range	Current Range	Dimension
ADW	06.V	24 to 75 VDC	1.9 to 6.0 Amps	94 x 122 x 25 mm

SANMOTION C
MOTION CONTROLLER

SANMOTION C integrates motion control, robot control, and sequence control into one unit to provide major advantages in reduced device costs and shorter development times. Several different types of industrial networks can be used. For use in material handling robots and general industrial machinery. Image processing devices and a touch panel have also been developed as motion controller peripherals.

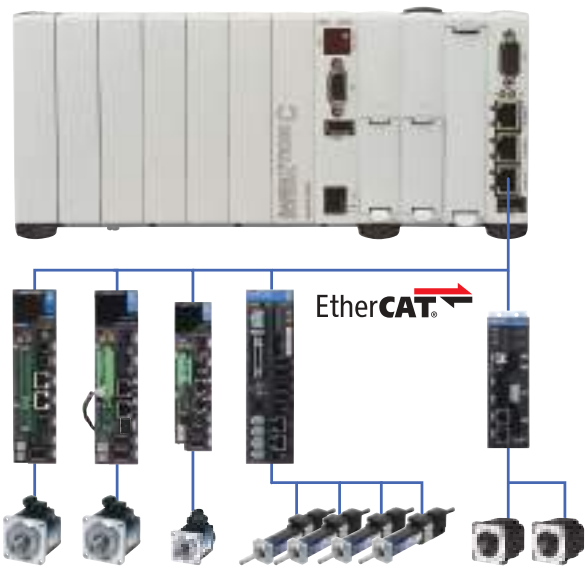
Controller with three control functions

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
- 3E Model EtherCAT Interface Type Servo Amplifier ····· P.40
- EtherCAT Interface Type Servo Amplifier ····· P.45
- EtherCAT Interface High Speed Type Servo Amplifier ····· P.50
- EtherCAT Interface DC Input Type Servo Amplifier ····· P.59
- EtherCAT Interface DC Input Type Multi Axis Servo Amplifier ··· P.63

SANMOTION Model No.PB
- DC Input Driver EtherCAT Model ····· P.90
- DC Input Driver EtherCAT Multi-Axis Model ····· P.93

CPU module

Model		SMC265X	Remarks
CPU		1.8 GHz	
Memory		1 GB	
Battery backed up SRAM		1 MB	
Specifications of provided interfaces	EtherCAT	100 Mbps	Motion bus RJ-45 connector
	CAN	125 kbps to 1 Mbps	D-Sub 9-pin female connector
	RS485	1200 bps to 115200 bps	Mini-D-Sub 15-pin male connector
	Ethernet	10/100 Mbps	RJ-45 connector
	USB	USB 2.0 high speed	For memory storage
Expansion unit maximum		12	
Input power supply		24 VDC (19.2 VDC to 30 VDC)	2-pin connector x 1 (Phoenix Contact)
Maximum input power		99 W	
Rush current		10 A	
Maximum output power (K-BUS DC24V)		40 W	
Maximum output power (K-BUS DC5V)		10 W	
Weight		1,335 g	

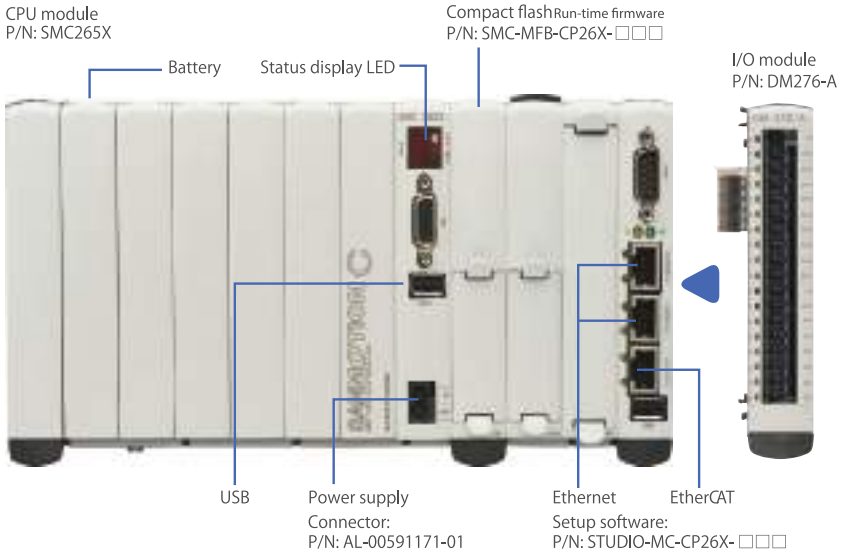
I/O module

P/N	Specifications	Mass	Cable side connector
DM276-A	Digital input: 6 points, 24 VDC, positive common input Digital output: 8 points, 24 VDC, 1 A, sink output	135 g	2-pin connector x 1 + 8-pin connector x 2 (Phoenix Contact)

Common specifications

Operating ambient temperature	0 to +55˚C
Storage ambient temperature	–40 to +70˚C
Operating/storage humidity	10 to 95% (no condensation)
Vibration resistance	Complies with EN 61131-2. For frequency range $5 \leqq f < 9$ Hz, half amplitude: 3.5 mm; for frequency range $9 \leqq f < 150$ Hz, acceleration: 9.8 m/s^2.
Shock resistance	147 m/s^2 in compliance with EN61131-2
Operating altitude	2000 m max.
Installation location	In control panel
Overvoltage category	II or lower
Degree of pollution	2 or lower

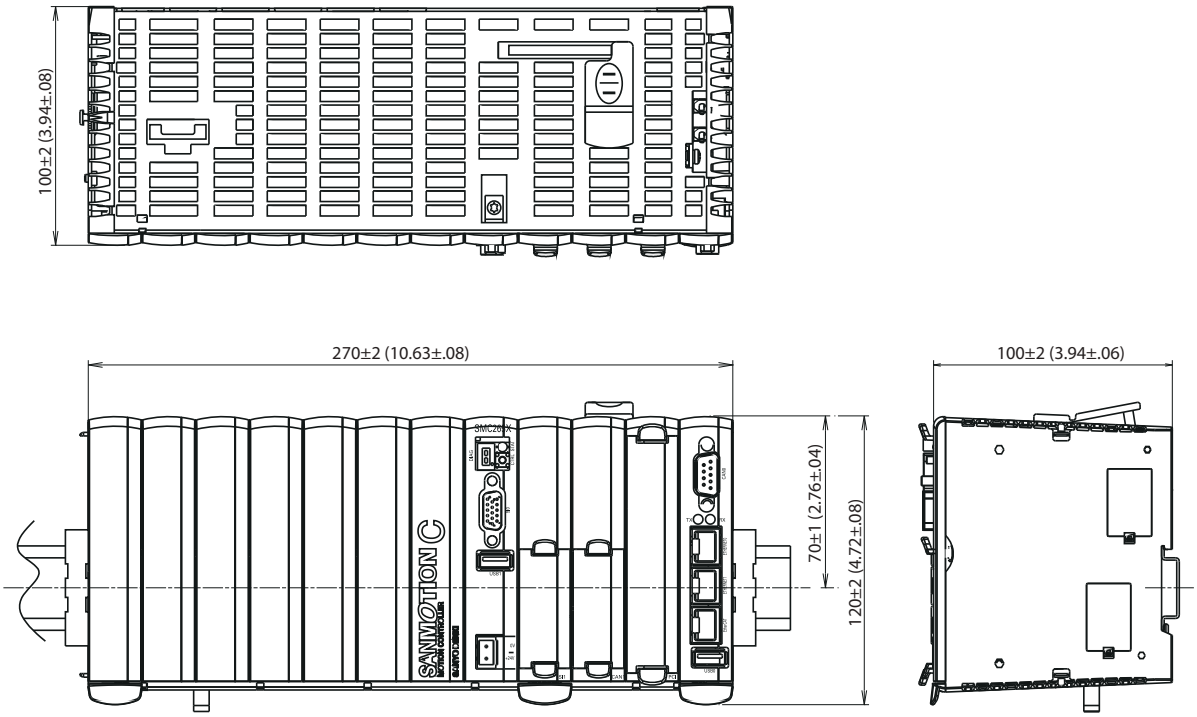
System Configuration



Dimensions

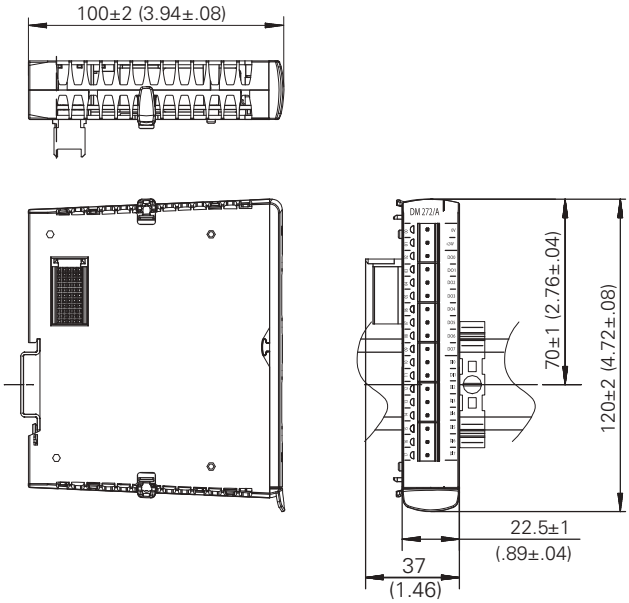
SMC265X

Unit: mm (inch)



DM276-A

Unit: mm (inch)



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.

SANYO DENKI *AMERICA, INC.*

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Remarks:
* Specifications are subject to change without notice.

8-October-2019 4th Edition Rev.4

Discover SANYO DENKI

Motion and Control

NSK

Motorized Actuator

MCE model

High performance motor with NSK Electrified Monocarrier linear actuator

SANMOTION R

AC SERVO SYSTEMS

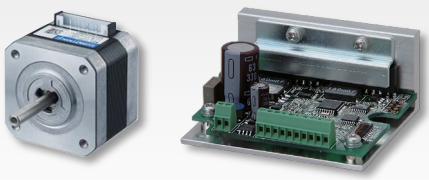
High-performance AC servo systems consisting of servo amplifiers with advanced vibration suppression and highly efficient servo motors.

EtherCAT®

SANMOTION F2

2-PHASE STEPPING SYSTEMS

With high torque, low vibration, low noise, and high resolution. Their rich lineup is used in a wide range of fields.



1.800.905.7989

SANYO DENKI *AMERICA, INC.*

STEPPING SYSTEM

24/36 VDC Input Bipolar Microstep Driver

42 mm sq (NEMA 17) Motor

Model Number (Actuator and Motor)	Lead	Stroke	Max Trust	Max Speed
MCE03010P01K0001SKF	1 mm	100 mm	1040 N	50 mm/s

Customize Options

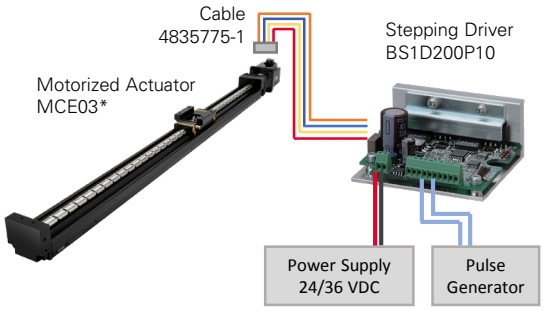
- Lead: 2, 10, 12 mm
- Stroke: 50, 150 mm

Closed loop stepping system with EtherCAT/ Indexer drive is also available.

Compatible Driver and Cable

Driver	BS1D200P10
Cable	4835775-1

System Configuration



AC SERVO SYSTEM

24 VDC Input Multi Axis EtherCAT Amplifier (Total 300 W)

40 mm sq, 30 W Motor

Model Number (Actuator and Motor)	Brake	Lead	Stroke	Max Trust	Max Speed
MCE03010P02K0001SAF		2 mm	100 mm	1040 N	100 mm/s
MCE03010P02K0001SBF	✓				

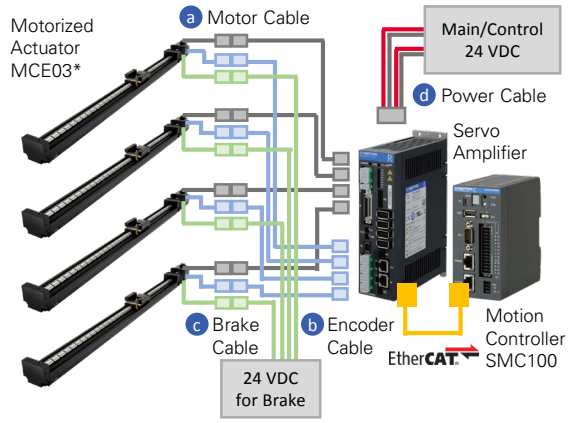
Customize Options

- Lead: 2, 10, 12 mm
- Stroke: 50 to 250 mm
- Driver I/F: Analog/Pulse, single axis EtherCAT

Compatible Amplifier and Cable

Amplifier		RF2K24A0HL5
Cable	a: Motor	1026-107009
	b: Encoder	EEXTKABS2410FT
	c: Brake	MEXTBRK2010FT
	d: Power	AL-00921367-01

System Configuration



200 VAC input EtherCAT Amplifier

40 mm sq, 100 W Motor

Model Number (Actuator and Motor)	Brake	Lead	Stroke	Max Trust	Max Speed
MCE03015H10K0001SCF		10 mm	150 mm	704 N	830 mm/s
MCE03015H10K0001SDF	✓				

60 mm sq, 200 W Motor

Model Number (Actuator and Motor)	Brake	Lead	Stroke	Max Trust	Max Speed
MCE06030H10K0001SEF		10 mm	300 mm	2626 N	830 mm/s
MCE06030H10K0001SFF	✓				

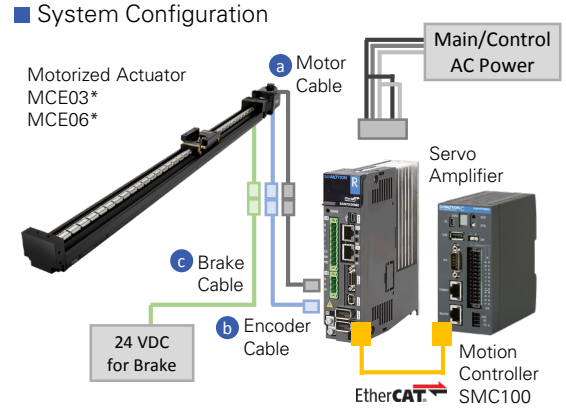
Customize Options

- Lead: 2, 10, 12 mm
- Stroke:
  MCE03 model 50 to 250 mm
  MCE06 model 50 to 600 mm
- Driver I/F: Analog/Pulse, Indexer

Compatible Amplifier and Cable

Amplifier	100 W motor	RS3A01A2HA4
	200 W Motor	RS3A02A2HA4
Cable	a: Motor	MEXTK1810FT
	b: Encoder	EEXTKABS2410FT
	c: Brake	MEXTBRK2010FT

System Configuration



For any inquiry, contact our sales department.

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