



BD3E AP & PH3 AC SERVO SYSTEM

SELECTION MANUAL

- BD3E AP SERIES SERVO DRIVE (CE)
- PH3 SERIES SERVO MOTOR (CE, UL, UKCA)



Company

Founded in Israel in 1987, Servotronix Motion Control Ltd., as a comprehensive solution provider for development, production, and sales of servomechanism, control systems, and other products, is committed to making continuous breakthroughs in the field of automation and facilitating the rapid development of China's high-end manufacturing industry. It owns two brands namely Servotronix and Dorna.

Servotronix and Dorna are dedicated to designing and providing standardized and customized motion control solutions for equipment manufacturers and automation system suppliers, providing professional services to more than 1,000 customers in over 30 countries around the globe. In particular, Servotronix has been leading the direct driver industry in Chinese market. As an international company, Servotronix has set up R&D teams in Israel, Shanghai, Jiashan, and Shunde.



Product & Applications

Our motion control solutions cover most industries and automation equipment, such as lithium battery industry, semiconductor industry, robot industry, robotic arms industry, 3C laser industry, photovoltaic industry, etc.

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BD3E AP & P3 AC SERVO SYSTEM

Exquisite Design

Concealed Battery Compartment

Simple wiring, stable connections

Easy Code Scanning

One code for one machine, enabling quick product information verification

HV & LV Separation

Significantly improved immunity from interference

Simple Debugging + Plug and Play

MTP Electronic Nameplate
Plug and play

One-click Auto Setting
Debugging time reduced by 90%

Absolute Encoder
Limits and home not required

Graphical Debugging Guide
Simplified and intuitive debugging

Control Panel
Six buttons designed for parameter setting, system setting, fault diagnosis and alarm clearing on one panel

Assured Quality

High-quality Materials
Strict process control to enhance quality, making equipment operation more stable and reliable, and improving production efficiency

CE-Certified
CE certification by TUV passed, meeting the safety application requirements of overseas customers

Active Cooling + Three-proof Coating
Good adaptability to severe environments including high temperature, high humidity, and heavy dust

Test against IEC 61800
Favorable tolerance to complex electrical environments



BD3E-AP SERIES NAMING RULES

BD3E - 1D6 2A AP

1 2 3 4

1 BD3E servo drive

1D6

2 Rated current

Code	Specification
1D6	1.6Arms (continuous)/5.8Arms (max)
2D8	2.8Arms (continuous)/9.8Arms (max)
3D5	3.5Arms (continuous)/11Arms (max)
5D4	5.4Arms (continuous)/14Arms (max)
5D5	5.5Arms (continuous)/16.9Arms (max)
8D4	8.4Arms (continuous)/20Arms (max)
012	11.9Arms (continuous)/29.75Arms (max)

2A

3 Rated input voltage

Code	Specification
2A	Single-phase: 200V-240V, -10%~+10%, 50/60Hz
4D	Three-phase: 380V-440V, -10%~+10%, 50/60Hz

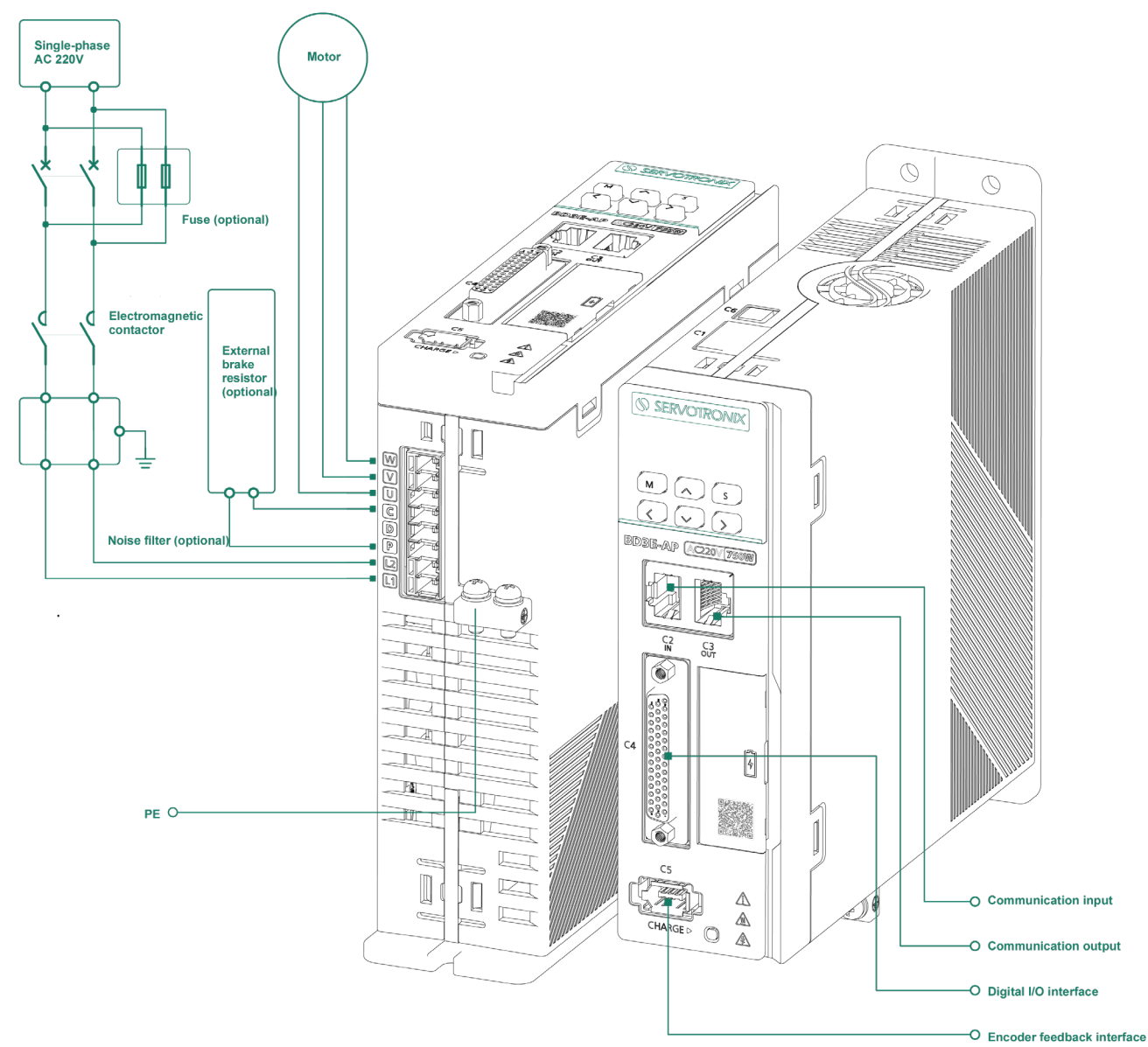
AP

4 Communication interface

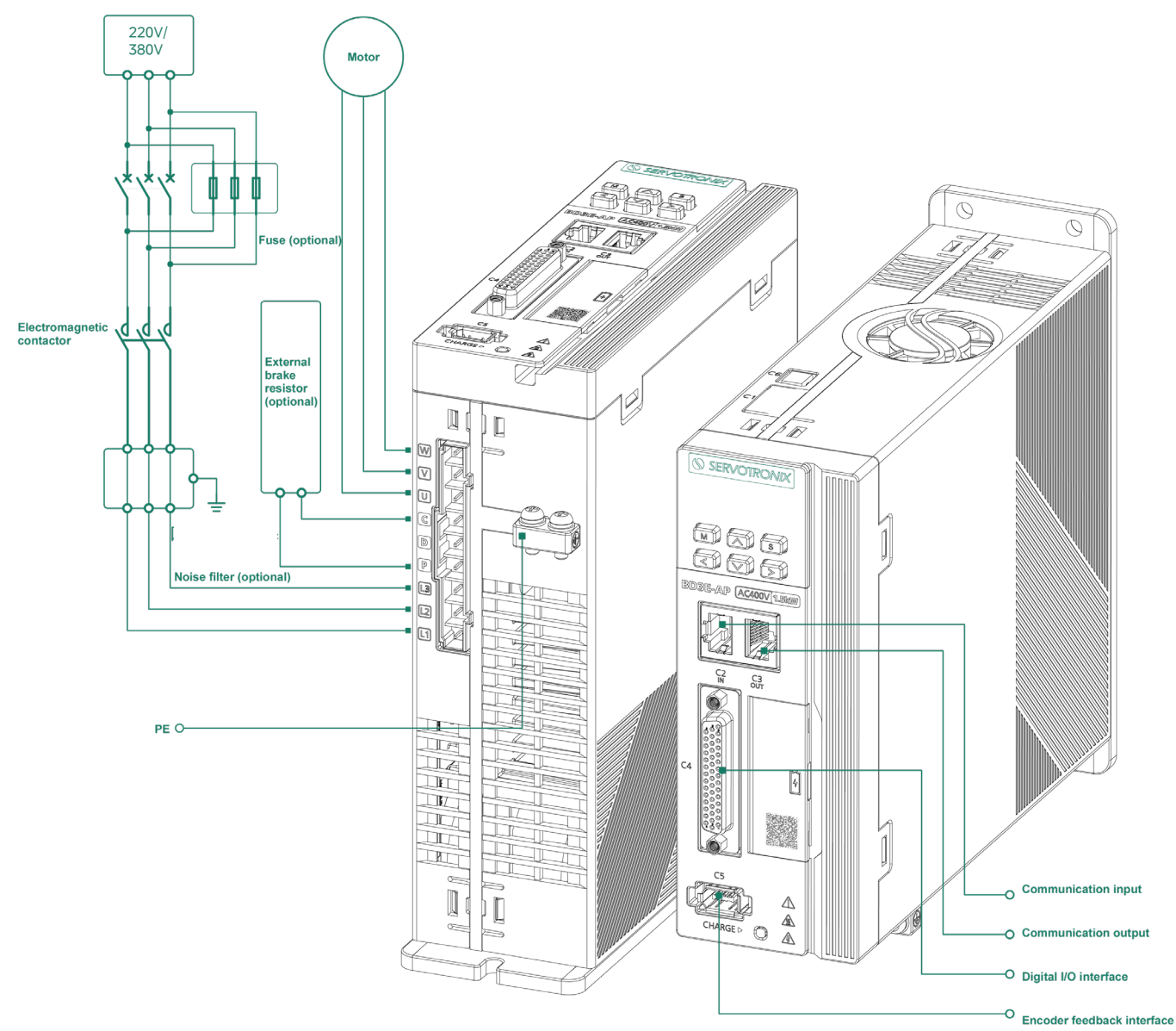
Code	Specification
AP	Position pulse
EB	EtherCAT

WIRING DIAGRAM

BD3E-AP (Single-phase)



BD3E-AP (Three-phase)



Basic Specifications

Basic Specifications			BD3E-AP
Control method			IGBT PWM control, sinusoidal current drive
Performance	Velocity loop		BD3E 2.1kHz
	Speed control range		1:5000 (lower limit of speed control range is the minimum speed at which stop will not occur at rated load and torque)
	Speed fluctuation rate	Load fluctuation	0~100% of rated load: ±0.5% (at rated speed)
		Voltage fluctuation	Rated voltage ±10%: 0.5% (at rated speed)
		Temperature fluctuation	25±25°C : ≦ ±0.5% (at rated speed)
	Torque control accuracy (reproducibility)		±2%
Soft start time setting		0~10s (with acceleration and deceleration settable individually)	
I/O signal	Encoder frequency-division pulse output		Phase A/B: differential output; Phase Z: differential output or open collector output at discretionary frequency division
	Sequential control input signal	Assignable input signals	7 points Servo ON input (S-ON) Control mode switch input (CMODE) Positive drive inhibition input (POT) Negative drive inhibition input (NOT) Deviation counter clear input (CLR) Alarm reset (A-RST) Gain switching input (GAIN) Command pulse inhibition input (INHIBIT), etc. The above-mentioned signals allow for allocation and change of positive/negative logic Sequential control output signal Assignable output signals
	Sequential control input signal	Assignable input signals	5 points Alarm signal (ALM) Positioning completed output signal (COIN) Phase Z pulse collector signal (CZ) External brake release signal (BK) Servo ready (S-RDY) The above-mentioned signals allow for allocation and change of positive/negative logic
Communication function	RS485	1-to-N communication	N=31 (max) when a relay is used
		Axis address setting	Setting by parameters
		Connected device	Computer, upper computer
	Computer	Communication interface	RS485
Display and control buttons			LED + 6 buttons
Dynamic brake (DB)			Activation conditions: Main circuit OFF; Servo alarm; Servo OFF; Overtravel (OT)
Regeneration			Built-in regenerative resistor or external regenerative resistor
Overtravel (OT) protection			Deceleration or free-gear stop when POT or NOT input is activated
Protection functions			Overcurrent protection, overvoltage protection, undervoltage protection, overload protection, regeneration fault protection
Position control	Feedforward compensation		0~100% (setting unit: 1%)
	Positioning completion width setting		0~65565 encoder units
	Input signal	Input pulse pattern	Differential input, open collector
		Max input pulse frequency	Differential input: max speed 4Mpps, min pulse width 0.125us Open collector: max speed 200Kpps, min pulse width 2.5us.
		Clear signal	Clearing deviation pulse open collector
	Internal position control setting	Position selection	Position selection for segments 0-15 via DI signal combination. (this function can be set for other terminals)
Speed control	Internal speed control setting	Soft start time setting	0~10s (with acceleration and deceleration settable individually)
		Speed selection	Selection by external IO input signal
Torque control	Internal torque control setting	Torque selection	Selection by external IO input signal
Other functions	Vibration control		Resonance suppression across frequency domains (low frequency + medium frequency + high frequency).
	Auto adjustment		HDM/PDFF gain adjustment.
	Adaptive notch filter		5 notch filters ranging from 50Hz to4000Hz, 2 of which support adaptive setting

Environmental Specifications

BD3E-AP	
IP rating	IP20 Pollution degree: IEC 60664-1, Level 2 Do not use the product in an environment with corrosive or flammable gases, water, oil or chemicals, dust (including iron powder), and salt
Operating temperature	0°C ~ 45°C , without power derating
	45° C ~ 55° C, with power derating
Storage temperature	-20°C ~70°C
Humidity	10 ~ 90% (no condensation)
Altitude	<1,000 m, according to IEC61800-5-1
Vibration	10m/s ² , 10-150Hz
Protection functions	Including but not limited to: power-off dynamic braking, low voltage/overvoltage protection, overcurrent protection, drive and motor overheating protection, motor overload, drive overload protection, feedback loss protection, parameter setting protection, circuit fault protection.

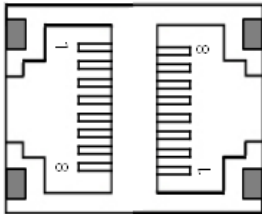
Electrical Specifications

Specification		1D62A	2D82A	5D52A	3D54D	5D44D	8D44D	0124D
Drive power		200W	400W	750W	1000W	1500W	2000W	3000W
Power circuit input L1, L2, (L3)	Input voltage ±10%	220	220	220	380	380	380	380
	Line frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60	50/60
	AC input	Single-phase	Single-phase	Single-phase	Three-phase	Three-phase	Three-phase	Three-phase
	Continuous current (single-phase, Arms)	2.3	4	7.9	2.4	3.6	5.6	8
	Fuse (FRN-R, LPN, or equivalent) (A)	4	6	16	15	15	15	20
Drive output	Continuous output current (Arms)	1.6	2.8	5.5	3.5	5.4	8.4	11.9
	Peak output current (Arms)	5.8	9.8	16.9	11	14	20	29.75
Cable Specifications	Control circuit (AWG)(< 3 m)	24~26	24~26	24~26	24~26	24~26	24~26	24~26
	Main circuit - motor wire (AWG)	20	18	16	16	16	16	14
	Main circuit - AC input (AWG)	20	18	16	16	16	16	14
External regenerative resistor	Min resistance (Ω)	50	40	40	80	60	45	40
	Max current (A)	8	10	10	10	13.3	17.8	20
Application	Bus capacitance (μF)	660	660	940	340	340	500	500

SERVO TERMINAL DEFINITION

Communication interface (CN2\CN3)

CN2 and CN3 are communication connectors for RS485 communication of the BD3E-AP servo drive. Specifically, CN2 serves as RS485 IN interface, and CN3 serves as RS485 OUT interface. The signals of CN2 and CN3 connectors are mirrored. When multiple servo drives are cascaded, it is required to use the standard parallel cables.

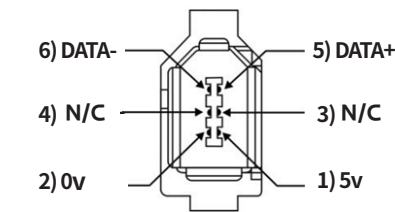


Pin	Description	Function
1	RS485+	RS485 positive signal
2	RS485-	RS485 negative signal
3	GND	Digital ground
4	PRS485+	Not connected
5	PRS485-	Not connected
6	NC	Not connected
7	NC	Not connected
8	NC	Not connected
Enclosure	FG	Shielded wire

Note: NC means "not connected". Do not connect a wire to such pin.

Signals of Terminal C5

See motor interface description for details about signals of terminal C5

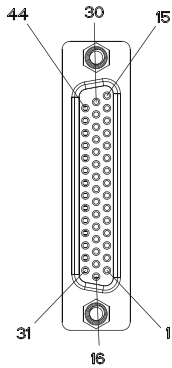


Servotronics Tmall
Flagship Store



Scan to Buy
Terminal Cables

IO interface signal definition



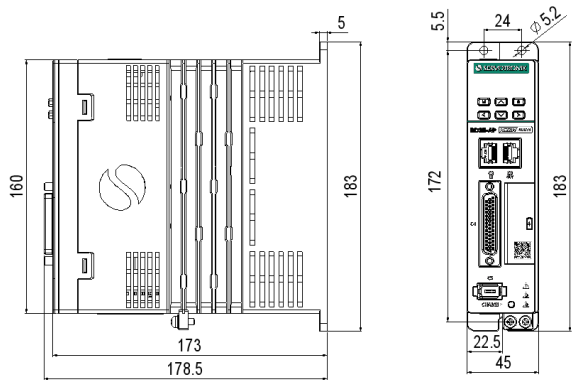
31-44			16-30			1-15		
44	NC	-	30	NC	-	15	NC	-
			29	DO5+	Digital output5+	14	PL	Pulse command power input
43	DO5-	Digital output 5 +	28	DOOZ-	Phase Z frequency division collector output -	13	DOOZ+	Phase Z frequency division collector output +
42	DO1-	Digital output1-	27	DO2-	Digital output2-	12	DO3+	Digital output3+
41	DO1+	Digital output1+	26	DO3-	Digital output3-	11	DO4+	Digital output4+
40	DO2+	Digital output2+	25	DO4-	Digital output4-	10	DI3	Digital input 3
39	DI1	Digital input 1	24	DI4	Digital input 4	9	DI6	Digital input 6
38	DI2	Digital input 2	23	DI5	Digital input 5	8	24VGND	Internal 24V power supply ground
37	SIGN-	Sign command input -	22	PULS+	Pulse command input+	7	24V	Internal 24V power supply
36	SIGN+	Sign command input +	21	PULS-	Pulse command input-	6	NC	-
35	COM	Digital input common terminal	20	COM	Digital input common terminal	5	NC	-
34	COM	Digital input common terminal	19	ZO-	Phase Z frequency division output -	4	AO-	Phase A frequency division output -
33	DI7	Digital input 7	18	ZO+	Phase Z frequency division output +	3	AO+	Phase A frequency division output +
32	NC	-	17	BO-	Phase B frequency division output -	2	GND	Internal digital ground
31	NC	-	16	BO+	Phase B frequency division output +	1	NC	-

- (Note)
- 1. Do not use a N/C terminal.
 - 2. Connect the shielding layer of the I/O cable to the connector shell. Implement frame grounding (FG) through the connector on the servo drive side.
 - 3. Assign signals to all I/O pins through parameter settings.

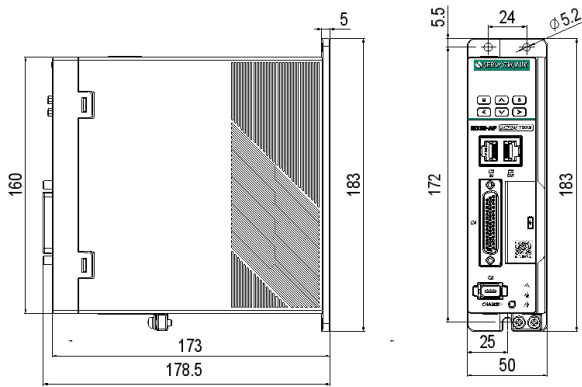
Name	Model	Material number	Remarks
IO control terminal plug	24F78-01-05-00	12115000002541	Standard

MOUNTING DIMENSION

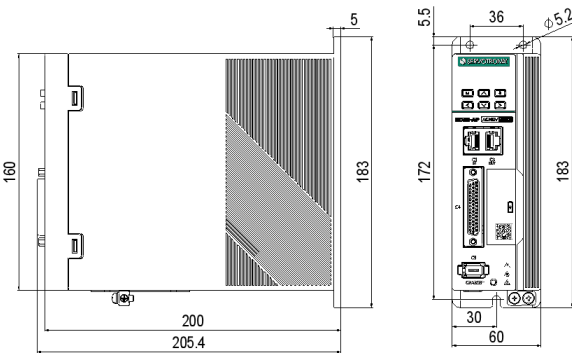
Installation diagram: To ensure a low air resistance and an effective heat dissipation of the cooling fan, please follow the recommended installation spacing for one or multiple AC servo drives.



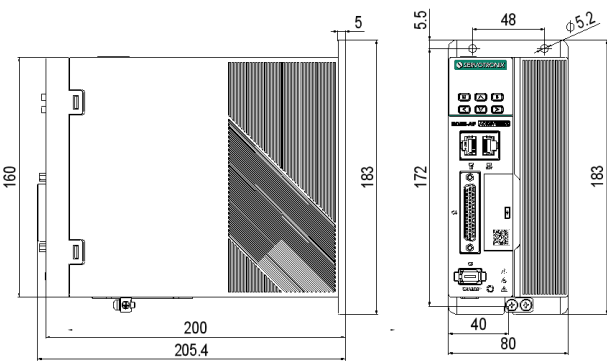
Dimensions of BD3E-1D62AAP/BD3E-2D82AAP (mm)



Dimensions of BD3E-5D52AAP (mm)



Dimensions of BD3E-3D54DAP/BD3E-5D44DAP (mm)



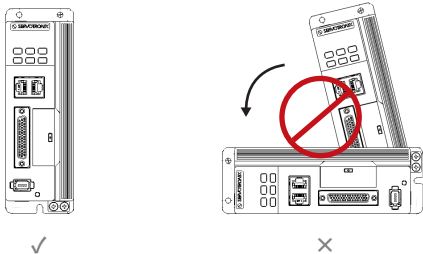
Dimensions of BD3E-8D44DAP/BD3E-0124DAP (mm)

Notes:

The installation must be done in the specified direction; otherwise, it may cause malfunctions.

To ensure a good cooling circulation, when installing the AC servo drive, always keep it at a sufficient distance from the adjacent objects and baffles at its top, bottom, left and right sides; otherwise, it may cause malfunctions.

During installation, prevent the air intake and exhaust ports of the AC servo drive from being blocked, and do not place the servo drive on its side; otherwise, it may cause malfunctions.



PH3 SERIES NAMING RULES

PH 3 S - M 04 A 0 06 S T - ***
1 2 3 4 5 6 7 8 9 10 11 12 13

1 Series

Mark	Meaning
PH	PH series

2 Generation

Mark	Meaning
3	3rd generation

6 Rated power

Mark	Meaning
01	0.1 kW
02	0.2 kW
04	0.4 kW
06	0.6 kW
08	0.75 kW
09	0.85 kW
10	1.0 kW
13	1.3 kW
18	1.8 kW

9 Frame size

Mark	Meaning
04	40mm
06	60mm
08	80mm
13	130mm

10 Brake/oil seal/shaft configuration

Mark	Meaning
S	W/ oil seal, w/o brake
E	W/ oil seal, w/ brake
N	W/O oil seal, w/o brake
B	W/O oil seal, w/ brake

3 Performance category

Mark	Meaning
S	Standard (optical encoder)
E	Economical (magnetic encoder)

7 Voltage level

Mark	Meaning
A	220V
B	380V

11 Encoder configuration

Mark	Meaning
T	23bit optical encoder (multi-turn, using 23bit Tamagawa protocol)
M	20bit magnetic encoder (multi-turn, using 23bit Tamagawa protocol)
G	20bit magnetic encoder (single-turn, using 23-bit Tamagawa protocol)

5 Motor type (construction)

Mark	Meaning
L	Small inertia & high speed
M	Small inertia & high speed
G	Medium inertia & high torque

8 Electromagnetic design sequence number

Mark	Meaning
0	Electromagnetic design sequence number 0
Others	Other electromagnetic designs

13 Custom code

Mark	Meaning
Null	Standard product (standard structure, standard key, standard shaft)
**	For other custom codes, see Specifications of custom products for details.

4, 12: Connector, with no special meaning

Note:

The example given herein is only for explaining the meaning of the characters in the model, and does not suggest that a model designation contains all the characters listed herein.

PH3 SERIES FEATURES

The PH3 series high-performance rotary servo motor is developed based on Servotronix's latest generation platform. Compared to the PH2 series, the PH3 series has been comprehensively upgraded in electrical characteristics, structural characteristics, control precision, ease of use, and manufacturability, while maintaining full compatibility with the PH2 series in terms of mounting flanges, output shafts and cables. The PH3 series boasts the following outstanding characteristics:

Better Performance

□ Models with 40/60/80 mm frame

Max speed

increased to 7,000 RPM

□ Models with 130 mm frame

Max torque overload up to

3.5 times of rating or more

Max speed

increased to 4,500 RPM

Max torque overload up to

2.5 times of rating or more

High Energy Efficiency



Compliance with Level 1 energy efficiency requirements in GB30253 for models with power above 550 V (energy efficiency label not required for models with a built-in brake)

Full Certification

UL certified, CE certified and UKCA certified

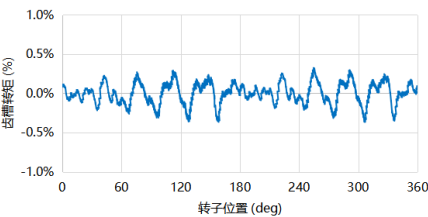


Richer Variants

The standard version of this series features frames ranging from 40 mm to 180 mm, power outputs from 0.05 kW to 7.5 kW, and options for medium or low inertia. In addition, models of such configuration combination as "small inertia + 40 mm flange + 0.15 kW power", "medium inertia + 60 mm flange + 0.6 kW power" and "medium inertia + 80 mm flange + 1.0 kW" are newly introduced.

High Stability

Minimum cogging torque deviation optimized to be below 1%



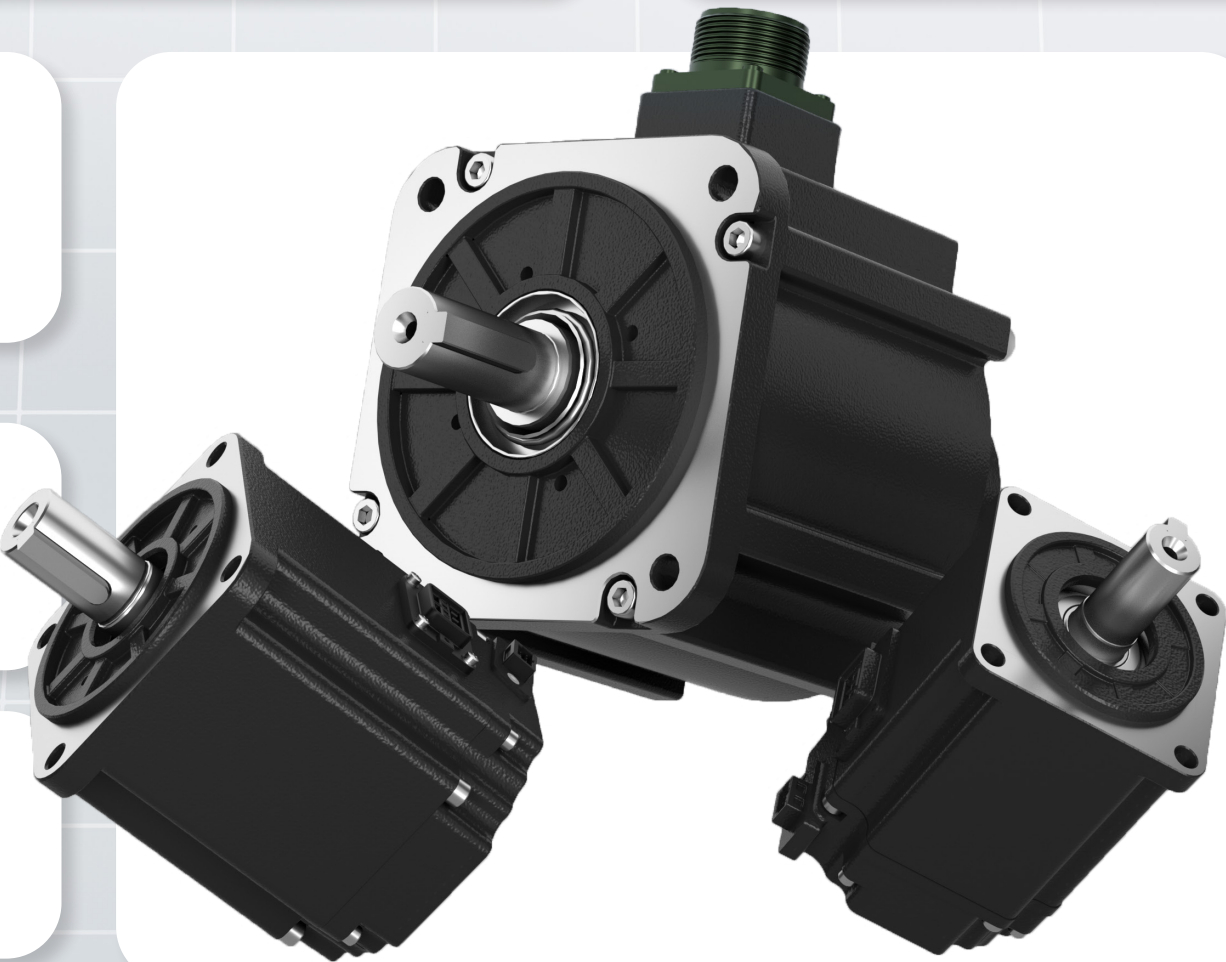
Low Temperature Rise

With patented electromagnetic circuit design, enclosure temperature rise under typical operating conditions

reduced below 60k

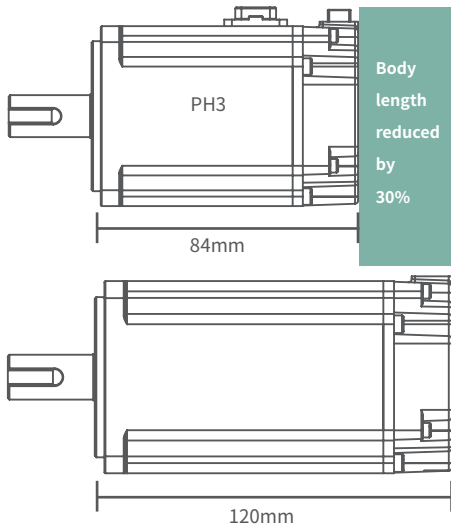
Low Noise

Magnetic circuit design and structural design optimized to ensure a lower operating noise



Short Body

Motor size reduced by up to 30% compared to PH2 series, significantly decreasing the mounting space required



Quick-connecting Design

Quick connector, without 'pigtail' on the body, adopted for all motors in the series, which prevents connections in the air and ensures higher interface reliability, easier wiring, and greater flexibility.

Secure Protection



Enclosures of all products in the series (incl. connectors, but excl. shaft penetration part) meet the IP67 certification requirements.

Multiple Encoder Options

Multiple encoders available for selection, and Tamagawa protocol used by default for an improved applicability

20bit magnetic encoder

Repeated positioning accuracy up to 50 arcsec

23bit optical encoder

Repeated positioning accuracy up to 20 arcsec

PH3 SERIES PRODUCT PORTFOLIO

2020bit single-turn magnetic encoder

2020bit multi-turn magnetic encode

2323bit single-turn absolute optical encoder

Inertia class	Specification	100W
PH3 □ -L (small inertia & high speed)	Model	L01A004
	Flange[mm]	40
	Rated/peak torque [N · m]	0.32/1.12
	Rated/peak speed [rpm]	3000/7000
	Inertia with/without brake[kg*cm ²]	0.035/0.042
	Voltage level [VAC]	220
	Encoder type [bit]	202023

Inertia class	Specification	200W	400W	600W	750W	1000W
PH3 □ -M (medium inertia & high speed)	Model	M02A006	M04A006	M06A006	M08A008	M10A008
	Flange[mm]	60	60	60	80	80
	Rated/peak torque [N · m]	0.64/2.24	1.27/4.77	1.91/4.69	2.39/8.37	3.18/11.13
	Rated/peak speed [rpm]	3000/7000	3000/7000	3000/7000	3000/7000	3000/7000
	Inertia with/without brake [kg*cm ²]	0.24/0.25	0.47/0.48	0.68/0.69	1.46/1.51	2.00/2.05
	Voltage level [VAC]	220	220	220	220	220
	Encoder type [bit]	202023202023202023	202023202023202023	202023202023202023	202023202023202023	202023202023202023

Inertia class	Specification	850W	1300W	1800W
PH3 □ -G (medium inertia & high torque)	Model	G09A013/G09B013	G13A013/G13B013	G18A013/G18B013
	Flange[mm]	130	130	130
	Rated/peak torque [N · m]	5.39/16.17	8.34/20.85	11.5/28.75
	Rated/peak speed [rpm]	1500/4500	1500/4500	1500/4500
	Inertia with/without brake [kg*cm ²]	13.14/15.4	18.91/21.2	25.05/27.0
	Voltage level [VAC]	220/380	220/380	220/380
	Encoder type [bit]	202023202023	202023202023	202023202023

PH3 SERIES STANDARD VERSION PRODUCT PORTFOLIO

Motor type	Frame size	Rated power (kW)	Voltage level (VAC)	Torque (N · m) (rated/peak)	Speed (rpm) (rated/max)	Inertia (kg*cm ²) (without/with brake)	Current (Arms) (rated/peak)	Oil seal	Brake	20bit magnetic encoder (single-turn, absolute)	20bit magnetic encoder (multi-turn, absolute)	23bit optical encoder (multi-turn, absolute)	Recommended drive
PH3-L small-inertia & high-speed motor	40	0.1	220	0.32/1.12	3000/7000	0.035/0.042	1.22/4.85	×	✓	PH3E-L01A004BG *	PH3E-L01A004BM *	PH3S-L01A004BT *	BD3E-1D62AAP
								×	×	PH3E-L01A004NG *	PH3E-L01A004NM *	PH3S-L01A004NT *	
PH3-M medium-inertia & high-speed motor	60	0.2	220	0.64/2.24	3000/7000	0.24/0.25	1.50/5.60	✓	✓	PH3E-M02A006EG	PH3E-M02A006EM	PH3S-M02A006ET	BD3E-1D62AAP
								✓	×	PH3E-M02A006SG	PH3E-M02A006SM	PH3S-M02A006ST	
		0.4	220	1.27/4.77	3000/7000	0.47/0.48	2.40/9.00	✓	✓	PH3E-M04A006EG	PH3E-M04A006EM	PH3S-M04A006ET	BD3E-2D82AAP
								✓	×	PH3E-M04A006SG	PH3E-M04A006SM	PH3S-M04A006ST	
	80	0.6	220	1.91/4.69	3000/7000	0.68/0.69	3.90/14.30	✓	✓	PH3E-M06A006EG	PH3E-M06A006EM	PH3S-M06A006ET	BD3E-5D52AAP
								✓	×	PH3E-M06A006SG	PH3E-M06A006SM	PH3S-M06A006ST	
		0.75	220	2.39/8.37	3000/7000	1.46/1.51	4.20/15.90	✓	✓	PH3E-M08A008EG	PH3E-M08A008EM	PH3S-M08A008ET	BD3E-5D52AAP
								✓	×	PH3E-M08A008SG	PH3E-M08A008SM	PH3S-M08A008ST	
PH3-G medium-inertia & high-torque motor	130	0.85	380	5.39/16.17	1500/4500	13.14/15.4	3.23/8.5	✓	✓	PH3E-G09B013EG	PH3E-G09B013EM	PH3S-G09B013ET	BD3E-3D54DAP
								✓	×	PH3E-G09B013SG	PH3E-G09B013SM	PH3S-G09B013ST	
		1.3	380	8.34/20.85	1500/4500	18.91/21.2	4.85/12.6	✓	✓	PH3E-G13B013EG	PH3E-G13B013EM	PH3S-G13B013ET	BD3E-5D44DAP
								✓	×	PH3E-G13B013SG	PH3E-G13B013SM	PH3S-G13B013ST	
	180	1.8	380	11.5/28.75	1500/4500	25.05/27.0	7.33/19.2	✓	✓	PH3E-G18B013EG	PH3E-G18B013EM	PH3S-G18B013ET	BD3E-8D44DAP
								✓	×	PH3E-G18B013SG	PH3E-G18B013SM	PH3S-G18B013ST	

* : The 40 mm frame model is still under development, and is expected to be released on April 30, 2025.

GENERAL TECHNICAL SPECIFICATIONS

Series		PH3	
Voltage level		220V	380V
Withstand voltage level		1500 VAC for 1 min, with leakage current ≤ 10mA	1800 VAC for 1 min, with leakage current ≤ 20mA
Operating mode		S1	
Insulation class		F	
Insulation resistance		≥ 10MΩ @ 500 VDC	
Excitation mode		Permanent magnet	
Installation method		Flange	
Drive connection method		Direct connection via an extension cable	
Rotation direction		Agreed positive rotation direction: counterclockwise (CCW) when viewed from the motor shaft side/load side, when the relationship of the counter electromotive force among the motor phases is: U > V > W.	
Vibration level		V15	
Enclosure IP rating		IP67 (excl. shaft penetration part)	
Vibration resistance strength		Vibration frequency 10~150Hz, amplitude 0.175mm or acceleration 25m/s², frequency sweep count 10;	
Impact resistance strength		Peak acceleration 50m/s², pulse duration 30ms, half sine wave; 18 times of impact in total, with 3 times in each direction;	
Environmental conditions	Storage environment	Please follow the environmental requirements below when the motor is to be stored with power cut off:	
		Ambient temperature: -10° C ~ +40° C (no freezing);	
		Ambient humidity: 20%RH ~ 85%RH (no condensation)	
	Operating environment	Ambient temperature: -10° C ~ 40° C,	
		Ambient humidity: 20%RH ~ 85%RH (no condensation)	
		· Indoors without corrosive or explosive gases	
	Installation location	· Well-ventilated locations with minimal dust, debris, and moisture	
		· Locations easily accessible for inspection and cleaning	
		· Altitude below 1,000m (for altitudes within 1,000m ~ 2,000m, operation with derated power is allowed)	
		· Locations without strong magnetic fields	

PH3-M ELECTRICAL SPECIFICATIONS

Model		/	M02A006	M04A006	M06A006	M08A008	M10A008
Rated voltage		V	220	220	220	220	220
Inertia type		/	Medium inertia	Medium inertia	Medium inertia	Medium inertia	Medium inertia
Mounting flange		mm	60	60	60	80	80
Rated power		W	200	400	600	750	1000
Rated torque		N · m	0.64	1.27	1.91	2.39	3.18
Max torque		N · m	2.3	4.46	6.69	8.37	11.13
Rated speed		r/min	3000	3000	3000	3000	3000
Max speed*1		r/min	7000	7000	7000	7000	7000
Rated current		Arms	1.5	2.4	3.9	4.2	5.6
Max current		Arms	5.6	9	14.3	15.9	21.2
Torque constant*		N · m/A	0.48	0.6	0.53	0.596	0.599
Number of pole-pairs		/	5	5	5	5	5
Voltage constant*		V/krpm	28.8	36.5	32.2	36.06	36.2
Electrical time constant		ms	1.11	1.62	3	2.96	2.86
Line resistance*		Ω	7.93	3.08	1.83	1.17	0.803
Line inductance*		mH	8.8	5	5.49	3.46	2.3
Inductance	q-axis	mH	4.75	2.73	1.3	1.865	1.215
	d-axis	mH	4.1	2.4	1.1	1.64	1.075
Rotor inertia*	W/O brake	x10 ⁻⁴ kg.m²	0.24	0.47	0.68	1.46	2
	W/ brake	x10 ⁻⁴ kg.m²	0.25	0.48	0.69	1.51	2.05
Mechanical time constant	W/O brake	ms	1.45	0.69	0.76	0.72	0.672
	W/ brake	ms	1.51	0.7	0.77	0.745	0.689
Mass	W/O brake	kg	0.68	1.01	1.27	1.98	2.38
	W/ brake	kg	1.03	1.36	1.62	2.27	2.76
Allowable load	Radial load	N	245	245	245	147	147
	Axial load	N	75	75	75	393	393
Brake specification*2	Rated voltage	VDC	24	24	24	24±10%	24±10%
	Rated current	A	0.4	0.4	0.4	0.438	0.353
	Rated power	W	9.6	9.6	9.6	10.5	8.5
	Static friction torque	N.m	2.3	2.3	2.3	≥ 3.2	≥ 3.8
	Engagement time	ms	< 70	< 70	< 70	< 70	< 60
	Disengagement time	ms	< 20	< 20	< 20	< 20	< 40
	Disengagement voltage	VDC	0.5~8	0.5~8	0.5~8	0.5~8	> 1.5
	Rotational clearance	°	< 0.5°	< 0.5°	< 0.5°	< 0.5°	< 0.5°

Values of parameter items marked with "*" herein are typical values, and subject to a certain tolerance for the actual products;

**1" represents the performance of the motor when being used together with a standard servo drive; and if it is used together with other drives, the performance may vary.

**2" indicates that the brake is only for static braking, and shall never be used for dynamic braking.

PH3-G ELECTRICAL SPECIFICATIONS

Item		Unit	G09A013	G13A013	G18A013	G09B013	G13B013	G18B013
Rated voltage		V	220	220	220	380	380	380
Inertia type		/	Medium inertia	Medium inertia	Medium inertia	Medium inertia	Medium inertia	Medium inertia
Mounting flange		mm	130	130	130	130	130	130
Rated power		W	850	1300	1800	850	1300	1800
Rated torque		N · m	5.39	8.28	11.5	5.39	8.28	11.5
Max torque		N · m	13.5	20.85	28.75	13.5	20.85	28.75
Rated speed		r/min	1500	1500	1500	1500	1500	1500
Max speed*1		r/min	4500	4500	4500	4500	4500	4500
Rated current		Arms	5.96	9.7	11.4	3.23	4.85	7.33
Max current		Arms	15.7	25.2	29.8	8.5	12.6	19.2
Torque constant*		N · m/A	0.92	0.88	1.03	1.71	1.75	1.6
Number of pole-pairs		/	5	5	5	5	5	5
Voltage constant*		V/krpm	55.91	53.05	62.13	103.13	106.1	96.64
Electrical time constant		ms	7.95	17.45	50.32	2.78	8.13	12.23
Line resistance*		Ω	0.97	0.44	0.39	3.42	1.77	0.96
Line inductance*		mH	7.7	7.7	19.6	9.5	14.4	11.7
Inductance	q-axis	mH	2.94	1.6	1.51	10.12	6.4	3.7
	d-axis	mH	2.29	1.2	1.16	7.77	4.85	2.83
Rotor inertia*	W/O brake	x10 ⁻⁴ kg.m²	13.14	18.91	25.05	13.14	18.91	25.05
	W/ brake	x10 ⁻⁴ kg.m²	15.4	21.2	27	15.4	21.2	27
Mechanical time constant	W/O brake	ms	2.6	1.87	1.59	2.66	1.89	1.62
	W/ brake	ms	3.05	2.09	1.72	3.12	2.12	1.75
Allowable load	Radial load	N	686	686	686	686	686	686
	Axial load	N	343	343	343	343	343	343
Brake specification*2	Rated voltage	VDC	24	24	24	24	24	24
	Rated current	A	0.94	0.94	0.94	0.94	0.94	0.94
	Rated power	W	23	23	23	23	23	23
	Static friction torque	N.m	16	16	16	16	16	16
	Engagement time	ms	80	80	80	80	80	80
	Disengagement time	ms	40	40	40	40	40	40
	Disengagement voltage	VDC	> 0.5	> 0.5	> 0.5	> 0.5	> 0.5	> 0.5
	Rotational clearance	°	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

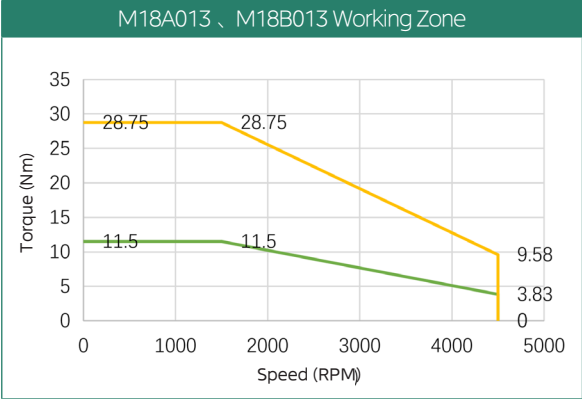
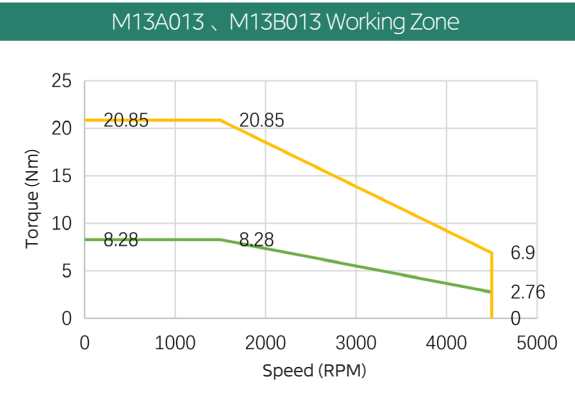
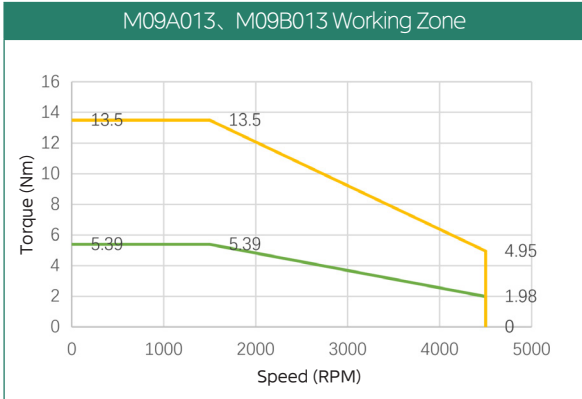
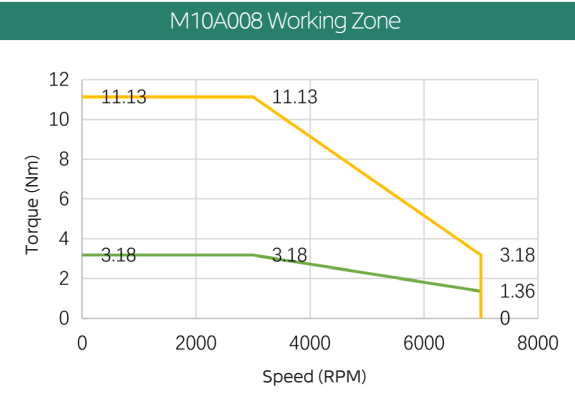
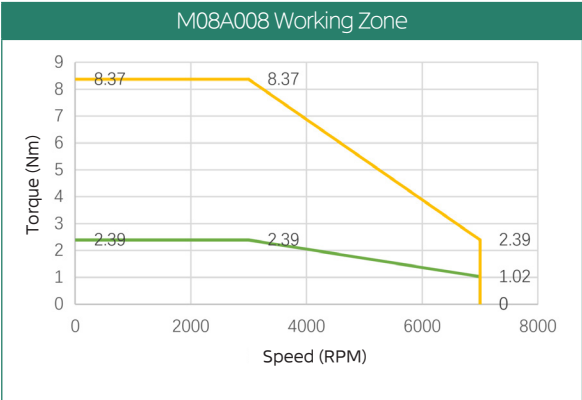
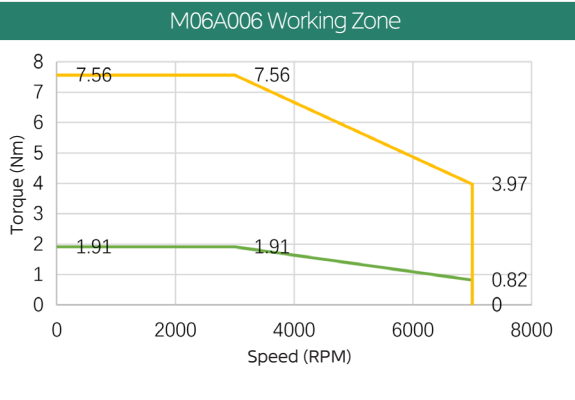
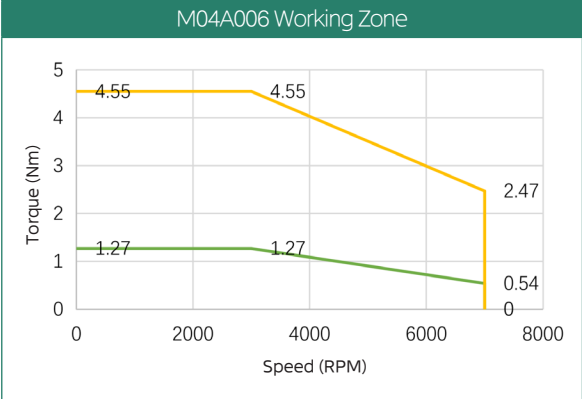
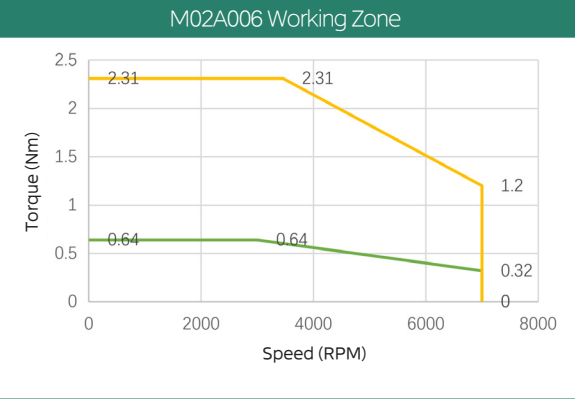
Values of parameter items marked with "*" herein are typical values, and subject to a certain tolerance for the actual products;

**1" represents the performance of the motor when being used together with a standard servo drive; and if it is used together with other drives, the performance may vary.

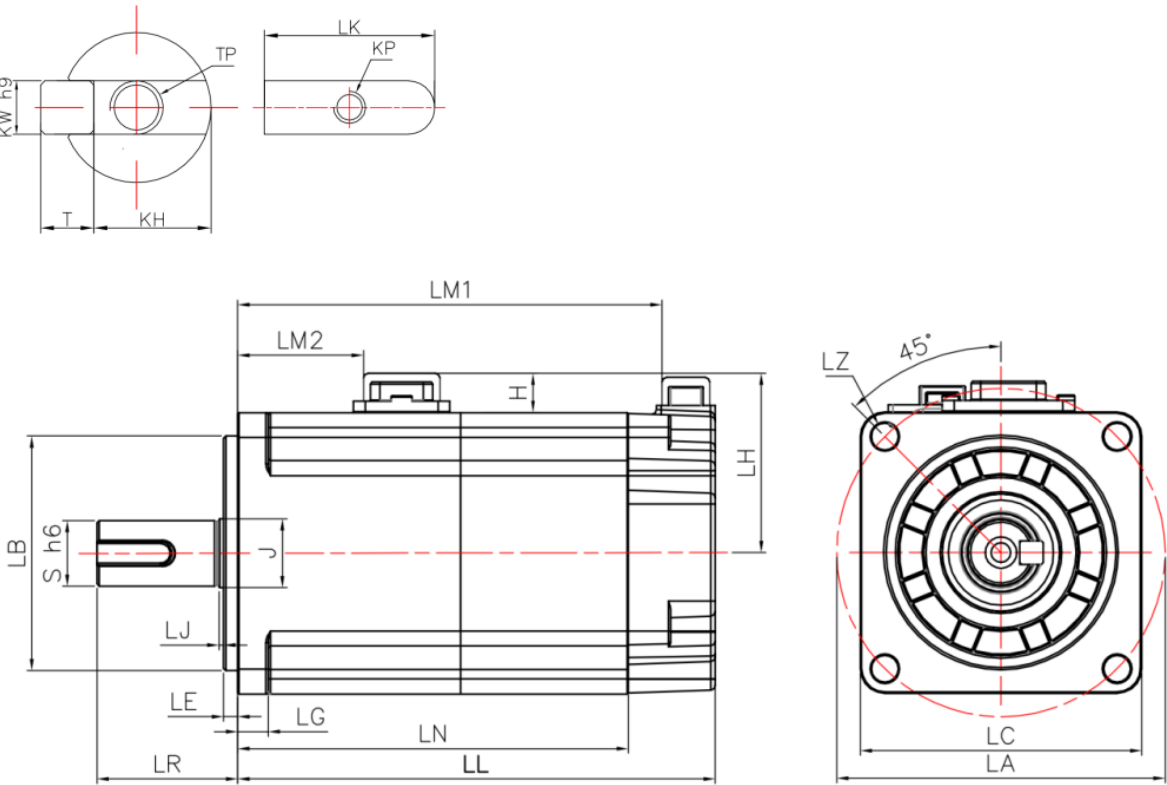
**2" indicates that the brake is only for static braking, and shall never be used for dynamic braking.

T-N CURVES

Continuous working zone
Short-term working zone



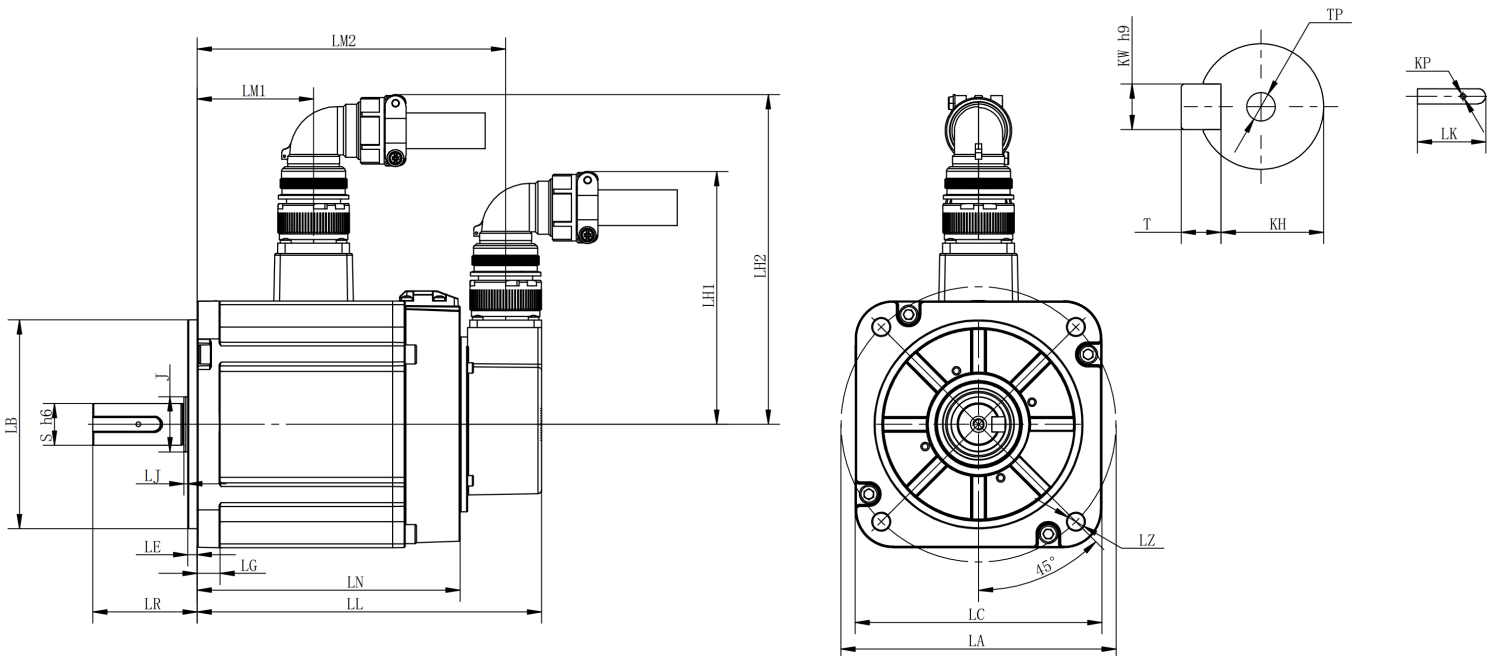
STRUCTURAL DIMENSION DIAGRAM (PH3-M SERIES, 60MM/80MM FRAME)



Model		M02A006	M04A006	M06A006	M08A008	M10A008
LA		φ 70	φ 70	φ 70	φ 90	φ 90
LB		φ 50	φ 50	φ 50	φ 70	φ 70
LC		60	60	60	80	80
LZ		4 φ 5.7	4 φ 5.7	4 φ 5.7	4 φ 6.6	4 φ 6.6
S		φ 14h6	φ 14h6	φ 14h6	φ 19h6	φ 19h6
J		φ 14.7	φ 14.7	φ 14.7	φ 19.8	φ 19.8
LH		38.3	38.3	38.3	46.5	46.5
LR		30	30	30	35	35
LE		3	3	3	3	3
LG		6.5	6.5	6.5	8	8
LJ		0.5	0.5	0.5	0.5	0.5
LL	W/O brake	69.3	84.8	100.3	96	108
	W/ brake	101.8	117.3	132.8	126	145
LM1	W/O brake	57.95	146.9	98.83	87	99
	W/ brake	90.45	211.9	134.94	116	137
LM2	W/O brake	26.8	84.6	64.22	60	72
	W/ brake	26.8	84.6	64.22	60	72
Key type		C	C	C	C	C
LK		16	16	16	25	25
KP		M3	M3	M3	M3	M3
T		5	5	5	6	6
KW		5	5	5	6	6
KH		11	11	11	15.5	15.5
TP		M5, depth 12	M5, depth 12	M5, depth 12	M6, depth 14	M6, depth 14

Note: Dimensions herein are measured in millimeters (mm)

STRUCTURAL DIMENSION DIAGRAM (PH3-G SERIES, 130MM FRAME)



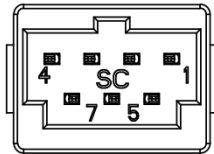
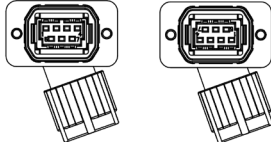
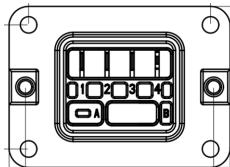
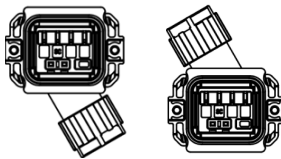
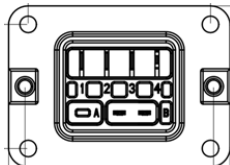
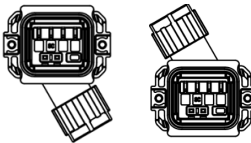
Model		G09A013 G09B013	G13A013 G13B013	G18A013 G18B013
LA		130	130	130
LB		110	110	110
LC		145	145	145
LZ		9	9	9
S		22	22	22
J		φ 29	φ 29	φ 29
LH1		135	135	135
LH2		175	175	175
LR		55	55	55
LE		5	5	5
LG		12	12	12
LJ		2	2	2
LL(magnetic encoder)	W/O brake	135	151.5	168
	W/ brake	164	180.5	197
LL(optical encoder)	W/O brake	145	161.5	178
	W/ brake	174	190.5	207
LM1	W/O brake	115.5	132	148.5
	W/ brake	144.5	161	177.5
LM2	W/O brake	58.5	75	91.5
	W/ brake	58.5	75	91.5
Key type		C	C	C
LK		36	36	36
KP		M3	M3	M3
T		7	7	7
KW		8	8	8
KH		18	18	18
TP		M6	M6	M6

Note:

- The aviation connector shown herein is not standard, and is only for illustrating the max installation height.
- Dimensions herein are measured in millimeters (mm)

INTERFACE DEFINITION

M02/04/06/08/10

	Motor connector	Extension cable connector																																								
Encoder interface	<p>Connector: Model: SC-MC7P-MDDL</p> <table><tr><th>Pin No.</th><th>Signal</th></tr><tr><td>1</td><td>Shield</td></tr><tr><td>2</td><td>VCC</td></tr><tr><td>3</td><td>GND</td></tr><tr><td>4</td><td>Data+</td></tr><tr><td>5</td><td>Data-</td></tr><tr><td>6</td><td>Bat+</td></tr><tr><td>7</td><td>Bat-</td></tr></table> 	Pin No.	Signal	1	Shield	2	VCC	3	GND	4	Data+	5	Data-	6	Bat+	7	Bat-	<p>Connector: Model: SC-MC7S-AB20-000-10</p> <p>Pin: Model: Forward: S-FMC19012220 (*7) Reverse: S-FMC19012220 (*7)</p> <table><tr><th>Pin No.</th><th>Signal</th><th>Wire color</th></tr><tr><td>1</td><td>Shield</td><td>Shielding layer</td></tr><tr><td>2</td><td>VCC</td><td>Red</td></tr><tr><td>3</td><td>GND</td><td>Black</td></tr><tr><td>4</td><td>Data+</td><td>Blue</td></tr><tr><td>5</td><td>Data-</td><td>Blue & black</td></tr><tr><td>6</td><td>Bat+</td><td>Green</td></tr><tr><td>7</td><td>Bat-</td><td>Green & black</td></tr></table> 	Pin No.	Signal	Wire color	1	Shield	Shielding layer	2	VCC	Red	3	GND	Black	4	Data+	Blue	5	Data-	Blue & black	6	Bat+	Green	7	Bat-	Green & black
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7	Bat-	Green & black																																								
Power cable interface (w/o brake)	<p>Connector: Model: SC-MC6P-AP2G-054-19</p> <table><tr><th>Pin No.</th><th>Signal</th></tr><tr><td>1</td><td>U</td></tr><tr><td>2</td><td>V</td></tr><tr><td>3</td><td>W</td></tr><tr><td>4</td><td>PE</td></tr></table> 	Pin No.	Signal	1	U	2	V	3	W	4	PE	<p>Connector: Model: SC-MC6S-AP20-00</p> <p>Pin: Model: Forward: S-FMCK6012220 (*4) Reverse: S-FMCK6092220 (*4)</p> <table><tr><th>Pin No.</th><th>Signal</th><th>Wire color</th></tr><tr><td>1</td><td>U</td><td>Red</td></tr><tr><td>2</td><td>V</td><td>White</td></tr><tr><td>3</td><td>W</td><td>Black</td></tr><tr><td>4</td><td>PE</td><td>Yellow & green</td></tr></table> 	Pin No.	Signal	Wire color	1	U	Red	2	V	White	3	W	Black	4	PE	Yellow & green															
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Power cable interface (w/ brake)	<p>Connector: Model: SC-MC6P-AP2G-044-19</p> <table><tr><th>Pin No.</th><th>Signal</th></tr><tr><td>1</td><td>U</td></tr><tr><td>2</td><td>V</td></tr><tr><td>3</td><td>W</td></tr><tr><td>4</td><td>PE</td></tr><tr><td>A</td><td>BRK-</td></tr><tr><td>B</td><td>BRK+</td></tr></table> 	Pin No.	Signal	1	U	2	V	3	W	4	PE	A	BRK-	B	BRK+	<p>Connector: Model: SC-MC6S-AP20-00</p> <p>Pin: Model: Forward: S-FMCK6012220 (*4) S-FMC19012220 (*2) Reverse: S-FMCK6092220 (*4) S-FMC19012220 (*2)</p> <table><tr><th>Pin No.</th><th>Signal</th><th>Wire color</th></tr><tr><td>1</td><td>U</td><td>Red</td></tr><tr><td>2</td><td>V</td><td>White</td></tr><tr><td>3</td><td>W</td><td>Brown</td></tr><tr><td>4</td><td>PE</td><td>Black</td></tr><tr><td>A</td><td>BRK-</td><td>Yellow & green</td></tr><tr><td>B</td><td>BRK+</td><td>Blue</td></tr></table> 	Pin No.	Signal	Wire color	1	U	Red	2	V	White	3	W	Brown	4	PE	Black	A	BRK-	Yellow & green	B	BRK+	Blue					
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B	BRK+	Blue																																								

Note:

The wire colors given in the tables are for recommendation, and if the wire color is different from those given herein, please confirm the signal based on the pin No.

Pins 6 and 7 in the encoder interface are external battery power supply interfaces for multi-turn encoders, and effective only for models with a multi-turn encoder.

INTERFACE DEFINITION

G09/13/18

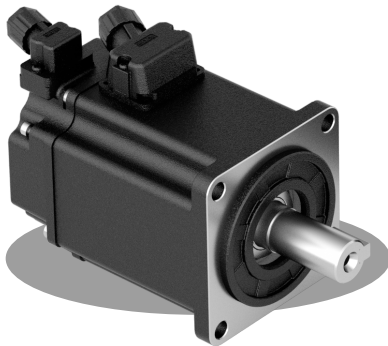
	Motor connector	Extension cable connector																																								
Encoder interface	<div>Connector: Model: CMS3102A20-29P P/N: 12119400001081</div> <div><table><tr><th>Pin No.</th><th>Signal</th></tr><tr><td>E</td><td>SD+</td></tr><tr><td>F</td><td>SD-</td></tr><tr><td>G</td><td>GND</td></tr><tr><td>H</td><td>VCC</td></tr><tr><td>J</td><td>Shield</td></tr><tr><td>S</td><td>Bat-</td></tr><tr><td>T</td><td>Bat+</td></tr></table></div>	Pin No.	Signal	E	SD+	F	SD-	G	GND	H	VCC	J	Shield	S	Bat-	T	Bat+	<div>Connector: Model: HMS3108AE20-29S P/N: 12119400000581</div> <div><table><tr><th>Pin No.</th><th>Signal</th><th>Wire color</th></tr><tr><td>E</td><td>SD+</td><td>Blue</td></tr><tr><td>F</td><td>SD-</td><td>Blue & black</td></tr><tr><td>G</td><td>GND</td><td>black</td></tr><tr><td>H</td><td>VCC</td><td>Red</td></tr><tr><td>J</td><td>Shield</td><td>Shielding layer</td></tr><tr><td>S</td><td>Bat-</td><td>Green & black</td></tr><tr><td>T</td><td>Bat+</td><td>Green</td></tr></table></div>	Pin No.	Signal	Wire color	E	SD+	Blue	F	SD-	Blue & black	G	GND	black	H	VCC	Red	J	Shield	Shielding layer	S	Bat-	Green & black	T	Bat+	Green
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J	Shield	Shielding layer																																								
S	Bat-	Green & black																																								
T	Bat+	Green																																								
Power cable interface (w/o brake)	<div>Connector: Model: CMS3102A20-18P P/N: 12119400000841</div> <div><table><tr><th>Pin No.</th><th>Signal</th></tr><tr><td>E</td><td>PE</td></tr><tr><td>F</td><td>U</td></tr><tr><td>I</td><td>V</td></tr><tr><td>B</td><td>W</td></tr></table></div>	Pin No.	Signal	E	PE	F	U	I	V	B	W	<div>Connector: Model: CMS3108A20-18SI P/N: 12119400000502</div> <div><table><tr><th>Pin No.</th><th>Signal</th><th>Wire color</th></tr><tr><td>E</td><td>PE</td><td>Yellow & green</td></tr><tr><td>F</td><td>U</td><td>Red</td></tr><tr><td>I</td><td>V</td><td>White</td></tr><tr><td>B</td><td>W</td><td>Black</td></tr></table></div>	Pin No.	Signal	Wire color	E	PE	Yellow & green	F	U	Red	I	V	White	B	W	Black															
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E	PE	Yellow & green																																								
F	U	Red																																								
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Power cable interface (w/ brake)	<div>Connector: Model: CMS3102A20-18P P/N: 12119400000841</div> <div><table><tr><th>Pin No.</th><th>Signal</th></tr><tr><td>E</td><td>PE</td></tr><tr><td>F</td><td>U</td></tr><tr><td>I</td><td>V</td></tr><tr><td>B</td><td>W</td></tr><tr><td>C</td><td>BRK+</td></tr><tr><td>D</td><td>BRK-</td></tr></table></div>	Pin No.	Signal	E	PE	F	U	I	V	B	W	C	BRK+	D	BRK-	<div>Connector: Model: CMS3108A20-18SI P/N: 12119400000502</div> <div><table><tr><th>Pin No.</th><th>Signal</th><th>Wire color</th></tr><tr><td>E</td><td>PE</td><td>Yellow & green</td></tr><tr><td>F</td><td>U</td><td>Red</td></tr><tr><td>I</td><td>V</td><td>White</td></tr><tr><td>B</td><td>W</td><td>Black</td></tr><tr><td>C</td><td>BRK+</td><td>Brown</td></tr><tr><td>D</td><td>BRK-</td><td>Blue</td></tr></table></div>	Pin No.	Signal	Wire color	E	PE	Yellow & green	F	U	Red	I	V	White	B	W	Black	C	BRK+	Brown	D	BRK-	Blue					
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Note:

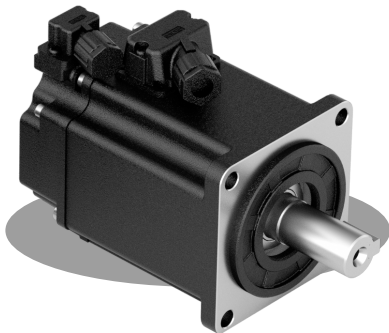
The wire colors given in the tables are for recommendation, and if the wire color is different from those given herein, please confirm the signal based on the pin No.

Pins S and T in the encoder interface are external battery power supply interfaces for multi-turn encoders, and effective only for models with a multi-turn encoder.

CABLE SELECTION



N-direction outlet
None Drive
(rear outlet/reverse outlet)



D-direction outlet
Drive
(front outlet/forward outlet)

POWER CABLE OR ACCESSORY KIT

W/O brake					
PH3 motor model	Drive type	Length (m)	Front outlet	Rear outlet	Connector kit
M02/04/ 06/08/10	BD3 series	3	SPC-A61031-0503-F	SPC-A63031-0503-F	Front outlet: CAP-A6-03-A Rear outlet: CAP-A6-03-B
		5	SPC-A61031-0505-F	SPC-A63031-0505-F	
		10	SPC-A61031-0510-F	SPC-A63031-0510-F	
		15	SPC-A61031-0515-F	SPC-A63031-0515-F	
		20	SPC-A61031-0520-F	SPC-A63031-0520-F	
G09/ 13/18	BD3 series	3	CBL-PWPH220000A003		CAP-PWPH20000A0
		5	CBL-PWPH220000A005		
		10	CBL-PWPH220000A010		
		15	CBL-PWPH220000A015		
		20	CBL-PWPH220000A020		

W/ brake					
PH3 motor model	Drive type	Length (m)	Front outlet	Rear outlet	Connector kit
M02/04/ 06/08/10	BD3 series CDHD2S series	3	SPC-A62041-0603-F	SPC-A64041-0603-F	Front outlet: CAP-A6-04-A Rear outlet: CAP-A6-04-B
		5	SPC-A62041-0605-F	SPC-A64041-0605-F	
		10	SPC-A62041-0610-F	SPC-A64041-0610-F	
		15	SPC-A62041-0615-F	SPC-A64041-0615-F	
		20	SPC-A62041-0620-F	SPC-A64041-0620-F	
G09/ 13/18	BD3 seriesCDHD2S series	3	CBL-PWPH220001A003		CBL-PWPH20001A0
		5	CBL-PWPH220001A005		
		10	CBL-PWPH220001A010		
		15	CBL-PWPH220001A015		
		20	CBL-PWPH220001A020		

ENCODER CABLE OR ACCESSORY KIT

Single-turn encoder (w/o battery)					
PH3 motor model	Drive type	Length (m)	Front outlet	Rear outlet	Connector kit
M02/04/ 06/08/10	BD3 series	3	SFC-A71A41-0103-F	SFC-A73A41-0103-F	CAP-A7-A4-1
		5	SFC-A71A41-0105-F	SFC-A73A41-0105-F	
		10	SFC-A71A41-0110-F	SFC-A73A41-0110-F	
		15	SFC-A71A41-0115-F	SFC-A73A41-0115-F	
		20	SFC-A71A41-0120-F	SFC-A73A41-0120-F	
G09/ 13/18	BD3 series	3	CBL-FBPH22S301A003		CAP-FBPH2S301A0
		5	CBL-FBPH22S301A005		
		10	CBL-FBPH22S301A010		
		15	CBL-FBPH22S301A015		
		20	CBL-FBPH22S301A020		

Multi-turn encoder (w/ battery)					
PH3 motor model	Drive type	Length (m)	Front outlet	Rear outlet	Connector kit
M02/04/ 06/08/10	BD3 series	3	SFC-A72A43-0103-F	SFC-A74A43-0103-F	CAP-A7-A4-3
		5	SFC-A72A43-0105-F	SFC-A74A43-0105-F	
		10	SFC-A72A43-0110-F	SFC-A74A43-0110-F	
		15	SFC-A72A43-0115-F	SFC-A74A43-0115-F	
		20	SFC-A72A43-0120-F	SFC-A74A43-0120-F	
G09/ 13/18	BD3 series	3	CBL-FBPH22T203A003		CAP-FBPH2T203A0
		5	CBL-FBPH22T203A005		
		10	CBL-FBPH22T203A010		
		15	CBL-FBPH22T203A015		
		20	CBL-FBPH22T203A020		

Note:

1. The BD3 series servo system comes standard with flexible cables;

2. Only standard cable lengths are provided. For cables of other lengths, please contact our sales personnel for evaluation and customization, or make it yourself.

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PH3 INTERFACE ADAPTER CABLE

Motor type	Length (m)	Standard cable		Highly flexible cable		Connector kit
		Front outlet	Rear outlet	Front outlet	Rear outlet	
Power cable (w/o brake)	0.3	SPC-A61D11-05A3-S	SPC-A63D11-05A3-S	SPC-A61D11-05A3-F	SPC-A63D11-05A3-F	Front outlet: CAP-A6-D1-A Rear outlet: CAP-A6-D1-B
Power cable (w/ brake)	0.3	SPC-A62D31-06A3-S	SPC-A64D31-06A3-S	SPC-A62D31-06A3-F	SPC-A64D31-06A3-F	Front outlet: CAP-A6-D3-A Rear outlet: CAP-A6-D3-B
Encoder cable (for both single-turn and multi-turn encoders)	0.3	SFC-A72D51-01A3-S	SFC-A74D51-01A3-S	SFC-A72D51-01A3-F	SFC-A74D51-01A3-F	CAP-A7-D5

Function:

· The adapter cable is used to convert the interfaces of M02/04/06/08/10 motors in PH3 series to the AMP connector interface used by the models with 40/60/80mm frames from the old series including PH2/PM2/PM1, making the PH3 series to be compatible with the harnesses of the old series and meeting the application needs for using servo drives of different generations together;

· Customers may have the need to upgrade the Servotronix's servo motors of old series, including PM1/PM2/PH2 series, to PH3 series motors of standard version with 60/80 mm frame. However, PH3 motor interface is of quick-connecting type, and cannot be directly connected to the AMP plastic connector cables on the customer's equipment. This adapter cable can convert the motor interface of PH3 series to the AMP connector of the old series, allowing the motor of PH3 series to be connected with the existing cables on the equipment.



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We are committed to continuous improvement of our products. Therefore, our products may be subject to change in technical specifications without notice.

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