Manuals+

☰

BUS
BD3E EB & PH3 AC SERVO SYSTEM
SELECTION MANUAL

Contents [hide]

BD3E EB AC Servo System

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

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Ver.2025a4

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.

BD3E&PH3 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

Ethernet Debugging Interface

Stable and convenient debugging, easier remote parameter downloading and firmware maintenance

Simple Debugging + Plug and Play

MTP Electronic Nameplate

Plug and play

Absolute Encoder

Limits and home not required

Graphical Debugging Guide

Simplified and intuitive debugging

One-click Auto Setting

Debugging time reduced by 90%

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

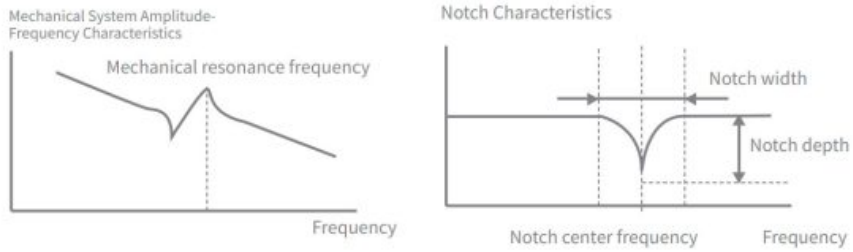
Active Cooling + Three-proof Coating

Good adaptability to severe environments including high temperature, high humidity, and heavy dust

Test against IEC 61800

Favorable tolerance to complex electrical environments

Advanced Algorithms for Flexible but Robust Operation



Simple Mode – Auto Setting

High Reliability

Model-based parameter setting, with high reliability

No Vibrations

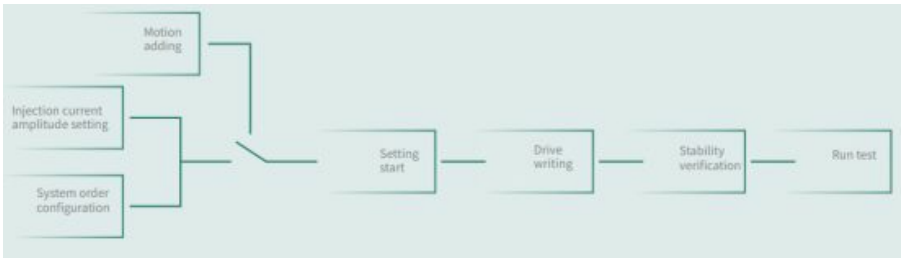
No severe vibrations that could damage the machine during parameter setting

Small Target Movement

Parameter setting based on frequency analysis, with small target movement distance during the setting process

Fast Parameter Setting

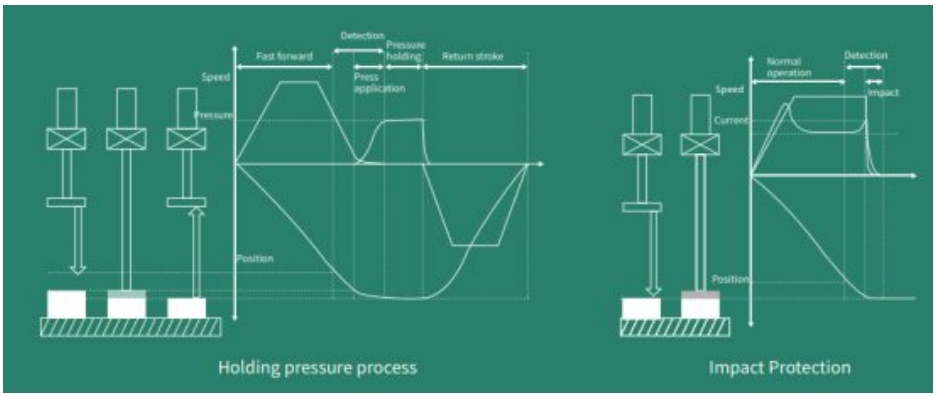
Fast parameter setting, with setting algorithms implemented on PC



Expert Mode – HDM Algorithm Based on Model Frequency Domain Analysis

System identification and automatic parameter design available to improve control performance

Open-loop Pressure Control



Sensorless pressure control with high control precision; pressure holding and impact protection available for selection, with 5 position and pressure setting segments designed to ensure precise impact protection and avoid false alarms

Safe and Reliable Operation

Impact Detection

Homing or shutdown after impact (depending on your setting)

Dynamic Braking

Shorter free-gear stopping distance after a power failure

Different Widths

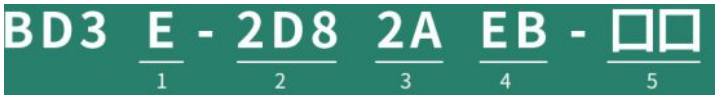
Built-in regenerative resistors designed for custom models of 400W, saving cabinet space, shortening deceleration time, and improving braking capability

STO (SAFE TORQUE OFF)

Simplified overall safety design

For other domestic manufacturers, external regenerative resistors are required for products of 400W

BD3E SERIES NAMING RULES



E

1. Drive type

Code	Specification
E	ECONOMICAL
S	Standard

2D8

2 Ratings

Code	Specification
220V	
1D6	1.6Arms (continuous)/5.8Arms (max)
2D8	2.8Arms (continuous)/9.8Arms (max)
5D5	5.5Arms (continuous)/16.9Arms (max)
7D6	7.6Arms (continuous)/23Arms (max)
012	11.6Arms (continuous)/32Arms (max)

380V	
3D5	3.5Arms (continuous)/11Arms (max)
5D4	5.4Arms (continuous)/14Arms (max)
8D4	8.4Arms (continuous)/20Arms (max)
12	11.9Arms (continuous)/29.75Arms (max)

2A

3. Rated input voltage

Code	Specification
2A	220V
4D	380V

EB

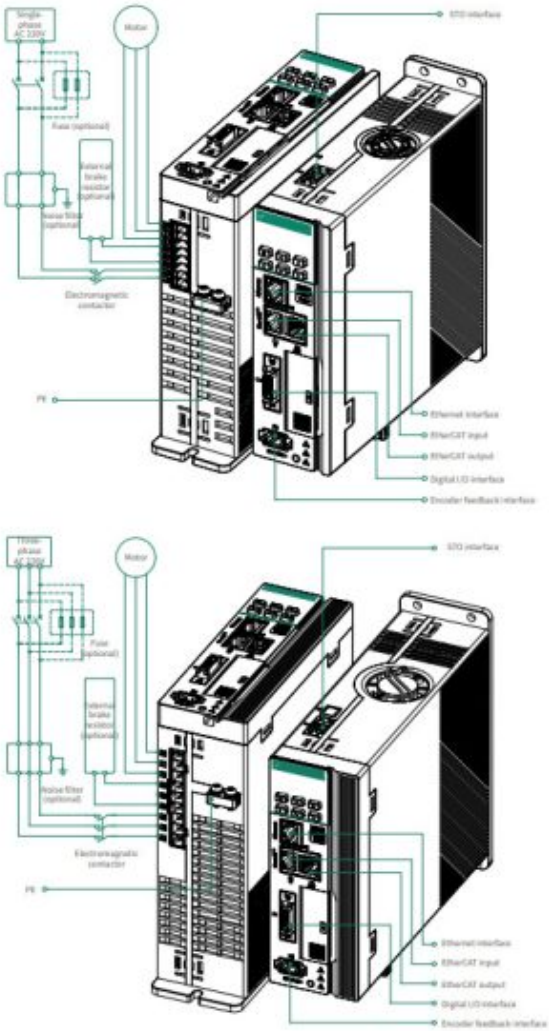
4 Communication interface

Code	Specification
EB	Ether CAT

5 Servo drive series

Code	Specification
[Blank]	Standard
ST	STO
BS	Built-in resistor + STO

WIRING DIAGRAM



BD3E SPECIFICATION

Feature item		BD3E specification
Motor	Motor	PH3
	Encoder	Absolute encoder of 23bit or below supported
	Number of phases	Auto configuration of motor phases and encoder direction
Operating mode	Control mode	Current (torque) control, speed control, and position control, with control mode switching supported
Current	Control method	DQ, PI, feedforward

(Torque) control	Reference command	Ether CAT Var Com
	Parameter setting method	Auto setting of current control loop parameters
Speed control	Performance	3.2kHz
	Filter	First-order low-pass filter, notch filter, load disturbance observer, speed observer
	Reference command	Ether CAT Var Com,
Position control	Performance	Update rate 125 μs (8 kHz)
	Control method	P+ feedforward
	Reference command	EtherCAT VarCom
Brake	Method	Dynamic braking, regenerative braking.
User interaction	Control panel	6 buttons + LED
GUI	User interface	Windows-based Servo Studio
	Function	Connection setting, drive information, power supply information, motor, feedback, I/O selection/configuration, motion setting/ tuning, fault history/display, setup wizard, expert view, etc.
Electronic gear ratio	Range	1:1000 ~ 8000:1

Safety control*	STO	STO (SAFE TORQUE OFF) optional
Motion units	Position	Count (user's unit)
	Speed	rpm
	Acceleration/deceleration	rpm/s
Control features	Motor	Field weakening control algorithm
	Notch filter	5-channel notch filter
	Feedforward	Available (speed/torque)
	Load variation suppression control	Available (position/torque)
	Friction torque compensation	Available (position/torque)
	Torque saturation protection	Available (position/torque)
	Torque limit switching	Available (position/torque)
	Gain switching	Available (position/torque)
	Torque filter	Improved HF vibration suppression effect
	Number of channels	2

High-speed digital input	Signal format	Optical isolation available for configuration
	Voltage level	24V IEC 61131
	Max input current	12.5 mA
	Transmission delay	1 μs

	Feature item	**BD3E specification**
Standard digital input	Number of channels	5 channels
	Signal format	Optical isolation available for configuration
	Voltage level	24V IEC 61131
	Max input current	6 mA
	Transmission delay	1 ms
	Max frequency	1 kHz
Standard digital output	Number of channels	3
	Signal format	Optical isolation available for configuration
	Voltage level	24V IEC 61131
	Max output current	50mA per output (total 200mA)

	Short-circuit protection	No
	Transmission delay	1 ms
Communication specifications	Application layer protocol	Ether CAT
	Supported services	CoE PDO SDO
	Synchronization method	DC – distributed clock
	Physical layer	100BASE-TX
	Baud rate	100Mbit/s 100BASE-TX
	Duplex mode	Full duplex
	Topology	Linear
	Transmission medium	Shielded cable of CAT5E or above
	Transmission distance	<150M between two nodes (in good environment, with good cables used)
	Number of slaves	65535 ports supported by protocol, and more than 200 slaves connectable in actual use
	Ether CAT frame length	44 bytes ~ 1498 bytes
	Process data	Max 1486 bytes per Ethernet frame

	Refresh time	About 30us for 1000 digital I/Os, and about 100us for two servo axes; with different refresh time defined for different interfaces.
	Communication bit error rate	10-10 Ethernet
	LED indicator light	No
Configuration unit	FMMU	8
	Storage sync management unit	8
	Process data RAM	8KB
	DC	64-bit
	EEPROM capacity	32Kbit, with initialization data written by Ether CAT master
Control mode		Position control: profile position control (pp), cyclic position control (csp)
		Speed control: profile speed control (pv), cyclic speed control (csv)
		Torque control: profile torque control (tq), cyclic torque control (cst)
		Homing mode (hm)
		The control modes described above are switched via EtherCAT communication commands

Environmental Specifications	Protection functions	Including but not limited to: dynamic brake (hardware), undervoltage/overvoltage protection, overcurrent protection, and drive and motor overheating protection
	Compliance	CE Directives: EN61800-3, EN61800-5-1
	Environment	Operating temperature: 0-45° C, without power derating; 45-55° C, with power derating
		Storage temperature: -20 ~ 65°
		Humidity: 10 – 90% (no condensation)
		Altitude: <1,000m, as per the spacing requirements specified in IEC 61800-5-1.
		Vibration: 5.88m/s², 10Hz-60Hz
	Operating conditions	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

MECHANICAL AND ELECTRICAL SPECIFICATIONS (220V)

Model	Standard Version	BD3E-1D62AEB	BD3E-2D82AEB		BD3E-5D52AEB	BD3E-7D62AEB	BD3E-0122AEB
	Safety Version	BD3E-1D62AEB-ST	BD3E-2D82AEB-ST	BD3E-2D82AEB-BS	BD3E-5D52AEB-ST	BD3E-7D62AEB-ST	BD3E-0122AEB-ST

Max available motor capacity (W)		200	400		750	1000	2000
Continuous output current [Arms]		1.6	2.8	2.8	5.5	7.6	11.6
Instantaneous max output current [Arms]		5.8	9.8	9.8	16.9	23	32
Main circuit	Power supply	1ph AC 200V-240V +10% -10% 50/60Hz				1/3ph AC 200V-240V +10% -10%, 50/60Hz	
	Input current [Arms]	2.3	4	4	7.9	9.6 (single-phase) 5.1 (three-phase)	12.8 (single-phase) 8.0 (three-phase)
Control power supply		Power supply via bus, with shared rectifier					
Regenerative resistor	Resistance of built-in resistor [Ω]	No	No	40	40	25	25
	Power of built-in resistor [W]	No	No	50	50	80	80
	Max braking energy absorption capacity of capacitor [J]	13.15	26.29	26.29	22.41	44.7	72.1
	Min allowable resistance of external resistor [Ω]	50	45	40	40	25	15

Case		A		B		C	D
Overall dimensions	W(mm)	45		50		60	80
	H(mm)	160		160		160	160
	D(mm)	173		173		200	200
Fan		No	No	Yes	Yes	Yes	Yes

MECHANICAL AND ELECTRICAL SPECIFICATIONS (380V)

Model	Standard Version	BD3E-3D54DEB	BD3E-5D44DEB	BD3E-8D44DEB	BD3E-0124DEB
	Safety Version	BD3E-3D54DEB-ST	BD3E-5D44DEB-ST	BD3E-8D44DEB-ST	BD3E-0124DEB-ST
Max available motor capacity (W)		1000	1500	2000	3000
Continuous output current [Arms]		3.5	5.4	8.4	11.9
Instantaneous max output current [Arms]		11	14	20	29.7
Main circuit	Power supply	3ph AC 380V-440V +10% -10% 50/60Hz			
	Input current [Arms]	2.4	3.6	5.6	8
Control power supply		Power supply via bus, with shared rectifier			

Regenerative resistor	Resistance of built-in resistor [Ω]	100		50	
	Power of built-in resistor [W]	60		75	
	Max braking energy absorption capacity of capacitor [J]	34.28	34.28	50.41	50.41
	Min allowable resistance of external resistor [Ω]	80	60	45	40
Case		C		D	
Overall dimensions	W(mm)	60		75	
	H(mm)	160		160	
	D(mm)	196		200	
Fan		Yes	Yes	Yes	Yes

SERVO TERMINAL DEFINITION

Servotronix Tmall Flagship Store

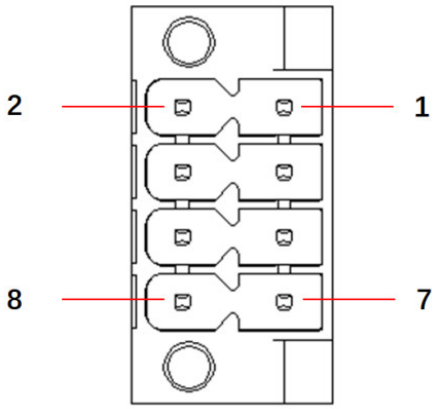
Scan to Buy
Terminal Cables

https://item.taobao.com/item.htm?id=826283494794&et_token=33eed087d8ba122d70ad937f46944395&et_ver=1.0

Terminal signal definition

Signals of Terminal C1

The STO blocks the PWM signal output to the drive power layer through external redundant hardware terminals STO1 and STO2, thereby preventing motor from movement.

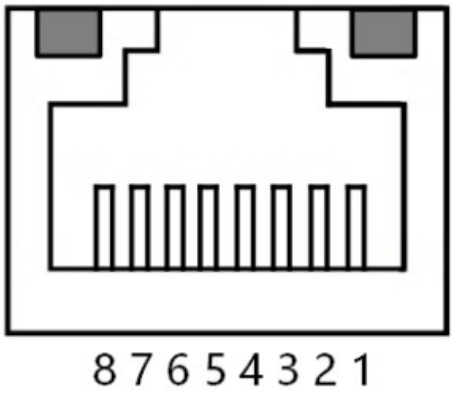


Pin	Function	Pin	Function
1	24V power supply	2	24V COM
3	STO1	4	STO COM
5	STO2	6	STO COM
7	NC	8	NC

(Note) The STO 24V power supply is only for the STO circuit, and cannot be used for other purposes.

Terminal signal definition

Signals of Terminal PC/C2/C3

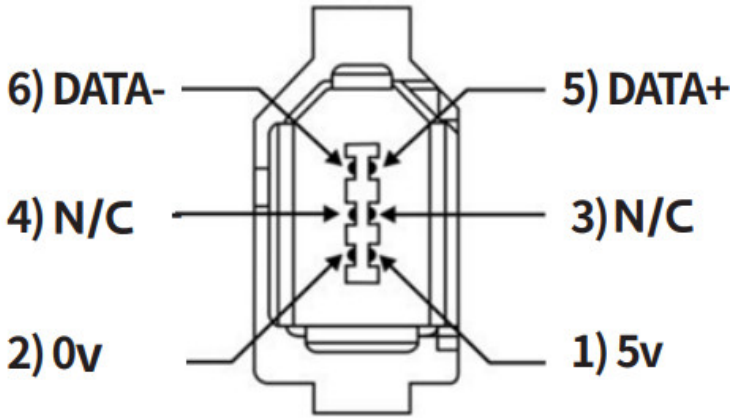


Pin	Description	Function
1	TX+	Data transmission +
2	TX-	Data transmission –
3	RX+	Data reception +
4	NC	Not connected
5	NC	Not connected
6	RX-	Data reception –
7	NC	Not connected
8	NC	Not connected
Enclosure	FG	Shielded wire

PC is the computer communication interface, which is used for the Ether NET communication of ServoStudio2 (a debugging software) on the computer.
C2 and C3 are the upper computer communication interfaces, which are used for Ether CAT communication of the EB servo drive.

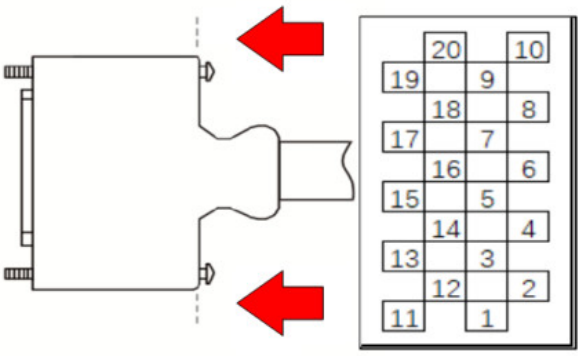
Signals of Terminal C5

See motor interface description for details about signals of terminal C5



Signals of Terminal C4

Terminal signal definition



Pin	Function	Description	Pin	Function	Description
1	Internal 24V power supply positive terminal	Internal 24V power supply positive terminal	11	Internal 24V power supply negative terminal	Internal 24V power supply negative terminal
2	N/C		12	N/C	
3	N/C		13	N/C	
4	DI1	Optically isolated programmable digital input drain-source	14	DI2	Optically isolated programmable digital input drain-source
5	DI3	Optically isolated programmable digital input drain-source	15	DI4	Optically isolated programmable digital input drain-source
6	DI5	Optically isolated programmable digital input drain-source	16	High-speed DI 1	Optically isolated programmable digital input drain-source

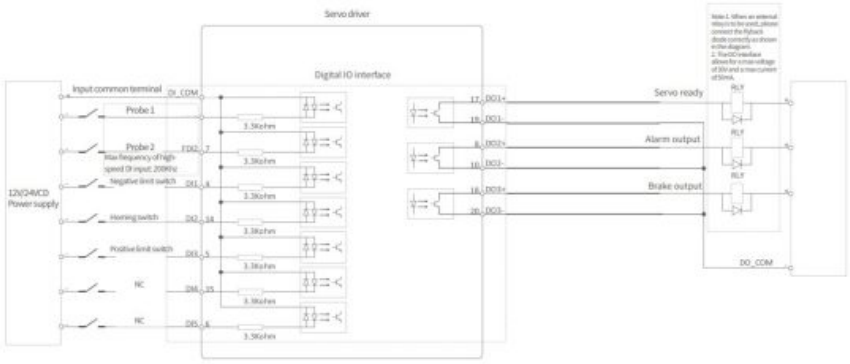
7	High-speed DI 2	Optically isolated programmable digital input drain-source	17	DO1+	Optically isolated programmable digital output
8	DO2+	Optically isolated programmable digital output	18	DO3+	Optically isolated programmable digital output
9	DI COM	24V or 0V (drain or source)	19	DO1-	Optically isolated programmable digital output
10	DO2-	Optically isolated programmable digital output	20	DO3-	Optically isolated programmable digital output

Description	Model	P/N	Remarks
C4 connector	MDR-20P20-BKAu-1.27	11201707000413	To be selected as demanded

(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.

I/O Interface (CN4)

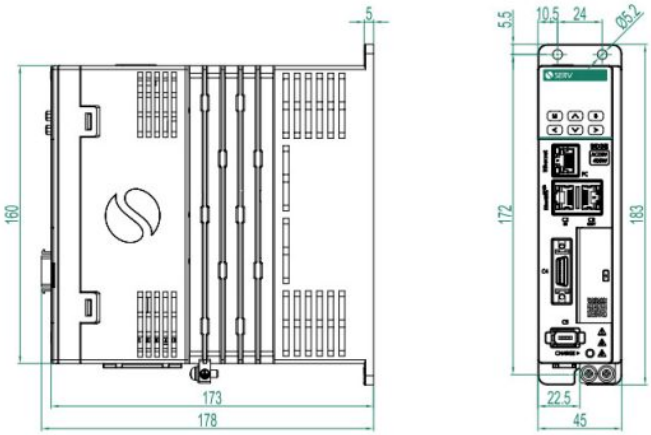


(Note)

1. The brake coil is non-polarized.
2. The power supply for the brake is to be provided by the customer. Additionally, the brake shall not share the same power supply with the control signal (VDC).
3. Do not apply a voltage above 24V or a current above 50mA to the control signal output terminal.
4. When the relays are to be driven by the output control signals directly, install the relays in parallel and install a diode as shown; if the diode is not installed or is installed reversely, the drive may be damaged.
5. It is recommended to use relay MY2N-D2_GSDC24V/MY2N-D2-DSDC12V or other relays with built-in flyback diodes, or connect FR102/FR103 or other fast recovery diodes with a withstand voltage of 70V and a current capacity greater than 1A in parallel across the relay coil.

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.



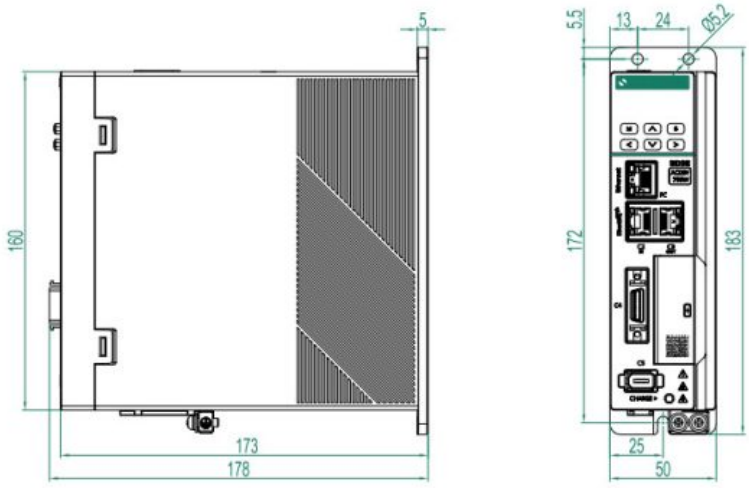
Case A:

BD3E-1D62AEB

BD3E-1D62AEB-ST

BD3E-2D82AEB

BD3E-2D82AEB-ST

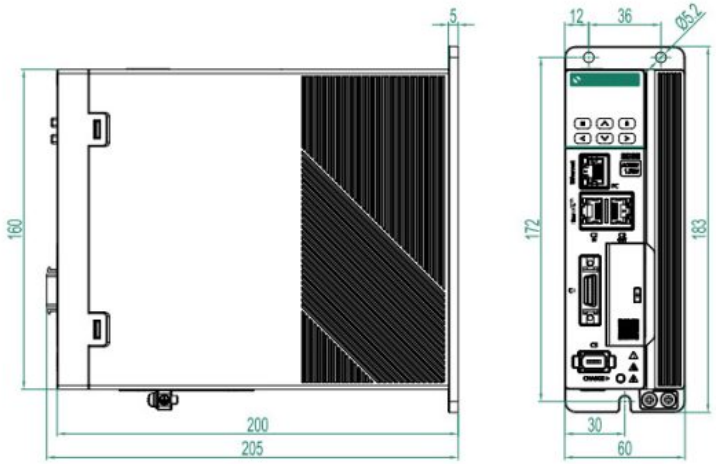


Case B:

BD3E-2D82AEB-BS

BD3E-5D52AEB

BD3E-5D52AEB-ST



Case C:

BD3E-7D62AEB

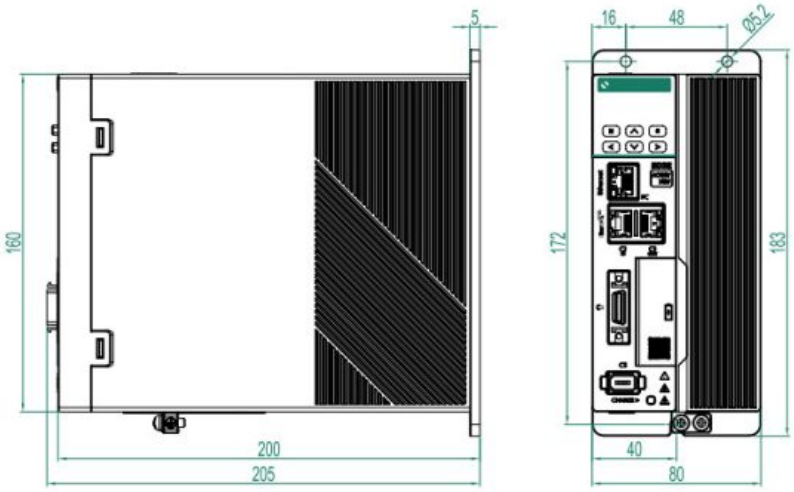
BD3E-7D62AEB-ST

BD3E-3D54DEB

BD3E-3D54DEB-ST

BD3E-5D44DEB

BD3E-5D44DEB-ST



Case D:

BD3E-0122AEB

BD3E-0122AEB-ST

BD3E-8D44DEB

BD3E-8D44DEB-ST

BD3E-0124DEB

BD3E-0124DEB-ST

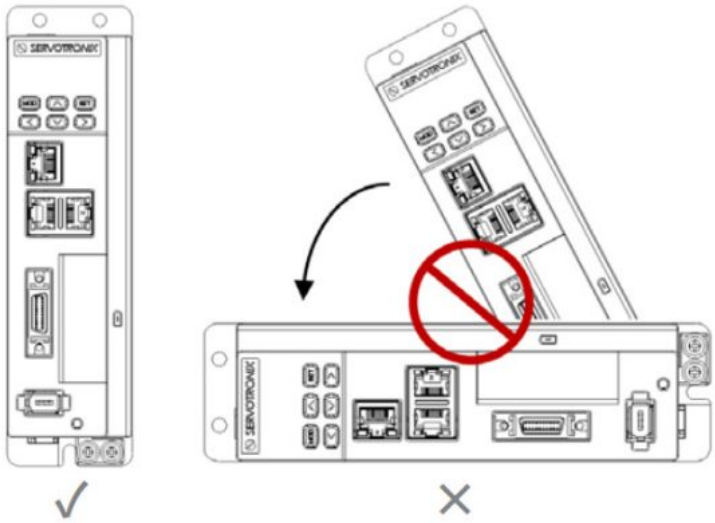
Notes:

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

1. Series

Mark	Meaning
PH	PH series

2 .Generation

Mark	Meaning
3	3rd generation

3 .Performance category

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

5 .Motor type (construction)

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

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

7. Voltage level

Mark	Meaning
A	220V
B	380V

8. Electromagnetic design sequence number

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

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

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)

13. Custom code

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

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:

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	Model w/ STO

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-1D62AEB	BD3E-1D62AEB-ST
								×	×	PH3E-L01A004NG *	PH3E-L01A004NM *	PH3S-L01A004NT *		
		0.2	220	0.64/2.24	3000/7000	0.24/0.25	1.50/5.60	√	√	PH3E-M02A006EG	PH3E-M02A006EM	PH3S-M02A006ET	BD3E-1D62AEB	BD3E-1D62AEB-ST
								√	×	PH3E-M02A006SG	PH3E-M02A006SM	PH3S-M02A006ST		
	6	0.	2 2	1.27/4	3000/	0.47/0	2.40/9	√	√	PH3E-M04A006EG	PH3E-M04A006EM	PH3S-M04A006ET	BD3E-2	BD3E-2D82

PH3-M Medium inertia & high-speed motor	0	4	0	.77	7000	.48	.00	√	×	PH3E-M04A006SG	PH3E-M04A006SM	PH3S-M04A006ST	D82AEB	AEB-ST
		0.6	220	1.91/4.69	3000/7000	0.68/0.69	3.90/14.30	√	√	PH3E-M06A006EG	PH3E-M06A006EM	PH3S-M06A006ET	BD3E-5D52AEB	BD3E-5D52AEB-ST
								√	×	PH3E-M06A006SG	PH3E-M06A006SM	PH3S-M06A006ST		
	80	0.75	220	2.39/8.37	3000/7000	1.46/1.51	4.20/15.90	√	√	PH3E-M08A008EG	PH3E-M08A008EM	PH3S-M08A008ET	BD3E-5D52AEB	BD3E-5D52AEB-ST
								√	×	PH3E-M08A008SG	PH3E-M08A008SM	PH3S-M08A008ST		
		1.	2	3.1	30	2.0	5.6	√	√	PH3E-M10A008EG	PH3E-M10A008EM	PH3S-M10A008ST	BD3E-7	BD3E-7

		0	20	8/11.13	00/7000	0/2.05	0/21.50	√	×	PH3E-M10A008SG	PH3E-M10A008SM	PH3S-M10A008ST	D62AEB	D62AEB-ST
PH3-		0.85	220	5.39/16.17	1500/4500	13.14/15.4	5.96/15.7	√	√	PH3E-G09A013EG	PH3E-G09A013EM	PH3S-G09A013ET	BD3E-7D62AEB	BD3E-7D62AEB-ST
								√	×	PH3E-G09A013SG	PH3E-G09A013SM	PH3S-G09A013ST		
			380	5.39/16.17	1500/4500	13.14/15.4	3.23/8.5	√	√	PH3E-G09B013EG	PH3E-G09B013EM	PH3S-G09B013ET	BD3E-3D54DEB	BD3E-3D54DEB-ST
								√	×	PH3E-G09B013SG	PH3E-G09B013SM	PH3S-G09B013ST		
			2	8.34/2	1500/	18.91/	9.7	√	√	PH3E-G13A013EG	PH3E-G13A013EM	PH3S-G13A013ET	BD3E-01	BD3E-01

G me diu m- ine rtia & hig h-t or qu e mo tor	1 3 0	1. 3	2 0	0.8 5	45 00	21. 2	/25 .2	√	×	PH3 E-G 13A 013 SG	PH3 E-G 13A 013 SM	PH3S -G13 A013 ST	22A EB	22A EB- ST
			3 8 0	8.3 4/2 0.8 5	15 00/ 45 00	18. 91/ 21. 2	4.8 5/1 2.6	√	√	PH3 E-G 13B 013 EG	PH3 E-G 13B 013 EM	PH3S -G13 B013 ET	BD3 E-5 D44 DEB	BD3 E-5 D44 DEB -ST
								√	×	PH3 E-G 13B 013 SG	PH3 E-G 13B 013 SM	PH3S -G13 B013 ST		
		1. 8	2 2 0	11. 5/2 8.7 5	15 00/ 45 00	25. 05/ 27. 0	11. 4/2 9.8	√	√	PH3 E-G 18A 013 EG	PH3 E-G 18A 013 EM	PH3S -G18 A013 ET	BD3 E-01 22A EB	BD3 E-01 22A EB- ST
								√	×	PH3 E-G 18A 013 SG	PH3 E-G 18A 013 SM	PH3S -G18 A013 ST		
			3	11. 5/2	15 00/	25. 05/	7.3	√	√	PH3 E-G 18B 013 EG	PH3 E-G 18B 013 EM	PH3S -G18 B013 ET	BD3 E-8	BD3 E-8

			80	8.75	4500	27.0	3/19.2	√	×	PH3E-G18B013SG	PH3E-G18B013SM	PH3S-G18B013ST	D44DEB	D44DEB-ST

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

PH3 SERIES PRODUCT PORTFOLIO

20 20bit single-turn magnetic encoder

20 20bit multi-turn magnetic encode

23 23bit 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]	20 20 23

Inertia class	Specification	200W	400W	600W	750W	1000W
	Model	M02A006	M04A006	M06A006	M08A008	M10A008

PH3 □ -M (medium inertia & high speed)	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]	20 20 23	20 20 23	20 20 23	20 20 23	20 20 23

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]	20 20 23	20 20 23	20 20 23

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/s^2, frequency sweep count 10;	
Impact resistance strength	Peak acceleration 50m/s^2, 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)
	Installation location	· Indoors without corrosive or explosive gases
		· 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	$x10^{-4}kg.m^2$	0.24	0.47	0.68	1.46	2
	W/ brake	$x10^{-4}kg.m^2$	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	$x10^{-4}kg.m^2$	13.14	18.91	25.05	13.14	18.91	25.05
	W/ brake	$x10^{-4}kg.m^2$	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

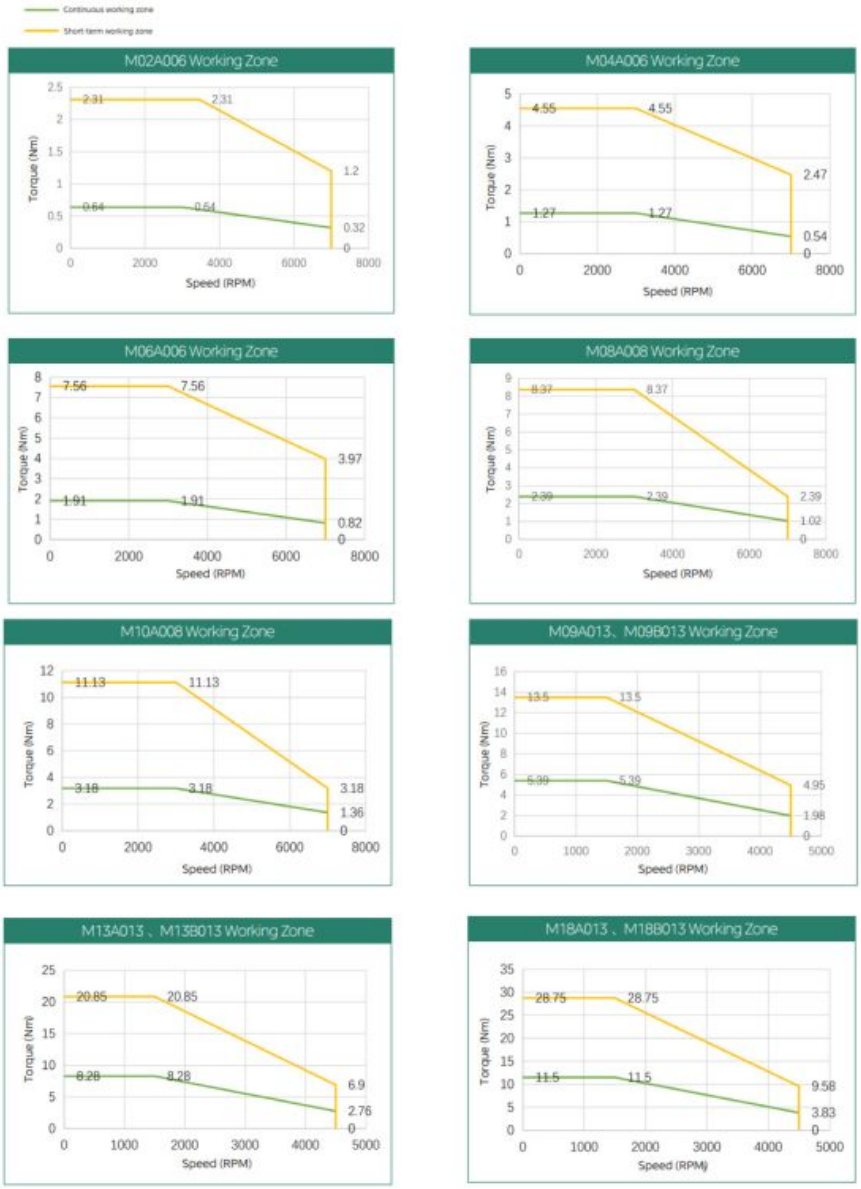
Values of parameter items marked with “*” herein are typical values, and subject to a certain tolerance for the actual products;

“*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.

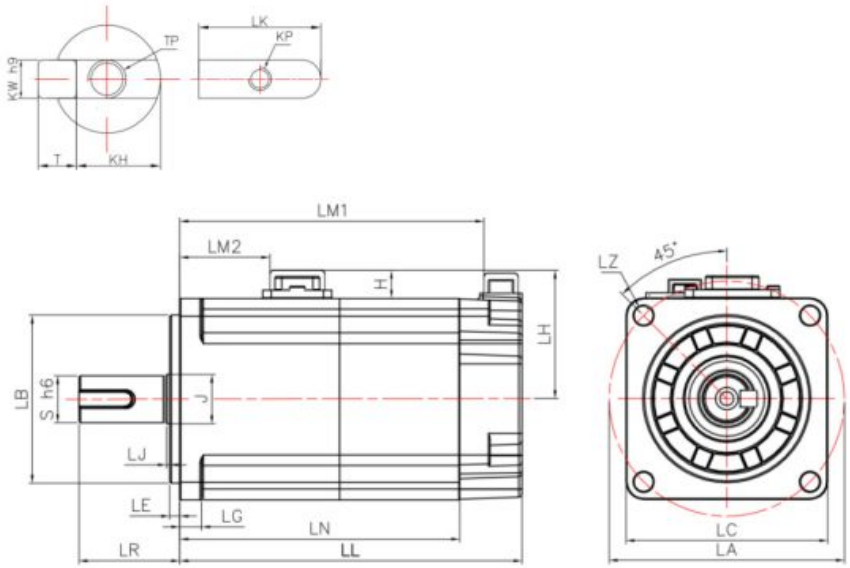
“*2” indicates that the brake is only for static braking, and shall never be used

for dynamic braking.

T-N CURVES



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

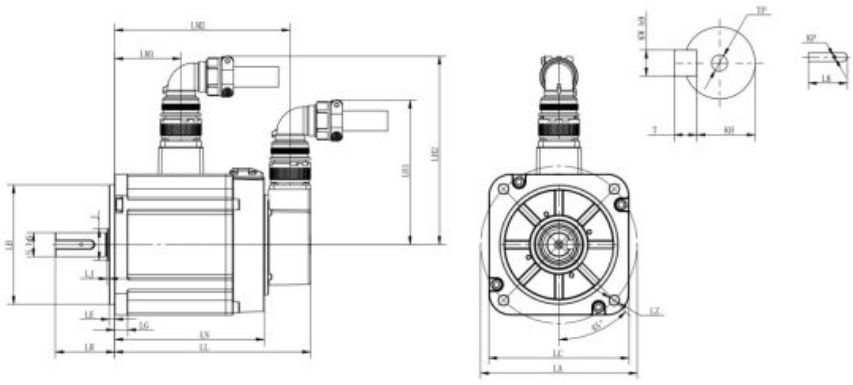


Model	Model	M02A006	M04A006	M06A006	M08A008	M10A008
LA		φ70	φ70	φ70	φ90	φ90
LB		φ50	φ50	φ50	φ70	φ70
LC		60	60	60	80	80
LZ		4φ5.7	4φ5.7	4φ5.7	4φ6.6	4φ6.6
S		φ14h6	φ14h6	φ14h6	φ19h6	φ19h6
j		φ14.7	φ14.7	φ14.7	φ19.8	φ19.8
LH		38.3	38.3	38.3	46.5	46.5
LR		30	30	30	35	35
LE		3	3	3	3	3
LG		6.5	6.5	6.5	8	8
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
LM 1	W/O bra ke	57.95	146.9	98.83	87	99
	W/ brake	90.45	211.9	134.94	116	137
LM 2	W/O bra ke	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 1 2	M5, depth 12	M5, depth 1 2	M6, depth 1 4	M6, depth 1 4

Note: Dimensions herein are measured in millimeters (mm)

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

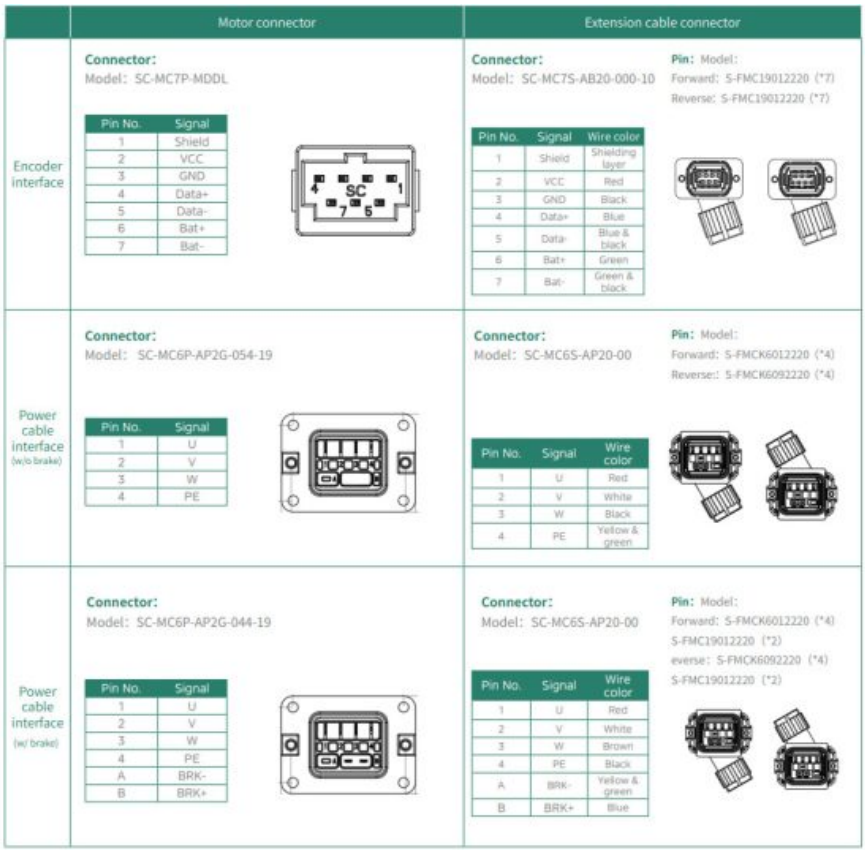


Model	Model	G09A013 G09B013	G13A013 G13B013	G18A013 G18B013
LA		130	130	130
LB		110	110	110
LC		145	145	145
LZ		9	9	9
S		22	22	22
j		φ29	φ29	φ29
LH1		135	135	135
LH2		175	175	175
LR		55	55	55
LE		5	5	5
LG		12	12	12
Lj		2	2	2
LL(magnetic encoder)	W/O brake	135	151.5	168
	W/ brake	164	180.5	197
LL(optical 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

INTERFACE DEFINITION

M02/04/06/08/10



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	**Connector:** Model: CMS3102A20-29P P/N: 12119400001081 Pin No. / Signal E SD+ F SD- G GND H VCC J Shield S Bat- T Bat+ 	**Connector:** Model: HMS3108AE20-29S P/N: 12119400000581 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 
Power cable interface (w/o brake)	**Connector:** Model: CMS3102A20-18P P/N: 12119400000841 Pin No. / Signal E PE F U I V B W 	**Connector:** Model: CMS3108A20-18SI P/N: 12119400000502 Pin No. / Signal / Wire color E PE Yellow & green F U Red I V White B W Black 
Power cable interface (w/ brake)	**Connector:** Model: CMS3102A20-18P P/N: 12119400000841 Pin No. / Signal E PE F U I V B W C BRK+ D BRK- 	**Connector:** Model: CMS3108A20-18SI P/N: 12119400000502 Pin No. / Signal / Wire color E PE Yellow & green F U Red I V White B W Black C BRK+ Brown D 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 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 series CDHD2S series	3	CBL-PWPH220001A003		CBL-PWPH20001A0
		5	CBL-PWPH220001A005		
		10	CBL-PWPH220001A010		
		15	CBL-PWPH220001A015		
		20	CBL-PWPH220001A020		

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
		3	SFC-A72A43-0103-F	SFC-A74A43-0103-F	

M02/04/06/08/10	BD3 series	5	SFC-A72A43-0105-F	SFC-A74A43-0105-F	CAP-A7-A4-3	
		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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Terminal Cables

https://item.taobao.com/item.htm?

id=826283494794&et_token=33eed087d8ba122d70ad937f46944395&et_ver=1.0

Servotronix Wechat official account	Gaochuang WeChat Channels	Official web
http://weixin.qq.com/r/oDuwqPXElqhdrbHL926y	https://weixin.qq.com/f/EAMoJHv4MlBZKrEbd5Zw7Js	http://m.seom.cn/

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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Servotronix Motion Technology Development (Shenzhen) Co., Ltd.

Documents / Resources

	SERVOTRONIX BD3E EB AC Servo System [pdf] User Manual BD3E EB, PH3, BD3E EB AC Servo System, BD3E EB, AC Servo System, Servo System, System

References

- User Manual

SERVOTRONIX

AC Servo System, BD3E EB, BD3E EB AC Servo System, PH3, Servo System, SERVOTRONIX, System

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