31050142-SC V1.1

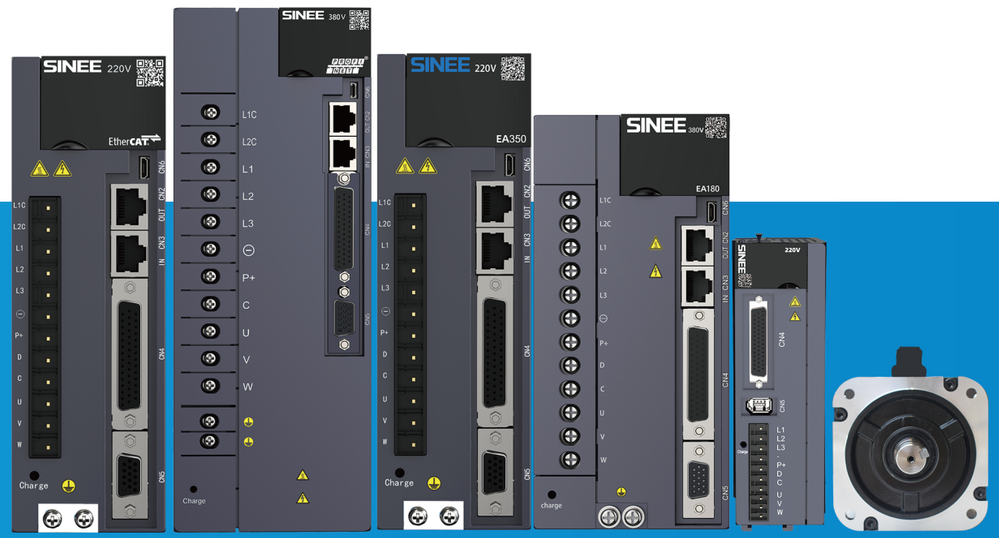
SINEE

Stock code
688395

深圳市正弦电气股份有限公司
Shenzhen Sine Electric Co . ,Ltd

Servo Selection Guide

Automated production and life



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Address: 6/F, Building No. 56, Huaqing Creativity Park, 33 Zhihui Road,
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SINEE

SINEE

Since its establishment in 2003, SINEE (Shenzhen Sine Electric Co., Ltd.) has been focusing on the R&D, production and sales of motor drive and control systems in the field of industrial automation. With the mission of “automated production and life”, it provides the most valuable products and services for users. In 2021, SINEE was listed on the Science and Technology Innovation Board of the Shanghai Stock Exchange (stock code: 688395). At present, it has R&D, production and service bases in Shenzhen, Wuhan and Wuxi.

Automated production and life

SINEE has established key core technology platforms such as high-performance variable frequency vector control technology, high-precision servo drive technology, embedded computer control technology, and power electronic application technology. It mainly provides inverters, integrated units, servo system products and system solutions.

Vision
Automated production and life

Operations
Motor drive and control system solution provider

Customers
Mechanical equipment manufacturer, electronic control system integrator and distributor

Competitiveness
Industry market solution and customization

Introduction of servo driver product line

Input device controller

Motion controller

HMI

PLC

Servo driver

EA350
Analog quantity and pulse type

EA190
Pulse type

EA196
Pulse type

EA190E
EtherCAT bus type

EA300E
EtherCAT bus type

EA180C
CANopen bus type

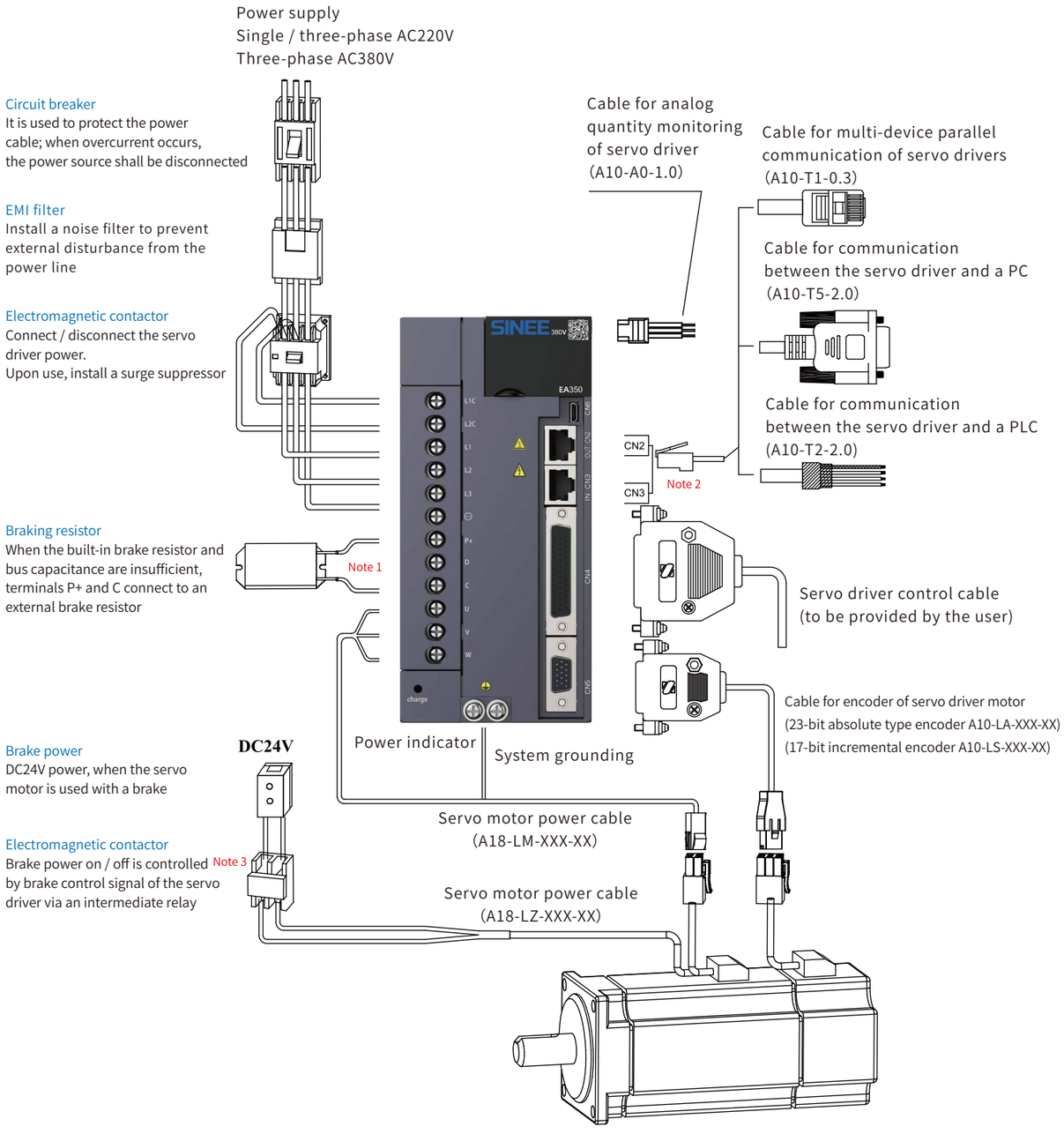
EA180P
PROFINET bus type

EA350 series servo driver

Single-phase 220 V ~ 240 V 0.1~1 kW
Three-phase 220 V ~ 240 V 0.75~1.5 kW
Three-phase 340 V ~ 460 V 1.5~30 kW

- High performance
- High electromagnetic compatibility
- Multi-functional and expansible

Connection between EA350 analog pulse type servo driver and peripheral device



Note 1: When an external brake resistor is used, it is required to remove the short-circuiting piece between P+ and D, and correctly set the brake resistor parameter on the driver

Note 2: CN2 and CN3 are two RJ45 sockets with identically defined internal pins

Note 3: It is strongly recommended that the servo motor brake is defined by the servo driver as the D0 terminal of the BK function for control. The D0 terminal of the servo driver shall have its load capacity used only for driving an intermediate relay other than an electromagnetic contactor

Terminal description of EA350 analog pulse type servo driver

Main circuit terminal

Terminal marking	Terminal name
L1C、L2C	Control power input terminal
L1、L2、L3	AC power input terminal of main circuit
P+、D、C	Connecting terminal for an external braking resistor
P+、⊖	Common DC bus terminal
U、V、W	Servo motor connecting terminal
PE	Grounding

CN1 analog quantity monitoring terminal

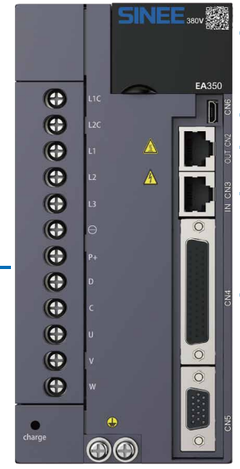
Pin number	Signal name	Function
1	AO1	Output voltage 0 V ~ 10 V, Maximum output current 1mA
2	AO2	
3	GND	Common ground of analog output signal
4	Reserved	Cannot be connected with any signal line

CN2 and CN3 communication terminals

Pin number	Signal name	Function
1	RS485+	Positive terminal of RS485 signal
2	RS485-	Negative terminal of RS485 signal
3	GND	Communication signal reference ground
4	RS232-RXD	RS232 signal receiving side
5	RS232-TXD	RS232 signal sending side

CN6 USB

According to USB 2.0 specification



CN4 control terminal

Signal name		Pin number	Default function	
Digital input	DI1	5	S-ON	Servo on
	DI2	20	ALM-RST	Alarm fault resetting
	DI3	4	P-CLR	Pulse deviation counter clearing
	DI4	19	P-OT	Inhibit forward drive
	DI5	3	N-OT	Inhibit reverse drive
	DI6	18	INHIBIT	Pulse inhibited
	DI7	2	ORPG	Homing detection signal
	DI8	17	SHOM	Homing enable
	COM+	21	DI input common positive terminal	
Power supply	+24V	25/40	Internal 24 V power source, with the voltage range of +20 V ~ 26 V, maximum output current 200 mA.	
	COM	7/22/36		
	+10V	44	+10V power, maximum output of 5mA.	
	GND	29		
Digital output	DO1	8	S-RDY+	The servo is ready and can be connected when S-ON signal status can be received
	DO1-	37	S-RDY-	
	DO2	23	BK+	Brake control signal
	DO2-	38	BK-	
	DO3	9	COIN+	Position reached signal
	DO3-	39	COIN-	
	DO4	24	ALM+	Connected upon occurrence of a fault
	DO4-	10	ALM-	
Frequency division output	PA+	28	A pulse frequency division output +	Maximum current 20 mA
	PA-	13	A pulse frequency division output -	
	PB+	12	B pulse frequency division output +	Maximum current 20 mA
	PB-	27	B pulse frequency division output -	
	PZ+	11	Z pulse frequency division output +	Maximum current 20 mA
	PZ-	26	Z pulse frequency division output -	
	OCA	43	ABZ pulse open-collector output (NPN) Maximum allowable input current with GND of 40 mA	
	OCB	42		
	OCZ	35		
	GND	29		
Analog quantity	AI1	15	Analog input signal, 16-bit resolution, maximum allowable input voltage: ±12V.	
	AI2	30		
	GND	29	Analog input signal ground	
Position command	PULHIP	1	Positive terminal when 24V power source is used for position pulse	Way of pulse command input: Differential pulse input, open collector input Input pulse form: Pulse + direction A, B-phase orthogonal pulse CW/CCW pulse
	PULSE+	33	Position pulse command +	
	PULSE-	34	Position pulse command -	
	SIGN+	31	Differential position direction command +	
	SIGN-	32	Differential position direction command -	

CN5 encoder terminal

Pin number	Signal name
1	SD+
3	SD-
5	+5V
10	GND
Housing	PE

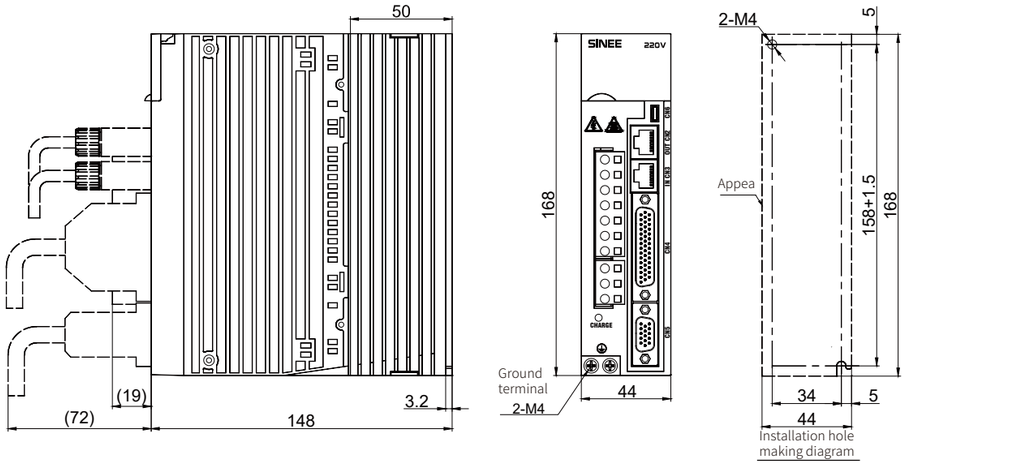
Model description of EA350 series analog pulse type servo driver

EA 350 X - 6R2 - 2 B - XX

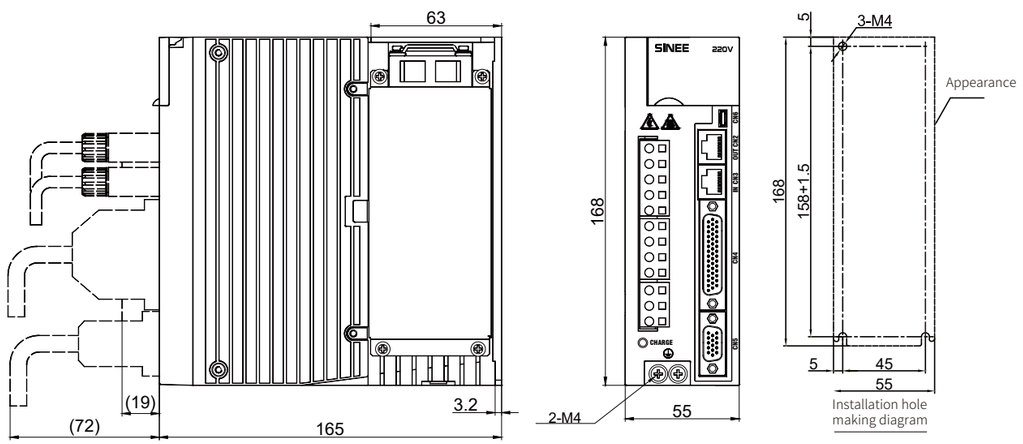
① ② ③ ④ ⑤ ⑥ ⑦

①Product Servo driver	④Rated output current 0R9-0.9A 062-62A	⑥ Encoder type B：17/23-bit serial encoder
②series 350 series		
③Null:standard A：16-bit high-precision analog input	⑤Rated voltage of power supply 1. Single-phase AC220 V 2.Single / three-phase AC220 V 3. Three-phase AC380 V	⑦Non-standard specification

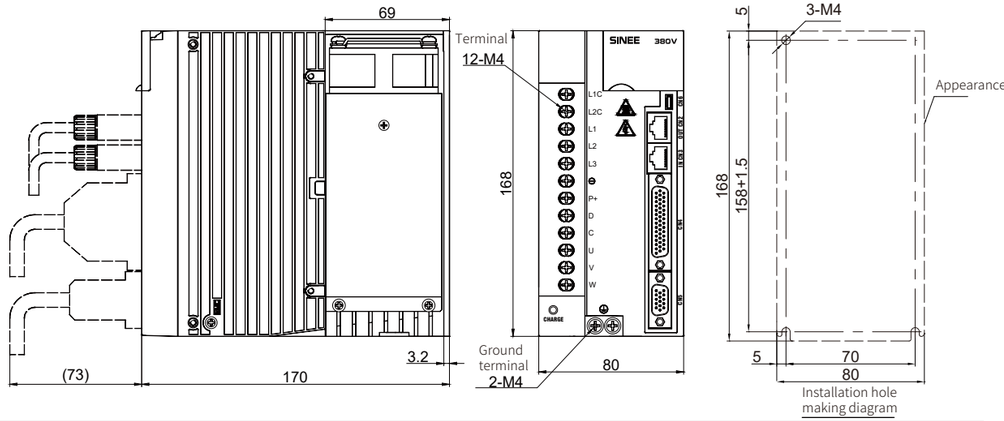
Dimension diagram of EA350 series analog pulse type servo driver



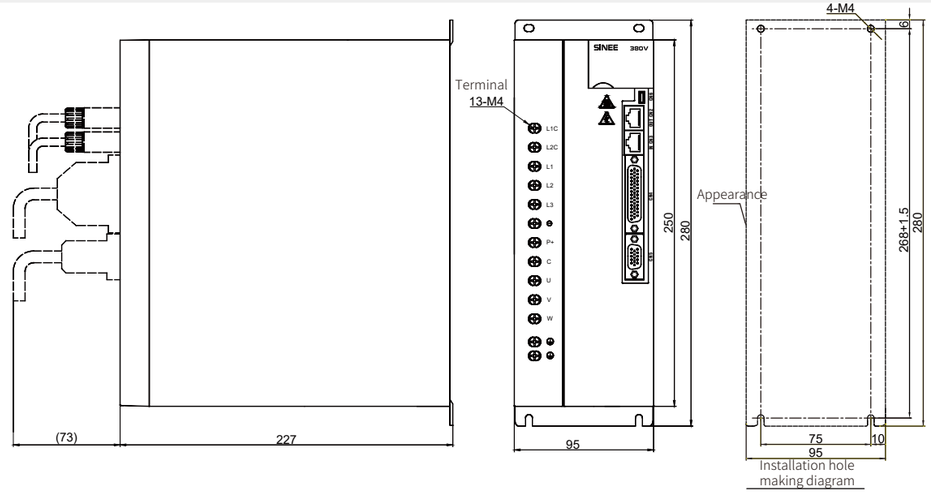
EA350□-0R9-1B EA350□-1R6-1B EA350□-2R5-1B



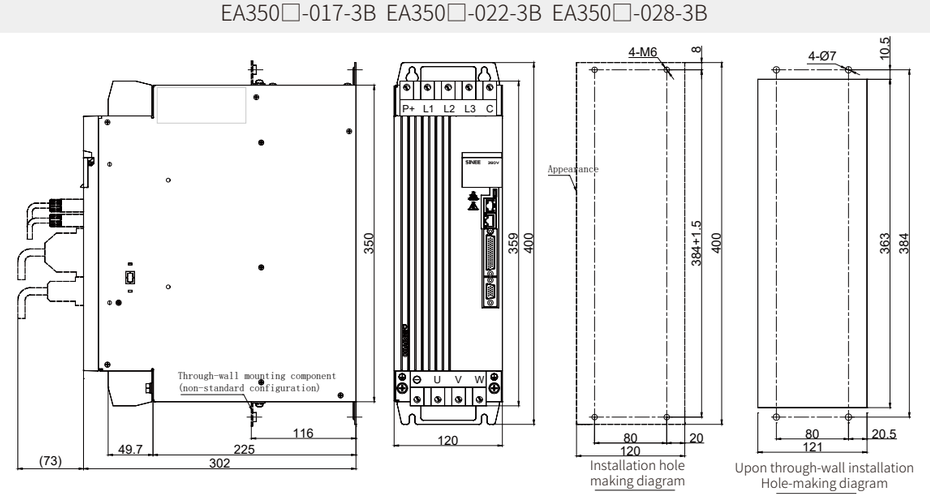
EA350□-4R8-2B EA350□-6R2-2B



EA350□-5R6-3B EA350□-8R5-3B EA350□-013-3B EA350□-011-2B



EA350□-017-3B EA350□-022-3B EA350□-028-3B

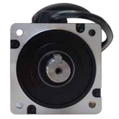


EA350□-038-3B EA350□-052-3B EA350□-062-3B

Specification of EA350 series analog pulse type servo driver

Operating conditions	Temperature	Working temperature 0~40° , storage temperature -20° ~85°	
	Humidity	Working / storage: ⩽ 90% RH (without dew condensation)	
	Altitude	⩽ 1,000 m	
	Vibration	⩽ 4.9 m/s^2, 10~60 Hz (no operation at the point of resonance is permitted)	
Cooling method		Fan cooling	
Control method		SVPWM, vector control	
Six control modes		Speed control, position control, torque control, speed / position control, torque / speed control, position / torque control	
Front panel		5 keys, 5-digit LED	
Regenerative brake		Built-in brake unit (a built-in brake resistor is provided in partial specifications), which can have an external resistor connected	
Feedback mode		RS485 serial communication encoder, RA-CODER or FA-FORMAT protocol (non-standard version of FA-FOR-MAT is supported)	
Digital input/output		Input	Pulse disable, forward drive disable, reverse drive disable, forward inch, backward inch
		Output	Servo ready, brake output, motor rotation output, zero-speed signal, speed approach, speed reached, position approach, torque limit, rotating speed limit, warning output, alarm output.
Protective Function Software		Hardware	Over-voltage, under-voltage, over-speed, overheat, overload, over-speed, encoder alarm, and so on.
		Software	Excessively large position error, EEPROM fault, and so on.
Alarm data tracking function		Record 4 groups of historical alarms and relevant data	
Communication function		Modbus RTU	
Encoder signal output	Signal type	A, B, Z differential outputs, Z signal open-collector output; Z signal width can be set. A/B/Z pulse open-collector output (NPN)	
	Resolution	Any frequency division can be programmed and output before or after frequency quadruplication	
Position control mode	Maximum input pulse frequency	Differential input mode: 500 Kpps Open-collector input mode: 200 Kpps	
	Pulse command mode	Pulse + symbol, A and B-phase orthogonal pulse, CW/CCW	
	Command control mode	External pulse command, multi-segment position command	
	Command smoothing mode	Low-pass filtering, FIR filter, trapezoid-shaped smoothing of multi-segment position command	
	Electronic gear ratio	Electronic gear ratio: N/M multiples (0.001 < N/M < 64000 = N: 1~2^{30}, M: 1 ~230	
	Position accuracy	±1 pulse command	
Speed control mode	Command control mode	External analog quantity command, digital speed command, multistage speed command, inching command	
	Command smoothing mode	Low-pass filtering, smooth S curve	
	Analog command input	Voltage range	-10 V ~ 10 V
		Input impedance	10 KΩ
		Time constant	200 μs
	Torque limit	Digital setting or external analog quantity limit	
	Speed regulation ratio	1:5000 (23-bit encoder)	Minimal speed/rated rotating speed of continuous stable operation under the rated load
	Bandwidth	3,000 Hz (23-bit encoder)	
	Speed fluctuation ratio	Load fluctuation (0 ~100%)	Maximum 0.1%
		Supply voltage change ±10%	Maximum 0.1%
		Ambient tempera-ture (0 ~ 50° C)	Maximum 0.1%
		For a 23-bit encoder, when the speed command is the rated rotating speed, (rotating speed without load - rotating speed with full load)/rated rotating speed.	
Torque control mode	Command con-trol mode	External analog command, digital torque command	
	Command smoothing mode	Low-pass filtering	
	Analog command input	Voltage range	-10 V ~ 10 V
		Input impedance	10 KΩ
		Time constant	200 μs
	Speed limit	Digital setting or external analog quantity limit	
	Accuracy	±1% (current repetition accuracy)	

EA350 series servo motor and driver matching table

Servo driver				Motor		
EA350		Model	Supply voltage	Motor	Power wattage	Adaptable motor model
SIZE A		EA350-0R9-1B EA350-1R6-1B EA350-2R5-1B	Single-phase AC220V		50W 100W 200W 400W	SES04-005-30-2FAY ☐ SES04-0R1-30-2FAY ☐ SES06-0R2-30-2FBY ☐ SES06-0R4-30-2FBY ☐
SIZE B		EA350-4R8-2B EA350-6R2-2B	Single-phase or three-phase AC220V		750W 1000W	SES08-0R7-30-2FBY ☐ SES08-1R0-30-2FBY ☐ SES13-1R0-20-2FBY ☐
SIZE C		EA350-5R6-3B EA350-8R5-3B EA350-013-3B	Three-phase AC380V		850W 1.3KW 1.7KW	SES13-0R8-15-3FBY ☐ SES13-1R3-15-3FBY ☐ SES13-1R7-30-3FBY ☐ SES13-1R1-20-3FBY ☐ SES13-1R7-20-3FBY ☐
					1.8KW 2.4KW 2.6KW 2.9KW 3.6KW	SES13-2R6-30-3FBY ☐ SES13-1R8-15-3FBY ☐ SES13-2R4-20-3FBY ☐ SES13-3R6-30-3FBY ☐ SES18-2R9-15-3FBY ☐
SIZE C		EA350-011-2B	Three-phase AC220V		0.8KW 1.1KW 1.7KW	SES13-1R1-20-2FBY ☐ SES13-0R8-15-2FBY ☐ SES13-1R7-30-2FBY ☐
SIZE D		EA350-017-3B EA350-022-3B EA350-028-3B	Three-phase AC380V		4.4KW 5.5KW 7.5KW	SES18-4R4-15-3FBY ☐ SES18-5R5-15-3FBY ☐ SES18-7R5-15-3FBY ☐
					11KW 13KW 15KW	SEC20-011-15-3FBY ☐ SEC20-011-20-3FBY ☐ SEC20-013-15-3FBY ☐ SEC20-015-15-3FBY ☐ SEC23-011-15-3FBY ☐
SIZE E		EA350-038-3B EA350-052-3B EA350-062-3B	Three-phase AC380 V		15KW/18W/ 22KW/29KW	SEC23-015-15-3FBY ☐ SEC23-018-15-3FBY ☐ SEC23-022-15-3FBY ☐ SEC23-029-15-3FBY ☐

EA350 series servo motor, driver and cable matching table

Motor specification/model	Adaptable driver model	Encoder cable	Motor cable
SES04-005-30-2FAY ☐	EA350-0R9-1B	A10-LS-A000-m (without battery) A10-LA-A000-m (without battery)	A18-LM-A007-m (motor power cable) A10-LZ-A005-m (brake cable for motor with a brake)
SES04-0R1-30-2FAY ☐	EA350-1R6-1B		
SES06-0R2-30-2FBY ☐			
SES06-0R4-30-2FBY ☐	EA350-2R5-1B		
SES08-0R7-30-2FBY ☐	EA350-4R8-2B		
SES08-1R0-30-2FBY ☐	EA350-6R2-2B		
SES13-1R1-20-2FBY ☐	EA350-6R2-2B	A18-LS-H400-m (without battery) A18-LA-H400-m (without battery)	A18-LM-M415-m (motor power cable) A18-LZ-H405-m (Brake line)
SES13-0R8-15-2FBY ☐	EA350-011-2B		A18-LM-M420-m (motor power cable) A18-LZ-H405-m (brake cable for motor with a brake)
SES13-1R7-30-2FBY ☐			
SES13-0R8-15-3FBY ☐	EA350-5R6-3B		
SES13-1R1-20-3FBY ☐			
SES13-1R7-30-3FBY ☐	EA350-5R6-3B		
SES13-1R3-15-3FBY ☐			
SES13-1R8-15-3FBY ☐	EA350-8R5-3B		
SES13-1R7-20-3FBY ☐			
SES13-2R6-30-3FBY ☐			
SES18-2R3-15-3FBY ☐	EA350-013-3B		Without brake: A18-LM-M525-m (motor power cable) With brake: A10-LM-M220-m (motor power cable) A18-LZ-H405-m (motor power cable)
SES13-2R4-20-3FBY ☐			
SES13-3R6-30-3FBY ☐			
SES18-2R9-15-3FBY ☐	EA350-013-3B		
SES18-3R6-20-3FBY ☐			
SES18-4R4-15-3FBY ☐	EA350-017-3B		
SES18-5R5-15-3FBY ☐	EA350-022-3B		A10-LM-M240-m (motor power cable) A18-LZ-H405-m (brake cable for motor with a brake)
SES18-7R5-15-3FBY ☐	EA350-028-3B		
SEC20-011-20-3FBY ☐	EA350-028-3B	A10-LS-H100-m (without battery) A10-LA-H100-m (with battery)	Not provided
SEC20-011-15-3FBY ☐			
SEC20-015-20-3FBY ☐			
SEC20-013-15-3FBY ☐			
SEC20-015-15-3FBY ☐			
SEC23-011-15-3FBY ☐			
SEC23-015-15-3FBY ☐	EA350-038-3B		
SEC23-018-15-3FBY ☐	EA350-052-3B		
SEC23-022-15-3FBY ☐			
SEC23-029-15-3FBY ☐	EA350-062-3B		

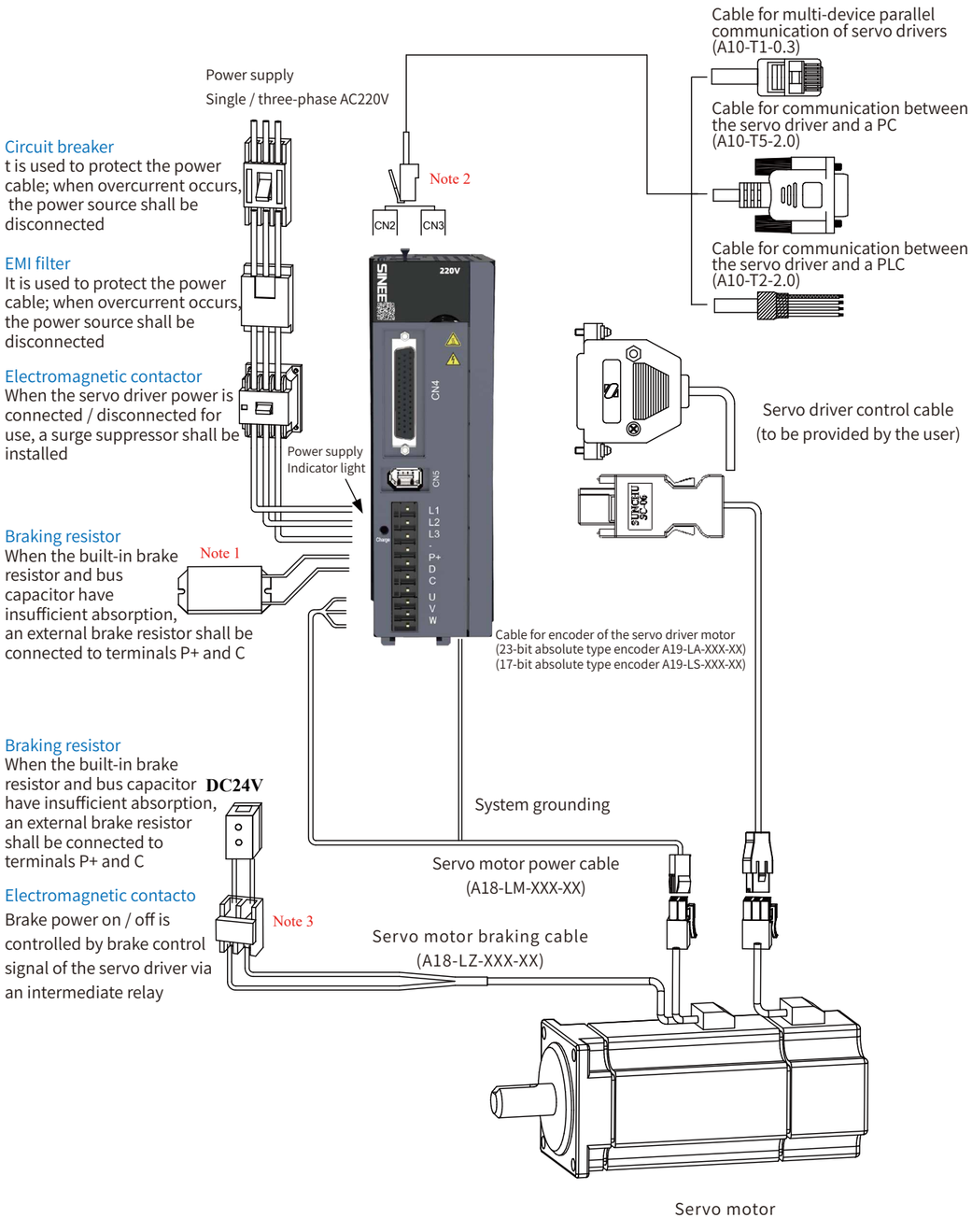
Note: Type A10/A18-LA encoder cable must be selected and used if the absolute position should be memorized upon power off, and Type A10/A18-LS encoder cable may be selected and used if the absolute position should be memorized without power off.

EA190 series servo driver

Single/three-phase 220V ~ 240V 50W ~ 1kW

- High-speed response
- Intelligent control
- High-precision positioning
- Stable and reliable

Connection between EA190 pulse type servo driver and peripheral device



Note 1: When an external brake resistor is used, it is required to remove the short-circuiting piece between P+ and D, and correctly set the brake resistor parameter on the driver.
Note 2: CN2 and CN3 are two RJ45 sockets with identically defined internal pins.
Note 3: It is strongly recommended that the servo motor brake is defined by the servo driver as the D0 terminal of the BK function for control. The D0 terminal of the servo driver shall have its load capacity used only for driving an intermediate relay other than an electromagnetic contactor.

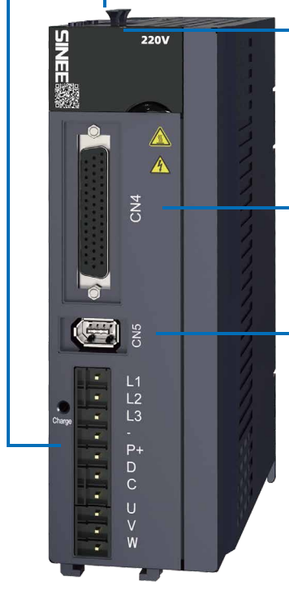
Terminal description of EA190 pulse type servo driver

Main circuit terminal

Terminal marking	Terminal name
L1、L2、L3	AC power input terminal
P+、D、C	Connecting terminal for an external braking resistor
P+、⊖	Common DC bus terminal
U、V、W	Servo motor connecting terminal
PE	Grounding

CN2 and CN3 communication terminals

Pin number	Signal name	Function
1	RS485+	RS485 communication port
2	RS485-	
3	GND	RS485/RS232 communication reference ground
4	RS232-RXD	The transmitting terminal of RS232 connects to the receiving terminal of the upper computer
5	RS232-TXD	The receiving terminal of RS232 connects to the transmitting terminal of the upper computer



CN5 encoder terminal

Pin number	Signal name
1	+5V
2	GND
3	+5V
4	GND
5	SD+
6	SD-
Housing	PE

CN4 control terminal

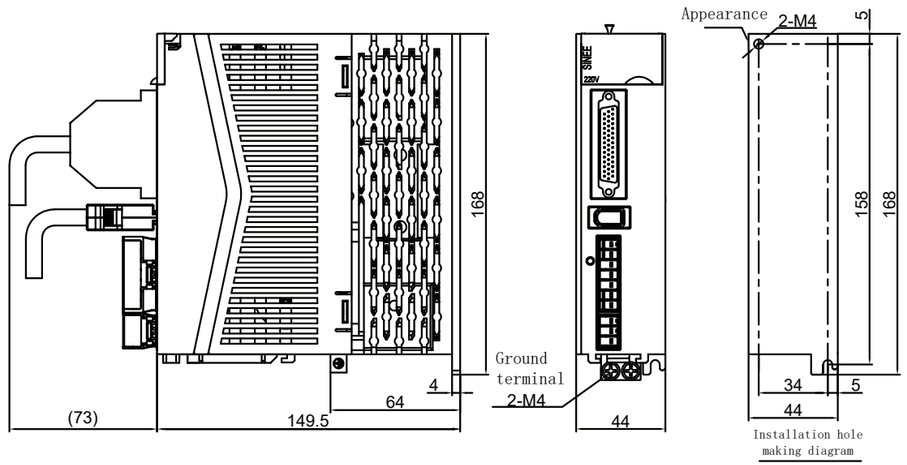
Signal name		Pin number	Function description
Digital input port	DI1	5	Digital input, default function No. 1
	DI2	20	Digital input, default function No. 2
	DI3	4	Digital input, default function No. 13
	DI4	19	Digital input, default function No. 14
	DI5	3	Digital input, default function No. 3
	DI6	18	Digital input, default function No. 12
	DI7	2	Digital input, default function No. 20
	DI8	17	Digital input, default function No. 21
	COM+	21	Digital input common positive terminal
Power supply	+24V	25/40	Internal 24V power source, with the voltage range of +20V ～ 26V Maximum output current 100mA
	COM	7/22/36	Internal 24V power ground; digital input common ground
Digital output	DO1	8	Digital output, default function No. 1
	DO1-	37	
	DO2	23	Digital output, default function No. 2
	DO2-	38	
	DO3	9	Digital output, default function No. 8
	DO3-	39	
	DO4	24	Digital output, fixed function No. 12
	DO4-	10	
	DO5	41	Digital output, with ground COM. Default function No. 0
Position pulse out/in	PULHIP	1	Positive terminal when 24V power source is used for command pulse
	PULSE+	33	Position pulse command +
	PULSE-	34	Position pulse command -
	PULHIS	16	Positive terminal when 24V power source is used for command pulse
	SIGN+	31	Position direction command +
	SIGN-	32	Position direction command -
Frequency division output	PA+	28	Differential frequency division output of pulse A, maximum allowable current 20mA
	PA-	13	
	PB+	12	Differential frequency division output of pulse B, maximum allowable current 20mA
	PB-	27	
	PZ+	11	Differential frequency division output of pulse B, maximum allowable current 20mA
	PZ-	26	
	OCZ	35	Z pulse open-collector output, maximum allowable current 40mA.
	GND	29	
	OCA	43	A pulse open-collector output, maximum allowable current 40mA
	OCB	42	B pulse open-collector output, maximum allowable current 40mA

Model description of EA190 pulse type servo driver

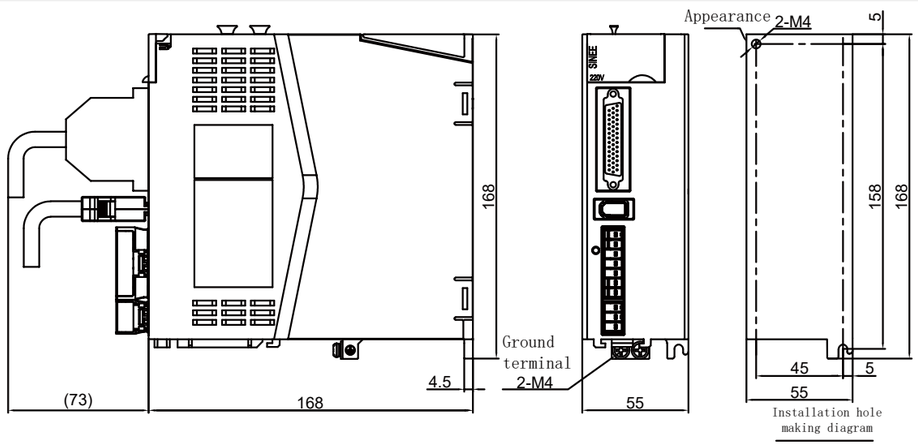
EA ① 190 ② X ③ - 6R2 ④ - 2 ⑤ B ⑥ - XX ⑦

①Product Servo driver	④Rated output current 0R9-0.9A 6R2-6.2A	⑥ Encoder type B: Serial communication type
②Series 190 series		
③ Null:Pulse type	⑤Power voltage specification 1.Single-phase 220 V 2.Single / three-phase 220 V	⑦Special specifications

Dimension diagram of EA190 pulse type servo driver



EA190□-0R9-1B EA190□-1R6-1B EA190□-2R5-1B

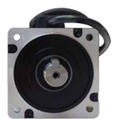


EA190□-4R8-2B EA190□-6R2-2B

Specification of EA190 pulse type servo driver

Operating conditions	Temperature	Working temperature 0~40° , storage temperature -20° ~85°	
	Humidity	Working/storage: ⩽ 90% RH (without dew condensation)	
	Altitude	⩽ 1,000 m	
	Vibration	⩽ 4.9 m/s^2, 10~60 Hz (no operation at the point of resonance is permitted)	
Cooling method		Fan cooling	
Control method		SVPWM, vector control	
Six control modes		Speed control, position control, torque control, speed / position control, torque / speed control, position / torque control	
Front panel		5 keys, 5-digit LED	
Regenerative brake		Built-in brake unit and resistor; an external braking resistor can be connected	
Feedback mode		Support 17-bit incremental / 23-bit absolute encoder	
Digital input / output	Input	Servo start, alarm resetting, position pulse deviation counter clearing, speed command direction selection, position / speed multi-segment switching, internal command trigger, control mode switching, pulse disable, forward drive disable, reverse drive disable, forward jog, backward jog	
	Output	Servo ready, brake output, motor rotation output, zero-speed signal, speed approach, speed reached, position approach, torque limit, rotating speed limit, warning output, alarm output.	
Protective Function	Hardware	Over-voltage, under-voltage, over-speed, overheat, overload, over-speed, encoder alarm, and so on.	
	Software	Excessively large position error, EEPROM fault, and so on.	
Alarm data tracking function		Record 4 groups of historical alarms and relevant data	
Communication function		Modbus RTU	
Encoder signal output resolution	Signal type	A, B, Z differential outputs, Z signal open-collector output; Z signal width can be set. A/B/Z Pulse open collector output （NPN）	
	Resolution	Any frequency division can be programmed and output before or after frequency quadruplication	
Position control mode	Maximum input pulse frequency	Differential input mode: 500 Kpps Open-collector input mode: 200 Kpps	
	Pulse command mode	Pulse + symbol, A and B-phase orthogonal pulse, CW/CCW	
	Command control mode	External pulse command, multi-segment position command	
	Command smoothing mode	Low-pass filtering, FIR filter, trapezoid-shaped smoothing of multi-segment position command	
	Electronic gear ratio	Electronic gear ratio: N/M multiples (0.001 < N/M < 64000 = N: 1~2^{30}, M: 1 ~ 2^{30}	
	Position accuracy	±1 pulse command	
Speed control mode	Command control mode	digital speed command, multistage speed command, inching command	
	Command smoothing mode	Low-pass filtering, smooth S curve	
	Torque limit	Digital setting limit	
	Speed regulation ratio	1:5000 (23-bit encoder)	Minimal speed/rated rotating speed of continuous stable operation under the rated load
	Bandwidth	No less than 800 Hz (in case of a 23-bit encoder)	
	Speed regulation ratio	Load fluctuation (0 ~100%)	Maximum 0.1%
		Power voltage change ±10%	Maximum 0.1%
		Environment temperature (0~50°C)	Maximum 0.1%
		For a 23-bit encoder, when the speed command is the rated rotating speed, (rotating speed without load - rotating speed with full load) / rated rotating speed.	
Torque control mode	Command control mode	digital torque command	
	Command smoothing mode	Low-pass filtering	
	Speed limit	Digital setting limit	
	Accuracy	±3% (current repetition accuracy)	

EA190 series servo motor and driver matching table

Servo driver				Motor		
EA190		Model	Supply voltage	Motor	Power wattage	Adaptable motor model
SIZE A		EA190 ☐ -0R9-1B EA190 ☐ -1R6-1B EA190 ☐ -2R5-1B	Single-phase AC220V	 	50W 100W 200W 400W	SES04-005-30-2HAY ☐ SES04-0R1-30-2HAY ☐ SES06-0R2-30-2HBY ☐ SES06-0R4-30-2HBY ☐
SIZE B		EA190 ☐ -4R8-2B EA190 ☐ -6R2-2B	Single-phase or three-phase AC220V		750W 1000W	SES08-0R7-30-2HBY☐ SES08-1R0-30-2HBY☐ SER13-1R0-10-2HBY☐ SER13-1R0-20-2HBY☐ SER13-1R0-30-2HBY☐ SES13-1R1-20-2HBY☐

EA190 series servo motor and driver matching table

Motor specification / model	Adaptable driver model	Encoder cable	Motor cable
SES04-005-30-2HAY ☐	EA190☐-0R9-1B	A19-LS-A000-m (without battery) A19-LA-A000-m (with battery)	A18-LM-A007-m (motor power cable) A18-LZ-A005-m (brake cable for motor with a brake)
SES04-0R1-30-2HAY ☐	EA190☐-1R6-1B		
SES06-0R2-30-2HBY ☐			
SES06-0R4-30-2HBY ☐	EA190☐-2R5-1B		
SES08-0R7-30-2HBY ☐	EA190☐-4R8-2B		
SES08-1R0-30-2HBY ☐	EA190☐-6R2-2B	A19-LS-H100-m (without battery) A19-LA-H100-m (with battery)	Without brake: A18-LM-H115-m With brake: A18-LB-H115-m
SER13-1R0-10-2HBY ☐			
SER13-1R0-20-2HBY ☐			
SER13-1R0-30-2HBY ☐			

Intelligent logistics

◎ Industrial demand

Rapid development of e-commerce and cold chain logistics in China brings new opportunities for the express delivery industry. The large delivery volume has expedited construction of sorting centers for express delivery of goods, while small modular sorting equipment and systems of high flexibility and performance-cost ratio have become a focus of fast delivery enterprises.

“To accomplish each delivery” is the uppermost pursuit of delivery services. Accurate sorting is obviously a core procedure of delivery. Sorting error will not only cause inconvenience to customers, but also impair confidence of goods sellers and express delivery enterprises. Reliable intelligent sorting systems are helping distribution centers of express delivery enterprises realize “intelligent sorting, fast transfer and less people-dependent operation” of parcels.

◎ Highlights of the scheme

- Accurate location with a precise high-speed response controller
- Frequency division output, subject to closed-loop configuration control
- Smooth acceleration and deceleration; fast and stable parcel loading
- High sorting efficiency, with single-machine sorting speed of 6-8 K/h

◎ Scheme composition

EA196、EA190 series servo motor

EtherCAT bus communication

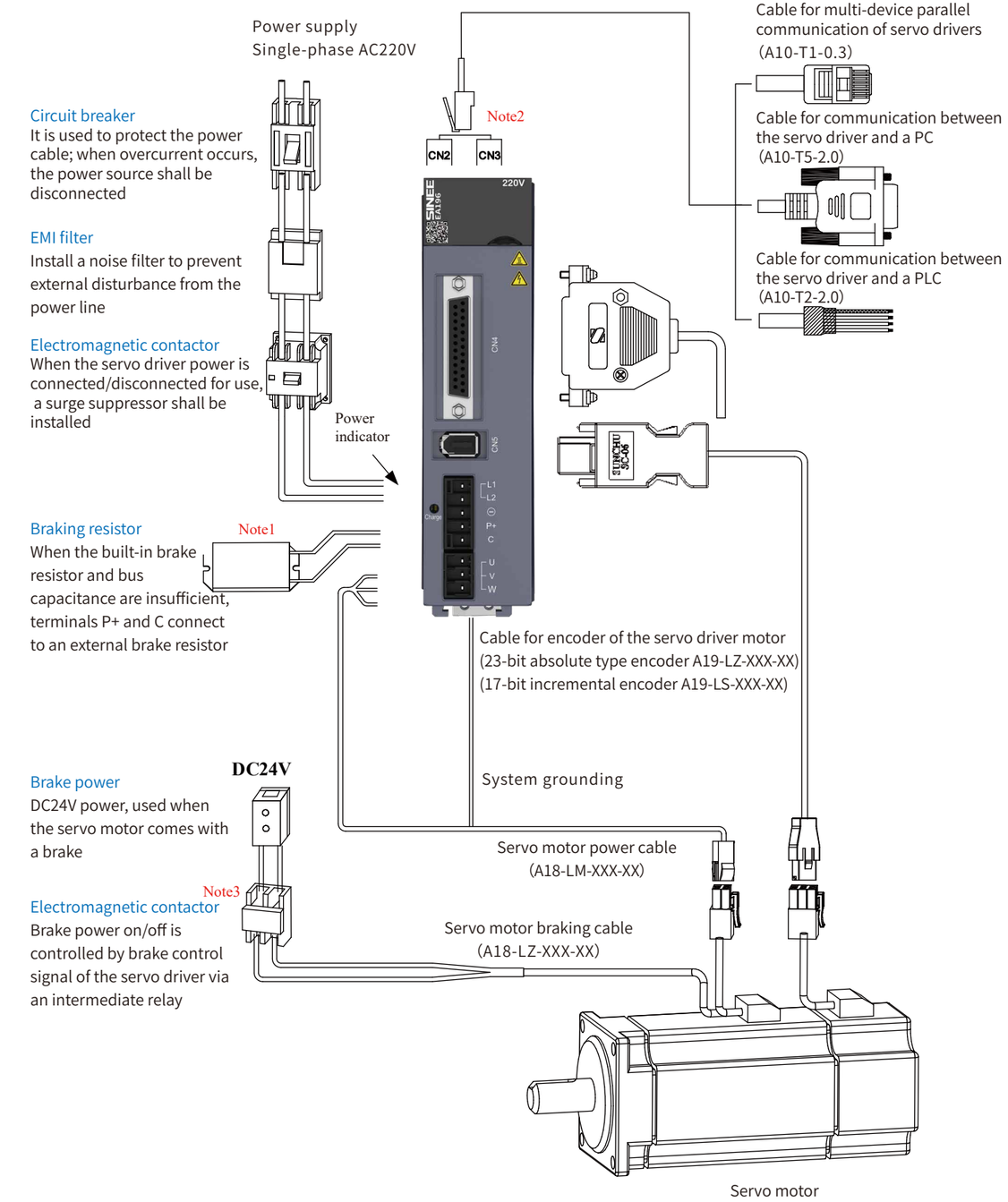
Customized motor cable

EA196 series servo driver

Single-phase 220V~240V 0.2~0.75kW

- High-speed response
- High-precision positioning
- Easy to use

Connection between EA196 pulse type servo driver and peripheral device



Note 1: When an external brake resistor is used, it is required to remove the short-circuiting piece between P+ and D, and correctly set the brake resistor parameter on the driver

Note 2: CN2 and CN3 are two RJ45 sockets with identically defined internal pins

Note 3: It is strongly recommended that the servo motor brake is defined by the servo driver as the DO terminal of the BK function for control. The DO terminal of the servo driver shall have its load capacity used only for driving an intermediate relay other than an electromagnetic contactor.

Terminal description of EA196 pulse type servo driver

Main circuit terminal

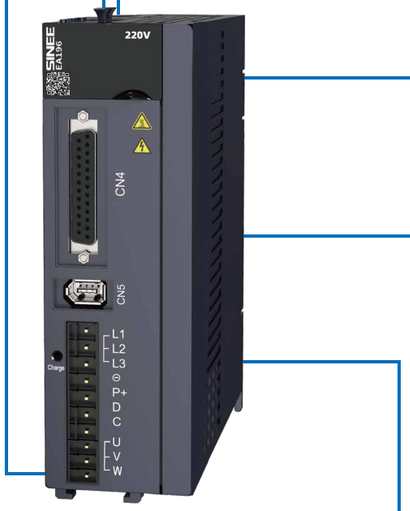
Terminal marking	Terminal name
L1、L2	AC power input terminal
P+、D、C	Connecting terminal for an external braking resistor
P+、⊖	Common DC bus terminal
U、V、W	Servo motor connecting terminal
PE	Grounding

CN2 and CN3 communication terminals

Pin number	Signal name	Function
1	RS485+	RS485 communication port
2	RS485-	
3	GND	RS485/RS232 communication reference ground
4	RS232-RXD	The transmitting terminal of RS232 conne -cts to the receiving terminal of the upper computer
5	RS232-TXD	The receiving terminal of RS232 connects to the transmitting terminal of the upper computer

CN6 USB communication terminal

CN4 control terminal



Signal name		Pin number	Function description
Digital input port	DI1	18	Digital input, default function No. 1
	DI2	6	Digital input, default function No. 2
	DI3	4	Digital input, default function No. 13
	DI4	17	Digital input, default function No. 14
	DI5	5	Digital input, default function No. 3
	COM+	19	Digital input common positive terminal
Power supply	+24V	7	Internal 24V power source, voltage range +20V~26V, maximum output current 100mA
	COM	16	Internal 24V power ground; digital input common ground
Digital output	DO1+	8	Digital output, default function No. 1
	DO1-	20	
	DO2+	21	Digital output, default function No. 2
	DO2-	9	
	DO3+	22	Digital output, default function No. 12
	DO3-	10	
Position pulse input	PULHIP	1	Positive terminal when 24V power source is used for command pulse
	PULSE+	15	Position pulse command +
	PULSE-	3	Position pulse command -
	SIGN+	14	Position direction command +
	SIGN-	2	Position direction command -

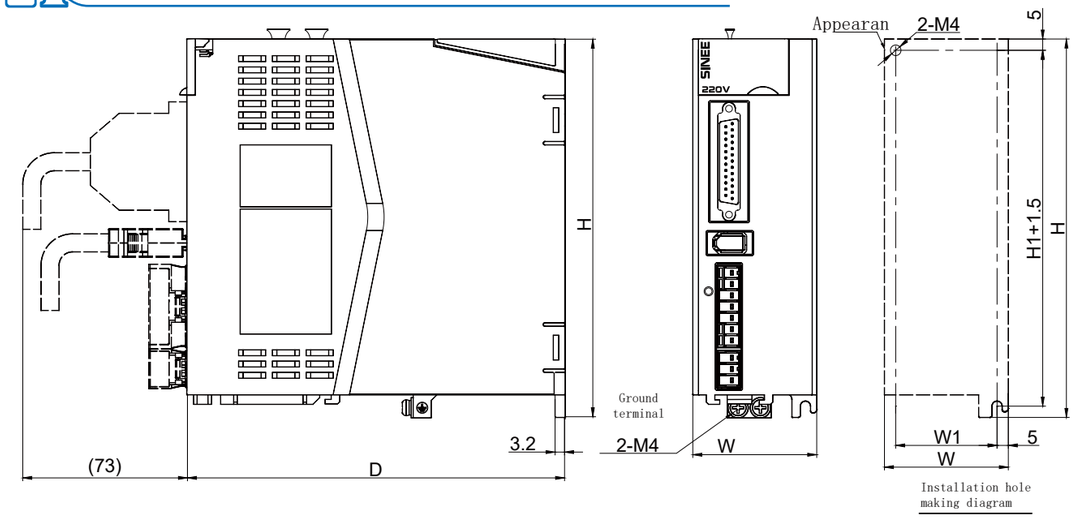
CN5 encoder terminal

Pin number	Signal name
1	+5V
2	GND
3	+5V
4	GND
5	SD+
6	SD-
Housing	PE

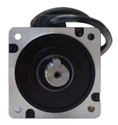
Specification of EA196 pulse type servo driver

Operating conditions	Temperature	Working temperature 0~40° , storage temperature -20° ~85°	
	Humidity	Working/storage: ⩽ 90%RH (without dew condensation)	
	Altitude	⩽ 1000m	
	Vibration	⩽ 4.9m/s^2, 10~60Hz (no operation at the point of resonance is permitted)	
Cooling method		Fan cooling	
Control method		SVPWM, vector control	
Six control modes		Speed control, position control, torque control, speed/position control, torque/speed control, position/torque control	
Front panel		5 keys, 5-digit LED	
Regenerative brake		Built-in brake unit and resistor; an external braking resistor can be connected	
Feedback mode		17-bit incremental/23-bit absolute encoder	
Digital input/output		Input	Servo start, alarm resetting, position pulse deviation counter clearing, speed command direction selection, position/speed multi-segment switching, internal command trigger, control Mode switching, pulse disable, forward drive disable, reverse drive disable, forward inch, backward inch
		Output	Servo ready, brake output, motor rotation output, zero-speed signal, speed approach, speed reached, posi-tion approach, torque limit, rotating speed limit, warning output, alarm output.
Protective Function		Hardware	Over-voltage, under-voltage, over-speed, overheat, overload, over-speed, encoder alarm, and so on.
		Software	Excessively large position error, EEPROM fault, and so on.
Alarm data tracking function		Record 4 groups of historical alarms and relevant data	
Communication function		Modbus RTU	
Position control mode	Maximum input pulse frequency	Differential input mode: 500Kpps Open-collector input mode: 200Kpps	
	Pulse command mode	Pulse + symbol, A and B-phase orthogonal pulse	
	Command control mode	External pulse command, multi-segment position command	
	Command smoothing mode	Low-pass filtering, FIR filter, trapezoid-shaped smoothing of multi-segment position command	
	Electronic gear ratio	Electronic gear ratio: N/M multiples (0.001< N/M< 64000 = N: 1~2^{30}, M: 1~2^{30}	
	Position accuracy	±1 pulse command	
Speed con-trol mode	Command control mode	External pulse, digital speed command, multistage speed command, inching command	
	Command smoothing mode	Low-pass filtering, smooth S curve	
	Torque limit	Digital setting limit	
	Speed regulation ratio	1:5000 (23-bit encoder)	Minimal speed/rated rotating speed of continuous stable operation under the rated load
	Bandwidth	No less than 400Hz (23-bit encoder)	
	Speed fluctuation ratio	Load fluctuation (0~100%)	Maximum 0.1%
		Supply voltage change ±10%	Maximum 0.1%
		Environment temperature (0~50°C)	Maximum 0.1%
		For a 23-bit encoder, when the speed command is the rated rotating speed, (rotating speed without load - rotating speed with full load)/rated rotating speed.	
Torque control mode	Command control mode	Digital torque command	
	Command smoothing mode	Low-pass filtering	
	Speed limit	Digital setting limit	
	Accuracy	±3% (current repetition accuracy)	

Dimension of EA196 pulse type servo driver



EA196 series servo motor and driver matching table

Servo driver			Motor		
EA196	Model	Supply voltage	Motor	Power	Adaptable motor model
SIZE A		EA196 -2R5-1B	Single-phase AC220V		200W 400W	SES06-0R2-30-2HBY □ SES06-0R4-30-2HBY □
SIZE B		EA196 -4R8-1B	Single-phase AC220V		750W	SES08-0R7-30-2HBY□

EA196 series servo motor and driver matching table

Motor specification/model	Adaptable driver model	Encoder cable	Motor cable
SES06-0R2-30-2HBY □	EA190□-2R5-1B	A19-LS-A000-m (without battery) A19-LA-A000-m (with battery)	A18-LM-A007-m (motor power cable) A18-LZ-A005-m (brake cable for motor with a brake)
SES06-0R4-30-2HBY □			
SES08-0R7-30-2HBY □	EA190□-4R8-2B		

Printing & packaging

Front-edge paper feeder

◎ Industrial demand

- It is the core demand of front-edge paper feeding device to make several groups of rubber axles of feed roller coordinate with paper feeding at a certain time sequence according to the real-time position of the printing roller and meet the required precision of the customer after paper feeding.

◎ Highlights of the scheme

- Motion controller scheme: 350 high-performance servo driver + ultra-low inertia motor + motion controller, with high speed and high accuracy of paper feeding, simple commissioning and convenient maintenance.

◎ Adaptable motor model

- Motion controller scheme: 350 high-performance servo driver + ultra-low inertia motor + motion controller, with high speed and high accuracy of paper feeding, simple commissioning and convenient maintenance.

EA180C/P servo driver

Single-phase 220V~240V 0.1~1kW

Three-phase 220V~240V 0.75~1.5kW

Three-phase 340V~460V 1.5~30kW

- High-speed response
- Bus control
- High-precision positioning
- Easy to use

Connection between EA180 CANopen bus servo driver and peripheral device

Power supply
Single/three-phase AC220V
Three-phase AV380V

Circuit breaker
It is used to protect the powercable; when overcurrent occurs, the power source shall be disconnected

EMI filter
Install a noise filter to prevent external disturbance from the power line

Electromagnetic contactor
When the servo driver power is connected/disconnected for use, a surge suppressor shall be installed

Braking resistor
When the built-in brake resistor and bus capacitance are insufficient, terminals P+ and C connect to an external brake

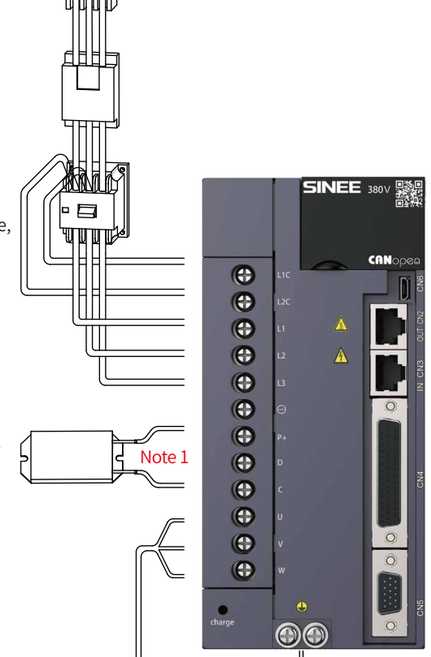
Note 1

Brake power
DC24V power, used when the servo motor comes with a brake

Electromagnetic contactor
Brake power on/off is controlled by brake control signal of the servo driver via an intermediate relay

DC24V

Note 3



Cable for communication between the servo driver and a PC
(A10-T0-2.0)

Cable for CAN multi-device parallel communication
(A10-T1-0.3)

CN2 OUT

Note 2

CN3 IN

Communication cable for connection to upper computer
(A10-T2-2.0)

Servo driver control cable
(to be provided by the user)

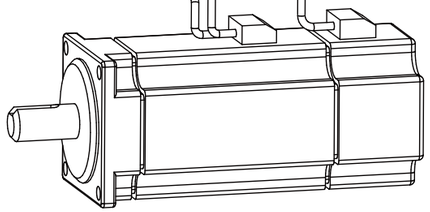
Cable for encoder of the servo driver motor
(23-bit absolute type encoder A10-LA-XXX-XX)
(17-bit incremental encoder A10-LS-XXX-XX)

Power indicator

System grounding

Servo motor power cable
(A18-LM-XXX-XX)

Servo motor braking cable
(A18-LZ-XXX-XX)



Servo motor

Note 1: When an external brake resistor is used, it is required to remove the short-circuiting piece between P+ and D, and correctly set the brake resistor parameter on the driver

Note 2: CN2 and CN3 are two RJ45 sockets with identically defined internal pins

Note 3: It is strongly recommended that the servo motor brake is defined by the servo driver as the DO terminal of the BK function for control. The DO terminal of the servo driver shall have its load capacity used only for driving an intermediate relay other than an electromagnetic contactor.

Terminal description of EA180 CANopen servo driver

Main circuit terminal

Terminal marking	Terminal name
L1C、L2C	Control power input terminal
L1、L2、L3	AC power input terminal of main circuit
P+、D、C	Connecting terminal for an external braking resistor
P+、⊖	Common DC bus terminal
U、V、W	Servo motor connecting terminal
PE	Grounding

CN1 analog quantity monitoring terminal

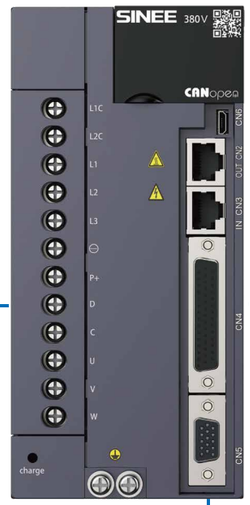
Pin number	Signal name	Function
1	AO1	Output voltage 0V ~ 10V, ma -ximum output current 1mA
2	AO2	
3	GND	Common ground of analog output signal
4	Reserved	Cannot be connected with any signal line

CN2 and CN3 communication terminals

Pin number	Signal name	Function
1	RS485+	Positive terminal of RS485 signal
2	RS485-	Negative terminal of RS485 signal
3	GND	Communication signal reference ground
4	RS232-RXD	RS232 signal receiving side
5	RS232-TXD	RS232 signal sending side
6	GND	Communication signal reference ground
7	CANH	CAN communication reference ground
8	CANL	Negative terminal of CAN signal

CN6 USB communication terminal

According to USB 2.0 specification



CN4 control terminal

Signal name		Pin number	Default function	
Digital input port	DI1	5	S-ON	Servo on
	DI2	20	ALM-RST	Alarm fault resetting
	DI3	4	P-CLR	Pulse deviation counter clearing
	DI4	19	P-OT	Inhibit forward drive
	DI5	3	N-OT	Inhibit reverse drive
	DI6	18	INHIBIT	Pulse inhibited
	DI7	2	ORPG	Homing detection signal
	DI8	17	SHOM	Homing enable
	COM+	21	DI input common positive terminal	
Power supply	+24V	25/40	Internal 24V power source, voltage range +20V~26V, maximum output current 200mA	
	COM	7/22/36		
	+10V	44	+10V power, maximum output of 10mA	
Digital output	DO1	8	S-RDY+	The servo is ready and can be connected when S-ON signal status can be received
	DO1-	37	S-RDY-	
	DO2	23	BK+	Brake control signal
	DO2-	38	BK-	
	DO3	9	COIN+	“Position reached” signal
	DO3-	39	COIN-	
	DO4	24	ALM+	Connected upon occurrence of a fault
	DO4-	10	ALM-	
	DO5	41	Disabled	No function predefined
Frequency division output	PA+	28	A pulse frequency division output +	Maximum current 20mA
	PA-	13	A pulse frequency division output -	
	PB+	12	B pulse frequency division output +	Maximum current 20mA
	PB-	27	B pulse frequency division output -	
	PZ+	11	Z pulse frequency division output +	Maximum current 20mA
	PZ-	26	Z pulse frequency division output -	
	OCZ	35	Z pulse open-collector output, maximum allowable current 40mA.	
	GND	29		

CN5 encoder terminal

Pin number	Signal name
1	SD+
3	SD-
5	+5V
10	GND
Housing	PE

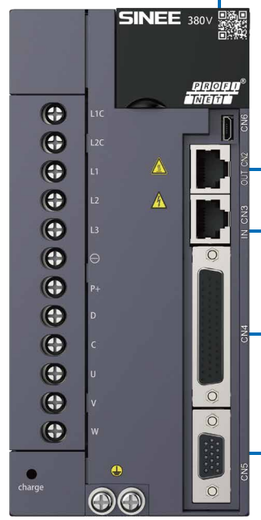
Terminal description of EA180 PROFINET bus servo driver

CN1 RS232 communication terminal

Pin number	Signal name	Function
1	RS232-TXD	RS232 signal sending side
2	RS232-RXD	RS232 signal receiving side
3	GND	RS232 communication signal reference ground
4	Reserved	Cannot be connected with any signal line

CN2 and CN3 PROFINET communication terminals

CN3 PRFINET Port1		CN2 PRFINET Port2	
Pin number	Signal name	Pin number	Signal name
1	TD+	1	TD+
2	TD-	2	TD-
3	RD+	3	RD+
4		4	
5		5	
6	RD-	6	RD-
7		7	
8		8	



CN4 control terminal

Signal name		Pin number	Default function	
Digital input port	DI1	5	P-OT	Inhibit forward drive
	DI2	20	N-OT	Inhibit reverse drive
	DI3	4	ORPG	Homing detection signal
	DI4	19	ALM-RST	Alarm fault resetting
	COM+	21	Digital input common positive terminal (12~24V)	
Power supply	+24V	25/40	Internal 24V power source, voltage range +20V~26V, maximum output current 200mA	
	COM	7/22/36	Internal 24V power ground; common negative terminal of digital input	
Digital output	DO1	8	S-RDY+	The servo is ready and can be connected when S-ON signal status can be received
	DO1-	37	S-RDY-	
	DO2	23	BK+	Brake control signal
	DO2-	38	BK-	
	DO3	9	COIN+	“Position reached” signal
	DO3-	39	COIN-	
	DO4	24	ALM+	Connected upon occurrence of a fault
	DO4-	10	ALM-	

Main circuit terminal

Terminal marking	Terminal name
L1C、L2C	Control power input terminal
L1、L2、L3	AC power input terminal of main circuit
P+、D、C	Connecting terminal for an extern -al braking resistor
P+、⊖	Common DC bus terminal
U、V、W	Servo motor connecting terminal
PE	Grounding

CN5 encoder terminal

Pin number	Signal name
1	SD+
3	SD-
5	+5V
10	GND
Housing	PE

Note: For connection between EA180P PROFINET bus servo driver and peripheral device, use connection between EA300EETHERCAT bus servo driver and peripheral device for reference.

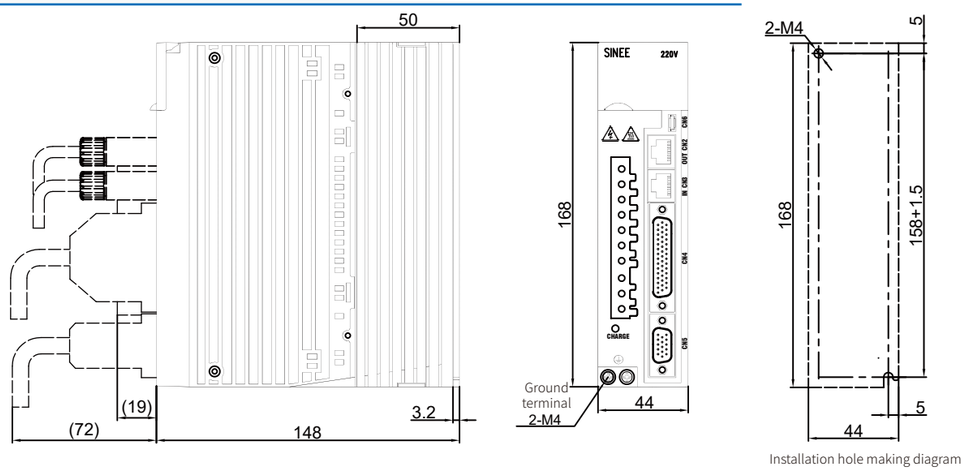
Model description of Series EA180C/P servo driver

EA ① 180 ② C ③ - 6R2 ④ - 2 ⑤ B ⑥ - XX ⑦

① Product Servo driver	④Rated output current 0R9-0.9A 028-28A	⑥ Encoder type B: 17/23-bit serial encoder
②Series 180 series		
③ C：CANOpen bus P：PROFINET bus	⑤Power voltage specification 1. Single-phase 220V 2. Single/three-phase 220V 3. Three-phase 380V	⑦ Non-standard specification

Supply voltage	Driver model	Rated motor power (KW)	Rated current (A)	Maximum current (A)	Structure	Adaptive motor encoder
Single-phase 220V	EA180 ☐ -0R9-1 ☐	0.05	0.9	3.15	SIZE A	☐ -B：17/23-bit serial encoder
	EA180 ☐ -1R6-1 ☐	0.02	1.6	5.6		
	EA180 ☐ -2R5-1 ☐	0.4	2.5	9.0		
Single-phase or three-phase 220V	EA180 ☐ -4R8-2 ☐	0.75	4.8	14.4	SIZE B	
	EA180 ☐ -6R2-2 ☐	1	6.2	18.6		
Three-phase 220V	EA180 ☐ -011-2 ☐	1.5	11	30	SIZE C	
Three-phase 380V	EA180 ☐ -5R6-3 ☐	1.5	5.6	15		
	EA180 ☐ -8R5-3 ☐	2	8.5	20		
	EA180 ☐ -013-3 ☐	3	13	30		
	EA180 ☐ -017-3 ☐	4.4	17	42.5	SIZE D	☐ -B：17/23-bit serial encoder
	EA180 ☐ -022-3 ☐	5.5	22	55		
	EA180 ☐ -028-3 ☐	7.5	28	70		

Dimension diagram of Series EA180C/P servo driver



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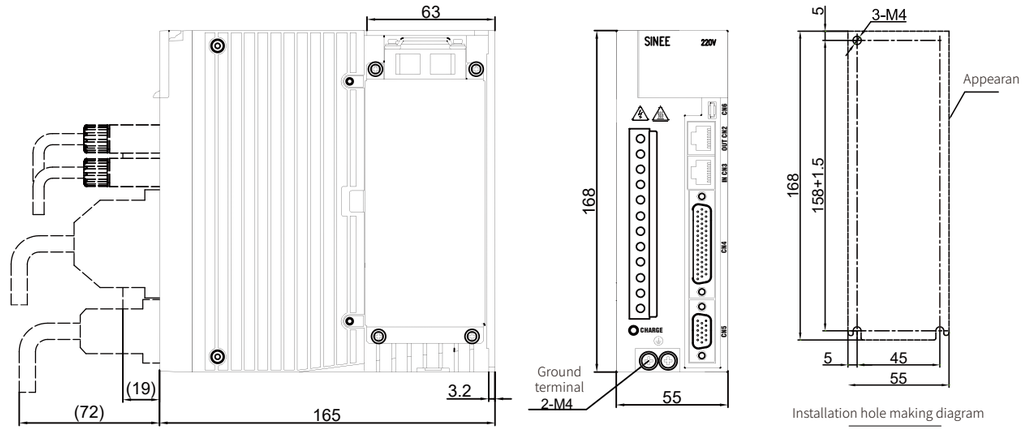
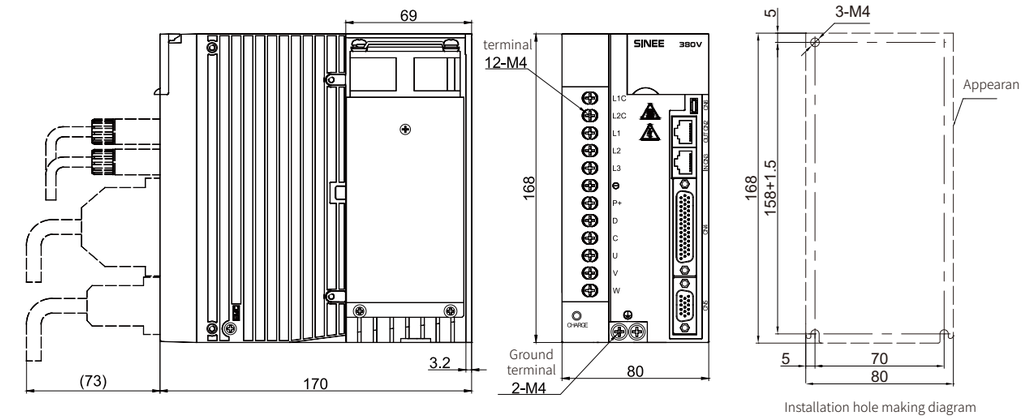
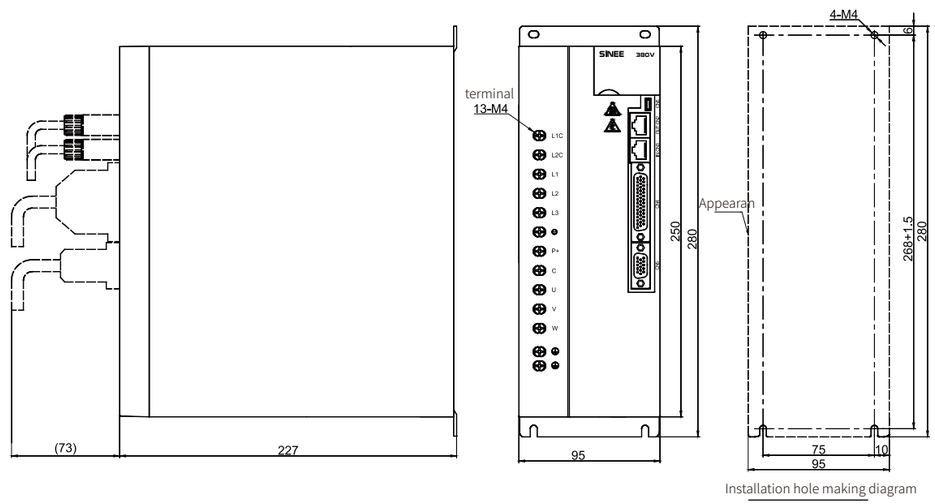


EA180☐-4R8-2☐ EA180☐-6R2-2☐



EA180☐-5R6-3☐ EA180☐-8R5-3☐ EA180☐-013-3☐ EA180☐-011-2☐



EA180☐-017-3☐ EA180☐-022-3☐ EA180☐-028-3☐

Technical specification of Series EA180C/P bus servo driver

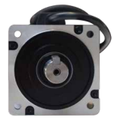
- EA180C CANopen and EA180P PROFINET bus servo driver

Item				Specification	
Basic specification	Control method			IGBT PWM control sine-wave current drive	
	Feedback			17-bit incremental/encoder, 23-bit absolute encoder	
	Six control modes			Speed control, position control, torque control, speed/position control, torque/speed control, position/torque control	
	Front panel			5 keys, 5-digit LED	
	Regenerative brake			Built-in brake unit and resistor; an external braking resistor can be connected	
	Use conditions	Environment temperature		Working temperature 0~40° , storage temperature -20° ~85°	
		Ambient humidity		Working/storage: ⩽ 90%RH (without dew condensation)	
		Altitude		⩽ 1,000m	
		Anti-vibration impact strength		Vibration: ⩽ 4.9m/s² (no operation at the point of resonance is permitted), impact: ⩽ 19.6m/s²	
		Protection level		IP10	
		Pollution level		2 level	
	Cooling method			Fan cooling	
Performance	Speed-torque control mode	Speed fluctuation ratio	Load fluctuation	0~100 load: Maximum 0.3%	Based on 23bit encoder, at rated speed
			Supply voltage change	At rated voltage ± 10%: Maximum 0.3%	
			Environment temperature	0~50°C : Maximum 0.3%	
		Speed regulation ratio		1:5000 (17bit and 23bit encoder)	Minimal speed/rated rotating speed of continuous stable operation under the rated load
		Frequency bandwidth		1.2kHZ (23-bit encoder)	
		Torque control accuracy		±3% current repetition accuracy	
		Soft start time setting		0~30s (acceleration and deceleration can be set respectively)	
	Position control mode	Feedforward compensation		Resolution 0~100% (set resolution 1%)	
		Positioning completion width		1~655,335 instruction units (set resolution to 1 instruction unit)	
		Min setting time		5ms (no load, from rated speed to positioning completion)	

- EA180 CANopen and EA180P PROFINET bus servo driver

Item				Specification
EA180C	Input/ output signal	Digital input port	Variable signal distribution	8 DI Fault reset, position pulse deviation counter clearing, pulse disable, forward drive disable, reverse drive disable, second torque limit, forward inch, backward inch, others
		Digital output	Variable signal frequency division	4 DO Servo ready, brake output, motor rotation output, zero-speed signal, speed approach, speed reached, position approach, torque limit, rotating speed limit, warning output, fault output, others
	Built-in function			Slow down and stop when P-OT and N-OT are valid
		LED display		5-digit LED display: Main circuit CHARGE
		Protective Function		Over-voltage, under-voltage, over-current, over-speed, IGBT overheat, overload, encoder exception, excessive position error, EEPROM fault, abnormal communication, others
		Others		Two-stage gain switching, automatic gain adjustment, 4 groups of alarm record, JOG operation
EA180P	Input/output signal	Digital input port	Function allocation available	Fault reset, forward drive disable, reverse drive disable, forward inch, backward inch, electronic gear ratio switching etc.
		Digital output	Function allocation available	Servo ready, brake output, motor rotation output, zero-speed signal, torque limit, rotating speed limit, warning output, fault output etc.
	Built-in function	Over-travel prevention function		Stopped immediately when P-OT and N-OT are activated.
		Electronic gear ratio		1.0 ⩽ B/A ⩽ 64000.0
		Protective Function		Over-voltage, under-voltage, over-speed, overheat, overload, over-speed, over-temperature, encoder fault, braking resistor overload fault, EEPROM fault, abnormal communication etc.
		Alarm data tracking function		Record 4 groups of historical alarms and relevant data
		RS232 communication		Status display, user parameter setting, monitoring display, alarm tracking display, JOG operation and automatic adjustment operation, speed instruction signal etc.
EA180C	Communication function	Communication mode		RS232, RS485, CANopen
		CANopen bus control		Synchronizing cycle: 1ms or its integral multiple The following running modes are supported: Profile Position; Profile Velocity Mode Profile Torque Mode; Homing Mode

EA180C/P series servo motor, driver and cable matching table

Servo driver				Motor		
EA180		Model	Supply voltage	Motor	Power	Adaptable motor model
SIZE A		EA180□-0R9-1 □ EA180□-1R6-1 □ EA180□-2R5-1 □	Single-phase AC220V		50W 100W 200W 400W	SES04-005-30-2FAY □ SES04-0R1-30-2FAY □ SES06-0R2-30-2FBY □ SES06-0R4-30-2FBY □
SIZE B		EA180□-4R8-2 □ EA180□-6R2-2 □	Single-phase or three-phase AC220V		750W 1000W	SES08-0R7-30-2FBY □ SER13-1R0-10-2FBY □ SER13-1R0-20-2FBY □ SER13-1R0-30-2FBY □
SIZE C		EA180□-5R6-3 □ EA180□-8R5-3 □ EA180□-013-3 □	Three-phase AC380V		850W 1.3kW 1.8kW	SES13-0R8-15-3FBY □ SES13-1R3-15-3FBY □ SES13-1R8-15-3FBY □
					2.9kW	
					1.5kW 2kW 3kW	SER13-1R5-10-3FBY □ SER13-1R5-20-3FBY □ SER13-1R5-30-3FBY □ SER13-2R0-20-3FBY □ SER13-2R0-30-3FBY □ SER13-3R0-20-3FBY □ SER13-3R0-30-3FBY □
SIZE D		EA180□-011-2 □	Three-phase AC220V		1.5kW	SER13-1R5-10-2FBY □ SER13-1R5-20-2FBY □ SER13-1R5-30-2FBY □
SIZE E		EA180□-017-3 □ EA180□-022-3 □ EA180□-028-3 □	Three-phase AV380V		4.4kW 5.5kW 7.5kW	SES18-4R4-15-3FBY □ SES18-5R5-15-3FBY □ SES18-7R5-15-3FBY □

EA180C/P series servo motor, driver and cable matching table

Motor specification/model	Adaptable driver model	Encoder cable	Motor cable
SER13-1R0-10-2FBY ☐	EA180 ☐ -6R2-2B	A10-LS-H100-m (without battery) A10-LA-H100-m (with battery)	A18-LM-H115-m (Power cable for motor without brake) A18-LB-H115-m (Power cable for motor with a brake)
SER13-1R0-20-2FBY ☐			
SER13-1R0-30-2FBY ☐			
SER13-1R5-10-2FBY ☐	EA180 ☐ -011-2B		A18-LM-H120-m (Power cable for motor without brake) A18-LB-H120-m (Power cable for motor with a brake)
SER13-1R5-20-2FBY ☐			
SER13-1R5-30-2FBY ☐			
SER13-1R5-10-3FBY ☐	EA180 ☐ -5R6-3B		
SER13-1R5-20-3FBY ☐			
SER13-1R5-30-3FBY ☐			
SER13-2R0-20-3FBY ☐	EA180 ☐ -8R5-3B		
SER13-2R0-30-3FBY ☐			
SER13-3R0-20-3FBY ☐	EA180 ☐ -013-3B		
SER13-3R0-30-3FBY ☐			

Note: When the encoder is used, A10-LA-xxxx-m encoder cable must be selected and used if the absolute position should be memorized upon power off, and A10-LS-xxxx-x encoder cable may be selected and used if the absolute position should be memorized without power off.

Motor specification/model	Adaptable driver model	Encoder cable	Motor cable
SES04-005-30-2FAY ☐	EA180 ☐ -0R9-1B	A10-LS-A000-m (without battery) A10-LA-A000-m (with battery)	A18-LM-A007-m (motor power cable) A10-LZ-A005-m (brake cable for motor with a brake)
SES04-0R1-30-2FAY ☐	EA180 ☐ -1R6-1B		
SES06-0R2-30-2FBY ☐			
SES06-0R4-30-2FBY ☐	EA180 ☐ -2R5-1B		
SES08-0R7-30-2FBY ☐	EA180 ☐ -4R8-2B		
SES08-1R0-30-2FBY ☐	EA180 ☐ -6R2-2B		
SES13-0R8-15-2FBY ☐	EA180 ☐ -011-2B	A18-LS-H400-m (without battery) A18-LA-H400-m (with battery)	A18-LM-M420-m (motor power cable) A18-LZ-H405-m (brake cable for motor with a brake)
SES13-0R8-15-3FBY ☐	EA180 ☐ -5R6-3B		
SES13-1R3-15-3FBY ☐			
SES13-1R8-15-3FBY ☐	EA180 ☐ -8R5-3B		
SES18-2R9-15-3FBY ☐	EA180 ☐ -013-3B		Without brake: A18-LM-M525-m (motor power cable) With brake: A10-LM-M220-m (motor power cable) A18-LZ-H405-m (brake cable for motor with a brake)
SES18-3R6-20-3FBY ☐			
SES18-4R0-30-3FBY ☐			
SES18-4R4-15-3FBY ☐	EA180 ☐ -017-3B		
SES18-5R5-15-3FBY ☐	EA180 ☐ -022-3B		A10-LM-M240-m (motor power cable) A18-LZ-H405-m (brake cable for motor with a brake)
SES18-7R5-15-3FBY ☐	EA180 ☐ -028-3B		

EA300E servo driver

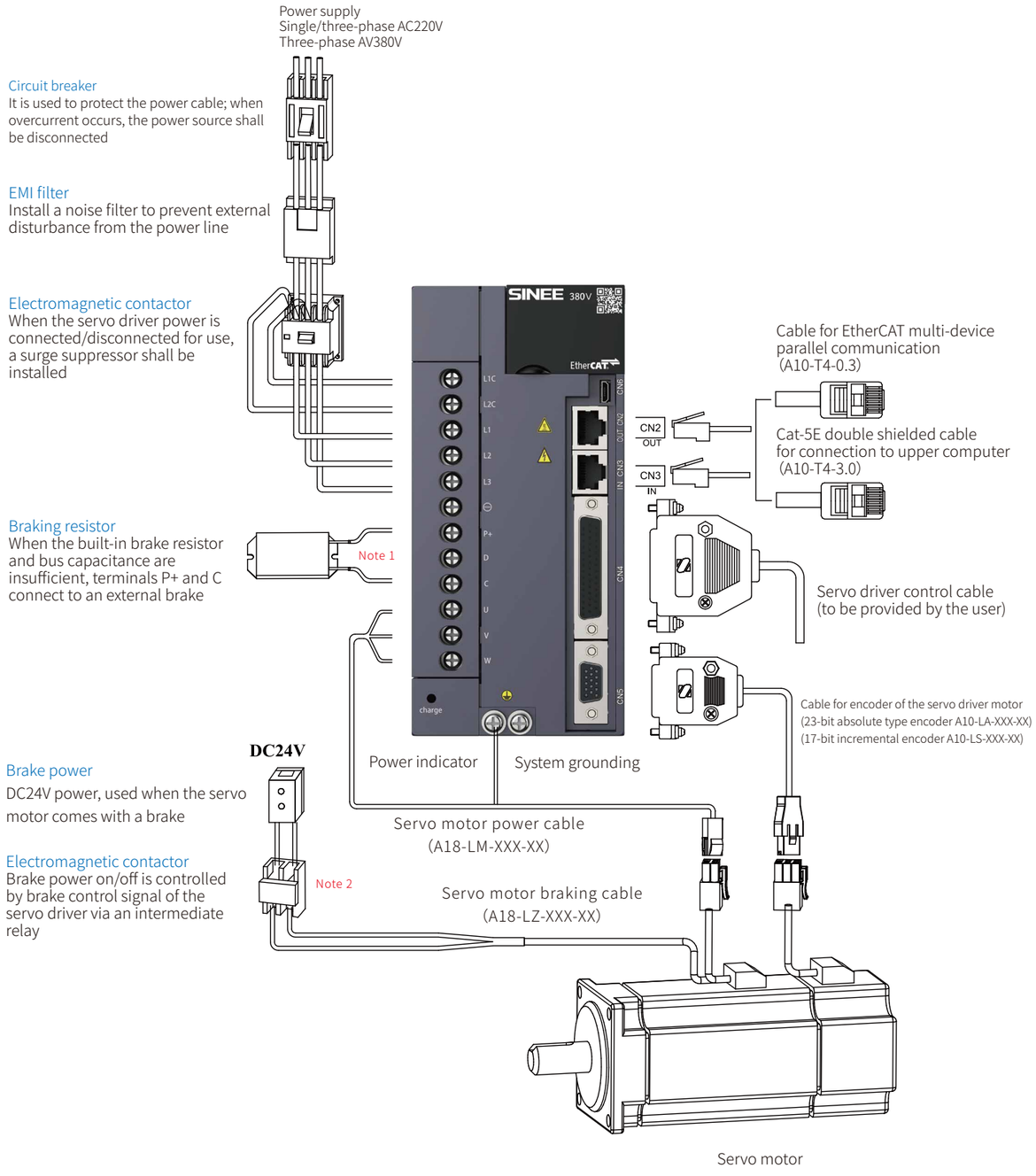
Single-phase 220V~240V 0.1~1kW

Three-phase 220V~240V 0.75~1.5kW

Three-phase 340V~460V 1.5~30kW

- High-speed response
- Bus control
- High-precision positioning
- Easy to use

Connection between EA300 EtherCAT bus servo driver and peripheral device



Note 1: When an external brake resistor is used, it is required to remove the short-circuiting piece between P+ and D, and correctly set the brake resistor parameter on the driver

Note 2: It is strongly recommended that the servo motor brake is defined by the servo driver as the DO terminal of the BK function for control. The DO terminal of the servo driver shall have its load capacity used only for driving an intermediate relay other than an electromagnetic contactor.

Terminal description of EA300 Ether CAT bus servo driver

CN2, CN3EtherCAT communication

IN CN3		OUT CN2	
Pin number	Signal name	Pin number	Signal name
1	TD+	1	TD+
2	TD-	2	TD-
3	RD+	3	RD+
4		4	
5		5	
6	RD-	6	RD-
7		7	
8		8	

CN4 control terminal

Signal name		Pin number	Default function	
Digital input port	DI1	5	P-OT	Inhibit forward drive
	DI2	20	N-OT	Inhibit reverse drive
	DI3	4	ORPG	Homing detection signal
	DI4	19	ALM-RST	Alarm fault resetting
	DI5	3	GAIN-SEL	Gain switching
	DI6	18	J-SEL	Inertia ratio switching
	DI7	2	P-CLR	Pulse deviation counter clearing
	DI8	17	INHIBIT	Pulse inhibited
	COM+	21	DI input common positive terminal	
Power supply	+24V	25/40	Internal 24V power source, voltage range +20V~26V, maximum output current 200mA	
	COM	7/22/36		
Digital output	DO1	8	S-RDY+	The servo is ready and can be connected when S-ON signal status can be received
	DO1-	37	S-RDY-	
	DO2	23	BK+	Brake control signal
	DO2-	38	BK-	
	DO3	9	COIN+	“Position reached” signal
	DO3-	39	COIN-	
	DO4	24	ALM+	Connected upon occurrence of a fault
	DO4-	10	ALM-	

Main circuit terminal

Terminal marking	Terminal name
L1C、L2C	Control power input terminal
L1、L2、L3	AC power input terminal of main circuit
P+、D、C	Connecting terminal for an external braking resistor
P+、⊖	Common DC bus terminal
U、V、W	Servo motor connecting terminal
PE	Grounding

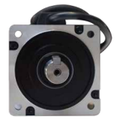
CN5 encoder terminal

Pin number	Signal name
1	SD+
3	SD-
5	+5V
10	GND
Housing	PE

Specification of EA300 EtherCAT bus servo driver

Basic specification	Control method		IGBT: PWM control, sine-wave current drive type. 220V, 380V; single phase or three phase full-wave rectifier	
	Encoder feedback		17bit serial incremental encoder, 23bit serial absolute encoder	
	Front panel		5 keys, 5-digit LED display, main power CHARGE	
	Regenerative brake		Can be basically built-in and externally installed	
	Use conditions	Environment temperature	Working temperature 0~40°	
		Ambient humidity	Working/storage: ≦ 90%RH (without dew condensation)	
		Anti-vibration/ impact strength	4.9m/s^2/19.6m/s^2	
		Protection level	IP10	
		Pollution level	2 level	
		Altitude	Less than 1,000m	
	Cooling method		Fan cooling	
EtherCAT slave specification	EtherCAT basic specification	Communication protocol	EtherCAT protocol	
		Support services	CoE(PDO, SDO)	
		Instruction synchronization cycle	1ms or its integral multiple	
		Synchronization method	DC- distributed clock	
		Physical layer	100BASE-TX	
		Baud rate	100Mbit/s	
		Duplex mode	Full duplex	
		Topological structure	Linear	
		Transmission medium	Shielded Cat-5E or better network cable	
		Transmission distance	Less than 50m between two nodes	
		Quantity of slave stations	No more than 100	
		EtherCAT frame length	44~1,498 bytes	
		Process data	44~1,498 bytes	
		Communication BER (bit error rate)	1/1000000000	
	EtherCAT configuration unit	FMMU unit	4	
		Storage synchronization management unit	4	
		Process data RAM	4K	
		Distributed clock	64 digits	
		EEPROM capacity	16K	
	Support running mode CIA402		Profile Position Mode Profile Velocity Mode Profile Torque Mode Interpolation Position Mode Cyclic Synchronous Position Mode Cyclic Synchronous Velocity Mode Cyclic Synchronous Torque Mode Homing Mode	
Performance	Speed-torque control mode	Speed fluctuation ratio: Load fluctuation	At 0~100% load: Maximum 0.3%	At rated speed
		Speed fluctuation ratio: Supply voltage change	At rated voltage ± 10%: Maximum 0.3%	
		Speed fluctuation ratio: Environment temperature	0~50℃ : Maximum 0.3%	
		Speed regulation ratio	1:5000	Minimal speed/rated rotating speed of continuous stable operation under the rated load
		Frequency bandwidth	1.0KHz (17bit and 23bit encoder)	
		Torque control accuracy	±3% (current repetition accuracy)	
		Soft start time setting	0~30s (acceleration and deceleration can be set respectively)	
	Position control mode	Feedforward compensation	Resolution 0~100% (set resolution 1%)	
		Positioning completion width	1~655,335 instruction units (set resolution to 1 instruction unit)	
		Min setting time	5ms (no load, from rated speed to positioning completion)	
Input/ output signal	Digital input signal	Function allocation available	Servo enable, alarm resetting, pulse deviation counter clearing, speed command direction selection, position/speed multi-segment switching, internal command trigger, control mode switching, pulse disable, forward drive disable, reverse drive disable, forward inch, backward inch	
	Digital output signal	Function allocation available	Servo ready, brake output, motor rotation output, zero-speed signal, speed approach, speed reached, position approach, torque limit, rotating speed limit, warning output, alarm output	
Built-in function	Over-travel (OT) prevention function		Stopped immediately when P-OT and N-OT are activated.	
	Electronic gear ratio		1.0 ≤ B/A ≤ 64000.0	
	Protective Function		Over-voltage, under-voltage, over-speed, overheat, overload, over-speed, over-temperature, encoder alarm, braking resistor overload alarm, excessive position error, EEPROM alarm, abnormal communication etc.	
	RS232 communication		Status display, user parameter setting, monitoring display, alarm tracking display, JOG operation and automatic tuning operation, speed, torque instruction signal etc.	
	Others		Gain adjustment, alarm record, JOG operation	

EA300E series servo motor, driver and cable matching table

Servo driver				Motor		
EA300E		Model	Supply voltage	Motor	Power	Adaptable motor model
SIZE A		EA300E-0R9-1B EA300E-1R6-1B EA300E-2R5-1B	Single-phase AC220V		50W 100W 200W 400W	SES04-005-30-2FAY ☐ SES04-0R1-30-2FAY ☐ SES06-0R2-30-2FBY ☐ SES06-0R4-30-2FBY ☐
SIZE B		EA300E-4R8-2B EA300E-6R2-2B	Single-phase or three-phase AC220V		750W 1000W	SES08-0R7-30-2FBY ☐ SES08-1R0-30-2FBY ☐ SES13-1R1-20-2FBY ☐
SIZE C		EA300E-5R6-3B EA300E-8R5-3B EA300E-013-3B	Three-phase AC380V		850W 1.3KW 1.7KW	SES13-0R8-15-3FBY ☐ SES13-1R3-15-3FBY ☐ SES13-1R7-30-3FBY ☐ SES13-1R1-20-3FBY ☐ SES13-1R7-20-3FBY ☐
					1.8kW 2.4kW 2.6kW 2.9kW 3.6kW	SES13-2R6-30-3FBY ☐ SES13-1R8-15-3FBY ☐ SES13-2R4-20-3FBY ☐ SES13-3R6-30-3FBY ☐ SES18-2R9-15-3FBY ☐
SIZE C		EA300E-011-2B	Three-phase AC220V		0.8kW 1.1kW 1.7kW	SES13-1R1-20-2FBY ☐ SES13-0R8-15-2FBY ☐ SES13-1R7-30-2FBY ☐
SIZE D		EA300E-017-3B EA300E-022-3B EA300E-028-3B	Three-phase AC380V		4.4kW 5.5kW 7.5kW	SES18-4R4-15-3FBY ☐ SES18-5R5-15-3FBY ☐ SES18-7R5-15-3FBY ☐
					11kW 13kW 15kW	SEC20-011-15-3FBY ☐ SEC20-011-20-3FBY ☐ SEC20-013-15-3FBY ☐ SEC20-015-15-3FBY ☐ SEC23-011-15-3FBY ☐
SIZE E		EA300E-038-3B EA300E-052-3B EA300E-062-3B	Three-phase AC380V		15kW 18kW 22kW 29kW	SEC23-015-15-3FBY ☐ SEC23-018-15-3FBY ☐ SEC23-022-15-3FBY ☐ SEC23-029-15-3FBY ☐

EA190 servo driver

Single-phase 220V~240V 0.1~1kW

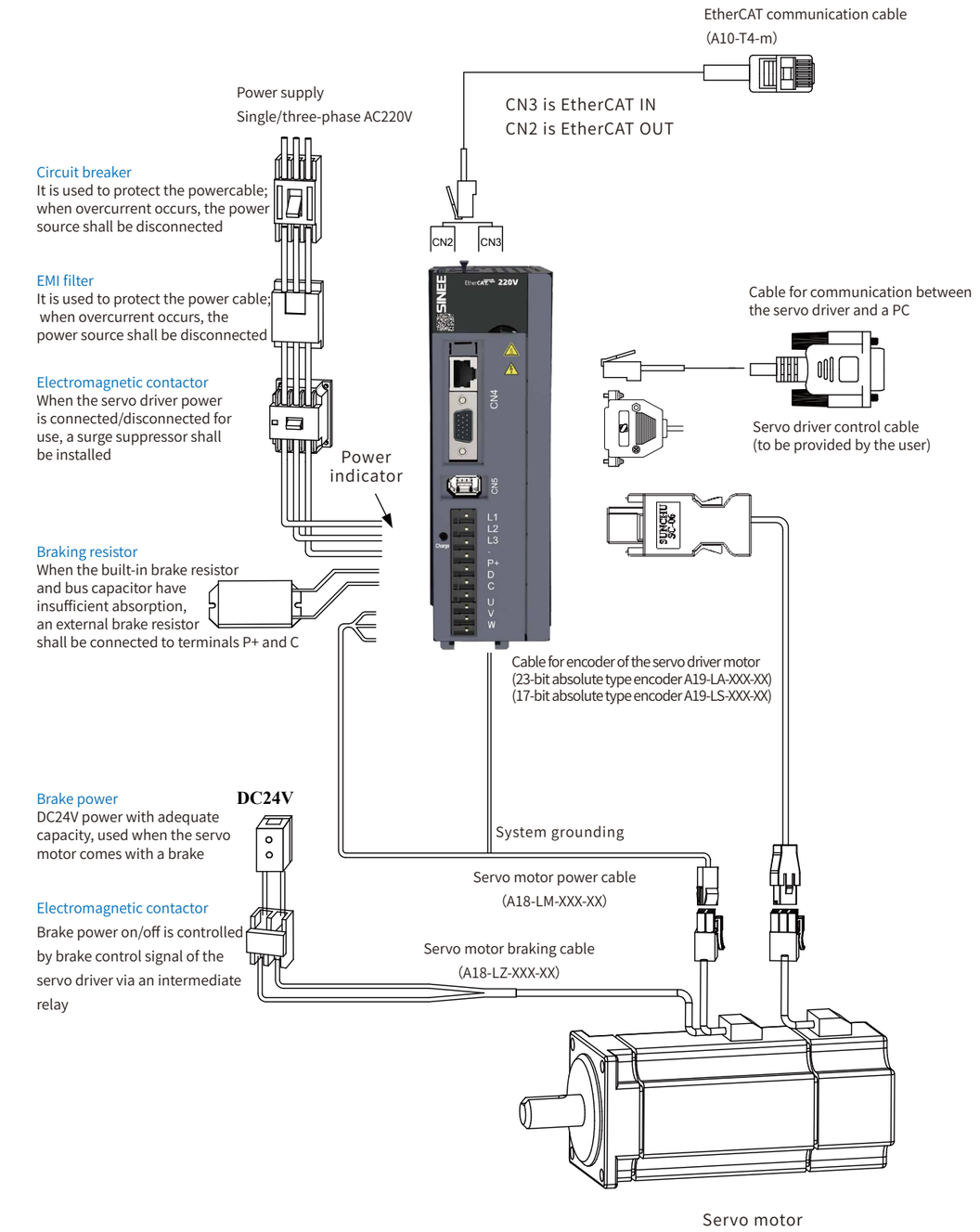
Stable and reliable

Bus control

High-precision positioning

Easy to use

Connection between Series EA190E bus servo driver and peripheral device

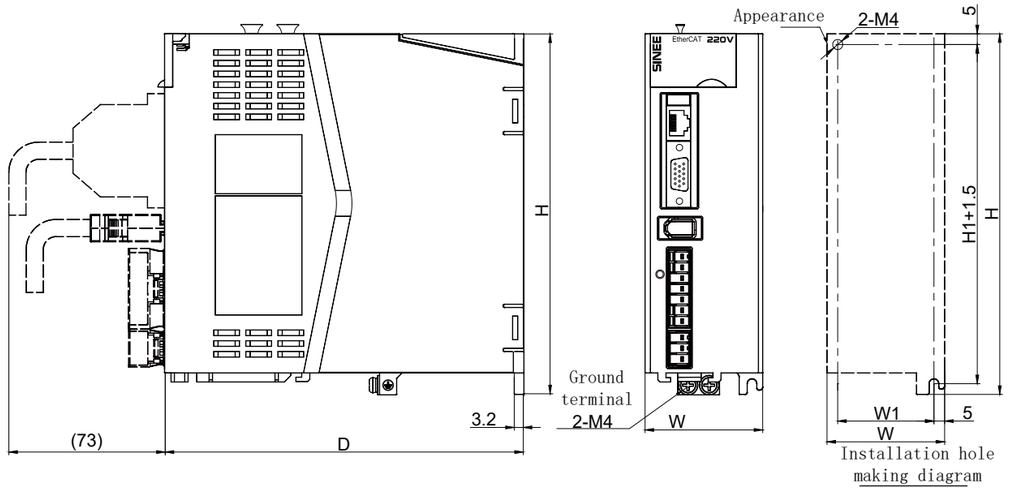


Model description of EA190E bus servo driver

EA ① 190 ② X ③ - 6R2 ④ - 2 ⑤ B ⑥ - XX ⑦

①Product Servo driver	④Rated output current 0R9-0.9A 6R2-6.2A	⑥ Encoder type B: 17/23-bit serial encoder
② Series 190 series		
③Null: Pulse type E: EtherCAT bus type	⑤Power voltage specification 1. Single-phase 220V 2. Single/three-phase 220V	⑦ Special specifications

Dimension diagram of EA190E bus servo driver

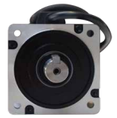


Model	D	H	W	W1	H1
EA190E-0R9-1B EA190E-1R6-1B EA190E-2R5-1B	150	168	44	34	158
EA190E-4R8-2B EA190E-6R2-2B	168	168	55	45	158

Specification of Series EA190E bus servo driver

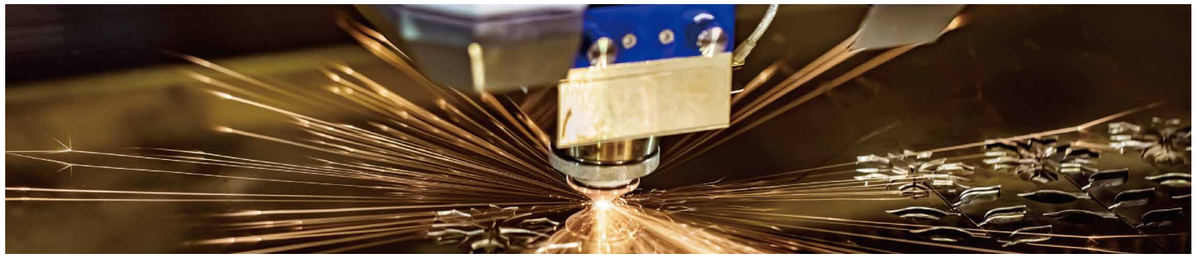
Basic specification	Control method		IGBT: PWM control, sine-wave current drive type
	Front panel		5 keys, 5-digit LED display, main power CHARGE
	Regenerative brake		Can be basically built-in and externally installed
	Use conditions	Environment temperature	Working temperature 0~40°
		Ambient humidity	Working/storage: ⩽ 90%RH (without dew condensation)
		Anti-vibration/ impact strength	4.9m/s^2/19.6m/s^2
		Protection level	IP20
		Pollution level	2 level
		Altitude	Less than 1,000m
	Cooling method		Natural (specifications 0R9, 1R6, 2R5)/ fan cooling (specifications 4R8, 6R2)
EtherCAT slave specification	EtherCAT basic specification	Communication protocol	EtherCAT protocol
		Support services	CoE(PDO, SDO)
		Instruction synchronization cycle	1ms or its integral multiple
		Synchronization method	DC- distributed clock
		Physical layer	100BASE-TX
		Baud rate	100Mbit/s
		Duplex mode	Full duplex
		Topological structure	Linear
		Transmission medium	Shielded Cat-5E or better network cable
		Transmission distance	Less than 50m between two nodes
		Quantity of slave stations	No more than 100
		EtherCAT frame length	44~1,498 bytes
		Process data	44~1,498 bytes
		Communication BER (bit error rate)	1/1000000000
	EtherCAT configuration unit	FMMU unit	4
		Storage synchronization management unit	4
		Process data RAM	4K
		Distributed clock	64 digits
		EEPROM capacity	16K
	Support running mode CIA402		Profile Position Mode Profile Velocity Mode Profile Torque Mode Interpolation Position Mode Cyclic Synchronous Position Mode Cyclic Synchronous Velocity Mode Cyclic Synchronous Torque Mode Homing Mode
Speed-torque control mode	Speed fluctuation ratio	Load fluctuation	At 0~100% load: Maximum 0.3% (At rated speed)
		Supply voltage change	At rated voltage ± 10%: Maximum 0.3% (At rated speed)
		Environment temperature	0~50°C : Maximum 0.3% (At rated speed)
	Speed regulation ratio		1:5000 (Minimal speed/rated rotating speed of continuous stable operation under the rated load)
	Frequency bandwidth		1.0KHz (17bit and 23bit encoder)
	Torque control accuracy		±3% (current repetition accuracy)
	Soft start time setting		0~30s (acceleration and deceleration can be set respectively)
Position control mode	Feedforward compensation		Resolution 0~100% (set resolution 1%)
	Positioning completion width		1~655,335 instruction units (set resolution to 1 instruction unit)
	Min setting time		5ms (no load, from rated speed to positioning completion)
Digital input signal	Function allocation available		Servo enable, alarm resetting, pulse deviation counter clearing, speed command direction selection, position/speed multi-segment switching, internal command trigger, control mode switching, forward drive disable, reverse drive disable, forward inch, backward inch
Digital output signal	Function allocation available		Servo ready, brake output, motor rotation output, zero-speed signal, speed approach, speed reached, position approach, torque limit, rotating speed limit, warning output, alarm output
Over-travel (OT) prevention function			Stopped immediately when P-OT and N-OT are activated.
Electronic gear ratio			1.0 ⩽ B/A ⩽ 64000.0
Protective Function			Over-voltage, under-voltage, over-speed, overheat, overload, over-speed, over-temperature, encoder alarm, braking resistor overload alarm, excessive position error, EEPROM alarm, abnormal communication etc.
RS232 communication			Status display, user parameter setting, monitoring display, alarm tracking display, JOG operation and automatic tuning operation, speed, torque instruction signal etc.
Others			Gain adjustment, alarm record, JOG operation

EA190E series servo motor and driver matching table

Servo driver				Motor		
EA190		Model	Supply voltage	Motor	Power	Adaptable motor model
SIZE A		EA190E-0R9-1B EA190E-1R6-1B EA190E-2R5-1B	Single-phase AC220V		50W 100W 200W 400W	SES04-005-30-2HAY ☐ SES04-0R1-30-2HAY ☐ SES06-0R2-30-2HBY ☐ SES06-0R4-30-2HBY ☐
SIZE B		EA190E-4R8-2B EA190E-6R2-2B	Single-phase or three-phase AC220V		750W 1000W	SES08-0R7-30-2HBY☐ SES08-1R0-30-2HBY☐ SER13-1R0-10-2HBY☐ SER13-1R0-20-2HBY☐ SER13-1R0-30-2HBY☐ SES13-1R1-20-2HBY☐

EA190E series servo motor and driver matching table

Motor specification/model	Adaptable driver model	Encoder cable	Motor cable
SES04-005-30-2HAY ☐	EA190☐-0R9-1B	A19-LS-A000-m (without battery) A19-LA-A000-m (with battery)	A18-LM-A007-m (motor power cable) A18-LZ-A005-m (brake cable for motor with a brake)
SES04-0R1-30-2HAY ☐	EA190☐-1R6-1B		
SES06-0R2-30-2HBY ☐			
SES06-0R4-30-2HBY ☐	EA190☐-2R5-1B		
SES08-0R7-30-2HBY ☐	EA190☐-4R8-2B		
SES08-1R0-30-2HBY ☐	EA190☐-6R2-2B	A19-LS-H100-m (without battery) A19-LA-H100-m (with battery)	Without brake: A18-LM-H115-m With brake: A18-LB-H115-m
SER13-1R0-10-2HBY ☐			
SER13-1R0-20-2HBY ☐			
SER13-1R0-30-2HBY ☐			



Model description of SER/SES series servo motor

SES 08 - 0R7 - 30 - 2 F B Y 1 -XX
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① series	②flange size of the motor	③ rated output power of the motor
SER：Standard servo motor SES：High-performance servo motor	04：40mm 06：60mm 08：80mm 09：86mm 11: 110mm 13：130mm 18：180mm 20：200mm	005: 50W 0R1：100W 0R2：200W 0R4：400W 0R7：750W 1R0：1000W 1R5：1500W 2R0：2000W 3R0：3000W 4R4：4400W 5R5：5500W 7R5：7500W
④rated speed of the motor	⑦inertia type	⑨optional accessory
10：1000rpm 15：1500rpm 20：2000rpm 25：2500rpm 30：3000rpm	A：Low inertia B：Medium inertia C：High inertia	Null: No optional accessory 1: With holding brake (DC24V) 2: With oil seal 3: With holding brake and oil seal 4: With fans 5: With brake and fans
⑤voltage level		
2：220V 3：380V		
⑥ encoder type	⑧bit Shaft end	⑩ special specification
A:2500ppr incremental encoder B:17bit incremental encode H:17bitincremental magnetic encoder F:23bit absolute type encoder K:17bitabsolute type magnetic encoder	X:Optical axis, without key slot *1 Y:Y: With U-shaped key slot and screw hole*2 Z:With double-circular key slot and screw hole	

Note 1: Generally not provided. Can be used as optical axis when the key is taken off.
Note 2: Partial varieties can be of double-circular key slots; except for motors with flange 130, the key width and height are the same with the U-shaped key slots.
Note 3: Random combination of various elements above is not available.

Common features of SER/SES series servo motors

Motor insulation level	FClass
Withstand voltage of insulation	1500V 60s
Insulation resistance	DC500V, above 10MΩ
Thermal resistance level of the motor	B
Protection level	Fully-closed self-cooling type, IP65 (except for the shaft running-through part)
Service environment	Ambient temperature 0-40° , RH 20%~80% (without dew condensation)
Installation method	Flange installation
Rotation direction	Rotate counterclockwise (CCW) under a forward command if viewed from the load side

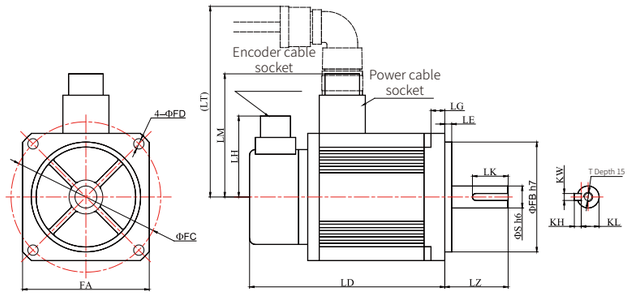
Holding brake specification

Motor flange size	Rated torque of motor	Rated voltage	Static friction torque	Rated power	Closing voltage	Release voltage	Set the closing action time	Set the release action time
mm	Nm	VDC	Nm	W	VDC	VDC	ms	ms
40	0.32 ⩽	24	0.35	3.5	22	1.5	63	55
60	0.64~1.27		2	6.3				
80	1.3~3.5		4	10.4			87	72
86	3.2~3.5		4	10.4				
110	2~6		10	11.6				
130	3.2~15		20	19.5			110	95
180	17~35		44	25			140	120
180	⩾ 36		74	45			152	130
200	35~95.5		120	95			165	140
230	70~184		200	120			230	180

1: The holding brake is used to keep the motor locked after stop, and cannot be used for braking.
2: A 24V power source shall be provided by the user for the holding brake, and it is prohibited to connect the holding brake to the 24V power in the servo driver. The 24V power source shall have a capacity that is at least 1.5 times the rated power of the holding brake (excluding capacity of any 24V power source for other devices).
3: The action time of the holding brake may differ for different circuits. The time provided above is only for reference, and the actual time depends on the physical product.
4: Static friction torque refers to the static friction torque provided by the brake when the motor is static; if there is external impact, keeping the motor static cannot be assured.

Installation dimension of SER series servo motor

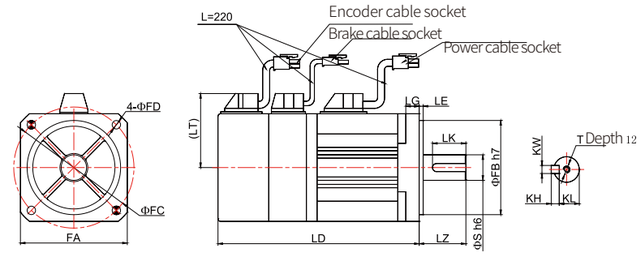
- Dimensions of SER series servo motors with flanges 110 and 130



Motor specification/model	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LH (mm)	LM (mm)	LT (mm)	S	KL	KH	KW	T	Quality (kg)	Cable connector model	
SER11-1R0-20-2 ☐ B ☐☐	205.5 (260.5)	110	95	130	9	55	31	6	9	-	107	176	19	15.5	6	6	M6	6.42 (7.88)	Without brake: Aviation plug YD28K4T With brake: Aviation plug YD28K7T	Aviation plug YD28K15TS
SER11-1R2-30-2 ☐ B ☐☐	185.5 (240.5)	110	95	130	9	55	31	6	9	-	107	176	19	15.5	6	6	M6	5.46 (6.92)		
SER11-1R8-30-2 ☐ B ☐☐	218.5 (273.5)	110	95	130	9	55	31	6	9	-	107	176	19	15.5	6	6	M6	7.26 (8.72)		
SER13-1R0-10-2 ☐ B ☐☐	215 (270)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	10.12 (11.67)		
SER13-1R0-20-2 ☐ B ☐☐	165 (220)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	6.41 (7.94)		
SER13-1R0-30-2 ☐ B ☐☐	150 (205)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	5.31 (6.89)		
SER13-1R5-10- ☐☐ B ☐☐	265 (320)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	13.82 (15.40)		
SER13-1R5-20- ☐☐ B ☐☐	185 (240)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	7.89 (9.43)		
SER13-1R5-30- ☐☐ B ☐☐	165 (220)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	6.40 (7.96)		
SER13-2R0-20-3 ☐ B ☐☐	215 (270)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	10.12 (11.67)		
SER13-2R0-30-3 ☐ B ☐☐	185 (240)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	7.85 (9.47)		
SER13-3R0-20-3 ☐ B ☐☐	265 (320)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	13.81 (15.34)		
SER13-3R0-30-3 ☐ B ☐☐	215 (270)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	10.12 (11.67)		

Installation dimension of SES series servo motor

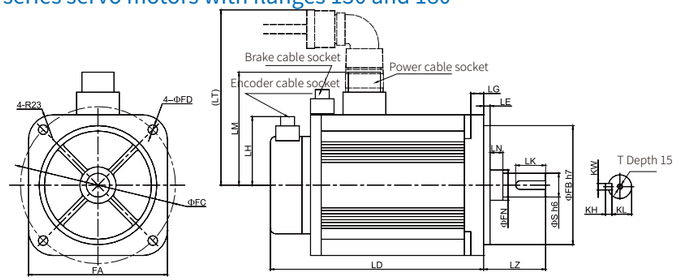
- Dimensions of SES series servo motors with flanges 40, 60 and 80



Motor specification/model	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LT (mm)	S (mm)	KL (mm)	KH (mm)	KW (mm)	T (mm)	Quality (kg)	Cable connector model	
SES04-005-30-2 ☐ AY ☐	85 (119.5)	40	30	46	4.5	25.5	14	3	8	37	8	6.3	3	3	M3	0.4 (0.6)	Power side:172159-1 Brake side:172157-1 Reed: 170362-1	Encoder side: 172161-1 Reed: 170361-1
SES04-0R1-30-2 ☐ AY ☐	100 (133.5)	40	30	46	4.5	25.5	14	3	8	37	8	6.3	3	3	M3	0.47 (0.67)		
SES06-0R2-30-2 ☐ BY ☐	93.7 (120.2)	60	50	70	4.5	30	20	3	8	48	14	8.5	4	4	M5	1.01 (1.4)		
SES06-0R4-30-2 ☐ BY ☐	110.7 (137.2)	60	50	70	4.5	30	25	3	8	48	14	11	5	5	M5	1.37 (1.78)		
SES08-0R7-30-2 ☐ BY ☐	122.4 (150.6)	80	70	90	6.3	35	25	3	10	58	19	15.5	6	6	M5	2.4 (2.8)		
SES08-1R0-30-2 ☐ BY ☐	136.4 (164.6)	80	70	90	6.3	35	25	3	10	58	19	15.5	6	6	M5	3.0 (3.4)		

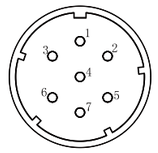
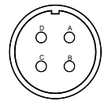
Note: An SES04 motor has two installation holes at the two shadowed locations as shown in the figure

- Dimensions of SES series servo motors with flanges 130 and 180

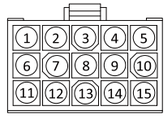
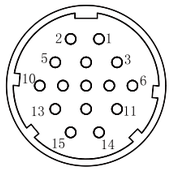
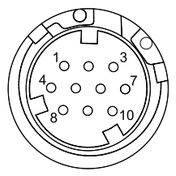


Motor specification/model	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LH (mm)	LM (mm)	LT (mm)	LN (mm)	FN (mm)	S (mm)	KL (mm)	KH (mm)	KW (mm)	T (mm)	Quality (kg)	Cable connector model	
SES13-0R8-15-3FBY ☐ SES13-1R7-30-3FBY ☐ SES13-1R1-20-3FBY ☐	150.9 (183.4)	130	110	145	9	58	27.5	6	12	63.3	105	230	12	28	19	16	5	5	M5	5.83 (17.8)	Power side: MS3108A18-10S Brake side: SM10-SP2S-S-T-V	Encoder side:SM10-SP10S-M1-T-V
SES13-1R3-15-3FBY ☐ SES13-1R7-20-3FBY ☐ SES13-2R6-30-3FBY ☐	166.9 (199.4)	130	110	145	9	58	28	6	12	63.3	105	230	12	28	22	18.5	6	6	M5	7.25 (9.3)		
SES13-1R8-15-3FBY ☐ SES13-2R4-20-3FBY ☐ SES13-3R6-30-3FBY ☐	184.9 (217.4)	130	110	145	9	58	29	6	12	63.3	105	230	12	28	24	20	8	8	M5	8.8 (10.8)		
SES18-2R9-15-3FBY ☐	173.3 (231)	180	114.3	200	13.5	79	65	3.2	18	63.3	135.5	230	0	35	35	30	8	10	M12	13 (19.5)	Power side: MS3108A22-22S Brake side: SM10-SP2S-S-T-V	
SES18-3R6-20-3FBY ☐	197.3 (324)	180	114.3	200	13.5	79	65	3.2	18	63.3	135.5	230	0	35	35	30	8	10	M12	17.5 (24)		
SES18-4R4-15-3FBY ☐	197.3 (324)	180	114.3	200	13.5	79	65	3.2	18	63.3	135.5	230	0	35	35	30	8	10	M12	17.5 (24)		
SES18-5R5-15-3FBY ☐	236.3 (278)	180	114.3	200	13.5	113	96	3.2	18	114.3	145.5	230	0	42	42	37	10	12	M16	22 (27.8)	Power side:MS3102A32-17S Brake side: SM10-SP2S-S-T-V	
SES18-7R5-15-3FBY ☐	282.3 (324)	180	114.3	200	13.5	113	96	3.2	18	114.3	145.5	230	0	42	42	37	10	12	M16	29.5 (35)		

Pin distribution of the motor-side power terminal

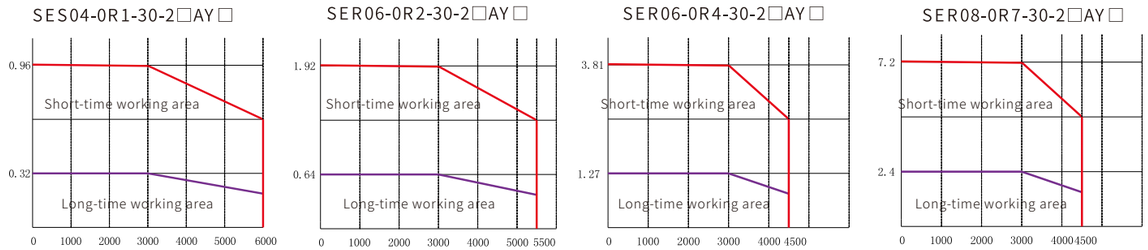
Connector type	Pin distribution	Pin number	Function definition
TE 172159-1		1	U
		2	V
		3	W
		4	PE
YD28K4TS The diameter of contact pairs is 3*ϕ3.5mm +1*ϕ2.5mm		1	PE
		2	U
		3	V
		4	W
The diameter of YD28K7TS contact pairs is 7*Φ2.5mm		1	PE
		2	U
		3	V
		4	W
		5	24V (brake)
		6	0V (brake)
		7	Null
MS3105A18-10S MS3108A22-22S MS3105A32-17S		A	U
		B	V
		C	W
		D	PE

- Pin distribution of the motor-side encoder terminal

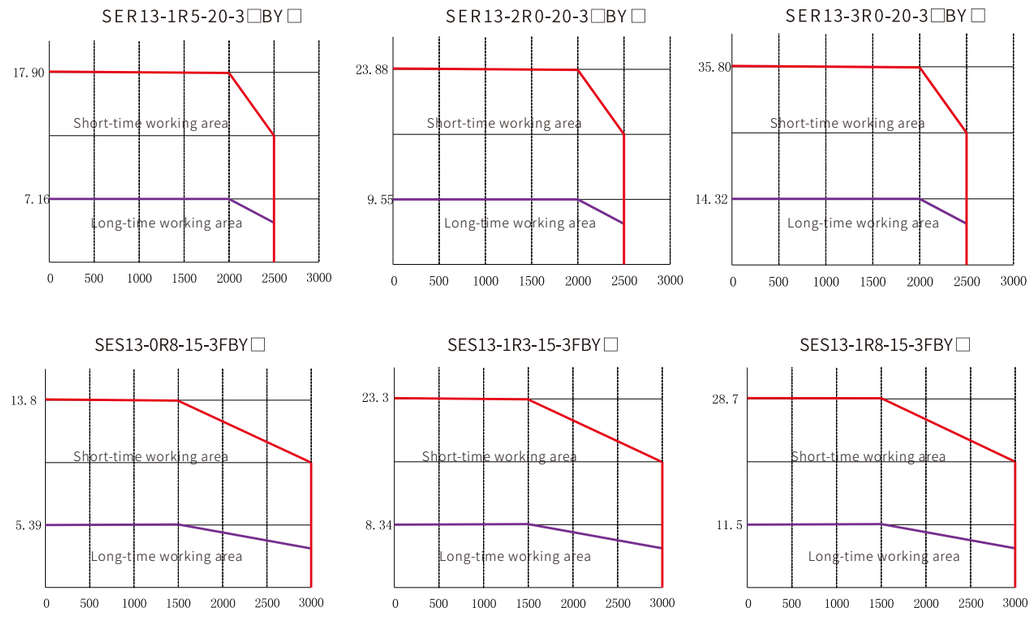
	TE 172163-1				TE 172161-1		YD28K15TS				CM10-SP10S-MD	
Connector type												
2500ppr incremental encoder	Signal	Pin number	Signal	Pin number			Signal	Pin number	Signal	Pin number		
	A+	9	V+	10			A+	4	V+	11		
	A-	13	V-	12			A-	7	V-	14		
	B+	4	W+	11			B+	5	W+	12		
	B-	14	W-	15			B-	8	W-	15		
	Z+	7	+5V	2			Z+	6	+5V	2		
	Z-	5	GND	3			Z-	9	GND	3		
	U+	6	PE	1			U+	10	PE	1		
	U-	8					U-	13				
17/23-bit encoder	Signal	Pin number			Signal	Pin number	Signal	Pin number			Signal	Pin number
	+5V	1			+5V	2	+5V	4			GND	9
	GND	2			SD+	5	SD+	4			SD+	1
	SD-	6			VD+	3	VD+	14			VD-	2
	VD+	4			VD-	15	VD-	1			PE	10

Torque-speed characteristic curve of Series SER/SES servo motors

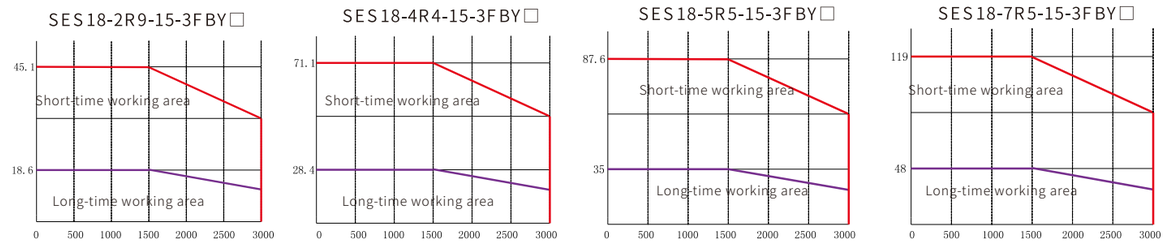
- Torque-speed characteristic curve of 40, 60 & 80 servo motors with flanges



- Torque-speed characteristic curve of 130 servo motors with flanges



- Torque-speed characteristic curve of 180 servo motors with flanges



Parameter table of SER series servo motor

Servo motor model	Voltage class V	Rated power W	Rated rotating speed rpm	Maximum rotating speed rpm	Rated current A	Maximum instantaneous current A	Rated torque Nm	Maximum instantaneous torque Nm	Torque constant Nm/A	Rotating inertia Kg.cm²*10⁻⁴	Adaptable driver
SER11-1R0-20-2 ☐ BY ☐	AC220V	1000	2000	2500	5.0	15.0	5.0	15.00	1.0	7.22(7.24)	6R2-2 ☐
SER11-1R2-30-2 ☐ BY ☐		1200	3000	3500	4.9	14.7	4.0	12.00	0.82	5.54(5.56)	
SER11-1R8-30-2 ☐ BY ☐		1800	3000	3500	6.6	19.8	6.0	18.00	0.91	8.55(8.57)	011-2 ☐
SER13-1R0-10-2 ☐ BY ☐		1000	1000	1500	4.72	14.2	9.55	28.65	2.02	17.14(17.16)	6R2-2 ☐
SER13-1R0-20-2 ☐ BY ☐			2000	2500	4.72	14.2	4.77	14.31	1.01	8.71(8.73)	
SER13-1R0-30-2 ☐ BY ☐			3000	3500	4.96	14.9	3.27	9.81	0.66	6.17(6.19)	
SER13-1R5-10-3 ☐ BY ☐	AC 380	1500	1000	1500	5.4	13.5	14.32	35.80	2.65	25.58(25.6)	5R6-3 ☐
SER13-1R5-20-3 ☐ BY ☐			2000	2500	4.1	10.3	7.16	17.90	1.75	12.08(12.1)	
SER13-1R5-30-3 ☐ BY ☐			3000	3500	4.2	10.5	4.78	11.95	1.14	8.71(8.73)	
SER13-2R0-20-3 ☐ BY ☐		2000	2000	2500	6.5	16.3	9.55	23.88	1.47	17.14(17.16)	8R5-3 ☐
SER13-2R0-30-3 ☐ BY ☐			3000	3500	5.8	14.5	6.5	16.25	1.12	12.08(12.1)	
SER13-3R0-20-3 ☐ BY ☐		3000	2000	2500	9.6	24.0	14.32	35.80	1.49	25.58(25.6)	013-3 ☐
SER13-3R0-30-3 ☐ BY ☐			3000	3500	8.3	20.8	9.55	23.88	1.15	17.14(17.16)	

Note 1: Value in () is the value in case a brake is provided;
2: When an oil seal is provided, it shall be derated by 10% for use

Parameter table of SES series servo motor

Servo motor model	Voltageclass V	Rated power W	Rated rotating speed rpm	Maximum rotating speed rpm	Rated current A	Maximum instantaneous current A	Rated torque Nm	Maximum instantaneous torque Nm	Torque constant Nm/A	Rotating inertia Kg.cm2*10-4	Adaptable driver EA180-
SES04-005-30-2 ☐ AY ☐	AC 220	50	3000	6000	0.6	1.8	0.16	0.48	0.26	0.02(0.02)	0R9-1 ☐
SES04-0R1-30-2 ☐ AY ☐		100	3000	6000	1.1	3.3	0.32	0.96	0.29	0.04(0.04)	1R6-1 ☐
SES06-0R2-30-2 ☐ BY ☐		200	3000	6000	1.6	4.8	0.64	1.92	0.44	0.29(0.34)	1R6-1 ☐
SES06-0R4-30-2 ☐ BY ☐		400	3000	6000	2.3	6.9	1.27	3.81	0.59	0.56(0.61)	2R5-1 ☐
SES08-0R7-30-2 ☐ BY ☐		750	3000	5000	4.0	12	2.4	7.2	0.653	1.56(1.66)	4R8-2 ☐
SES08-1R0-30-2 ☐ BY ☐		1000	3000	5000	6.0	18	3.2	9.6	0.538	2.03(2.13)	6R2-2 ☐
SES13-0R8-15-2FBY ☐		850	1500	3000	6.9	17	5.39	13.8	1.72	13.95(16.1)	011-2B
SES13-1R1-20-2 ☐ BY ☐		1100	2000	4000	7.2	18.9	5.39	14.15	0.75	13.95(16.1)	011-2B
SES13-1R7-30-2 ☐ BY ☐		1700	3000	5000	9.2	24.1	5.39	14.15	0.69	13.95(16.1)	011-2B
SES13-0R8-15-3FBY ☐	AC 380	850	1500	3000	3.5	8.5	5.39	13.8	1.72	13.95(16.1)	5R6-3B
SES13-1R7-30-3 ☐ BY ☐		1700	3000	5000	5.3	13.9	5.39	14.15	1.02	13.95(16.1)	5R6-3B
SES13-1R1-20-3 ☐ BY ☐		1100	2000	4000	4.3	11.3	5.39	14.15	1.25	13.95(16.1)	5R6-3B
SES13-1R3-15-3FBY ☐		1300	1500	3000	5.4	14	8.34	23.3	1.78	19.95(22.1)	5R6-3B
SES13-1R7-30-3 ☐ BY ☐		1700	2000	4000	7.5	22.5	8.34	25	1.11	19.95(22.1)	8R5-3B
SES13-2R6-30-3 ☐ BY ☐		2600	3000	5000	8	22.35	8.34	23.3	1.04	19.95(22.1)	8R5-3B
SES13-1R8-15-3FBY ☐		1800	1500	3000	8.4	20	11.5	28.7	1.5	26.1(28.1)	8R5-3B
SES13-2R4-20-3 ☐ BY ☐		2400	2000	4000	8.9	22.2	11.5	28.7	1.29	26.1(28.1)	013-3B
SES13-3R6-30-3 ☐ BY ☐		3600	3000	5000	10.8	27	11.5	28.7	1.07	26.1(28.1)	013-3B
SES18-2R9-15-3FBY ☐		2900	1500	3000	11.9	28	18.6	45.1	1.7	46.0 (53.9)	013-3B
SES18-4R4-15-3FBY ☐		4400			16.5	40.5	28.4	71.1	1.93	67.5 (75.4)	017-3B
SES18-5R5-15-3FBY ☐		5500			20.8	52	35	87.6	1.8	89.0(96.9)	022-3B
SES18-7R5-15-3FBY ☐		7500			25.7	65	48	119	1.92	125.0(133)	028-3B
SES18-3R6-20-3FBY ☐		3600	2000	2500	9.5	28.5	16.7	50.16	2.1	46.0(53.9)	013-3B

Note: 1: Value in () is the value in case a brake is provided;

CNC machine tool

Industrial demand

Machines and equipment have become a part of human production and life. Where machines and equipment are used, machine tools are needed. Machine tools can machine parts with high precision and surface roughness requirements by casting, forging, welding, pressing, extruding or otherwise for manufacture of equipment. Manufacturing is a pillar industry for economic development of a country. Strength of the machine tool industry is one of the key indicators that reflect the manufacturing development level of the country. CNC machines tools have become a mainstream development trend of modern machine tools due to their high precision, good flexibility, high work efficiency, compound functions, intelligent control and other features.

Highlights of the scheme

- Adaptable to multiple motor types
- Different types of interfaces for connection to CNC systems of different brands
- Accommodated to multiple types of machining processes: 6,000~24,000 r high-speed precision machining, C-axis function, low-speed heavy cutting machining, rigid tapping, independent positioning function, spindle swing function

Scheme composition

- Multi-axis synchronous control approach
- Electric screw press approach

Semiconductor, silicon wafer machining

◎ Industrial demand

Multi wire cutting is a new cutting method that can cut semiconductor or other hard and bristle materials (such as silicon plate, sapphire, ruby, neodymium iron boron, ferrite and so on) into several hundred of thin sheets at a time by high-speed reciprocating movement of metal wires. It has become a major method of cutting silicon wafers and magnetic materials.

◎ Highlights of the scheme

- It has high work efficiency, capable of producing several hundred of products at a time
- It has high precision and small cutting loss in product machining
- It features a constant swing bar output torque, steady tension of metal wires and swing bar jitter angle of less than ±1°
- Stably operating FPC can realize automatic deviation rectification and direction switching
- Spindles are directly coupled to realize synchronous closed-loop control between the spindles without additional linking mechanism and fast dynamic response
- The maximum linear cutting speed is 2000 m/min

◎ Scheme composition

Comprising three parts, i.e. touch screen, motion controller and servo motor

Stage lighting

Industrial demand

As consumption level constantly improves and recreational activities diversify, new performance venues and forms emerge one after another in the market, large-scale stage machinery and theater equipment of high technology are introduced, and equipment used is generally becoming more complicated. To render spectators better visual experience requires diversified stage performances and innovation, which can not only promote creativity conversion and art presentation, but also enhance the overall effect of stage scenes and treat the spectators with a feast of aesthetic enjoyment. SINEE stage control systems, featuring high safety, diversity, flexibility and easy operation, are powerful aids for stage scenes and actions.

Highlights of the scheme

- Support multi-mode switch control
- Support multiple protection functions
- Easy and simple cable connection
- Support storage of massive formula data with stable communication

Scheme composition

EA180 series servo system