



# SD300 Series

## Servo Drive



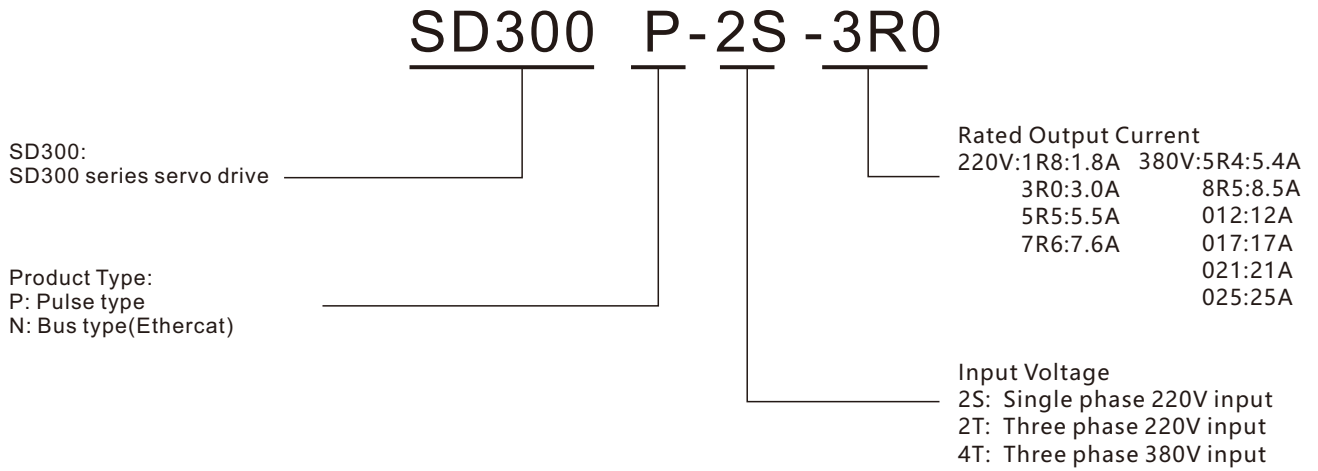
FRECON ELECTRIC (SHENZHEN) CO.,LTD.





## SD300 series model description

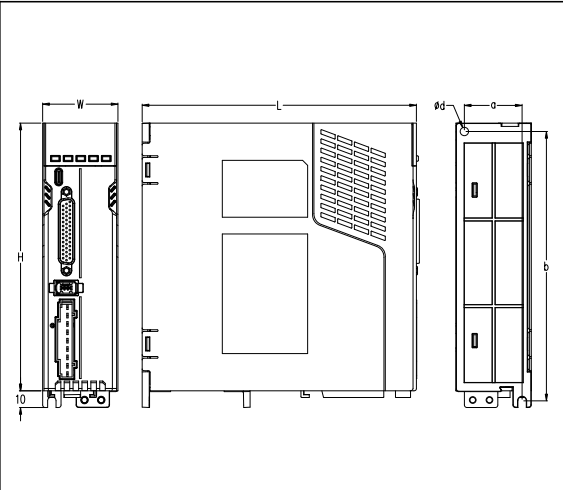
### Model description



### Drive model data

Frame	Model	Input Voltage(V)	Rated Current(A)	Maximum Current(A)
Size A	SD300□-2S-1R8	Single phase 220V	1.8	5.4
	SD300□-2S-3R0		3	9
	SD300□-2S-5R5		5.5	14
Size B	SD300□-2T-7R6	Three phase 220V	7.6	18
	SD300□-4T-5R4	Three phase 380V	5.4	14
Size C	SD300□-2T-012	Three phase 220V	12	32
	SD300□-4T-8R5	Three phase 380V	8.5	19
	SD300□-4T-012	Three phase 380V	12	30
Size D	SD300□-4T-017	Three phase 380V	17	40
	SD300□-4T-021	Three phase 380V	21	50
	SD300□-4T-025	Three phase 380V	25	60

### Drive frame

	Frame	Model	Product size (mm)					
			L	W	H	a	b	d
	Size A	SD300□-2S-1R8	166	45	160	34.5	161	5
		SD300□-2S-3R0						
		SD300□-2S-5R5						
Size B	SD300□-2T-7R6	172	66	167	54.5	157.2	5	
	SD300□-4T-5R4							
Size C	SD300□-2T-012	170	83	167	71.5	157.2	5	
	SD300□-4T-8R5							
	SD300□-4T-012							
Size D	SD300□-4T-017	230	85	250	73.5	240.2	5.5	
	SD300□-4T-021							
	SD300□-4T-025							

## Drive technical specifications

### SD300 drive general technical specifications

Control method	IGBT PWM Control, sine wave current drive method, 220V, 380V: single-phase or three-phase full-wave rectification		
Environment	Temperature	Working/Storage: 0°C ~ 55°C (the ambient temperature is above 45°C, derate by 10% for every 5°C increase) / -20°C ~ 70°C	
	Humidity	Working/Storage: Below 90%RH (no condensation)	
	Vibration	4.9m/s <sup>2</sup> / 19.6m/s <sup>2</sup>	
	Atmospheric pressure	86kPa ~ 106kPa	
IP grade	IP20		
Altitude	Maximum altitude is up to 2000m. No derating is required for use at 1000m and below. Derating by 1% for every 100m above 1000m.		
Feedback method	Single-turn/multi-turn absolute encoder (Tamagawa protocol)		

### SD300P drive technical specifications

Position Mode	Input signal	Pulse command	Input pulse type	Three command formats: Direction + Pulse; A, B Phase Quadrature Pulse; Forward/Reverse Pulse
			Input Mode	Differential input, Collector Open Circuit
			Input Frequency	Low speed: ≤500kHz (differential input) ; ≤200kHz (single-ended input) High speed: ≤4MHz (differential input)
	Position output	Output mode		A phase, B phase: differential output Z phase: differential output or open collector output
Frequency division ratio		Any frequency division ratio		
Speed Mode	Analog command input		-10V ~ +10V, Input impedance 10kΩ, 0~10V	
	Command acceleration and deceleration		Parameter set	
	Command source		Analog, Parameter set	
Torque Mode	Analog command input		-10V ~ +10V, Input impedance 10kΩ, 0~10V	
	Speed limit		Parameter set	
	Source of command		Analog, Parameter set	
Input and output signals	Digital input signal	Input signal function selection	7 DI DI1 ~ DI5 Digital signal inputs with a maximum frequency of 1kHz (frequency may decrease when the current-limiting resistance is greater than 2.4kΩ). DI8 ~ DI9 Digital signal inputs with hardware delay less than 1ms (current-limiting resistance is 2.4kΩ). DI functions are as follows: Servo enable, Alarm reset/clear, Forward drive disable, Reverse drive disable, Forward torque limit, Reverse torque limit, Emergency stop, Electronic gear selection 1, Electronic gear selection 2, Clear position deviation, Disable pulse input	
	Digital output signal		Output signal function selection	5DO, programmable output terminal (photoelectric isolation) DO functions are as follows: Servo ready, alarm, positioning completed, speed reached, electromagnetic brake, torque limit, etc.
	Analog input signal		Voltage input specifications: -10V ~ +10V; maximum allowable voltage: ±12V	

### SD300P drive technical specifications

Built-in function	Overtravel (OT) prevention function	P-OT, N-OT stops immediately when operate
	Electronic gear ratio	Numerator and denominator: 1-32767/1-32767
	LED display	5 digit LED display
	Monitoring function	Speed, current position, position deviation, motor torque, motor current, command pulse frequency, bus voltage, module internal temperature, etc.
	Protective function	Overspeed, overvoltage, overcurrent, overload, abnormal braking, abnormal encoder, abnormal position, etc.
	Communication	Modbus RTU
	Host computer interface	USB, support parameter reading and writing, online upgrade

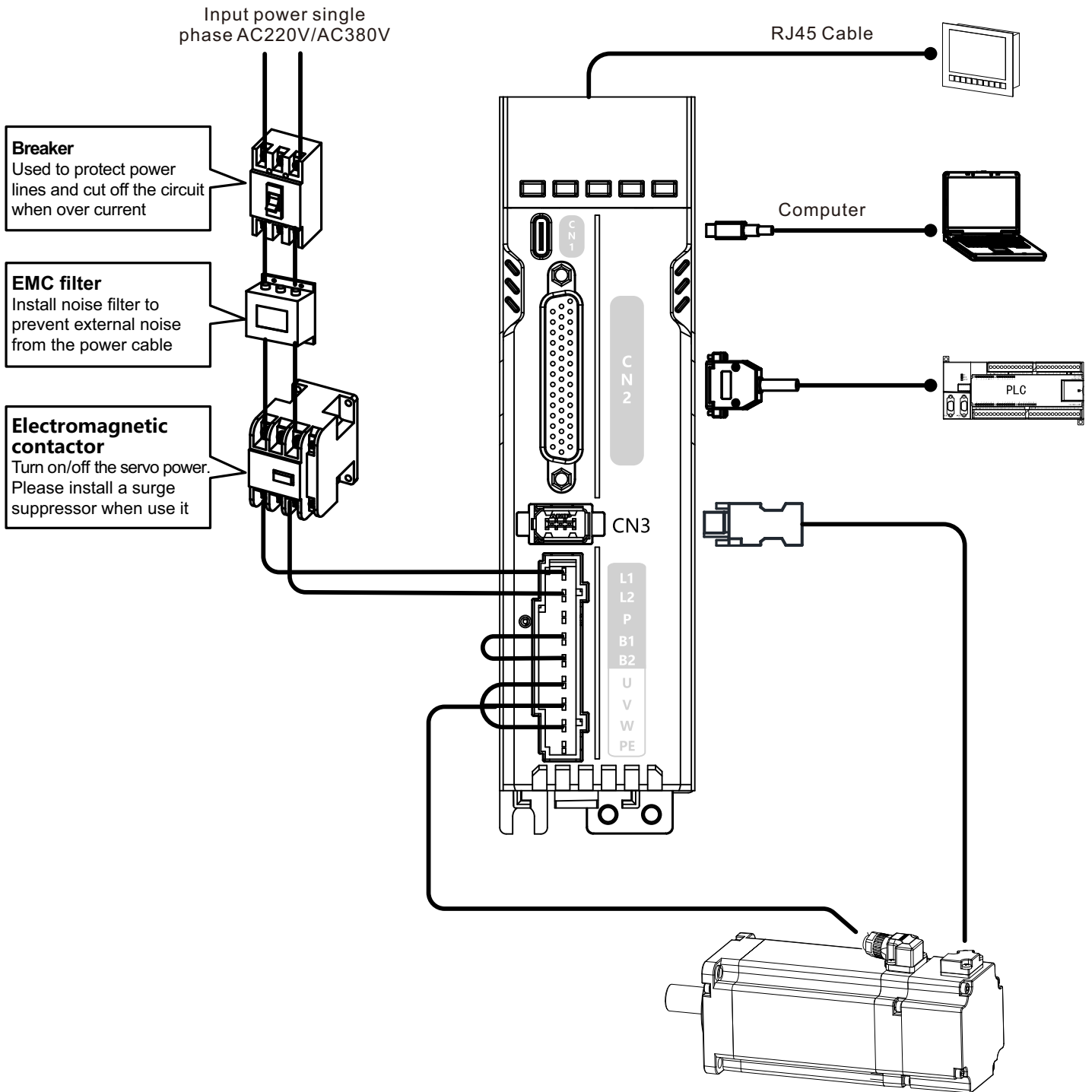
### SD300N drive technical specifications

Input and output signals	Digital input signals	4 programmable input DI terminals (photoelectric isolation) 2 high-speed optocoupler input DI terminals (high-speed latch), supporting up to 200kHz DI functions as follows: Servo enable, Alarm reset, Gain switch, Mode switch 1, Mode switch 2, Zero-point fix enable, Forward over travel switch, Reverse over travel switch, Zero command, Positive external torque limit, Forward jog, Reverse jog, Electronic gear selection, Command direction setting, Home switch, Home return enable, Emergency stop, Clear position deviation, Set current position as home	
	Digital output signals	4 programmable output DO terminals, DO load capacity 50mA, voltage range 5V ~ 30V DO functions as follows: Servo ready for output, zero speed, positioning completed, approaching position, torque limit, speed limit, brake engaged output, warning output, fault output, home return completed, electrical home return output, torque reached output, speed reached output, DB brake output.	
Location mode	Performance	Feedforward compensation	0~100%
	Input signal	Position command input	EtherCAT communication mode: CSP (Cyclic Synchronous Position Mode) / PP (Profile Position Mode) / HM (Home Mode)
Speed torque control mode	Speed control range	1: 5000 (the lower limit of the speed control range is the condition for non-stop at rated torque load)	
	Torque control accuracy	±2%	
	Input signals	Speed command input	EtherCAT communication mode: CSV (cycle sync speed mode) / PV (contour speed mode)
Torque command input		EtherCAT communication mode: CSV (cycle sync speed mode) / PV (contour speed mode)	
Built-in function	Overtravel prevention function	P-OT、N-OT stop immediately when moving	
	Protection	Overcurrent, overvoltage, undervoltage, overload, main circuit detection abnormality, radiator overheating, overspeed, encoder abnormality, CPU abnormality, parameter abnormality	
	LED display function	5 digit LED display	
	Communication	EtherCAT, Maximum number of slaves 255	
	Other functions	Gain adjustment, alarm recording, JOG operation, dynamic braking	

EtherCAT Slave communication technical specifications	
Communication protocol	EtherCAT
Support services	CoE (PDO、SDO)
Synchronously	DC-Distributed Clock
Physical layer	100BASE-TX
Baud Rate	100 Mbit/s (100Base-TX)
Duplex mode	Full-duplex
Topology	Linear
Transmission medium	Shielded Category 5 or electrical performance specification Category 6 or higher cable
Transmission distance	Less than 100M between two nodes (good environment, excellent cable)
Number of slave stations	Protocol supports up to 65535, actual usage does not exceed 100 units
EtherCAT frame length	44 bytes to 1498 bytes
Process data	Maximum size of a single Ethernet frame is 1486 bytes
Sync Jitter between Two Slaves	<1us
Refresh time	Approximately 30us for 1000 digital input/output switches; approximately 100us for 100 servo axes; different refresh times are defined for different interfaces

## Servo drive wiring

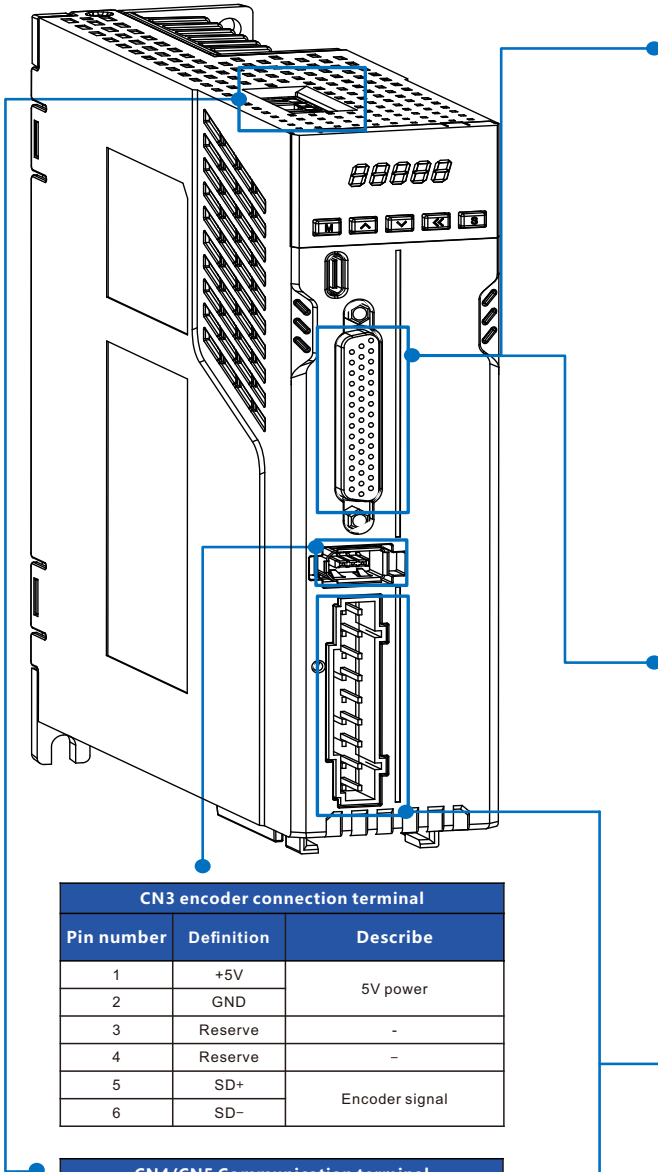
### SD300P drive wiring



**Note:** For three-phase input, the power input terminals are L1, L2, and L3.  
The control power supply needs to select any two lines as the control power input L1C, L2C.



## SD300P drive port definition



CN3 encoder connection terminal		
Pin number	Definition	Describe
1	+5V	5V power
2	GND	
3	Reserve	-
4	Reserve	-
5	SD+	Encoder signal
6	SD-	

CN4/CN5 Communication terminal		
Pin number	Signal name	Terminal function
1	MBS-	Modbus Communication data negative terminal
2	MBS+	Modbus communication data positive terminal
3	PE	Ground terminal
4	NC	Reserve
5	NC	Reserve
6	GND	Internal power ground
7	PE	The drive is grounded and connected to the power supply and motor ground terminals
8	NC	Reserve

CN2 Control terminal definition				
Signal name	Default function	Pin number	Terminal function	
Universal terminal signal	D11	S-ON	9	Servo enable
	D12	ALM-RST	10	Alarm fault reset
	D13	P-OT	24	Forward overtravel
	D14	N-OT	8	Reverse overtravel
	D15	ClrPosErr	33	Clear position deviation
	D18	Reserve	30	-
	D19	Reserve	12	-
	COM+		11	DI input terminal common end
	D01+	S-RDY+	7	Servo ready
	D01-	S-RDY-	6	
	D02+	COIN+	5	Positioning completed
	D02-	COIN-	4	
	D03+	ZERO+	3	Zero speed signal
	D03-	ZERO-	2	
	D04+	ALM+	1	Fault output
D04-	ALM-	26		
D05+	HomeAttain+	28	Home return completion	
D05-	HomeAttain-	27		

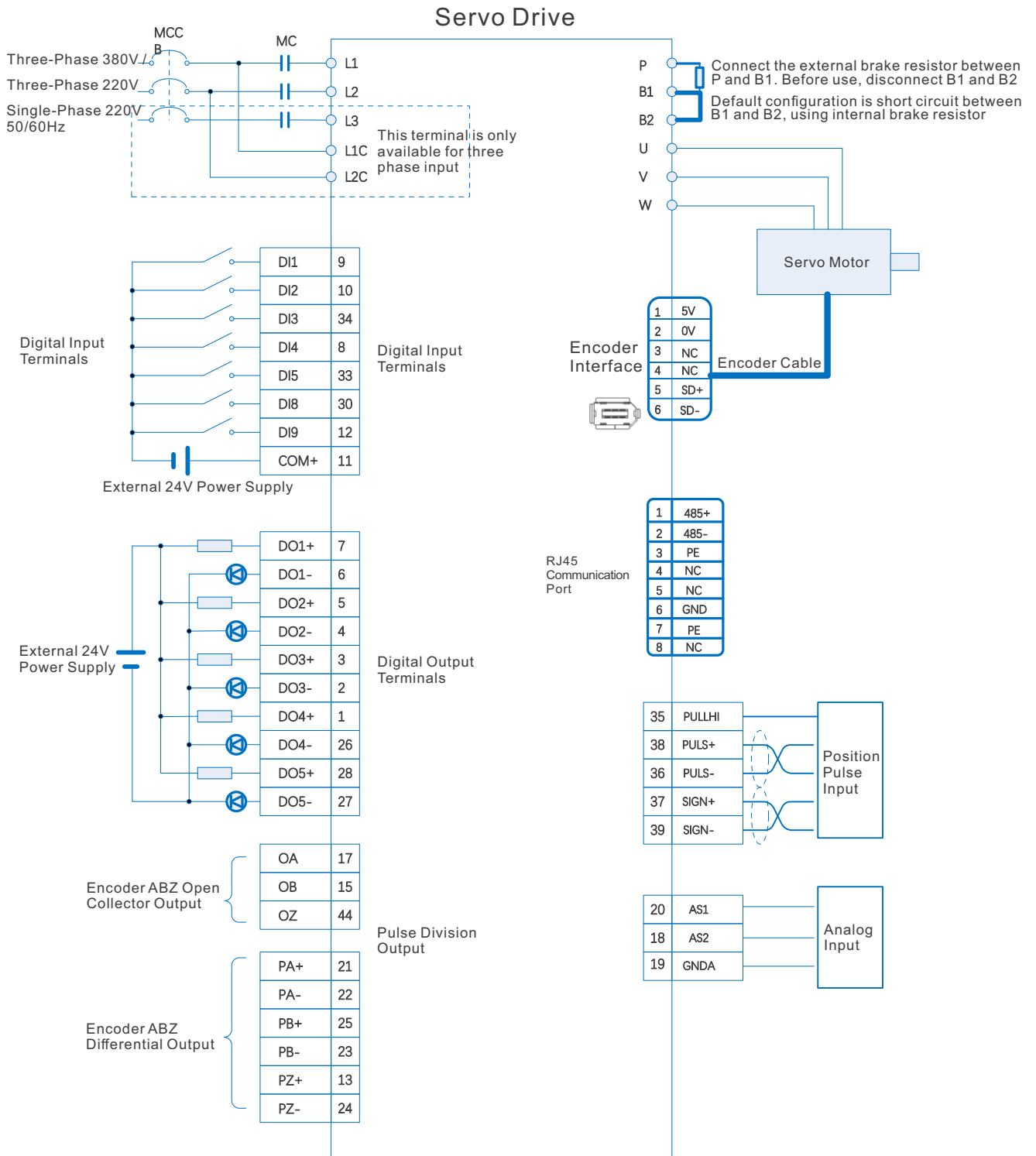
Signal name	Pin number	Terminal function	
Position command	PULSE+	41	Input pulse command mode: Differential drive input, collector open circuit
	PULSE-	43	
	SIGN+	37	
	SIGN-	39	Input pulse form: Direction + pulse, A, B phase orthogonal pulse, CW/CCW pulse
	HPULSE+	38	
	HPULSE-	36	
	HSIGN+	42	High-speed input pulse command
	HSIGN-	40	
	PULLHI	35	External power input interface for command pulse
GND	29	Signal ground	

Main circuit terminal definition (Size A)	
Terminal identification	Terminal function
L1, L2	Control circuit power input terminal
P, B1, B2	When use external brake resistor, disconnect between B1 and B2, and connect the external brake resistor across P and B1, not connected to B2
U, V, W	Output to motor U V W power
PE	PE motor ground terminal

Main circuit terminal definition (Size B/Size C/Size D)	
Terminal identification	Terminal function
L1C, L2C	Control circuit power input terminal
L1, L2, L3	Main circuit power input terminal
P+, N-	Servo bus terminal
P, B1, B2	When use external brake resistor, disconnect between B1 and B2, and connect the external brake resistor across P and B1, not connected to B2
U, V, W	Output to motor U V W power
PE	PE motor ground terminal

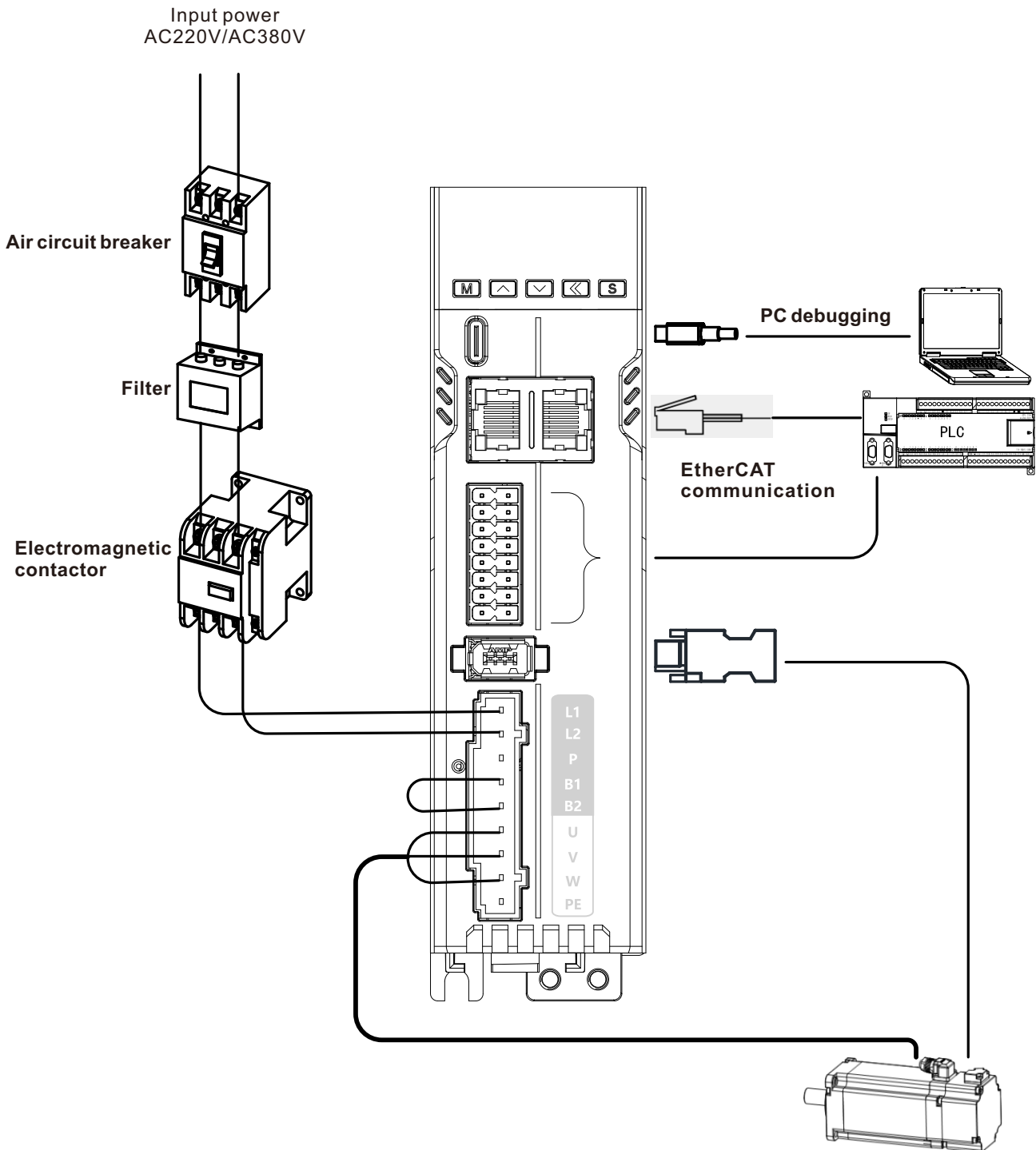


## SD300P control wiring diagram



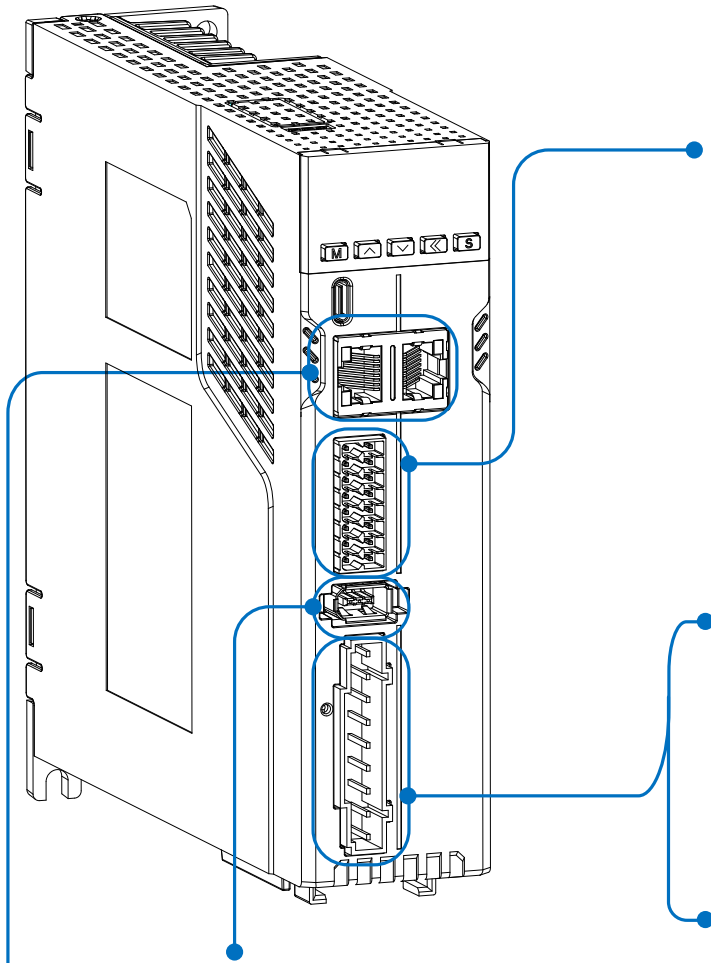
**Note:**  
Use twisted pair shield cable for pulse input.

## SD300N drive wiring



**Note:** For three-phase input, the input power terminals are L1, L2, and L3.  
 The control power supply needs to select any two lines as the control power input L1C, L2C.

## SD300N drive port definition



Cn3 encoder connection terminal		
Pin number	Terminal description	Function description
1	+5V	5V power
2	GND	
3	Reserve	-
4	Reserve	-
5	SD+	Encoder signal
6	SD-	


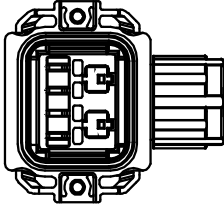
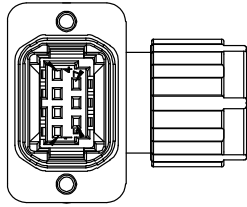
CN2, CN3 EtherCAT communication terminal			
A		B	
Pin number	Signal name	Pin number	Terminal function
1	TD+	1	TD+
2	TD-	2	TD-
3	RD+	3	RD+
4	-	4	-
5	-	5	-
6	RD-	6	RD-
7	-	7	-
8	-	8	-


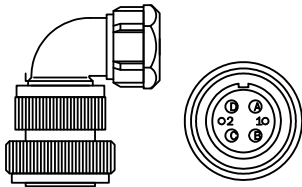
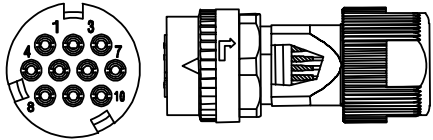
Cn4 control terminal definition			
Signal name	Default function	Pin number	Terminal function
Di1	S-ON	1	Servo enable
DI2	ALM-RST	3	Alarm fault reset
DI3	P-OT	11	Forward over range
DI4	N-OT	13	Reverse over range
COM+		9	Digital input common
HDI1		5	High speed digital input 1
HDI2		7	High speed digital input 2
DO1+,COM-	S-RDY	8, 10	Servo ready
DO2+,COM-	ALM	6, 10	Fault output
DO3+,DO3-	BK	3, 2	Brake
DO4+,COM-	Reserve	12, 10	-
COM-	-	10	DO output common terminal

Main circuit terminal definition (Size A)	
Terminal identification	Terminal function
L1, L2	Main circuit power input terminal
P, B1, B2	When use external brake resistor, disconnect between B1 and B2, and connect the external brake resistor across P and B1, not connected to B2
U, V, W	Output to motor U V W power
PE	PE motor ground terminal

Main circuit terminal definition (Size B/Size C/Size D)	
Terminal identification	Terminal function
L1C, L2C	Control circuit power input terminal
L1, L2, L3	Main circuit power input terminal
P+, N-	Servo bus terminal
P+, B1, B2	When use external brake resistor, disconnect between B1 and B2, and connect the external brake resistor across P and B1, not connected to B2
U, V, W	Output to motor U V W power
PE	PE motor ground terminal

## SD300 servo motor

40/60/80 flange motor side terminal definition	Power side cable 6P connector	Power side encoder 7-pin connector				
						
			Pin number	Signal name	Pin number	Signal name
			1	W	1	5V
			2	V	2	0
			3	U	3	SD+
			4	PE	4	SD-
			A	BK+	5	PE
B	BK-	6	BAT+			
		7	BAT-			

130/180 flange motor side terminal definition	Power side cable with 6-pin aviation connector	Power side encoder with 10-pin aviation connector				
						
			Pin number	Signal name	Pin number	Signal name
			A	W	1	/
			B	V	2	E-
			C	U	3	E+
			D	PE	4	SD-
			1	BK+	5	0V
			2	BK-	6	SD+
					7	5V
					8	/
		9	/			
		10	PE			

## Cable selection

### Cable model description

LPG - 0 075 0 - 3.0 - G

①      ②      ③      ④      ⑤      ⑥

LEG - 0 0 - 3.0 - G

①      ②      ③      ④      ⑤

<b>① Motor power cable</b> LPG: General 4-core power LPB: Power cable with brake	<b>④ Motor side plug type</b> 0: 4-core Amp head 1: SC-MC6S (Gecko Head) 2: 6P-core aviation head	<b>① Encoder cables</b> LEG: Universal absolute encoder cables LEB: Battery-powered absolute encoder cables	<b>④ Cable length</b> 3.0: 3m 5.0: 5m 10.0: 10m ...
<b>② Drive Side Plug Type</b> 0: U-shaped type terminal 1: Needle type terminal	<b>⑤ Cable length</b> 3.0: 3m 5.0: 5m 10.0: 10m ...	<b>② Drive side plug type</b> 0: 1394 plug 1: DB15 plug 2: DB9 plug	<b>⑤ Cable type</b> G: General Cable H: Super High-flex Cable (Bend endurance over 10 million cycles)
<b>③ Wire diameter(mm<sup>2</sup>)</b> 050: 0.5 075: 0.75 100: 1.0 150: 1.5 250: 2.5 ...	<b>⑥ Cable type</b> G: General Cable H: Super High-flex Cable (Bend endurance over 10 million cycles)	<b>③ Motor side plug type</b> 1: SC-MC7S (Gecko Head) 2: 10P-core aviation plug	

### Cable selection table

Motor model	Cable name	Cable model	Length(m)	Cable appearance diagram
F1M terminal type motor (40/60/80 flange motor)	Power cable without brake	LPG-10501-3.0-G	3	
		LPG-10501-5.0-G	5	
		LPG-10501-10.0-G	10	
	Power cable with brake	LPB-10501-3.0-G	3	
		LPB-10501-5.0-G	5	
		LPB-10501-10.0-G	10	
	Single-turn absolute encoder cable	LEG-01-3.0-G	3	
		LEG-01-5.0-G	5	
		LEG-01-10.0-G	10	
Multi-turn absolute encoder cable	LEB-01-3.0-G	3		
	LEB-01-5.0-G	5		
	LEB-01-10.0-G	10		
F1M aviation plug motor (130 flange, 1.5kW and below)	Without brake power cable	LPG-11002-3.0-G	3	
		LPG-11002-5.0-G	5	
		LPG-11002-10.0-G	10	

F1M aviation plug motor (130 flange, 1.5kW and below)	With brake power cable	LPB-11002-3. 0-G	3	
		LPB-11002-5. 0-G	5	
		LPB-11002-10. 0-G	10	
	Single-turn absolute encoder cable	LEG-02-3. 0-G	3	
		LEG-02-5. 0-G	5	
		LEG-02-10. 0-G	10	
	Multi-turn absolute encoder cable	LEB-02-3. 0-G	3	
		LEB-02-5. 0-G	5	
		LEB-02-10. 0-G	10	
F1M aviation plug motor (130 flange, >1.5kW, ≤3.0kW)	Without brake power cable	LPG-11502-3. 0-G	3	
		LPG-11502-5. 0-G	5	
		LPG-11502-10. 0-G	10	
	With brake power cable	LPB-11502-3. 0-G	3	
		LPB-11502-5. 0-G	5	
		LPB-11502-10. 0-G	10	
	Single-turn absolute encoder cable	LEG-02-3. 0-G	3	
		LEG-02-5. 0-G	5	
		LEG-02-10. 0-G	10	
	Multi-turn absolute encoder cable	LEB-02-3. 0-G	3	
		LEB-02-5. 0-G	5	
		LEB-02-10. 0-G	10	
F1M aviation plug motor (180 flange, >3.0kW, ≤7.5kW)	Without brake power cable	LPG-12502-3. 0-G	3	
		LPG-12502-5. 0-G	5	
		LPG-12502-10. 0-G	10	
	With brake power cable	LPB-12502-3. 0-G	3	
		LPB-12502-5. 0-G	5	
		LPB-12502-10. 0-G	10	
	Single-turn absolute encoder cable	LEG-02-3. 0-G	3	
		LEG-02-5. 0-G	5	
		LEG-02-10. 0-G	10	
	Multi-turn absolute encoder cable	LEB-02-3. 0-G	3	
		LEB-02-5. 0-G	5	
		LEB-02-10. 0-G	10	

## Servo motor selection

### Motor model description

①
②
③
④
⑤
⑥
⑦
⑧

**F1 M - 40A 30 L 1 - A3 60**

<b>① Product Series</b>	<b>④ Rated speed(Rpm)</b>	<b>⑦ Encoder type</b>
F1:F1 series motor F2:F2 series motor	15=1500rpm 20=2000rpm 25=2500rpm 30=3000rpm	A: Magnetic Encoder B: Optical Encoder  1: 17-bit Absolute Value Single-turn 2: 17-bit Absolute Value Multi-turn 3: 23-bit Absolute Value Single-turn 4: 23-bit Absolute Value Multi-turn
<b>② Rotor inertia</b>	<b>⑤ Input voltage(V)</b>	<b>⑧ Motor flange</b>
H:high inertia M:medium inertia S:low inertia	L : AC 220V H : AC 380V	40:40 flange 60:60 flange 80:80 flange 13:130 flange 18:180 flange
<b>③ Rated power(W)</b>	<b>⑥ Brake</b>	
A:×10 B:×100 For example:40A=400W ...	1:Without brake 2:With brake	

### Motor selection table

Motor model	Rated output (kW)	Voltage (V)	Rated torque (N.m)	Rated current (A)	Rotor inertia (x10 <sup>-4</sup> kg.m <sup>2</sup> )	Rated speed/ Maximum speed(rpm)
F1M-10A30L□-B440	100W	220V	0.318	1.1	0.066	3000/6000
F1M-20A30L□-B460	200W	220V	0.64	1.7	0.28	3000/6000
F1M-40A30L□-B460	400W	220V	1.27	2.5	0.52	3000/6000
F1M-60A30L□-B460	600W	220V	1.91	3.6	0.76	3000/6000
F1M-75A30L□-B480	750W	220V	2.39	4.4	1.48	3000/6000
F1M-10B30L□-B480	1000W	220V	3.18	5.8	1.97	3000/6000
F1M-85A15L□-B413	850W	220V	5.41	4.6	12.1	1500/3000
F1M-85A15H□-B413	850W	380V	5.41	3.1	12.1	1500/3000
F1M-13B15L□-B413	1300W	220V	8.28	7.7	17.5	1500/3000
F1M-13B15H□-B413	1300W	380V	8.28	5.1	17.5	1500/3000
F1M-18B15L□-B413	1800W	220V	11.46	9.8	23.7	1500/3000
F1M-18B15H□-B413	1800W	380V	11.46	6.3	23.7	1500/3000
F1M-23B15L□-B413	2300W	220V	14.64	12.4	31.2	1500/3000
F1M-23B15H□-B413	2300W	380V	14.64	8.5	31.2	1500/3000
F1M-30B15H□-B413	3000W	380V	14.64	8.5	31.2	1500/3000
F1M-30B15H□-B418	3000W	380V	19.1	11.6	47.2	1500/3500
F1M-45B15H□-B418	4500W	380V	28.65	16.6	69.3	1500/3500
F1M-55B15H□-B418	5000W	380V	35	21.4	94.1	1500/3500
F1M-75B15H□-B418	7500W	380V	47.76	26.7	135.6	1500/3500

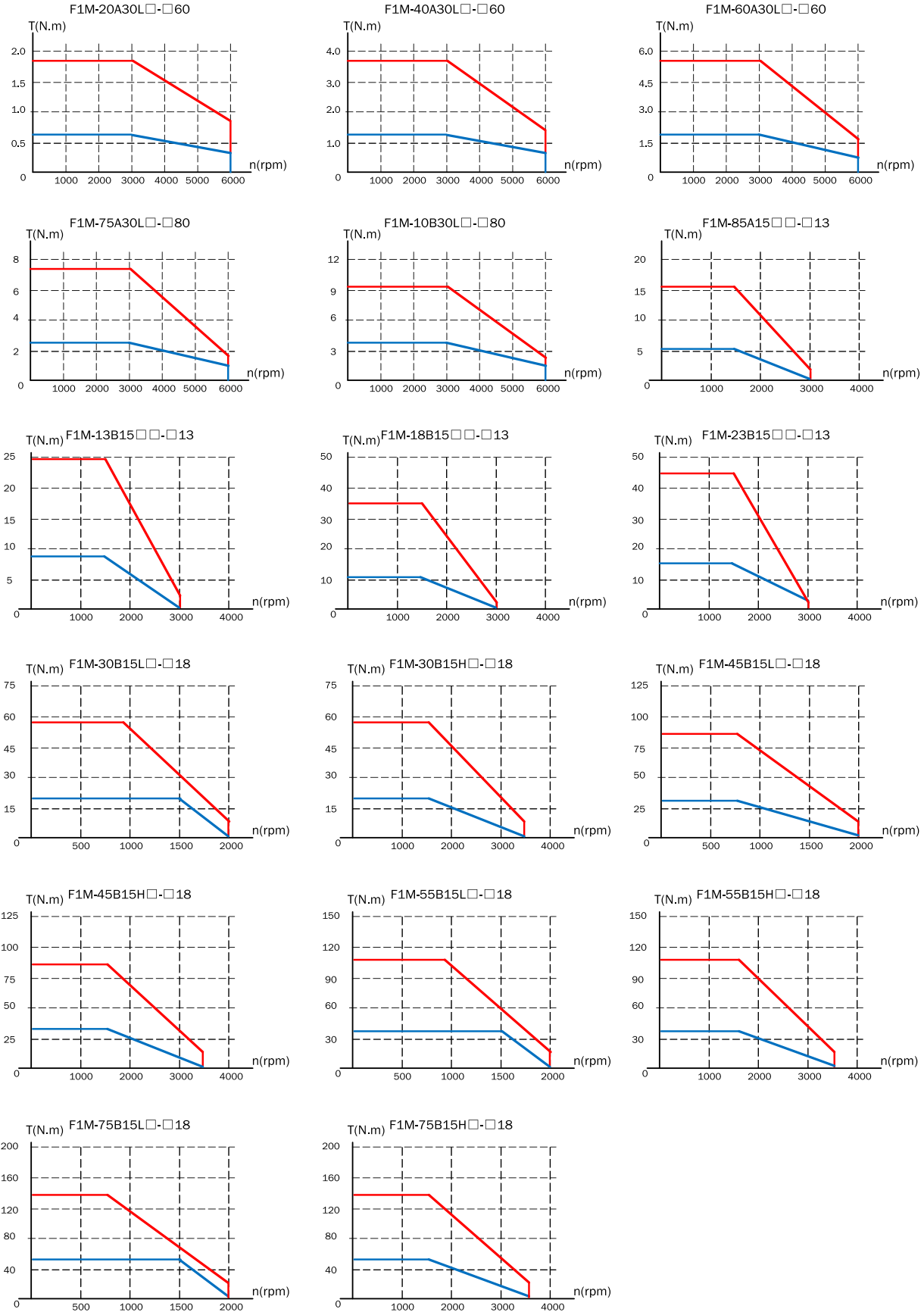
**Note:**

- 1) □:1 (without brake) , 2 (with brake)
- 2) If need 40 flange motor, please contact FRECON.





## Servo motor characteristic curve



**Note:** The blue line is for rated torque, the red line is for instantaneous torque.

## SD300 configuration table

Motor model	Flange	Rated current (A)	Rated torque (N.m)	Voltage (V)	Adapter drive	Encoder cable	Power cable		
F1M-20A30L□-B460	60	1.7	0.64	220V	SD300□-2S-1R8	LEG-01-3.0-G (Without battery)	LPG-10501-3.0-G		
F1M-40A30L□-B460		2.5	1.27		SD300□-2S-3R0				
F1M-60A30L□-B460		3.6	1.91		SD300□-2S-5R5				
F1M-75A30L□-B480	80	4.4	2.39		220V	SD300□-2T-7R6	LEB-01-3.0-G (With battery)	LPB-10501-3.0-G (With brake)	
F1M-10B30L□-B480		5.8	3.18						
F1M-85A15L□-B413	130	4.6	5.41	220V	SD300□-4T-5R4	LEG-02-3.0-G (Without battery)	LPG-11002-3.0-G		
F1M-85A15H□-B413		3.1	5.41	380V					
F1M-13B15L□-B413		7.7	8.28	220V	SD300□-2T-012			LEB-02-3.0-G (With battery)	LPB-11002-3.0-G (With brake)
F1M-13B15H□-B413		5.1	8.28	380V	SD300□-4T-5R4				
F1M-18B15L□-B413		9.8	11.46	220V	SD300□-2T-012	LEG-02-3.0-G (Without battery)	LPG-11502-3.0-G		
F1M-18B15H□-B413		6.3	11.46	380V	SD300□-4T-8R5				
F1M-23B15L□-B413		12.4	14.64	220V	SD300□-2T-012	LEB-02-3.0-G (With battery)	LPB-11502-3.0-G (With brake)		
F1M-23B15H□-B413		8.5	14.64	380V	SD300□-4T-012				
F1M-30B15H□-B418		180	11.6	19.1	380V	SD300□-4T-012	LEG-02-3.0-G (Without battery)	LPG-12502-3.0-G	
F1M-45B15H□-B418			16.6	28.65	380V	SD300□-4T-017			
F1M-55B15H□-B418	21.4		35	380V	SD300□-4T-021	LEB-02-3.0-G (With battery)			LPB-12502-3.0-G (With brake)
F1M-75B15H□-B418	26.7		47.76	380V	SD300□-4T-025				





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