



DS2 series servo drive

Fast Manual

WUXI XINJE ELECTRIC CO., LTD.

Data No.: SC209 20161017 1.0

►► Safety notes

■ Confirmation

- ✓ Do not use the drivers that are broken, lack of parts or wrong types.

■ Installation

- ✓ Make sure all the external powers are cut off before install the drivers.

■ Wiring

- ✓ Please cut off all the powers before wiring.
- ✓ Connect the AC power to the power terminals of driver.
- ✓ Do not connect U, V, W terminals of driver with 3-phase power supply.
- ✓ Please use 2mm² cables to ground the GND terminal of driver.

■ Maintenance and running

- ✓ Install the panel cover when power on.
- ✓ Do not touch the terminals in 10 minutes after power off.
- ✓ Do not connect motor with load when test running.
- ✓ Set the suitable power consumption parameters before connecting the machine.
- ✓ Do not change the wiring with electricity.
- ✓ Do not touch the radiator when running.

►► Confirmation after getting the products

1. Please confirm the following items after getting the products.

Item	Contents
The type is what you ordered?	Check the label of driver and motor
Does the motor shaft rotate well?	Can rotate by manual. Cannot rotate by manual for brake types
Is there any damage?	Check if the cover has damage during transporting
Is the screw loose?	Check the screw with screwdriver
Check the motor code	Check if the driver and the motor code is matched

Please contact us if there are any problems in these items.

2. Type

(1) Servo driver

DS2 - 2 0P7 - AS

Series name		Configuration:
DS2:compact model		AS/AS2/AS6
Voltage level	Motor capacity	BS/BS6
2: 220V	0P2: 0.2KW	BSW/BSW6
4:380V	0P4: 0.4KW	
	0P7: 0.75KW	
	1P5:1.5 KW	
	2P3:2.3 KW	
	3P0:3.0 KW	

(2) Servo motor

MS -80 ST - M 02430 A Z- 2 0P7

	Power
	Voltage
	Power-loss brake
	Shaft specs
	Feature code
	Feedback part code
	Sine drive motor
	Base code
	Series name

Base code: 60, 80, 90,110,130,180;

Feedback part code: M (optical pulse encoder)

Feature code: first 3 bits are rated torque; last 2 bits are rated speed;

For example: 00630: rated torque 0.637N m, rated speed 3000rpm;

01330: rated torque 1.3N m, rated speed 3000rpm;

Shaft spec: A- no key; B- with key;

Power-loss brake: empty- no brake; Z- with brake;

Voltage level: 2—220V;4 -380V

Power: 0P2: 0.2KW; 0P4: 0.4KW; 0P7: 0.75KW;1P5:1.5KW;2P3:2.3KW ;3P0:3.0KW

3. Specification

(1) servo motor

Voltage level	220V					
Motor type MS-	60ST-			80ST-		
	M00630	M01330		M02430		M03520
	□□-20P2	□□-20P4		□□-20P7		
Motor code	1003	0004	1004	0011	1011	0012
Rated power (KW)	0.2	0.4	0.4	0.75		
Rated current (A)	1.8	2.5	1.8	3.0	2.6	3.0
Rated speed (rpm)	3000	3000	3000	3000	3000	2000
Max speed (rpm)	4000	4000	4000	4000	4000	2500
Rated torque (N m)	0.637	1.27	1.27	2.39	2.39	3.5
Peak torque (N m)	1.91	3.8	3.8	7.1	7.1	10.5
Back EMF constant (V/krpm)	26	28	162	48	56.6	71
Torque coefficient (N m/A)	0.37	0.5	0.68	0.8	0.92	1.17
Rotor inertia (Kg m ²)	0.18 ×10 ⁻⁴	0.438 ×10 ⁻⁴	0.53 ×10 ⁻⁴	1.82 ×10 ⁻⁴	1.05 ×10 ⁻⁴	2.63 ×10 ⁻⁴
Winding resistor (Ω)	3.5	3.49	3.8	2.88	2.7	3.65
Winding inductance (mH)	8.32	8.47	11.51	6.40	6.25	8.80
Electrical time constant (ms)	2.38	2.4	3.03	2.22	2.3	2.41
Weight (Kg)	1.1	1.78	1.72	2.9	2.87	3.7
Encoder ppr (PPR)	2500					

Pole pairs		4	
Motor insulation level		Class B（130℃）	
Protection level		IP64	IP65
Use condition	Environment temperature	-20℃~+50℃	
	Environment humidity	Under 90% RH (no condensation)	

Voltage level	220V					
Motor type MS-	90ST-	110ST-		130ST-		
	M02430	M04030	M05030	M04030	M06025	
	□□-20P7	□□-21P2	□□-21P5	□□-21P2	□□-21P5	
Motor code	0021	0031	0032	1031	0042	1042
Rated power (KW)	0.75	1.2	1.5	1.2	1.5	1.5
Rated current (A)	3.0	5.0	6.0	6.7	6.0	7.4
Rated speed (rpm)	3000	3000	3000	3000	2500	2500
Max speed (rpm)	4000	3500	3500	4000	3000	3000
Rated torque (N m)	2.4	4	5	4	6	6
Peak torque (N m)	7.1	12	15	10	18	18
Back EMF constant (V/krpm)	51	54	62	33	65	82
Torque coefficient (N m/A)	0.8	0.8	0.83	0.54	1.0	0.81
Rotor inertia (Kg m ²)	0.24 ×10 ⁻³	0.54 ×10 ⁻³	0.63 ×10 ⁻³	0.54 ×10 ⁻³	1.26 ×10 ⁻³	0.84 ×10 ⁻³
Winding resistor (Ω)	3.20	1.09	1.03	2.6	1.21	0.7
Winding inductance (mH)	7.00	3.30	3.43	12	3.87	5.07
Electrical time constant (ms)	2.19	3.03	3.33	4.62	3.20	7.5

Weight (Kg)		3.4	5.5	6.1	5.9	8.9	7.16
Encoder ppr (PPR)		2500					
Pole pairs		4					
Motor insulation level		Class B (130°C)					
Protection level		IP65					
Use condition	Environment temperature	-20°C~+50°C					
	Environment humidity	Under 90% RH (no condensation)					

Voltage level	220V			
Motor type MS-	130ST-			
	M10015		M07725	M15015
	□□-21P5		□□-22P0	□□-22P3
Motor code	0044	1044	0043	0046
Rated power (KW)	1.5	1.5	2.0	2.3
Rated current (A)	6.0	8.0	7.5	9.5
Rated speed (rpm)	1500	1500	2500	1500
Max speed (rpm)	2000	2000	3000	2000
Rated torque (N m)	10	10	7.7	15
Peak torque (N m)	25	25	22	30
Back EMF constant (V/krpm)	103	61	68	114
Torque coefficient (N m/A)	1.67	1.25	1.03	1.58
Rotor inertia (Kg m ²)	1.94×10 ⁻³	1.272×10 ⁻³	1.53×10 ⁻³	2.77×10 ⁻³
Winding resistor (Ω)	1.29	0.3	1.01	1.10
Winding inductance (mH)	5.07	1.29	2.94	4.45
Electrical time constant (ms)	3.93	4.3	2.91	4.05

Weight (Kg)		11.5	9.34	10.0	14.4
Encoder ppr (PPR)		2500			
Pole pairs		4			
Motor insulation level		Class B (130°C)			
Protection level		IP65			
Use condition	Environment temperature	-20°C~+50°C			
	Environment humidity	Under 90% RH (no condensation)			

Voltage level	380V					
Motor type MS-	110ST-		130ST-			
	M04030	M05030	M06025	M10015		M07725
	□□-41P2	□□-41P5	□□-41P5			□□-42P0
Motor code	0131	0132	0142	0144	2144	1143
Rated power (KW)	1.2	1.5	1.5	1.5	1.5	2.0
Rated current (A)	3.0	3.9	3.7	3.5	5.6	6.4
Rated speed (rpm)	3000	3000	2500	1500	1500	2500
Max speed (rpm)	3500	3500	3000	2000	2000	3000
Rated torque (N m)	4	5	6	10	10	7.7
Peak torque (N m)	12	15	18	25	20	19.25
Back EMF constant (V/krpm)	89	90	110	177	61	61
Torque coefficient (N m/A)	1.33	1.11	1.62	2.86	1.25	1.2
Rotor inertia (Kg m ²)	0.54 ×10 ⁻³	0.63 ×10 ⁻³	1.26 ×10 ⁻³	1.94 ×10 ⁻³	1.272 ×10 ⁻³	1.272 ×10 ⁻³
Winding resistor (Ω)	3.30	2.28	3.50	4.37	0.3	0.3
Winding inductance (mH)	8.78	7.40	10.75	15.00	1.29	1.29

Electrical time constant (ms)		2.66	3.25	3.07	3.46	4.3	4.3
Weight (Kg)		5.5	6.1	8.9	11.5	9.34	9.34
Encoder ppr (PPR)		2500					
Pole pairs		4					
Motor insulation level		Class B (130°C)					
Protection level		IP65					
Use condition	Environment temperature	-20°C~+50°C					
	Environment humidity	Under 90% RH (no condensation)					

Voltage level	380V				
Motor type MS-	130ST-		180ST-		
	M15015	M10030	M19015		M21520
	□□-42P3	□□-43P0	□□-43P0		□□-44P5
Motor code	1146	1148	0156	1052	0150
Rated power (KW)	2.3	3.0	3.0	3.0	4.5
Rated current (A)	7.3	6.4	7.5	7.8	9.5
Rated speed (rpm)	1500	3000	1500	1500	2000
Max speed (rpm)	2000	3500	2000	2000	3000
Rated torque (N m)	15	10	19	20	21.5
Peak torque (N m)	45	25	47	50	53
Back EMF constant (V/krpm)	124	88.3	158	138	140
Torque coefficient (N m/A)	2	1.56	2.53	2.56	2.26
Rotor inertia (Kg m ²)	2.44×10 ⁻³	1.13×10 ⁻³	3.8×10 ⁻³	2.8×10 ⁻³	4.7×10 ⁻³

Winding resistor (Ω)	1.8	0.46	1.15	0.67	0.71
Winding inductance (mH)	11.6	1.52	6.4	2.68	4.00
Electrical time constant (ms)	6.44	3.33	5.57	4.00	5.63
Weight (Kg)	11.1	11.4	20.5	17.1	22.2
Encoder ppr (PPR)	2500				
Pole pairs	4				
Motor insulation level	Class B (130°C)				
Protection level	IP65				
Use condition	Environment temperature	-20°C~+50°C			
	Environment humidity	Under 90% RH (no condensation)			

Voltage level	380V					
Motor type MS-	180ST-					220ST-
	M27015		M35015		M48015	M40015
	□□-43P3		□□-45P5		□□-47P5	□□-411P0
Motor code	2151	0151	1152	0152	0153	1157
Rated power (KW)	4.3	4.3	5.5	5.5	7.5	11.0
Rated current (A)	8.0	10.0	8.5	12.0	20.0	25
Rated speed (rpm)	1500	1500	1500	1500	1500	1500
Max speed (rpm)	2000	2000	2000	2000	2000	2000
Rated torque (N m)	27	27	35	35	48	70
Peak torque (N m)	54	67	87.5	70	96	105
Back EMF constant (V/krpm)	210	172	250	181	156	170
Torque coefficient (N m/A)	3.37	2.7	4.1	2.92	2.4	2.8
Rotor inertia (Kg m ²)	7.2 ×10 ⁻³	6.1 ×10 ⁻³	9.18 ×10 ⁻³	8.6 ×10 ⁻³	9.5 ×10 ⁻³	23.5 ×10 ⁻³
Winding resistor (Ω)	0.59	0.796	1.1	0.62	0.273	0.46

Winding inductance (mH)	14.4	4.83	15.1	4.0	2.14	5.54
Electrical time constant (ms)	24.4	6.07	13.7	6.45	7.84	12
Weight (Kg)	23.3	25.5	27.7	30.5	40.0	55.0
Encoder ppr (PPR)	2500					
Pole pairs	4					
Motor insulation level	Class B (130°C)					
Protection level	IP65					
Use condition	Environment temperature	-20°C~+50°C				
	Environment humidity	Under 90% RH (no condensation)				

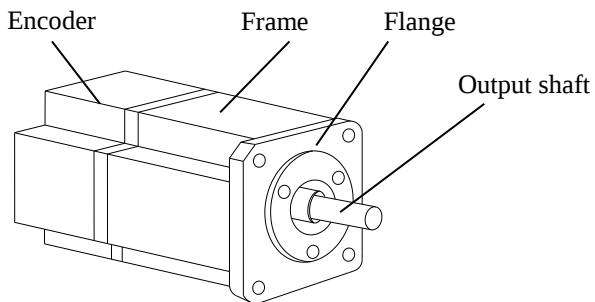
(2) servo drive

Servo drive	DS2 series 220V DS2 series 380V	
Suitable encoder	Incremental encoder (2500 ppr)	
Input power	DS2-2□P□-□: single/three phases AC200~240V, 50/60Hz DS2-4□P□-□: three-phases AC380~400V, 50/60Hz 【note: DS2-2□P□-□: Under 1.5KW (not including 1.5KW) may use single phase AC200~240V 50/60Hz; Above 1.5KW (including 1.5KW) suggest to use three phases AC200~240V 50/60Hz	
Control mode	Three phases full wave rectification IGBT PWM control, sine current drive mode	
Use condition	Temperature	0~+50 °C/-20~+85 °C
	Humidity	Under 90% RH(no condensation)

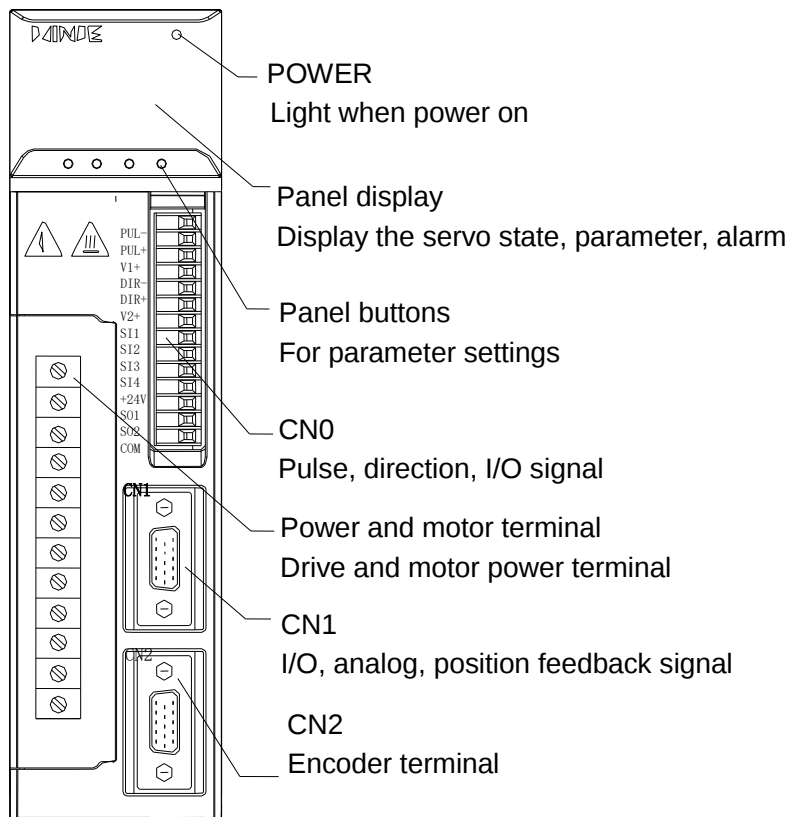
	Vibration resistance/impact resistance	4.9m/s ² / 19.6m/s ²
Structure		Foundation installation

4. Parts introduction

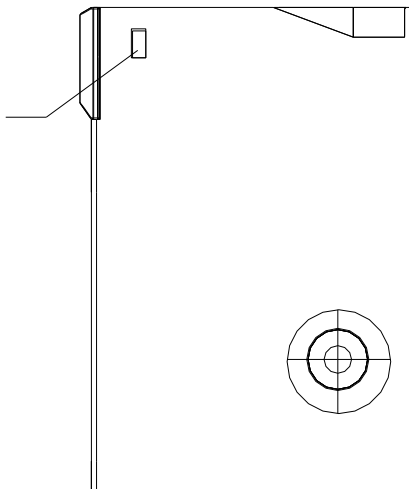
(1) Servo motor



(2) Servo drive



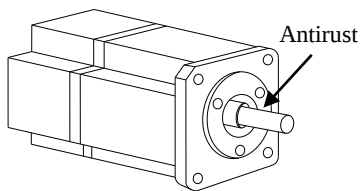
Communication port
(RS232 communication)
can connect to computer and
touch screen



►► Installation

1. Servo motor

MS series servo motors can be installed either horizontally or vertically. The service life of the servo motor can be shortened or unexpected problems might occur if it is installed incorrectly or in an inappropriate location. Follow these installation instructions carefully.



Notes:

The end of the motor shaft is coated with antirust. Before installing, carefully remove all of the paint using a cloth moistened with paint thinner. Avoid getting thinner on other parts of the servo motor.

(1) Storage temperature

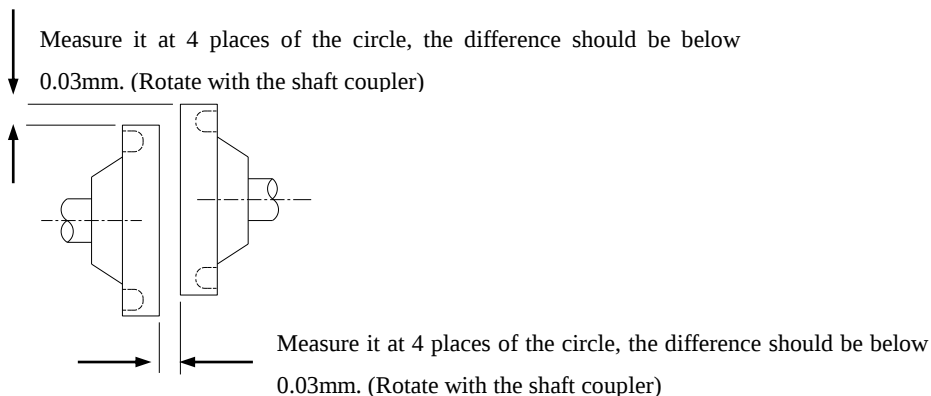
Store the servomotor within $-20\sim+60\text{ }^{\circ}\text{C}$ as long as it is stored with the power cable disconnected.

(2) Installation location

- Free of corrosive or explosive gases.
- Well-ventilated and free of dust and moisture.
- Ambient temperature of 0 °to 50 °C.
- Relative humidity (r.h.) of 20 to 80% with no condensation.
- Accessible for inspection and cleaning.

(3) Concentricity

Please use coupling when connecting to machine; keep the shaft center of servo motor and machine at the same line. It should be accord to the following diagram when installing the servo motor.



Note:

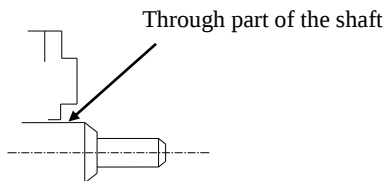
- If the concentricity is not enough, it will cause the vibration and bearing damage.
- When installing the coupler, prevent direct impact to the shaft. This can damage the encoder mounted on the shaft end at the opposite side of the load.

(4) Installation direction

MS series servo motors can be installed either horizontally or vertically.

(5) Avoid oil and water

Install a protective cover over the servomotor if it is used in a location that is subject to water or oil mist. Also use a servomotor with an oil seal when needed to seal the through-shaft section.



(6) Cable stress

Make sure that the power lines are free from bends and tension. Be especially careful to wire signal line cables so that they are not subject to stress because the core wires are very thin, measuring only 0.2 to 0.3mm².

2. Servo drive

The DS2 series servo drivers are base-mounted servo drivers. Incorrect installation will cause problems. Follow the installation instructions below:

(1) Storage temperature

Store the servo driver within -20~+85°C, as long as it is stored with the power cable disconnected.

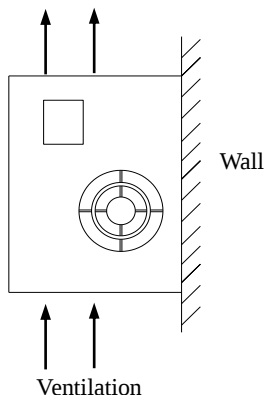
(2) Installation location

The following precautions apply to the installation site.

Situation	Installation Precaution
Installation in a Control Panel	Design the control panel size, unit layout, and cooling method so the temperature around the servo drivers does not exceed 50 °C.
Installation Near a Heating Unit	Minimize heat radiated from the heating unit as well as any temperature rise caused by natural convection so the temperature around the servo drivers does not exceed 50 °C.
Installation Near a Source of Vibration	Install a vibration isolator beneath the servo driver to avoid subjecting it to vibration.

Installation at a Site Exposed to Corrosive Gas	Corrosive gas does not have an immediate effect on the servo drivers, but will eventually cause electronic components and terminals to malfunction. Take appropriate action to avoid corrosive gas.
Other Situations	Do not install the servo driver in hot and humid locations or locations subject to excessive dust or iron powder in the air.

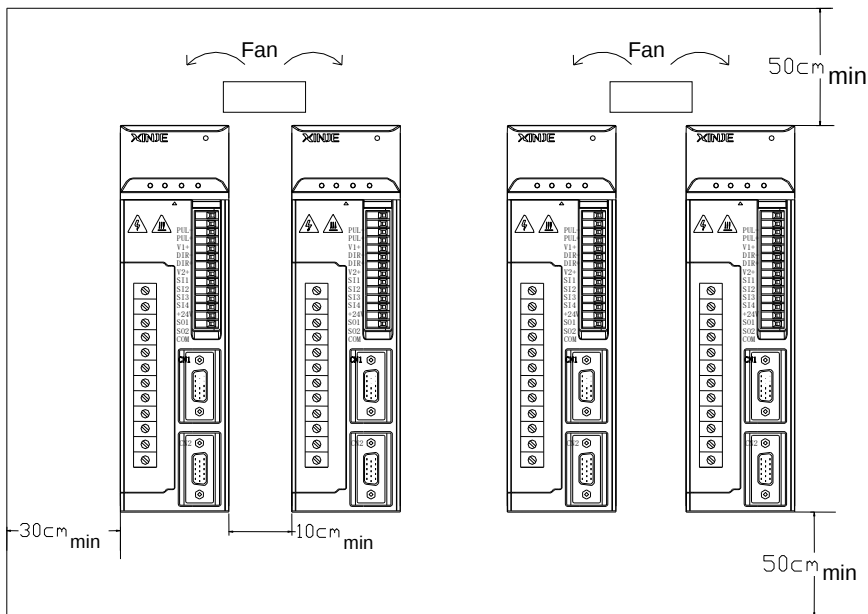
(3) Installation direction



Install the servo driver perpendicular to the wall as shown in the figure. The servo driver must be oriented this way because it is designed to be cooled by natural convection or by a cooling fan. Please must follow the installation direction requirements. For the driver with internal at the bottom ,please pay attention to the installation face cooling, void the driver overheat ,or cause fire accident.

(4) Installation

Follow the procedure below to install multiple servo drivers side by side in a control panel.



■ Servo drive direction

Install the servo driver perpendicular to the wall and make the front panel towards operator.

■ Cooling

Please leave enough space as the above diagram to ensure cooling by fans or natural ventilation.

■ Side-by-side installation

As the above diagram, leave min 10cm space at horizontal direction, leave min 50mm space at vertical direction. Install cooling fans above the drive. Keep the uniform temperature inside the control panel to avoid overheat at local place.

■ Temperature in the control panel

- ❖ Servo driver temperature: 0~50 °C

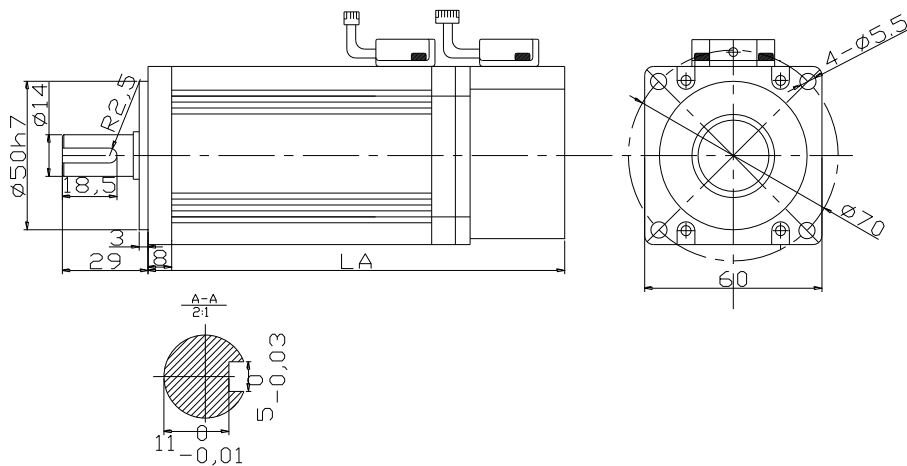
- ❖ Humidity: 90%RH or less
- ❖ Vibration: 4.9m/s^2
- ❖ No condensation and Freezing
- ❖ Ambient Temperature for Long-term reliability: $50\text{ }^{\circ}\text{C}$ maximum to use

►► Dimensions

1. Servo motor

■ 60 series motor installation dimensions

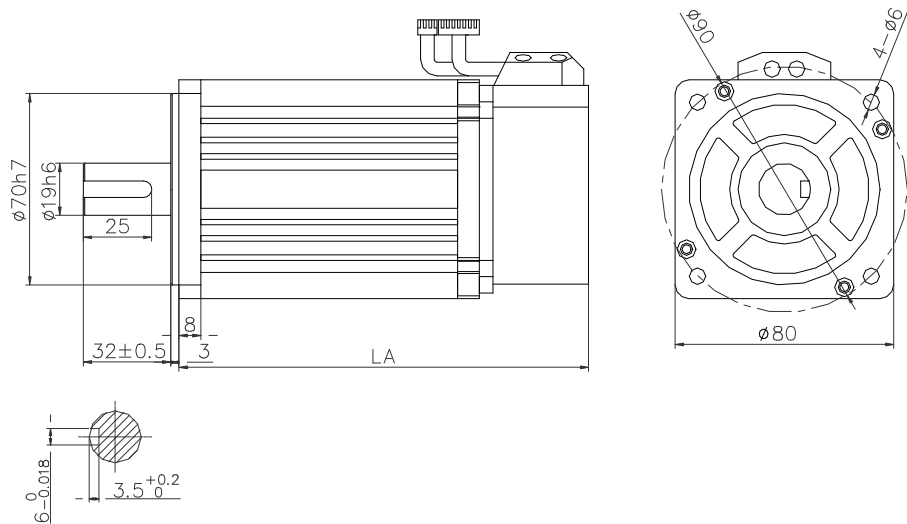
Unit: mm



Model	LA	
	Normal	With brake
MS-60ST-M00630□□-20P2	115.5	159.5
MS-60ST-M01330□□-20P4	145	189
MS-60ST-M01330□□S-20P4 (short body)	112	149

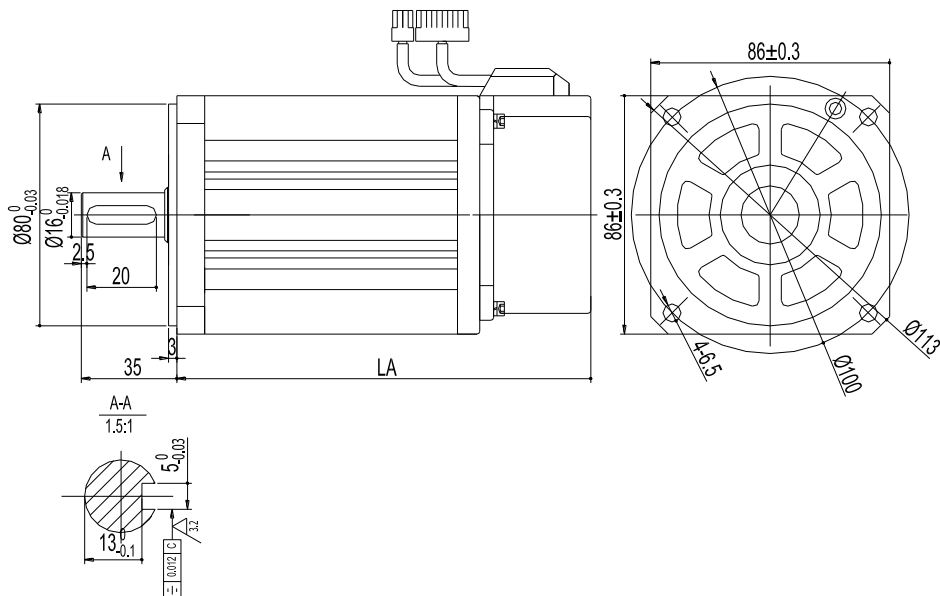
■ 80 series motor installation dimensions

Unit: mm



Model	LA	
	Normal	With brake
MS-80ST-M02430□□-20P7	150	199
MS-80ST-M02430□□S-20P7 (short body)	121	162
MS-80ST-M03520□□-20P7	178	219

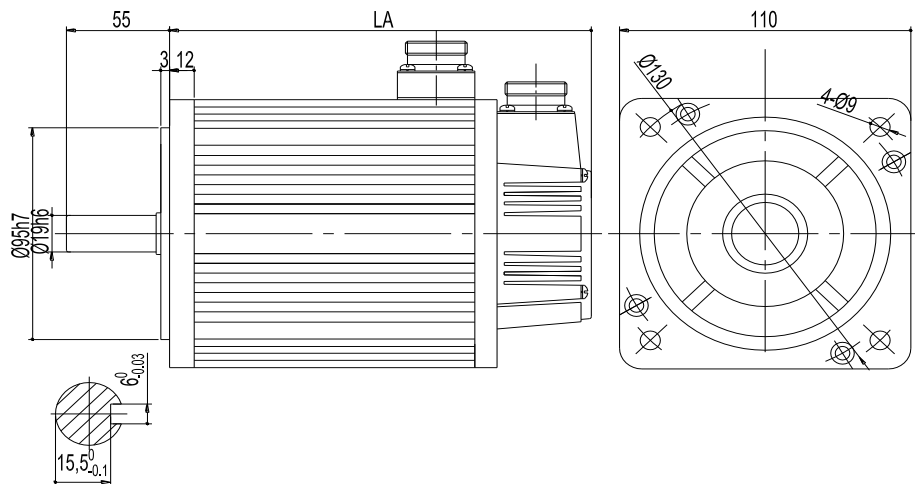
■ 90 series motor installation dimensions Unit: mm



Type	LA	
	Normal	With brake
MS-90ST-M02430□□-20P7	149	194

■ 110 series motor installation dimensions

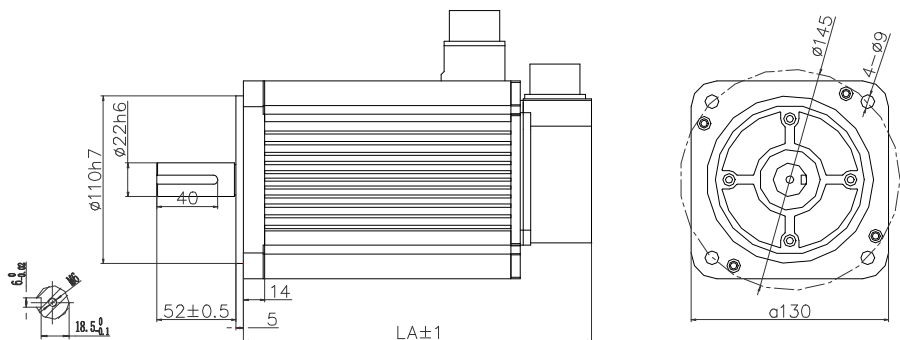
Unit: mm



Type	LA	
	Normal	With brake
MS-110ST-M04030□□-21P2	189	263
MS-110ST-M05030□□-21P5	204	278
MS-110ST-M04030□□-41P2	189	263
MS-110ST-M05030□□-41P5	204	278

■ 130 series motor installation dimensions

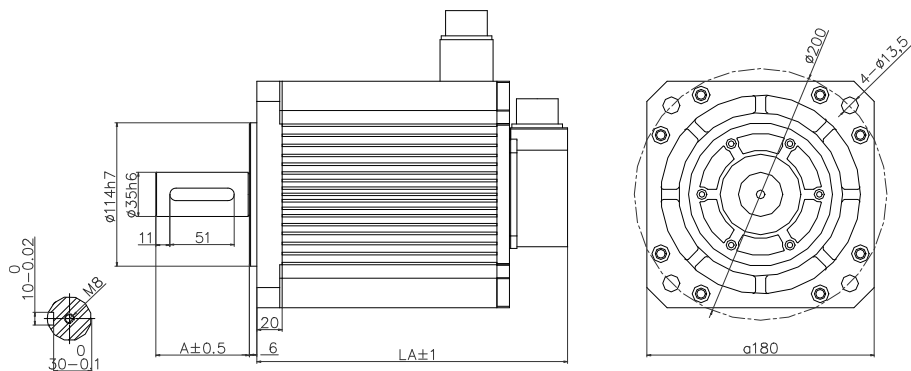
Unit: mm



Model	Motor code	LA	
		Normal	With brake
MS-130ST-M04030□□-21P2	1031	165	\
MS-130ST-M10010□□-21P0	1040	194	265
MS-130ST-M06025□□-21P5	1042	165	239
	0042	179	263
MS-130ST-M10015□□-21P5	1044	206	265
	0044	213	270
MS-130ST-M07725□□-22P0	0043	192	249
MS-130ST-M15015□□-22P3	0046	241	298
MS-130ST-M15015□□-42P3	1146	226	285
MS-130ST-M06025□□-41P5	0142	179	263
MS-130ST-M10015□□-41P5	0144	213	270
	2144	206	265
MS-130ST-M10030□□-43P0	1148	230	289

■ 180 series motor installation dimensions

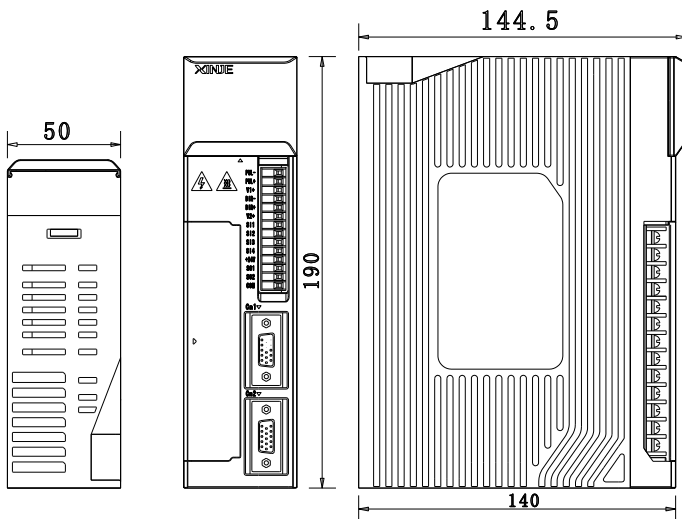
Unit: mm



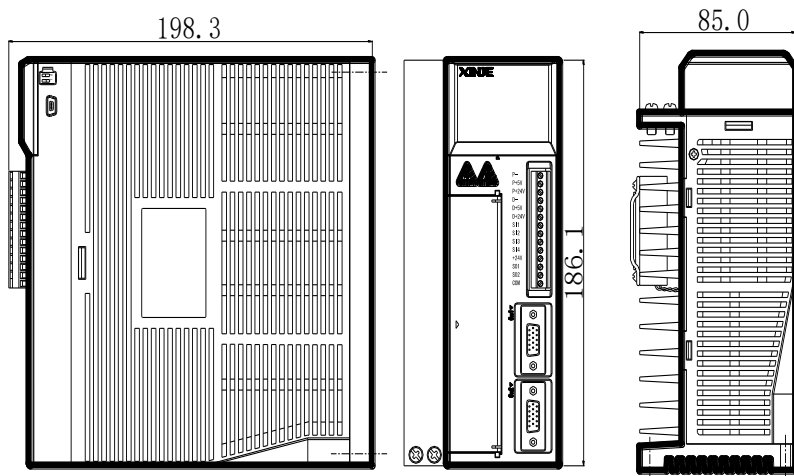
Model	Motor code	A	LA	
			Normal	With brake
MS-180ST-M19015□□-43P0	1052	79	221	303
MS-180ST-M19015□□-43P0-S	1052	65	221	303
	0156	65	232	289
MS-180ST-M21520□□-44P5	0150	65	243	300
MS-180ST-M27015□□-44P3	1151	79	247	329
MS-180ST-M27015□□-44P3-S	1151	65	247	329
	0151	65	262	219
MS-180ST-M35015□□-45P5	1152	79	277	359
MS-180ST-M35015□□-45P5-S	1152	65	277	359
	0152	65	292	249
MS-180ST-M48015□□-47P5	0153	65	346	403

2. Servo drive (unit: mm)

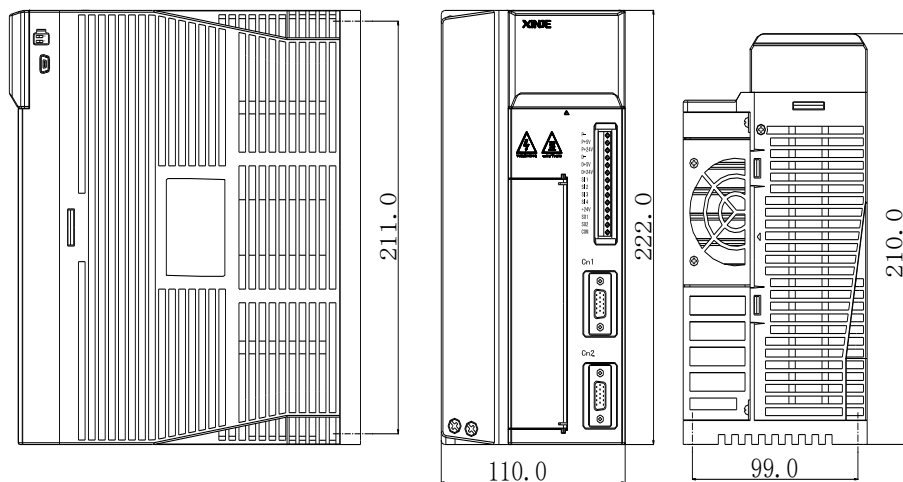
- DS2-20P□-AS/AS6, DS2-20P4-BS/BS6



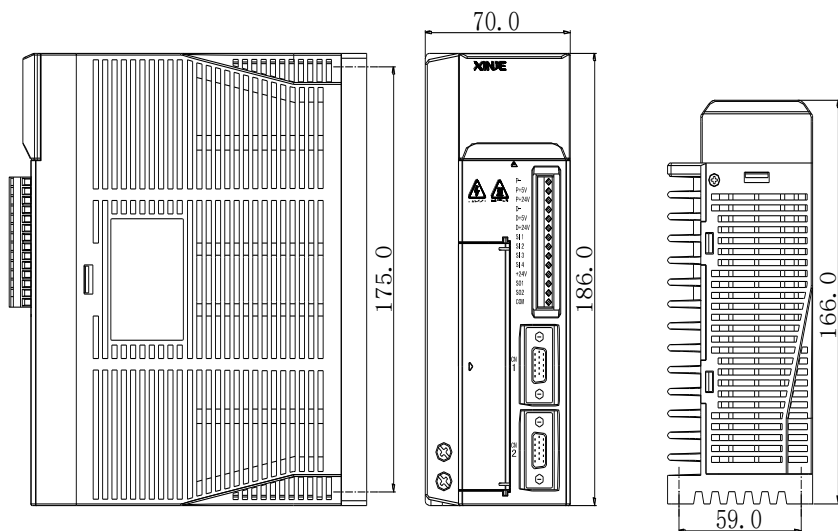
- DS2-21P5-AS/AS6, DS2-22P3-AS/AS6, DS2-41P5-AS/AS6,
DS2-21P5-AS2



■ DS2-43P0-AS/AS6



■ DS2-20P7-BSW/BSW6



►► Wiring

1. Main circuit

■ DS2-20P2-AS/AS6, DS2-20P4-AS/AS6, DS2-20P7-AS/AS6

The terminal function of main circuit:

⊗	•
⊗	•
⊗	⊕
⊗	L1
⊗	L2
⊗	L3
⊗	P+
⊗	PB
⊗	U
⊗	V
⊗	W
⊗	⊕

Terminal	Function	Explanation
L1/L2/L3	Power input of main circuit	AC single-phase or 3-phase 200~240V, 50/60Hz
⊕	Ground terminal	Connect to ground terminal of motor
P+, PB	Regeneration brake resistor	Connect the regeneration resistor between P+ and PB
U, V, W	Motor terminal	Connect to motor
⊕	Ground terminal	Connect to motor ground terminal

■ DS2-43P0-AS/AS6

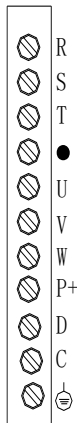
According to the order from top to bottom, the functions of the main circuit are as followed:

Terminal	Function	Explanation
R/S/T	Power input of main circuit	3-phase 360~400V, 50/60Hz
●	Empty pin	
U, V, W	Motor terminal	Connect to motor
P+, D, C	Use internal regeneration resistor	Short connect the terminal P+ and D, disconnect P+ and C; Set P0-10=0
	Use external regeneration resistor	Connect regeneration resistor to terminal P+ and C, cut down the short wires between P+ and D; set P0-10=1
P+/P-	Bus terminal	Can measure the real-time voltage of bus, be careful it is dangerous

■ DS2-20P4-BS/BS6

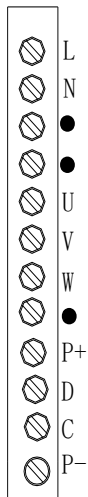
According to the order from top to bottom, the functions of the main circuit are as followed:

Terminal	Function	Explanation
L/N	Power input of main circuit	AC single-phase 200 ~ 240V, 50/60Hz
●	Empty pin	
U, V, W	Motor terminal	Connect to motor;
P+, PB	Regenerative braking resistor terminal	Connect the external regeneration resistor between P and PB;
P+/P-	Bus terminal	Can measure the real-time voltage of bus, be careful it is dangerous



■ DS2-21P5-AS/AS6, DS2-22P3-AS/AS6, DS2-41P5-AS/AS6, DS2-21P5-AS2

Terminal	Function	Explanation
R/S/T	Power input of main circuit	3-phase 200~240V, 50/60Hz (DS2-2□P□-AS/AS6 DS2-21P5-AS2)
		AC 3-phase 360~400V, 50/60Hz (DS2-4□P□-AS)
●	Empty Pin	
U, V, W	Motor terminal	Connect to motor
P+, D, C	Regenerative braking resistor terminal	When using internal regeneration resistor, short connect the terminal P+ and D; set P0-10=0
		When using external regeneration resistor, cut down the short wires between P+ and D, Connect regeneration resistor to terminal P+ and C; set P0-10=1
⊕	Ground terminal	Connect to motor terminal, Connect to motor ground terminal



■ DS2-20P7-BSW/BSW6

Terminal	Function	Explanation
L/N	Power input of main circuit	AC single-phase 200 ~ 240V, 50/60Hz
●	Empty Pin	
U, V, W	Motor terminal	Connect to the motor
P+, D, C	Use internal regeneration resistor	Short connect the terminal P+ and D, disconnect P+ and C; Set P0-10=0
	Use external regeneration resistor	Connect regeneration resistor to terminal P+ and C, cut down the short wires between P+ and D; set P0-10=1

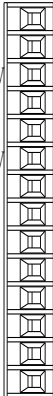
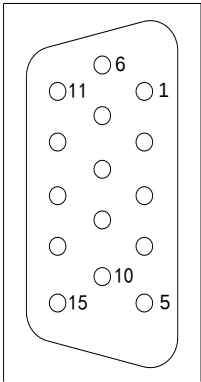
	P+/P-	Bus terminal	Can measure the real-time voltage of bus , be careful it is dangerous
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2. Winding connector of servo motor

Signal	60, 80, 90 series motor	110,130,180 series motor
U	1-brown(red)	2-brown
V	3-black(blue)	3-black
W	2-blue(yellow))	4-blue
PE	4-yellow and green(yellow and green)	1-yellow and green

3. I/O terminal (CN0, CN1)

The connector is looked at the soldering terminal:

CN0	CN1(DB15)
P- P+5V P+24V D- D+5V D+24V SI1 SI2 SI3 SI4 +24V S01 S02 COM 	

■ CN0, CN1 Terminal

■ CN0 terminals

No.	Name	Contents	No.	Name	Contents
1	P-	Pulse input P+	8	SI2	Input terminal 2
2	P+5V	5V difference input P+	9	SI3	Input terminal 3
3	P+24V	Open collector input	10	SI4	Input terminal 4
4	D-	Direction input D-	11	+24V	Input terminal +24V
5	D+5V	5V difference input	12	SO1	Output terminal 1
6	D+24V	Open collector input	13	SO2	Output terminal 2
7	SI1	Input terminal 1	14	COM	Ground of output terminal

■ CN1 (DB15) terminals

No.	Name	Contents	No.	Name	Contents
1	NC	Reservation	9	Z-	Encoder output Z-
2	NC	Reservation	10	B+	Encoder output B+
3	SI5	Input terminal 5	11	T-REF	Torque analog input
4	SO3	Output terminal 3	12	V-REF	Speed analog input
5	B-	Encoder output B-	13	GND	GND for analog input
6	A+	Encoder output A+	14	A	RS485 communication+
7	A-	Encoder output A-	15	B	RS485 communication -
8	Z+	Encoder output Z+			

■ CN1 (DB15) terminals

(Note: special for DS2-20P4-BS/BS6 DS2-20P7-BSW/BSW6 DS2-21P5-AS2)

No.	Name	Explanation
1	NC	Reservation
2	NC	Reservation
3	SI5	Input terminal 5
4	SO3	Output terminal 3

4. I/O signals

(1) Input signal

Item	Input terminals	Function
Digital input	SI1~SI5	Multi-functional input terminals

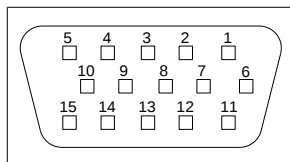
Pulse input	P-/P+5V/P+24V	P2-00=0: positive pulse P2-00=2: pulse
	D-/D+5V/D+24V	P2-00=0: negative pulse P2-00=2: direction

(2) Output signal

Item	Output terminals	Function
Optical output	SO1~SO3	Multi-functional output terminals

5. CN2 terminals

The connector is looked at the soldering terminal:



Drive terminal	Encoder terminal		Name	Drive terminal	Encoder terminal		Name
	60, 80, 90 Series motor	110,130,180 series motor			60, 80, 90 Series motor	110,130, 180series motor	
1	9	4	A+	2	4	5	B+
3	7	6	Z+	4	6	10	U+
5	11	12	W+	6	13	7	A-
7	14	8	B-	8	5	9	Z-
9	8	13	U-	10	15	15	W-
11	1	1	Shield	12	3	3	GND
13	2	2	5V	14	10	11	V+
15	12	14	V-				

6. Communication port

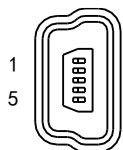
- COM1

COM1 is RS232 port which can be used to connect PC for debugging. Do not set the panel display to bb or RUN when debugging.

The parameters of COM1 cannot be modified.

Baud rate 19200bps, 8 data bits, 1 stop bit, even parity, Modbus station no.1.

■ All types



(5-pin port)

Terminal	Name	Explanation
1	TXD	RS232 send
2	RXD	RS232 receive
3	GND	RS232 ground

Note: please use the cable offered by XINJE company.

- COM2

The COM2 position of each type:

Type	Port	COM mode	Mark
DS2-2□P□-AS/AS6 DS2-4□P□-AS/AS6	A (CN1-14) B (CN1-15)	RS485	This port cannot be used with COM1 at the same time.

The parameters of COM2 can be set through P0-04:

Parameter	Function	Default setting	Range
P0-04.0	Baud rate	6	0~9 0: 300 1: 600

			2: 1200 3: 2400 4: 4800 5: 9600 6: 19200 7: 38400 8: 57600 9: 115200
P0-04.1	Data bit	0	0: 8
P0-04.2	Stop bit	2	0: 2 bits; 2: 1 bit
P0-04.3	Parity bit	2	0~2 0: no parity 1: odd parity 2: even parity

Modbus station no. can be set through P0-03.

Parameter	Function	Unit	Default setting	Range
P0-03	Modbus station no.	—	1	1~255

Note: the above parameters will be worked after re-power on.

7. Regeneration resistor

When the servo motor is driven by the generator mode, the power returns to the side of the servo amplifier, which is called regenerative power. The regenerative power is absorbed by the charging of the smooth capacitor of the servo amplifier. When it exceeds the energy that can be recharged, the regenerative resistor is used to consume the regenerated electricity.

The servo motor driven by regenerative (generator) mode is shown as below:

- deceleration stop time during acceleration and deceleration
- vertical axis moves down
- external load drives the motor rotating

Servo drive model	Regenerative resistor connection terminal
DS2-20P2/4/7-AS/AS6	(1) no built-in resistor

DS2-20P4-BS/BS6	(2) Connect the external regenerative resistor between P+ and PB
DS2-45P5-A/AS	
DS2-47P5-A	
DS2-20P7-BS/BSW6 DS2-4□P□-AS/AS6	(1) use built-in regenerative resistor: short connect P+ and D, break P+ and C, P0-10=0. (2) Connect the external regenerative resistor between P+ and C, tear down the short wire between P+ and D, P0-10=1.

The following are regenerative resistor specifications for each motor model:

Servo drive model	External regenerative resistor	Recommended resistor value	External regenerative resistor (recommended power range)
DS2-20P2-AS/AS6	$\geq 50\Omega$	50-100 Ω	$\geq 200W$
DS2-20P4-AS/AS6/BS/BS6	$\geq 40\ \Omega$	40-100 Ω	$\geq 500W$
DS2-20P7-AS/AS6	$\geq 40\ \Omega$	40-100 Ω	$\geq 500W$
DS2-20P7-BSW/BSW6	$\geq 40\ \Omega$	40-100 Ω	$\geq 500W$
DS2-21P5-AS/AS6/AS2	$\geq 25\ \Omega$	25-50 Ω	$\geq 1000W$
DS2-22P3-AS/AS6	$\geq 25\ \Omega$	25-50 Ω	$\geq 1000W$
DS2-41P5-AS/AS6	$\geq 55\ \Omega$	55-100 Ω	$\geq 1000W$
DS2-43P0-AS/AS6	$\geq 55\ \Omega$	55-75 Ω	$\geq 1000W$
DS2-45P5-A/AS	$\geq 25\ \Omega$	25-50 Ω	$\geq 2000W$
DS2-47P5-A	$\geq 18\ \Omega$	18-50 Ω	$\geq 2000W$
DS2-411P0-A	$\geq 18\ \Omega$	18-45 Ω	$\geq 3000W$

Parameter	Signal	Setting	Meaning	Effective
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	name			
P0-10	Regenerative resistor selection	0	Use built-in regenerative resistor	Re-power on
		1	Use external regenerative resistor (refer to above table for resistor specifications)	

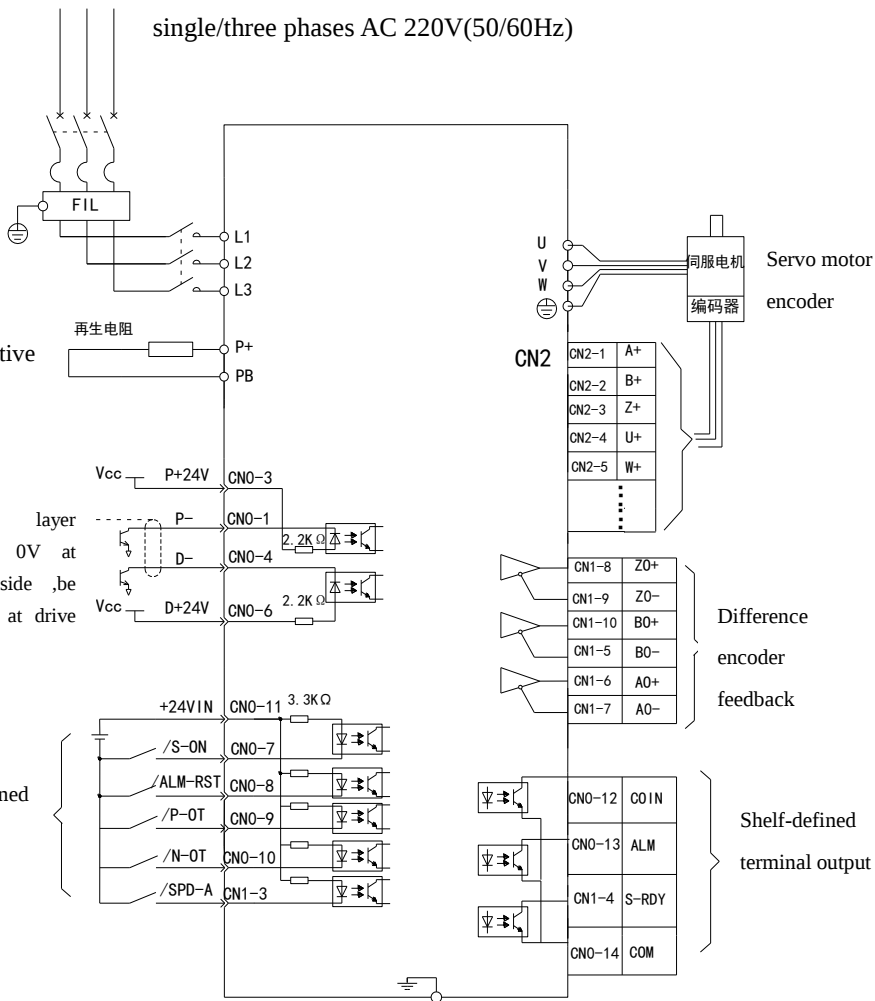
Note:

- (1) For the drive with internal regeneration resistor, if it needs to use external regeneration resistor, you have to modify the drive's parameters again. Or the drive will work abnormal. Even worse, it will cause huge damage to the drive. Parameter setting: P0-10=1 for external regeneration resistor; P0-10=0 for internal regeneration resistor. If there is internal regeneration resistor, you need to modify the parameter ,if not ,you don't need to modify the parameter.
- (2) For choosing the resistor, please make the resistor value close to the min value of recommended value, the power must consider the local condition.
- (3) The surface temperature will be very high when the regenerative resistance is frequently discharged. Please use high temperature and flame retardant wire, and pay attention to the surface of the regenerative resistance not contacting with the wire.

8. Typical wiring

■ DS2-20P□-AS/AS6

single/three phases AC 220V(50/60Hz)



■ DS2-21P5-AS/AS6, DS2-22P3-AS/AS6, DS2-4□P□-AS/AS6

DS2-21P5-AS/AS6, DS2-22P3-AS/AS6: three

phases AC 220V(50/60Hz)

DS2-4□P□-AS/AS6: three phases AC380V

(50/60Hz)

Connect internal resistor P+ and D

Connect external resistor P+ and C

Regenerative resistor

Servo motor
编码器
encoder

CN2

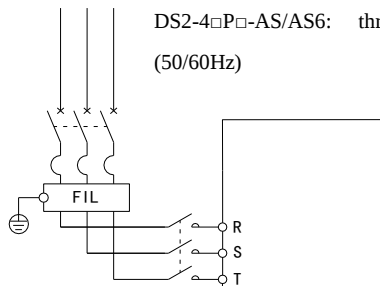
CN2-1	A+
CN2-2	B+
CN2-3	Z+
CN2-4	U+
CN2-5	W+
...	

Difference encoder
feedback

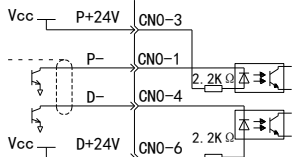
CN1-8	Z0+
CN1-9	Z0-
CN1-10	B0+
CN1-5	B0-
CN1-6	A0+
CN1-7	A0-

Self-defined
terminal output

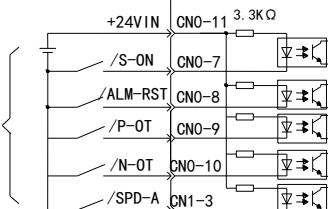
CN0-12	CO1N
CN0-13	ALM
CN1-4	S-RDY
CN0-14	COM



Shield layer
connect 0V at
signal side, be
empty at drive
side



Shelf-defined
terminal
output



■ DS2-20P4-BS/BS6, DS2-20P7-BSW/BSW6, DS2-21P5-AS2

DS2-20P4-BS/BS6: single-phase AC 220V (50/60Hz)

DS2-20P7-BSW/BSW6: single-phase AC 220V (50/60Hz)

DS2-21P5-AS2 : three-phase AC 220V (50/60Hz)

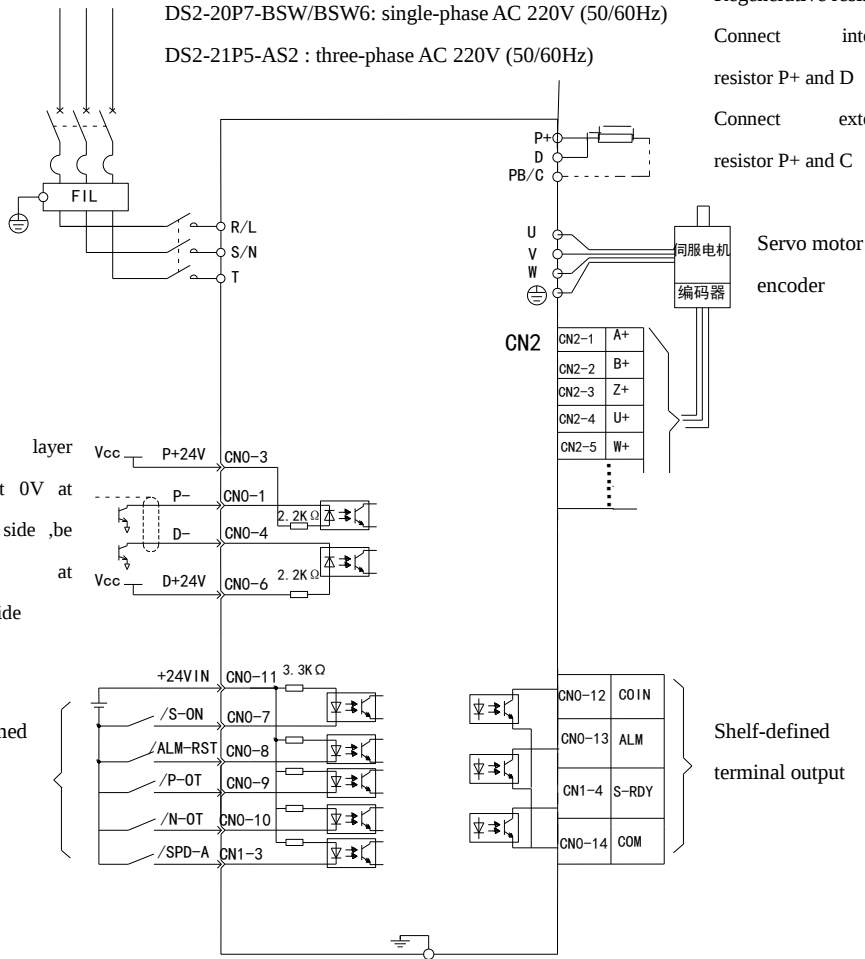
Regenerative resistor

Connect internal

resistor P+ and D

Connect external

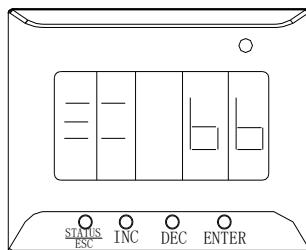
resistor P+ and C



►► Use the control panel

1. Basic operation

The control panel can display the servo status, alarm code, command and set the parameters.

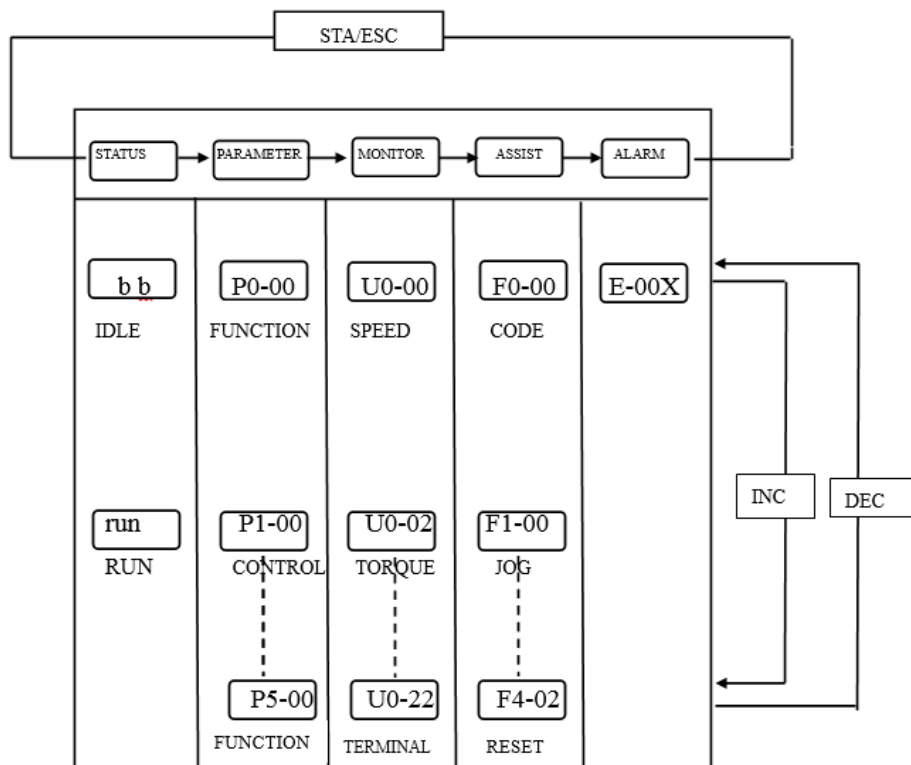


Buttons	Function
STATUS/ESC	Press: change the status, status return
INC	Press: increase the value Keep press: continuous increase the value
DEC	Press: decrease the value Keep press: continuous decrease the value
ENTER	Press: shift Keep press: enter data setting and checking

(1) Key operation

The control panel can display the running status, set the parameters and command.

The basic status includes display status, parameter settings, monitor, auxiliary function, alarm status. Press STATUS/ESC to change the status.



Display mode:

Status: bb stand for the servo system is in idle status; run stand for the servo system is in run status

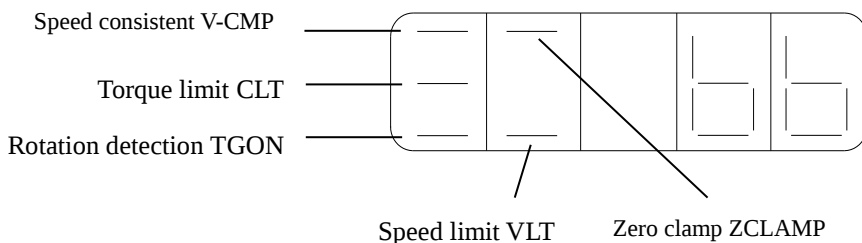
Parameter settings mode PX-XX: the first X is group code; the second X is parameter code in this group.

Auxiliary function mode: FX-XX: the first X is group code; the second X is parameter code in this group.

Alarm mode E-XXX: XXX is alarm code.

2. Running status

■ Speed, torque control mode



A. Bit display

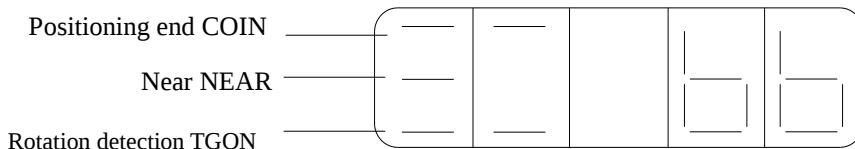
Bit data	contents
P5-29 Same speed detection (/V-CMP)	When motor's actual speed is the same as the order speed, the light on. Same speed signal detection width: P5-03 (Unit: rpm)
P5-32 Torque limit (/CLT)	When speed control, torque is more than the setting value, the light on. Positive torque limit: P4-02 Reverse torque limit: P4-03
P5-30 Rotation detection (/TGON)	When motor speed is higher than rotation detection speed, the light on. Rotation detection speed: P5-02 (Unit: rpm)
P5-21 Zero clamp (/ZCLAMP)	When zero clamp is effective, the light on

P5-33 Speed limit (/VLT)	When torque control, the speed is more than the setting value, the light on Torque control speed limit: P4-07
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B. Code contents

Code	Contents
	Standby Servo is OFF (motor has no electricity)
	Run Servo enable (motor has electricity)
	Forward prohibit P-OT ON
	Reverse prohibit N-OT ON

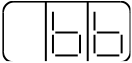
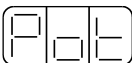
● Position control



A. Bit display

Bit data	Contents
P5-28 Positioning end (/COIN)	For position control, when given position is the same to actual, the light on Positioning end signal width: P5-00 (Unit: command pulse)
P5-36 Near (/NEAR)	For position control, when given position is the same to actual, the light on Near signal width: P5-04
P5-30 Rotation detection (/TGON)	When motor speed is higher than the rotation detection speed, the light on Rotation defection speed: P5-02 (Unit: rpm)

B. Code display

Code	Contents
	Stand by status, Servo is OFF (motor is power off)
	Running Servo is running (motor is power on)
	positive rotation prohibition P-OT ON status
	reverse rotation prohibition N-OT ON status

3. U-XX monitor status

Code	Contents		Unit
U-00	Motor real speed		Rpm
U-01	Input speed command		Rpm
U-02	Servo motor torque		%
U-03	Rotate angle (physical angle)		0.1 °
U-04	Rotate angle (electricity angle)		0.1 °
U-05	Bus voltage		V
U-06	Module temperature		0.1°C
U-07	Input command pulse speed		Rpm
U-08	Offset command pulse value	(0000 ~ 9999) *1	Command
U-09		(0000 ~ 9999) *10000	pulse
U-10	Rotate angle (encoder value)	(0000 ~ 9999) *1	Encoder
U-11		(0000 ~ 9999) *10000	pulse
U-12	Input command pulses	(0000 ~ 9999) *1	Command
U-13		(0000 ~ 9999) *10000	pulse
U-14	Feedback command pulses	(0000 ~ 9999) *1	Command
U-15		(0000 ~ 9999) *10000	pulse
U-16	Current position (cumulative value)	(0000 ~ 9999) *1	Encoder
U-17		(0000 ~ 9999) *10000	pulse
U-18	Real-time current, 1 decimal place		0.1A
U-19	Analog input V-REF		0.01V
U-20	Analog input T-REF		0.01V
U-21	I/O signal status		
U-22	I/O terminal status		

■ U-21 I/O signal status

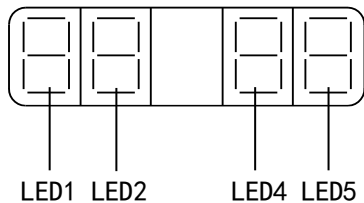


Fig 1

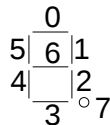


Fig 2

In fig 1, input status is shown in LED4 and LED5; output status is shown in LED1 and LED2. Fig 2 is the LED segment number.

➤ Input signal distribution

segment	instruction	segment	instruction
LED4_0	/SPD-A set internal speed	LED5_0	/S-ON servo signal
LED4_1	/SPD-B set internal speed	LED5_1	/P-CON ratio action command
LED4_2	/C-SEL control mode selection	LED5_2	/P-OT ban positive rotation
LED4_3	/ZCLAMP zero clamp	LED5_3	/N-OT ban reverse rotation
LED4_5	/G-SEL gaining switch	LED5_5	/P-CL external torque limit at forward rotation side
LED4_6	/CLR clean pulse	LED5_6	/N-CL external torque limit at reverse rotation side
LED4_7	/CHGSTP change step	LED5_7	/SPD-D set internal speed

➤ Output signal distribution

segment	instruction	segment	instruction
LED1_0	Near (/NEAR)	LED2_0	Positioning end (/COIN)
LED1_1	Alarm output (/ALM)	LED2_1	Same speed dection

			(/V-CMP)
LED1_2	Encoder Z phase output (/Z)	LED2_2	Rotation detection (/TGON)
		LED2_3	Get ready (/S-RDY)
		LED2_4	Torque limit (/CLT)
		LED2_5	Speed limit detection (/VLT)
		LED2_6	Brake interlock (/BK)
		LED2_7	Warning (/WARN)

■ U-22 I/O terminal status

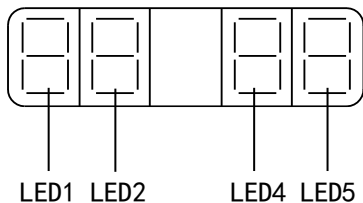


Fig 1

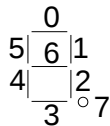


Fig 2

In fig1, input terminal status is shown in LED5; output terminal status is shown in LED2.

Fig 2 is the LED segment number.

Input terminal		Output terminal	
Segment	Instruction	Segment	Instruction
LED5_0	SI1 input status	LED2_0	SO1 output status
LED5_1	SI2 input status	LED2_1	SO2 output status
LED5_2	SI3 input status	LED2_2	SO3 output status
LED5_3	SI4 input status		
LED5_4	SI5 input status		
LED5_5	SI6 input status		

4. Auxiliary function

Function code	Contents
F0-**	System information
F1-**	Auxiliary function, show auxiliary command and result
F2-**	Motor code
F3-**	Alarm information
F4-00	Reset to default settings
F5-00	External communication monitor

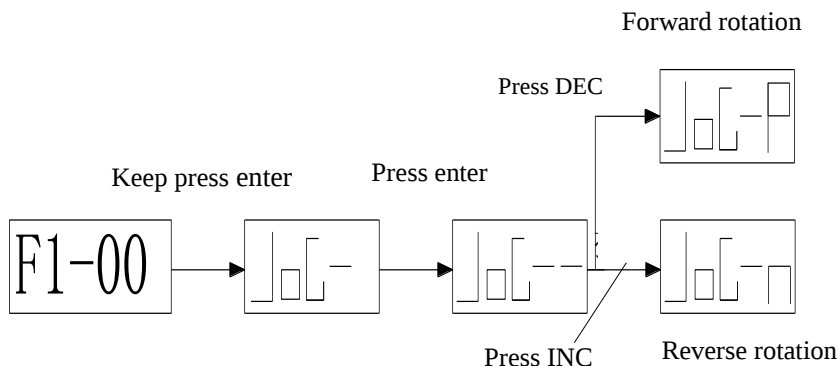
● F0-XX

Code	Contents	Code	Contents
F0-00	Motor code	F0-01	Series
F0-02	Machine type	F0-03	Production: year
F0-04	Production date: month	F0-05	Production date: day
F0-06	Software version	F0-07	Hardware version

● F1-XX

(1) Jog (F1-00)

Make sure motor doesn't connect to the machine before jogging!



P3-04	JOG speed					
	Unit	Factory set	Range	Suitable mode	Modify	Effective
	1rpm	100	0~1000	JOG	Servo OFF	Immediately

(2) test run (F1-01)

Make sure the motor doesn't connect to the machine before test running!

Please enter test run if servo connects to non-original encoder line and power line.

Set panel to F1-01, keep press ENTER to go to test run.

The display will show the following when test running.

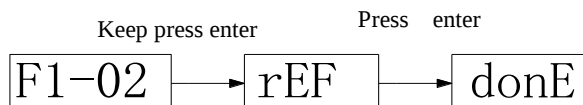


If all the wires are connected correctly, the motor will run forward (direction is counterclockwise) in 5 seconds. The motor will shake if the wiring is not correct. Even worse, the drive will alarm. Please cut the power at this time and check the wiring.

Press STATUS/ESC to exit.

(3) current offset auto-tune (parameter F1-02)

Please use current offset auto-tune when servo finishes updating or motor is not running smoothly after long time.



Press STATUS/ESC to exit.

(4) speed analog value auto-tune (parameter F1-03)



Press STATUS/ESC to exit.

(5) torque analog value auto-tune (parameter F1-04)



Press STATUS/ESC to exit.

(6) forced enable (F1-05)

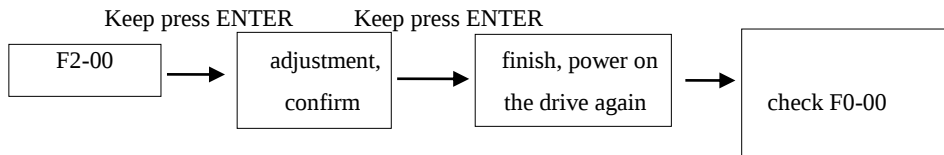
0: cancel enable, return to bb status

1: forced enable, servo is in RUN status

Power on again, forced enable will be ineffective

- Change the motor code (parameter F2-00)

Note: Servo drive can match to different motors with similar power level. Please see the motor code on the product label. Make sure F0-00 is the same to the motor code on the label.



- Check the alarm information (parameter F3-XX)

Function no.	Contents	Unit
F3-00	Current alarm code ※1	
F3-01	Current warn code ※2	
F3-02	Alarm/warn code 1 when alarming	

F3-03	U phase current when alarming	A
F3-04	V phase current when alarming	A
F3-05	DC bus voltage when alarming	V
F3-06	The module temperature of IGBT when alarming	°C
F3-07	The speed when alarming	rpm
F3-08	The internal torque command when alarming	%
F3-09	The V-REF value when alarming	V
F3-10	The T-REF value when alarming	V
F3-11	Alarm/warn code 2 when alarming	
F3-12	Alarm/warn code 3 when alarming	
F3-13	Alarm/warn code 4 when alarming	
F3-14	Alarm/warn code 5 when alarming	
F3-15	Alarm/warn code 6 when alarming	
F3-16	Alarm/warn code 7 when alarming	

※1: when F3-00=0, no alarm

※2: when F3-01=0, no warning

- Set to default value (parameter F4-XX)

F4-00=1, all parameter will back to default value.

Note: When drive is on, the change cannot be done. The operations must be done when servo is OFF.

- External monitor (parameter F5-XX)

In auxiliary function, choose F5-00, it will show C-OUT. COM1 is available, control panel is invalid. User can debug the servo through PC.

Press STATUS/ESC to exit.

5. Error alarm operation (parameter E-XX)

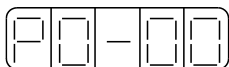
When error appears, the drive will enter alarm status and display the alarm no.; when there is no error, the alarm status cannot see. System error display “E-XXX”. Under the alarm status ,short press ENTER can reset the error. If the power is off because of the servo alarm, we may not do the alarm clear.

Note: when error appears, First to delete the alarm reason, then do alarm clear.

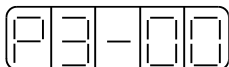
6. Parameter setting

The following steps show how to change the value of P3-09 from 2000 to 3000.

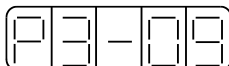
(1) Press STATUS/ESC, change to parameter setting status, press ENTER to confirm.



(2) The second LED will blink, press INC or DEC to change the value to 3, keep press ENTER to confirm.



(3) The last two LEDs will blink at this time, press INC or DEC to change the value to 09, keep press ENTER to confirm.



(4) It will show the value in P3-09. The lowest bit will blink; press ENTER to left shift the bit. Press INC, DEC or ENTER to change the value to 3000. Keep press ENTER to confirm.



Repeat step2 to step4 to change the value.

(5) Press STATUS/ESC to exit.

▶▶ Parameter list

Effective time: “○” modify when servo OFF, effective when servo ON;

“●” modify anytime, effective when re-power on;

“√” modify anytime, effective immediately

Parameter: $PX-XX = \frac{xx}{xx}$
 $PX-XX.H \swarrow \searrow PX-XX.L$

1. Function selection P0(address: 0000~00FF)

P0-	Function	Unit	Default value	Range	Effective	Suitable mode
00	Main mode	-	0	0	○	-
01	Sub-mode 1 0: idle 1: torque (command) 2: torque (analog) 3: speed (terminal command) 4: speed (analog) 5: position (internal) 6: position (pulse) 7: speed (pulse)	-	6	0~7	○	All
02	Sub-mode 2 0: idle 1: torque (command) 2: torque (analog) 3: speed (terminal command) 4: speed (analog) 5: position (internal)	-	0	0~7	○	All

	6: position (pulse) 7: speed (pulse)					
03	Modbus station no. of COM2	-	1	1~255	●	All
04	Parameters of COM2	-	n.2206	n.0000 ~ n.2209	●	All
05	Rotation direction 0: look at load side, counterclockwise is forward. 1: look at load side, clockwise is forward.	-	0	0, 1	●	2, 4, 6, 7
06	06.L: stop mode when servo OFF or alarm. DS2 is inertia stop. Keep inertia state after stop.	-	2	0~2	●	All
	06.H: stop mode when over range 0~1: inertia stop. Keep inertia state after stop. 2: deceleration stop. Change to zero clamp state after stop. Torque value: P4-06 urgent stop torque 3: deceleration stop. Change to inertia motion after stop. Torque value: P4-06 urgent stop torque.	-	2	0~3	●	All
07	T-REF distribution 0: undefined.	-	0	0~3	○	3, 4, 5, 6, 7

	1: T-REF is external torque limit input. 2: undefined. 3: P-CL, N-CL is ON, T-REF is external torque limit input.					
08	V-REF distribution 0: undefined. 1: V-REF external speed limit input.	-	0	0, 1	○	1, 2
09	Forced input terminal 0: undefined. 1: SO1 output signal 2: SO2 output signal 3: SO3 output signal	-	0	0-3	√	All
10	Regenerative resistor choice 0: internal regenerative resistor 1: external regenerative resistor	-	0	0, 1	●	All
16	Forced open the fan 0: default fan is OFF 1: fan is ON	-	0	0, 1	√	All
20	Running time	-	0	Monitor value, cannot be changed		
21	Alarm times	-	0	Monitor value, cannot be changed		

2. Control parameter P1 (address: 0100~01FF)

P1-	Name	Unit	Default value	Range	Effective time	Suitable mode
00	Speed loop gain	1Hz	100	1~5000	√	All
01	Speed loop integral time	0.1	400	1 ~	√	All

		ms		50000		
02	Position loop gain	1/s	100	1~2000	√	5, 6
03	Reserved					
04	Second speed loop gain	1Hz	250	1~5000	√	All
05	Second speed loop integral time	0.1 ms	10000	1 ~ 50000	√	All
06	Second position loop gain	1/s	250	1~2000	√	All
07	Reserved					
08	Reserved					
09	Position loop feed forward gain	1%	0	0~100	√	5, 6
10	Feed forward filter time	0.01 ms	0	0~65535	√	5, 6

3. Position control parameter P2 (address: 0200~02FF)

P2-	Function	Unit	Default value	Range	Effective time	Suitable mode
00	Command pulse mode 1: AB phase pulse (90° phase, 4-time) 2: sign and pulses	-	2	0, 1, 2	●	6, 7
01	Position command filter 0: first order filter 1: smooth filter	-	0	0, 1	●	6
02	Electronic gear ratio (numerator)	-	1	1 ~ 65535	√	6
03	Electronic gear ratio	-	1	1 ~	√	6

	(denominator)			65535		
04	Position command filter time	1ms	0	0~128	●	6
05	Reserved					
06	Command pulse frequency at rated speed	100 Hz	5000	1~10000	○	7
07	Speed command pulse filter time	0.1 ms	20	0~1000	√	7
08	Reserved					
09	Reserved					
10	Internal position mode	-	n.0000		○	5
11	First segment of pulse (low bit)	1	0	-9999~+9999	√	5
12	First segment of pulse (high bit)	1	0	-9999~+9999	√	5
13	First segment speed	0.1 rpm	0	0~50000	√	5
14	First segment adjusting time	1ms	0	0~65535	√	5
15	First segment command filter time	0.1 ms	0	0~65535	√	

P2-16~P2-90 are 2~16 segment parameters, P2-91~P2-93 are reserved.

94. xx□x	Search 0 point function on or off 0:search 0 point function is off 1:search 0 point function is on	-	0	0~1	○	5, 6
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94. xxx□	The times pass Z phase signal after leaving the limit switch	time s	2	1~65535	○	5, 6
95	The speed close to the proximity switch	0.1 rpm	600	0~50000	√	5, 6
96	The speed leave the proximity switch	0.1 rpm	100	0~50000	√	5, 6
97	Communication segment no.	-	00	00-16	√	5, 6

4. Speed control P3 (address: 0300~03FF)

P3-	Name	Unit	Default value	Range	Effective time	Suitable mode
00	Analog value of rated speed	0.01V	1000	150~3000	○	4
01	Internal speed 1	rpm	100	-5000~+5000	√	3
02	Internal speed 2	rpm	200	-5000~+5000	√	3
03	Internal speed 3	rpm	300	-5000~+5000	√	3
04	JOG speed	rpm	100	0~1000	√	All
05	Acceleration time of soft start	1ms	0	0~65535	○	3, 4
06	Deceleration time of soft start	1ms	0	0~65535	○	3, 4
07	Speed command filter time	0.01ms	0	0~65535	√	3, 4, 5, 6, 7

08	Speed feedback filter time	0.01ms	20	0~65535	√	3, 4, 5, 6, 7
09	Max speed limit (MAX speed)	rpm	Different for each motor	0~5000	●	All
10	Speed command input dead area voltage	0.01V	0	0~100	○	4

5. Torque control P4 (address: 0400~04FF)

P4-	Name	Unit	Default value	Range	Effective time	Suitable mode
00	Analog value of rated torque	0.01V	1000	150 ~ 3000	○	2
01	Torque command filter time	0.01ms	20	0 ~ 65535	√	1, 2
02	Forward torque limit	1%	300	0~300	√	All
03	Reverse torque limit	1%	300	0~300	√	All
04	Forward run side external torque limit	1%	100	0~300	√	All
05	Reverse run side external torque limit	1%	100	0~300	√	All
06	Urgent stop torque	1%	300	0~300	○	All
07	Internal speed limit in torque control mode	rpm	2000	1~5000	√	1

08	Reserved					
09	Internal torque command setting	1%	0	-300 ~ 300	√	1
10	Torque command input dead area voltage	0.01V	0	0~100	○	2
11	Forward run torque	1%	300	0~300	√	3, 4, 5, 6, 7
12	Reverse run torque	1%	300	0~300	√	3, 4, 5, 6, 7
13	Over limit time	1ms	0	0~60000	√	3, 4, 5, 6, 7

6. Signal parameter P5 (address: 0500~05FF)

P5-	Name	Unit	Default value	Range	Effective time	Suitable mode
00	Positioning end width /COIN	Command pulse	7	0~250	○	5, 6
01	Zero clamp speed /ZCLAMP	rpm	10	0~300	○	3, 4
02	Rotation checking speed /TGON	rpm	20	1~1000	○	All
03	Co-speed checking signal width /V-CMP	rpm	10	1~250	○	All
04	Near output signal width /NEAR	Command pulse	50	0 ~ 10000	○	5, 6
05	Deviation pulse limit	256	1000	0 ~	○	5, 6

		command pulses		65535		
06	Servo OFF delay time (brake command)	1ms	0	0~500	○	All
07	brake command output speed (when OFF)	rpm	100	0~5000	○	All
08	Brake command wait time (when OFF)	1ms	500	10 ~ 1000	○	All
09	Input filter time	5ms	0	0~100	√	All
10	/S-ON servo signal 0000: signal invalid 0001: input positive signal to terminal SI1 0002: input positive signal to terminal SI2 0003: input positive signal to terminal SI3 0004: input positive signal to terminal SI4 0005: input positive signal to terminal SI5	—	※1	※3	●	All

	0006: input positive signal to terminal SI6 0010 : signals are valid 0011: input negative signal to terminal SI1 0012: input negative signal to terminal SI2 0013: input negative signal to terminal SI3 0014: input negative signal to terminal SI4 0015: input negative signal to terminal SI5 0016: input negative signal to terminal SI6					
11	/P-CON proportion command, ditto	—	※1	※3	●	All
12	/P-OT forward prohibition, ditto	—	※1	※3	●	All
13	/N-OT reverse	—	※1	※3	●	All

	prohibition, ditto					
14	/ALM-RST clear the alarm, ditto	—	※1	※3	●	All
15	/P-CL forward external torque limit, ditto	—	※1	※3	●	All
16	/N-CL reverse external torque limit, ditto	—	※1	※3	●	All
17	/SPD-D internal speed choice, ditto	—	※1	※3	●	1, 2, 3, 4
18	/SPD-A internal speed choice, ditto	—	※1	※3	●	3, 5, 6
19	/SPD-B internal speed choice, ditto	—	※1	※3	●	3, 5, 6
20	/C-SEL control mode choice, ditto	—	※1	※3	●	All
21	/ZCLAMP zero clamp, ditto	—	※1	※3	●	3, 5
22	/INHIBIT pulse command prohibition, ditto		※1	※3	●	5, 6
23	/G-SEL gain switching, ditto	—	※1	※3	●	All
24	/CLR clear pulse offset, ditto	—	※1	※3	●	5, 6
25	/CHGSTP change	—	※1	※3	●	5

	step signal, ditto					
26	Reserved					
27	Reserved					
28	/COIN positioning end 0000: not output to the terminal 0001: output positive signal from terminal SO1 0002: output positive signal from terminal SO2 0003: output positive signal from terminal SO3 0011: output positive signal from terminal SO1 0012: output positive signal from terminal SO2 0013: output positive signal from terminal SO3	—	※2	※4	●	5, 6
29	/V-CMP co-speed checking, ditto	—	※2	※4	●	All
30	/TGON rotation	—	※2	※4	●	All

	checking, ditto					
31	/S-RDY ready, ditto	—	※2	※4	●	All
32	/CLT torque limit, ditto	—	※2	※4	●	3, 4, 5, 6, 7
33	/VLT speed limit checking, ditto	—	※2	※4	●	1, 2, 5, 6
34	/BK brake interlock, ditto	—	※2	※4	●	All
35	/WARN warn, ditto	—	※2	※4	●	All
36	/NEAR near, ditto	—	※2	※4	●	5, 6
37	/ALM alarm, ditto	—	※2	※4	●	All
38	/Z Z signal of encoder, ditto	—	※2	※4	●	All

Note: P5-10~P5-25, P5-28~P5-38, the SI/SO terminal definition cannot repeat, otherwise SI/SO function will lose efficacy.

※1: the default value of input terminals, please refer to table 2.

※2: the default value of output terminals, please refer to table 4.

※3: the input terminal distributions please refer to table 1.

※4: the output terminal distributions please refer to table 3.

Table 1: Input signal distributions

Input terminal parameters	Servo drive	Range
P5-10~P5-24	All the models	n.0000~n.0005 n.0010~n.0015

Table 2: default settings of input terminals

Terminal	SI1	SI2	SI3	SI4	SI5
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Function	/S-ON	/ALM-RST	/P-OT	/N-OT	/SPD-A
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Table 3: output signal distributions

Output terminal parameters	Servo drive	Range
P5-28~P5-38	All the models	n.0000~n.0003 n.0010~n.0013

Table 4: the default settings of output terminals

Terminal	SO1	SO2	SO3
Function	/COIN	/ALM	/S-RDY

Modbus address

■ Parameter address

Parameter	Modbus Address (hex)	Modbus Address (decimal)	Parameter	Modbus Address (hex)	Modbus Address (decimal)
P0-00	0x0000	0	P1-00	0x0100	256
P0-01	0x0001	1	P1-01	0x0101	257
P0-02	0x0002	2	P1-02	0x0102	258
P0-03	0x0003	3	P1-03	0x0103	259
P0-04	0x0004	4	P1-04	0x0104	260
P0-05	0x0005	5	P1-05	0x0105	261
P0-06	0x0006	6	P1-06	0x0106	262
P0-07	0x0007	7	P1-07	0x0107	263
P0-08	0x0008	8	P1-08	0x0108	264
P0-09	0x0009	9	P1-09	0x0109	265

P0-10	0x000A	10	P1-10	0x010A	266
Parameter	Modbus Address (hex)	Modbus Address (decimal)	Parameter	Modbus Address (hex)	Modbus Address (decimal)
P2-00	0x0200	512	P3-00	0x0300	768
P2-01	0x0201	513	P3-01	0x0301	769
P2-02	0x0202	514	P3-02	0x0302	770
P2-03	0x0203	515	P3-03	0x0303	771
P2-04	0x0204	516	P3-04	0x0304	772
P2-05	0x0205	517	P3-05	0x0305	773
P2-06	0x0206	518	P3-06	0x0306	774
P2-07	0x0207	519	P3-07	0x0307	775
P2-10	0x020A	522	P3-08	0x0308	776
P2-11~P2-9 0	0x020B- 0x025A	523-602	P3-09	0x0309	777
P2-94	0x025E	606	P3-10	0x030A	778
P2-95	0x025F	607			
P2-96	0x0260	608			
P2-97	0x0261	609			
Parameter	Modbus Address (hex)	Modbus Address (decimal)	Parameter	Modbus Address (hex)	Modbus Address (decimal)
P4-00	0x0400	1024	P5-00	0x0500	1280
P4-01	0x0401	1025	P5-01	0x0501	1281
P4-02	0x0402	1026	P5-02	0x0502	1282
P4-03	0x0403	1027	P5-03	0x0503	1283
P4-04	0x0404	1028	P5-04	0x0504	1284

P4-05	0x0405	1029	P5-05	0x0505	1285
P4-06	0x0406	1030	P5-06	0x0506	1286
P4-07	0x0407	1031	P5-07	0x0507	1287
P4-08	0x0408	1032	P5-08	0x0508	1288
P4-09	0x0409	1033	P5-09	0x0509	1289
P4-10	0x040A	1034	P5-10	0x050A	1290
P4-11	0x040B	1035	P5-11	0x050B	1291
P4-12	0x040C	1036	P5-12	0x050C	1292
P4-13	0x040D	1037			
Parameter	Modbus Address (hex)	Modbus Address (decimal)	Parameter	Modbus Address (hex)	Modbus Address (decimal)
P5-13	0x050D	1293	P5-26	0x051A	1306
P5-14	0x050E	1294	P5-27	0x051B	1307
P5-15	0x050F	1295	P5-28	0x051C	1308
P5-16	0x0510	1296	P5-29	0x051D	1309
P5-17	0x0511	1297	P5-30	0x051E	1310
P5-18	0x0512	1298	P5-31	0x051F	1311
P5-19	0x0513	1299	P5-32	0x0520	1312
P5-20	0x0514	1300	P5-33	0x0521	1313
P5-21	0x0515	1301	P5-34	0x0522	1314
P5-22	0x0516	1302	P5-35	0x0523	1315
P5-23	0x0517	1303	P5-36	0x0524	1316
P5-24	0x0518	1304	P5-37	0x0525	1317
P5-25	0x0519	1305	P5-38	0x0526	1318

■ Monitor state address

Explanations	Modbus Address (hex)	Modbus Address (decimal)	Explanations	Modbus address (hex)	Modbus Address (decimal)
U-00 Motor speed	0x0700	1792	F3-00 current alarm code	0x0716	1814
U-01 Speed command	0x0701	1793	F3-01 Current warn code	0x0717	1815
U-02 Internal torque command	0x0702	1794	F3-02 Alarm/warn code 1	0x0718	1816
U-03 Rotation angle (physical angle)	0x0703	1795	F3-03 U phase current when alarming	0x0719	1817
U-04 Rotation angle (electricity angle)	0x0704	1796	F3-04 V phase current when alarming	0x071A	1818
U-05 Bus voltage	0x0705	1797	F3-05 DC bus voltage when alarming	0x071B	1819
U-06 Module temperature	0x0706	1798	F3-06 IGBT temperature when alarming	0x071C	1820
U-07 Input command pulse speed	0x0707	1799	F3-07 The speed when alarming	0x071D	1821
U-08 Offset pulse value (low	0x0708	1800	F3-08 Internal torque command	0x071E	1822

16 bits)			when alarming		
U-09 Offset pulse value (high 16 bits)	0x0709	1801	F3-09 V-REF value when alarming	0x071F	1823
U-10 Rotation angle (low 16 bits)	0x070A	1802	F3-10 T-REF value when alarming	0x0720	1824
U-11 Rotation angle (high 16 bits)	0x070B	1803	F3-11 Alarm/warn code 2	0x0728	1832
U-12 Input command pulse (low 16 bits)	0x070C	1804	F3-12 Alarm/warn code 3	0x0729	1833
U-13 Input command pulse (high 16 bits)	0x070D	1805	F3-13 Alarm/warn code 4	0x072A	1834
U-14 Feedback pulse (low 16 bits)	0x070E	1806	F3-14 Alarm/warn code 5	0x072B	1835
U-15 Feedback pulse (high 16 bits)	0x070F	1807	F3-15 Alarm/warn code 6	0x072C	1836
U-16 Current accumulated position (low 16 bits)	0x0710	1808	F3-16 Alarm/warn code 7	0x072D	1837
U-17 Current accumulated	0x0711	1809			

position (high 16 bits)					
U-18 Present current	0x0712	1810			
U-19 Analog input (speed)	0x0713	1811			
U-20 Analog input (torque)	0x0714	1812			

■ Input signal state (can read and write)

Explanation	Address (hex)	Address (decimal)	Explanation	Address (hex)	Address (decimal)
/S-ON servo signal	0x0800	2048	/SPD-A internal speed selection	0x0808	2056
/P-CON proportion action command	0x0801	2049	/SPD-B internal speed selection	0x0809	2057
/P-OT forward drive prohibition	0x0802	2050	/C-SEL control mode selection	0x080A	2058
/N-OT reverse drive prohibition	0x0803	2051	/ZCLAMP zero clamp	0x080B	2059
/ALM-RST reset alarm	0x0804	2052	/INHIBIT command pulse prohibition	0x080C	2060

/P-CL forward external torque limit	0x0805	2053	/G-SEL gain switch	0x080D	2061
/N-CL reverse external torque limit	0x0806	2054	/CLR pulse clear	0x080E	2062
/SPD-D internal speed selection	0x0807	2055	/CHGSTP change step	0x080F	2063

Note: for example, /S-ON signal address 0x0800=1, this function is effective; 0x0800=0, this function is ineffective.

■ Output state signal (can read, cannot write)

Explanation	Address (hex)	Address (decimal)	Explanation	Address (hex)	Address (decimal)
Positioning finished (/COIN)	0x0812	2066	Brake lock (/BK)	0x0818	2072
Coincidence speed checking (/V-CMP)	0x0813	2067	Warn (/WARN)	0x0819	2073
Rotation checking (/TGON)	0x0814	2068	Near (/NEAR)	0x081A	2074
Ready (/S-RDY)	0x0815	2069	Alarm output (/ALM)	0x081B	2075
Torque limit (/CLT)	0x0816	2070	Encoder Z signal (/Z)	0x081C	2076
Speed limit	0x0817	2071			

checking (/VLT)					
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►► Alarm information

Code	Explanations	Reasons	Solution
E-001	Program damage	Cannot pass the program self-test	Re-download the program, contact us
E-002	Parameter damage	Cannot pass the parameter self-test	Re-power on the drive or contact us
E-003	bus overvoltage	Grid voltage is too high or not connect to regenerative resistor, regenerative resistor is broken or value too large	Check the grid and regenerative
E-004	Bus under voltage	Grid voltage is too low	Check the grid
E-005	Regenerative resistor error	Regenerative resistor is not functional	Check the regenerative resistor
E-006	Module temperature too high	Running for long time with large load will cause module temperature too high	Use small load, enhance the ventilation, check if the fan is working when servo is enable; decrease the environment temperature
E-007	Over current	UVW output short circuit or motor error	Change the motor, check the Uvw wiring
E-008	Over speed	Motor speed is too fast, motor Uvw connection is error	Check if there is external force make the motor over speed, check motor Uvw connection
E-009	Analog input	Input voltage is error when	Input correct voltage when

	error	two channels analog is zeroing	analog zeroing
E-010	Position offset is too large	The difference between setting value and actual value is larger than limits in position control mode	Check if the motor is blocked, decrease the position setting speed, increase the deviation pulse limits P5-05
E-011	Motor UVW is short circuit	External short circuit at first power-on self-test	Check motor UVW connection, change the broken motor
E-012	Motor UVW current error	Current collection circuit is error	Check motor wiring, change servo drive
E-013	Encoder UVW open circuit	Not connect encoder, encoder wiring is error or damaged	Check encoder wiring, re-connect it after power off, change the encoder
E-014	Encoder ABZ open circuit	Not connect encoder, encoder wiring is error or damaged	Check encoder wiring, re-connect it after power off, change the encoder
E-015	Speed changing is too fast (encoder feedback error)	Encoder wiring error, encoder has external interference	Check encoder wiring, add shield layer for encoder wire
E-016	Over load	Run over load for long time	Decrease the time of overload running, change a motor with larger rated power
E-017	Power failure when running	Grid power is off when running	Re-power on after the grid voltage is stable
E-018	Erase parameter error	Cannot erase parameter , the voltage is too low when power on initialization	Check the power supply and re-power on
E-031	Motor code error	The motor code doesn't match the drive	Set F2-00 motor code

E-032	System initialization is failure	System IC chip is broken	Contact us
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►► General debug steps

- Make sure there is no obvious damage on the product before power on.
- Connect servo drive and motor. Please note the power terminal UVW and the servo drive terminal UVW must one-to-one connect. Otherwise, the servo motor will be blocked or run too fast.
- Power on, the servo drive panel will display bb.
- Enter F2-00, set the value same to the motor code on the motor label, then re-power on. Please note the compatible motor is different for each servo drive.
- Re-power on the drive, enter F1-02 to do current offset auto-adjustment, please refer to auxiliary function for details.
- Set F1-01 to 1, check the motor running state. If the motor runs smoothly, the connection is correct. Otherwise, please check the wiring.
- If the connection is correct, enter F1-00 for jog running. Make sure there is no error, and then connect the motor to the machine.
- Set the servo drive parameters as actual needs, and adjust it depend on actual conditions.

►► Motor code

Motor type	Rated power KW	Rated torque Nm	Speed RPM	Current A	Over load ratio	Motor code
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MS-60ST-M00630-20P2	0.2	0.637	3000	1.8	3	1003
MS-60ST-M01330-20P4	0.4	1.27	3000	2.5	3	0004
MS-60ST-M01330-20P4	0.4	1.27	3000	1.8	3	1004
MS-80ST-M02430-20P7	0.75	2.39	3000	3.0	3	0011
MS-80ST-M02430-20P7	0.75	2.39	3000	3.0	3	1011
MS-80ST-M03520-20P7	0.75	3.5	2000	3.0	3	0012
MS-90ST-M02430-20P7	0.75	2.4	3000	3.0	3	0021
MS-110ST-M04030-21P2	1.2	4	3000	5	3	0031
MS-110ST-M05030-21P5	1.5	5	3000	6	3	0032
MS-110ST-M04030-41P2	1.2	4	3000	3	3	0131
MS-110ST-M05030-41P5	1.5	5	3000	3.9	3	0132
MS-130ST-M06025-21P5	1.5	6	2500	6	3	0042
MS-130ST-M06025-21P5	1.5	6	2500	7.4	3	1042
MS-130ST-M10015-21P5	1.5	10	1500	6	2.5	0044
MS-130ST-M10015-21P5	1.5	10	1500	8	2.5	1044
MS-130ST-M07725-22P0	2.0	7.7	2500	7.5	3	0043
MS-130ST-M15015-22P3	2.3	15	1500	9.5	2	0046
MS-130ST-M06025-41P5	1.5	6	2500	3.7	3	0142
MS-130ST-M10015-41P5	1.5	10	1500	3.5	2.5	0144
MS-130ST-M10015-41P5	1.5	10	1500	8	2.5	2144
MS-130ST-M10030-43P0	3.0	10	3000	6.4	2.5	1148
MS-130ST-M07725-42P0	2.0	7.7	2500	6.4	2.5	1143
MS-130ST-M15015-42P3	2.3	15	1500	7.3	3	1146
MS-180ST-M19015-43P0	3.0	19	1500	7.5	2.5	0156
MS-180ST-M20015-43P0	3.0	20	1500	8.5	2.5	1052
MS-180ST-M21520-44P5	4.5	21.5	2000	9.5	2.5	0150
MS-180ST-M27015-44P3	4.3	27	1500	10	2.5	0151

MS-180ST-M27015-44P3	4.3	27	1500	8	2	2151
MS-180ST-M35015-45P5	5.5	35	1500	12	2	0152
MS-180ST-M35015-45P5	5.5	35	1500	8.5	2.5	1152
MS-180ST-M48015-47P5	7.5	48	1500	20	2	0153
MS-180ST-M70015-411P0	11	70	1500	25	1.5	1157

►► Drive type and suitable motor code

Servo drive type	Suitable Motor code
DS2-20P2-AS/AS6	1003 (default setting)
DS2-20P4-AS/AS6 DS2-20P4-BS/BS6	0004 (default setting), 1004
DS2-20P7-AS/AS6 DS2-20P7-BSW/BSW6	0011 (default setting), 1011, 0012, 0021
DS2-21P5-AS/AS6 DS2-21P5-AS2	0044 (default setting), 0031, 0032, 0042, 1042, 1044
DS2-22P3-AS/AS6	0046 (default setting), 0043
DS2-41P5-AS/AS6	0144 (default setting), 0131, 0132, 0142, 2144
DS2-43P0-AS/AS6	0156 (default setting), 1148, 1052, 1143, 1146
DS2-45P5-A/AS	0150 (default setting), 0151, 2151, 0152, 1152
DS2-47P5-A	0153 (default setting)
DS2-411P0-A	1157 (default setting)

XINJE



WUXI XINJE ELECTRIC CO., LTD.

4th Floor, Building 7th, No.100 Dicui Rd,
Wuxi, China

Tel: 86-0510-85134139

Fax: 86-0510-85111290

www.xinje.com