



# **DS3/DS3E series servo drive**

Fast manual

**Wuxi Xinje Electric Co., Ltd.**

Data No. SC301 20171206 1.0



This manual is suitable for below users

- Servo system installation
- Installation and wiring
- Test run and servo debug
- Maintenance and inspection

## Responsibility statement

- the contents of the manual though have been carefully checked, but mistakes is unavoidably, we can't guarantee completely consistent
- we will check the contents of the manual, and carry on the correction in future versions, welcome to put forward valuable opinion
- The contents described in the manual, if there are any changes, please understand we will not prior notice

## Contact us

If you have any questions about the use of this product, please contact the agent or xinje company.

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## Related manual

Please contact us for the DS3-PQA and DS3E-PFA series user manual.



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## ►► Confirmation when receive the products

After the arrival of the product, please confirm the integrity of the product in the following aspects.

Items	Comments
Are the delivered products the ones that were ordered?	Check the model numbers marked on the nameplates of the servomotor and servo drive.
The panel displays flashing “code”	Please set motor code in P0-33 (the motor code please refer to motor label)
Does the servomotor shaft rotate smoothly?	The servomotor shaft is normal if it can be turned smoothly by hand. Servomotors with brakes, however, cannot be turned manually.
Is there any damage?	Check the overall appearance, and check for damage or scratches that may have occurred during shipping.
Are there any loose screws?	Check screws for looseness using a screwdrive.
Is the motor code the same with the code in drive?	Check the motor code marked on the nameplates of the servomotor and the parameter P0-33 on the servo drive.

If there is anything wrong with the items listed above, please contact the agent or xinje company.

## ►► Safety caution

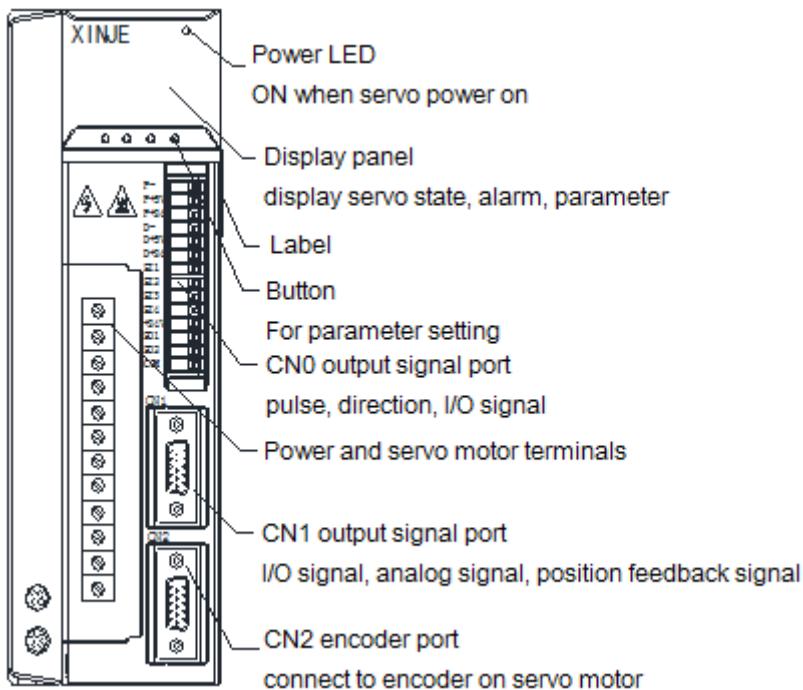
- Confirmation when receive products
  - ✓ DO NOT install any driver which is damaged, lack of accessories or not the same with the model ordered.
- Installation
  - ✓ Cut off external power supply before installation.
- Wiring
  - ✓ Cut off external power supply before wiring.
  - ✓ Connect AC power supply to the corresponding terminals.

- 
- ✓ Do not connect a three-phase power supply to the U, V, or W output terminals.
  - ✓ Use 2mm<sup>2</sup> wire to grounding the ground terminals.
  - ✓ For wiring please make sure that the encoder lines, power lines in loose state, not tight, so as to avoid cable damage.
  - Product running and maintenance
    - Do not remove the panel cover while the power is ON.
    - Do not touch terminals for 10 minutes after the power has been turned OFF.
    - Do not connect with any motor when trial operation.
    - Before starting operation with a machine connected, change the settings to match the parameters of the machine.
    - Do not attempt to change wiring while the power is ON.
    - Do not touch the heat sinks during operation.

## 1. Product description and specification

### 1-1. Servo drive

#### 1-1-1. Parts description



### 1-1-2. Model naming

DS3 – 20P7 – PQA

Series name

DS3: series name

DS3E: series name

Voltage level

2: 220V

4: 380V

Matchced

motor capacity

0P2: 0.2KW

0P4: 0.4KW

0P7: 0.75KW

1P5: 1.5KW

2P3: 2.3KW

3P0: 3.0KW

Configuration type

P-input command type: pulse

Encoder type:

Q- quadrature encoder

F- compatible quadrature

encoder

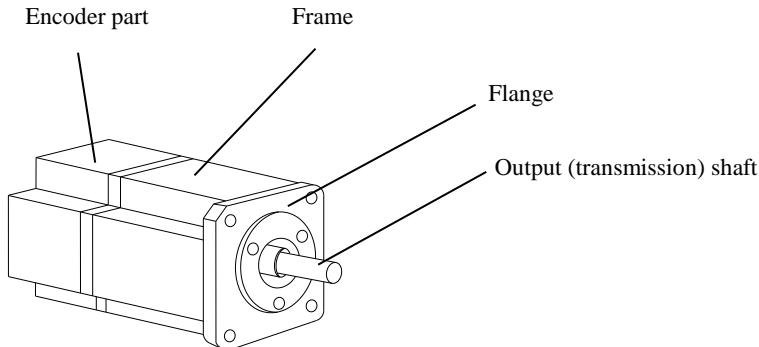
A-design order: A

### 1-1-3. Performance

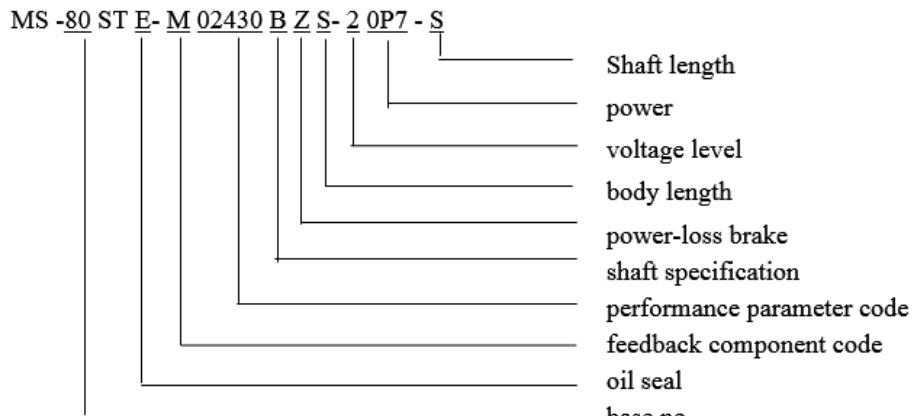
Servo unit	DS3/DS3E series 220V, DS3/DS3E series 380V
Suitable encoder	Incremental encoder (2500 ppr)
Input power supply	<p>DS3-2□P□-PQA/ DS3E-2□P□-PFA: single/3-phase AC200~240V, 50/60Hz</p> <p>DS3-4□P□-PQA/ DS3E-4□P□-PFA: 3-phase AC380~400V, 50/60Hz</p> <p>【Note: DS3-2□P□-PQA/ DS3E-2□P□-PFA Below 1.5KW(not include 1.5KW) can use single phase AC200~240V 50/60Hz; Above 1.5KW(include 1.5KW) should use 3-phase AC200~240V 50/60Hz (for single phase, please connect to L1, L3, otherwise it will affect the power-off memory)</p>
Control method	3-phase full wave rectifier IPM PWM control sine current driving mode
Using condition	Using temperature 0~+50 °C
	Storage temperature -20~+85 °C
	Humidity Below 90%RH (no condensation)
	Resistance to vibration and impact strength 4.9m/s <sup>2</sup> / 19.6m/s <sup>2</sup>
Structure	Base installation

## 1-2. Servo motor

### 1-2-1. Part description



### 1-2-2. Model naming



Base number	40, 60, 80, 90, 110, 130, 180, 220		
Oil seal	Empty	Without oil seal (130ST and above models all have	

		oil seal, so the model without E)
	E	With oil seal (60ST, 80ST model name has differences)
Feedback component no.	M	Incremental encoder (2500ppr optical pulse encoder)
	F	Line-saving incremental encoder (2500ppr optical pulse encoder)
	T	17 bits absolute value encoder
	N	20 bits absolute value encoder
Performance parameter no.	<p>First 3 bits mean rated torque, last 2 bits mean rated speed            Such as: 00630: rated torque 0.6N.m, rated speed 3000rpm            06025: rated torque 6.0N.m, rated speed 2500rpm            19015: rated torque 19.0N.m, rated speed 1500rpm</p>	
Shaft spec	A	No key
	B	With key
Power-loss brake	Vacant	No
	Z	With power-off brake
Body length	Vacant	Normal models
	S	Short body
Voltage level	2	220V
	4	380V

Power	Such as: 0P4: 0.4kW 0P7: 0.75kW 1P5: 1.5KW		
Motor shaft length  Note: only 180ST has differences	vacant	Normal models	
	S	Short shaft	

### 1-2-3. Motor specification

Voltage level	220V			
Motor type MS-	40ST-	60ST-		
	M00330	M00630	M01330	
	□□-20P1	□□-20P2	□□-20P4	
Motor code	1002	1003	0004	1004
Rated power (KW)	0.1	0.4	0.4	0.4
Rated current (A)	1.8	1.8	2.5	1.8
Rated speed (rpm)	3000	3000	3000	3000
Max speed (rpm)	4000	4000	4000	4000
Rated torque (N·m)	0.32	0.637	1.27	1.27
Peak torque (N·m)	0.96	1.91	3.8	3.8
Back EMF constat (V/krpm)	11	26	28	162
Torque coefficient (N·m/A)	0.18	0.37	0.5	0.68
Rotor inertia (Kg·m²)	$0.04 \times 10^{-4}$	$0.18 \times 10^{-4}$	$0.438 \times 10^{-4}$	$0.53 \times 10^{-4}$
Winding resistor (Ω)	3.4	3.5	3.49	3.80
Winding inductance (mH)	2.7	8.32	8.47	11.51
Electrical time constant (ms)	0.8	2.38	2.43	3.03

Weight (Kg)		0.55	1.1	1.8	1.7
Encoder ppr (PPR)		2500			
Pole pairs		4			
Motor insulation level		Class B (130°C)			
Protection level		IP65			
Ambient	Temperature	−20°C~+50°C			
	Humidity	Relative humidity < 90% (no condensation)			

Voltage level		220V			
Motor type MS-	80ST-				90ST-
	M02430		M03520	M02430	
	□□-20P7				□□-21P5
Motor code	0011	1011	0012	0021	
Rated power (KW)	0.75	0.75	0.75	1.5	
Rated current (A)	3.0	2.6	3.0	3.0	
Rated speed (rpm)	3000	3000	2000	3000	
Max speed (rpm)	4000	4000	2500	4000	
Rated torque (N·m)	2.39	2.39	3.5	2.4	
Peak torque (N·m)	7.1	7.1	10.5	7.1	
Back EMF constat (V/krpm)	48	56.6	71	51	
Torque coefficient (N·m/A)	0.8	0.92	1.17	0.8	
Rotor inertia (Kg·m²)	$1.82 \times 10^{-4}$	$1.05 \times 10^{-4}$	$2.63 \times 10^{-4}$	$2.45 \times 10^{-3}$	
Winding resistor (Ω)	2.88	2.7	3.65	3.2	
Winding inductance	6.4	6.25	8.80	7.00	

(mH)				
Electrical time constant (ms)	2.22	2.3	2.41	2.19
Weight (Kg)	2.9	2.87	3.7	3.4
Encoder ppr (PPR)	2500			
Pole pairs	4			
Motor insulation level	Class B (130°C)			
Protection level	IP65			
Ambient	Temperature	−20°C~+50°C		
	Humidity	Relative humidity < 90% (no condensation)		

Voltage level	220V			
Motor type MS-	110ST-		130ST-	
	M04030	M05030	M04030	M06025
	□□-21P2	□□-21P5	□□-21P2	□□-21P5
Motor code	0031	0032	1031	0042
Rated power (KW)	1.2	1.5	1.2	1.5
Rated current (A)	5.0	6.0	6.7	6.0
Rated speed (rpm)	3000	3000	3000	2500
Max speed (rpm)	3500	3500	4000	3000
Rated torque (N m)	4	5	4	6
Peak torque (N m)	12	15	10	18
Back EMF constat (V/kgpm)	54	62	33	65
Torque coefficient (N m/A)	0.8	0.83	0.54	1.0

Rotor inertia (Kg m <sup>2</sup> )	0.54×10 <sup>-3</sup>	0.63×10 <sup>-3</sup>	0.54×10 <sup>-3</sup>	1.26×10 <sup>-3</sup>
Winding resistor (Ω)	1.09	1.03	2.6	1.21
Winding inductance (mH)	3.30	3.43	12	3.87
Electrical time constant (ms)	3.03	3.33	4.62	3.20
Weight (Kg)	5.5	6.1	5.9	8.9
Encoder ppr (PPR)	2500			
Pole pairs	4			
Motor insulation level	Class B (130°C)			
Protection level	IP65			
Ambient	Temperature	−20°C~+50°C		
	Humidity	Relative humidity < 90% (no condensation)		

Voltage level	220V				
Motor type MS-	130ST-				
	M06025	M10015		M07725	M15015
	□□-21P5	□□-21P5		□□-22P0	□□-22P3
Motor code	1042	0044	1044	0043	0046
Rated power (KW)	1.5	1.5	1.5	2.0	2.3
Rated current (A)	7.4	6.0	8.0	7.5	9.5
Rated speed (rpm)	2500	1500	1500	2500	1500
Max speed (rpm)	3000	2000	2000	3000	2000
Rated torque (N·m)	6	10	10	7.7	15
Peak torque (N·m)	18	25	25	22	30

Back EMF constat (V/krpm)	82	103	61	68	114
Torque coefficient (N m/A)	0.81	1.67	1.25	1.03	1.58
Rotor inertia (Kg m <sup>2</sup> )	$0.84 \times 10^{-3}$	$1.94 \times 10^{-3}$	$1.272 \times 10^{-3}$	$1.53 \times 10^{-3}$	$2.77 \times 10^{-3}$
Winding resistor (Ω)	0.70	1.29	0.3	1.01	1.10
Winding inductance (mH)	5.07	5.07	1.29	2.94	4.45
Electrical time constant (ms)	7.24	3.93	4.3	2.91	4.05
Weight (Kg)	7.2	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				
Ambient	Temperature	$-20^{\circ}\text{C} \sim +50^{\circ}\text{C}$			
	Humidity	Relative humidity < 90% (no condensation)			

Voltage level	380V				
Motor type MS-	110ST-		130ST-		
	M04030	M05030	M06025	M10015	
	□□-41P2	□□-41P5	□□-41P5		
Motor code	0131	0132	0142	0144	1144
Rated power (KW)	1.2	1.5	1.5	1.5	1.5
Rated current (A)	3.0	3.9	3.7	3.5	8.0
Rated speed (rpm)	3000	3000	2500	1500	1500

Max speed (rpm)	3500	3500	3000	2000	2000
Rated torque (N m)	4	5	6	10	10
Peak torque (N m)	12	15	18	25	20
Back EMF constat (V/kg rpm)	89	90	110	177	61
Torque coefficient (N m/A)	1.33	1.11	1.62	2.86	1.25
Rotor inertia (Kg m <sup>2</sup> )	$0.54 \times 10^{-3}$	$0.63 \times 10^{-3}$	$1.26 \times 10^{-3}$	$1.94 \times 10^{-3}$	$1.272 \times 10^{-3}$
Winding resistor ( $\Omega$ )	3.30	2.28	3.50	4.37	0.3
Winding inductance (mH)	8.78	7.40	10.75	15.00	1.29
Electrical time constant (ms)	2.66	3.25	3.07	3.46	4.3
Weight (Kg)	5.5	6.1	8.9	11.5	9.34
Encoder ppr (PPR)	2500				
Pole pairs	4				
Motor insulation level	Class B (130°C)				
Protection level	IP65				
Ambient	Temperature	$-20^{\circ}\text{C} \sim +50^{\circ}\text{C}$			
	Humidity	Relative humidity < 90% (no condensation)			

Voltage level	380V			
Motor type MS-	130ST-			180ST-
	M07725	M15015	M10030	M19015
	□□-42P0	□□-42P3	□□-43P0	□□-43P0

Motor code	1143	1146	1148	0156	1052
Rated power (KW)	2.0	2.3	3.0	3.0	3.0
Rated current (A)	6.4	7.3	6.4	7.5	7.8
Rated speed (rpm)	2500	1500	3000	1500	1500
Max speed (rpm)	3000	2000	3500	2000	2000
Rated torque (N m)	7.7	15	10	19	20
Peak torque (N m)	19.25	45	25	47	50
Back EMF constat (V/krpm)	61	124	88.3	158	138
Torque coefficient (N m/A)	1.2	2	1.56	2.53	2.56
Rotor inertia (Kg m <sup>2</sup> )	$1.272 \times 10^{-3}$	$2.44 \times 10^{-3}$	$1.13 \times 10^{-3}$	$3.8 \times 10^{-3}$	$2.8 \times 10^{-3}$
Winding resistor ( $\Omega$ )	0.3	1.8	0.46	1.15	0.67
Winding inductance (mH)	1.29	11.6	1.52	6.4	2.68
Electrical time constant (ms)	4.3	6.44	3.33	5.57	4.00
Weight (Kg)	9.34	11.1	11.4	20.5	17.1
Encoder ppr (PPR)	2500				
Pole pairs	4				
Motor insulation level	Class B (130°C)				
Protection level	IP65				
Ambient	Temperature	$-20^{\circ}\text{C} \sim +50^{\circ}\text{C}$			
	Humidity	Relative humidity < 90% (no condensation)			

Voltage level	380V					
Motor type MS-	130ST-			180ST-		
	M2152 0	M27015		M35015		M4801 5
	□□-44P 5	□□-44P3		□□-45P5		□□-47P 5
Motor code	0150	2151	0151	1152	0152	0153
Rated power (KW)	4.5	4.3	4.3	5.5	5.5	7.5
Rated current (A)	9.5	8.0	10.0	8.5	12.0	20.0
Rated speed (rpm)	2000	1500	1500	1500	1500	1500
Max speed (rpm)	3000	2000	2000	2000	2000	2000
Rated torque (N m)	21.5	27	27	35	35	48
Peak torque (N m)	53	54	67	87.5	70	96
Back EMF constat (V/krpm)	140	210	172	250	181	156
Torque coefficient (N m/A)	2.26	3.37	2.70	4.1	2.92	2.40
Rotor inertia (Kg m <sup>2</sup> )	$4.7 \times 10^{-3}$	$7.2 \times 10^{-3}$	$6.1 \times 10^{-3}$	$9.18 \times 10^{-3}$	$8.6 \times 10^{-3}$	$9.5 \times 10^{-3}$
Winding resistor (Ω)	0.71	0.59	0.796	1.1	0.62	0.273
Winding inductance (mH)	4.00	14.4	4.83	15.1	4.00	2.14
Electrical time constant (ms)	5.63	24.4	6.07	13.7	6.45	7.84
Weight (Kg)	22.2	23.3	25.5	27.7	30.5	40.0
Encoder ppr (PPR)	2500					
Pole pairs	4					

Motor insulation level		Class B (130°C)
Protection level		IP65
Ambient	Temperature	−20°C~+50°C
	Humidity	Relative humidity < 90% (no condensation)

## 2. Product installation

### 2-1. Servo drive

The DS3/DS3E series servo drives are base-type servo drive. Incorrect installation will cause problems. Follow the installation instructions below.

#### 1) Storage temperature

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

#### 2) Installation site

Please install the servo drive as the following items.

Situation	Installation Precaution
Installation in a Control Panel	Design the control panel size, unit layout, and cooling method so the temperature around the servo drives 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 drives does not exceed 50 °C.
Installation Near a Source of Vibration	Install a vibration isolator beneath the servo drive to avoid subjecting it to vibration.
Installation at a Site Exposed to Corrosive	Corrosive gas does not have an immediate effect on the servo drives, but will eventually cause electronic components and

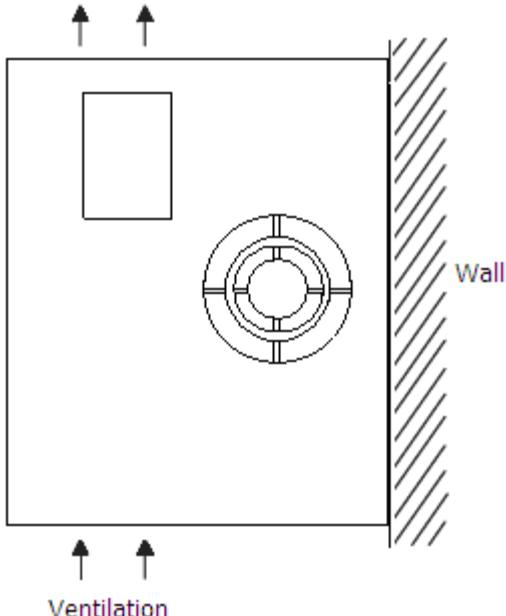
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Gas	terminals to malfunction. Take appropriate action to avoid corrosive gas.
Other Situations	Do not install the servo drive in hot and humid locations or locations subject to excessive dust or iron powder in the air.

### 3) Installation direction

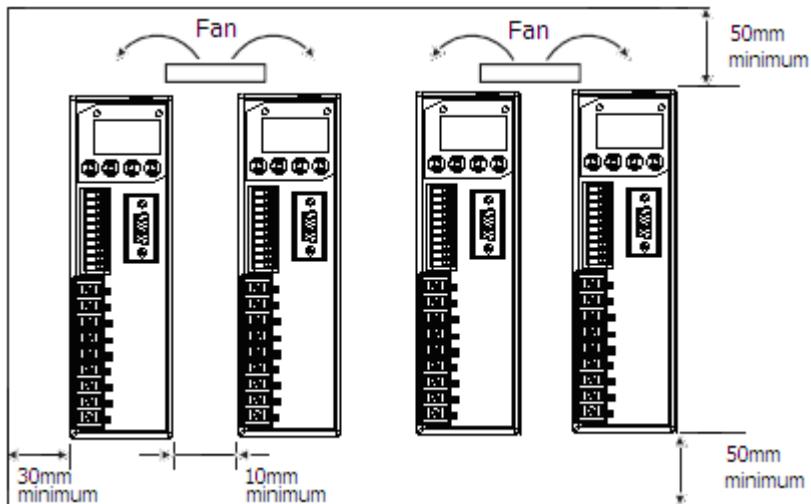
As shown in the below picture, the direction of installation should be perpendicular to the direction of the wall.

Use natural convection or fan to cool the servo drive. Be sure to comply with the installation direction requirement and fix the servo drive firmly on the mounting surface. For a drive equipped with a regenerative resistor at the bottom, it shall pay attention to the heat dissipation of the mounting surface to avoid overheating of the drive or causing fire.



#### 4) Installation standard

Be sure to comply with the installation standard in the control panel shown below, which is applicable for installing multiple servo drives side-by-side in the control panel (hereinafter called "side-by-side installation" for short).



## ■ Servo Drive Orientation

Install the servo drive perpendicular to the wall so the front panel containing connectors faces outward.

## ■ Cooling

As shown in the figure above, allow sufficient space around each servo drive for cooling by cooling fans or natural convection.

## ■ Side-by-side Installation

When install servo drives side by side as shown in the figure above, make at least 10mm between and at least 50mm above and below each servo drive. Install cooling fans above the servo drives to avoid excessive temperature rise and to maintain even temperature inside the control panel.

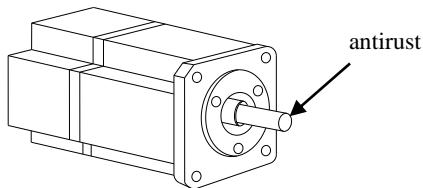
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## ■ Environmental Conditions in the Control Panel

- Ambient Temperature: 0~50 °C
- Humidity: 90%RH or less
- Vibration: 4.9m/s<sup>2</sup>
- Condensation and Freezing: None
- Ambient Temperature for Long-term Reliability: 50 °C maximum

### 2-2. Servo motor

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



Notes:

1. 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.
2. Avoid getting thinner on other parts of the servo motor.

#### 1) Storage temperature

Store the servomotor within -20~+60 °C as long as it is stored with the power cable disconnected.

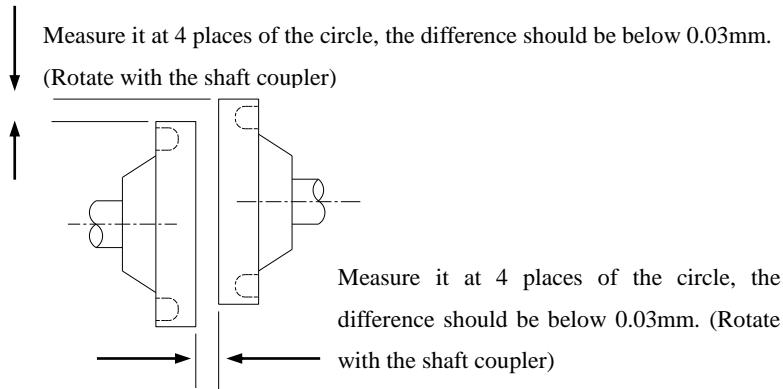
#### 2) Installation site

- 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 90% 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:** (1) If the concentricity is not enough, it will cause the vibration and bearing damage.  
(2) 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.

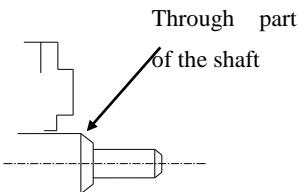
### 4) Installation direction

MS series servomotors can be installed either horizontally or vertically.

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## 5) Prevent from oil and water

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



## 6) Cable stress

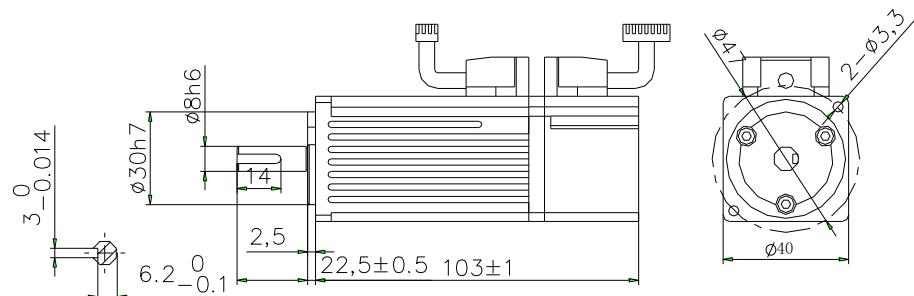
Make sure that the power lines are free from bends and tension. Be especially careful to wire signal line cables so that they are not subject to stress because the core wires are very thin, measuring only 0.2 to 0.3mm<sup>2</sup>.

## 3. Product dimensions

### 3-1. Servo motor

#### ■ 40 series servo motor dimension

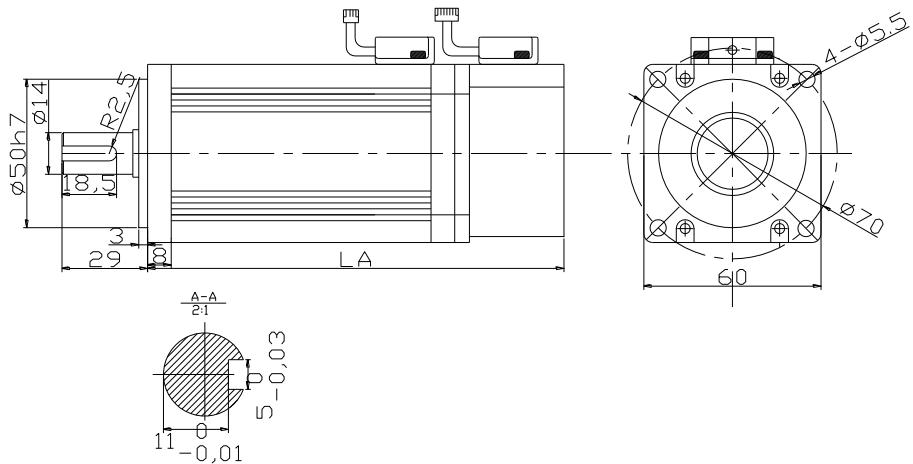
Unit: mm



Motor model	LA	
	Normal	With brake
MS-40ST-M00330□□-20P1	103	

■ 60 series servo motor dimension

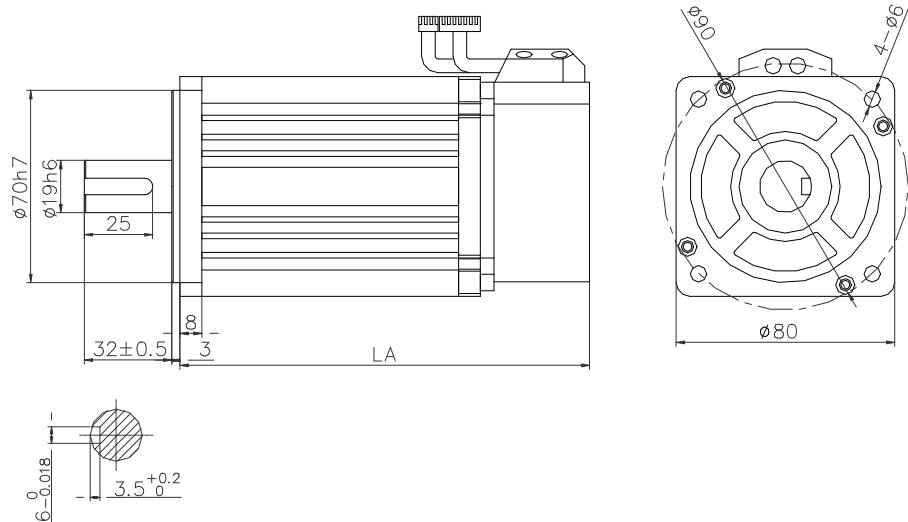
Unit: mm



Model	LA	
	Normal	With brake
MS-60ST-M00630□□-20P2	115.5	159.5
MS-60ST-M01330□□-20P4	145	189

■ 80 series servo motor dimension

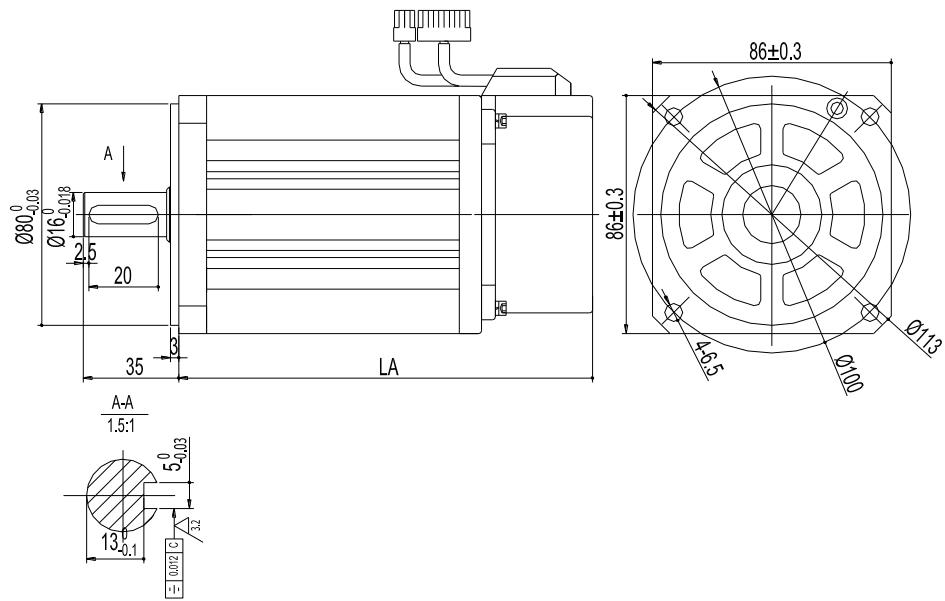
Unit: mm



Model	LA	
	Normal	With brake
MS-80ST-M02430□□-20P7	150	199
MS-80ST-M03520□□-20P7	178	219

■ 90 series servo motor dimension

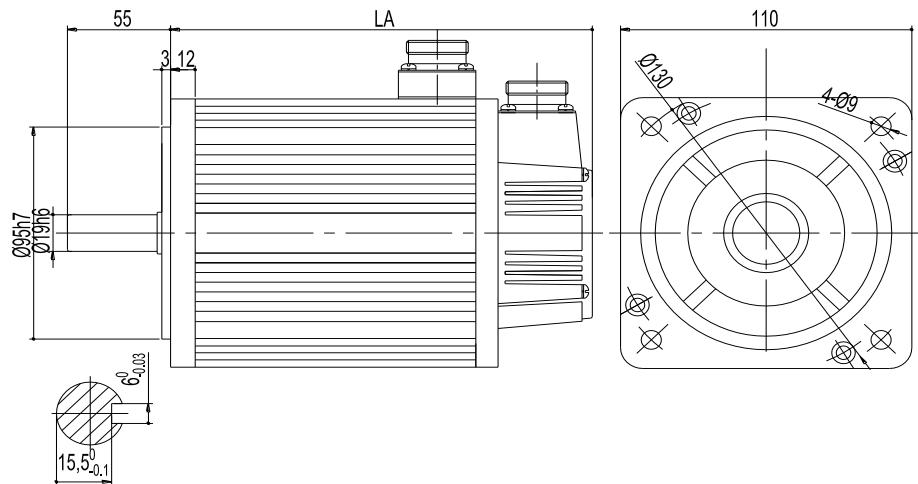
Unit: mm



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

■ 110 series servo motor dimension

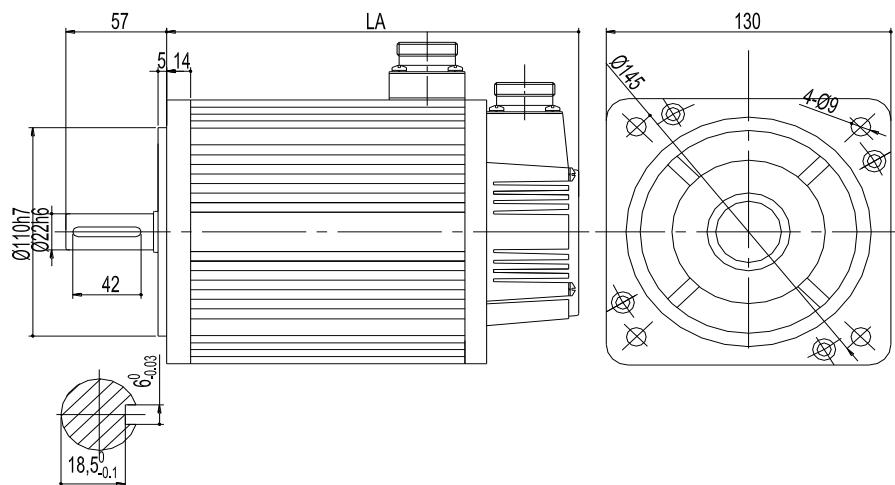
Unit: mm



Model	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 servo motor dimension

Unit: mm

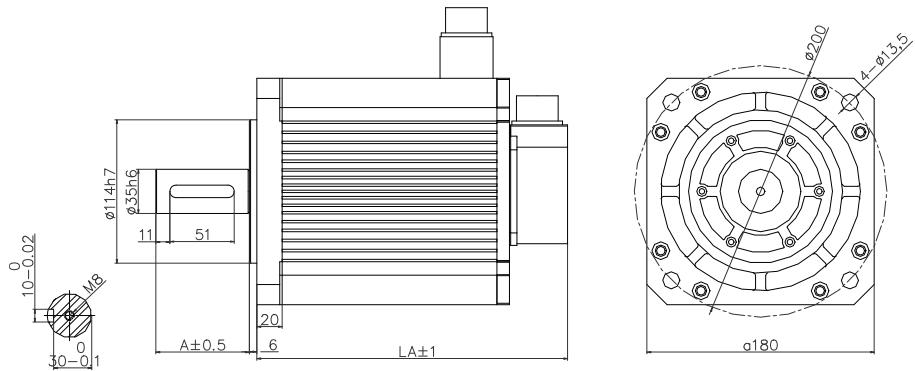


Model	Motor code	LA	
		Normal	With brake
MS-130ST-M04030□□-21P2	1031	165	\
MS-130ST-M10010□□-21P0	1040	194	265
MS-130ST-M06025□□-21P5	1042	165	239
	0042	179	263
MS-130ST-M10015□□-21P5	1044	206	265
	0044	213	270
MS-130ST-M07725□□-22P0	0043	192	249
MS-130ST-M07725□□-42P0	1143	205	264
MS-130ST-M15015□□-22P3	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 servo motor dimension

Unit: mm

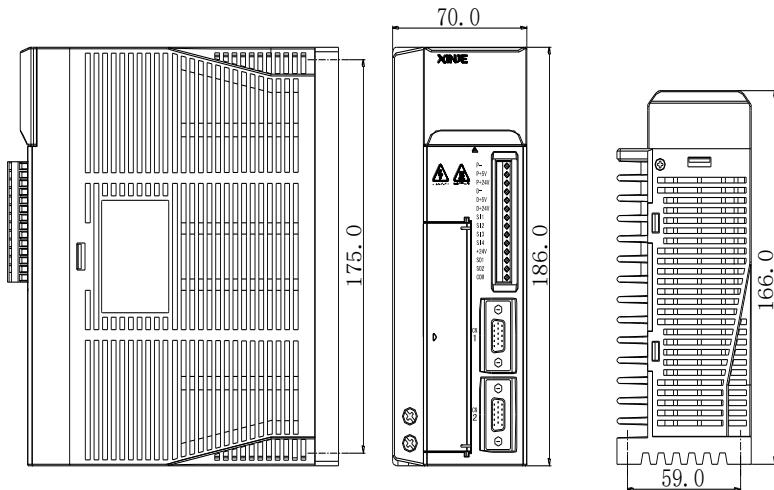


Model	Motor code	A	LA	
			Normal	With brake
MS-180ST-M19015□□-43P0	0156	59	232	289
	1052	74	221	303
MS-180ST-M21520□□-44P5	0150	59	243	300
MS-180ST-M27015□□-44P3	2151	74	247	329
	0151	59	262	319
MS-180ST-M35015□□-45P5	1152	74	277	359
	0152	59	292	349
MS-180ST-M48015□□-45P5	0153	59	346	403

### 3-2. Servo drive

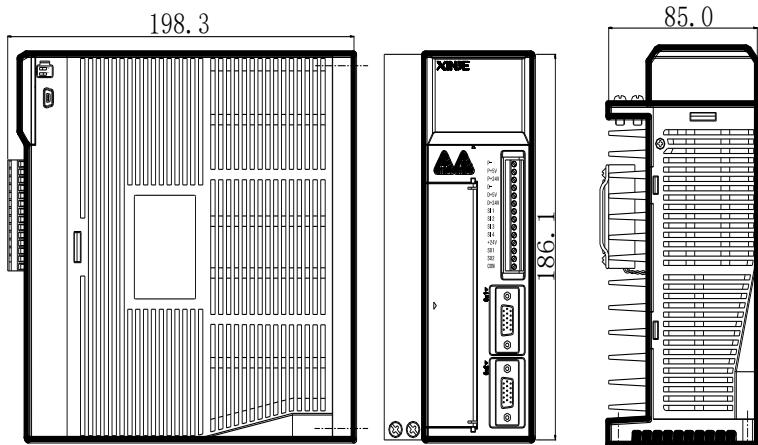
■ DS3-20P2/4/7-PQA, DS3E-20P2/4/7-PFA

Unit: mm



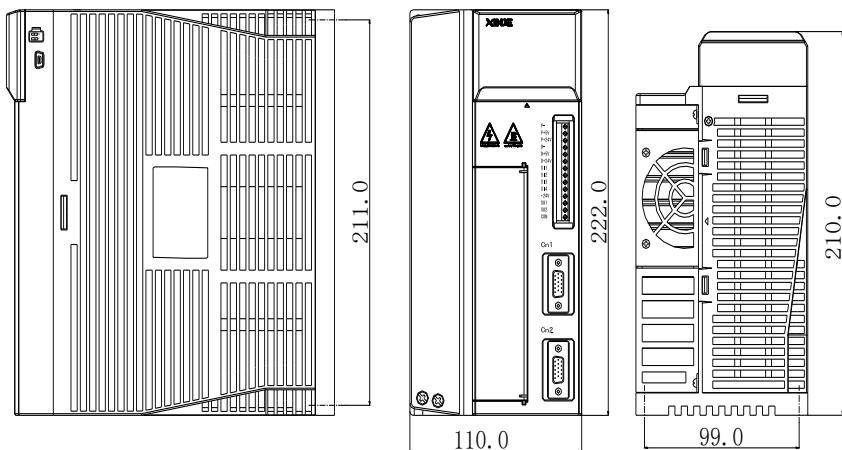
- DS3-21P5-PQA/ DS3-22P3-PQA/ DS3-41P5-PQA  
DS3E-21P5-PFA/ DS3E-22P3-PFA/ DS3E-41P5-PFA

Unit: mm



- DS3-43P0-PQA, DS3E-43P0-PFA

Unit: mm



## 4. Wiring

### 4-1. Main circuit terminals

■ DS3-20P2/4/7-PQA			
	Terminal	Function	Explanation
L1	L1/L2/L3	Power supply input of main circuit	Single or 3 phase AC 200~240V, 50/60Hz
L2	*	Vacant terminal	-
L3	U、V、W	Motor terminals	Connect the motor  (Note: the ground line is on the cooling fin, please check it before power on!)
U	P+、D、C	Internal regenerative resistor	Short P+ and D, disconnect P+ and C, set P0-24=0
V		External regenerative resistor	Connect regenerative resistor between P+ and C, disconnect P+ and D, set P0-24=1, P0-25= power value, P0-26= resistor value
W	P+/P-	Bus terminal	Real-time check the bus voltage, please take attention of this terminal
P+			
D			
C			
P-			

■ DS3E-20P2/4/7-PFA

Terminal	Function	Explanation
L/N	Power supply input of main circuit	Single AC 200~240V, 50/60Hz
•	Vacant terminal	-
U, V, W	Motor terminals	Connect the motor  (Note: the ground line is on the cooling fin, please check it before power on!)
P+, D, C	Internal regenerative resistor	Short P+ and D, disconnect P+ and C, set P0-24=0
	External regenerative resistor	Connect regenerative resistor between P+ and C, disconnect P+ and D, set P0-24=1, P0-25= power value, P0-26= resistor value
P+/P-	Bus terminal	Real-time check the bus voltage, please take attention of this terminal



■ DS3-21P5-PQA/ DS3-22P3-PQA/ DS3-41P5-PQA  
DS3E-21P5-PFA/ DS3E-22P3-PFA/ DS3E-41P5-PFA

Terminal	Function	Explanation
R/S/T	Power supply input of main circuit	DS3-21P5/22P3-PQA, DS3E-21P5/22P3-PFA: 3-phase AC200~240V, 50/60Hz  DS3-41P5-PQA, DS3E-41P5-PFA: 3-phase AC360~400V, 50/60Hz
•	Vacant	-
U、V、W	Motor terminals	Connect the motor
P+、D、C	Internal regenerative resistor	Short P+ and D, disconnect P+ and C, set P0-24=0
	External regenerative resistor	Connect regenerative resistor between P+ and C, disconnect P+ and D, set P0-24=1, P0-25=power value, P0-26=resistor value
( $\ominus$ )	Ground	Connect to ground terminal of motor, then connect to the ground

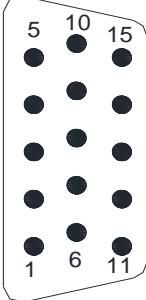
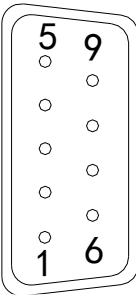
■ DS3-43P0-PQA, DS3E-43P0-PFA			
	Terminal	Function	Explanation
R	R/S/T	Power supply input of main circuit	3-phase AC360~400V, 50/60Hz
S	.	Vacant	-
T	U、V、W	Motor terminals	Connect the motor  (Note: the ground line is on the cooling fin, please check it before power on!)
U	P+、D、C	Internal regenerative resistor	Short P+ and D, disconnect P+ and C, set P0-24=0
V		External regenerative resistor	Connect regenerative resistor between P+ and C, disconnect P+ and D, set P0-24=1, P0-25= power value, P0-26= resistor value
W	P+/P-	Bus terminal	Real-time check the bus voltage, please take attention of this terminal
P+			
D			
C			
P-			

### ■ Wiring terminals of servo motor

Signal	40, 60, 80, 90 Series	110, 130, 180 Series
PE	4-yellow green (yellow green)	1-yellow green
U	1-brown (red)	2-brown
V	3-black (blue)	3-black
W	2-blue (yellow)	4-blue

## 4-2. I/O (CN0, CN1) terminals

The serial numbers of the following connectors are in the order of viewing the welding side.

CN0		CN1	
DS3/DS3E		DS3	DS3E
P- P+5V P+24V D- D+5V D+24V SI1 SI2 SI3 SI4 +24V SO1 SO2 COM			

### ■ CN0 terminals

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

■ CN1 terminals

(1) DS3 series 750W and below servo drive (hardware version v3.1.20)

No.	Name	Explanation	No.	Name	Explanation
1	GND	GND-485	9	Z-	Encoder output Z-
2	A1	RS485+	10	B+	Encoder output B+
3	B1	RS485-	11	T-REF	Torque analog input
4	VCC	VCC-RS485	12	V-REF	Speed analog input
5	B-	Encoder output B-	13	GND	GND for analog input
6	A+	Encoder output A+	14	A2	RS485+
7	A-	Encoder output A-	15	B2	RS485-
8	Z+	Encoder output Z+			

(2) DS3 series 750W and up servo drive (hardware version is V1.0)

(except 5.5KW and 7.5KW)

No.	Name	Explanation	No.	Name	Explanation
1	NC	Reserved	9	Z-	Encoder output Z-
2	NC	Reserved	10	B+	Encoder output B+
3	SI5	Input 5	11	T-REF	Torque analog input
4	SO3	Output 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+
7	A-	Encoder output A-	15	B	RS485-
8	Z+	Encoder output Z+			

(3) DS3 series 5.5KW and 7.5KW servo drive

No.	Name	Explanation	No.	Name	Explanation
1	GND	GND-485	2	A1	RS485+
3	B1	RS485-	4	A2	RS485+
5	B2	RS485-	6	GND	GND-485
7	NC	Reserved	8	NC	Reserved
9	NC	Reserved			

(4) DS3E series servo drive

No.	Name	Explanation	No.	Name	Explanation
1	GND	GND-485	2	A1	RS485+
3	B1	RS485-	4	A2	RS485+
5	B2	RS485-	6	GND	GND-485
7	NC	Reserved	8	NC	Reserved
9	NC	Reserved			

(5) DS3L series servo drive (DS3L not support frequency division function)

No.	Name	Explanation	No.	Name	Explanation
1	NC	Reserved	2	NC	Reserved
3	NC	Reserved	4	NC	Reserved
5	B-	Encoder output B-	6	A+	Encoder output A+
7	A-	Encoder output A-	8	Z+	Encoder output Z+
9	Z-	Encoder output Z-	10	B+	Encoder output B+
11	NC	Reserved	12	NC	Reserved
13	NC	Reserved	14	NC	Reserved
15	NC	Reserved	-	-	-

---

**Note:**

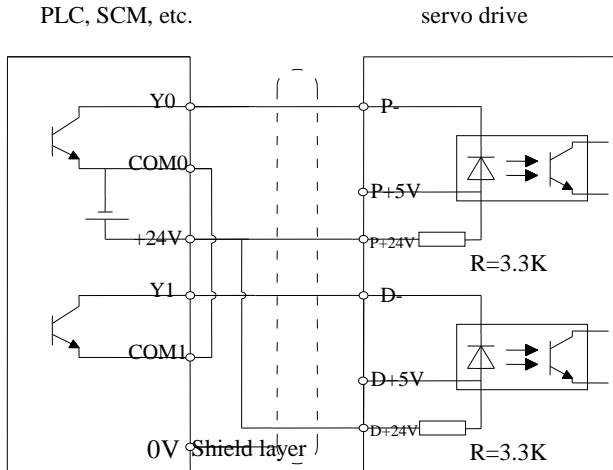
The servo motor bus function needs to be equipped with the bus module, which is inserted into the driver CN1 port for the purpose of extending the bus function. Please note that the transfer module should not be hot-pluggable. It is recommended to use the profibus standard cable to achieve the best communication reliability.

**■ Pulse wiring diagram**

Command	Choice	Meaning	P-input signal	D-input signal
P0-10 xxx□	0	CW, CCW double pulse mode	CW	CCW
	1	AB phase mode	A phase	B phase
	2	Pulse + direction mode	Pulse	Direction
Collector open circuit (24V) input positive signal: P+24V/D+24V Differential mode (5V) input positive signal: P+5V/D+5V Note: DS3E, DS3L series servo cannot support CW, CCW double pulse mode.				

The interface circuit of Pulse + direction, CW, CCW, AB phase mode:

Open collector (24V)



When upper device is open collector output, please use this wiring diagram.

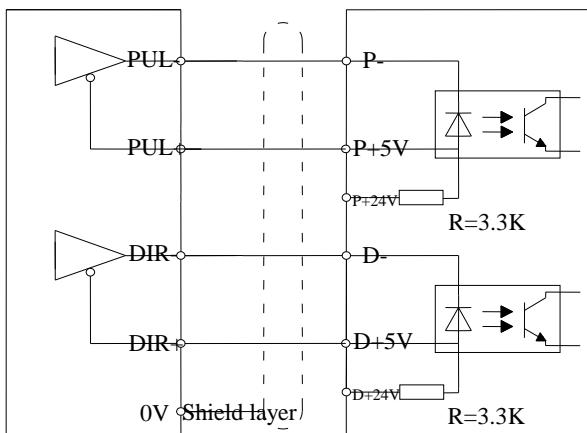
Please note: P+5V and D+5V must be vacant.

Differential mode (5V)

---

PLC, SCM, etc.

servo drive



When upper device is 5V differential output, please use this wiring diagram.

Please note: P+24V and D+24V must be vacant.

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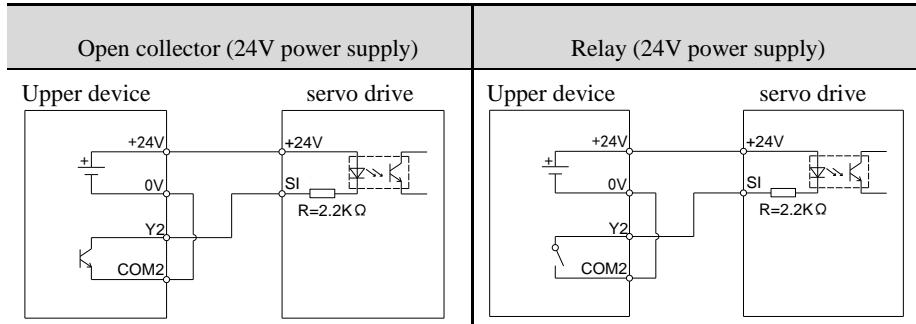
### ■ SI input signal

Please use relay or open collector transistor to connect. When using relay, please choose micro-current relay. Otherwise, the contact will be not good.

Type	Input terminal	Function
Digital input	SI1~SI5	Multi-functional input

Default setting of SI input terminal

Terminal	SI1	SI2	SI3	SI4	SI5
Function	/S-ON	/ALM-RST	/P-OT	/N-OT	Not distribute



Note: the max allowable voltage and current of open collector output circuit:

Voltage: max DC30V

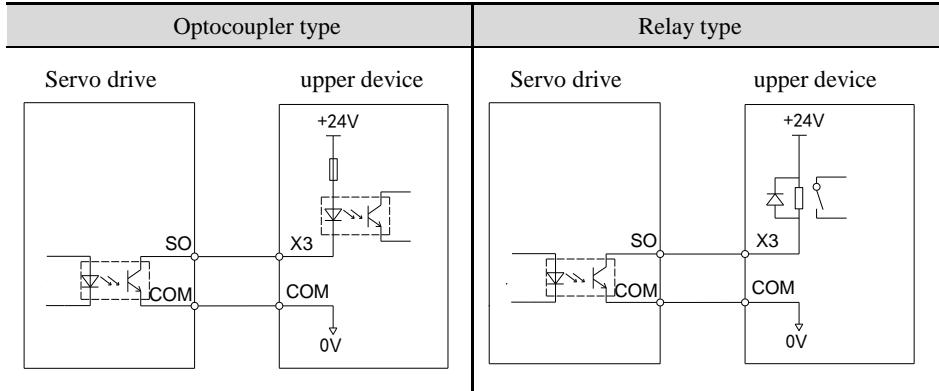
Current: max DC50mA

### ■ SO output signal

Type	Output terminal	Function
Optocoupler output	SO1~SO3	Multiple functions output terminal

Default setting of output terminal

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

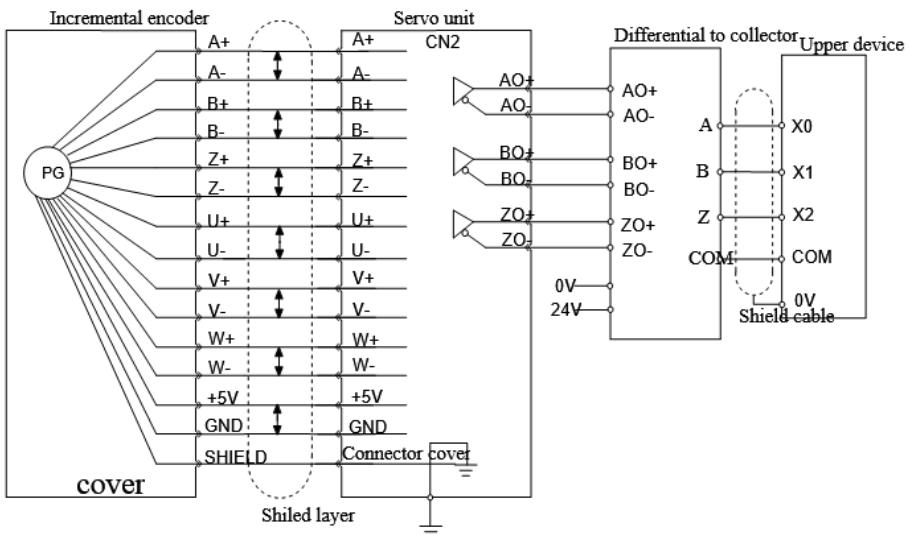


Note: max load current 400mA (if control the brake motor by SO signal, please confirm the brake current, if it is larger than 400mA, please use intermediate relay). 750w and above power motor is recommended to use intermediate relay.

### ■ Analog input circuit

DS3-2□P□-PQA DS3-4□P□-PQA	
	<p>Analog signal is speed command or torque command. Input impedance:</p> <ul style="list-style-type: none"> <li>• speed command input: about 13KΩ</li> <li>• torque command input: about 13KΩ</li> <li>• max allowable voltage of input signal is <math>\pm 10V</math></li> </ul> <p>Note: DS3E/DS3L series servo cannot support analog input.</p>

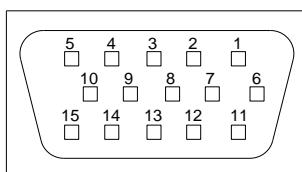
## ■ Encoder feedback signal



Note: DS3E series servo cannot support encoder feedback.

### 4-3. Encoder interface (CN2)

CN2 connector terminal arrangement (facing the weld)



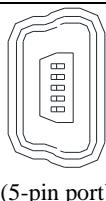
Drive interface	Motor encoder interface		Name	Drive interface	Motor encoder interface		Name
	40, 60, 80, 90	110, 130, 180 series			40, 60, 80, 90	110, 130, 180 series	

	series				series		
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	Connect shielded	12	3	3	GND
13	2	2	5V	14	10	11	V+
15	12	14	V-				

#### 4-4. Communication port

- RS-232 communication

Connect to PC for debugging.



Pin no.	Name	Explanation
1	TXD	RS232 send
2	RXD	RS232 receive
3	GND	RS232 ground

Note: please use the cable supplied by XINJE Company

Communication parameters:

RS232 default communication parameters: baud rate 19200bps, data bit 8, stop bit 1, even parity.

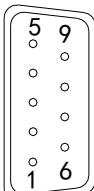
Modbus station no. setting:

Parameter	Function	Default setting	Range	Modify
P7-10	Modbus station no.	1	1~255	Servo OFF

Please set the following parameters through P7-11:

Parameter no.	Function	Default value	Range	Effective time
n.xx□□	Baud rate	06	00~10 00: 300 01: 600 02: 1200 03: 2400 04: 4800 05: 9600 06: 19200 07: 38400 08: 57600 09: 115200 0A: 192000 0B: 256000 0C: 288000 0D: 384000 0E: 512000 0F: 576000 10: 768000	At once
n.x□xx	Stop bit	2	0: 2 bits, 2: 1 bit	At once
n.□xxx	Parity bit	2	0~2 0:no parity, 1: odd parity, 2: even parity	At once
Note: data bit cannot be changed, it is 8 bits.				

- RS-485 port

<p>DS3 series</p>  <p>CN1: terminals at drive side</p>	<table border="1"> <thead> <tr> <th>Pin no.</th><th>Name</th></tr> </thead> <tbody> <tr> <td>CN1-14</td><td>A</td></tr> <tr> <td>CN1-15</td><td>B</td></tr> </tbody> </table>	Pin no.	Name	CN1-14	A	CN1-15	B
Pin no.	Name						
CN1-14	A						
CN1-15	B						
<p>DS3E series</p>  <p>CN1: terminals at drive side</p>	<table border="1"> <thead> <tr> <th>Pin no.</th> <th>Name</th> </tr> </thead> <tbody> <tr> <td>CN1-2</td> <td>A</td> </tr> <tr> <td>CN1-3</td> <td>B</td> </tr> </tbody> </table> <p>Note: the servo motor bus function needs to be equipped with the bus module, which is inserted into the driver CN1 port for the purpose of extending the bus function. Please note that the transfer module should not be hot-pluggable. It is recommended to use the profibus standard cable to achieve the best communication reliability.</p>	Pin no.	Name	CN1-2	A	CN1-3	B
Pin no.	Name						
CN1-2	A						
CN1-3	B						

Communication parameters:

**RS485 default communication parameters:** baud rate 19200bps, data bit 8, stop bit 1, even parity, Modbus station no.1.

The value can be set in P7-00/P7-01.

RS485 communication port Modbus station no. can be set freely

Parameter	Function	Default value	Range	Effective time
P7-00	Modbus station no.	1	0~255	Servo OFF

---

The communication parameters can be set through P7-01:

Parameter	Function	Default value	Range	Effective time
n.xx□□	Baud rate	06	00~10 00: 300 01: 600 02: 1200 03: 2400 04: 4800 05: 9600 06: 19200 07: 38400 08: 57600 09: 115200 0A: 192000 0B: 256000 0C: 288000 0D: 384000 0E: 512000 0F: 576000 10: 768000 11: 1M 12: 2M 13: 3M 14: 4M 15: 5M 16: 6M	Servo OFF
n.x□xx	Stop bit	2	0: 2 bits, 2: 1 bit	Servo OFF

n.□XXX	Parity bit	2	0~2 0: no parity, 1: odd parity, 2: even parity	Servo OFF
Note: data bit cannot be changed, it is 8 bits.				

#### P7-02 RS485 communication protocol setting:

Parameter	Function	Default setting	Range	Effective
P7-02	RS485 communication protocol	1	1: Modbus Rtu protocol 2: Xnet filedbus protocol	Servo OFF

Note:

1. Support standard Modbus RTU protocol, it is used as Modbus slave device.
2. RS232 port and RS485 port can be used at the same time.

#### 4-5. Regenerative resistor

When the servo motor operates in generator mode, power is returned to the servo drive side. This is called regenerative power. The regenerative power is absorbed by charging the smoothing capacitor, but when the capacitor's charging limit is exceeded, the regenerative power needs to be reduced by the regenerative resistor.

The servomotor is driven in regeneration (generator) mode in the following conditions:

- From decelerating to stop for acceleration/deceleration operation.
- Move down on the vertical axis.
- The external load drives the motor running

Servo drive	Regenerative resistor connection terminals
DS3-2□P□-PQA DS3E-2□P□-PFA DS3-4□P□-PQA DS3E-4□P□-PFA	for internal regenerative resistor: short P+ and D, disconnect P+ and C, P0-24=0.  for external regenerative resistor: connect resistor between P+ and C, disconnect P+ and D, P0-24=1, P0-25=power value, P0-26=resistor value.

Parameter	Signal name	Setting	Meaning	Effective	Modify
P0-24	Choose regenerative resistor	0	Use internal regenerative resistor	At once	Servo OFF
		1	Use external regenerative resistor (resistor type please refer to the following table)		

Parameter	Signal name	Setting	Unit	Effective
P0-25	Discharge resistor power	1. self-cooling mode (natural convection cooling): below 20% of regenerative resistor capacity (W)  2. forced air cooling: below 50% of regenerative resistor capacity (W)	W	At once
P0-26	Discharge resistor value	Resistor value	Ω	At once

The following table shows the recommended specifications of the external regenerative resistance for each type of motor.

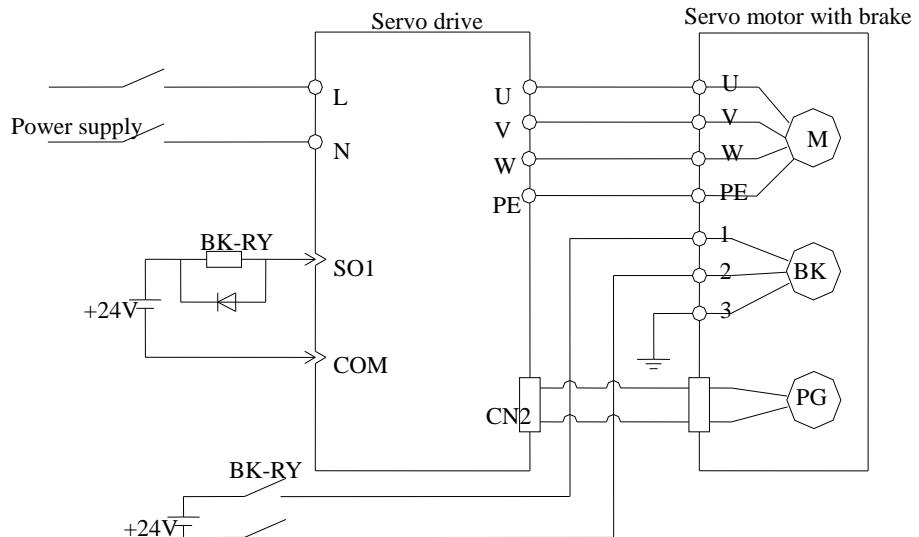
Servo drive	Min resistor (cannot smaller than this value)	External regenerative resistor (recommend value)	External regenerative resistor (recommend power)
DS3-20P2-PQA DS3E-20P2-PFA	$\geq 50\Omega$	$50\Omega$ — $100\Omega$	$\geq 200W$
DS3-20P4-PQA DS3E-20P4-PFA	$\geq 40\Omega$	$40\Omega$ — $100\Omega$	$\geq 500W$
DS3-20P7-PQA DS3E-20P7-PFA	$\geq 40\Omega$	$40\Omega$ — $100\Omega$	$\geq 500W$
DS3-21P5-PQA DS3E-21P5-PFA	$\geq 25\Omega$	$25\Omega$ — $50\Omega$	$\geq 1000W$
DS3-22P3-PQA DS3E-22P3-PFA	$\geq 25\Omega$	$25\Omega$ — $50\Omega$	$\geq 1000W$
DS3-41P5-PQA DS3E-41P5-PFA	$\geq 55\Omega$	$55\Omega$ — $100\Omega$	$\geq 1000W$
DS3-43P0-PQA DS3E-43P0-PFA	$\geq 55\Omega$	$55\Omega$ — $75\Omega$	$\geq 1000W$
DS3-45P5-PQA DS3L-45P5-PQA	$\geq 25\Omega$	$25\Omega$ — $65\Omega$	$\geq 2000W$
DS3-47P5-PQA DS3L-47P5-PQA	$\geq 25\Omega$	$25\Omega$ — $50\Omega$	$\geq 2000W$
DS3-411P0-PQA DS3-415P0-PQA	$\geq 18\Omega$	$18\Omega$ — $45\Omega$	$\geq 3000W$

1. The temperature will be very high when the regenerative resistor is discharging, please use heat-resistant non-flammable wire. Don't touch the regenerative resistor when wiring.
2. When you choose the regenerative resistor, please make the resistor value close to the min value of recommend value. The resistor power is decided by the actual condition specially the heat.

## 4-6. Power-off brake(BK)

### 1. Wiring example

The ON/OFF circuit of brake includes sequence output signal /BK and brake power. The following diagram shows a standard wiring example.



Note: (1) the working voltage of brake is DC 24V.

(2) In the above diagram, BK signal output from SO1, please set P5-44 to n.0011. if it outputs from SO2, please set P5-44 to n.0002.

### 2. Brake signal

Parameter	Name	Type	Default setting	Meaning	Modify
P5-44	/BK	Output	n.0000	Not distribute output	Range 0000-0002, distribute to output terminal through P5-44. When P5-44=0001, it means output

				terminal	from SO1.
--	--	--	--	----------	-----------

### 3. The switch time between BK signal and SON signal

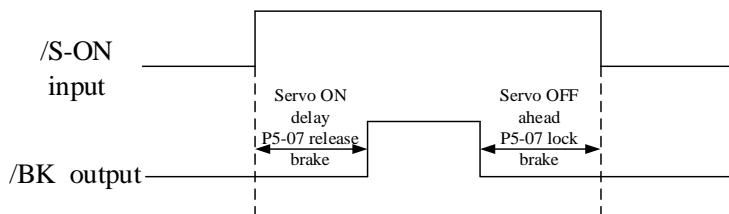
If the machine moves slightly due to gravity because of the brake has action delay time.

Please adjust the time as below parameter.

P5-07	Servo OFF delay time (brake command)					
	Unit	Default	Range	Suitable mode	Modify	Effective
	1ms	0	0~65535	All the modes	Servo OFF	Immediately

P5-07 Meaning: delay the time P5-07 to release the brake when the enable is ON.

When the enable is OFF and the signal is true, lock the brake and delay the time P5-07 then close the enable.



### 4. Brake ON parameters

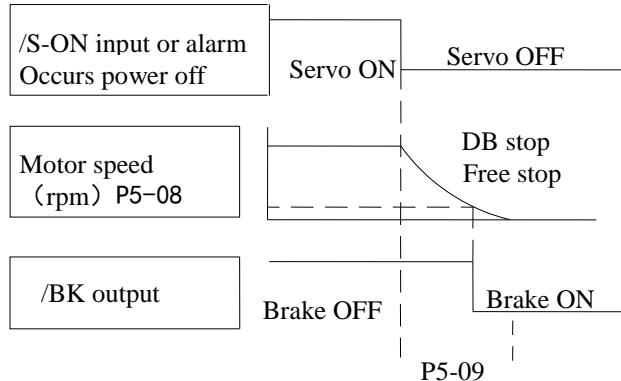
The motor will power OFF when alarm occurs. The machine will move as gravity until the brake action.

Set below parameters in order to use brake when motor speed decreases to setting value or waiting time ends.

P5-08	Brake command output speed					
	Unit	Default	Range	Suitable mode	Modify	Effective
	rpm	30	0~1000 0	All the modes	Any	Immediately

P5-09	Brake command waiting time					
	Unit	Default	Range	Suitable mode	Modify	Effective
	1ms	500	0~1000	All the modes	Servo OFF	Immediately

Set the brake time when servo OFF caused by /S-ON signal or alarm.



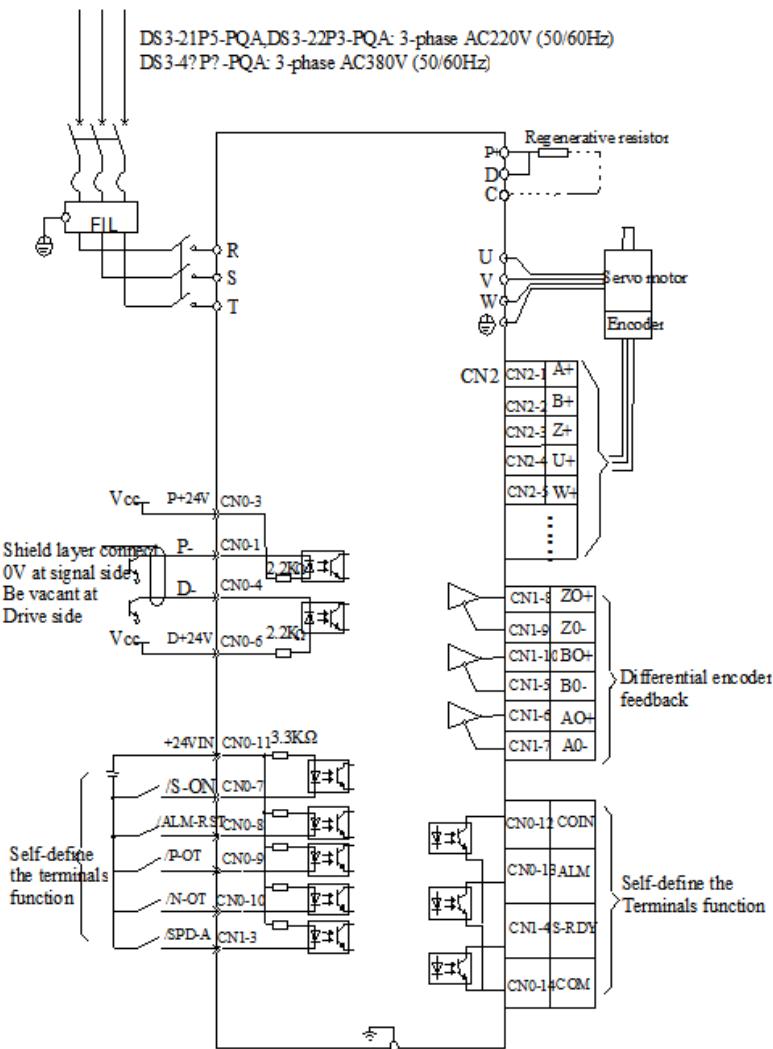
The brake is used to protect the position. The brake must be effective at suitable time when servo motor stop. Users can adjust the parameters according to the machine action.

The /BK signal from ON to OFF under either of the following conditions:

1. Motor speed drops below the value of P5-08 after servo OFF.
2. over the time of P5-09 after servo OFF.

## 4-7. Wiring example

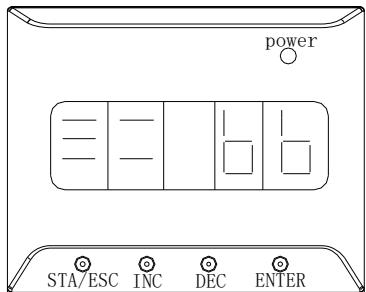
- Take DS3-21P5-PQA as an example



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## 5. Use the operate panel

### 5-1. Button operation



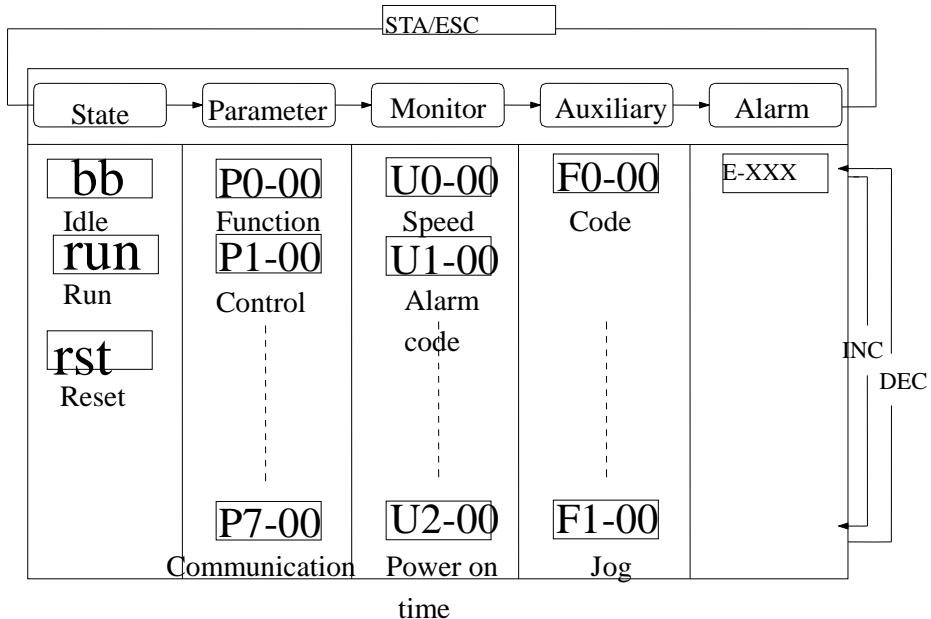
Key Name	Function
STATUS/ESC	Press: Status switch, status return
INC	Press: Increase the value; Press and hold: Increase the value continuously
DEC	Press: Decrease the value; Press and hold: Decrease the value continuously
ENTER	Press: Shift the editing digit; Press and hold: Enter a status, Enter

The operate panel can display the status, set parameter and run the command by switching the basic mode.

The running status, auxiliary function, parameter setting, and monitoring are the basic modes.

The modes switch as the below diagram by pressing STATUS/ESC.

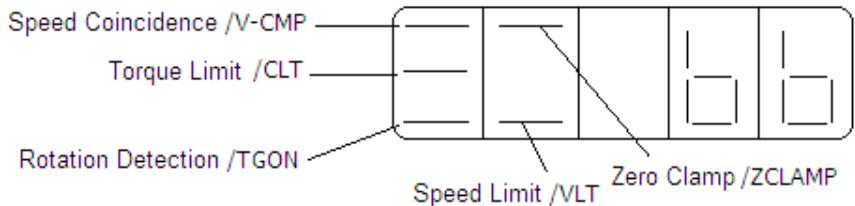
Status: bb indicates that the servo system is idle; Run indicates that the servo system is running, and RST indicates that the servo needs to be powered on again.



- Monitor Function UX—XX: The first X means group No., the last two X means the member No. in the group.
- Auxiliary Function FX—XX: The first X means group No., the last two X means the member No. in the group.
- Parameter Setting PX—XX: The first X means group No., the last two X means the member No. in the group.
- Alarm E—XXX: XXX means the alarm code.

## 5-2. Display status

### ➤ Speed and Torque Control Mode



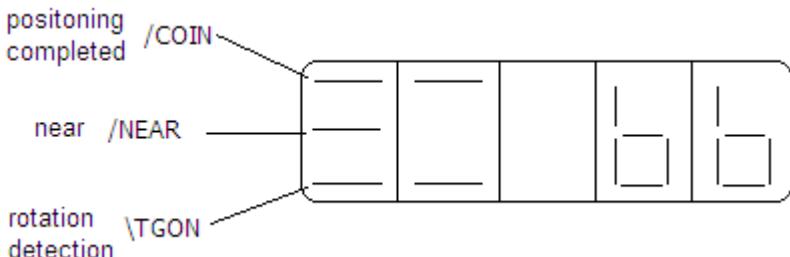
#### A. Bit display contents

Bit Data	Description
P5-39 Speed Coincidence (/V-CMP)	Light when the motor actual speed and command speed is the same. Speed coincidence signal checking width: P5-04 (unit: rpm)
P5-42 Torque Limit (/CLT)	Light when actual torque exceeds preset value. Forward Torque Limit: P3-28 Reverse Torque Limit: P3-29
P5-40 Rotation Detection (/TGON)	Light when the motor speed exceeds the rotation detection speed. Rotation Detection Speed Level: P5-03(Unit: rpm)
P5-31 Zero Clamp (/ZCLAMP)	Light when zero clamp signal is ON.
P5-43 Speed Limit (/VLT)	Light when actual speed exceeds preset value. Forward speed limit during Torque Control: P3-16, reverse speed limit: P3-17

## B. The code contents

Code	Description
	Standby Servo OFF (motor power OFF)
	Run Servo ON (motor power ON)
	Reset Servo re-power
	Forward Run Prohibited P-OT ON. Please refer to 5-2-4 "Overtravel Limit"
	Reverse Run Prohibited N-OT ON. Please refer to 5-2-4 "Overtravel Limit"

## ■ Position control mode



## A. Bit display contents

Bit Data	Description
P5-38 Positioning Completed (/COIN)	Light when set position and actual position is the same. Positioning accomplishment width: P5-00 (unit: command pulse)

P5-36 Near (/NEAR)	Light when set position and actual position is the same. Near signal width: P5-06
P5-40 Rotation Detection (/TGON)	Light when the motor speed exceeds the rotation detection speed. Rotation detection speed: P5-03 (unit: rpm)

### B. The code contents

Code	Description
	Standby Servo OFF (motor power OFF)
	Run Servo ON (motor power ON)
	Reset Servo re-power
	Forward Run Prohibited P-OT ON. Please refer to 5-2-4 "Overtravel Limit"
	Reverse Run Prohibited N-OT ON. Please refer to 5-2-4 "Overtravel Limit"

### 5-3. U-XX monitor status

U0-XX:

Number	Monitor Display	Unit
U0-00	Actual speed of motor	Rpm
U0-01	Input speed command	Rpm
U0-02	Torque command	% of rated

U0-03	Rotate angle (mechanism angle)		0.1 °
U0-04	Rotate angle (electrical angle)		0.1 °
U0-05	Bus voltage		V
U0-06	IPM temperature		0.1°C
U0-07	Torque feedback		% of rated
U0-08	Pulse offset value	(0000~9999)*1	Command pulse
U0-09		(0000~65535)*10000	
U0-10	Encoder feedback value	(0000~9999)*1	encoder pulse
U0-11		(0000~65535)*10000	
U0-12	Pulse value of input command	(0000~9999)*1	Command pulse
U0-13		(0000~65535)*10000	
U0-14	Position feedback	(0000~9999)*1	Command pulse
U0-15		(0000~65535)*10000	
U0-16	Encoder position (Accumulated)	(0000~9999)*1	encoder pulse
U0-17		(0000~65535)*10000	
U0-18	Current, 2-bit decimal/torque current		0.1A
U0-19	Analog input V-REF		0.01V
U0-20	Analog input T-REF		0.01V
U0-21	Input signal status 1		
U0-22	Input signal status 2		
U0-23	Output signal status 1		
U0-24	Output signal status 2		
U0-25	Input pulse frequency	(0000~9999)*1	Hz
U0-26		(0000~9999)*10000	
U0-27	U-phase current sampling zero value related to current value		0.01A
U0-28	V-phase current sampling zero value related to current		0.01A

	value	
U0-29	W-phase current sampling zero value related to current value	0.01A
U0-30	VREF input analog zero value related to digital value	0~4095
U0-31	TREF input analog zero value related to digital value	0~4095
U0-32	Electric zero	(0000~9999)*1
U0-33		(0000~9999)*10000
U0-34	Output excitation voltage	% of bus voltage
U0-35	Output torque voltage	% of bus voltage
U0-36	Excitation current (change around 0)	0.01A
U0-37	VREF sampling value	0~4095
U0-38	TREF sampling value	0~4095
U0-39	Reserved	
U0-40	Reserved	
U0-41	Instantaneous output power	1W
U0-42	Average output power	1W
U0-43	Instantaneous thermal power	1W
U0-44	Average thermal power	1W
U0-45	Reserved	
U0-46	Reserved	
U0-47	Reserved	
U0-48	Reserved	
U0-49	Position feedforward	1 command unit
U0-50	Speed feedforward	rpm
U0-51	Torque feedforward	% of rated
U0-52	Instantaneous bus capacitor power	1W
U0-53	Average bus capacitor power	1W

U0-54	Reserved	
U0-55	Instantaneous regenerative braking discharge power	
U0-56	Average regenerative braking discharge power	
U0-57	Absolute encoder present	(0000~9999)*1
U0-58	position feedback	(0000~65535)*10000
		Encoder pulse

U1-XX:

Number	Contents	Unit
U1-00	Current alarm code	
U1-01	Current warning code	
U1-02	U phase current when alarming	0.01A
U1-03	V phase current when alarming	0.01A
U1-04	Bus voltage when alarming	V
U1-05	IGBT temperature when alarming	0.1°C
U1-06	Q axis current (torque current) when alarming	0.1A
U1-07	Excitation current when alarming	A
U1-08	Position offset when alarming	Command pulse
U1-09	Speed value when alarming	rpm
U1-10	The alarm occurred time second (low 16 bits), count from power on	s
U1-11	The alarm occurred time second (high 16 bits), count from power on	s
U1-12	Run error times, count from power on	
U1-13	Warning times, count from power on	
U1-14	History alarm times	
U1-15	History warning times	
U1-16	The second time alarm code recently	

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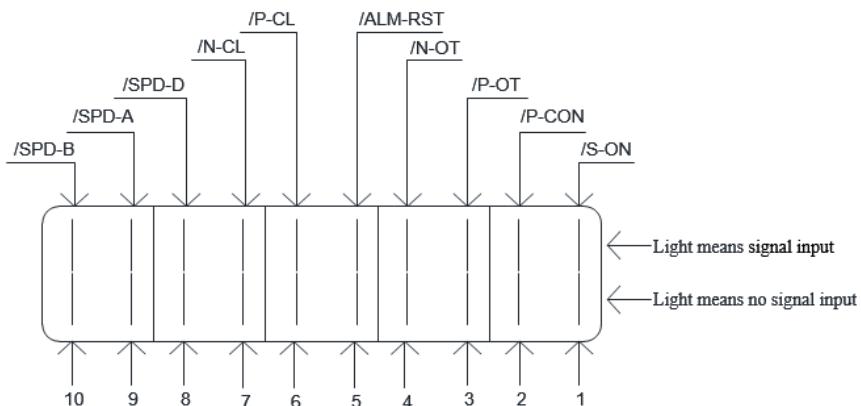
U1-17	The third time alarm code recently	
U1-18	The fourth time alarm code recently	
U1-19	The fifth time alarm code recently	
U1-20	The sixth time alarm code recently	
U1-21	The second time warning code recently	
U1-22	The third time warning code recently	
U1-23	The fourth time warning code recently	
U1-24	The fifth time warning code recently	
U1-25	The sixth time warning code recently	

**U2-XX:**

Number	Contents	Unit
U2-00	Power on times	
U2-01	Series (low 16 bits)	
U2-02	Series (high 16 bits)	
U2-03	Type	
U2-04	Out of factory date: year	
U2-05	Out of factory date: month	
U2-06	Out of factory date: day	
U2-07	Hardware version	
U2-08	Hardware version	
U2-09	Total run time (from the first time power on)	Hour
U2-10	Total run time (from the first time power on)	Minute
U2-11	Total run time (from the first time power on)	Second
U2-12	This time run time (from this time power on)	Hour
U2-13	This time run time (from this time power on)	Minute
U2-14	This time run time (from this time power on)	Second

U2-15	Average output power (count from the first time enable)		1W
U2-16	Average heating power (count from the first time enable)		1W
U2-17	Average bus capacitor filter power		1W
U2-18	Motor accumulative circles	(0000~9999)*1	circle
U2-19		(0000~9999)*10000	circle
U2-20	Device serial number: low 16 bits		
U2-21	Device serial number: high 16 bits		
U2-22	Firmware generation date: year		
U2-23	Firmware generation date: month/day		
U2-24	Firmware generation time: hour/minute		

■ U0-21 input signal status



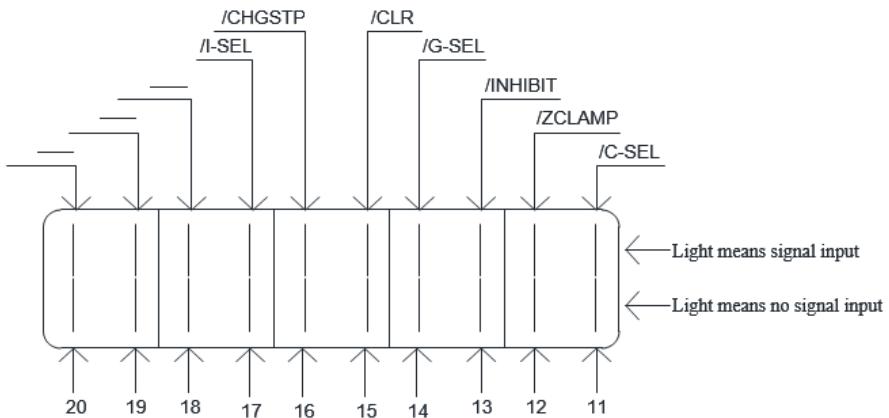
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#### U0-21 input signal 1 distribution

Segment code	Explanation	Segment code	Explanation
1	/S-ON servo enable signal	2	/P-CON proportion action command
3	/P-OT forward run prohibited	4	/N-OT reverse run prohibited
5	/ALM-RST alarm reset	6	/P-CL forward side external torque limit
7	/N-CL reverse side external torque limit	8	/SPD-D internal set speed selection
9	/SPD-A internal set speed selection	10	/SPD-B internal set speed selection

Note: read the status through communication, the binary value from right to left are related to /S-ON, /P-CON. 0 means no input, 1 means has input. For example: 0x0001 means /S-ON has input, 0x0201 means /S-ON and /SPD-B has input.

#### ■ U0-22 input signal status



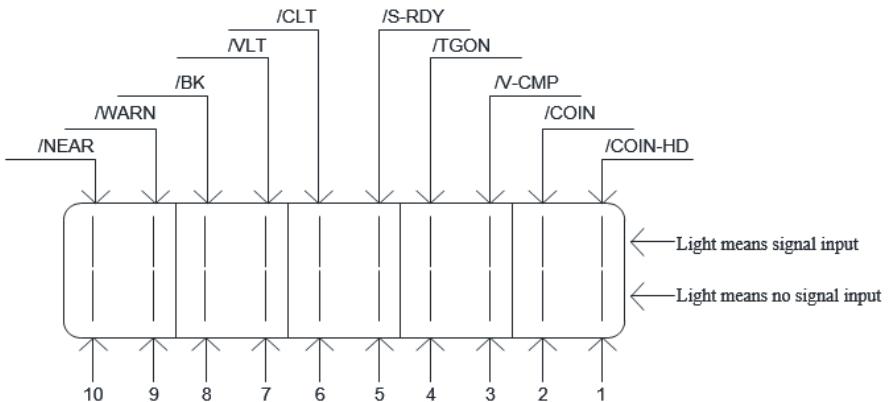
U0-22 input signal 2 distribution

Segment code	Explanation	Segment code	Explanation
11	/C-SEL control mode	12	/ZCLAMP zero clamp
13	/INHIBIT command pulse prohibited	14	/G-SEL gain switch
15	/CLR pulse clear	16	/CHGSTP change step
17	/I-SEL inertia switch	18	—
19	—	20	—

Note: read the status through communication, the binary value from right to left are related to /C-SEL, /ZCLAMP. 0 means no input, 1 means has input. For example: 0x0001 means /C-SEL has input, 0x0041 means /C-SEL and /I-SEL has input.

Note: “—“ is reserved bit, it is always 0.

■ U0-23 output signal status

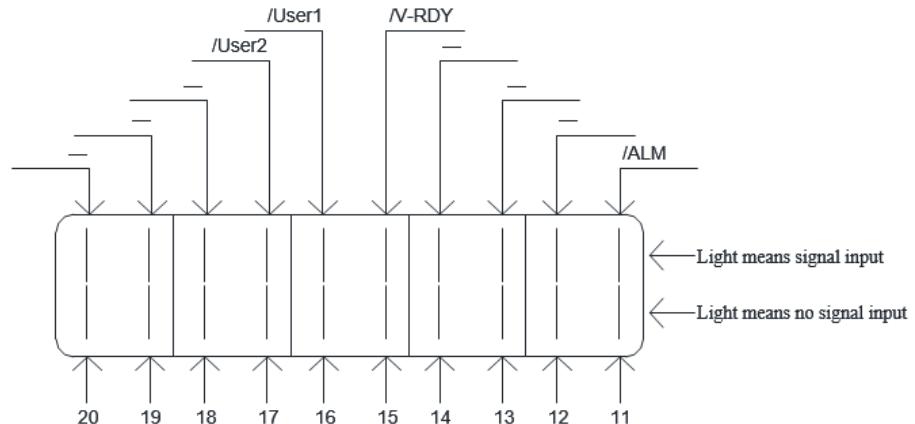


U0-23 output signal 1 distribution

Segment code	Explanation	Segment code	Explanation
1	Positioning complete maintain (/COIN HD)	2	Positioning end (/COIN)
3	Same speed detection (/V-CMP)	4	Rotate detection (/TGON)
5	Ready (/S-RDY)	6	Torque limit (/CLT)
7	Speed limit detection (/VLT)	8	Brake lock (/BK)
9	Warn (/WARN)	10	Output near (/NEAR)

Note: read the status through communication, the binary value from right to left are related to /COIN HD, /COIN. 0 means no output, 1 means has output. For example: 0x0001 means /COIN HD has output, 0x0201 means /COIN HD and /NEAR has output.

## ■ U0-24 output signal status



## ■ U0-24 output signal 2 distribution

Segment code	Explanation	Segment code	Explanation
11	Alarm (/ALM)	12	—
13	—	14	—
15	Speed reach (/V-RDY)	16	Self-defined output 1
17	Self-defined output 2	18	—
19	—	20	—

Note: read the status through communication, the binary value from right to left are related to /ALM, “—”. 0 means no output, 1 means has output. For example: 0x0001 means /ALM has output, 0x0041 means /ALM and self-defined output 2 has output.

Note: “—“ is reserved bit, it is always 0.

## 5-4.FX-XX auxiliary function

### ■ F0-XX

Function No.	Description
F0-00	Clean the alarm
F0-01	Back to out of factory settings
F0-02	Clean the offset

#### 1. Clean the alarm

Set F0-00=1 to reset the alarm. When the alarm occurred, please find out the alarm reasons then clean the alarm.

#### 2. Back to out of factory settings

Please power off the servo drive before the operation.

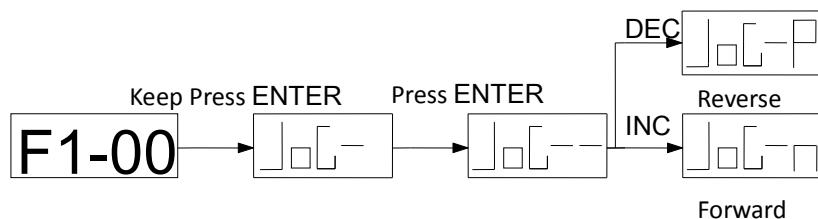
Set F0-01=1, then press ENTER. No need to re-power the servo drive.

#### 3. Clean the offset

Set F0-02=1 to clean the offset.

### ■ Jog (F1-00)

**Make sure that the motor shaft is not connected to the machine before jogging!**



When the servo is in jog run mode, gain and other parameters will join the process. Please adjust the parameters according to the jog run status.

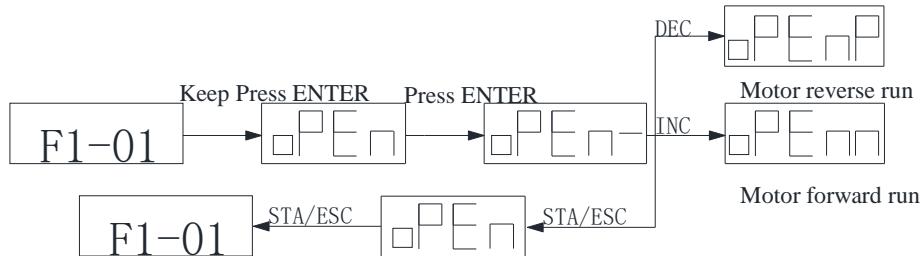
P3-18	JOG speed					
	Unit	Default	Setting range	Suitable mode	Change	Effective
	1Rpm	100	0~1000	JOG	Servo OFF	Immediately

■ Test run (F1-01)

**Make sure that the motor shaft is not connected to the machine before test run!**

When servo drive is connected with non-original encoder line or power line, test run must be run first to ensure that the encoder line or power line is connected correctly.

Test run can detect the connection of power line and encoder feedback. Please operate the servo as the following steps. If the motor shaft jitter or servo alarm, please cut off the power at once then check the wiring.



■ Current sampling zero (F1-02)

After the servo drive updated to latest software version, or the motor does not revolve smoothly for long time, the current offset auto-adjustment is recommended.

---

Keep press ENTER

Press ENTER



Press STATUS/ESC to exit.

- Vref zero (F1-03)

Keep press ENTER

Press ENTER



Press STATUS/ESC key to exit.

- Tref zero (F1-04)

Keep press ENTER

Press ENTER



Press STATUS/ESC key to exit.

---

## ■ Forced Servo enables (F1-05)

Parameter	Signal name	Set	Meaning	Modify	Effective
P0-03	Enable mode	0	Not enable	Servo OFF	At once
		1 (default)	I/O enable /S-ON		
		2	Software enable (F1-05 or communication)		
		3	Bus enable (the model support movement bus)		
P0-03=2 F1-05 = 0: cancel the enable, return to bb status. F1-05 = 1: forced enable, servo is in RUN status.					

## ■ Alarm operation (E-XX)

The alarm code will show when there is error in the drive. Set F0-00=1 to reset the alarm. If the servo is OFF caused by alarm, it is no need to reset the alarm.

Note: please find out the alarm reason before reset the alarm.

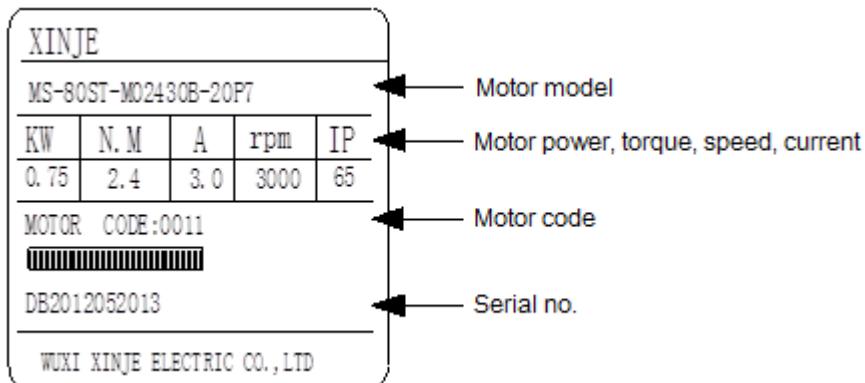
## 5-5. Change motor code

Note:

- (1) One servo drive can match several servo motors with same power level. Before using the servo system, please make sure the motor code on the servo motor label is the same to P0-33.
- (2) If the motor code setting is error, it will show E-310, please clear the alarm through F0-00, then set the correct code.



Motor label



## 5-6. Parameter setting example

The example below shows how to change parameter P3-09 from 2000 to 3000.

1. Press the STATUS/ESC key to select the parameter setting mode.



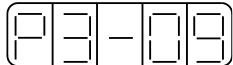
2. At this time the second LED is blinking, and press INC or DEC key to set the group No. to 3.

3. Press ENTER key to confirm.

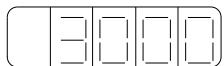


3. At this time the last LED is blinking, and press INC or DEC key to set the member No. to 9.

Press and hold ENTER key to confirm.



4. At this time the panel displays the value in P3-09, and the last decimal “0” is blinking. Press ENTER to left shift the blinking decimal. Press INC, DEC or ENTER key to modify the value to 3000, and press and hold ENTER to confirm.



The parameter in P3-09 is changed from 2000 to 3000.

Repeat steps 2 to 4 to change the parameter again.

5. Press STATUS/ESC key to return.

when the parameters are over the setting range, the drive will show E-021 alarm.

## 6. Parameter list

○ means the parameter can be modified when the servo is OFF, and effective when servo is ON.

● means the parameter can be modified any time, and effective when re-power on the servo.

✓ means the parameter can be modified any time, and effective immediately.

Adding “n.” before the parameter means the value is hex.

Parameter: PX-XX= n.xxxx  
PX-XX.H  $\leftarrow$   $\rightarrow$  PX-XX.L

P0: function selection

P0-	Function	Unit	Default	Range	Effective	Suitable mode
01	Submode 1 1: torque (command) (for DS3-PQA)	-	6	1~10	○	All the modes

	<p>3: speed (command)</p> <p>4: speed (analog) (for DS3-PQA)</p> <p>5: position (internal) (for DS3E/DS3L)</p> <p>Note: hardware versoin v3.2.1 and above support this mode</p> <p>6: position (pulse)</p> <p>7: speed (pulse)</p> <p>10: fieldbus position mode (for DS3E)</p>					
02	<p>Submode 2</p> <p>1: torque (command)</p> <p>2: torque (analog) (for DS3-PQA)</p> <p>3: speed (command)</p> <p>4: speed (analog) (for DS3-PQA)</p> <p>5: position (internal) (for DS3E/DS3L)</p> <p>Note: hardware versoin v3.2.1 and above support this mode</p> <p>6: position (pulse)</p> <p>7: speed (pulse)</p> <p>10: fieldbus position mode (for DS3E)</p>	-	0	1~10	○	All the modes

03	Enable mode: 0: not enable 1: IO/SON input signal 2: software enable(panel/Modbus) panel F1-05 write in 1; Modbus write 1 to register 0x2105. Write 0 cancel enable. 3: bus enable (support motion bus model)	-	1	0~3	o	All the modes
05	Rotation direction selection	-	0	0, 1	o	All the modes
09	Input pulse command positive direction	-	0	0~1	o	6, 7
10 xxx □	0: CW/CCW 1: AB 2: P+D	-	2	0~2	o	6, 7
10 xx□ x	0: falling edge is effective 1: rising edge is effective	-	0	0~1	o	6, 7
11	Pulses per circle low bit×1	-	0	0~9999	√	6
12	Pulses per circle high bit×10000	-	1	0~9999	√	6
13	Numerator of Electronic gear ratio	-	1	1~65535	√	6
14	Denomination of	-	1	1~	√	6

	electronic gear ratio			65535		
15	Pulse frequency corresponding to speed mode rated speed	*100 Hz	1000	0~10000	○	7
16	Speed command pulse filter time	0.01 ms	100	0~10000	○	7
18	Encoder feedback pulse per circle ×1	1	2500	0~9999	○	All the modes
19	Encoder feedback pulse per circle ×10000	1000 0	0	0~9999	○	All the modes
20	Encoder pulse frequency division (numerator)	-	1	0~65535	○	All the modes
21	Encoder pulse frequency division (denomination)	-	1	0~65535	○	All the modes
23	Pulse offset limit	*256 com mand unit	50000	0~65535	√	6
24	Discharge resistor type 0: internal 1: external	-	0	0~1	○	All the modes
25	Discharge resistor power	W	-	0~65535	√	All the modes
26	Discharge resistor value	Ω	-	0~500	√	All the modes
27	Servo OFF stop mode 0: inertia running stop, keep the inertia running	-	0	0, 2	○	All the modes

	state after stop 2: deceleration running stop, keep inertia running state after stop					
28	Servo over range stop mode  0: deceleration stop, over range direction torque is 0 after stop, receive command  1: inertia stop, over range direction torque is 0 after stop, receive command  2: deceleration stop, over range direction not receive command after stop  3: alarm (E-260)	-	2	0~3	○	All the modes
29	Servo alarm stop mode  0: inertia stop, keep inertia running state after stop  2: deceleration stop, keep inertia running state after stop	-	0	0, 2	○	All the modes
30	Stop overtime time	0.1ms	20000	0~65535	○	All the modes
33	Motor code	-		0~	●	All the

				65535		modes
69	Fan switch 0: temperature over 45 °C, fan is ON, below 42 °C, fan is OFF (hysteresis 3°C) 1: fan is ON after servo enabled, fan is OFF after servo is disable	-	1	0~1	○	All the modes
74	Block alarm time	1S	0	0~9999	○	All the modes
Note: driver U2-23= 1224, motor block time is P0-70						
75	Block alarm speed	1rpm	50	5~9999	○	All the modes
Note: driver U2-23=1224, motor block speed is P0-71						

### P1: control parameters

P1-	Name	Unit	Default	Range	Effective	Suitable mode
00	The gain of first speed loop	Hz	100	1~9999	√	3,4,6,7,10
01	First speed loop integral time	0.1ms	400	0~10000	√	3,4,6,7,10
02	The gain of first position loop	1/s	100	1~9999	√	6, 10
03	First speed feedback response level	Hz	1000	0~4000	√	All the modes

04	First torque command filter time	0.01ms	0	0~9999	✓	All the modes
05	Second speed loop gain	Hz	100	1~9999	✓	3,4,6,7,10
06	Second speed loop integral time	0.1ms	400	0~10000	✓	3,4,6,7,10
07	Second position loop gain	1/s	100	1~9999	✓	6, 10
08	Second speed feedback response level	Hz	1000	0~4000	✓	All the modes
09	Second torque command filter time	0.01ms	0	0~9999	✓	All the modes
10	Speed Feedforward gain	1%	0	0~300	✓	6, 10
11	Speed feedforward filter time	0.01ms	50	0~10000	✓	6, 10
12	Torque feedforward	1%	0	0~300	✓	3,4,6,7,10
13	Torqaue feedforward filter time	0.01ms	0	0~10000	✓	3,4,6,7,10
14	Position gain switching mode 0: fixed the first group	-	0	0~6	✓	6, 10

	1: fixed the second group 2: G-SEL signal 3: torque command 4: speed command 5: position offset 6: speed feedback					
16	Position gain switching comparison value	Related to the P1-14 mode	50	-9999~99 99	√	6, 10
17	Position gain switching comparison value hysteresis loop	Related to the P1-14 mode	20	0~9999	√	6, 10
18	Speed gain switching mode 0: fixed the first group 1: fixed the second group 2: G-SEL signal 3: torque command 4: speed command 5: position offset 6: speed feedback	-	0	0~6	√	3, 4, 7

20	Speed gain switching comparison value	Related to the P1-18 mode	50	-9999~99 99	√	3, 4, 7
21	Speed gain switching comparison value hysteresis loop	Related to the P1-18 mode	0	0~9999	√	3, 4, 7
22	Speed command filter 0: first order low-pass filter 1: smoothing filter	-	0	0	√	3, 4, 7
23	Speed command filter time	0.1ms	0	0~65535	√	3, 4, 7
24	Position command filter 0: first order low-pass filter 1: smoothing filter	-	0	0~1	√	6, 10
25	Position command filter time	0.1ms	0	0~65535	√	6, 10

P2: parameters (reserved)

P3: speed control

P3-XX	Name	Unit	Default value	Range	Effective	Suitable mode
00	V-REF function	—	0	0~2	○	1, 2, 4, 6

	distribution 0: V-REF is speed command input 1: V-REF is external speed limit input, actual speed limit depend on external analog speed limit 2: speed feedforward					
01	Rated speed corresponding to analog voltage	0.01V	150~3000	○	1, 2, 4, 6	
02	Analog voltage speed filter	0.01ms	0~1000	√	1, 2, 4, 6	
03	Speed command input dead area voltage	0.01v	0~100	√	1, 2, 4, 6	
05	Preset speed 1	rpm	0~-9999 +9999	√	3	
06	Preset speed 2	rpm	0~-9999 +9999	√	3	
07	Preset speed 3	rpm	0~-9999 +9999	√	3	
09	Acceleration time	ms	0~65535	○	3, 4	
10	Deceleration time	ms	0~	○	3, 4	

				65535		
11	Reserved					
12	<p>Zero speed clamp mode</p> <p>0: ZCLAMP input signal is ON, forced speed command is 0. When the speed below P3-13, switch to position mode and the servo locked in this position</p> <p>1: ZCLAMP input signal is ON, forced set speed command to 0</p> <p>2: ZCLAMP input signal is ON, speed below P3-13 switch to position mode and the servo locked in this position</p>	—		0~2	○	3, 4, 7
13	Zero speed clamp speed	rpm	10	0~10000	○	3, 4
14	Forward max speed command limit	rpm	Rated	30~10000	○	All the modes
15	Reverse max speed command limit	rpm	Rated	30~10000	○	All the modes
16	Internal forward speed limit in torque control	rpm	Related to the	30~10000	√	1, 2

	mode		motor			
17	Internal reverse speed limit in torque control mode	rpm	Related to the motor	30~10000	√	1, 2
18	Jog speed	rpm	100	0~1000	○	All the modes
19	Forward warning speed	rpm	Related to the motor	0~10000	○	All the modes
20	Reverse warning speed	rpm	Related to the motor	0~10000	○	All the modes
21	Forward alarm speed	rpm	Related to the motor	0~10000	○	All the modes
22	Reverse alarm speed	rpm	Related to the motor	0~10000	○	All the modes
23	T-REF function distribution 0: torque command input 1: the necessary condition of external torque limit input, compare to P3-28/P3-29, min value is effective	—	0	0, 1, 2	○	All the modes

	2: torque feedforward					
24	Rated torque corresponding to the analog value	0.01V	1000	150~300	○	All the modes
25	Analog voltage torque filter	0.01ms	0	0~1000	√	All the modes
26	Torque command input dead area voltage	0.01V	0	0~100	√	All the modes
28	Internal forward torque	%	300	0~300	√	All the modes
29	Internal reverse torque	%	300	0~300	√	All the modes
30	External forward torque	%	300	0~300	√	2,3,4,6,7
31	External reverse torque	%	300	0~300	√	2,3,4,6,7
32	Brake torque	1%	100	0~300	√	All the modes
33	Preset torque 1	%	0	-300~-300	√	1, 2
37	Gravity compensation	%	0			All the modes
38	Gravity compensation coefficient	%	100			All the modes

#### P4: internal position parameters

P4-XX	Name	Unit	Default value	Range	Effective	Suitable mode
0.	Pass Z phase signal	-	2	0~F	○	5, 6

xxx□	times after leaving the limit switch(stop when n+1 Z phase signal arrived)					
0. xx□x	Find origin function 0: OFF 1: ON	-	0	0~1	○	5, 6
01	Hit proximity switch speed	0.1rpm	600	0~50000	○	5, 6
02	Leaving proximity switch speed	0.1rpm	100	0~50000	○	5, 6
03	Internal position mode	-	n.0000		○	5, 6
04	Effective segment number	-	1	1~35	○	5, 6
10	First segment pulse (low byte)	1 pulse	0	-9999~9 999	○	5, 6
11	First segment pulse (high byte)	10000 pulse	0	-32767~ 32767	○	5, 6
12	First segment speed	0.1rpm	0	0~10000	○	5, 6
13	First segment acceleration time	1ms	0	0~65535	○	5, 6
14	First segment deceleration time	1ms	0	0~65535	○	5, 6
15	Reserved					
16	Adjustment time	1ms	0	0~65535	○	5, 6
P4-17~P4-23 are internal position segment 2 parameters, the following total 35 segments.						

Note: (1) setting pulse number = pulse numbers (high byte)×10000+pulse number(low byte)  
(2) total 35 segments. Segment 1~12 parameters can be set through operate panel, segment 13~35 can write in parameters through communication (RS232 or RS485).

#### P5: signal parameter setting

P5-	Name	Unit	Default	Range	Effective	Suitable mode
00	Positioning finished width /COIN	Command pulse	7	0~65535	○	6
01	Positioning finished checking mode 0: offset absolute value below P5-00, output COIN signal 1: offset below P5-00 after command finished, output COIN signal 2: command finished, motor speed below P5-03 and offset absolute value below P5-00, output	-	0	0~3	○	6

	COIN signal 3: command finished, offset absolute value below P5-00, output COIN signal. If COIN keeps the time P5-02, output COIN-HOLD signal.					
02	Positioning finished hold time	ms	0	0~65535	○	6
03	Rotation checking speed	rpm	50	1~10000	○	All the modes
04	Same speed checking speed	rpm	50	1~10000	○	3, 4, 7
05	Reach checking speed	rpm	1000	0~10000	○	3, 4, 7
06	Positioning near output width	Command unit	50	0~65535	○	6
07	Servo OFF delay time	ms	0	0~65535	○	All the modes
08	Brake command output speed	rpm	30	0~10000	○	All the modes
09	Brake command waiting time	ms	500	0~65535	○	All the modes
10	User-defined	-	0	0~FFFF	○	All the

	output 1 trigger condition					modes
11	User-defined output 1 trigger condition comparison value	Related to the trigger condition	0	-9999~999 9	○	All the modes
12	0: P5-10≥P5-11, output SOx 1: P5-10<P5-11, output SOx 2: P5-10 absolute value≥ P5-11, output SOx 3: P5-10 absolute value <P5-11, output SOx	-	0	0~3	○	All the modes
13	User-defined output 1 hysteresis loop	Related to the trigger condition	0	0~65535	○	All the modes
14	User-defined output 2 trigger condition	-	0	0~FFFF	○	All the modes
15	User-defined output 2 trigger condition comparison value	Related to the trigger condition	0	-9999~999 9	○	All the modes
16	0: P5-14≥P5-15, output SOx	-	0	0~3	○	All the modes

	1: P5-14≤ P5-15, SOx output 2: P5-14 absolute value ≥P5-15, output SOx 3: P5-14 absolute value <P5-15, output SOx					
17	User-defined output 2 hysteresis loop	Related to the trigger condition	0	0~65535	○	All the modes
18	IO filter time	ms	0	0~10000	○	All the modes
19	Z phase signal pulse width	ms	2	2~20	√	All the modes
20	/S-ON servo signal 0000: signal is always invalid 0001: input positive signal from SI1 0002: input positive signal from SI2 0003: input positive signal from SI3 0004: input	—	n.0001	n.0000~ n.0015	√	All the modes

	positive signal from SI4 0010: signal is always valid 0011: input negative signal from SI1 0012: input negative signal from SI2 0013: input negative signal from SI3 0014: input negative signal from SI4					
21	/P-CON proportion action command Ditto	—	n.0000	n.0000~n.0015	√	All the modes
22	/P-OT forward drive ban ditto	—	n.0003	n.0000~n.0015	√	All the modes
23	/N-OT reverse drive ban ditto	—	n.0004	n.0000~n.0015	√	All the modes
24	/ALM-RST alarm clean	—	n.0002	n.0000~n.0015	√	All the modes

	ditto					
25	/P-CL forward side external torque limit ditto	—	n.0000	n.0000~ n.0015	✓	All the modes
26	/N-CL reverse side external torque limit ditto	—	n.0000	n.0000~ n.0015	✓	All the modes
27	/SPD-D internal speed direction choice ditto	—	n.0000	n.0000~ n.0015	✓	1,2,3,4
28	/SPD-A internal setting speed choice ditto	—	n.0000	n.0000~ n.0015	✓	3,6
29	/SPD-B internal setting speed choice ditto	—	n.0000	n.0000~ n.0015	✓	3,6
30	/C-SEL control mode choice ditto	—	n.0000	n.0000~ n.0015	✓	All the modes
31	/ZCLAMP zero clamp ditto	—	n.0000	n.0000~ n.0015	✓	3,4,7
32	/INHIBIT		n.0000	n.0000~	✓	6

	command pulse ban ditto			n.0015		
33	/G-SEL gain switching ditto	—	n.0000	n.0000~ n.0015	√	All the modes
34	/CLR pulse offset clean ditto	—	n.0000	n.0000~ n.0015	√	6
36	/I-SEL inertia ratio switching		n.0000	n.0000~ n.0015	√	All the modes
37	/COIN_HD positioning finished hold 0000: not output to the terminal 0001: output positive signal from SO1 0002: output positive signal from SO2 0003: output positive signal from SO3 0011: output negative signal from SO1		n.0000	n.0000~ n.0013	√	6

	0012: output negative signal from SO2 0013: output negative signal from SO3					
38	/COIN positioning finished ditto	—	n.0001	n.0000~n.0013	√	6
39	/V-CMP same speed checking ditto	—	n.0000	n.0000~n.0013	√	3,4,7
40	/TGON rotation checking ditto	—	n.0000	n.0000~n.0013	√	All the modes
41	/S-RDY ready ditto	—	n.0000	n.0000~n.0013	√	All the modes
42	/CLT torque limit ditto	—	n.0000	n.0000~n.0013	√	3,4,6,7
43	/VLT speed limit checking ditto	—	n.0000	n.0000~n.0013	√	1,2,6
44	/BK brake lock Ditto(BK signal output from SO1, P5-44=n.0001. BK signal output from SO2,	—	n.0000	n.0000~n.0013	√	All the modes

	P5-44=n.0002.)					
45	/WARN warning ditto	—	n.0000	n.0000~ n.0013	✓	All the modes
46	/NEAR near ditto	—	n.0000	n.0000~ n.0013	✓	5, 6
47	/ALM alarm ditto	—	n.0002	n.0000~ n.0013	✓	All the modes
48	/Z phase encoder signal	—	n.0000	n.0000~ n.0013	✓	All the modes
51	/V-RDY speed arrived	—	n.0000	n.0000~ n.0013	✓	3, 4, 7
52	/user-defined output 1 terminal setting	—	n.0000	n.0000~ n.0013	○	All the modes
53	/user-defined output 2 terminal setting	—	n.0000	n.0000~ n.0013	○	All the modes
57	/PREFA internal position segment 1 position option		※ 1	※ 3	✓	5
58	/PREFB internal position segment 2 position option		※ 1	※ 3	✓	5
59	/PREFC internal position segment 3 position option		※ 1	※ 3	✓	5

\*servo drive input terminal distribution: refer to table 1.

\*servo drive output terminal distribution: refer to table 2.

Table 1 input terminal distribution

input terminal	Servo model	Setting range
P5-20~P5-36 P5-57~P5-59	DS3 series	n.0000~n.0005 n.0010~n.0015
	DS3E series	n.0000~n.0004 n.0010~n.0014

Table 2 output terminal distribution

output terminal	Servo model	Setting range
P5-37~P5-53	DS3 series	n.0000~n.0003 n.0010~n.0013
	DS3E series	n.0000~n.0002 n.0010~n.0012

P6: signal parameters (reserved)

P6-XX	Name	Unit	Default value	Range	Effective	Suitable mode
00~04	-	-	-	-	-	-

P7: communication parameters

P7-	Name	Unit	Default value	Range	Effective
00	RS485 station no.	—	1	1~255	○
01	RS485 parameters	—	2206		○
10	RS232 station no.	—	1	1~255	
11	RS232 parameters	—	2206		○

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## 7. Modbus address (hex format)

Parameter	Modbus address	Notes
P0-00~P0-33	0x0000~0x0021	The Modbus is incremented by 1 from 0x0000, P0-23 related Modbus address is 0x0017
P1-00~P1-28	0x0100~0x011C	The Modbus is incremented by 1 from 0x0100, P1-10 related Modbus address is 0x010A
P2-15~P2-36	0x020F~0x0224	The Modbus is incremented by 1 from 0x020F, P2-16 related Modbus address is 0x0210
P3-00~P3-36	0x0300~0x0324	The Modbus is incremented by 1 from 0x0300, P3-13 related Modbus address is 0x030D
P4-00~P4-31	0x0400~0x041F	The Modbus is incremented by 1 from 0x0400, P4-25 related Modbus address is 0x0419
P5-00~P5-53	0x0500~0x0535	The Modbus is incremented by 1 from 0x0500, P5-20 related Modbus address is 0x0514
P6-00~P6-xx	0x0600~0x06xx	Reserved
P7-00~P7-15	0x0700~0x070F	The Modbus is incremented by 1 from 0x0700, P7-11 related Modbus address is 0x070B
U0-00~U0-53	0x1000~0x1035	The Modbus is incremented by 1 from 0x1000, U0-05 related Modbus address is 0x1005
U1-00~U1-25	0x1100~0x1119	The Modbus is incremented by 1 from 0x1100, U1-14 related Modbus address is 0x110E
U2-00~U2-20	0x1200~0x1214	The Modbus is incremented by 1 from 0x1200, U2-08 related Modbus address is 0x1208
F0-00~F0-02	0x2000~0x2002	The Modbus is incremented by 1 from 0x2000, F0-01 related Modbus address is 0x2001
F1-00~F1-05	0x2100~0x2105	The Modbus is incremented by 1 from 0x2100, F1-03 related Modbus address is 0x2103

## 8. Alarm information

XX	□	Alarm	Explanation	Reasons	Solution
01	0	E-010	Hardware version not match	The hardware version is error	Contact us
	2	E-012	System loading error	The program damaged	Contact us
	3	E-013	FPGA loading error	1. program damaged 2. hardware damaged	Contact us
	4	E-014	FPGA visiting error	1. program damaged 2. hardware damaged 3. external interference is too serious	Contact us
	5	E-015	Program running error	Program damaged	Contact us
	6	E-016	CPU running error	Hardware damaged	Contact us
	7	E-017	CPU running overtime	Program damaged	Contact us
	8	E-018	FPGA running overtime	Program damaged	Contact us
	9	E-019	System password	Program damaged	Contact us

			error		
02	0	E-020	Parameter loading error	Parameter self-checking cannot pass	Re-power the servo to restore default setting or contact us
	1	E-021	Parameter out of range	The setting value out of range	Check the parameters and set again
	2	E-022	Parameter conflict	TREF or VREF function setting conflict	Check the TREF or VREF setting
	3	E-023	Sampling channel setting error	User-defined output trigger channel or data monitor channel setting error	Check the setting parameter
	4	E-024	Parameter lost	Power supply voltage too low	1. for single phase 220V, connect L1, L3 2. power on at once after cut power supply it will show E-024 3. set the parameter again
	5	E-025	Erase flash error	Parameter store error when power off	Contact us
	6	E-026	Initialize flash error	Flash chip power supply not stable	Contact us
03	0	E-030	Bus overvoltage (220V: U0-05 ≥390 alarm, 380V: U0-05	power grid voltage too high	Check the power supply, 220V servo drive voltage range is 200V~240V, 380V servo drive voltage range is 360~420V, please use regulator and

			$\geq 780V$ alarm)		correct power supply
				Load inertia too large (regenerative ability not enough)	<p>1. connect external regenerative resistor, please see below table for resistor value (220V: bus voltage U0-05=380 start discharging, U0-05=350V discharge end. 380V: U0-05=700 start discharging, U0-05=660 discharge end)</p> <p>2. increase acceleration/deceleration time</p> <p>3. decrease load inertia</p> <p>4. decrease start/stop frequency</p> <p>5. change larger power drive and motor</p>
				regenerative resistor broken or value too big	Change suitable resistor, refer to chapter 3-4
				Load has locked rotor	Run the motor without load to check the problem
04	0	E-040	Bus undervoltage( 220V: U0-05 $\leq 140$ . 380V: U0-05 $\leq 300$ )	Power grid voltage too low	<p>1. Check the power grid, 220V servo drive voltage range 200~240V, please use regulator.</p> <p>2. change large capacity transformer</p>

				Instant cut power supply	Repower on after voltage is stable
06	1	E-041	Drive power off	Drive power cut off	Check the power supply
	3	E-043	Bus voltage charging failure	Hardware damage	Please note if there is relay ON/OFF sound when drive power on
	0	E-060	Module temperature too high	1. long time running with large load 2. environment temperature too high 3. short circuit between UVW	1. consider change the motor capacity(mointor U0-02, motor present torque) decrease the load 2. good ventilation, check if the fan is running when module temperature $U0-06 \geq 45^{\circ}\text{C}$ 3. check the UVW wiring
07	1	E-061	Motor temperature too high	1. long time running with large load 2. environment temperature too high	1. decrease the load 2. good ventilation
	2	E-062	Drive too cold	Environment temperature is too low	The environment must up to $0^{\circ}\text{C}$
	0	E-070	Current too large	Not match the motor code U, V, W wiring error Encoder problem	Drive P0-33 must match the motor code on the motor label Check the UVW wiring 1. Check encoder cable or change it 2. Set servo to bb

					state, monitor U0-10, rotate motor shaft by hand, U0-10 increase at one direction and decrease at another direction (0~9999)
			Short circuit with drive UVW or motor problem		<ol style="list-style-type: none"> <li>1. measure the phase resistor of motor phase UVW, if not balanced, change the motor</li> <li>2. If short circuit between UVW and PE, change the motor</li> <li>3. Measure UVW output with multimeter (diode gear), black pen test P+, red pen test UVW, red pen test P-, black pen test UVW.</li> <li>6. Group voltage any one is 0, change the drive</li> </ol>
			Load has locked rotor		Run the motor without load to check the problem
			Interference		Shut down the device with interference
			Alarm at the moment of high-speed stop/start		Increase the acceleration time
08	0	E-080	Over speed(actual speed $\geq$ P3-21/P3-22)	Motor speed too fast	<ol style="list-style-type: none"> <li>1. check if there is external force make the motor over speed</li> <li>2. input command frequency</li> </ol>

					too high 3. electronic gear ratio too large
				Not match the motor code	Drive P0-33 must match the motor code on the motor label
				U, V, W wiring error with ground	Check the wiring
				Encoder problem	1. Check encoder cable or change it 2. Set servo to bb state, monitor U0-10, rotate motor shaft by hand, U0-10 increase at one direction and decrease at another direction (0~9999)
				Check P3-21/P3-22 max speed limit	When actual speed larger than P3-21/P3-22, it will alarm
	E-092	Analog Tref zero calibration over limit	Analog zero calibration operation error		Please not add analog value when calibrating
	E-093	Analog Vref zero calibration over limit	Analog zero calibration operation error		Please not add analog value when calibrating
10	0	E-100	Position offset too large	The difference between setting position and actual position is over the	1. check whether the motor stall, decrease the position setting speed 2. increase the offset pulse

				limit	limit P0-23
				Not match the motor code	Drive P0-33 must match the motor code on the motor label
				U, V, W wiring error	Check UVW phase wiring
11	0	E-110	Motor UVW short circuit	Short circuit with drive UVW or motor problem	<ol style="list-style-type: none"> <li>1. measure the phase resistor of motor phase UVW, if not balanced, change the motor</li> <li>2. If short circuit between UVW and PE, change the motor</li> <li>3. Measure UVW output with multimeter (diode gear), black pen test P+, red pen test UVW, red pen test P-, black pen test UVW.</li> <li>6. Group voltage any one is 0, change the drive</li> </ol>
				Load has locked rotor	Run the motor without load to check the problem
				Alarm at the moment of high-speed stop/start	Increase the acceleration time
				Encoder problem	<ol style="list-style-type: none"> <li>1. Check encoder cable or change it</li> <li>2. Set servo to bb state, monitor U0-10, rotate motor shaft by hand, U0-10 increase at one direction and decrease at another direction (0~9999)</li> </ol>

	0	E-120	Current sensor error	Current sensor damaged or external interference too large	Check the ground wiring or contact us
12	1	E-121	U phase current sampling zero calibration value error	Current sensor damaged or external interference too large	Check the ground wiring or contact us
	2	E-122	V phase current sampling zero calibration value error	Current sensor damaged or external interference too large	Check the ground wiring or contact us
13	0	E-130	Motor quadrature encoder AB or UVW broken circuit	AB or UVW broken circuit	Cut off the drive power, Check the wiring, then repower the drive
14	2	E-142	Motor encoder Z phase disconnected	Z phase disconnected	Cut off the drive power, Check the wiring, then repower the drive
15	0	E-150	Motor encoder UVW phase disconnected	UVW phase disconnected	Check the wiring of UVW
16	0	E-160	Motor output	Motor output power	1. Change larger power motor

			power overload	over the rated power	2. Check the motor shaft wiring
1	E-161	The heating power overload		Motor overheating	1. Change larger power motor 2. Check the motor shaft wiring
4	E-164	The bus capacitor overload	Power supply not stable, motor load too large, cause the bus capacitor charge frequently		1. use 3 phase 220V power supply for 220V drive 2. change larger power motor
5	E-165	locked rotor alarm (drive version U2-23=12.24 &750W and down model support)	Locked rotor time up to P0-70(unit is second) and motor speed lower than P0-71(unit is 1rpm), motor present output torque larger than P3-28, P3-29		1. monitor U0-02 motor torque, check if P3-28, P3-29 torque limit value is reasonable 2. check the mechanical structure
17	0	E-170	Motor undervoltage when running	Bus voltage too low when running	1. check the power grid voltage fluctuation 2. wait the bus voltage stable, then repower
20	0	E-200	Regenerative resistor overload	Regenerative resistor discharging power over the rated	Change larger power regenerative resistor
	1	E-201	Regenerative resistor discharge too	Regenerative resistor connection error or value too	Change small value resistor and check the wiring

			long time	large	
22	0	E-220	Absolute encoder communication error	1. Encoder not connect or contactor not good	Cut off drive power, check encoder wiring, use multi-meter test the connection
				2. received encoder data error, and error time over encoder error time register P0-56 value	Not put the encoder wire together with the strong power supply cable, install filter at servo drive power supply input side, install magnet ring around encoder wire, far away from large noise equipment
	2	E-222	Absolute encoder battery voltage low	The battery voltage is lower than 2.75V	Please change new battery when the servo power is on, the battery is no.5 3.6V
	3	E-223	Absolute encoder data visit alarm	Encoder problem, or power supply is not stable	Unplug the encoder cable without battery will alarm
26	4	E-224	Absolute encoder overspeed	Large change of encoder data	Unplug the encoder cable without battery will alarm
	0	E-260	Over range alarm	Check the over range signal and the over range mode is alarm	If it no need to alarm after over range, user can change the over range signal mode
	1	E-261	Over range signal	1. motor run forward and encounter the	Check the over range connection and over range

			connection error	reverse over range signal 2. motor run reverse and encounter the forward over range signal	terminal distribution
2	E-262	Control stop over time	1. inertia too big 2. stop overtime too short 3. brake torque too small	1. decrease the inertia or use motor with brake 2. increase stop overtime P0-30 3. increase brake torque P3-32	
28	0	E-280	Vibration too serious	Motor vibration too serious	Decrease servo position loop or speed loop gain, check the motor shaft connection
30	0	E-300	Motion bus lose synchronization	Motion bus communication error	Check the motion bus connection
31	0	E-310	Motor code error	Motor code error	Set the correct motor code
	1	E-311	Motor code lost	Motor code not set	Set motor code in P0-33

## 9. General debug steps

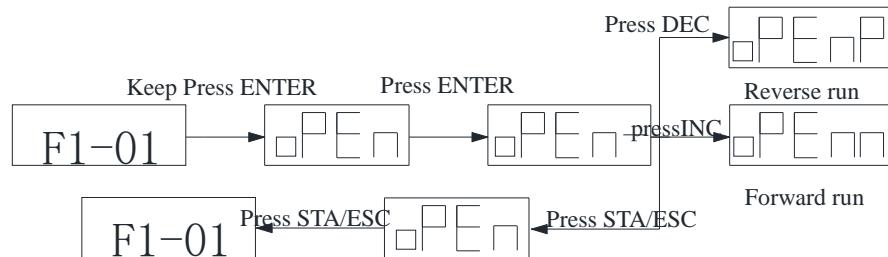
- (A) Before power on, check the product according to the inspection of the goods described in the manual to confirm that the equipment is not obviously damaged.
- (B) In the absence of obvious damage, connect the servo drive and servo motor, and

connected to the power supply, pay attention to the power supply is not wrong, U, V, W, PE must be connect with servo drive U, V, W, PE terminal, do not cross, otherwise servo motor will be blocked or racing. PE wire must be connected.

- (C) power on, servo will display bb.
- (D) enter P0-33, set it to the motor code on motor label, then power on again.
- (E) current inspection offset automatical adjustment
- (1) enter F1-02 to adjust the current offset, it will show rEF.
  - (2) press ENTER to adjust the current offset, it will show rEF and flash.
  - (3) after about 5 seconds, it will show donE, the adjusting process completed.
  - (4) press STATUS/ESC to exit.

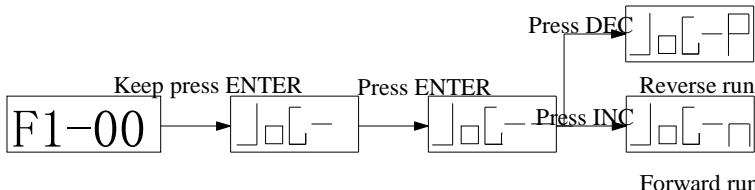
(F) open loop test run

Before entering the trial operation mode, please confirm that the motor shaft is not connected to the machine! The test run is mainly to check the power line and encoder feedback line to determine whether the connection is normal. The motor can normally rotate forward and backward according to the following operations. If the motor shaft wobbles or the alarm is prompted, the power should be cut off immediately and the wiring should be re-checked.



(G) jog run

Please make sure the motor shaft is not connected to the machine and the drive is in bb idle state before entering the jog run mode.



The gain and other parameters will participate in the control during the jog run. According to the running condition, we can judge whether the parameter setting is appropriate.

P3-18	JOG run speed					
	Unit	Default setting	Range	Suitable mode	Modify	Effective
	1rpm	100	0~1000	JOG run	Servo OFF	At once

#### (H) debug with motor and machine

Observe the running direction of the machine head. If it is contrary to actual needs, after the servo OFF, set the parameter p0-05 to 1, and then restart the power to make the change take effect.

(I) Before the device is enabled, the parameters of the servo drive are set according to the actual application and adjusted according to the actual application. During the operation, observe the stability and responsiveness of the operation, and adjust the servo control parameters appropriately

## 10. Motor code

Motor code	Power KW	Torque Nm	Speed RPM	Current A	Overload times	Motor code
MS-40ST-M00330-20P1	0.1	0.032	3000	1.8	3	1002
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

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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-M10010-21P0	1.0	10	1000	6.2	3	1040
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	8.0	2.5	1044
MS-130ST-M10015-21P5	1.5	10	1500	6	2.5	0044
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-M15015-42P3	2.3	15	1500	5.0	2	0146
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-M10030-43P0	3.0	10	3000	6.4	2.5	1148
MS-180ST-M19015-43P0	3.0	19	1500	7.5	2.5	0156
MS-180ST-M19015-43P0	3.0	20	1500	7.8	2.5	1052







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