DS2 series 380V servo drive

Fast reference manual

►► 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 $2mm^2$ wire to grounding the ground terminals.

■ Operation

- ✓ Do not remove the panel cover while the power is ON.
- ✓ Do not touch terminals for five 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.

►► Checking Products upon Delivery

1**. When receive the products, please check below items:**

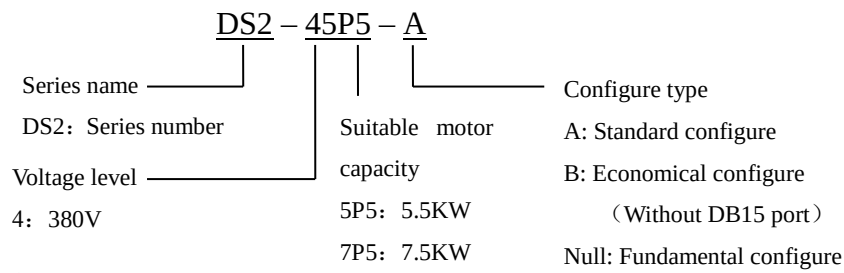
Items	Comments
Are the delivered products the ones that were ordered?	Check the model numbers marked on the nameplates of the servomotor and servo drive.
Does the servomotor shaft rotate smoothly?	The servomotor shaft is normal if it can be turned smoothly by hand. Servomotors with brakes,

	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 screwdriver.
Is the motor code the same with the code in driver?	Check the motor code marked on the nameplates of the servomotor and the parameter F0-00 on the servo drive.

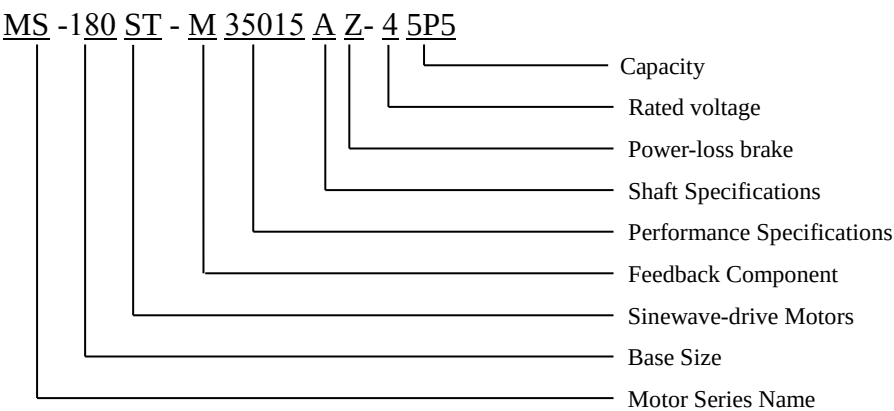
If any of the above is faulty or incorrect, contact SPECTRA or an authorized distributor.

2. **Model description**

1）Servo drive



2）Servo motor



Base size：180；

Feedback component: M（Photoelectric pulse coder）；

Performance Specifications: First 3 numbers mean rated torque, last 2 numbers mean rated revolution;

For instance:35015：rated torque 35N·m,rated revolution 1500rpm；

48015：rated torque 48N·m,rated revolution 1500rpm；

Shaft Specifications：A－Without key；B－With key；

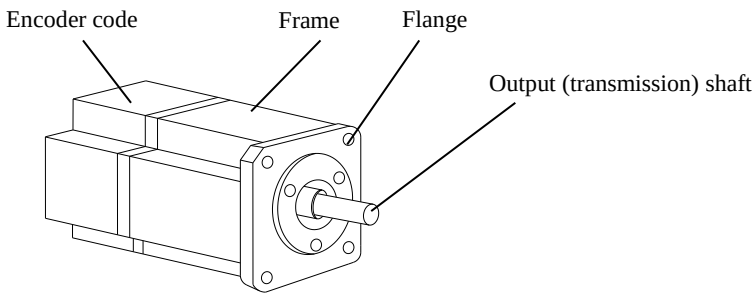
Power-loss brake：Null－Have it；Z－Not have it；

Voltage level：4-380V；

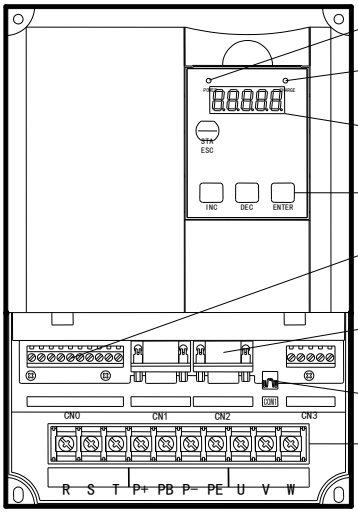
Capacity：5.5KW、7.5KW.

3. Sections description

1）Servo motor



2）Servo drive



POWER LED
Turn on when the drive power on

CHARGE LED
Turn on when main circuit power on.

Panel display
Show the servo state, alarm and parameters

Panel keys

To set the parameters

CN0/CN1/CN3

To connect the I/O signal and RS485 communication port

CN2

To connect the encoder on the servo motor

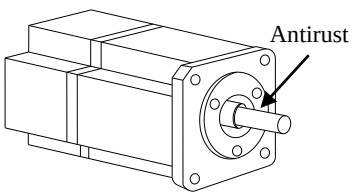
COM1
Connect to PC, HMI, PLC

Power supply and servo motor terminals
Power supply input, servo motor terminals

►► Installations

1. Servomotor

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.



Caution：

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 servomotor.

1） Storage Temperature

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

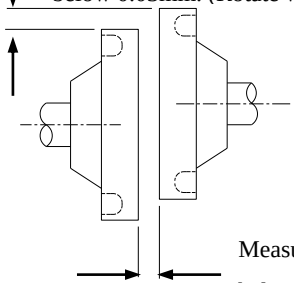
2） Installation Site

- Indoor，free of corrosive or explosive gases.
- Well-ventilated and free of dust and moisture.
- Ambient temperature of 0 °to 50 ℃.
- 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.

Measure it at 4 places of the circle, the difference should be below 0.03mm. (Rotate with the shaft coupler)



Measure it at 4 places of the circle, the difference should be below 0.03mm. (Rotate with the shaft coupler)

Caution：（1）If the concentricity is not enough, it will cause the vibration and bearing damage.

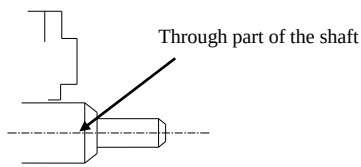
（2）When installing the coupler, prevent direct impact to the shaft. This can damage the encoder mounted on the shaft end at the opposite side of the load.

4） Orientation

MS series servomotors can be installed either horizontally or vertically.

5） Handling Oil and Water

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



seal the through-shaft section.

6） Cable Stress

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

2. Servo drive

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

1）Storage Conditions

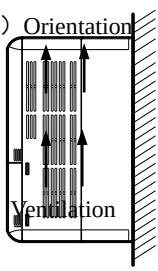
Store the servo drive within -20~+85℃, as long as it is stored with the power cable disconnected.

2）Installation Site

The following precautions apply to the installation site:

Situation	Installation Precaution
Installation in a Control Panel	Design the control panel size, unit layout, and cooling method so the temperature around the servo drives does not exceed 50 ℃.
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 ℃.
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 Gas	Corrosive gas does not have an immediate effect on the servo drives, but will eventually cause electronic components and 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.

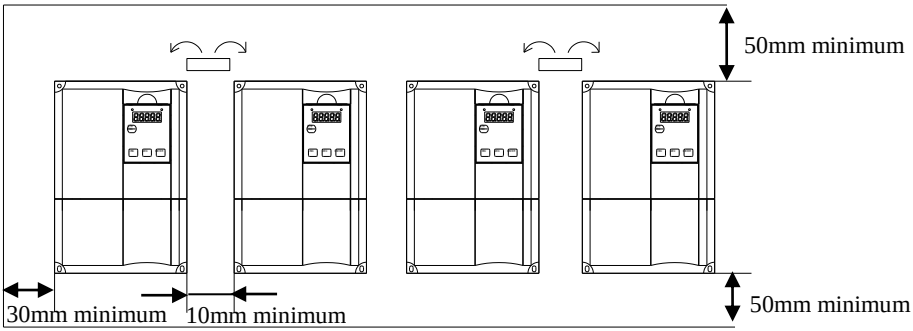
3）Orientation



Install the servo drive perpendicular to the wall as shown in the figure. The servo drive must be oriented this way because it is designed to be cooled by natural convection or by a cooling fan.

4）Installation

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



■ **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.

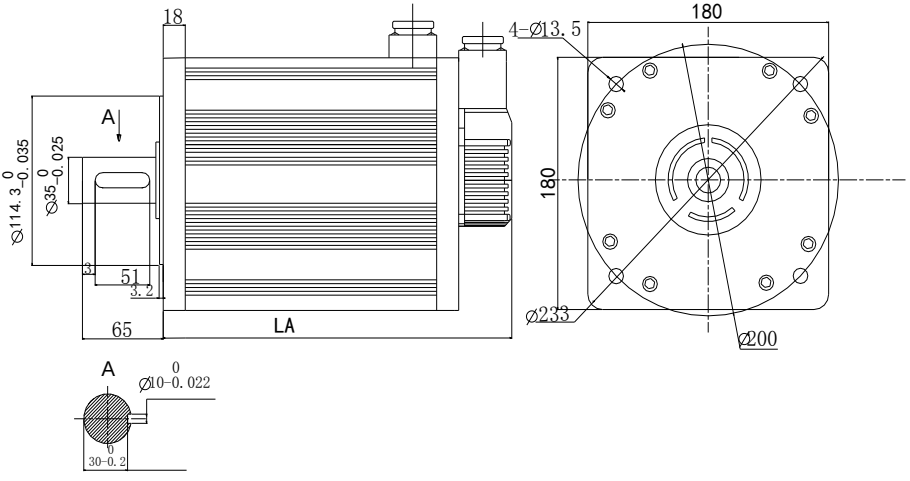
■ **Environmental Conditions in the Control Panel**

- ❖ Ambient Temperature: 0~50 ℃
- ❖ Humidity: 90%RH or less
- ❖ Vibration: 4.9m/s^2
- ❖ Condensation and Freezing: None
- ❖ Ambient Temperature for Long-term Reliability: 50 ℃ maximum

►► Dimensions

1. Servo motor

■ 180 Series（Units: mm）

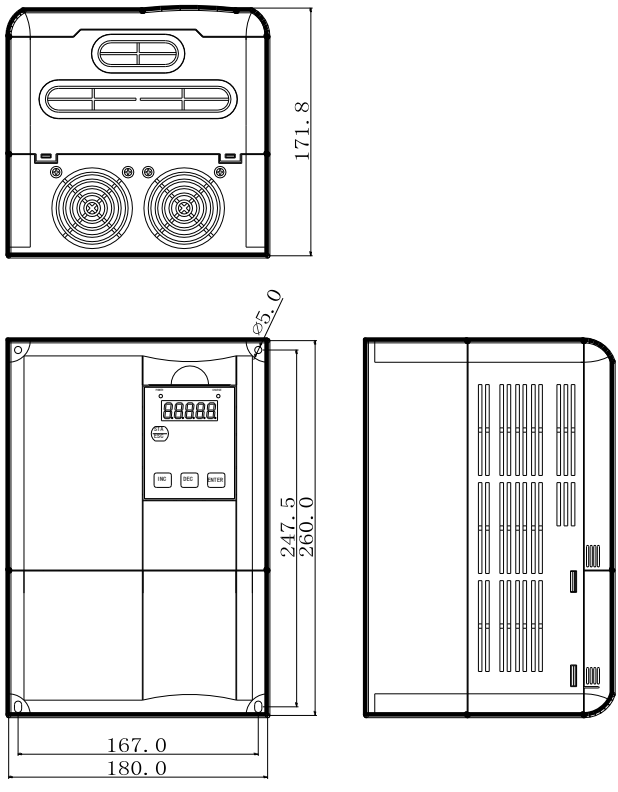


Type	LA	
	Normal	Band-type brake
MS-180ST-M21520□□-44P5	243	300

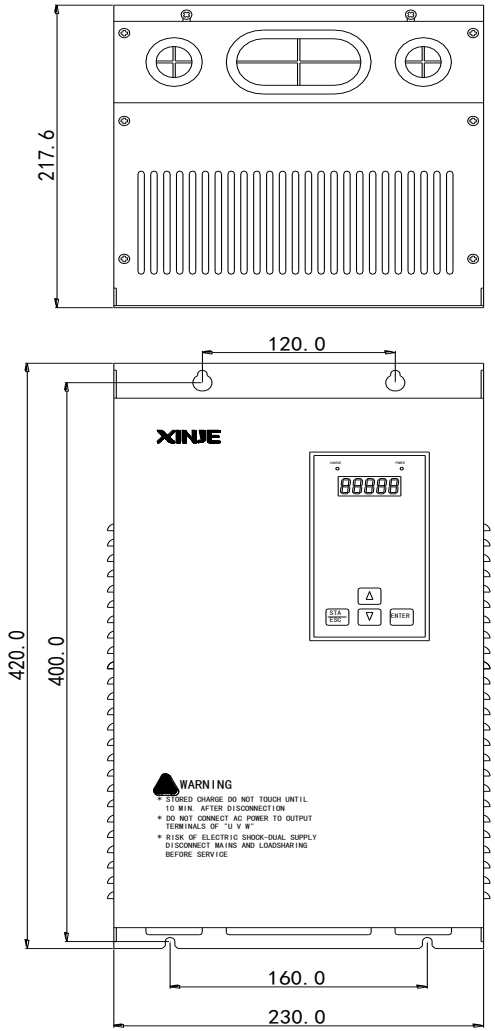
MS-180ST-M27015□□-44P3	262	319
MS-180ST-M35015□□-45P5	292	349
MS-180ST-M48015□□-47P5	346	403

2. Servo drive（Units: mm）

DS2-45P5-A



DS2-47P5-A


217.6
120.0
XINJE
STA
ESC
ENTER
420.0
400.0
WARNING
* STORED CHARGE DO NOT TOUCH UNTIL 10 MIN. AFTER DISCONNECTION
* DO NOT CONNECT AC POWER TO OUTPUT TERMINALS OF "U V W"
* RISK OF ELECTRIC SHOCK-DUAL SUPPLY DISCONNECT MAINS AND LOADSHARING BEFORE SERVICE
160.0
230.0

►► Servo drive general specification

Servo unit		DS2 series 380V servo drive
Encoder		Incremental encoder (2500 ppr)
Input power		DS2-4□P□-A：3-phase AC380V，50/60Hz
Control mode		3-phase full-wave rectifier control IPM PWM sine-wave current drive
Using	Temperature	0～+50 ℃/-20～+85 ℃
	Humidity	Below 90% RH (no condensation)
	Vibration /impact resistance	4.9m/s^2 / 19.6m/s^2
Structure		Base installation

Performance specification

Servo drive type				DS2-45P5-A、DS2-47P5-A
Speed torque control mode	Performance	Speed control range		1：2500 (the lower limit of speed control range, not stop at rated load torque)
		Speed change rate	Load change rate	0~100% load: below ±0.01% (rated speed)
			Voltage change rate	Rated voltage ±10% : 0% (rated speed)
			Temperature change rate	20±25℃: below ±0.1% (rated speed)
		Frequency feature		250Hz（JL≤JM）
		Soft start time		0～65535ms（set acceleration, deceleration individually）

	Input signal			RS485
Position control mode	Performance	Feedforward compensation		0～100% (resolution is 1%)
		Positioning finished width		0～250 command unit (resolution is 1 command unit)
	Input signal	Command pulse	Input pulse type	Sign+ pulse, CW, CCW mode
			Input pulse state	Collector (+24V) and differential signal input
			Input pulse frequency	Open collector input: 200kHZ Differential input: 500kHZ
		Control signal		Clear signal (/CLR)
I/O signal	Position output			open collector output
	Input signal	External input		6
		Changeable signal distribution		/S-ON、/P-CON、/P-OT、/N-OT、/ALM-RST、/PCL、/NCL、/SPD-D、/SPD-A、/SPD-B、/C-SEL、/ZCLAMP、/CLR、/G-SEL、/CHGSTP
	Output signal	External output		3
		Changeable signal distribution		/COIN、/V-CMP、/TGON、/S-RDY、/CLT、/VLT、/BK、/WARN、/NEAR、/ALM、/Z

Built-in function	Dynamic brake (DB)			No
	Regeneration			Built-in regeneration unit, external regenerative resistor
	Over range（OT）protection			For P-OT, N-OT action, deceleration stop or inertia stop
	Electronic gear			0.01≤ B/A≤100
	Protection			Program error, parameter error, overvoltage, undervoltage, regeneration error, overtemperature, overcurrent, overspeed, analog input error, position offset overflow, output shorting, current error, encoder cut, encoder error, overload, power off when running, write parameter error…
	LED display			Charge, power supply, 7-segment LED ×5 (built-in digital operate)
	communication	COM 1	Connector	RS232, connect to PC
			Serial parameter	Baud rate 19200; data bit 8; stop bit 1; communication protocol: ModubsRTU slave; Modbus station No.1
			Function	Debug online
		COM 2	Connector	RS485, connect to PLC, HMI, PC and other devices
			Serial parameter	Serial parameter can be set; communication protocol: ModbusRTU slave; Modbus station No. can be set
			Function	State display, user constant setting, monitor display, alarm display, alarm display, special control, online debug

►► Wiring

1. Names and Descriptions of Main Circuit Terminal

- 5.5KW driver: R S T P+ PB P- PE U V W
- 7.5KW driver: P+ P- R S T PE U V W PB

Terminal names	Function
R、S、T	3-phase AC 380V ±10%（50/60Hz）
P+、PB	Regenerative braking resistor connection
P+、P-	Power supply for main circuit
PE	Ground (Connect to the ground terminal of motor and power, to be grounded)
U、V、W	Motor connection

2. Winding Terminals on Servo motor

Symbol	180 Series
PE	1
U	2
V	3
W	4

3. Layout of CN0/CN1/CN3 terminals

The diagram shows the solder side:

■ Terminals description of CN0

NO.	Name	Description	NO.	Name	Description
1	PUL-	Pulse input PUL-	6	V2+	+24V for open collector
2	PUL+	Differential input	7	SI1	Input terminal 1

		PUL+			
3	V1+	+24V for open collector	8	SI2	Input terminal 2
4	DIR-	Direction input DUL-	9	SI3	Input terminal 3
5	DIR+	Differential input DIR+	10	+24V	+24V for input

■ Terminals description of CN1

NO.	Name	Description	NO.	Name	Description
1	NC	Null	9	BO	Encoder output B
2	SI4	Input terminal 4	10	ZO	Encoder output Z
3	SI5	Input terminal 5	11	T-REF	Torque analog input
4	SI6	Input terminal 6	12	V-REF	Speed analog input
5	+24V	+24V for input	13	GND	GND for analog input
6	SO3	Output terminal 3	14	GND	GND for AO&BO output
7	COM	Ground of output terminal	15	GND	GND for ZO output
8	AO	Encoder output A			

■ Terminals description of CN3

NO.	Name	Description	NO.	Name	Description
1	SO1	Output terminal 1	4	A	RS485+
2	SO2	Output terminal 2	5	B	RS485-
3	COM	Ground of output terminal			

4. I/O Signal Names and Functions

1）Input signals

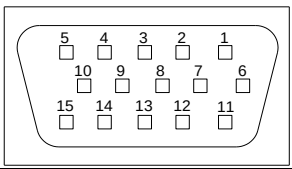
Item	Input terminal	Function
Digital input	SI1～SI6	Multi-functional input terminal
Pulse input	PUL-、PUL+/V1+	P2-00=0:A-phase pulse；P2-00=2:pulse
	DIR-、DIR+/V2+	P2-00=0:B-phase pulse；P2-00=2:pusle direction (sign)

2）Output signals

Class	Output terminal	Function
Optocoupler output	SO1～SO3	Multi-functions Output Terminals

5. CN2 Connector Terminal Layout

The following diagrams are the layout of CN2 connector (face the solder pin).



Drive side	Encoder Side On Motor 180 series	Name	Drive side	Encoder Side On Motor 180 series	Name
1	4	A+	2	5	B+
3	6	Z+	4	10	U+
5	12	W+	6	7	A-
7	8	B-	8	9	Z-
9	13	U-	10	15	W-
11	1	Shield	12	3	GND
13	2	5V	14	11	V+
15	14	V-			

6. Communication port

- Serial Port 1（COM1）

COM1 supports RS232, and is often used to connect with PC for debugging.

■ DS2-45P5-A、DS2-47P5-A

（5-pin port）

Pin	Name	Description
1	TXD	RS232 send
2	RXD	RS232 receive
3	GND	RS232 ground

Caution：1. Please use the cable provided by SPECTRA company.

2. The types in the table cannot use RS232 (COM1) and RS485 (COM2) at the same time.

The communication parameters of COM1 and COM2 will be changed at the same time.

- Serial Port（COM2） （Pin: A：CN3-4, B：CN3-5）

Communication parameters of COM2 can be set via P0-04.

Parameter Number	Name	Default Setting	Range
P0-04.0	Baud rate	6	0～9 0：300 1：600 2：1200 3：2400 4：4800 5：9600 6：19200

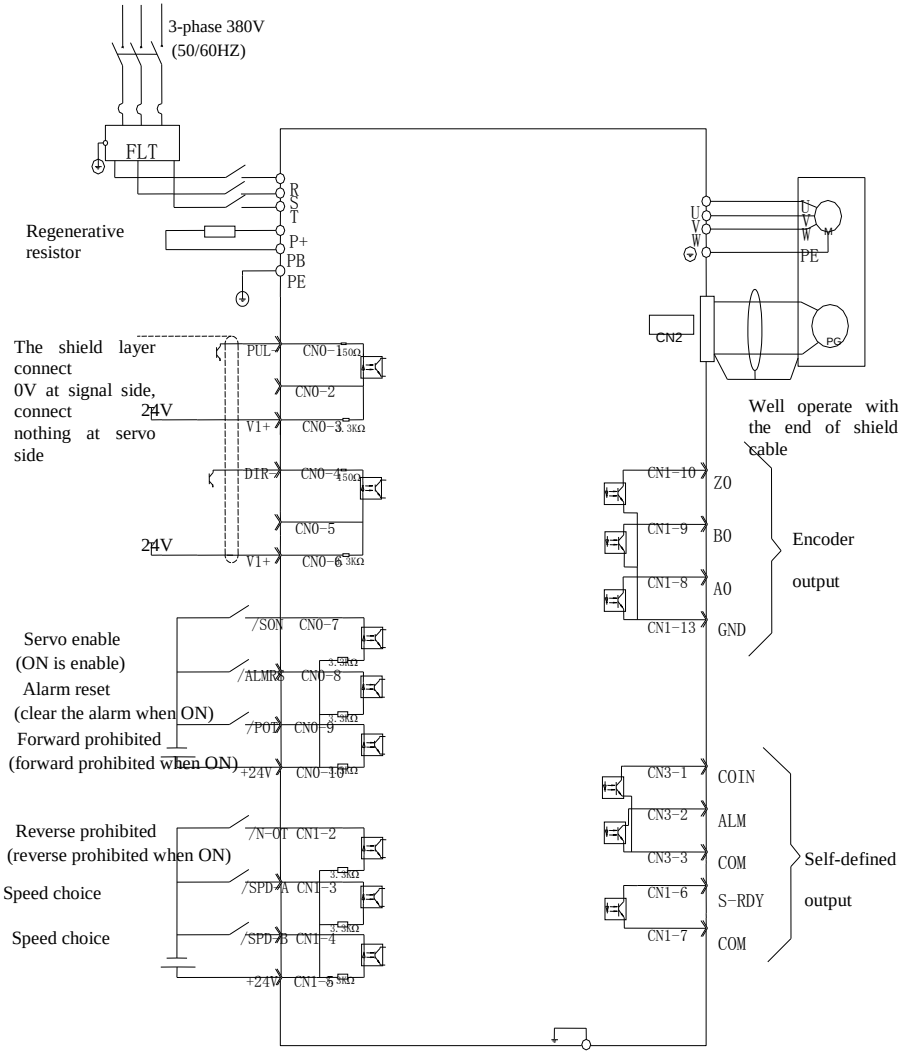
			7：38400 8：57600 9：115200
P0-04.1	Data bits	0	0：8
P0-04.2	Stop bits	2	0：2 bits；2：1 bits
P0-04.3	Parity	2	0～2 0：No Parity；1：Odd Parity；2：Even Parity

Modbus station number can be set freely, depending on the following parameter.

Parameter Number	Name	Unit	Default setting	Range
P0-03	Modbus Station Number	—	1	1～255

Note: Parameters above will take effect after repower on.

7. Standard connection example of DS2-45P5&47P5

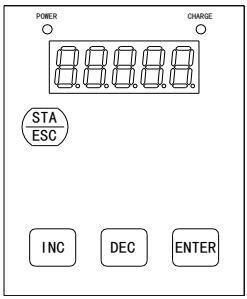


Note: This is the standard connection diagram of open collector input (+24V).

►► Using the operation panel

1. Basic operation

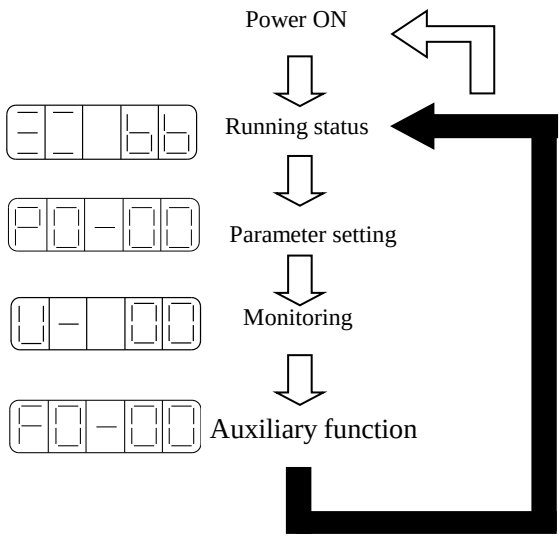
The operate panel can be used for parameter settings, operating references, and status displays. 5-bit LED displays parameter settings, status or alarm.



Button name	Function
STA/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, check the data

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.



Display mode：

1. Monitor Function U－ XX: XX means the number of the monitor function.

2. Auxiliary Function FX－XX: The first X means group No., the last two X means the member No. in the group.

3. Parameter Setting PX－XX: The first X means group No., the last two X means the member No. in the group.

4. Alarm E－XXX: XXX means the alarm code.

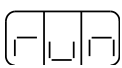
2. Running status mode

In running status mode, bit data and codes indicate the status of the servo drive.

- **Select the running status mode**

The servo will enter running status when power on. If not, press STATUS/ESC to enter.

- **The display content of running status mode**

Code	Description
	Standby Servo OFF (motor power OFF)
	Run Servo ON (motor power ON)
	Forward Run Prohibited P-OT is OFF
	Reverse Run Prohibited N-OT is OFF

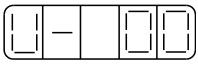
3. Monitoring Mode

The Monitoring Mode can be used to monitor the reference values, I/O signal status, and servo drive internal status. The monitor mode can be set when the motor is running.

- **Using the Monitor Mode**

Now we take the monitor code U-16 as an example.

（1）Press the STATUS/ESC key to select the monitoring mode.



（2）Press the INC or DEC key to select the monitor number U-16, and then press and hold ENTER to enter the monitor mode.

（3）The value 0 is now displayed, means the driver is in a normal condition.

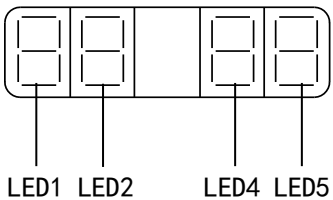
（4）Press STATUS/ESC key to return to the monitoring number switching state.

Display contents of Monitoring Mode

Number	Monitor Display		Unit
U-00	Actual speed of motor		Rpm
U-01	Input speed command		Rpm
U-02	Internal torque command		%
U-03	Rotate angle (mechanism angle)		0.1 °
U-04	Rotate angle (electrical angle)		0.1 °
U-05	Bus voltage		V
U-06	Module temperature		0.1℃
U-07	Input command pulse speed		Rpm
U-08	Pulse value of shift	（0000～9999）*1	Command
U-09	command	（0000～9999）*10000	pulse
U-10	Rotate angle	（0000～9999）*1	encoder pulse
U-11	(encoder value)	（0000～9999）*10000	
U-12	Pulse value of input	（0000～9999）*1	Pulse
U-13	command	（0000～9999）*10000	command
U-14	Pulse value of	（0000～9999）*1	Pulse

U-15	feedback command	（0000～9999）*10000	command
U-16	Current position	（0000～9999）*1	encoder pulse
U-17	(Accumulated)	（0000～9999）*10000	
U-18	Current, 1-bit decimal		0.1A
U-19	Analog input V-REF		0.01V
U-20	Analog input T-REF		0.01V
U-21	I/O signals status		
U-22	I/O terminals status		

U-21 displays I/O signals status



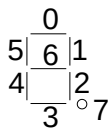
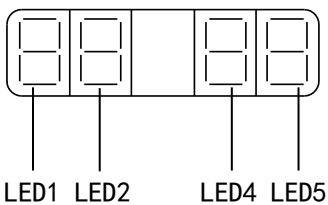


Diagram 1 Diagram 2

In diagram 1, LED4 and LED5 stand for input signals status, and LED1 and LED2 stand for output signals status. In diagram 2 there shows the segment No. of each LED.

The description of led display please refer to《DS2 series servo drive user manual》。

U-22 displays I/O terminals status



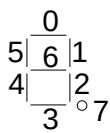


Diagram 1 Diagram 2

In diagram 1, LED5 stands for input signals status, and LED2 stands for output signals status. In diagram 2 there shows the segment No. of each LED.

The description of led display please refer to DS2 series servo drive user manual.

4. Auxiliary Function

Use the operate panel to do application in auxiliary function mode.

Group No.	Content
F0-**	Check system information, display the system code and data
F1-**	Auxiliary run mode, display the auxiliary run command and result
F2-**	Set the motor code
F3-**	Check the alarm information, clear the alarm
F4-00	Reset parameters to default
F5-00	External communication monitoring

- **Check System Information**

Press STATUS/ESC to switch to the auxiliary function mode. Set the group No. to 0 to check system information. Press INC or DEC key to select different No., and press and hold ENTER key to check current information. Press STATUS/ESC key to return.

The following table describes the meaning of each No.:

Function No.	Description	Function No.	Description
F0-00	Motor Code	F0-01	Servo Series
F0-02	Servo Model	F0-03	Produce Date: Year
F0-04	Produce Date: Month	F0-05	Produce Date: Day
F0-06	Software Version	F0-07	Hardware Version

- **Auxiliary Run Mode**

Press the STATUS/ESC key to select the auxiliary function mode. Set the group No. to 1. Press INC or DEC key to select different No., and press and hold ENTER key to use current function. Press STATUS/ESC key to return.

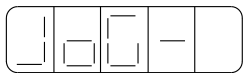
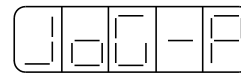
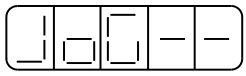
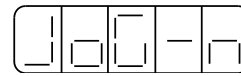
（1）**Jog (F1-00)**

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

Press ENTER to power on the motor (servo on). Press INC for forward jogging, press DEC for reverse jogging. Press STATUS/ESC key to power off the motor (servo off), and

press STATUS/ESC key again to return.

4 different states of jogging:

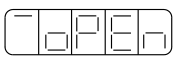
State	Panel Display	State	Panel Display
Idle		Forward Jogging	
Servo ON		Reverse Jogging	

（2）**Trial Operation (F1-01)**

Make sure that the motor shaft is not connected to the machine before trial operation!

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

Set the display value to 1, and press and hold ENTER key to enter trial operation mode. The operate panel displays:



If correctly wired, the motor would rotate in 5 seconds in forward direction (fixed to counter-clockwise), otherwise the motor would shock or vibrate, raising an alarm for worse. In this case the power must be switched off immediately and check the wiring again.

Press STATUS/ESC key to return.

（3）**Current Offset Auto-Adjustment (F1-02)**

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

Select F1-02 and enter current offset auto-adjustment function, and the panel displays “rEF”.

Press ENTER key to start current offset auto-adjustment, and the panel displays blinking “rEF”.

About 5 seconds later auto-adjustment is finished, and the panel displays “donE” to inform that the function is already finished.

Press STATUS/ESC key to return.

（4）**Speed command offset auto-adjustment (F1-03)**

Select F1-03 and enter speed command offset auto-adjustment function, and the panel displays “rEF_o”.

Press ENTER key to start speed command offset auto-adjustment, and the panel displays blinking “rEF_o”.

About 1 second later, auto-adjustment is finished, and the panel displays “donE” to inform that the function is already finished.

Press STATUS/ESC key to return.

（5）**Torque command offset Auto-Adjustment (F1-04)**

Select F1-04 and enter torque command offset auto-adjustment function, and the panel displays “rEF_o”.

Press ENTER key to start torque command offset auto-adjustment, and the panel displays blinking “rEF_o”.

About 1 second later, auto-adjustment is finished, and the panel displays “donE” to inform that the function is already finished.

Press STATUS/ESC key to return.

（6）**Forced Servo enables (F1-05)**

0：Cancel forced servo enables

1：Forced servo enables

- Change the motor type

Set the group No. to 2 in auxiliary function mode.

The servo drive can match multi-servo-motor with close power classes printed on the nameplate of each motor. When user needs to change a motor, please refer to the Quick Guide to ensure the motor match the driver.

The following steps are how to change motor type.

（1）Press STATUS/ESC key to select Auxiliary Function mode.

（2）Press INC or DEC key to set group No. to 2, and press ENTER to confirm.

（3）Press and hold ENTER key to display current motor type.

（4）Press INC, DEC or ENTER key to show the motor type and press and hold ENTER key to confirm.

（5）Repower on the servo drive to make this function effective.

- Check Alarm Information

Set group No. to 3 in auxiliary function mode and enter checking alarm information mode.

The following steps show how to check alarm information.

（1）Press STATUS/ESC key to select Auxiliary Function mode.

（2）Press INC or DEC key to set group No. to 3, and press ENTER key.

（3）Press INC, DEC or ENTER key to modify the alarm No.

（4）Press and hold ENTER key to display corresponding alarm information.

The descriptions of alarm information please refer to **DS2 series servo drive user manual.**

- Reset Parameters to Default

The following steps show how to reset parameters to default.

（1）Press STATUS/ESC key to select Auxiliary Function.

（2）Press INC or DEC key to set group No. to 4, and press ENTER key.

（3）Press and hold ENTER key, and the panel displays “0” and is blinking.

（4）Set the value to 1. Press and hold ENTER key to confirm.

（5）Repower on the drive and the parameters are all reset to default.

- External monitoring

Select F5-00 in auxiliary function, the panel displays “C-OUT” which means external monitoring mode, COM1 is effective, operate panel is ineffective. At this time user can debug the servo via PC.

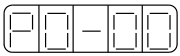
Press STATUS/ESC to return.

5. Parameter Setting

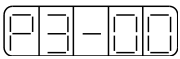
Select or adjust the functions via parameter setting. The following steps show how to change a parameter.

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

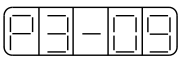
（1）Press the STATUS/ESC key to select the parameter setting mode.



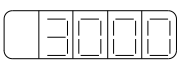
（2）At this time the second LED is blinking, and press INC or DEC key to set the group No. to 3. Press ENTER key to confirm.



（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 in changed from 2000 to 3000.

Repeat steps 2 to 4 to change the parameter again.

（5）Press STATUS/ESC key to return.

6. Alarm

Alarm code will pop up (E-XXX) if there is error in servo. The alarm state is invisible when there is no error in servo. Press ENTER to reset the alarm.

It is no need to reset the alarm when the servo is OFF because of error.

Notes: when there is alarm, please clear the alarm reasons, then reset the alarm.

►► Parameter list

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

Parameter：PX－XX＝××　××

PX－XX. H↵　↳PX－XX.L

1. P0: function selection (Address：0000～00FF)

P0-	Function	Unit	Default	Range	Effective
00	Main mode	-	0	0	
01	Submode 1 0: idle 1: torque (command) 2: torque (analog) 3: speed (command) 4: speed (analog) 5: position (internal) 6: position (pulse) 7: speed (pulse)	-	6	0～7	○
02	Submode 2 0~7: same as submode 1	-	0	0～7	○
03	Modbus station of serial port 2	-	1	1～255	●
04	Parameter of serial port 2	-	n.2206	n.0000～n.2209	●
05	Rotation direction selection 0:From the side view of motor load, CCW is	-	0	0、1	●

	forward rotate 1:From the side view of motor load, CW is forward rotate				
06	06.L: stop mode when servo OFF or alarm. DS2 series default is inertia stop. Keep the inertia motion after stop.	-	2	0～2	●
	06.H: over range (OT) stop mode 0~1: inertia stop. Keep inertia motion after stop. 2: deceleration stop. Change to zero clamp after stop. Torque: P4-06 urgent stop torque. 3: deceleration stop. Change to inertia motion after stop. Torque: P4-06 urgent stop torque.	-	2	0～3	●
07	T-REF distribution 0: undefined. 1: make T-REF as external torque limit input 2: undefined. 3: when P-CL, N-CL is ON, make T-REF as external torque limit input.	-	0	0～3	○
08	V-REF distribution 0: - 1: make V-REF as external speed limit input.	-	0	0、1	○

2. P1: control parameters (Address：0100～01FF)

P1-	Name	Unit	Default	Range	Effective
00	The gain of speed loop	1Hz	100	1～5000	√
01	Speed loop integral time	0.1ms	400	1～50000	√
02	The gain of position loop	1/s	100	1～2000	√

03	Reserved				
04	The gain of second speed loop	1Hz	250	1～5000	√
05	Integral time of second speed loop	0.1ms	10000	1～50000	√
06	The gain of second position loop	1/s	250	1～2000	√
07	Reserved				
08	Reserved				
09	The gain of position loop feedforward	1%	0	0～100	√
10	Feedforward filter time	0.01ms	0	0~65535	√

3. P2: position control（0200～02FF）

P2-	Function	Unit	Default	Range	Effective
00	Command pulse state 0：Symbol+ Pulse train 1：AB phase pulse（90° phase, 4-time mode） 2：Pulse+ direction	-	2	0,1,2	●
01	Position command filter selection 0：First order inertia filtering 1：smoothing filtering	-	0	0,1	●
02	Electronic gear ratio (molecular)	-	1	1～65535	√
03	Electronic gear ratio (denominator)	-	1	1～65535	√
04	Position command filter time	1ms	0	0～100	●
05	Reserved				
06	Command pulse frequency at rated speed	100Hz	5000	1～10000	○
07	Speed command pulse filter time	0.1ms	20	0～1000	√
08	Reserved				
09	Reserved				
10	Internal position mode setting	-	n.0000		●

11	First segment pulse (low bit)	1	0	-9999～+9999	○
12	First segment pulse (high bit)	1	0	-9999～+9999	○
13	First segment speed	0.1rpm	0	0～50000	○
14	First segment adjustment time	1ms	0	0～65535	○
15	First segment command filter time	0.1ms	0	0～65535	○
P2-16~P2-90 are 2~16 segments parameter setting.					
94. xx□x	Find the original point 0: invalid 1: valid	-	0	0~1	●
94. xxx□	The signal quantity pass the Z phase signal at the direction of leaving the limit switch	A	2	1～F（Hex）	●
95	The speed of closing the proximity switch	0.1rpm	600	0~50000	○
96	The speed of leaving the proximity switch	0.1rpm	100	0~50000	○

4. P3: speed control（0300～03FF）

P3-	Name	Unit	Default	Range	Effective
00	Analog value of rated speed	0.01V	1000	150～3000	○
01	Internal setting speed 1	rpm	100	-5000～+5000	√
02	Internal setting speed 2	rpm	200	-5000～+5000	√
03	Internal setting speed 3	rpm	300	-5000～+5000	√
04	JOG speed	rpm	100	0～1000	√
05	Soft start acceleration time	1ms	0	0～65535	○
06	Soft start deceleration time	1ms	0	0～65535	○
07	Speed command filter time	0.01ms	0	0～65535	○
08	Speed feedback filter time	0.01ms	20	0～65535	○

09	Max speed limit (MAX speed)	rpm	Different for each type	0～5000	●
10	Speed command input dead area voltage	0.01V	0	0～100	○

5. P4: torque control（0400～04FF）

P4-	Name	Unit	Default	Range	Effective
00	Analog value of rated torque	0.01V	1000	150～3000	○
01	Torque command filter time	0.01ms	0	0～65535	○
02	Forward torque limit	1%	300	0～300	√
03	Reverse torque limit	1%	300	0～300	√
04	Forward external torque limit	1%	100	0～300	√
05	Reverse external torque limit	1%	100	0～300	√
06	Urgent stop torque	1%	300	0～300	○
07	Internal speed limit when torque controlling	rpm	2000	1～5000	√
08	Reserved				
09	Internal torque command setting	1%	0	-300～300	√
10	Torque command input dead area voltage	0.01V	0	0～100	○

6. P5: signal parameter setting（0500～05FF）

P5-	Name	Unit	Default	Range	Effective
00	Positioning finished width /COIN	Command pulse	7	0～250	○
01	Zero clamp speed /ZCLAMP	rpm	10	0～300	○
02	Rotation checking speed /TGON	rpm	20	1～1000	○
03	Coincide speed checking signal width /V-CMP	rpm	10	1～250	○

04	Near output signal width /NEAR	Command pulse	50	0～10000	○
05	Offset pulse limit value	256* command pulse	1000	0～65535	○
06	Servo OFF delay time (brake command)	1ms	0	0～500	○
07	Brake command output speed	rpm	100	0～5000	○
08	Brake command wait time	1ms	500	10～1000	○
09	Input filter time	5ms	0	0~100	√
10	/S-ON servo signal 0000: signal is always ineffective 0001: input positive signal to SI1 0002: input positive signal to SI2 0003: input positive signal to SI3 0004: input positive signal to SI4 0005: input positive signal to SI5 0006: input positive signal to SI6 0010: signal is always effective 0011: input negative signal to SI1 0012: input negative signal to SI2 0013: input negative signal to SI3 0014: input negative signal to SI4 0015: input negative signal to SI5 0016: input negative signal to SI6	—	0001	0000-0016	●
11	/P-CON proportion action command ditto	—	0000	0000-0016	●
12	/P-OT forward drive prohibition	—	0003	0000-0016	●

	ditto				
13	/N-OT reverse drive prohibition ditto	—	0004	0000-0016	●
14	/ALM-RST alarm reset ditto	—	0002	0000-0016	●
15	/P-CL forward external torque limit ditto	—	0000	0000-0016	●
16	/N-CL reverse external torque limit ditto	—	0000	0000-0016	●
17	/SPD-D internal speed selection ditto	—	0000	0000-0016	●
18	/SPD-A internal speed selection Same to above	—	0005	0000-0016	●
19	/SPD-B internal speed selection ditto	—	0006	0000-0016	●
20	/C-SEL control mode selection ditto	—	0000	0000-0016	●
21	/ZCLAMP zero clamp ditto	—	0000	0000-0016	●
22	/INHIBIT command pulse prohibition ditto		0000	0000-0016	●
23	/G-SEL gain switch ditto	—	0000	0000-0016	●
24	/CLR clear pulse offset ditto	—	0000	0000-0016	●

25	/CHGSTP step change signal ditto	—	0000	0000-0016	●
26	Reserved				
27	Reserved				
28	/COIN positioning finished 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 0012: output negative signal from SO2 0013: output negative signal from SO3	—	0001	0000-0013	●
29	/V-CMP speed coincide checking ditto	—	0000	0000-0013	●
30	/TGON rotation checking ditto	—	0000	0000-0013	●
31	/S-RDY ready ditto	—	0003	0000-0013	●
32	/CLT torque limit ditto	—	0000	0000-0013	●
33	/VLT speed limit checking ditto	—	0000	0000-0013	●

34	/BK brake lock ditto	—	0000	0000-0013	●
35	/WARN warn ditto	—	0000	0000-0013	●
36	/NEAR near ditto	—	0000	0000-0013	●
37	/ALM alarm ditto	—	0002	0000-0013	●
38	/Z encoder Z signal ditto	—	0000	0000-0013	●

►► Alarm Information

Alarm Code	Description	Reason	Solution
E-001	Program damage	program self-test failed	Re-download the program or contact SPECTRA or an authorized distributor
E-002	Parameter damage	Parameter self-test failed	Restart the drive to reset the parameters. If it occurs for many times please contact SPECTRA or an authorized distributor
E-003	Bus over-voltage	Power grid is over voltage or need a regenerative resistor; the regenerative resistor damage or its value is too large	Check the power grid; connect and check the regenerative resistor
E-004	Bus under	Power grid is under voltage	Check the power grid

	voltage		
E-005	Regenerative resistor error	Regenerative resistor is ineffective	Check the connection of regenerative resistor
E-006	Module over temperature	Run with large load for long time	Reduce the load, and enhance the cooling system, or check if the fan is revolving when motor is ON; cool down the ambient temperature
E-007	Over current	UVW of drive is short circuit or the motor is error	Replace the damaged motor; check the UVW wiring.
E-008	Over speed	Motor speed is too fast, motor UVW connection is error	Check if there is other device that make motor revolve too fast; check the UVW wiring.
E-009	Analog input error	Input voltage error when 2-channe analog zero calibrating	Input correct voltage when zero calibration for analog
E-010	Position offset too large	The difference between set position and actual position exceeds the limit value	Check if the motor stalled, decrease the set position speed, increase offset pulse limit value P5-05
E-011	Motor UVW is short circuit	External is short circuit when fist self-test	Check the UVW wiring of motor, or replace the damaged motor
E-012	Motor UVW current error	Current collection circuit error	Check the UVW wiring of motor, or replace the damaged drive
E-013	Encoder UVW wire break	Encoder wiring error, encoder broken, encoder is	Check the wiring of encoder, and re-connect the encoder after

		not connected	power-off, or replace the damaged encoder
E-014	Encoder ABZ wire break	Encoder wiring error, encoder broken, encoder is not connected	Check the wiring of encoder, and re-connect the encoder after power-off, or replace the damaged encoder
E-015	Speed changes too fast (encoder feedback error)	The encoder wiring is error, or the encoder has interference	Check the wiring of encoder, or add shield layer for the encoder wire
E-016	Overload	Run overload for long time	Reduce the overload running time, change a motor with larger rated power
E-017	Power off when running	Bus voltage is too low when running	Re-power on after the bus voltage is normal
E-018	Erase parameter error	Voltage is too low when power on, cannot erase the parameter	Check the power supply and re-power on
E-031	Motor code error	Motor code cannot match to drive type	Set the motor code in F2-00 again
E-032	Initialization error	System chip is damaged	Contact SPECTRA or an authorized distributor

►►Debug steps

b) Please check the products before power on, make sure the devices are not significant damage.

c) Connect the cables correctly. Connect U, V, W one-to-one, don't cross them.

d) Power on, panel display: bb;

e) Enter F2-00，set the correct motor code.

f) After power on again，proceed to current Offset Auto-Adjustment，please refer to auxiliary run mode；

g) Set F1-01=1, check if the motor can work normally. If yes, enter F1-00. If not, check the cables.

h) Enter F1-00 and proceed to jog test-running, if work normally, connect to motor.

i) Before start the devices, set the parameters of servo according to actual application, and adjust in real-time.

►►Motor code

Motor Type	Capacity KW	Torque Nm	Rotate speed RPM	Current A	Overload	Motor code
MS-60ST-M00630	0.2	0.637	3000	1.8	3	1003
MS-60ST-M01330	0.4	1.27	3000	2.5	3	0004
MS-80ST-M02430	0.75	2.39	3000	3.0	3	0011
MS-90ST-M02430	0.75	2.4	3000	3.0	3	0021
MS-110ST-M04030	1.2	4	3000	5.0	3	0031
MS-110ST-M05030	1.5	5	3000	6.0	3	0032
MS-130ST-M06025	1.5	6	2500	6.0	3	0042
MS-130ST-M10015	1.5	10	1500	6.0	2.5	0044
MS-130ST-M07725	2.0	7.7	2500	7.5	3	0043
MS-130ST-M15015	2.3	15	1500	9.5	2	0046
MS-180ST-M19015	3.0	19	1500	12.0	2.5	0052
MS-180ST-M21520	4.5	21.5	2000	9.5	2.5	0150
MS-180ST-M27015	4.3	27	1500	10	2.5	0151
MS-180ST-M35015	5.5	35	1500	12	2	0152
MS-180ST-M48015	7.5	48	1500	20	2	0153

►► Suitable motor code for each servo drive

Servo drive	Motor code
DS2-20P2-AS	1003
DS2-20P4/-A/-AS	0004
DS2-20P7/-A/-AS	**0011（Default setting）**
	0021
DS2-21P5/-A/-B	0031
	0032
	0042
	0044（Default setting）
DS2-22P3-A	0043
	0046（Default setting）
DS2-23P0-A	**0052（Default setting）**
DS2-45P5-A	0150
	0151
	0152（Default setting）
DS2-47P5-A	**0153（Default setting）**