



DS3 series servo

User manual

►► Safety notes

■ Confirmation after get the products

- ✓ If servo drive is missing parts, broken, type wrong, please do not install it.

■ Installation

- ✓ Cut off all the power before installation.

■ Wiring

- ✓ Cut off all the power before wiring.
- ✓ Connect the AC power to the power terminals on the servo drive.
- ✓ Do not connect output terminal U, V, W of servo drive to 3-phase power.
- ✓ Ground the servo drive with 2mm² cables.

■ Running and maintenance

- ✓ Please install the panel guard when power on.
- ✓ Do not touch the terminals within 5 minutes after power off.
- ✓ Do not connect servo drive with loader when test-running.
- ✓ After connect to the loader, please set suitable parameters before running.
- ✓ Do not change the wiring when power on.
- ✓ Do not touch the radiator when running.

►► Product arrival confirmation

1. Confirm the product as the following items.

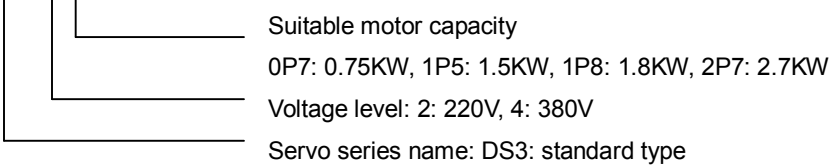
| Item | Remark |
|---|---|
| The product type is accord with the ordered one | Please confirm the label of servo drive and motor |
| Servo motor rotation axis is turning well | Can turn by manual. Cannot turn with brake |
| Is the product broken? | Please check if there is broken because of transportation |
| Is the screw loose? | Check the screw with screw driver |
| Motor code | Check the motor code on servo drive and motor, if they are the same |

If there is inconsistent item, please contact XINJE sales department.

2. Type

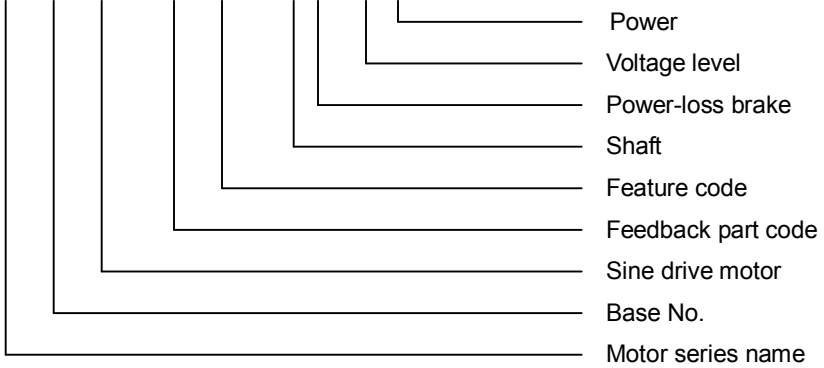
1) Servo drive

DS3 - 2 1P8



2) Servo motor

MS - 110 ST - M 06030 A Z - 2 1P8



Base No.: 60, 80, 110, 130;

Feedback part code: M (optical pulse encoder)

Feature code: first 3-bit means rated torque; last 2-bit means rated speed

00630: rated torque 0.6N·m, rate speed: 3000rpm

02430: rated torque 2.4N·m, rate speed: 3000rpm

06030: rated torque 6.0N·m, rate speed: 3000rpm

10015: rated torque 10.0N·m, rate speed: 1500rpm

Shaft type: A-no key, B-with key

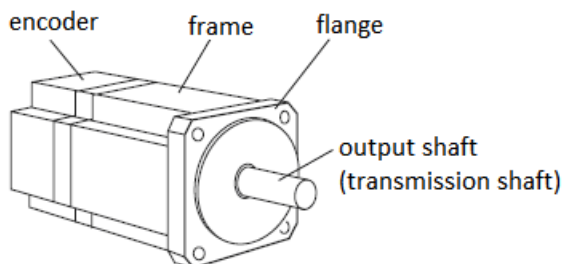
Power-loss brake: vacant-no, Z-with DC99V power-loss brake

Voltage level: 2—220V, 4-380V

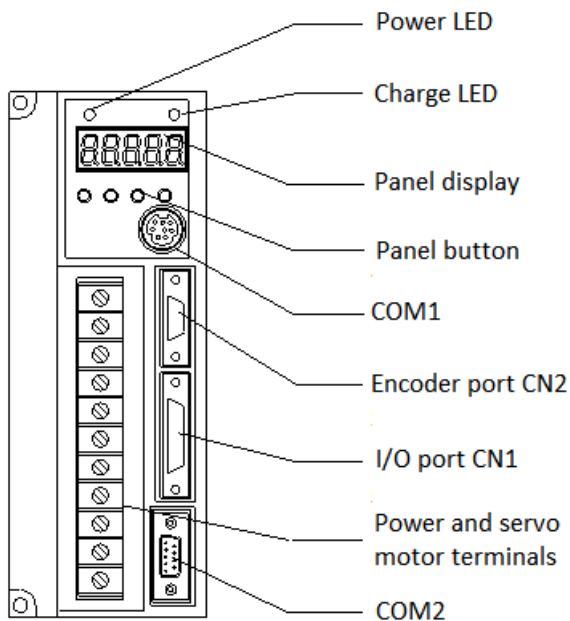
Power: 0P2-0.2KW; 0P4-0.4KW; 0P7-0.75KW; 1P5-1.5KW; 1P8—1.8KW

3. Part name

1) Servo motor



2) Servo drive



Power LED: turn on when servo drive is power on.

Charge LED: turn on when servo drive is power on. After power off, it will be on until there is no charge in the capacitance of servo drive. At this time, please do not touch the servo drive.

Panel display: to display the servo state, alarm and parameters.

Panel button: to set the parameters.

COM1: connect to PC to debug the servo.

CN2: connect the encoder.

CN1: command input, sequence I/O signal

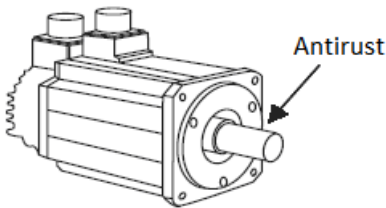
Power and servo motor terminals: to connect the power supply and power cable of servo motor.

COM2: connect with PLC, HMI, ect.

►► Installation

1. Servo motor

MS series servo motor can be installed vertical or horizontal. If it is installed unsuitable or is in wrong location, the motor life will be shortened.



Notes:

Please clear the antirust on the shaft with thinner before install the motor. The thinner cannot touch other parts of motor.

1) Storage temperature

Please store the motor in the range of -20~+60°C

2) Installation location

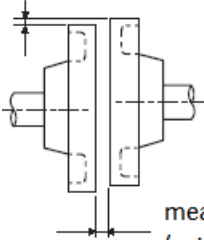
MS series servo motor should be installed under below location:

- Indoor, no corrosive, flammable, explosive gas
- Good ventilation, less dusts, humidity
- Ambient temperature is in the range of 0~50 °C
- Relative humidity is in the range of 20%~90% RH, no condensation
- Easy to clean and check

3) Concentricity

Please use coupler when connect to the machine, make the shaft center of motor and machine on the same line. The installation of motor should be accord with the below requirements.

measure this in 4 locations, the difference must be less than 0.03mm
(rotate with coupler)



measure this in 4 locations, the difference must be less than 0.03mm
(rotate with coupler)

If the concentricity is not enough, it may cause vibration and damage the shaft.

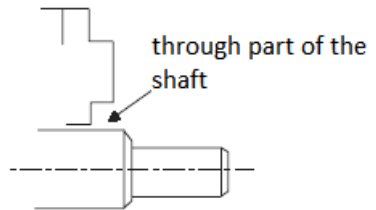
Do not impact the motor shaft when install the coupler. Otherwise the monitor on the other end of loader shaft will be broken.

4) Installation direction

MS series servo motor can be installed vertical or horizontal.

5) The solution to prevent from water or oil drops

Seal the through part of the shaft. Please order the motor with oil sealed.



6) The tension of the cables

Do not make large tension for the cable especially for the 0.2mm², 0.3mm² cables.

2. Servo drive

DS3 series servo drive is base-type. Please install it correctly otherwise there will be error.

1) Storage temperature

Store the servo drive in the range of -20~+85 °C.

2) Installation location

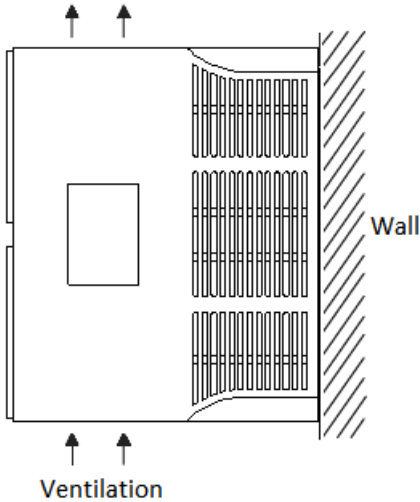
Install the drive as the following item:

| Location | Notes |
|------------------------------|---|
| Install in the control panel | Design the control panel size, servo configuration and cooling mode, to decrease the ambient temperature under 50°C |
| If close to the heater | to decrease the ambient temperature under 50°C |

| | |
|-------------------------------|--|
| If close to the vibration | Install the shockproof device on the installation side of servo drive |
| If close to the corrosive gas | To prevent the corrosive gas from the servo drive, otherwise there will be error for the circuit. |
| Others | Do not install in the location of high temperature, high humidity, full of dusty and metal powder. |

3) Installation direction

The direction must be vertical to the wall. Cool the servo by natural convection or fan.

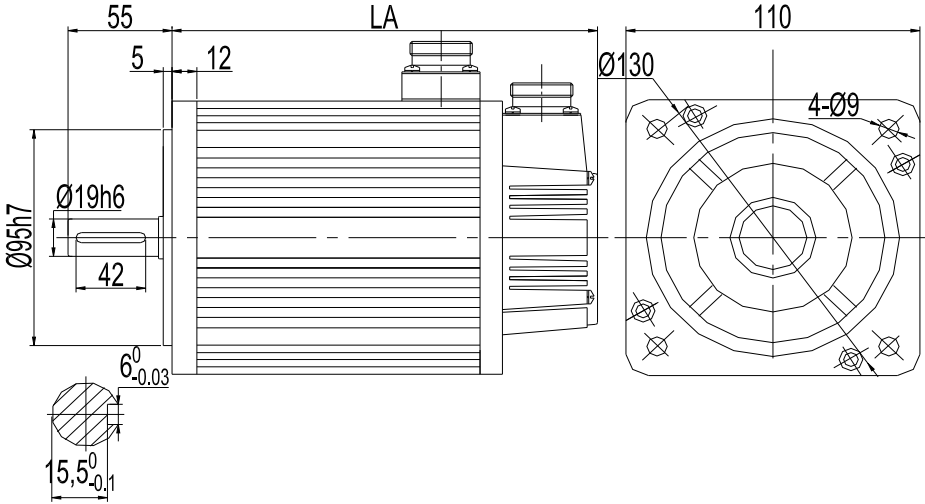


4) Installation standard

Please install the servo drive as the below figure.

(2) MS-110ST-M06030□□-21P8 installation dimension

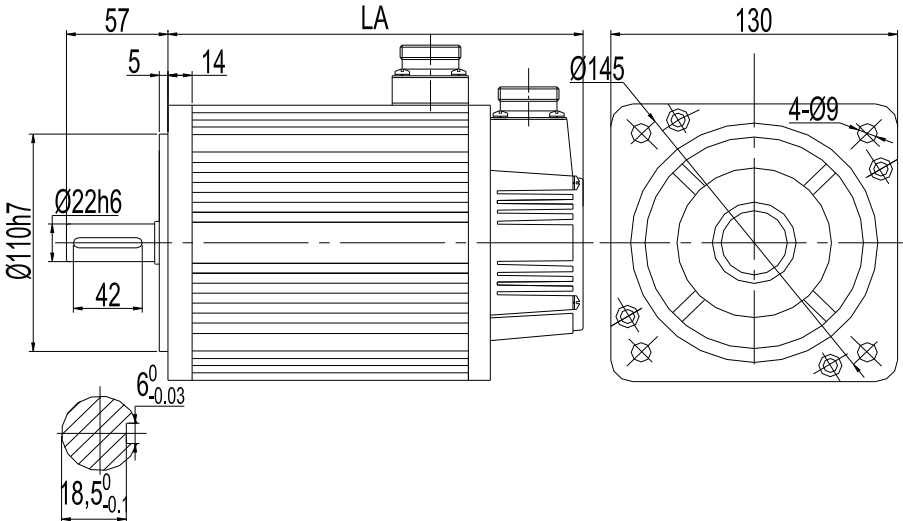
Unit: mm



| Type | LA |
|------------------------|-----|
| MS-110ST-M06030□□-21P8 | 219 |

(3) MS-130ST-M10015□□-21P5 installation dimension

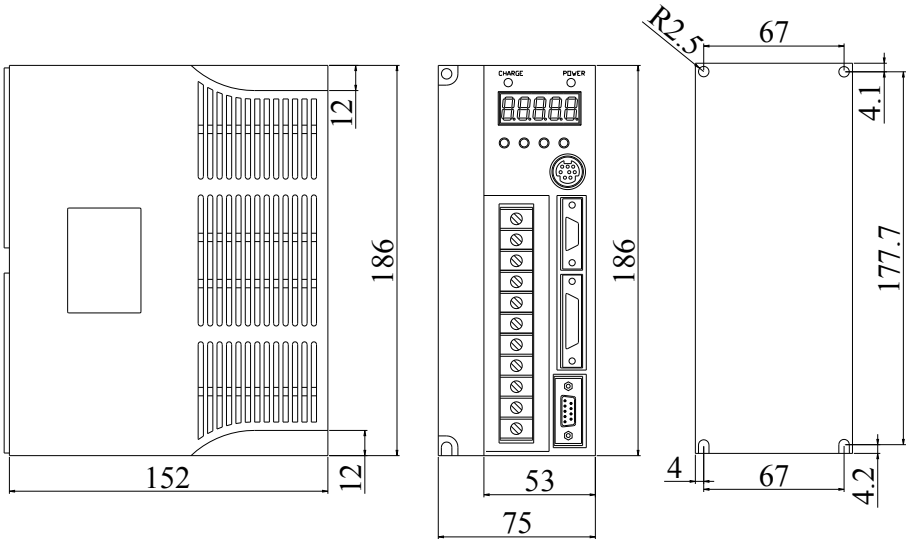
Unit: mm



| Type | LA |
|------------------------|-----|
| MS-130ST-M10015□□-21P5 | 213 |

2. Servo drive

Unit: mm



▶▶ Wiring

1. Main circuit terminals

| Terminal | Function | Explanation |
|---------------------------------|--|--|
| ⊕ ₁ , ⊕ ₂ | connect to the DC reactor | ⊕ ₁ and ⊕ ₂ are shorted together. Connect reactor between ⊕ ₁ and ⊕ ₂ to suppress high harmonics |
| R, S, T | Power supply input | 3-phase or single phase 200~240V, 50/60Hz |
| ⊕ | Ground | Connect to the ground terminal of power supply and motor and ground |
| U, V, W | Connect to the motor | Connect to the motor |
| P+, PB | Connect to the regenerative braking resistor | Connect regenerative braking resistor between P+ and PB |

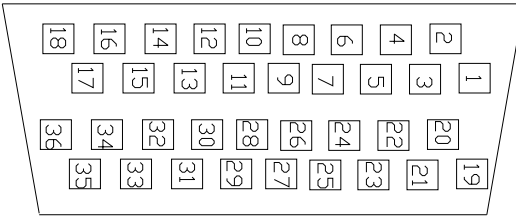
Notes: connect to any of the 2 terminals among R, S, T if the power supply is single phase.

2. Servo motor winding connector terminals

| Signal | Motor terminal | |
|--------|----------------|-----------------|
| | 80 series | 110, 130 series |
| PE | 4 | 1 |
| U | 1 | 2 |
| V | 3 | 3 |
| W | 2 | 4 |

3. CN1 terminal arrangement

Look at the solder side:



| No. | Terminal | Explanation | No. | Terminal | Explanation |
|-----|----------|-------------------------|-----|----------|---|
| 1 | GND | Z phase | 19 | V-REF | Analog set, speed |
| 2 | CZ | transistor output | 20 | GND | |
| 3 | SO3- | Output terminal 3 | 21 | T-REF | Analog set, torque |
| 4 | SO3+ | | 22 | GND | |
| 5 | SO2- | Output terminal 2 | 23 | PL1 | Power supply for open collector |
| 6 | SO2+ | | 24 | PULS- | |
| 7 | SO1- | Output terminal 1 | 25 | PULS+ | Input pulse A (pulse signal) |
| 8 | SO1+ | | 26 | SIGN- | |
| 9 | +24V | +24V for input terminal | 27 | SIGN + | Input pulse B (pulse direction) |
| 10 | SI7 | Input terminal 7 | 28 | PL2 | Power supply for open collector command |
| 11 | SI6 | Input terminal 6 | 29 | NC | Vacant |
| 12 | SI5 | Input terminal 5 | 30 | ZO+ | Z phase differential output |
| 13 | SI4 | Input terminal 4 | 31 | ZO- | |

| | | | | | |
|----|-----|------------------|----|-----|-----------------------------|
| 14 | NC | Vacant | 32 | BO+ | B phase differential output |
| 15 | SI3 | Input terminal 3 | 33 | BO- | |
| 16 | SI2 | Input terminal 2 | 34 | AO+ | A phase differential output |
| 17 | SI1 | Input terminal 1 | 35 | AO- | |
| 18 | GND | Ground | 36 | GND | Ground |

4. I/O signal

(1) Input signal

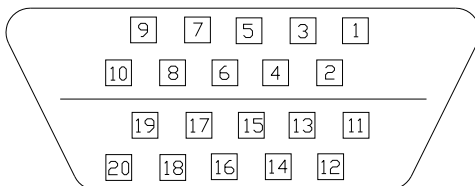
| Type | Input terminal | Function |
|---------------|----------------|--|
| Digital input | SI1~SI7 | Multi-functional input |
| Pulse input | PULS+, PULS- | P2-00=1: A phase pulse; P2-00=2: pulse |
| | SIGN+, SIGN- | P2-00=1: B phase pulse; P2-00=2: direction |
| Analog input | V-REF | Set speed or limit speed |
| | T-REF | Set torque or limit torque |

(2) Output signal

| Type | Output terminal | Function |
|---------------------|-----------------|-----------------------------|
| Optical output | SO1~SO3 | Multi-functional output |
| Transistor output | CZ, GND | Z phase transistor output |
| Differential output | AO+, AO- | A phase differential output |
| | BO+, BO- | B phase differential output |
| | ZO+, ZO- | Z phase differential output |

5. CN2 terminal arrangement

Look at the solder side:



| Drive port | Motor encoder port | | Name | Drive port | Motor encoder port | | Name |
|------------|--------------------|----------------|--------|------------|--------------------|----------------|------|
| | 80 series | 110/130 series | | | 80 series | 110/130 series | |
| 1 | 9 | 4 | A+ | 2 | 13 | 7 | A- |
| 3 | 4 | 5 | B+ | 4 | 14 | 8 | B- |
| 5 | 7 | 6 | Z+ | 6 | 5 | 9 | Z- |
| 7 | 2 | 2 | +5V | 8 | | | +5V |
| 9 | | | +5V | 10 | | | +5V |
| 11 | 6 | 10 | U+ | 12 | 8 | 13 | U- |
| 13 | 10 | 11 | V+ | 14 | 12 | 14 | V- |
| 15 | 11 | 12 | W+ | 16 | 15 | 15 | W- |
| 17 | 3 | 3 | GND | 18 | | | GND |
| 19 | | | GND | 20 | | | GND |
| Cover | 1 | 1 | SHIELD | | | | |

6. Communication port

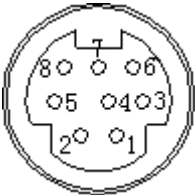
(1) COM1

COM1 support RS232 mode, connect with PC to debug the servo. When communicate with PC, set F5-00 to C-OUT mode, the panel operation is invalid. If exits C-OUT, the communication between PC and servo will be invalid.

The communication parameter of COM1 cannot be modified:

Baud rate: 19200bps, data bit: 8, stop bit: 1, even checking, Modbus station 1.

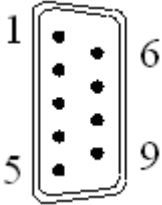
Look at the servo drive side, COM1 pin figure:



| Pin | Name | Explanation |
|-----|------|---------------|
| 4 | RXD | RS232 receive |
| 5 | TXD | RS232 send |
| 8 | GND | RS232 ground |

(2) COM2

COM2 supports RS232 and RS485, Modbus-RTU protocol. It can realize 1:N communication. It is used to connect with HMI, PLC and other devices. Its parameters can be configured. Look at the servo drive side, COM2 pin figure:



| Pin | Name | Explanation |
|-----|------|---------------|
| 2 | RXD | RS232 receive |
| 3 | TXD | RS232 send |
| 5 | GND | RS232 ground |
| 7 | B | RS485- |
| 4 | A | RS485+ |

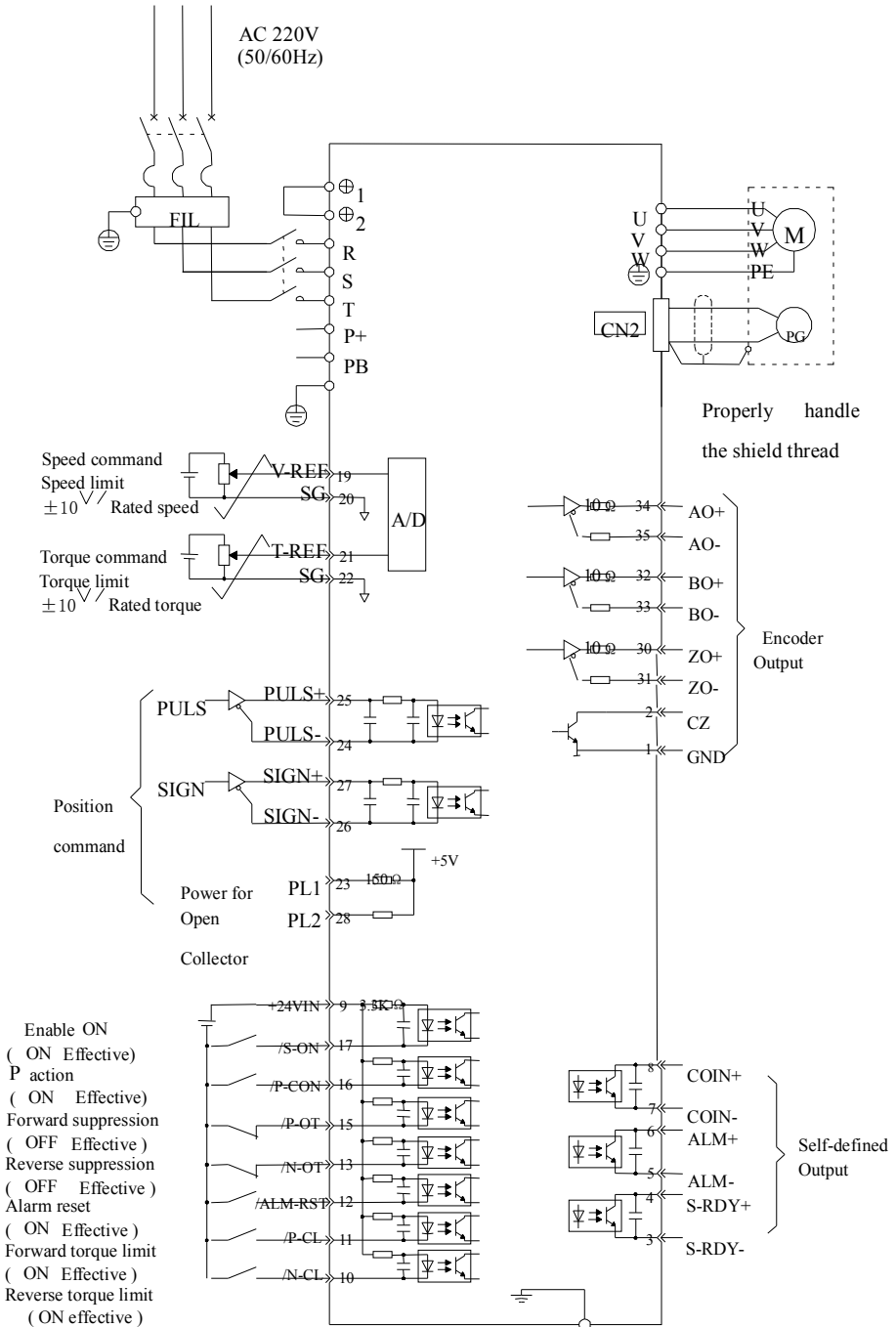
The parameters of COM2 can be set in P0-04:

| Parameter | Function | Default value | Set range |
|-----------|--------------|---------------|--|
| P0-04.0 | Baud rate | 6 | 0~9 0: 300 1: 600 2: 1200 3: 2400 4: 4800 5: 9600 6: 19200 7: 38400 8: 57600 9: 115200 |
| P0-04.1 | Data bit | 0 | 0: 8 |
| P0-04.2 | Stop bit | 2 | 0: 2-bit 2: 1-bit |
| P0-04.3 | Checking bit | 2 | 0~2 0: no checking 1: odd 2: even |

Modbus station No. can be set in P0-03.

| Parameter | Function | Unit | Default value | Set range |
|-----------|--------------------|------|---------------|-----------|
| P0-03 | Modbus station No. | — | 1 | 1~255 |

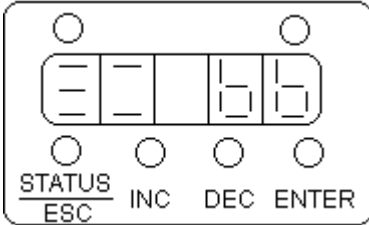
7. Connection example



▶▶ Operation panel

1. Basic operation

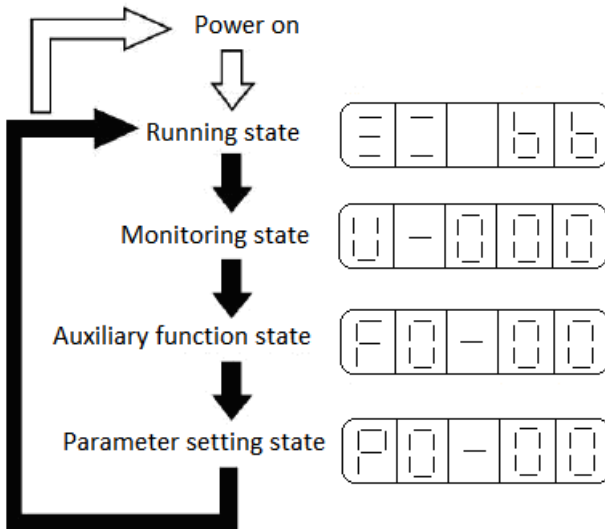
Set the parameters by operation panel. 5-bit LED displays the servo state, parameters, alarm code.



| Button | Function |
|------------|---|
| STATUS/ESC | Switch the state and return |
| INC | Increase or decrease the data, group number |
| DEC | |
| ENTER | Set and monitor the data |

The operation panel function includes running state display, parameter setting, and running command.

The basic state includes running state, monitoring state, auxiliary function state, parameter setting state, alarm state. Press STATUS/ESC to see these states one by one.



Monitoring state U-XXX: XXX means monitor parameter number

Auxiliary function state FX-XX: first X means group number, next two X means the parameter number in this group

Parameter setting state PX-XX: first X means group number, next two X means the

parameter number in this group

Alarm state E-XXX: XXX means alarm code

2. Running state

Display the servo state with LED bit and code in state display mode.

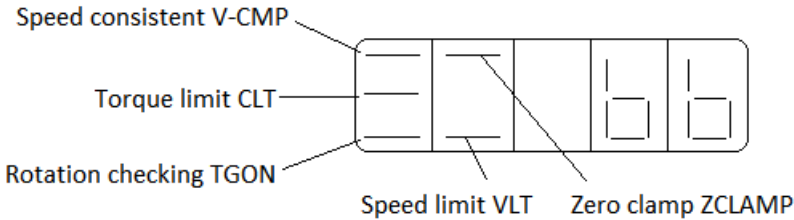
- Select the display state

Power on and enter the state display. If you cannot see the state display, press STATUS/ESC button.

- The content of state display

It is different in speed/torque mode and position mode.

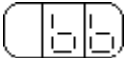
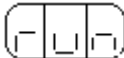
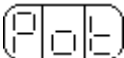
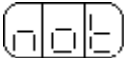
Speed/torque mode:



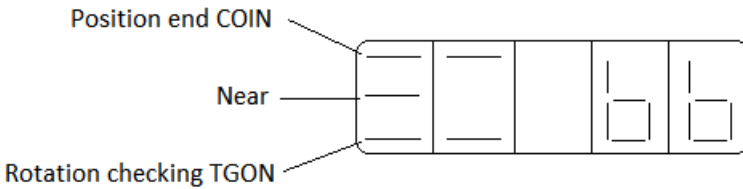
Bit display content:

| Bit data | Content |
|---------------------------|--|
| Servo enable (S-ON) | ON when servo enable |
| Speed consistent (/V-CMP) | ON when the motor speed is equal to command speed. Speed consistent range: P5-03 (unit: rpm) |
| Torque limit (/CLT) | ON when the torque is larger than setting value in speed control Forward torque limit: P4-02 Reverse torque limit: P4-03 |
| Rotation checking (/TGON) | ON when motor speed is larger than rotation checking speed Rotation checking speed: P5-02 (unit: rpm) |
| Zero clamp (/ZCLAMP) | ON when zero clamp is effective |
| Speed limit (/VLT) | ON when speed is larger than setting value in torque control Torque control speed limit: P4-07 |

Code content

| Code | Content |
|--|---|
|  | Sleep mode Servo OFF state (motor is not power on) |
|  | Running Servo enable state (motor is power on) |
|  | Forward suppression state P-OT OFF state. Refer to chapter 4-2-2 |
|  | Reverse suppression state N-OT OFF state. Refer to chapter 4-2-2 |

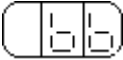
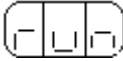
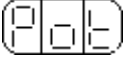
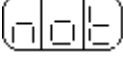
Position control



Bit display content

| Bit data | Content |
|---------------------------|--|
| Position end (/COIN) | In position control, ON when set position is equal to actual position Position range: P5-00 (unit: command pulse) |
| Near (/NEAR) | In position control, ON when set position is equal to actual position Near signal range: P5-04 |
| Rotation checking (/TGON) | ON when motor speed is higher than rotation checking speed Rotation checking speed: P5-02 (unit: rpm) |

Code content

| Code | Content |
|--|---|
|  | Sleep mode Servo OFF state. (motor is power off) |
|  | Running Servo enable state. (motor is power on) |
|  | Forward suppression state P-OT OFF state |
|  | Reverse suppression state N-OT OFF state |

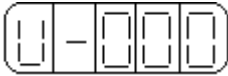
3. Monitoring state

It is capable to monitor the input command, I/O signal and internal state of servo drive by monitoring state. The monitoring state can be changed even the motor is running.


■ How to use monitoring state

Take the monitoring code U-016 to explain.

1. Press STATUS/ESC, switch to the monitoring state, press ENTER.



2. Press INC or DEC to select the monitoring code U-016, press ENTER to enter.



3. Now it will show the data in U-016. 0 means the servo drive is in normal state.



4. Press ENTER, the monitoring code will increase by 1.
5. Press STATUS/ESC to return to monitoring code switch state.

Monitoring code

| Code | Content | Unit |
|-------|---------------------------------|------|
| U-000 | Motor actual speed | rpm |
| U-001 | Input speed command | rpm |
| U-002 | Internal torque command | % |
| U-003 | Rotation angle (physical angle) | 0.1° |

| | | | |
|-------|------------------------------------|-------------------|---------|
| U-004 | Rotation angle (electricity angle) | | 0.1° |
| U-005 | Bus voltage | | V |
| U-006 | Module temperature | | 0.1 °C |
| U-007 | Input command pulse speed | | rpm |
| U-008 | Shift command | (0000~FFFF) *1 | Command |
| U-009 | pulse value | (0000~FFFF) *9999 | pulse |
| U-010 | Rotation angle | (0000~FFFF) *1 | Encoder |
| U-011 | (encoder value) | (0000~FFFF) *9999 | pulse |
| U-012 | Input command | (0000~FFFF) *1 | Command |
| U-013 | pulse quantity | (0000~FFFF) *9999 | pulse |
| U-014 | Feedback | (0000~FFFF) *1 | Command |
| U-015 | command pulse quantity | (0000~FFFF) *9999 | pulse |
| U-016 | Current position | (0000~FFFF) *1 | Encoder |
| U-017 | (accumulative) | (0000~FFFF) *9999 | pulse |
| U-018 | Present current (precision=0.1) | | 0.1A |
| U-019 | Analog input V-REF | | 0.01V |
| U-020 | Analog input T-REF | | 0.01V |
| U-021 | I/O signal state | | |
| U-022 | I/O terminal state | | |

U-021 can display the I/O signal state. Next we will explain them.

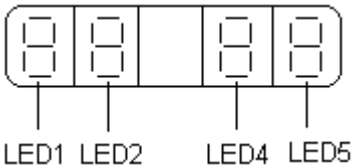


Figure 1

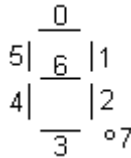


Figure 2

In figure 1, the input state will show in LED4 and LED5. The output state will show in LED1 and LED2. Figure 2 is the segment code of LED.

Input signal state

| Segment Code | Explanation | Modbus address | Segment Code | Explanation | Modbus address |
|--------------|-------------------------------|----------------|--------------|-------------------------------------|----------------|
| LED4_0 | /SPD-A internal speed setting | 0x0808 | LED5_0 | /S-ON servo signal | 0x0800 |
| LED4_1 | /SPD-B internal speed setting | 0x0809 | LED5_1 | /P-CON proportional action command | 0x0801 |
| LED4_2 | /C-SEL control mode | 0x080A | LED5_2 | /P-OT forward suppression | 0x0802 |
| LED4_3 | /ZCLAMP zero clamp | 0x080B | LED5_3 | /N-OT reverse suppression | 0x0803 |
| LED4_4 | Vacant | 0x080C | LED5_4 | /ALM-RST clear the alarm | 0x0804 |
| LED4_5 | /G-SEL gain switch | 0x080D | LED5_5 | /P-CL forward external torque limit | 0x0805 |
| LED4_6 | /CLR clear the pulse | 0x080E | LED5_6 | /N-CL reverse external torque limit | 0x0806 |
| | | | LED5_7 | /SPD-D internal speed setting | 0x0807 |

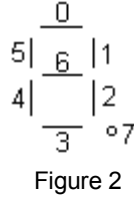
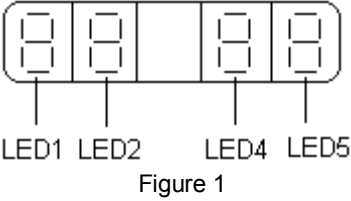
Output signal state

| Segment code | Explanation | Modbus address | Segment code | Explanation | Modbus address |
|--------------|---------------------|----------------|--------------|---------------------------|----------------|
| LED1_0 | Near (/NEAR) | 0x081A | LED2_0 | Position end (/COIN) | 0x0812 |
| LED1_1 | Alarm output (/ALM) | 0x081B | LED2_1 | Speed consistent (/V-CMP) | 0x0813 |
| | | | LED2_2 | Rotation checking (/TGON) | 0x0814 |
| | | | LED2_3 | Ready (/S-RDY) | 0x0815 |
| | | | LED2_4 | Torque limit (/CLT) | 0x0816 |
| | | | LED2_5 | Speed limit | 0x0817 |

| | | | | | |
|--|--|--|--------|------------------|--------|
| | | | | checking (/VLT) | |
| | | | LED2_6 | Brake lock (/BK) | 0x0818 |
| | | | LED2_7 | Warn (/WARN) | 0x0819 |

Note: the state value read from communication: 0=OFF, 1=ON.

U-022 can display the I/O terminal state. Next we will explain them.



In figure 1, input terminal state will show in LED5, output terminal state will show in LED2.

Figure 2 is the segment code of LED.

| Input terminal | | Output terminal | |
|----------------|-----------------|-----------------|------------------|
| Segment code | Explanation | Segment code | Explanation |
| LED5_0 | SI1 input state | LED2_0 | SO1 output state |
| LED5_1 | SI2 input state | LED2_1 | SO2 output state |
| LED5_2 | SI3 input state | LED2_2 | SO3 output state |
| LED5_3 | SI4 input state | | |
| LED5_4 | SI5 input state | | |
| LED5_5 | SI6 input state | | |
| LED5_6 | SI7 input state | | |

4. Auxiliary function

Do some application operation on the operation panel in auxiliary function state.

| Function code | Content |
|---------------|---|
| F0-** | View the system information |
| F1-** | Auxiliary running state, display running state, auxiliary running command, auxiliary running result |
| F3-** | View the alarm message, clear the alarm message |
| F4-** | Set the parameter to default value |
| F5-00 | Monitor external communication |

● **View the system information**

Press STATUS/ESC to switch to auxiliary function state, set the group number to 0. Press INC or DEC to select the code. Press ENTER to enter, press STATUS/ESC to return.

System information code:

| Code | Explanation | Code | Explanation |
|-------|--------------------------------|-------|---------------------------|
| F0-00 | Motor code | F0-01 | Series |
| F0-02 | Type | F0-03 | Out of factory date: year |
| F0-04 | Out of factory date: month day | F0-05 | Software version 1 |
| F0-06 | Software version 2 | F0-07 | Hardware version |

● **Change the motor type**

Set the group number to 2 in auxiliary state, modify the motor type.

Servo drive can match to motors which have similar power. The motor type can be distinguished by the code on the motor label. If users need to change the motor type, check the manual in advance, make sure the motor is compatible with the drive. Below are the steps of change motor type.

1. Press STATUS/ESC, select auxiliary function state.
2. Press INC or DEC to select function group no. 2.
3. Press ENTER, it will show all the motor code.
4. Find the code match to the drive, press ENTER to exit.
5. Repower on the drive to make the setting effective.



● **Auxiliary operation**

In the auxiliary function state, set the group no. to 1, press ENTER. Press INC or DEC to select the command, press ENTER to make the command effective. The LED on the panel will show the running state, press STATUS/ESC to return.

(1) Jog (F1-00)

Make sure the motor is not connected to the machine before operation. Press ENTER to set whether to enable the drive. In enable the drive mode, press INC to forward jog, press DEC to reverse jog. Press STATUS/ESC to exit. Four states in jog mode:

| State | Panel display | State | Panel display |
|-------|---------------|-------------|---------------|
| Idle | | Forward jog | |

| | | | |
|--------|---|-------------|--|
| Enable |  | Reverse jog |  |
|--------|---|-------------|--|

(2) Test run (F1-01)

Make sure the motor is not connected to the machine before test run.

When servo drive connects to non-original encoder or power cables, please enter test run state to ensure the encoder or power cables connect correctly.

In test run mode, the panel LED shows 0 and twinkles which means user must modify the voltage (unit: %). The suggested value for voltage is 20. Press ENTER to make the motor power on. The motor will forward run at certain speed. If the motor doesn't run, increase the voltage until the motor can run stable. If the connection is error, the motor will reverse run or lock at certain angle whatever how big is the voltage. Please cut the power at this time and check the connection carefully.

Press STATUS/ESC to exit.

(3) Current checking offset auto-adjustment

When servo drive finished self-update or the motor run unstable for long time, it needs to run current checking offset auto-adjustment. Select F1-02 to enter this function, the LED displays rEF. Press ENTER, the rEF is twinkling. After about 5s, the current checking offset auto-adjustment ends, the LED displays donE. Press STATUS/ESC to exit.

(4) Speed offset auto-adjustment

Select F1-03 to enter this function, LED displays rEF_o. Press ENTER, the rEF_o is twinkling. After about 1s, the speed offset auto-adjustment ends, the LED displays donE. Press STATUS/ESC to exit.

(5) Torque offset auto-adjustment

Select F1-04 to enter this function, the LED displays rEF_o. Press ENTER, rEF_o is twinkling. After about 1s, the torque offset auto-adjustment ends, the LED displays donE. Press STATUS/ESC to exit.

(6) Forced function (F1-05)

0: cancel this function

1: forced function enables

● **View the alarm information**

In auxiliary function state, set the group no. to 3 to enter alarm information. Below is the steps:

(1) Press STSTATUS/ESC, select auxiliary function state.

(2) Press INC or DEC, set the function code to 3.

(3) Press ENTER, it will display the latest alarm code.

| Alarm code | Content | Unit | Modbus address |
|------------|---------------------------------------|------|----------------|
| F3-00 | Current alarm code ※1 | | 0x0716 |
| F3-01 | Current alarm code ※2 | | 0x0717 |
| F3-02 | Alarm/warn code 1 when alarming | | 0x0718 |
| F3-03 | U-phase current when alarming | A | 0x0719 |
| F3-04 | V-phase current when alarming | A | 0x071A |
| F3-05 | DC bus-voltage when alarming | V | 0x071B |
| F3-06 | IGBT module temperature when alarming | °C | 0x071C |
| F3-07 | The speed when alarming | rpm | 0x071D |
| F3-08 | Internal torque command when alarming | % | 0x071E |
| F3-09 | V-REF value when alarming | V | 0x071F |
| F3-10 | T-REF value when alarming | V | 0x0720 |
| F3-11 | Alarm/warn code 2 when alarming | | 0x0728 |
| F3-12 | Alarm/warn code 3 when alarming | | 0x0729 |
| F3-13 | Alarm/warn code 4 when alarming | | 0x072A |
| F3-14 | Alarm/warn code 5 when alarming | | 0x072B |
| F3-15 | Alarm/warn code 6 when alarming | | 0x072C |
| F3-16 | Alarm/warn code 7 when alarming | | 0x072D |

※1: F3-00=0, means no alarm state.

※2: F3-01=0, means no warn state.

● Factory reset

- (1) close the servo enable signal (set OFF the S-ON signal or make the enable ineffective)
- (2) Press STATUS/ESC to enter auxiliary function state.
- (3) Press INC or DEC to set the group no. to 4.
- (4) Select F4-00. Set it to 1, press ENTER to confirm.

● External monitoring

In auxiliary function state, select parameter F5-00, it shows C-OUT (in external monitoring state, serial port 1 is effective, panel monitoring is ineffective). User can debug the servo drive in the PC at this time. Press STATUS/ESC to exit and return to panel monitoring.

5. Parameter setting

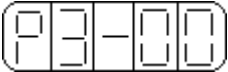
Select the function by setting the parameters. Below are the steps:

For example: change the P3-09 value from 2000 to 3000.

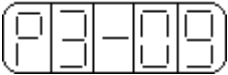
- (1) Press STATUS/ESC, switch to parameter setting state, press ENTER.



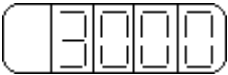
- (2) The second LED is twinkling, press INC to change the group no. to 3, press ENTER to confirm.



- (3) The last two LEDs are twinkling, press INC or DEC to set the group no. to 9, press ENTER to confirm.



- (4) Now it displays the value in P3-09 and twinkling. Press INC to change the value to 3000, press ENTER to confirm.



- (5) Press STATUS/ESC to exit.

6. Error alarm

If there is error, the alarming will auto-display. E-XXX means system error. EEEEE means panel communication error. Press ENTER to reset the error. If the servo alarming causes the power off, it is no need to clear the alarming.

Note: when the alarm occurs, please find the reason, and then clear the alarming.

▶▶ Parameter list

Effective time: “○” means servo OFF; “●” means power on; “√” means running and changeable.

Parameter construction: PX-XX=xx xx

PX-XX.H ◀ | ▶ PX-XX.L

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

| P0- | Function | Unit | Default value | Setting range | Effective time |
|-----|---|------|---------------|---------------|----------------|
| 00 | Main mode | - | 0 | 0 | |
| 01 | Sub mode 1 0: idle 1: torque (command) 2: torque (analog) 3: speed (command) 4: speed (analog) 5: position (internal) 6: position (pulse) 7: speed (pulse) | - | 0 | 0~7 | ○ |
| 02 | Sub mode 2 0~7 the same as the above | - | 0 | 0~7 | ○ |
| 03 | Serial port 2 Modbus station no. | - | 1 | 1~255 | ● |
| 04 | Serial port 2 parameters | - | 2206 | 0~2209 | ● |
| 05 | Rotation direction selection 0: look at motor loader side, CCW is forward 1: look at motor loader side, CW is forward | - | 0 | 0, 1 | ● |
| 06 | 06.L: stop mode for servo OFF or alarming 0: stop by dynamic brake (DB). After stop, keep the DB state. 1: stop by dynamic brake (DB). After stop, release DB and change to inertial motion state. 2: stop inertial motion. Motor is power off. Stop by machine friction. | - | 2 | 0~2 | ● |
| | 06.H: stop mode when over-range (OT) 0: stop by dynamic brake (DB). After stop, release DB, change to inertial motion state. 1: inertial stop. After stop, keep inertial motion state. 2: deceleration stop. After stop, change to zero clamp state. Torque setting: P4-06 urgent stop | - | 2 | 0~3 | ● |

| | | | | | |
|----|---|---|---|------|---|
| | torque. 3: deceleration stop. After stop, change to inertial motion state. Torque setting: P4-06 urgent stop torque. | | | | |
| 07 | T-REF distribution 0: no 1: make T-REF as external torque limit input 2: un-defined 3: P-CL, N-CL is ON, make T-REF as external torque limit input. | - | 0 | 0~3 | ○ |
| 08 | V-REF distribution 0: no 1: make V-REF as external speed limit input. | - | 0 | 0, 1 | ○ |
| 09 | Reserved | | | | |
| 10 | Reserved | | | | |

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

| P1- | Function | Unit | Default value | Setting range | Effective time |
|-----|---------------------------------|--------|---------------|---------------|----------------|
| 00 | Speed-loop gain | 1Hz | 100 | 1~5000 | √ |
| 01 | Speed-loop integral time | 0.1ms | 400 | 1~5000 | √ |
| 02 | Position-loop gain | 1/s | 30 | 1~2000 | √ |
| 03 | Rotation inertia ratio | % | 0 | 0~20000 | √ |
| 04 | Second speed-loop gain | 1Hz | 150 | 1~5000 | √ |
| 05 | Second speed-loop integral time | 0.1ms | 100 | 1~5000 | √ |
| 06 | Second position-loop gain | 1/s | 80 | 1~2000 | √ |
| 07 | Reserved | | | | |
| 08 | Reserved | | | | |
| 09 | Position-loop feed-forward gain | 1% | 0 | 0~100 | √ |
| 10 | Feed-forward filter time | 0.01ms | 0 | 0~65535 | √ |
| 11 | Reserved | | | | |
| 12 | Reserved | | | | |

| | | | | | |
|----|----------|--|--|--|--|
| 13 | Reserved | | | | |
| 14 | Reserved | | | | |
| 15 | Reserved | | | | |
| 16 | Reserved | | | | |
| 17 | Reserved | | | | |
| 18 | Reserved | | | | |

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

| P2- | Function | Unit | Default value | Setting range | Effective time |
|-----|--|-------|---------------|---------------|----------------|
| 00 | Command pulse mode 1: AB-phase pulse (90 degree phase, 4-time gain). 2: sign + pulse | - | 2 | 1, 2 | ● |
| 01 | Position command filter selection 0: first-order inertial filter. 1: smooth filter. | - | 0 | 0, 1 | ● |
| 02 | Electronic gear ratio (numerator) | - | 1 | 1~65535 | ○ |
| 03 | Electronic gear ratio (denominator) | - | 1 | 1~65535 | ○ |
| 04 | Position command filter time | ms | 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 | Reserved | | | | |
| 11 | Reserved | | | | |
| 12 | Reserved | | | | |
| 13 | Reserved | | | | |
| 14 | Reserved | | | | |
| 15 | Reserved | | | | |

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

| P3- | Function | Unit | Default value | Setting range | Effective time |
|-----|------------------------------|--------|---|---------------|----------------|
| 00 | Analog value of rate 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 | ms | 0 | 0~65535 | ○ |
| 06 | Soft start deceleration time | ms | 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 | Rated speed 3000:4000 Rate speed 1500:2000 | 0~5000 | ○ |

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

| P4- | Function | Unit | Default value | Setting range | Effective time |
|-----|--|--------|---------------|---------------|----------------|
| 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 | 0~5000 | ○ |

| | | | | | |
|----|---------------------------------|----|---|----------|---|
| 08 | Reserved | | | | |
| 09 | Internal torque command setting | 1% | 0 | -300~300 | √ |

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

| P5- | Function | Unit | Default value | Setting range | Effective time |
|-----|---|-------------------|---------------|---------------|----------------|
| 00 | Positioning 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 | Speed consistent signal checking width /V-CMP | rpm | 10 | 1~250 | ○ |
| 04 | Close output signal width /NEAR | Command pulse | 50 | 0~10000 | ○ |
| 05 | Differential 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 | 10.L: input signal distribution mode 0: external input accords to default value, P5-10.H~P5-17.H are unchangeable. 1: external input, can be set, P5-10.H~P5-17.H are changeable. | — | 0 | 0, 1 | √ |
| | 10.H: /S-ON servo signal 00: set the signal to always ineffective. 01: input positive signal from SI1. 02: input positive signal from SI2. | — | 01 | 00~17 | √ |

| | | | | | |
|----|--|---|----|-------|---|
| | <p>03: input positive signal from SI3. 04: input positive signal from SI4. 05: input positive signal from SI5. 06: input positive signal from SI6. 07: input positive signal from SI7. 80: set the signal to always effective. 81: input negative signal from SI1. 82: input negative signal from SI2. 83: input negative signal from SI3. 84: input negative signal from SI4. 85: input negative signal from SI5. 86: input negative signal from SI6. 87: input negative signal from SI7.</p> | | | | |
| 11 | <p>11.L: /P-CON proportion action command The setting is the same as P5-10.H</p> | — | 02 | 00~17 | √ |
| | <p>11.H: P-OT forward run suppression The setting is the same as P5-10.H</p> | — | 13 | 00~17 | √ |
| 12 | <p>12.L: N-OT reverse run suppression The setting is the same as P5-10.H</p> | — | 14 | 00~17 | √ |
| | <p>12.H: /ALM-RST clear the alarm The setting is the same as P5-10.H</p> | — | 05 | 00~17 | √ |
| 13 | <p>13.L: /P-CL forward external torque limit The setting is the same as P5-10.H</p> | — | 06 | 00~17 | √ |
| | <p>13.H: /N-CL reverse external torque limit The setting is the same as P5-10.H</p> | — | 07 | 00~17 | √ |
| 14 | <p>14.L:/SPD-D internal speed selection The setting is the same as P5-10.H</p> | — | 00 | 00~17 | √ |
| | <p>14.H: /SPD-A internal speed selection</p> | — | 00 | 00~17 | √ |

| | | | | | |
|----|---|-----|----|-------|---|
| | The setting is the same as P5-10.H | | | | |
| 15 | 15.L: /SPD-B internal speed selection The setting is the same as P5-10.H | — | 00 | 00~17 | √ |
| | 15.H: /C-SEL control mode selection The setting is the same as P5-10.H | — | 00 | 00~17 | √ |
| 16 | 16.L: /ZCLAMP zero clamp The setting is the same as P5-10.H | — | 00 | 00~17 | √ |
| | 16.H: reserved | | | | |
| 17 | 17.L: /G-SEL gain switch The setting is the same as P5-10.H | — | 00 | 00~17 | √ |
| | 17.H: /CLR clear pulse offset The setting is the same as P5-10.H | — | 00 | 00~17 | √ |
| 18 | Reserved | | | | |
| 19 | Input filter time | 5ms | 4 | 0~100 | √ |
| 20 | 20.L: /COIN positioning end 00: not output to the terminal 01: output positive signal from SO1 02: output positive signal from SO2 03: output positive signal from SO3 81: output negative signal from SO1 82: output negative signal from SO2 83: output negative signal from SO3 | — | 01 | 00~13 | √ |
| | 20.H: /V-CMP speed consistent checking The setting is the same as P5-20.L | — | 00 | 00~13 | √ |
| 21 | 21.L: /TGON rotation checking The setting is the same as P5-20.L | — | 00 | 00~13 | √ |
| | 21.H: /S-RDY ready The setting is the same as P5-20.L | — | 03 | 00~13 | √ |
| 22 | 22.L: /CLT torque limit The setting is the same as P5-20.L | — | 00 | 00~13 | √ |
| | 22.H: /VLT speed limit checking | — | 00 | 00~13 | √ |

| | | | | | |
|----|--|---|----|-------|---|
| | The setting is the same as P5-20.L | | | | |
| 23 | 23.L: /BK brake lock The setting is the same as P5-20.L | — | 00 | 00~13 | √ |
| | 23.H: /WARN warn The setting is the same as P5-20.L | — | 00 | 00~13 | √ |
| 24 | 24.L: /NEAR near The setting is the same as P5-20.L | — | 00 | 00~13 | √ |
| | 24.H: /ALM alarm The setting is the same as P5-20.L | — | 02 | 00~13 | √ |
| 25 | Reserved | | | | |

▶▶ Alarm information

| Alarm code | Explanation | Reason | Solution |
|------------|-----------------------------|--|--|
| E-001 | Program damage | Cannot pass program self-test | Re-download the program, contact with XINJE company |
| E-002 | Parameter damage | Cannot pass parameter self-test | Re-power on to reset the parameter, if the recurring problems, please contact with XINJE company |
| E-003 | Bus over-voltage | Power grid voltage is too high, not connect regenerative resistor, regenerative resistor damage or resistor is too large | Check the power grid and regenerative resistor |
| E-004 | Bus under-voltage | Power grid voltage is too low | Check the power grid voltage |
| E-005 | Regenerative resistor error | Regenerative resistor is ineffective | Check the connection of regenerative resistor |
| E-006 | Module temperature is too | Run with big loader for long time, causes power | decrease the loader, check the ventilation device, servo fan, |

| | | | |
|-------|--|--|--|
| | high | module temperature too high, ambient temperature too high | decrease the ambient temperature |
| E-007 | Over current | Drive U, V, W output short or motor error | Change motor, check motor U, V, W connection |
| E-008 | Over speed | Motor speed too fast, motor U, V, W connection error | Check if there is external force make the motor run too fast, check motor U, V, W connection |
| E-009 | Analog input error | Input voltage is error when adjust zero for 2-channel analog | Input correct voltage when adjust zero for 2-channel analog |
| E-010 | Position offset too large | The difference between setting and actual position is over the limit when position control | Check if the motor is blocked, decrease the setting speed, increase the value of P5-05 |
| E-011 | Motor U, W, W short | External short after power on self-test | Check the connection of U, V, W, change damage motor |
| E-012 | Motor U, V, W current error | Current collection circuit error | Check the motor wiring, change the servo unit |
| E-013 | Encoder U, V, W break | Not connect encoder, encoder wiring error, encoder damage | Check the encoder wiring, change encoder or reconnect it after power off |
| E-014 | Encoder A, B, Z break | Not connect encoder, encoder wiring error, encoder damage | Check the encoder connection, change the encoder or reconnect it after power off |
| E-015 | Speed changes too large (encoder feedback error) | Encoder wiring error, encoder is influenced by serious interference | Add shield layer and check the encoder connection |
| E-016 | Over load | Over load for long time | Change higher power motor or decrease run-time of over load |
| E-017 | Power off when running | The power grid cut off when running | Re-power on and wait until the bus voltage is stable |

▶▶ Common setting

1. It needs to do current checking offset auto-adjustment under below states:
 - New servo drive
 - After updated the hardware
 - Reset to out of factory parameters

Current checking offset auto-adjustment please refers to parameter F1-02.

2. Over range signal (P-OT/N-OT) and servo enable signal (S-ON)

(1) Over range signal

P-OT and N-OT input from terminal SI3 and SI4 separately. When the signal is ON (SI3/SI4 are 24V), ban forward or reverse rotation; when the signal is OFF (SI3/SI4 are 0V), enable forward or reverse rotation.

The settings when users don't use over range signal: (XX means any value or keep the original value)

| Parameter code | P5-10 | P5-11 | P5-12 |
|---------------------|--|-------|-------|
| Explanation | Enable to change terminal distribution | P-OT | N-OT |
| Setting value (HEX) | XX01 | 00XX | XX00 |

(2) Servo enable signal

The servo enable signal input from SI1. When the signal is OFF (SI1 is 0V), the servo enables. When the signal is ON (SI1 is 24V), the servo doesn't enable, power off.

The settings when the servo enables (XX means any value or keep the original value)

| Parameter code | P5-10 |
|---------------------|---|
| Explanation | S-ON and enable to change terminal distribution |
| Setting value (HEX) | 8001 |

3. Simple settings of operation mode

(1) External pulse control

PLC or other motion controller sends continuous pulse, servo drive positioning according to the received pulse quantity and frequency. The electronic gear ratio can be set freely.

For example: PLC output continuous pulse, the pulse mode is "pulse + direction". The servo motor rotates 1.75 circles per 15000 pulses.

Wiring:

- (a) “pulse + direction” signal: “pulse” connects CN1-24/CN1-25, “direction” connects CN1-26/CN1-27.
- (b) “AB-phase” signal: A-phase connects CN1-24/CN1-25, B-phase connects CN1-26/CN1-27.
- (c) The shield layer connects to COM terminal of PLC.

The details please refer to DS series servo manual

Parameters:

Calculate the electronic gear ratio:

$$15000 \times \text{gear ratio} = 1.75 \times \text{pulse quantity per rotation of servo motor}$$

$$\text{Pulse quantity per rotation of servo motor} = 2500 \times 4 = 10000, \text{ so gear ratio} = 7/6.$$

| Parameter code | P0-00 | P0-01/P0-02 | P2-00 | P2-02 | P2-03 |
|---------------------|-----------|-------------|---|------------------------------------|--------------------------------------|
| Explanation | Main mode | Sub mode | Pulse mode | Numerator of electronic gear ratio | Denominator of electronic gear ratio |
| Setting value (HEX) | 0 | 6 | “AB phase” signal: 1 “pulse+direction” signal: 2 | 7 | 6 |

(2) Segment speed control (internal setting speed)

For example: SPD-D, SPD-A, SPD-B connects to SI2, SI6, and SI7 separately which are all positive signal input, uses software filter. Three segments of speed are 100rpm, 500 rpm, 1500 rpm, soft start acceleration/deceleration time is 200ms.

Wiring:

SPD-D connects to CN1-16, SPD-A connects to CN1-11, SPD-B connects to CN1-10, external 24V power supply connects to CN1-9.

Terminal parameter setting:

| Parameter code | P5-10 | P5-14 | P5-15 |
|---------------------|---|-------------|-------|
| Explanation | Enables to change terminal distribution | SPD-A、SPD-D | SPD-B |
| Setting value (HEX) | XX01 | 0602 | XX07 |

Mode parameters:

| Parameter code | P0-00 | P0-01/ P0-02 | P3-01 | P3-02 | P3-03 | P3-05 | P3-06 |
|-------------------------|-----------|-----------------|---------|---------|---------|------------------------------|------------------------------|
| Explanation | Main mode | Sub mode | Speed 1 | Speed 2 | Speed 3 | Soft start acceleration time | Soft start deceleration time |
| Setting value (decimal) | 0 | 3 | 100 | 500 | 1500 | 200 | 200 |

(3) Mode switch

The servo drive can switch to any modes seamlessly.

Users only need to set the parameter in single mode:

| | | |
|----------------|---|-------|
| Parameter code | P5-10 | P5-15 |
| Explanation | Enables to change the terminal distribution | C-SEL |
| Setting value | XX01 | 00XX |

At this time, it is ineffective to set P0-02 to sub mode 2.

If user wants to switch between two modes, please follow below steps:

For example: C-SEL signal inputs from terminal SI2, positive signal, uses software filter.

Wiring:

C-SEL connects to CN1-16; external 24V power supply connects to CN1-9.

Parameters:

| | | |
|----------------|---|-------|
| Parameter code | P5-10 | P5-15 |
| Explanation | Enables to change the terminal distribution | C-SEL |
| Setting value | XX01 | 02XX |



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