

## Preface

This user manual is applicable to Wecon VD3E series bus servo drives.

In order to use this series of servo drives correctly, please read this manual carefully in advance and save it for later use.

During use, if you have any doubt about the function and performance of this equipment, please contact our technicians for relevant assistance to use this equipment smoothly.

The company's products are constantly being improved and upgraded, and the contents of this manual are subject to change without notice.

This manual is suitable for introductory and use reference books for elementary and intermediate readers. At the same time, all interpretation rights of this manual belong to our company.



### Dangerous

The danger caused by failure to operate as required may result in serious injuries or even death.



### Notice

The danger caused by failure to operate as required may result in moderate or minor injuries, and equipment damage.

## User Manual Change Record

| Date       | Changed version | Change content | Corresponding software version |
|------------|-----------------|----------------|--------------------------------|
| March 2022 | V1.0            | First edition  | ★ VD3E-0□□SA1G model           |

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## Chapter 1 Safety Reminder

### 1.1 Safety Precautions

This section describes the important items that users must observe, such as product confirmation, storage, transportation, installation, wiring, operation, inspection, and disposal. Please follow the steps required by this manual for trial operation.



#### Dangerous

- ◆ After the power is turned off for more than 5 minutes and the power indicator is off, use a multimeter to confirm that the voltage across the high-voltage capacitor has dropped to a safe voltage, and then proceed with the disassembly and assembly of the drive, otherwise the residual voltage may cause electric shock.
- ◆ Please never touch the inside of the servo drive, otherwise it may cause electric shock.
- ◆ Please insulate the connection part of the power terminal, otherwise it may cause electric shock.
- ◆ The grounding terminal of the servo drive must be grounded, otherwise it may cause electric shock.
- ◆ Please install the servo drive, servo motor, and external braking resistor on non-combustible materials, otherwise it may cause a fire.
- ◆ Be sure to connect an electromagnetic contactor and a non-fuse circuit breaker between the power supply and the main circuit power supply of the servo drive. Otherwise, when the equipment fails, it may cause fire because it cannot cut off the large current.
- ◆ In the servo drive and servo motor, please do not mix with oil, grease and other flammable foreign objects and screws, metal pieces and other conductive foreign objects, otherwise it may cause a fire.
- ◆ When the servo motor is connected to the machine, in case of any error in operation, it will not only cause damage to the machine, but also sometimes cause personal safety accidents.
- ◆ Do not damage or pull the cable forcefully, do not impose excessive force on the cable, or place heavy objects underneath, otherwise electric shock may occur, causing the product to stop operating or burn out.
- ◆ Do not use the brake of the brake motor for normal braking, otherwise it may cause a malfunction.
- ◆ Except for the designated operator, please do not set up, disassemble and repair the equipment, otherwise it may cause electric shock or injury.
- ◆ Do not remove the cover, cables, connectors and optional accessories while the power is on, otherwise it may cause electric shock.
- ◆ Please install a stop device on the machine side to ensure safety.
- ◆ Please take measures to ensure that your personal safety will not be endangered when restarting, otherwise it may cause injury.
- ◆ Do not modify this product, otherwise it may cause personal injury or mechanical damage.

## 1.2 Precautions for Storage and Transportation



### Notice

Please keep and install the product in the following environment:

- ◆ Places without direct sunlight;
- ◆ Places where the ambient temperature does not exceed product specifications;
- ◆ Places where the relative humidity does not exceed product specifications;
- ◆ Places where condensation will not occur due to rapid changes in temperature;
- ◆ Places free of corrosive gas and flammable gas;
- ◆ Places without combustible materials nearby;
- ◆ Places with less dust, salt and metal powder;
- ◆ Places where there is no splash of water, oil, medicine, etc.;
- ◆ Places where vibration or shock will not affect the product (places that exceed product specifications);
- ◆ Places that will not be exposed to radiation;

Storage or installation in environments other than the above may cause product failure or damage:

- ◆ Please use the correct method for handling according to the weight of the product;
- ◆ Do not hold the motor cable or motor shaft for transportation;
- ◆ When operating the servo unit and servo motor, please pay attention to sharp parts such as the corners of the device.

## 1.3 Precautions During Installation



### Notice

- ◆ Do not install this product in a place free from water splashed or in an environment prone to corrosion;
- ◆ Please be sure to comply with the device installation direction, otherwise it may cause device failure;
- ◆ When installing, please make sure to keep the specified distance between the servo drive and the inner surface of the electric cabinet and other machines, otherwise it may cause fire or device failure;
- ◆ Do not apply excessive impact, otherwise it may cause equipment failure;
- ◆ Do not sit on the product or place heavy objects on it, otherwise it may cause personal injury;
- ◆ Do not use this product near flammable gases and combustibles, otherwise there may be a risk of electric shock or fire;
- ◆ Do not block the suction and exhaust ports, and do not allow foreign objects to enter the product, otherwise it may cause device failure or fire due to the aging of internal components.

## 1.4 Precautions During Wiring

**Notice**

- ◆ Do not connect the three-phase power supply to the output terminals U, V, W of the servo drive, otherwise it may damage the device or cause a fire;
- ◆ Please connect the output U, V, W of the servo drive and the U, V, W of the servo motor directly. Do not use the electromagnetic contactor during the connection, otherwise it may cause abnormal operation or malfunction of the device;
- ◆ When the DO output terminals are connected to the relay, please pay attention to the polarity of the freewheeling diode, otherwise the drive may be damaged and the signal can not be output normally;
- ◆ Please fix the power terminal and the motor terminal firmly, otherwise it may cause a fire hazard;
- ◆ Do not connect the 220V servo unit directly to the 380V power supply;
- ◆ Do not pass the power line and signal line through the same pipe or bundle them together. When wiring, the power line and signal line should be placed at an interval of more than 30cm;
- ◆ Use twisted-pair shielded cables for signal cables and encoder cables, and the shielding layer should be grounded at both ends;
- ◆ The wiring length of the signal input line is recommended to be within 3M, and the wiring length of the encoder is recommended to be within 15M;
- ◆ When using in the following places, please take adequate shielding measures.
  - When interference occurs due to static electricity.
  - ◆ Places where strong electric or magnetic fields are generated;
  - ◆ Places where there may be radiation;
- ◆ When checking the status, please make sure that the CHARGE indicator is off.

**1.5 Precautions During Operation****Notice**

- ◆ During trial operation, in order to prevent accidents, please run the servo motor without load (not connected to the drive shaft), otherwise it may cause injury.
- ◆ When the servo motor is running, do not touch its rotating parts, otherwise it may cause injury.
- ◆ Be sure to set the correct rotational inertia ratio, otherwise it may cause vibration.
- ◆ When it is installed on the supporting machine and starts to run, please set the user parameters in accordance with the machine in advance. If the operation is started without parameter setting, the machine may lose control or fail.
- ◆ When installing on the supporting machinery and starting to run, please put the servo motor in a state where it can be stopped in an emergency at any time, otherwise you may get injured.
- ◆ When using a servo motor on a vertical axis, please install a safety device to prevent the workpiece

from falling under states such as alarm and overtravel. In addition, please perform servo lock stop setting when overtravel occurs, otherwise the workpiece may fall in overtravel state.

◆ Since extreme user parameter adjustments and setting changes will cause the servo system to become unstable, please never make settings, otherwise it may cause injury.

◆ When an alarm occurs, reset the alarm after removing the cause and ensuring safety, and restart the operation, otherwise it may cause injury.

◆ Except for special purposes, do not change the maximum speed threshold (P01-10). If user change it carelessly, it may damage the machine or cause injury.

◆ When the power is turned on and within a period of time after the power is cut off, the cooling fin of the servo drive, the external braking resistor, the servo motor, etc. may be exposed to high temperature. Please do not touch it, otherwise it may cause burns.

◆ If the power supply is restored after an instantaneous power failure occurs during operation, the machine may restart suddenly, so please do not stay close to the machine, and press the stop button when the power is off, and operate after the power supply is stable.

## 1.6 Precautions During Maintenance and Inspection



### Notice

◆ The power on and off operations should be carried out by professional operators.

◆ When testing the insulation resistance of the drive, please cut off all the connections with the drive first, otherwise it may cause the drive to malfunction.

◆ Do not use gasoline, alcohol, acid and alkaline detergents to avoid discoloration or damage to the casing.

◆ When replacing the servo drive, please transfer the user parameters of the servo drive to be replaced to the new servo drive before restarting operation, otherwise the machine may be damaged.

◆ Do not change the wiring when the power is on, otherwise it may cause electric shock or injury.

◆ Do not disassemble the servo motor, otherwise it may cause electric shock or injury.

Chapter 2 Product Information

2.1 Servo Drives

2.1.1 Servo Drive Model Naming

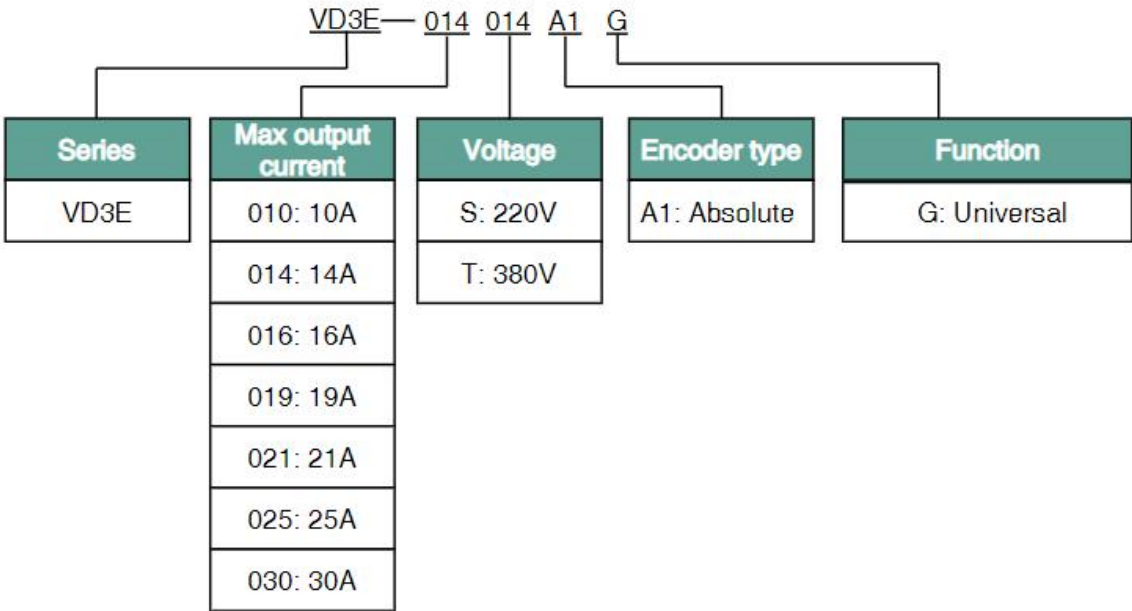


Figure 2-1 Servo drive model

Wecon VD3E series bus servo drive nameplate and appearance are shown in Figure 2-2 and Figure 2-3

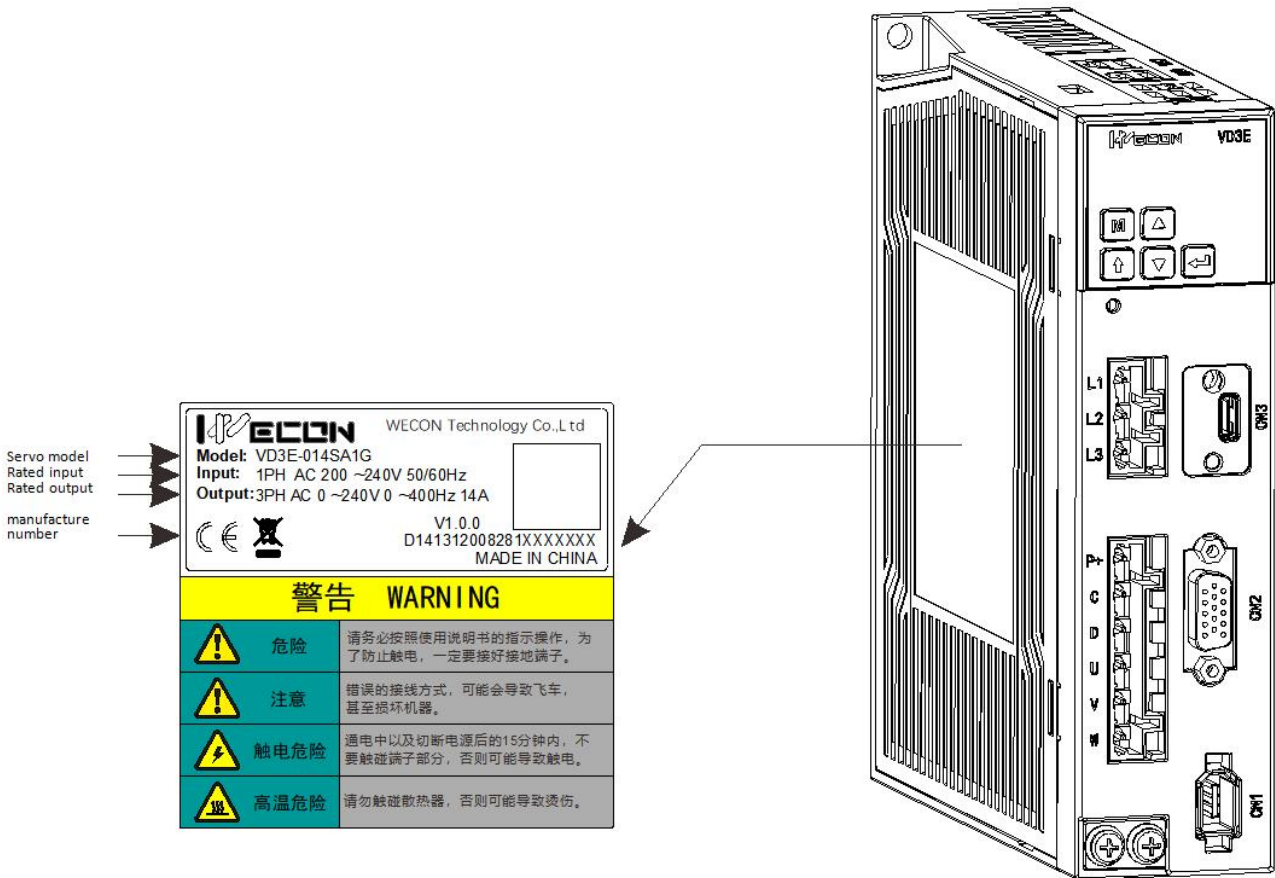


Figure 2-2 Type A servo drive nameplate and appearance

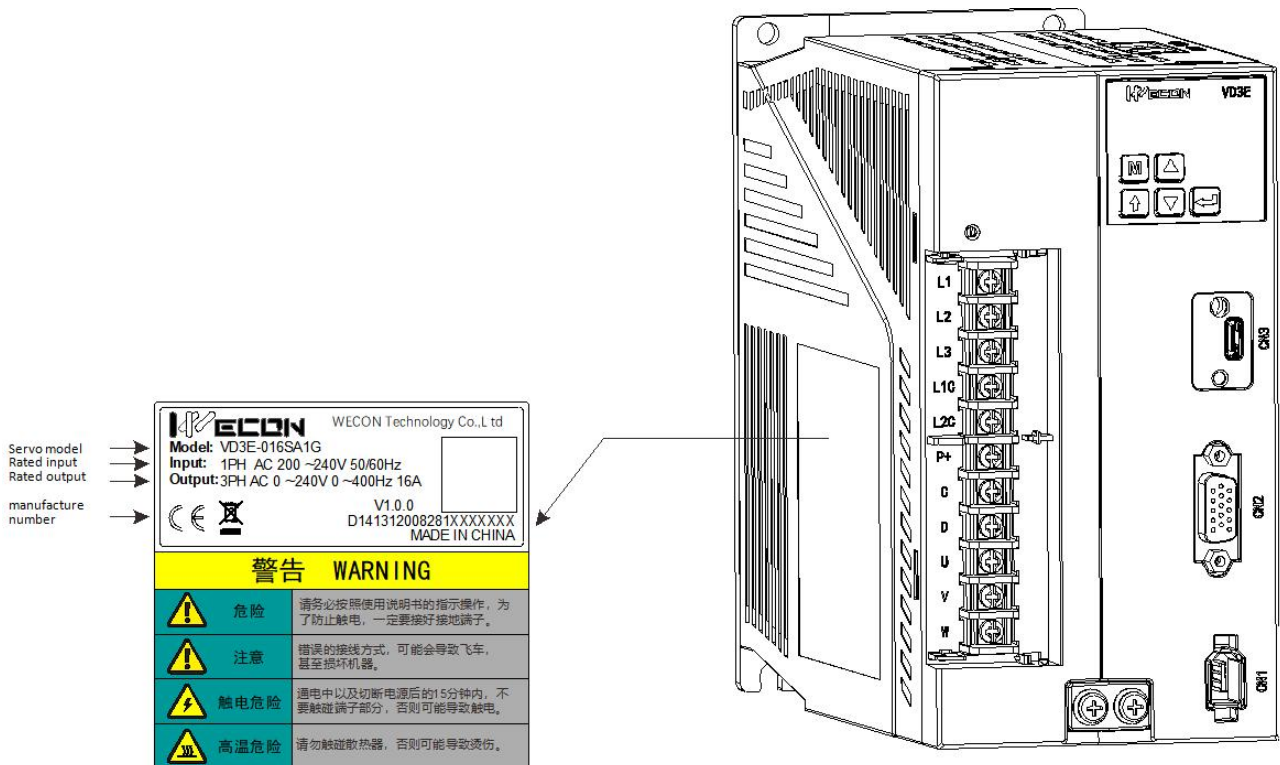


Figure 2-3 Type B servo drive nameplate and appearance

### 2.1.2 The Composition of Servo Drive

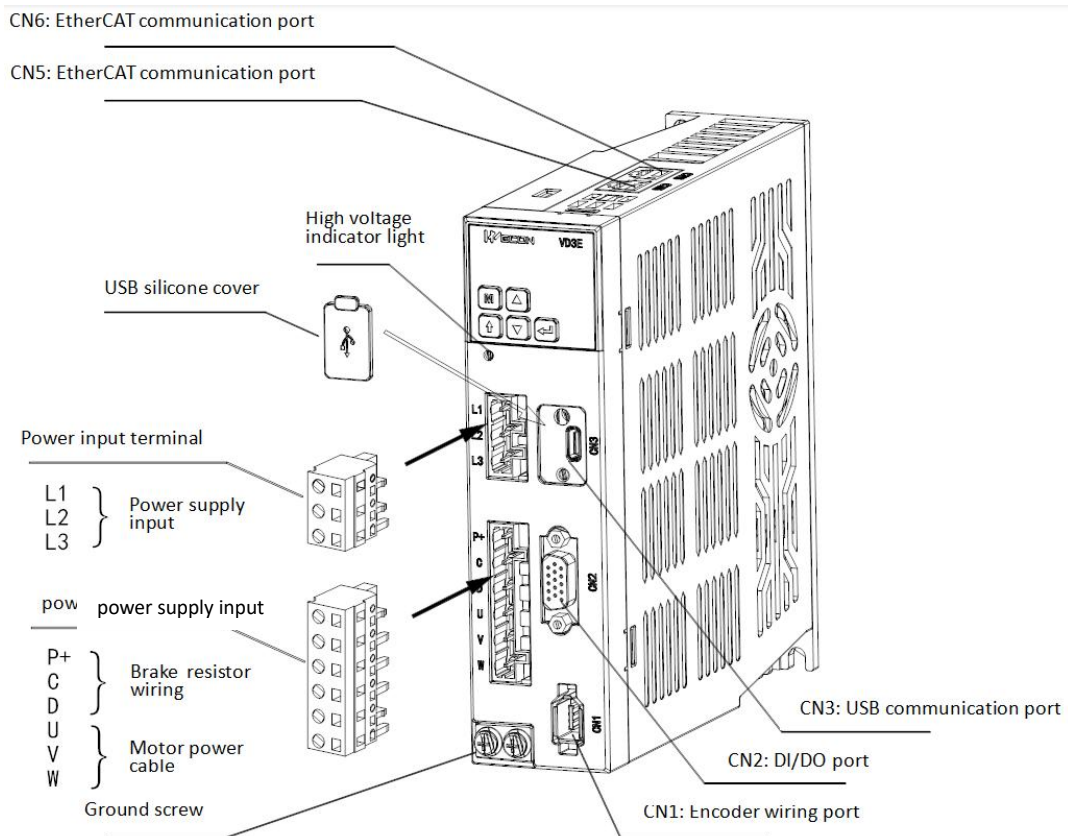


Figure 2-4 Composition of VD3E type A servo drive



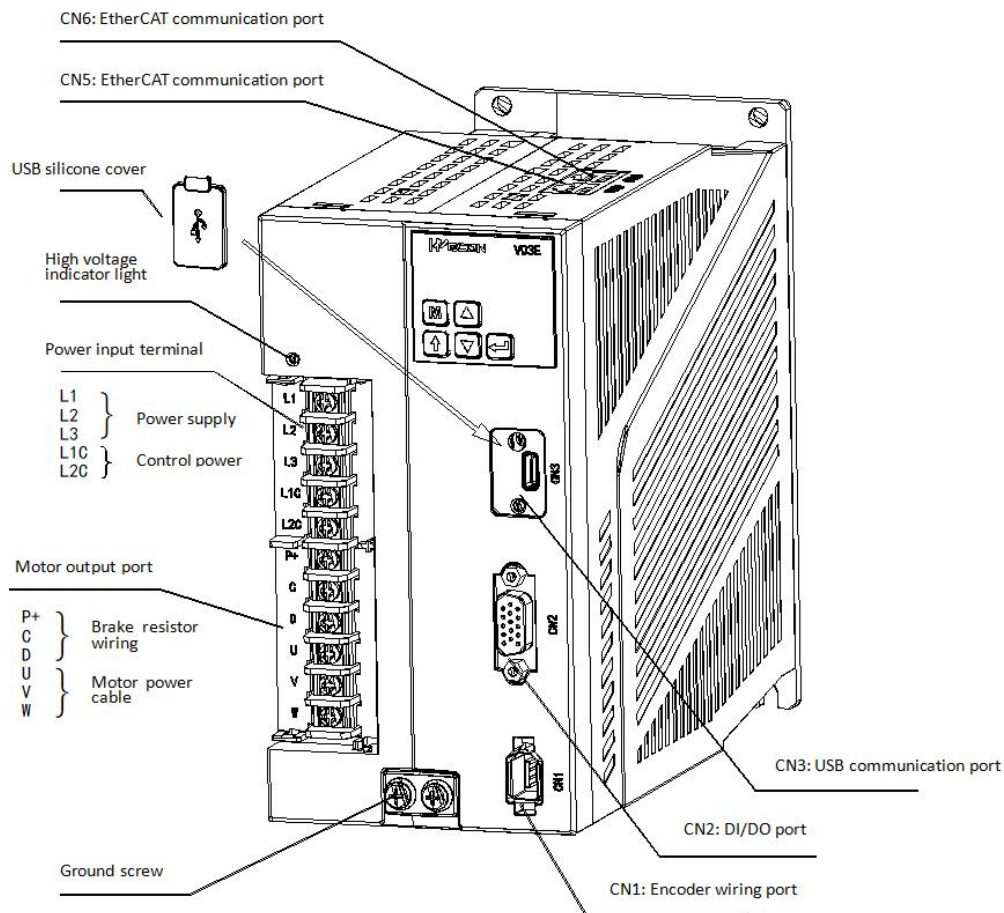


Figure 2-5 Composition of VD3E type B servo drive

Remarks: When using external braking resistor or internal braking resistor, special short-circuit treatment is required, which is shown in Figure 2-6.

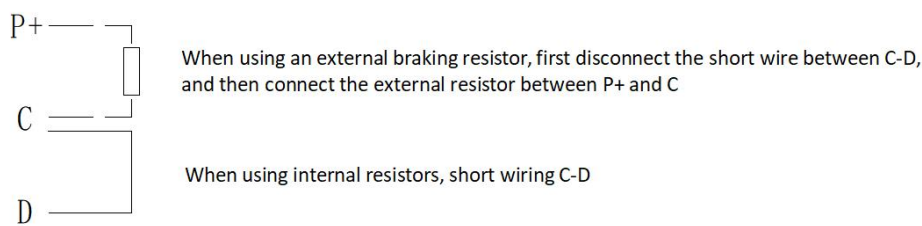


Figure 2-6 Short circuit schematic diagram of braking resistance

2.1.3 Specification of Servo Drive

(1) Electrical specification

Table 2-1 Electrical specification for single-phase 220V class servo drives

| Project                | VD3E Type A  |              | VD3E Type B  |              |
|------------------------|--------------|--------------|--------------|--------------|
| Model                  | VD3E-010SA1G | VD3E-014SA1G | VD3E-016SA1G | VD3E-019SA1G |
| Maximum output current | 10A          | 14A          | 16A          | 19A          |

|                      |  |                                      |
|----------------------|--|--------------------------------------|
| Control power supply | -  | Single-phase AC 200V ~ 240V 50/60 Hz |
| Power supply         | Single-phase AC 200V ~ 240V 50/60 Hz     |                                      |
| Braking resistor     | Support built-in and external connection |                                      |

Table 2-2 Electrical specification for type B servo drives

| Project                | VD3E Type B                              |              |              |
|------------------------|--|--------------|--------------|
| Model                  | VD3E-021SA1G                             | VD3E-025SA1G | VD3E-030SA1G |
| Maximum output current | 21A                                      | 25A          | 30A          |
| Control power supply   | Single-phase AC 200V ~ 240V 50/60 Hz     |              |              |
| Power supply           | Three-phase AC 200V ~ 240V 50/60 Hz      |              |              |
| Braking resistor       | Support built-in and external connection |              |              |

## (2) Basic specifications

| Project                                     |                                 | Description  |
|---|---------------------------------|--|
| Basic information                           | Control method                  | IGBT PWM control, sine wave current drive mode                 |
|   | Drive model                     | VD3E-0□□SA1G   |
|   | Encoder feedback                | 17-bit absolute value encoder<br>23-bit absolute value encoder |
|   | Operating temperature           | 0 ~ 45 °C  |
|   | Operating humidity              | Below 90% RH (no condensation)                                 |
| Basic Performance of EtherCAT Slave Station | Communication protocol          | EtherCAT protocol  |
|   | Support services                | CoE  |
|   | Synchronization mode            | DC   |
|   | Physical layer                  | 100BASE-TX   |
|   | Baud rate                       | 100Mbit/s  |
|   | Duplex mode                     | Full duplex  |
|   | Topological structure           | Ring, linear   |
|   | Slave station number            | Less than 128 sets suggested for actual working                |
|   | Synchronous jitter              | 1 μs   |
| EtherCAT Configuration on Unit              | FMMU unit                       | 8  |
|   | Storage synchronization snap-in | 8  |

|                  |                            |              |
|------------------|----------------------------|--------------|
|                  | Process data RAM           | 8KB          |
|                  | Distributed clock          | 64-bit       |
|                  | EEPROM capacity            | 32Kbit       |
| Input and output | Digital input (DI) signal  | 6-channel DI |
|                  | Digital output (DO) signal | 3-channel DO |

## (3) Support function

| Project           |                           | Description  |
|-------------------|---------------------------|--|
| Input and output  | Digital input (DI) signal | Servo Enable (S-ON), Fault and Warning Clear (A-CLR), Forward Drive Disable (POT), Reverse Drive Disable (NOT), Error Counter Clear (CL), Emergency Stop (E-STOP), Origin Signal (HOMEORG)   |
|                   | Digital input (DI) signal | Servo Ready (RDY), Fault Signal (ALM), Speed Limited (V-LIMIT) Brake output (BRK-OFF), warning signal (WARN warning signal), servo running state output (SRV-ST), rotation detection (TGON), communication VDO1 output (COM_VDO1), communication VDO2 output (COM_VDO2), communication VDO3 output (COM_VDO3) ZSP (Zero Speed Signal), Positioning Complete (P-COIN), Speed Approach (V-NEAR), Torque Arrival (T-COIN) |
| Built-in function | Electronic gear ratio     | The range is " $0.001 \times \text{Encoder Resolution}/10000$ , $4000 \times \text{Encoder Resolution}/10000$ "  |
|                   | Protective function       | Overcurrent protection, overvoltage protection, undervoltage protection, overload protection, main circuit lack of phase protection, Overtemperature protection, abnormal parameter protection, encoder protection, others   |
|                   | LED display function      | Panel 5-bit LED  |
|                   | Others                    | Gain adjustment, fault and alarm recording, inching operation  |

2.2 Servo Motors

2.2.1 Servo Motor Model Naming

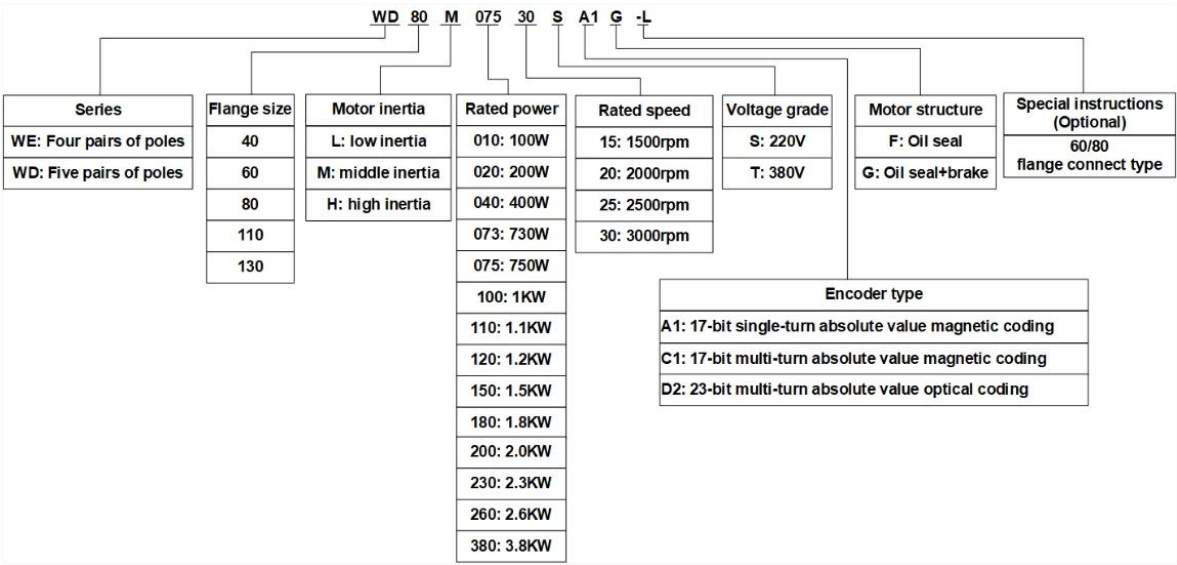


Figure 2-7 Naming of servo motor

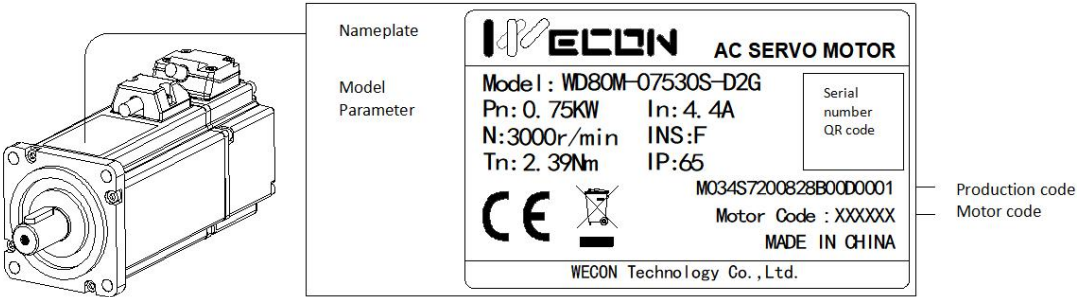


Figure 2-8 Servo motor nameplate

### 2.2.2 Composition of Servo Motor

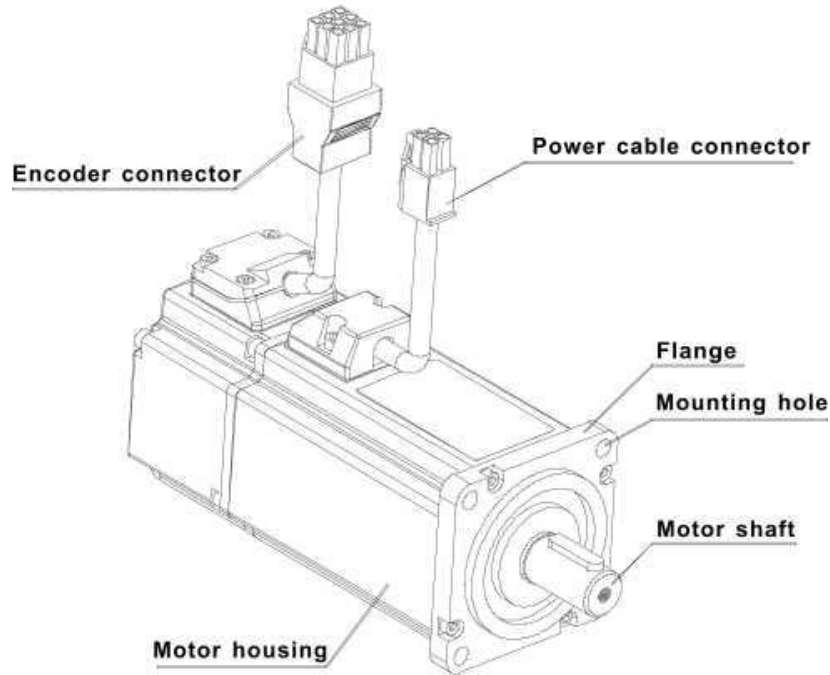


Figure 2-9 Motor composition of 400W-750W

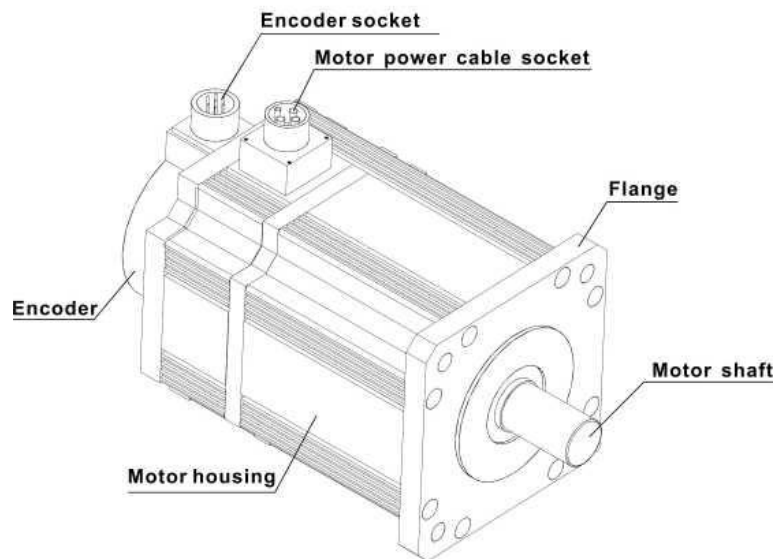



Figure 2-10 Composition of 110/130 flange motor

### 2.2.3 Specification of Servo Motor

Table 2-3 Wecon motor specifications

| Wecon motor model | Motor Code | Flange size | Rated power (KW) | Rated torque (N.m) | Voltage (V) | Rated speed (rpm) | Encoder type                         | Brake function |
|-------------------|------------|-------------|------------------|--------------------|-------------|-------------------|--------------------------------------|----------------|
| WE130M-10025S-A1F | A091       | 130         | 1.0              | 4.0                | 220         | 2500              | 17-bit single turn absolute magnetic | Not supported  |
| WE130M-15025S-A1G | A111       | 130         | 1.5              | 6.0                | 220         | 2500              | 17-bit single turn                   | Supported      |

|                   |      |     |     |      |     |      |  |               |
|-------------------|------|-----|-----|------|-----|------|--|---------------|
|                   |      |     |     |      |     |      | absolute magnetic                      |               |
| WE130M-26025S-C1F | C191 | 130 | 2.6 | 10   | 220 | 2500 | 17-bit multi turn<br>absolute magnetic | Not supported |
| WE80M-12030S-C1G  | C231 | 80  | 1.2 | 4.0  | 220 | 3000 | 17-bit multi turn<br>absolute magnetic | Supported     |
| WE110M-18030S-D2G | D131 | 110 | 1.8 | 6.0  | 220 | 3000 | 23-bit multi turn<br>absolute optical  | Supported     |
| WE130M-23015S-D2F | D161 | 130 | 2.3 | 15.0 | 220 | 1500 | 23-bit multi turn<br>absolute optical  | Not supported |

 **Note:** Only part of the motor models are displayed, please refer to the [Model Selection Manual] for details.

## 2.3 Servo System Wiring Diagram

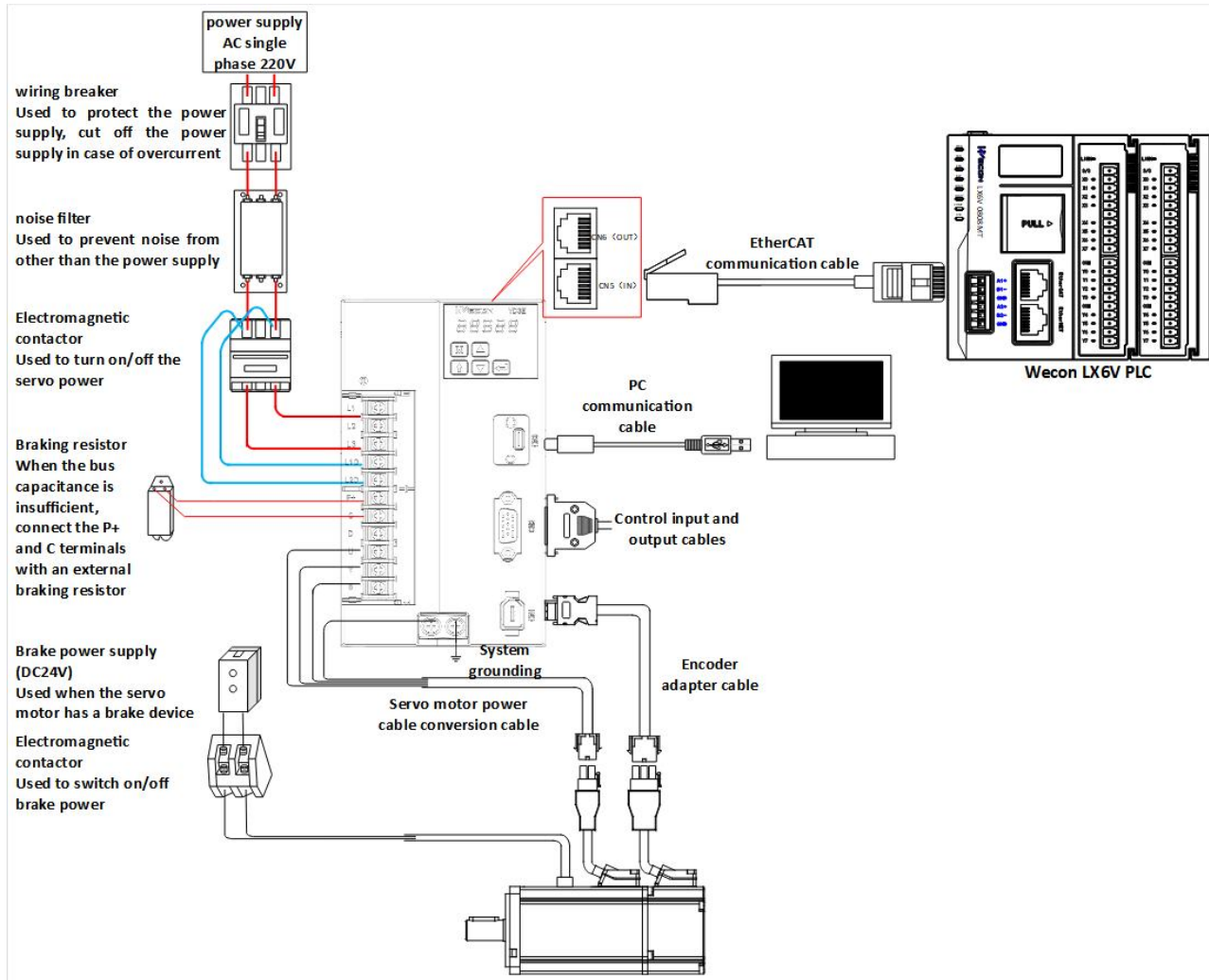


Figure 2-11 Wiring diagram of single-phase 220V servo drive system



### Notice

- ① When using external brake, need to remove the shorting cap or short wiring between terminal C and D of servo drive before operating!
- ② Pay attention to the power capacity of the brake power supply. When powering multiple brake devices at the same time, if the power supply capacity is insufficient, the brake will fail!
- ③ It is strictly forbidden to use electromagnetic brake for motor operation and stop operation! Otherwise, the instantaneous high voltage generated by the motor may break down the contactor!
- ④ In order to prevent cross-shock accidents in the servo system, please use a fuse or a circuit breaker for wiring on the input power supply!

## Chapter 3 Installation of Servo Drive and Motor

### 3.1 Installation of Servo Drive

#### 3.1.1 Dimensions (Unit: mm)

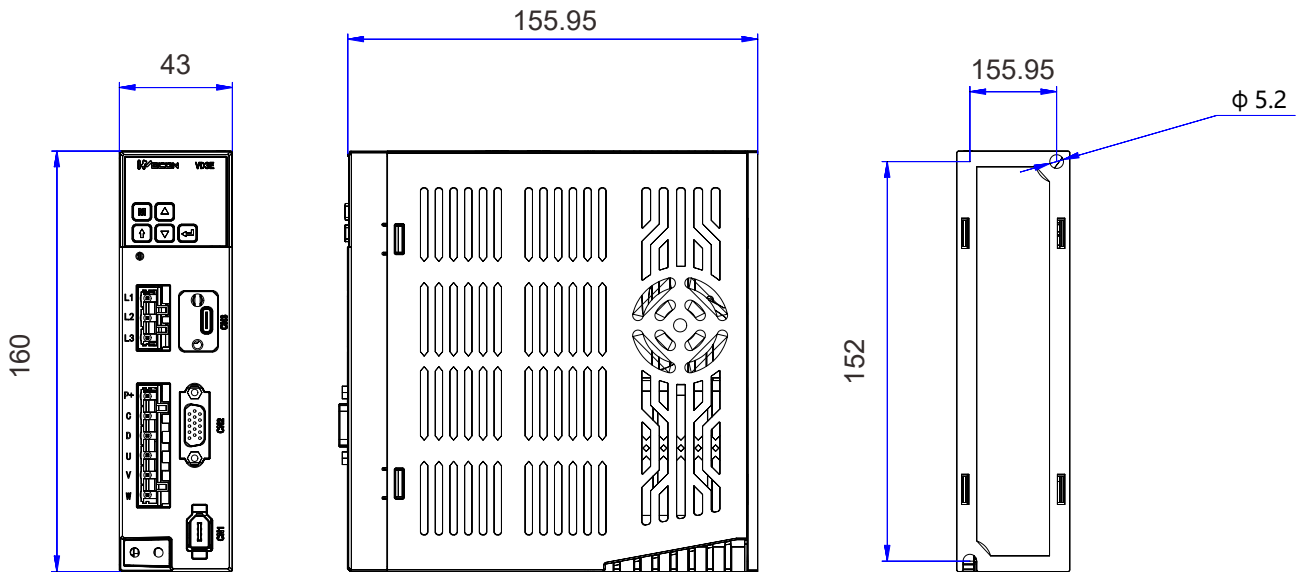


Figure 3-1 Installation Dimensions of VD3E Type A Servo Drive

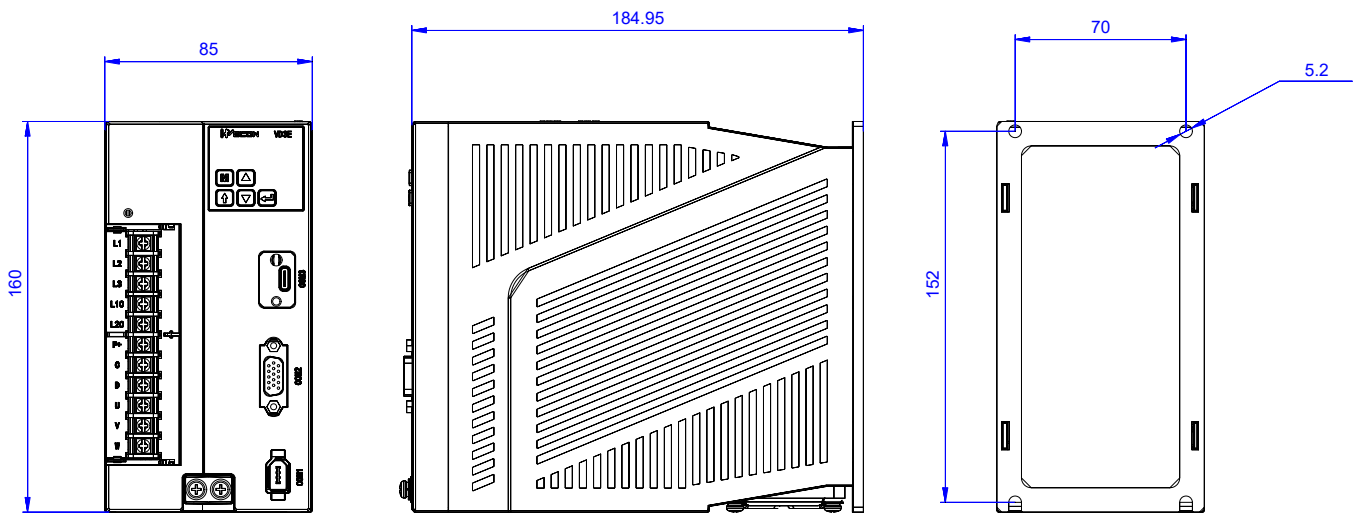


Figure 3-2 Installation Dimensions of VD3E Type B Servo drive

#### 3.1.2 Installation Site

- ① Please install the device in an installation cabinet free from sunlight and rain;
- ② In a place without vibration;
- ③ Please do not install in the environment exposed to high temperature, humidity, dust and metal dust;
- ④ Do not use this product near corrosive and flammable gases such as hydrogen sulfide, chlorine, ammonia, sulfur, chlorinated gas, acid, alkali, salt or combustible materials.



### 3.1.3 Installation Environment

The installation environment of the servo drive has a direct impact on the normal function of it and its service life. Therefore, the installation environment of servo drive must meet the following conditions:

| Project             | Specification   |
|---------------------|---|
| Ambient temperature | -10℃~40℃ (no freezing)  |
| Ambient humidity    | -20%~90%RH (no condensation)  |
| Storage temperature | -20℃~60℃  |
| Storage humidity    | -20%~90%RH (no condensation)  |
| Protection level    | IP65  |
| Vibration           | Less than 0.5G (4.9 m/s <sup>2</sup> ), 10 ~ 60Hz (discontinuous operation) |
| Power Systems       | TN system*  |

**Note:** The neutral point of the power system is directly connected to the ground, and the exposed metal components are connected to the ground through a protective grounding conductor.

### 3.1.4 Installation Precautions

#### (1) Installation specifications

In order to achieve a good cooling cycle effect, ensure that there is enough ventilation space around it when installing the servo drive, and be sure to comply with the installation standards in the control cabinet shown in the figure below, otherwise it may cause the drive to malfunction. Please refer to Figure 3-3 for the typical minimum installation size.

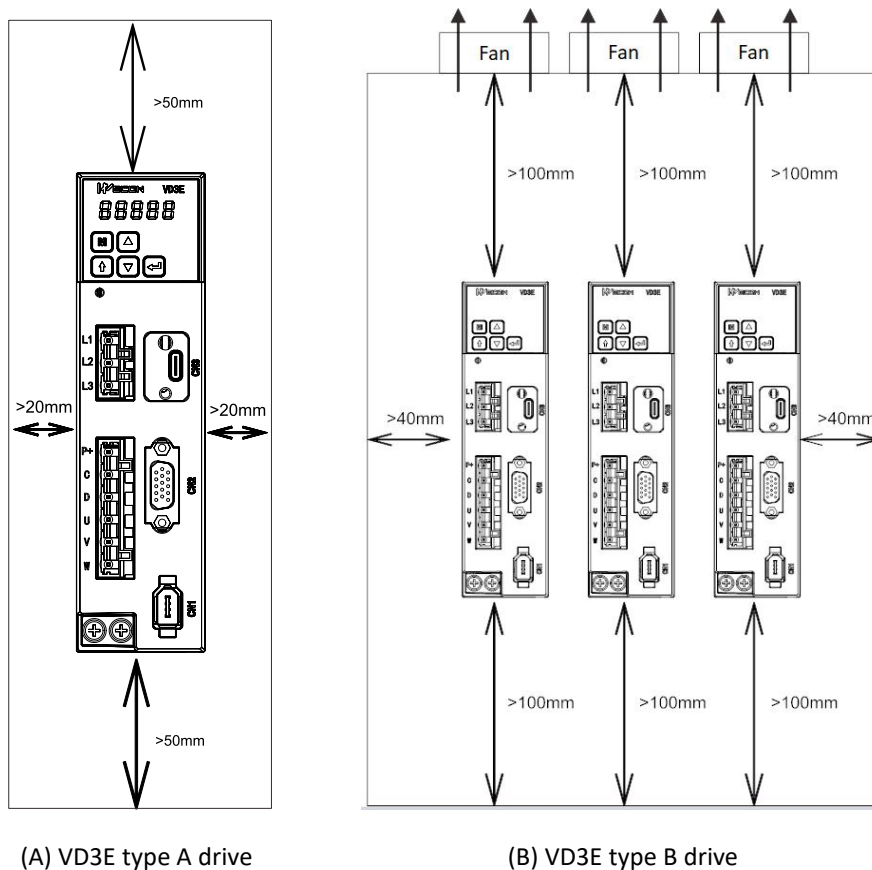


Figure 3-3 Minimum mounting size

**(2) Parallel installation**

When multiple units are installed in parallel, the minimum distance between each other should be 20mm, and the distance between each other in vertical dimension should be at least 100mm. Please refer to Figure 3-4 and Figure 3-5 for details. To prevent temperature rise, a cooling fan can be placed on the upper part. For smaller spacing installation, please consult our company.

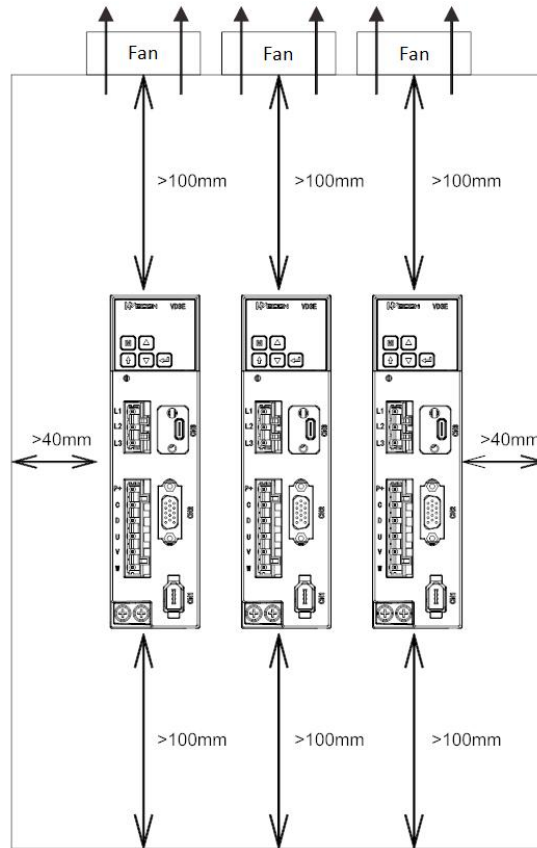


Figure 3-4 Parallel installation dimensions of multiple type A drives

### (3) Installation direction

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## 3.2 Installation of Servo Motor

### 3.2.1 Dimensions (unit: mm)

#### (1) Installation dimensions of WD series 60 flange servo motor

| Specification         | WD series 60 flange motor |       |
|-----------------------|---------------------------|-------|
| Rated torque (N.m)    | 0.64                      | 1.27  |
| LA without brake (mm) | 75                        | 92    |
| LA with brake (mm)    | 104.5                     | 121.5 |

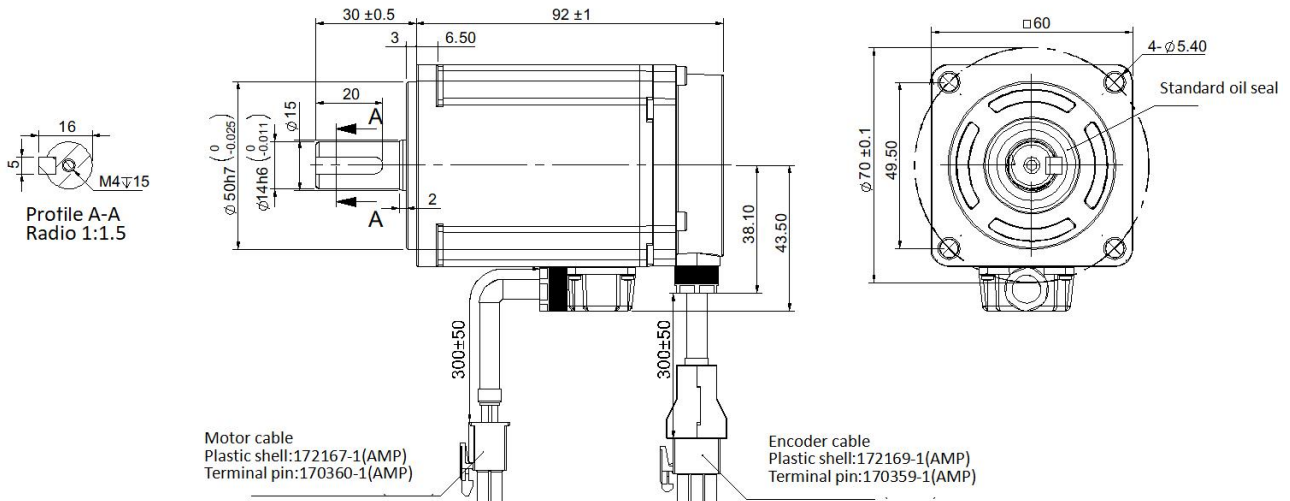


Figure 3-6 WD series 60 flange servo motor installation dimension drawing

#### (2) Installation dimensions of 80 flange servo motor

##### ① WD series motor

| Specification         | WD series 80 flange motor |
|-----------------------|---------------------------|
| Rated torque (N.m)    | 2.39                      |
| LA without brake (mm) | 98.5                      |
| LA with brake (mm)    | 132.5                     |

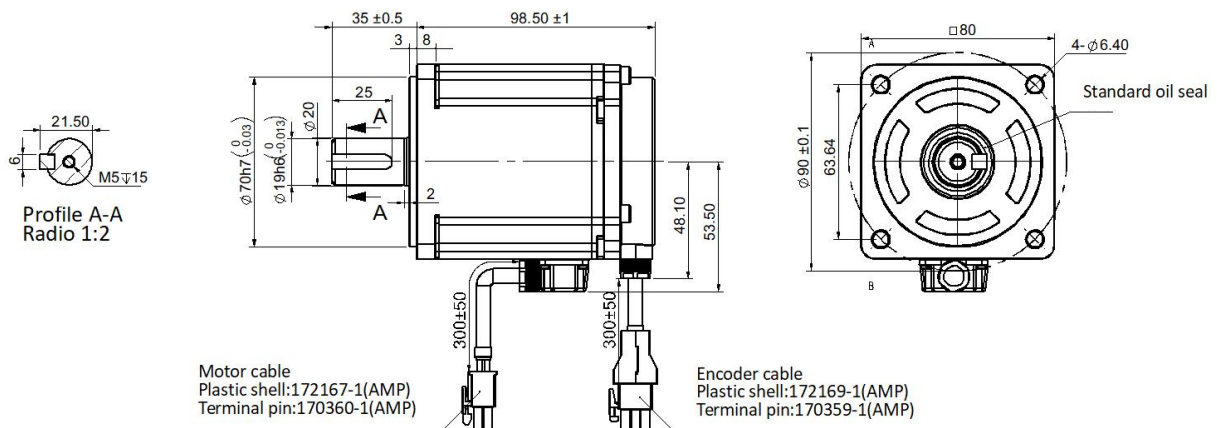


Figure 3-7 Installation dimension drawing of WD series 80 flange servo motor

## ② WE series motor

| Specification         | WE series 80 flange motor |  |     |     |
|-----------------------|---------------------------|--|-----|-----|
| Rated torque (N.m)    |                           |  | 3.5 | 4.0 |
| LA without brake (mm) |                           |  | 179 | 191 |
| LA with brake (mm)    |                           |  | 221 | 233 |

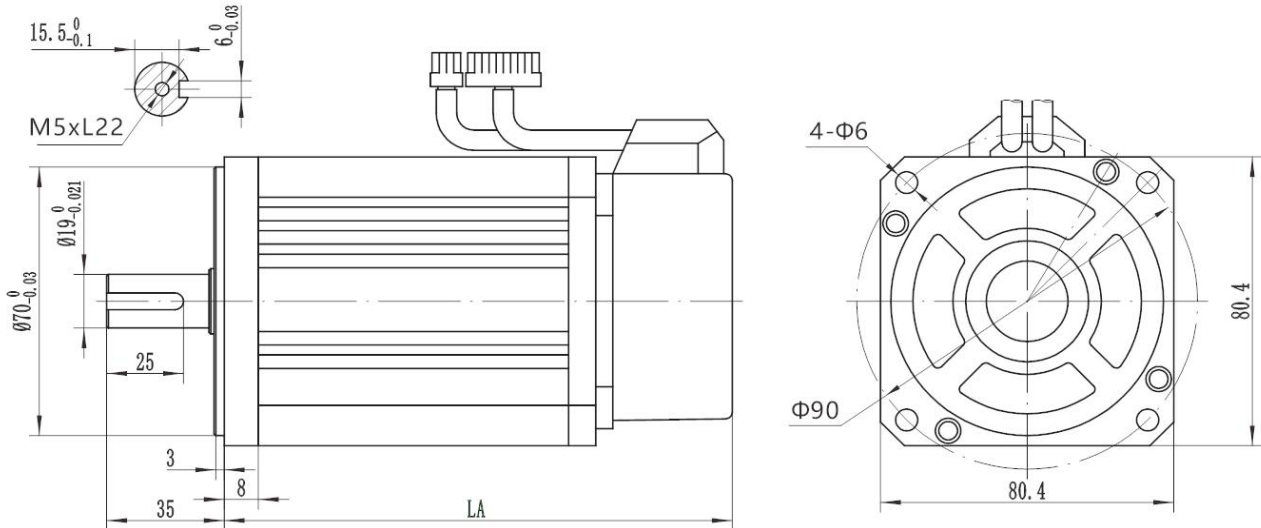


Figure 3-8 Installation dimension drawing of WE series 80 flange servo motor

## (3) Installation dimensions of WE series 110 flange servo motor

| Specification         | WE series 110 flange motor |     |     |     |
|-----------------------|----------------------------|-----|-----|-----|
| Rated torque (N.m)    |                            | 4   | 5   | 6   |
| LA without brake (mm) |                            | 189 | 204 | 219 |
| LA with brake (mm)    |                            | 254 | 269 | 284 |

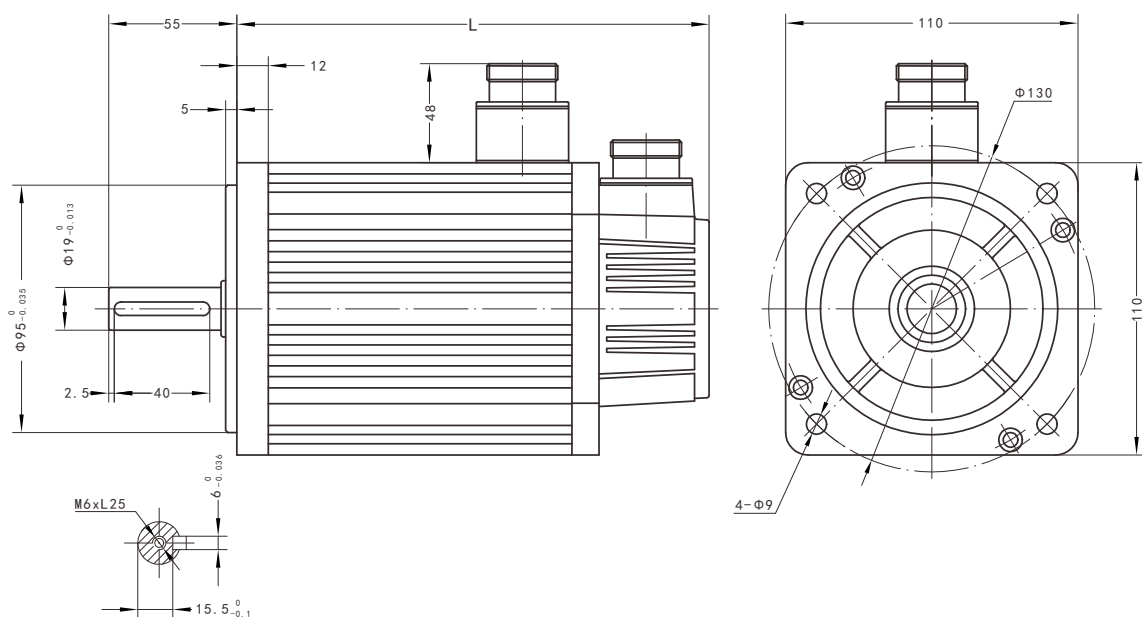


Figure 3-9 Installation dimensions of WE series 110 flange servo motor

## (4) Installation dimensions of WE series 130 flange servo motor

| Specification         | WE series 130 flange motor |     |     |     |     |         |         |         |         |
|-----------------------|----------------------------|-----|-----|-----|-----|---------|---------|---------|---------|
| Rated torque (N.m)    | 4                          | 5   | 6   | 7.7 | 10  |         |         | 15      |         |
|                       |                            |     |     |     |     | 1500rpm | 2500rpm | 1500rpm | 2500rpm |
| LA without brake (mm) | 166                        | 171 | 179 | 192 | 213 |         | 209     | 241     | 231     |
| LA with brake (mm)    | 226                        | 231 | 239 | 252 | 276 |         | 276     | 304     | 294     |

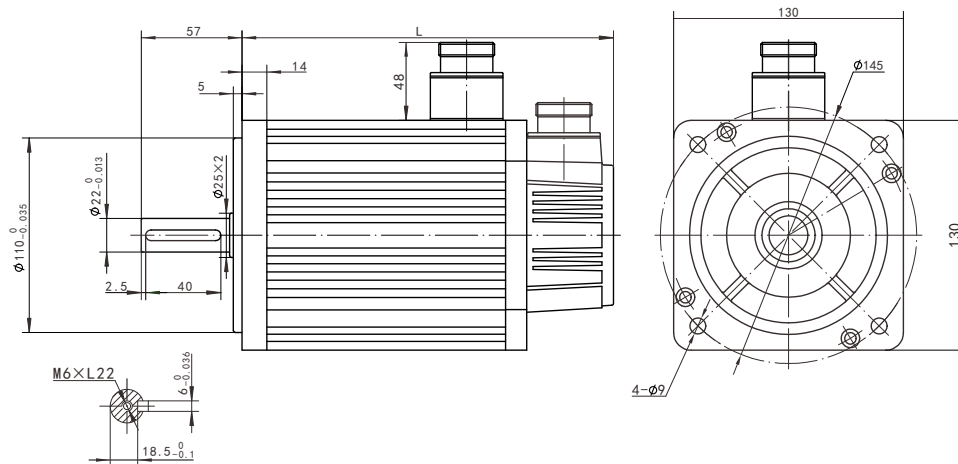


Figure 3-10 Installation dimension drawing of WE series 130 flange servo motor

**3.2.2 Installation Site**

1. Do not use the motor near corrosive, flammable gas environment, combustible materials such as hydrogen sulfide, chlorine, ammonia, sulfur, chlorinated gas, acid, alkali, salt, etc.
2. Do not remove the oil seal in places where there is grinding fluid, oil mist, iron powder, cutting, etc.
3. Do not use the motor in a closed environment. Closed environment will cause high temperature of the motor and shorten the service life.
4. A place far away from heat sources such as stoves.

**3.2.3 Installation Environment**

The installation environment of the servo motor has a direct impact on the normal function of it and its service life. Therefore, the installation environment of the servo motor must meet the following conditions:

| Project             | Specification   |
|---------------------|---|
| Ambient temperature | -10℃~40℃ (no freezing)  |
| Ambient humidity    | -20%~90%RH (no condensation)  |
| Storage temperature | -20℃~60℃  |
| Storage humidity    | -20%~90%RH (no condensation)  |
| Protection level    | IP65  |
| Vibration           | Less than 0.5G (4.9m/s <sup>2</sup> ), 10~60Hz (non-continuous operation) |

### 3.2.4 Installation Precautions

| Project                          | Specification   |
|----------------------------------|---|
| Rust inhibitor                   | Before installation, please wipe clean the "anti-rust agent" on the shaft extension end of the servo motor, and then do the relevant anti-rust treatment.   |
| Encoder notice                   | <ul style="list-style-type: none"> <li>When installing a pulley on a servo motor shaft with a keyway, use a screw hole at the shaft end. In order to install the pulley, first insert the double-headed nail into the screw hole of the shaft, use a washer on the surface of the coupling end, and gradually lock the pulley into the pulley with a nut;</li> <li>For the servo motor shaft with keyway, use the screw hole on the shaft end to install;</li> <li>For shafts without keyway, adopt friction coupling or similar methods</li> <li>When removing the pulley, use a pulley remover to prevent the bearing from being strongly impacted by the load;</li> <li>To ensure safety, install a protective cover or similar device in the rotating area, such as a pulley installed on the shaft.</li> </ul>   |
| Centering                        | When linking with the machine, please use the coupling, and keep the axis of the servo motor and the axis of the machine in a straight line.  |
| Installation direction           | The servo motor can be installed horizontally or vertically.  |
| Oil and water countermeasures    | <p>When using in a place with dripping water, please use it after confirming the protection level of the servo motor. When using it in a place where oil drips on the shaft penetration part, do not remove the oil seal of the servo motor.</p> <p>The use conditions of the servo motor with oil seal:</p> <ul style="list-style-type: none"> <li>When using, please make sure the oil level is lower than the lip of the oil seal;</li> <li>The oil seal can be used in a state with a good degree of splashing of oil foam;</li> <li>When the servo motor is installed vertically upwards, please be careful not to accumulate oil on the oil seal lip.</li> </ul>  |
| Stress condition of the cable    | Do not "bend" the wire or apply "tension" to it, especially the signal wire whose core diameter is 0.2mm or 0.3mm. During the wiring process, please do not make it too tight.  |
| Processing of the connector part | <p>Regarding the connector part, please note the following matters:</p> <ul style="list-style-type: none"> <li>When connecting the connector, please make sure that there is no foreign matter such as garbage or metal pieces in the connector;</li> <li>When connecting the connector to the servo motor, be sure to connect it from the side of the main circuit cable of the servo motor first, and the grounding of the main line cable must be reliably connected. If you connect one side of the encoder cable first, the encoder may malfunction due to the potential difference between PEs;</li> <li>When connecting, please make sure that the pin arrangement is correct;</li> <li>The connector is made of resin, please do not apply impact to avoid damage to the connector;</li> <li>Do not apply stress to the connector part during handling while the cable is connected. If stress is applied to the connector part, the connector may be damaged.</li> </ul> |

## Chapter 4 Wiring

### 4.1 Main Circuit Wiring

#### 4.1.1 Main Circuit Terminals

(1) Main circuit terminal distribution of VD3E type A servo drive

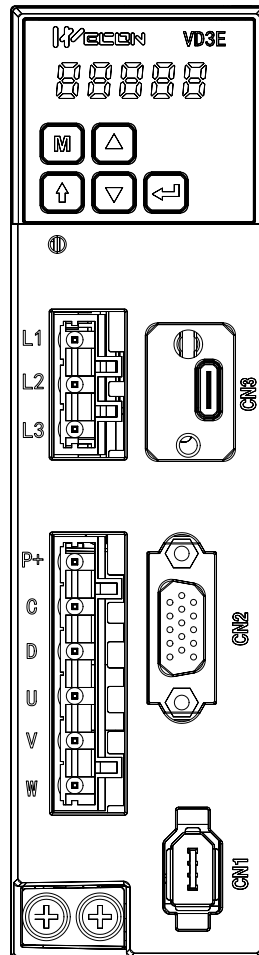


Figure 4-1 VD3E Type A Servo Drive Main Circuit Terminal Schematic

Table 4-1 Name and function of main circuit terminal of VD3E type A servo drive

| Terminal number | Terminal name             | Terminal function   |
|-----------------|---------------------------|---|
| L1              | Power input terminal      | Single-phase 220V AC input is connected to L1 and L3.   |
| L2              |                           |   |
| L3              |                           |   |
| P+              | Braking resistor terminal | Use internal braking resistor: short connected C-D.<br>Use an external braking resistor: please disconnect the short wire between C-D, and then connect the external braking resistor between P+ and C; |
| C               |                           |   |
| D               |                           |   |
| U               | Motor power line terminal | Connect with the U, V, W of the motor to supply power to the motor.   |
| V               |                           |   |
| W               |                           |   |
| Ground terminal | Ground terminal           | Grounding of the servo drive.   |



## (2) Main circuit terminal distribution of VD3E type B servo drive

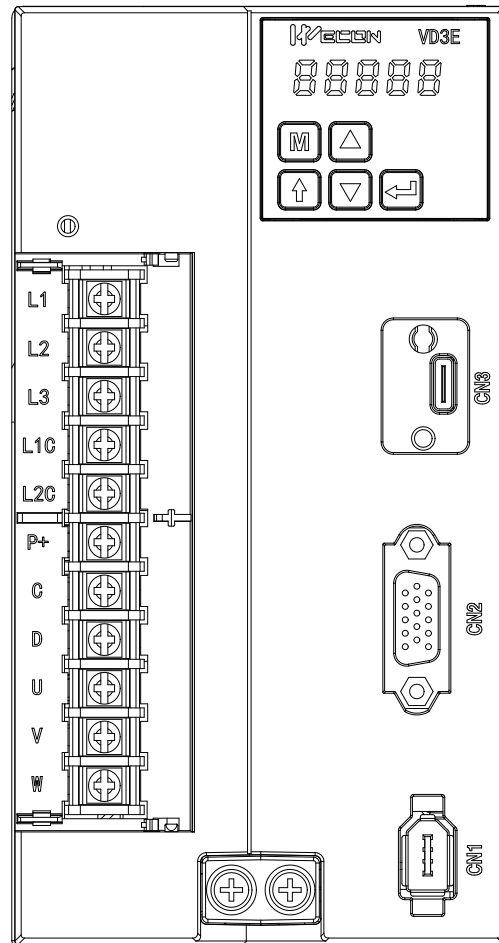


Figure 4-2 Schematic Diagram of VD3E Type B Servo Drive Main Circuit Terminal

Table 4-2 Name and function of main circuit terminal of VD3E type B servo drive

| Terminal number | Terminal name                | Terminal function   |
|-----------------|------------------------------|---|
| L1              | Power input terminal         | Single-phase 220V AC input is connected to L1 and L3.<br>Three-phase 220V AC input is connected to L1, L2, L3;  |
| L2              |                              |   |
| L3              |                              |   |
| L1C             | Control power input terminal | Single-phase 220V AC input connected to L1C and L2C   |
| L2C             |                              |   |
| P+              | Braking resistor terminal    | Use internal braking resistor: short connected C-D.<br>Use an external braking resistor: please disconnect the short wire between C-D, and then connect the external braking resistor between P+ and C; |
| C               |                              |   |
| D               |                              |   |
| U               | Motor power line terminal    | Connect with the U, V, W of the motor to supply power to the motor.   |
| V               |                              |   |
| W               |                              |   |
| Ground terminal | Ground terminal              | Grounding of the servo drive.   |

## 4.1.2 Power Wiring Example

## (1) VD3E Type A Drive Single-phase 220V Main Circuit Wiring

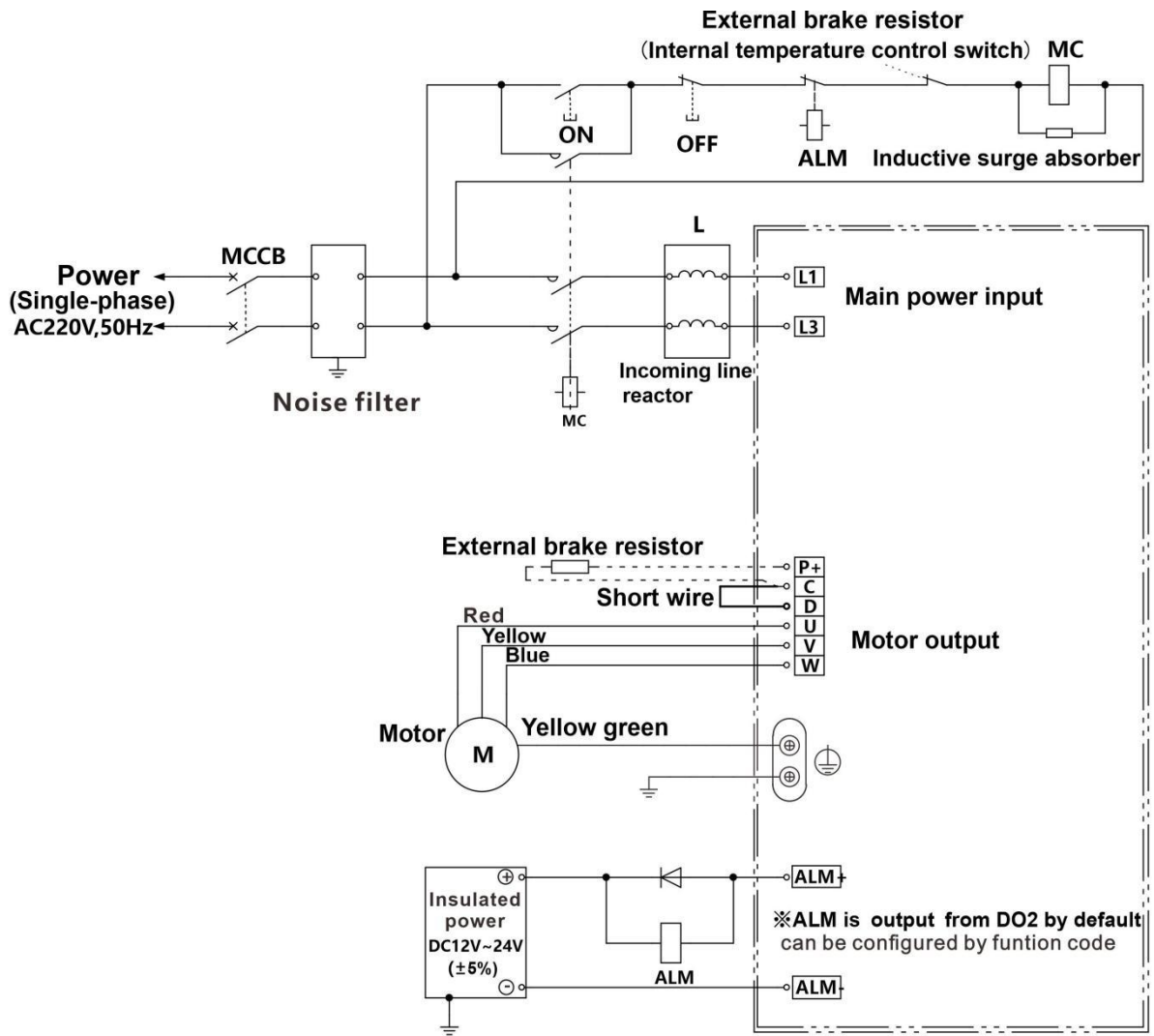


Figure 4-3 VD3E Type A Drive Single-phase 220V Main Circuit Wiring

## (2) VD3E Type B Drive Single-phase 220V Main Circuit Wiring

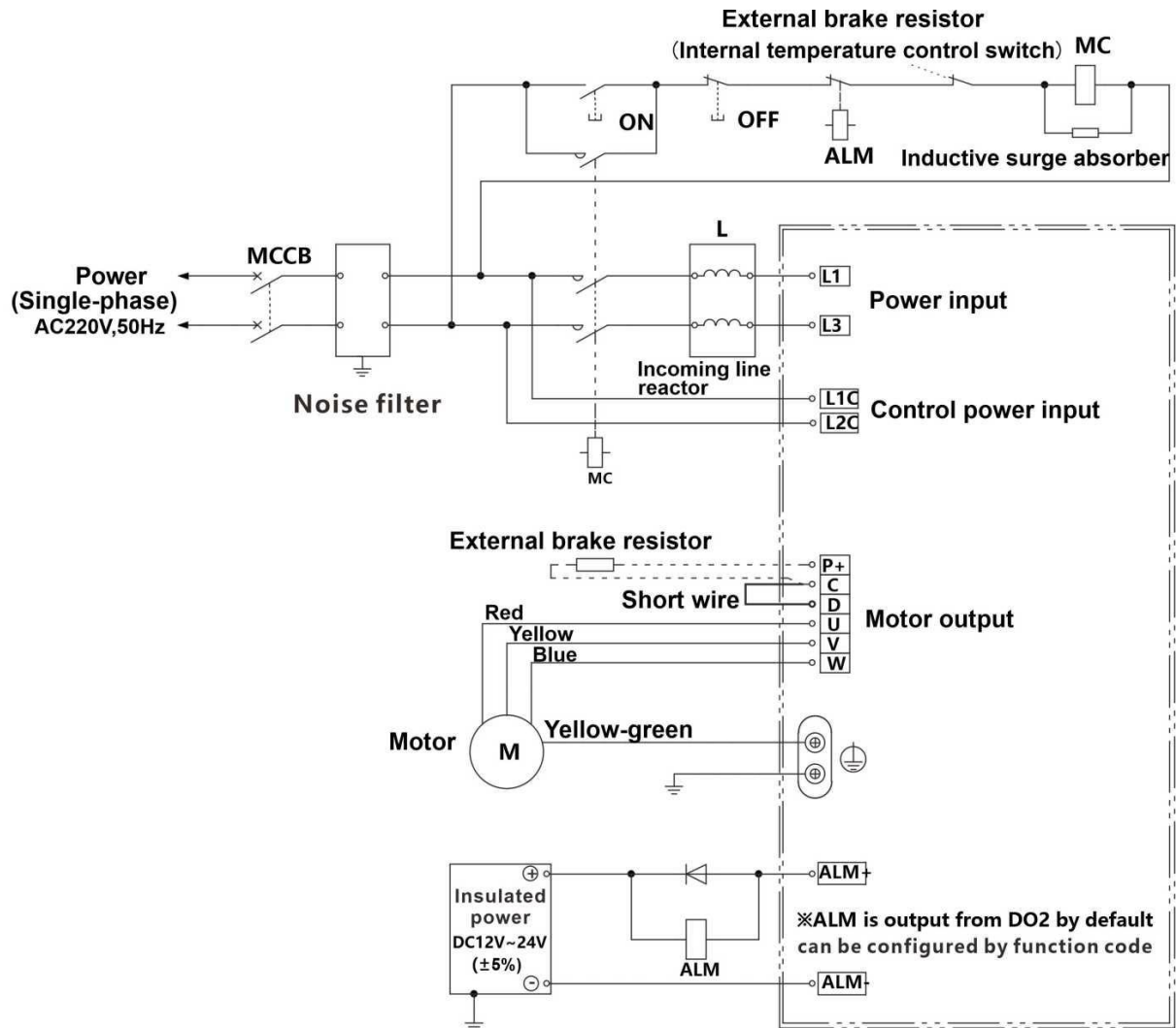


Figure 4-4 VD3E Type B Drive Single-phase 220V Main Circuit Wiring

## (3) VD3E Type B Drive Three-phase 220V Main Circuit Wiring

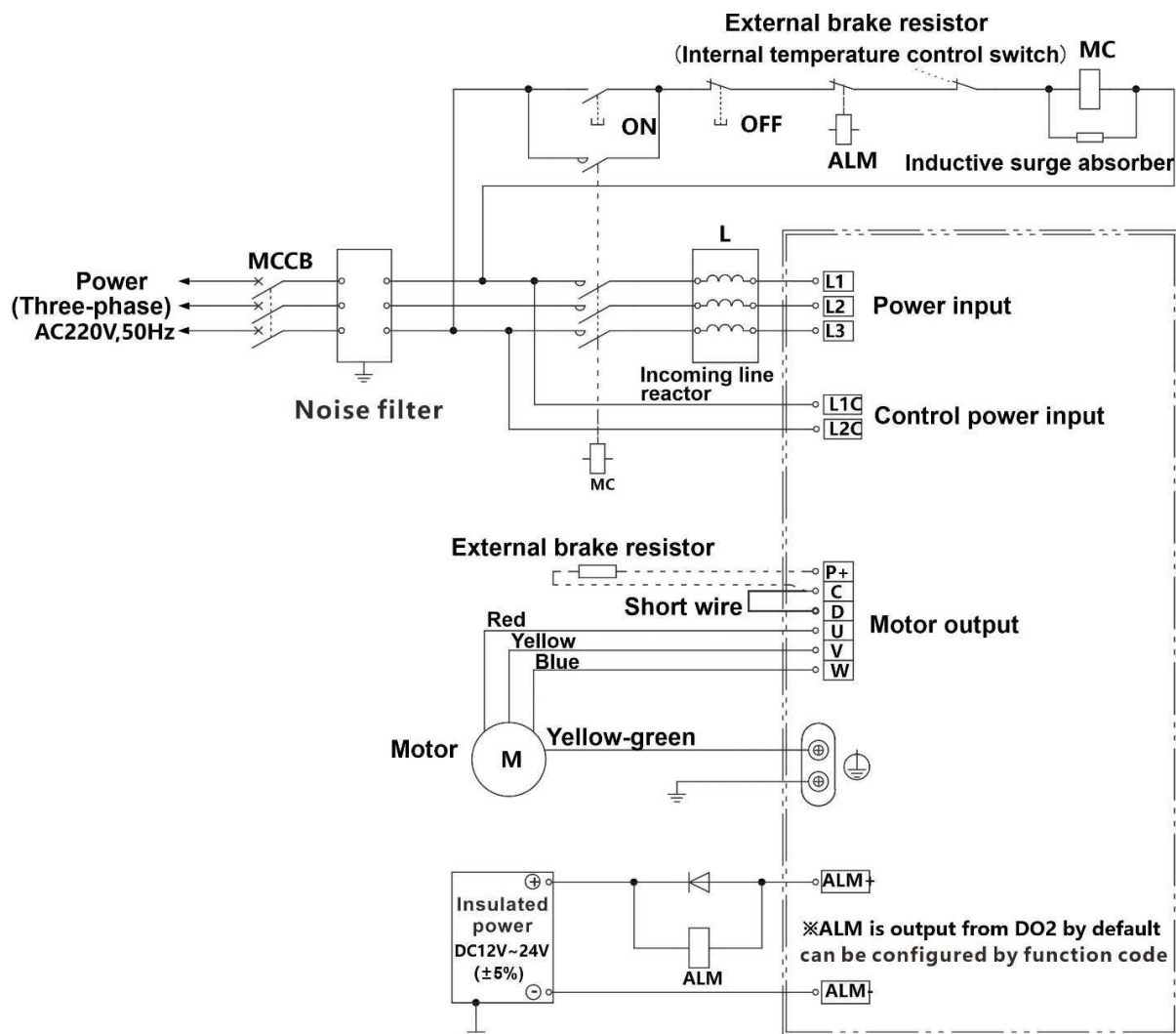


Figure 4-5 VD3E Type B Drive Three-phase 220V Main Circuit Wiring

## 4.1.3 Precautions for Main Circuit Wiring

- ① The input power line cannot be connected to the output terminals U, V and W, otherwise the servo drive will be damaged. When using the built-in braking resistor, C and D must be connected (factory default connection).
- ② When the cables are bundled and used in pipes, etc., due to the deterioration of heat dissipation conditions, please consider the allowable current reduction rate.
- ③ When the temperature in the cabinet is higher than the cable temperature limit, please choose a cable with a larger cable temperature limit, and it is recommended that the cable wire use Teflon wire. Please pay attention to the warmth of the cable in the low temperature environment. Generally, the surface of the cable is prone to hardening and breakage under the low temperature environment.
- ④ The bending radius of the cable should be more than 10 times the outer diameter of the cable itself to prevent the core of the cable from breaking due to long-term bending.

## 4.2 Power Line Connection of Servo Drive and Servo Motor

### 4.2.1 Power Cable

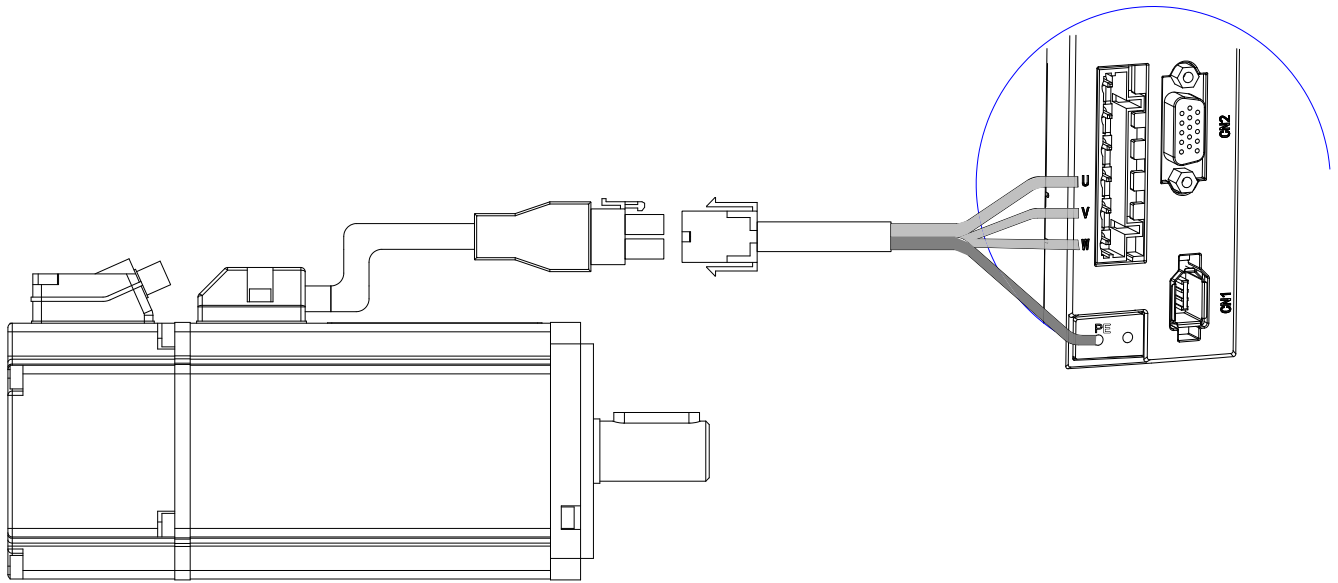
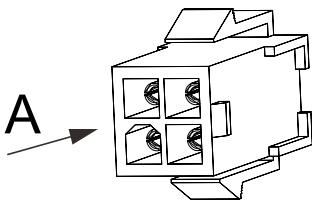
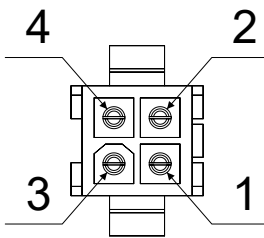
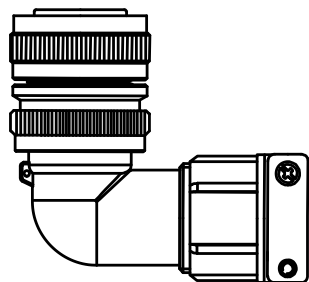
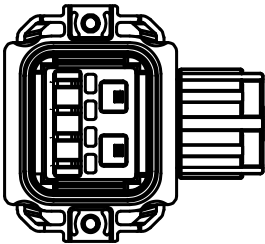
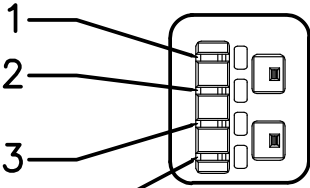


Figure 4-6 Connection schematic diagram of servo drive and servo motor

Wecon VD3E series servo drives have 3 kinds of interface power cables: rectangular plug, aviation plug and in-line type.

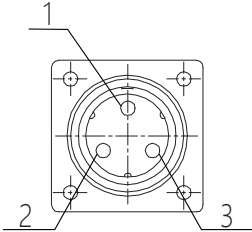
Table 4-3 Power cable servo motor side connector

| Connector exterior  | Terminal pin distribution   | Pin description   | Adaptation<br>Motor<br>flange |            |             |       |   |   |       |   |   |              |   |   |       |
|---|---|---|-------------------------------|------------|-------------|-------|---|---|-------|---|---|--------------|---|---|-------|
|  |  | Rectangular plug  | 60<br>80                      |            |             |       |   |   |       |   |   |              |   |   |       |
|   |   | <table><tr><th>Pin number</th><th>Signal name</th><th>Color</th></tr><tr><td>1</td><td>U</td><td>Red</td></tr><tr><td>2</td><td>V</td><td>White</td></tr><tr><td>3</td><td>W</td><td>Black</td></tr><tr><td>4</td><td>PE</td><td>Yellow-green</td></tr></table>   |                               | Pin number | Signal name | Color | 1 | U | Red   | 2 | V | White        | 3 | W | Black |
| Pin number  | Signal name   | Color   |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 1   | U   | Red   |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 2   | V   | White   |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 3   | W   | Black   |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 4   | PE  | Yellow-green  |                               |            |             |       |   |   |       |   |   |              |   |   |       |
|  |   | Aviation plug   | 110<br>130                    |            |             |       |   |   |       |   |   |              |   |   |       |
|   |   | <table><tr><th>Pin number</th><th>Signal name</th><th>Color</th></tr><tr><td>2</td><td>U</td><td>Black</td></tr><tr><td>4</td><td>V</td><td>Yellow-green</td></tr><tr><td>3</td><td>W</td><td>Black</td></tr><tr><td>1</td><td>PE</td><td>Black</td></tr></table> |                               | Pin number | Signal name | Color | 2 | U | Black | 4 | V | Yellow-green | 3 | W | Black |
| Pin number  | Signal name   | Color   |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 2   | U   | Black   |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 4   | V   | Yellow-green  |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 3   | W   | Black   |                               |            |             |       |   |   |       |   |   |              |   |   |       |
| 1   | PE  | Black   |                               |            |             |       |   |   |       |   |   |              |   |   |       |

|   |   |                   |             |              |          |
|---|---|-------------------|-------------|--------------|----------|
|  |  | In-line type plug |             |              | 60<br>80 |
|   |   | Pin number        | Signal name | Color        |          |
|   |   | 3                 | U           | Red          |          |
|   |   | 1                 | V           | White        |          |
|   |   | 2                 | W           | Black        |          |
|   |   | 4                 | PE          | Yellow-green |          |

**Note:** The color of the lines is subject to the actual product. The lines described in this manual are all lines of Wecon.

4.2.2 Brake Device Cable

| Connector shape and terminal pin distribution                                      | Pin description   |            |             |   |        |   |     |   |   |
|--|---|------------|-------------|---|--------|---|-----|---|---|
|  | <table><tr><th>Pin number</th><th>Signal name</th></tr><tr><td>1</td><td>DC 24V</td></tr><tr><td>2</td><td>GND</td></tr><tr><td>3</td><td>-</td></tr></table> | Pin number | Signal name | 1 | DC 24V | 2 | GND | 3 | - |
| Pin number   | Signal name   |            |             |   |        |   |     |   |   |
| 1  | DC 24V  |            |             |   |        |   |     |   |   |
| 2  | GND   |            |             |   |        |   |     |   |   |
| 3  | -   |            |             |   |        |   |     |   |   |

4.3 Encoder Cable Connection of Servo Drive and Servo Motor

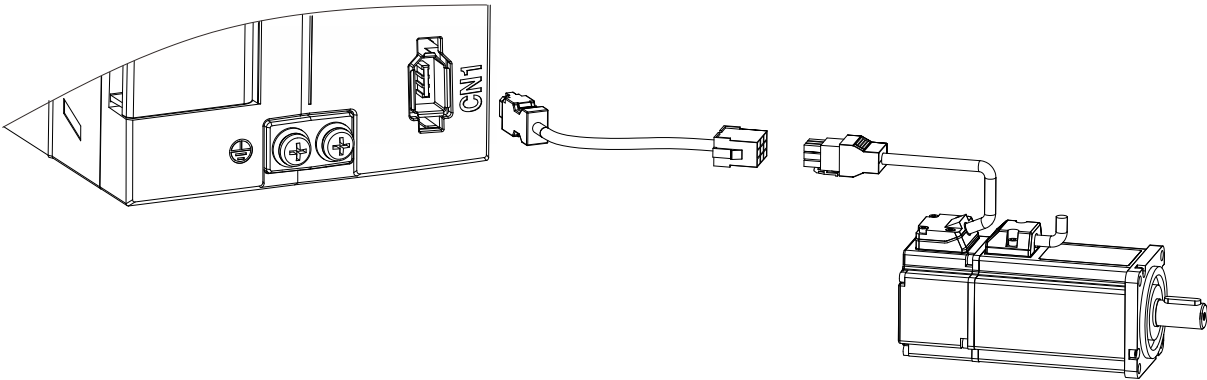


Figure 4-7 Encoder cable connection schema

Table 4-4 Encoder cable servo drive side connector

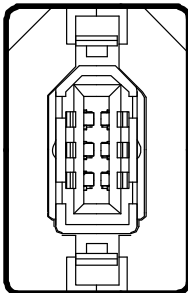
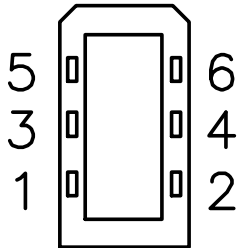
| Connector exterior   | Terminal pin distribution  | Pin description  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |
|--|--|--|------------|-------------|---|----|---|-----|---|---|---|---|---|-----|---|-----|
|  |  | <table><tr><th>Pin number</th><th>Signal name</th></tr><tr><td>1</td><td>5V</td></tr><tr><td>2</td><td>GND</td></tr><tr><td>3</td><td>-</td></tr><tr><td>4</td><td>-</td></tr><tr><td>5</td><td>SD+</td></tr><tr><td>6</td><td>SD-</td></tr></table> | Pin number | Signal name | 1 | 5V | 2 | GND | 3 | - | 4 | - | 5 | SD+ | 6 | SD- |
| Pin number   | Signal name  |  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |
| 1  | 5V   |  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |
| 2  | GND  |  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |
| 3  | -  |  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |
| 4  | -  |  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |
| 5  | SD+  |  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |
| 6  | SD-  |  |            |             |   |    |   |     |   |   |   |   |   |     |   |     |

Table 4-5 Absolute encoder cable connector (rectangular plug)

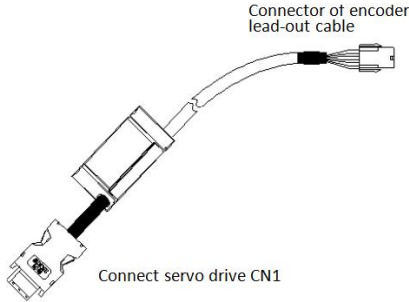
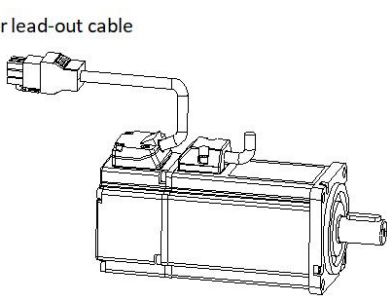
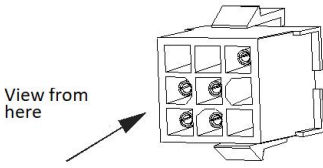
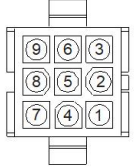
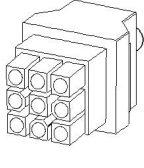
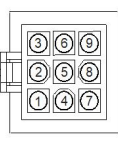
| Connector shape and terminal pin distribution   |  | Adapted motor<br>Flange |
|---|--|-------------------------|
|  <p>Connector of encoder lead-out cable</p> <p>Connect servo drive CN1</p>                               |  <p>Encoder lead-out cable</p>   | 60<br>80                |
|   |  |                         |
|  <p>View from here</p>  |  <p>View from here</p>  |                         |
| Pin number  | Signal name  |                         |
| 7   | 5V   |                         |
| 8   | GND  |                         |
| 4   | SD+  |                         |
| 5   | SD-  |                         |
| 3   | Shield   |                         |
| 1   | Battery+   |                         |
| 2   | Battery-   |                         |

Table 4-6 Encoder cable pin connection relationship

| Drive side J1394 |             | Description                   | Motor side                  |             |
|------------------|-------------|-------------------------------|-----------------------------|-------------|
| Pin number       | Signal name |                               | Rectangular plug pin number | Cable color |
| 1                | 5V          | Encoder +5v power             | 7                           | Blue        |
| 2                | GND         | Encoder power ground          | 8                           | Orange      |
| 5                | SD+         | Serial communication signal + | 4                           | Green       |
| 6                | SD-         | Serial communication signal - | 5                           | Brown       |
| Shell            | Shield      | Shield                        | 3                           | -           |
| -                | -           | Battery+                      | 1*                          | Pink        |
| -                | -           | Battery-                      | 2*                          | Pink-Black  |



**Note:** The color of the cable is subject to the actual product. The cables described in this manual are all cables of Wecon!

Table 4-7 Absolute value encoder cable connector (aviation plug)

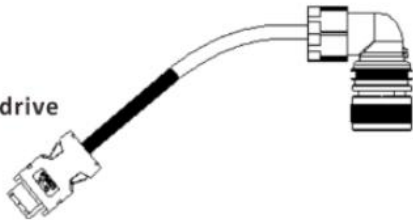
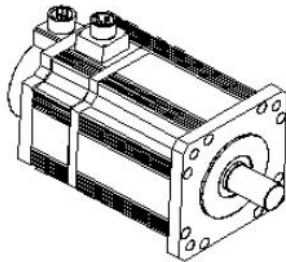
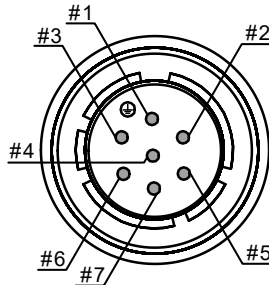
| Connector shape and terminal pin distribution  |   | Adapte<br>d motor<br>Flange |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
|--|---|-----------------------------|-------------|---|----|---|-----|---|-----|---|-----|---|--------|---|----------|---|----------|--|
| <div>Connector of encoder pinout</div> <div>Connect servo drive<br/>CN1</div>   | <div>Encoder connected to a socket</div>  | 110<br>130                  |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
|  |    |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| <table><thead><tr><th>Pin<br/>number</th><th>Signal name</th></tr></thead><tbody><tr><td>7</td><td>5V</td></tr><tr><td>5</td><td>GND</td></tr><tr><td>6</td><td>SD+</td></tr><tr><td>4</td><td>SD-</td></tr><tr><td>1</td><td>Shield</td></tr><tr><td>3</td><td>Battery+</td></tr><tr><td>2</td><td>Battery-</td></tr></tbody></table> |   | Pin<br>number               | Signal name | 7 | 5V | 5 | GND | 6 | SD+ | 4 | SD- | 1 | Shield | 3 | Battery+ | 2 | Battery- |  |
| Pin<br>number  | Signal name   |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| 7  | 5V  |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| 5  | GND   |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| 6  | SD+   |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| 4  | SD-   |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| 1  | Shield  |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| 3  | Battery+  |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |
| 2  | Battery-  |                             |             |   |    |   |     |   |     |   |     |   |        |   |          |   |          |  |

Table 4-8 Encoder cable pin connection relationship

| Drive side J1394 |             | Description                   | Motor side               |             |
|------------------|-------------|-------------------------------|--------------------------|-------------|
| Pin number       | Signal name |                               | Aviation plug pin number | Cable color |
| 1                | 5V          | Encoder +5v power             | 7                        | Blue        |
| 2                | GND         | Encoder power ground          | 5                        | Orange      |
| 5                | SD+         | Serial communication signal + | 6                        | Green       |

|       |        |                               |    |            |
|-------|--------|-------------------------------|----|------------|
| 6     | SD-    | Serial communication signal - | 4  | Brown      |
| Shell | Shield | Shield                        | 1  | -          |
| -     | -      | Battery+                      | 3* | Pink       |
| -     | -      | Battery-                      | 2* | Pink-Black |

**Note:** The color of the cable is subject to the actual product. The cables described in this manual are all cables of Wecon!

Table 4-9 Absolute value encoder cable connector (in-line type)

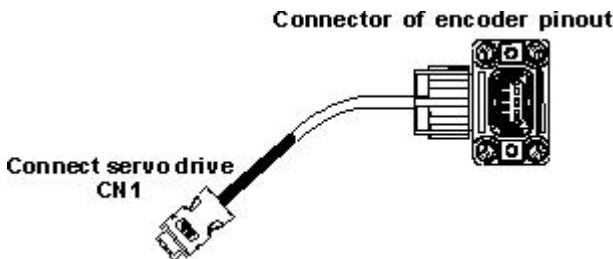
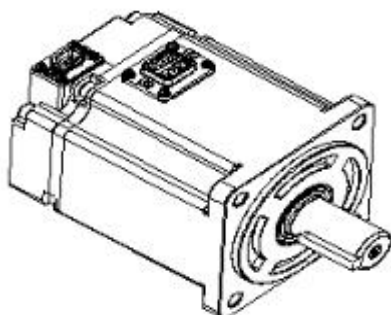
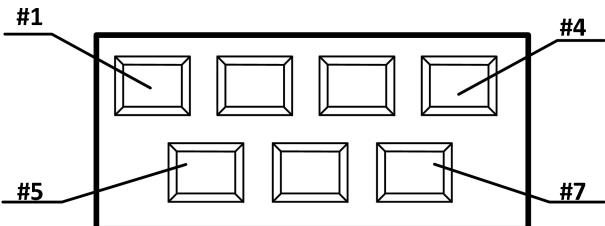
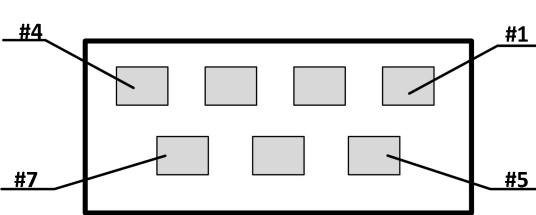
| Connector shape and terminal pin distribution  |   | Adapted motor<br>Flange |            |             |   |    |   |     |   |     |   |     |   |        |
|--|---|-------------------------|------------|-------------|---|----|---|-----|---|-----|---|-----|---|--------|
| <div><p>Connector of encoder pinout</p><p>Connect servo drive<br/>CN1</p></div>  | <div><p>Encoder socket</p></div> | 60<br>80                |            |             |   |    |   |     |   |     |   |     |   |        |
| <div></div>   | <div></div>                     |                         |            |             |   |    |   |     |   |     |   |     |   |        |
| <table><tr><th>Pin number</th><th>Signal name</th></tr><tr><td>7</td><td>5V</td></tr><tr><td>5</td><td>GND</td></tr><tr><td>6</td><td>SD+</td></tr><tr><td>4</td><td>SD-</td></tr><tr><td>1</td><td>Shield</td></tr></table> |   |                         | Pin number | Signal name | 7 | 5V | 5 | GND | 6 | SD+ | 4 | SD- | 1 | Shield |
| Pin number   | Signal name   |                         |            |             |   |    |   |     |   |     |   |     |   |        |
| 7  | 5V  |                         |            |             |   |    |   |     |   |     |   |     |   |        |
| 5  | GND   |                         |            |             |   |    |   |     |   |     |   |     |   |        |
| 6  | SD+   |                         |            |             |   |    |   |     |   |     |   |     |   |        |
| 4  | SD-   |                         |            |             |   |    |   |     |   |     |   |     |   |        |
| 1  | Shield  |                         |            |             |   |    |   |     |   |     |   |     |   |        |

Table 4-10 Encoder cable pin connection relationship

| Drive side J1394 |             | Description                   | Motor side               |             |
|------------------|-------------|-------------------------------|--------------------------|-------------|
| Pin number       | Signal name |                               | Aviation plug pin number | Cable color |
| 1                | 5V          | Encoder +5v power             | 7                        | Blue        |
| 2                | GND         | Encoder power ground          | 5                        | Orange      |
| 5                | SD+         | Serial communication signal + | 6                        | Green       |
| 6                | SD-         | Serial communication signal - | 4                        | Brown       |
| Shell            | Shield      | Shield                        | 1                        | -           |

**Note:** The color of the cable is subject to the actual product. The cables described in this manual are all cables of Wecon!

## 4.4 Servo Drive Control Input and Output Terminal Wiring

### 4.4.1 CN2 Pin Distribution

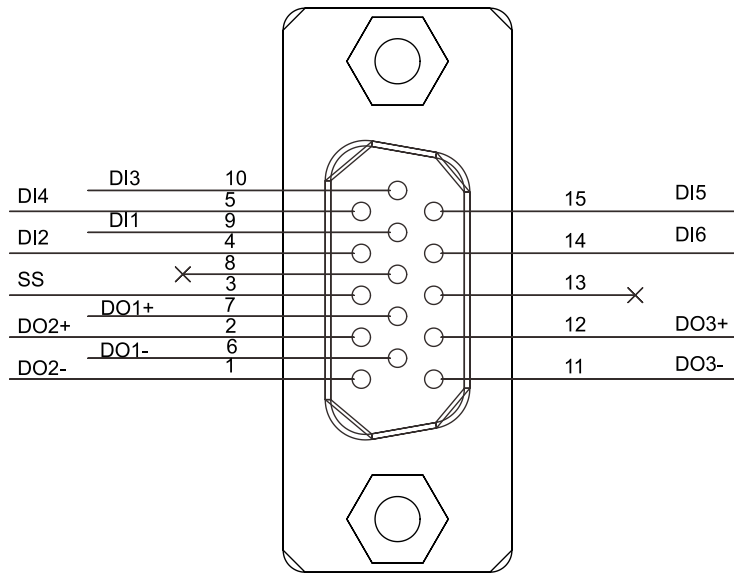


Figure 4-8 Shape and pin distribution of control input and output terminals

Table 4-11 CN2 Interface Definition

| Pin number | Signal name | Pin number | Signal name |
|------------|-------------|------------|-------------|
| 1          | DO2-        | 9          | DI1         |
| 2          | DO2+        | 10         | DI3         |
| 3          | SS          | 11         | DO3-        |
| 4          | DI2         | 12         | DO3+        |
| 5          | DI4         | 13         | -           |
| 6          | DO1-        | 14         | DI6         |
| 7          | DO1+        | 15         | DI5         |
| 8          | -           |            |             |

### 4.4.2 Digital Input and Output Signals

Table 4-12 DI/DO signal description

| Pin number | Signal name | Default function          |
|------------|-------------|---------------------------|
| 9          | DI1         | None                      |
| 4          | DI2         | Fault and warning clear   |
| 10         | DI3         | Forward drive prohibition |
| 5          | DI4         | Reverse drive prohibition |
| 15         | DI5         | None                      |
| 14         | DI6         | None                      |
| 3          | SS          | Power input (12 ~ 24V)    |
| 6          | DO1-        | Rotation detection        |
| 7          | DO1+        |                           |
| 1          | DO2-        | Fault signal              |
| 2          | DO2+        |                           |

|    |      |             |
|----|------|-------------|
| 11 | DO3- | Servo ready |
| 12 | DO3+ |             |

### 1) Digital input circuit

Taking DI1 as an example, the interface circuits of DI1 ~ DI6 are exactly the same.

When the control device(HMI/PLC) is relay output

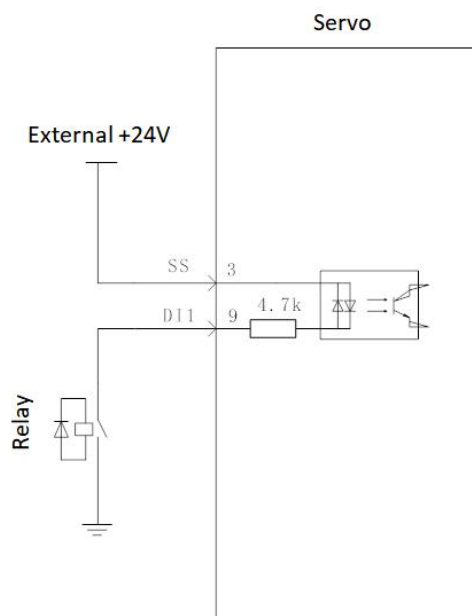


Figure 4-9 Relay output

When the control device(HMI/PLC) is open collector output

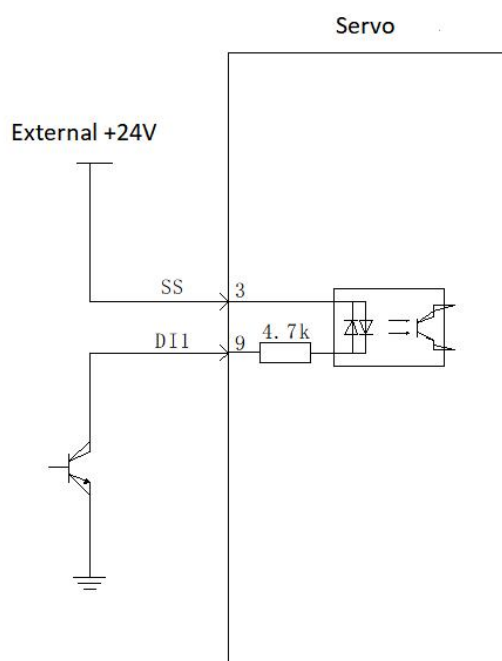


Figure 4-10 Open collector output

**Digital output circuit**

Taking DO1 as an example, the interface circuits of DO1 ~ DO3 are exactly the same.

When the control device(HMI/PLC) is relay input

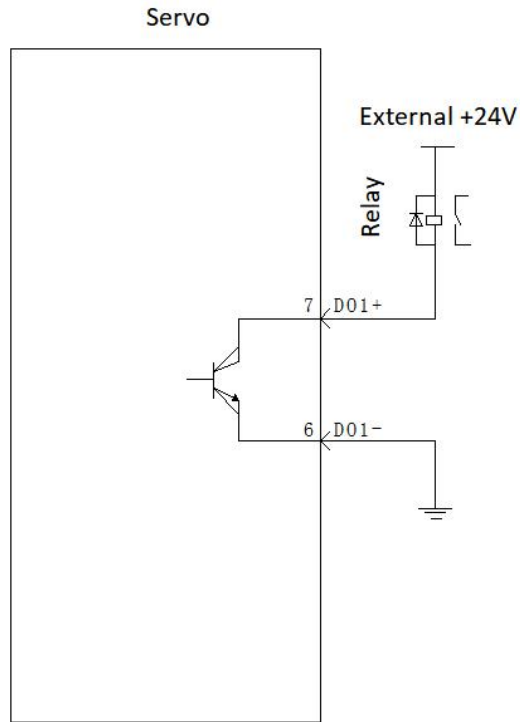
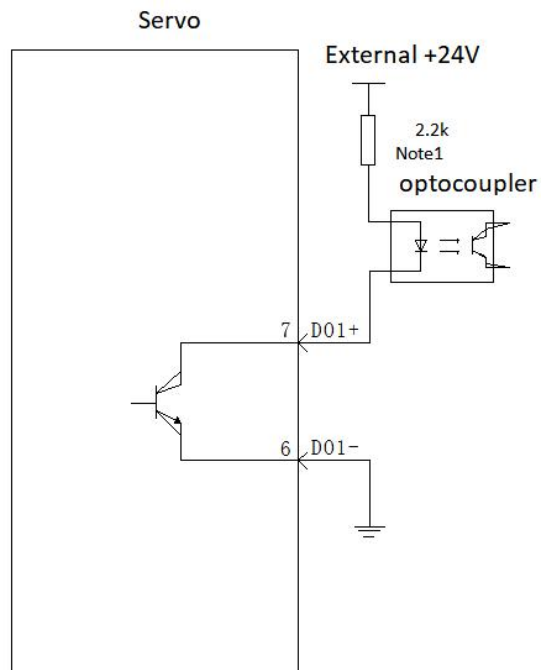


Figure 4-11 Relay input

When the control device(HMI/PLC) is optocoupler input



Note1: The maximum current should not exceed 50ma

Figure 4-12 Optocoupler input

#### 4.4.3 Brake Wiring

The brake is a mechanism that prevents the servo motor shaft from moving when the servo drive is in a non-operating state, and keeps the motor locked in position, so that the moving part of the machine will not move due to its own weight or external force.

The brake input signal is non-polar, and the user needs to prepare 24V power supply. The standard connection diagram of brake signal BK and brake power supply is as follows:

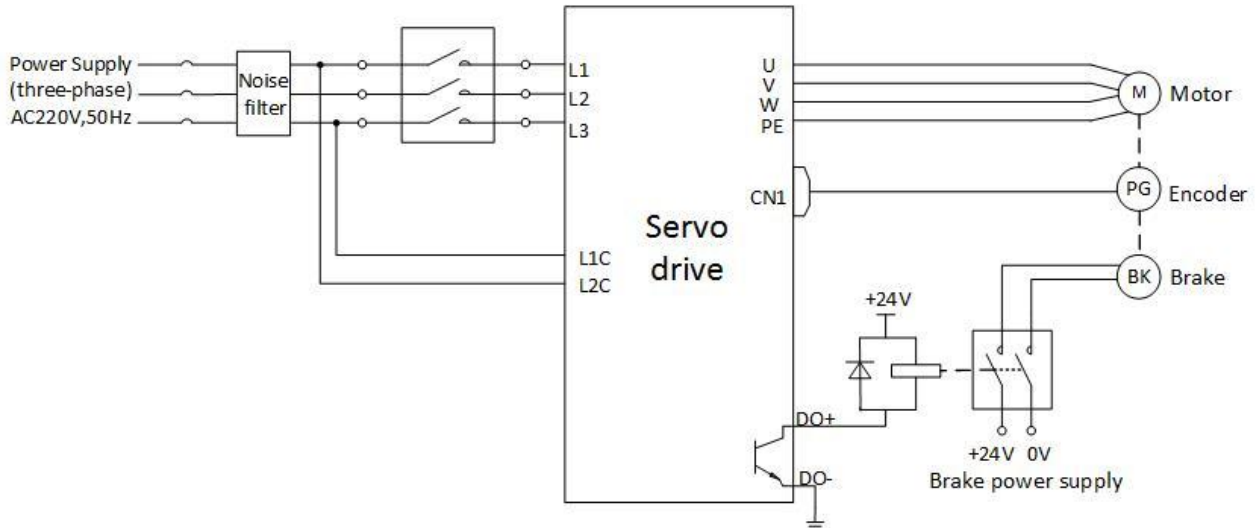


Figure 4-13 Brake wiring (taking three-phase 220V input as an example)

## 4.5 Communication Signal Wiring

The CN5 port of the first servo drive is connected to Wecon PLC LX6V

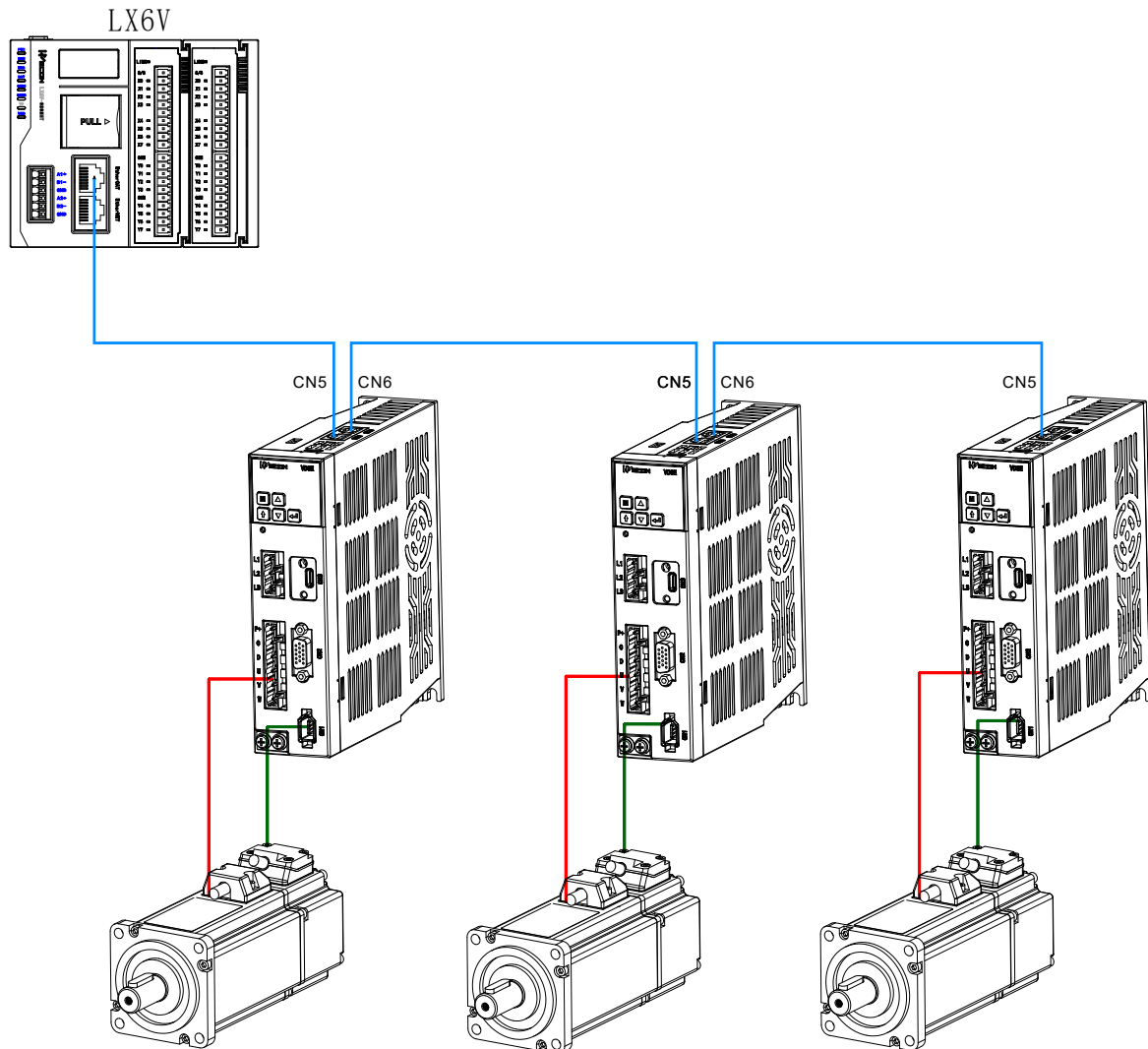


Figure 4-14 Communication topology networking schema

Table 4-13 CN5\ CN6 interface definition

| Pin | Name     | Function description  |
|-----|----------|---|
| 1   | RX-      | Computer sends negative terminal<br>(drive receives negative) |
| 2   | RX+      | Computer sends terminal (drive<br>receives positive)          |
| 3   | TX-      | Computer receives negative terminal<br>(drive sends negative) |
| 4   | GND      | Ground terminal   |
| 5   | Not used | Not used  |
| 6   | TX+      | Computer receives positive terminal<br>(drive sends positive) |



Chapter 5 Panel

|   |    |          |
|---|----|----------|
| 7 | NC | Not used |
| 8 | NC | Not used |

## Chapter 5 Panel Composition

### 5.1 Panel Composition

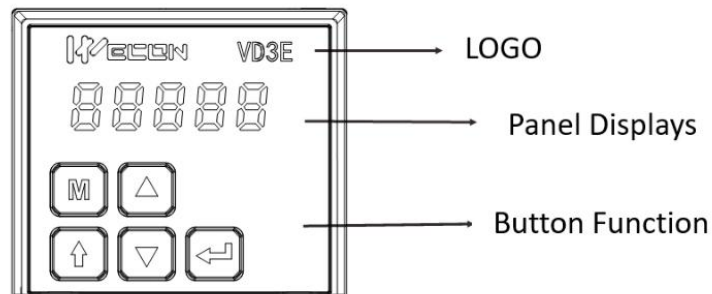


Figure 5-1 Appearance schematic diagram of servo drive panel

The panel of Wecon VD3E series bus servo drive is composed of a display (5-bit LED digital tube) and buttons, which can be used for various display and parameter setting functions of servo drive. Taking parameter setting as an example, the conventional functions of buttons are shown in Table 5-1.

Table 5-1 Brief introduction of key function

| Icon | Name             | Function  |
|------|------------------|---|
|      | Mode             | Mode switching<br>Return to the previous menu   |
|      | Increase         | Increase the value of the LED flashing bit  |
|      | Down (decrease)  | Decrease the value of the LED flashing bit  |
|      | SHIFT (Settings) | ① Change the LED flashing bit<br>② View the high-order values of data with a length greater than 4 bits |
|      | Confirm (Enter)  | ① Enter the next menu<br>① Execute instructions such as storing parameter setting values                |

### 5.2 Panel Display

When servo drive is in operation, the panel could be used for status display, parameter display, fault display and monitoring display of the servo.

**Status display:** Display the current operating status of servo drive.

**Parameter display:** Display the object dictionary and the setting value of the object dictionary corresponding to different functions.

**Fault display:** Display the fault code of servo drive.

**Monitor display:** Display the current operating parameter values of servo drive.

### 5.2.1 Display Switching

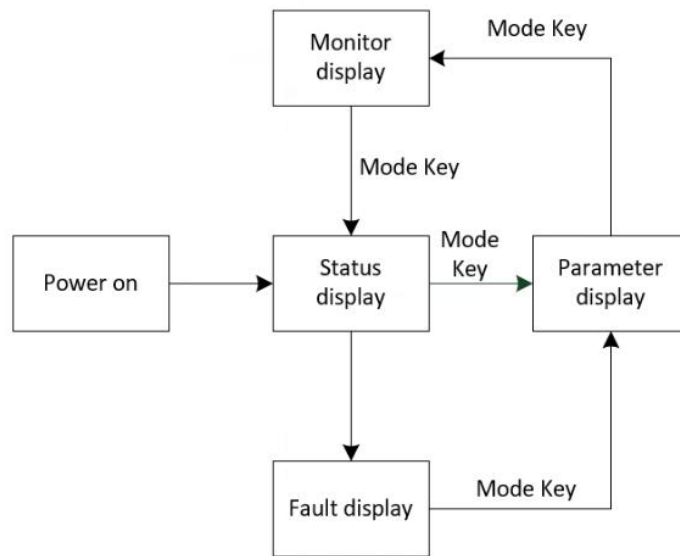


Figure 5-2 Switching schema of each display type of panel

#### Description:

- ① Power on, the panel display of the servo drive enters [status display mode]
- ② When an operation failure occurs, the panel immediately switches to the bit failure display mode, and all the digital tubes flash synchronously, press the "mode" key to switch to the parameter display mode.
- ③ Press the "Mode" key to switch between different display modes. The switching conditions are shown in Figure 5-2.

### 5.2.2 Status Display

Table 5-2 Status display example

| Display | Name                          | Display occasion   | Meaning  |
|---------|-------------------------------|--|--|
|         | Reset<br>Servo initialization | Servo drive is powered on within 1 second                | The servo drive is in an initialized or reset state. After waiting for initialization or reset to complete, automatically switch to other states |
|         | nr<br>Servo is not ready      | After initialization is complete, but servo is not ready | The servo drive is in a non-operational state  |
|         | ry<br>Servo ready             | Servo ready  | The servo is in a ready state, waiting for the upper computer to give an enable signal   |
|         | rn<br>Servo is running        | Servo enable signal is active (S-ON is ON state)         | The servo drive is in operation  |

|  |                                     |                          |   |
|--|-------------------------------------|--------------------------|---|
|  | nF<br>Servo trouble-free            | Servo drive has no fault | Servo drive has no fault  |
|  | 1 ~ A<br>Control mode               | -                        | Displays the current operation mode of the servo drive in hexadecimal digital form:<br>1: Contour Position Mode<br>3: Contour velocity mode<br>4: Contour torque mode<br>6: Return to zero mode<br>8: Cyclic Synchronous Position Mode<br>9: Periodic Synchronous speed Mode<br>A: Periodic synchronous torque mode |
|  | 1 ~ 8<br>Communication Status       | -                        | Displays the Ether CAT state machine status of the slave station in character form:<br>1: Initialization state<br>2: Pre-operating status<br>4: Safe operation status<br>8: Operating status  |
|  | CN6 Interface Connection Indication | -                        | Keep dark constantly: No communication connection detected<br>Keep bright constantly: A communication connection has been established   |
|  | CN5 Interface Connection Indication | -                        |   |

Control mode  
 1: Contour position control  
 3: Contour speed mode  
 4: Contour torque mode  
 6: Home return mode  
 7: Interpolation mode  
 8: Periodic synchronous position mode  
 9: Periodic synchronous velocity mode  
 A: Periodic synchronous torque mode

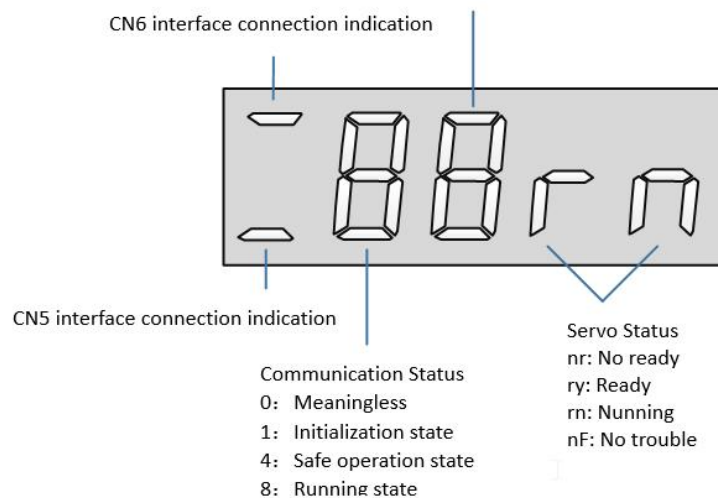


Figure 5-3 Status indication schema

### 5.2.3 Parameter Display


Wecon VD3E series bus servo drive is divided into 13 groups of function codes according to different parameters and functions, which can quickly locate the position of function codes according to the group of function codes. For specific parameters, please refer to "Chapter 8 Object Dictionary".

#### (1) Parameter group display

The parameter display is the display of different function codes. The format of the function code is PXX.YY, where PXX represents the group number of the function code, and YY represents the number within the function code group.

| Display | Name                       | Content                       |
|---------|----------------------------|-------------------------------|
| PXX.YY  | Function code group number | Number in function code group |

For example, the function code 2000.01 is shown as follows:

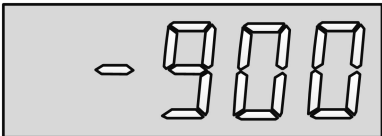
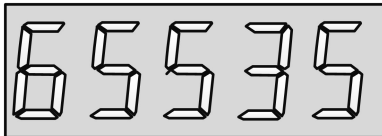
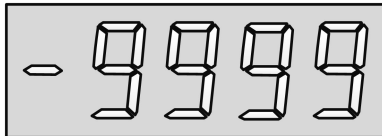
| Display   | Name                  | Content   |
|---|-----------------------|---|
|  | Function code 2000-01 | 00: Function code group number<br>01: Number in function code group |

#### (2) Display of different length data

##### ① Data display of four digits and below

Using single page display, if it is a signed number, the highest bit of the data is "-".

Examples:

| Display   |   |   |
|---|---|---|
|  |  |  |

Display Data more than five bits

Display in pages from low to high digits, each 4 bits is a page. Display method: current page + current value, as shown, switch the current page by pressing the "shift" key.

For example: 2147483646 is displayed as follows:

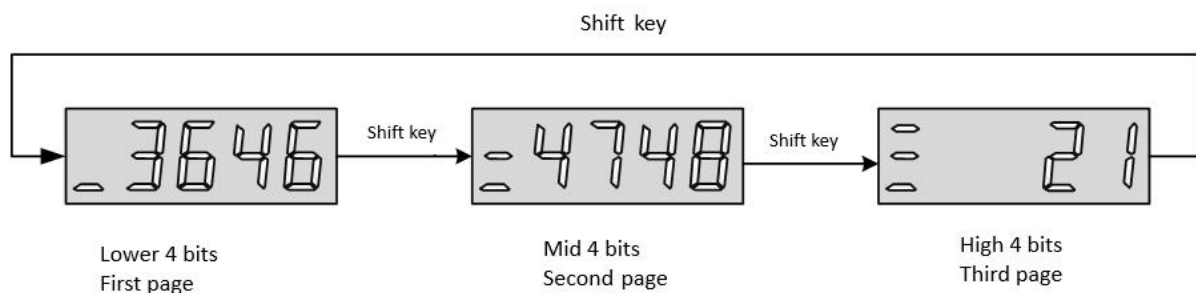


Figure 5-4 2147483646 Display Action

For example: -2147483647 is displayed as follows:

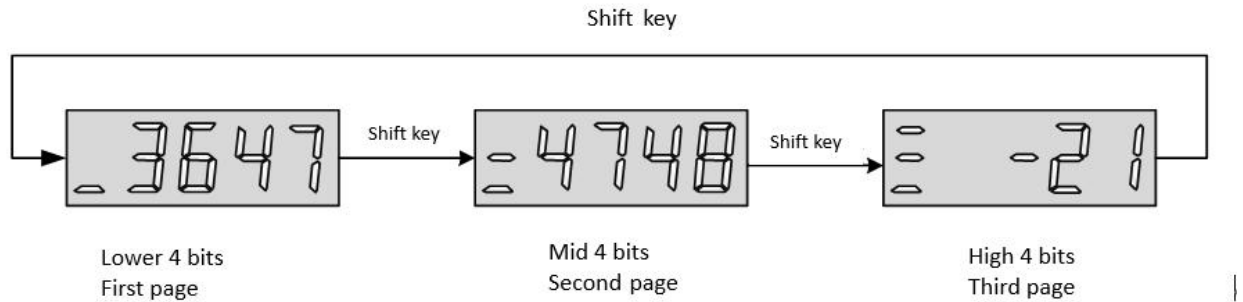


Figure 5-5 -2147483647 Display Operation

## (3) Decimal point display

Digital tube of individual bit data ". "Represents the decimal point, and the decimal point". "No flashing, as shown below:

| Display |  |
|---------|--|
|         |  |

## (4) Parameter setting display

Table 5-3 Parameter setting display

| Display | Name   | Display occasion  | Meaning   |
|---------|--|---|---|
|         | Done<br>Parameter setting<br>completed               | Restore factory<br>settings   |   |
|         | P.Init<br>Parameter restore factory<br>setting value | Restore factory<br>settings   | The servo drive is in the<br>process of parameter<br>restoration to factory<br>settings |
|         | Error<br>parameter error                             | Parameter setting<br>exceeds the limit<br>(Or not allowed to<br>exceed the limit) | Prompt that the parameter<br>setting exceeds the limit                                  |

## 5.2.4 Fault Display

The panel can display current or historical fault and warning codes. Please refer to the analysis and troubleshooting of faults and warnings"Chapter 7 Failure".

When a single fault or warning occurs, the panel immediately displays the current fault or warning code; when multiple faults or warnings occur, the highest fault code is displayed. When a fault occurs, when switching from the auxiliary function to the parameter display function, the corresponding fault or warning code will be displayed. You can view the current fault and warning codes and the past five fault and warning codes through

the monitor display on the panel. You can view the current fault and warning codes and the last five fault and warning codes through the monitoring display of the panel.

Table 5-4 Warning display case

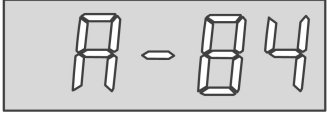
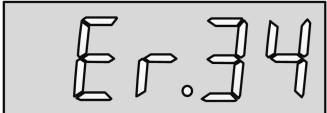
| Display   | Name   | Content  |
|---|--|--|
|  | Parameter modification that needs to be powered on again | Modified the parameters that need to be re-powered on to take effect |

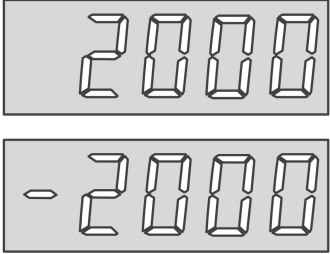
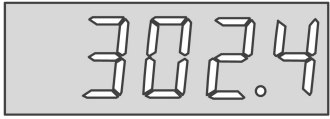
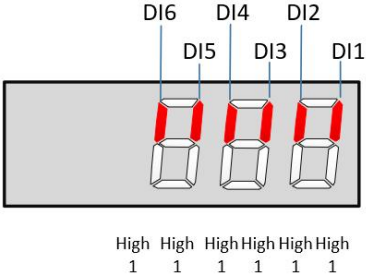
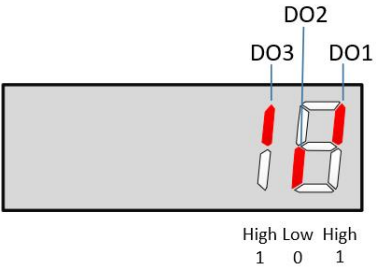
Table 5-5 Fault display case

| Display   | Name                      | Content                   |
|---|---------------------------|---------------------------|
|  | Motor overload protection | Motor overload protection |

### 5.2.5 Monitor Display

After the servo drive is powered on or the servo enable is turned on, you can press the "Mode" key to enter the monitoring display mode.

Table 5-6 Monitoring quantity display schema

| Display   | Monitoring volume | Name                 | Unit | Meaning   |
|---|-------------------|----------------------|------|---|
|    | U0-02             | Servo motor speed    | rpm  | Indicates the actual running speed of servo motor, which is expressed in decimal system   |
|    | U0-31             | Bus voltage          | V    | Represents the voltage value , the DC bus voltage between P+ and - of the drive   |
|   | U0-17             | Input signal status  | -    | Indicates the level status corresponding to the 6 DI terminals. The upper half of the LED light indicates high level, and the lower half light indicates low level. |
|  | U0-19             | Output signal status | -    | Indicates the level status corresponding to the 3 DO terminals. The upper half of the LED light indicates high level, and the lower half light indicates low level. |



## 5.3 Panel Operation

### 5.3.1 Parameter Setting

The servo drive panel can be used to set parameters. For details, please refer to "Chapter 6 Parameters" Taking 2000.01 as an example, the control mode of servo drive is changed from position control mode to speed control mode. The specific setting steps are shown in Figure 5-5.

#### Description:

The power supply is in Rdy state after power on.

Press "Mode" key to enter the function code parameter interface.

Press "Confirm" key to enter the function code value modification interface after completing the function code selection.

Press the "Up" and "Down" keys to modify the parameter value.

Press the "Confirm" key twice to complete the value modification.

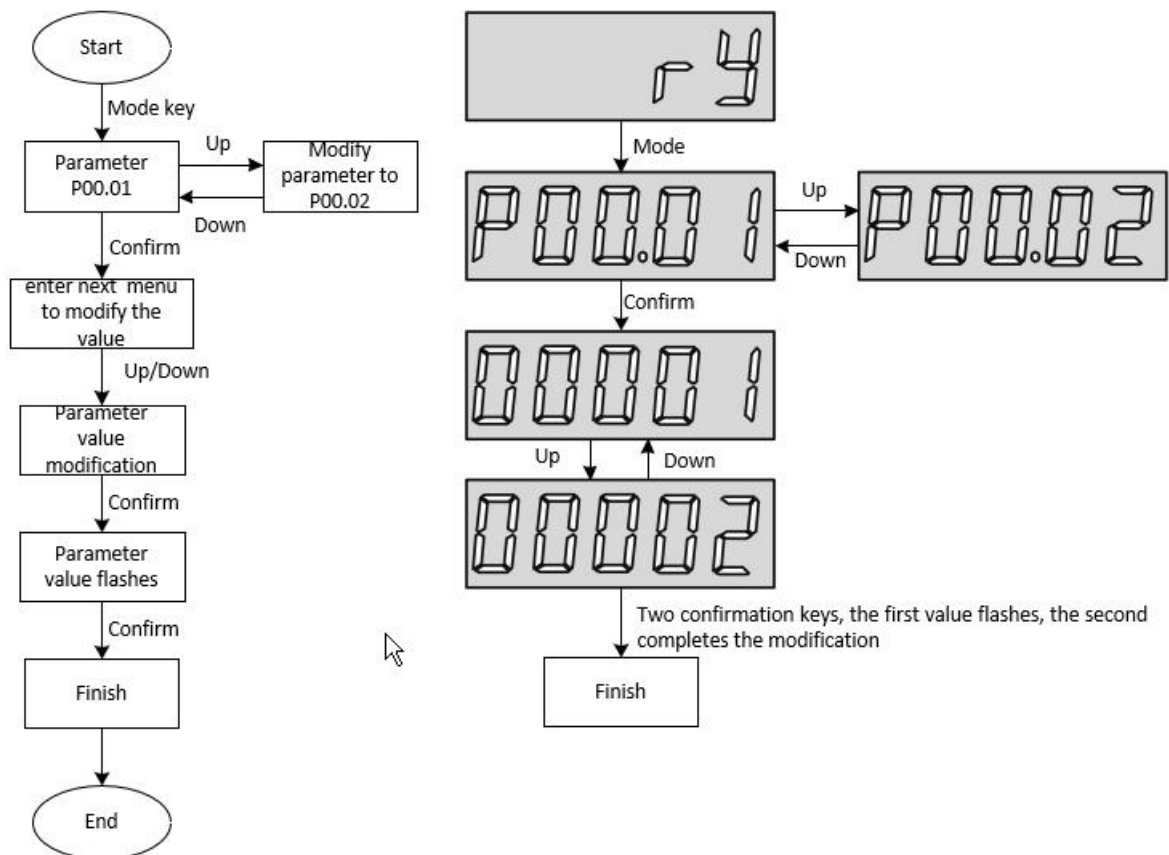


Figure 5-6 Schematic diagram of parameter setting steps

### 5.3.2 Jog Operation

In order to test run the servo motor and the servo drive, you can use the jog running function. The operation steps are shown in . **Description:**

① Adjust the function code to P10.01 after power on.

Press the "Enter" key to enter the next menu to set the JOG jog speed.

After the "JOG jog speed" setting is completed, press the "Enter" key, the panel displays "JOG" in a flashing state, press the "Enter" key again to enter the JOG mode.

Long press the "Up" key and "Down" key to realize the forward and reverse rotation of the motor.

Press the "Mode" key to exit the JOG mode.

Note 1: Press the Up/Down key for a long time, and the motor will continue to rotate; Press the Up/Down key, and the motor will inching and rotating.

Note 2: Exit the "inching operation" status through the "Mode" keyboard and return to the superior menu at the same time.

Note 3: Display Error cause: Please refer to the corresponding fault code"Chapter 10 Failure".

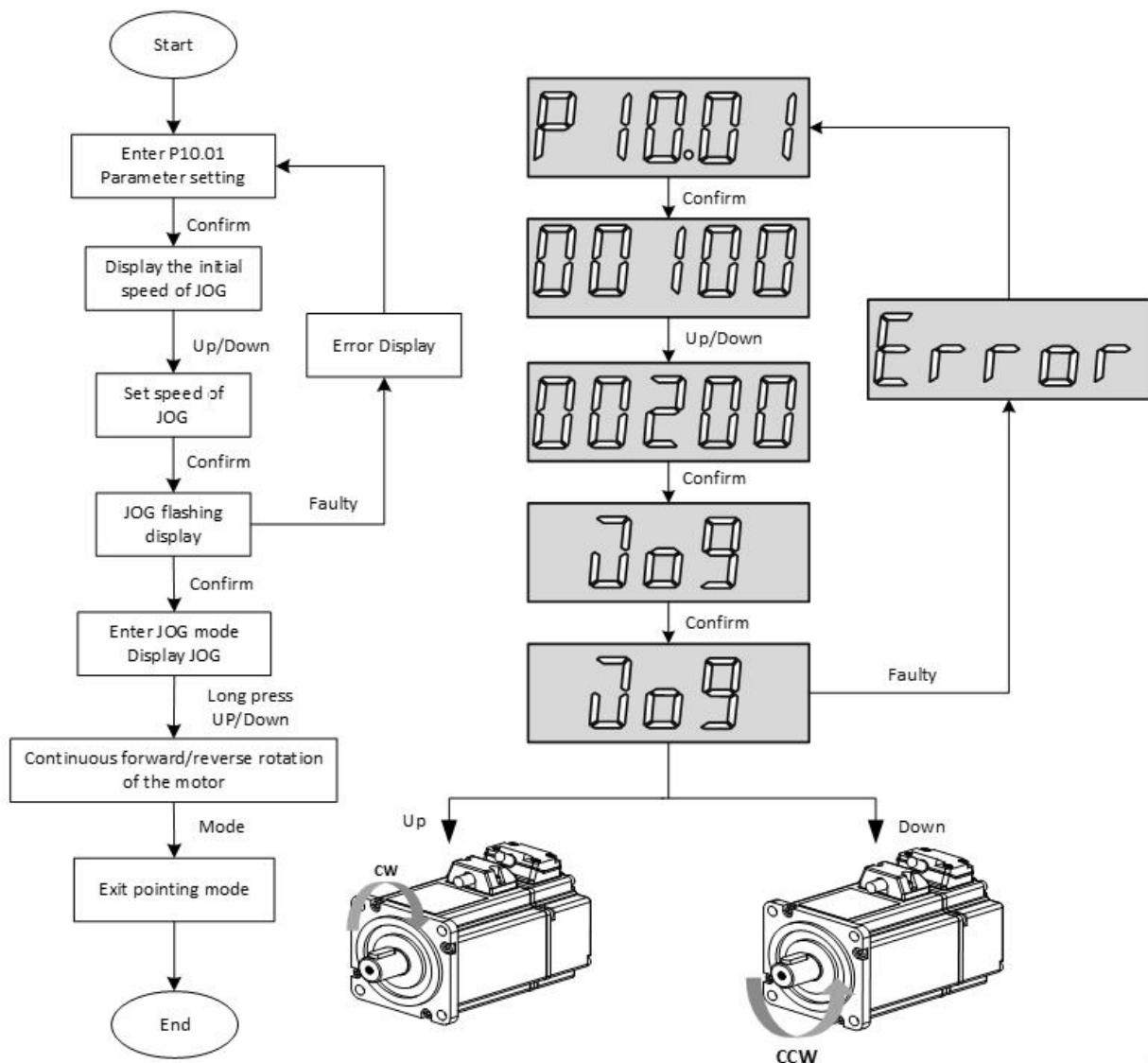


Figure 5-7 Inching operation setting step



### 5.3.3 Factory Reset

The factory settings can be restored through the servo drive panel. The specific operation steps are shown in Figure 5-8.

#### Illustrate:

After power on, modify the function code to P10.02.

Press the "Enter" key to enter the next menu to set the parameters.

- ③ After the parameter is set to 1, press the "Confirm" key, at this time, the digital tube flashes to display "00001", and press the "Confirm" key again, and the digital tube displays P.init.
- ④ Long press the "Enter" key for 3s, the panel digital tube will gradually light up from left to right until 88888 is displayed.
- ⑤ You can release the "confirm" key during the display of 8.8. 8.8. 8.
- ⑥ Digital tube shows done, indicating that the factory settings are restored. At this time, it is recommended to re-power up and down the servo drive.

Note 1: Display Error Reason: When the parameter value of P10.02 is set beyond the set range (0 ~ 1), Error will be displayed.

Note 2: When the setting value is displayed as 0, press the Down key, and the panel will display Error. After displaying for 1 second, the setting value will automatically jump to 1.

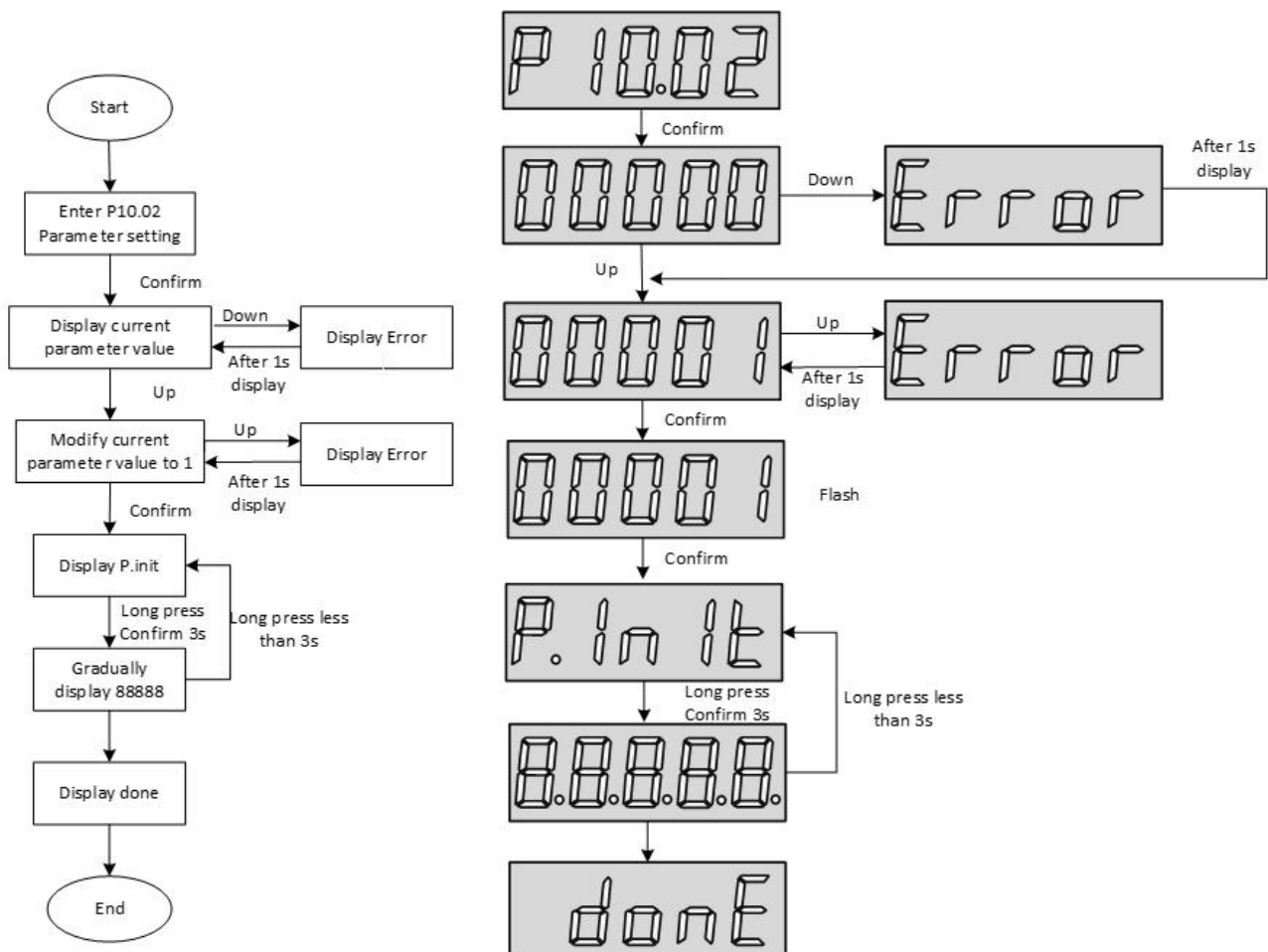


Figure 5-8 Restore factory setting steps

## Chapter 6 Communication Network Configuration

### 6.1 EtherCAT Operation

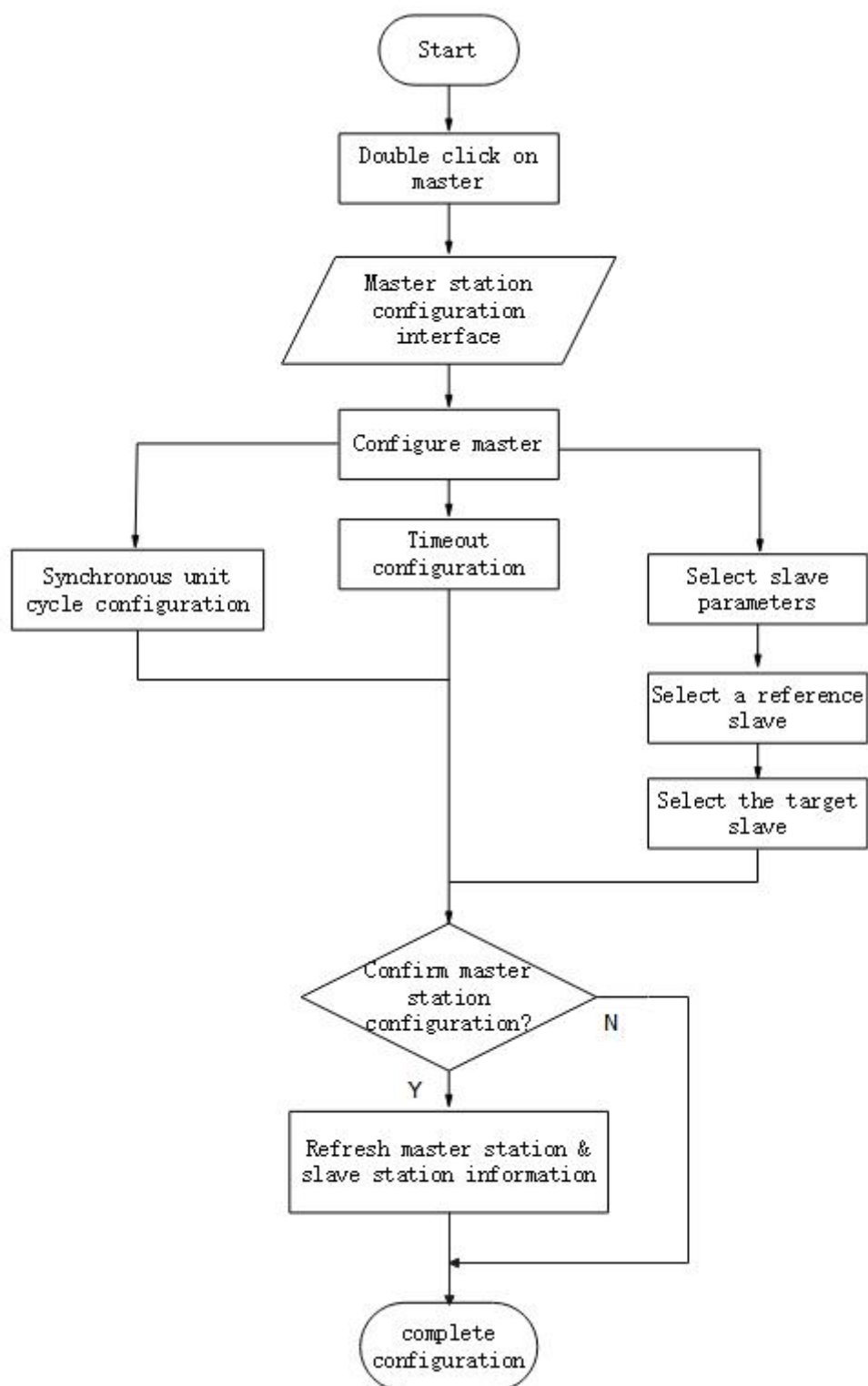


Figure 6-1 EtherCAT Operation Configuration Flow

## 6.2 EtherCAT Communication Fundamentals

### 6.2.1 EtherCAT Communication Specification

| Hierarchy         | Content                 | Specification  |
|-------------------|-------------------------|--|
| Application layer | PDO                     | Variable PDO mapping   |
|                   | SDO                     | SDO request, SDO reply   |
|                   | CIA 402                 | Cyclic Synchronous Position Mode(CSP)<br>Origin return mode (HM) |
| Physical layer    | Transport protocol      | 100BASE-TX (IEEE802.3)   |
|                   | Communication interface | RJ45 Port * 2 (IN, OUT)  |

### 6.2.2 Communication Structure

Wecon VD3E series bus servo drives adopt IEC 61800-7 (CiA402)-CANOpen motion control sub-protocol.

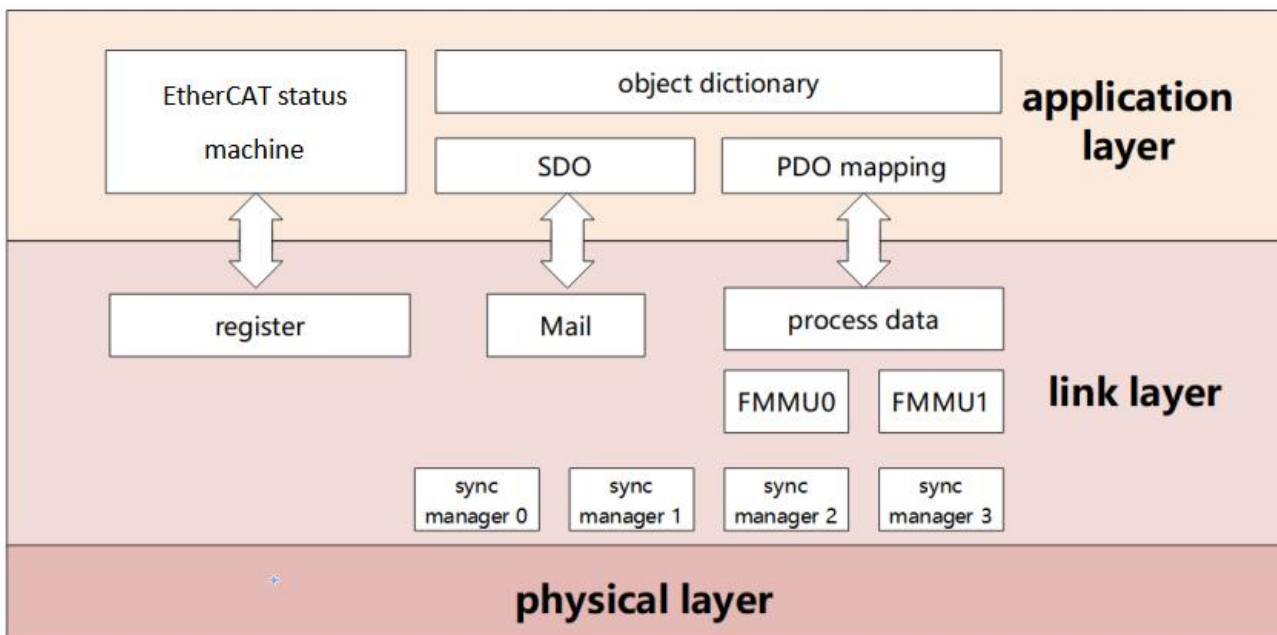


Figure 6-2 Communication structure

PDO (Process Data Object) is composed of Object Dictionary (Object Dictionary) which can be mapped in PDO, and the content of process data is defined according to PDO mapping.

Email is a kind of aperiodic communication and can read and write all object dictionaries.

### 6.2.3 State Machines

EtherCAT devices support four states and are responsible for coordinating the state relationship between master and slave applications at initialization and running:

Init: Initialization, abbreviated as I;

Pre-Operational: Pre-Operational, abbreviated as P;

Safe-Operational: Safe operation, abbreviated as S;

Operational: Operational, abbreviated as O.

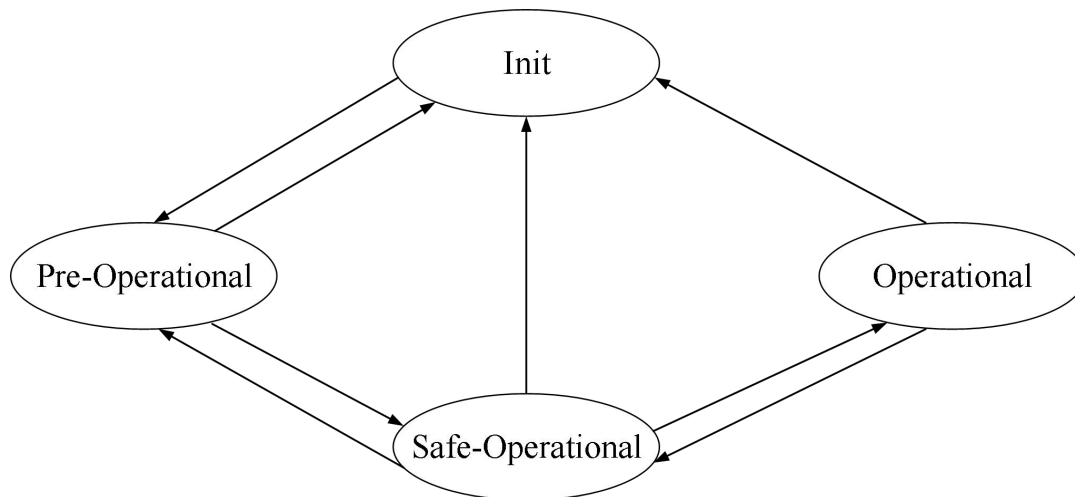


Figure 6-3 Communication structure

When changing from initialization state to operational state, it must be changed in the order of "initialization → pre-Operational → safe Operational → Operational"!

Leapfrog transition when returning from operational state. Refer to the following table for state transition operation and initialization process:

| Status                           | Operate   |
|----------------------------------|---|
| Initialization                   | There is no communication in the application layer, and the master station can only read and write ESC registers  |
| Initialization → pre-operational | The master station configures the site address of the slave station;<br>Configure Email channels;<br>Configure DC distributed clock;<br>Request "pre-Operational" status  |
| Pre-operation                    | Application Layer Email Data Communication (SDO)  |
| Pre-operation → safe operation   | The master station uses Email to initialize the process data mapping;<br>The master station configures the SM channel used for process data communication;<br>The main station is configured with FMMU;;<br>Request "safe status" |
| Safe operation                   | Allow input data to be read without output signal (SDO, TPDO)   |
| Safe operation → operation       | The master station sends valid output data;<br>Request "operation" status   |
| Operation                        | Input and output are all valid and can use Email communication (SDO, TPDO, RPDO)  |



### 6.2.4 Communication Indicator Lamp

The communication indicator for the VD3E servo drive is located on the CN5 (IN), CN6 (OUT) sockets, as shown in Figure 6-5As shown in.

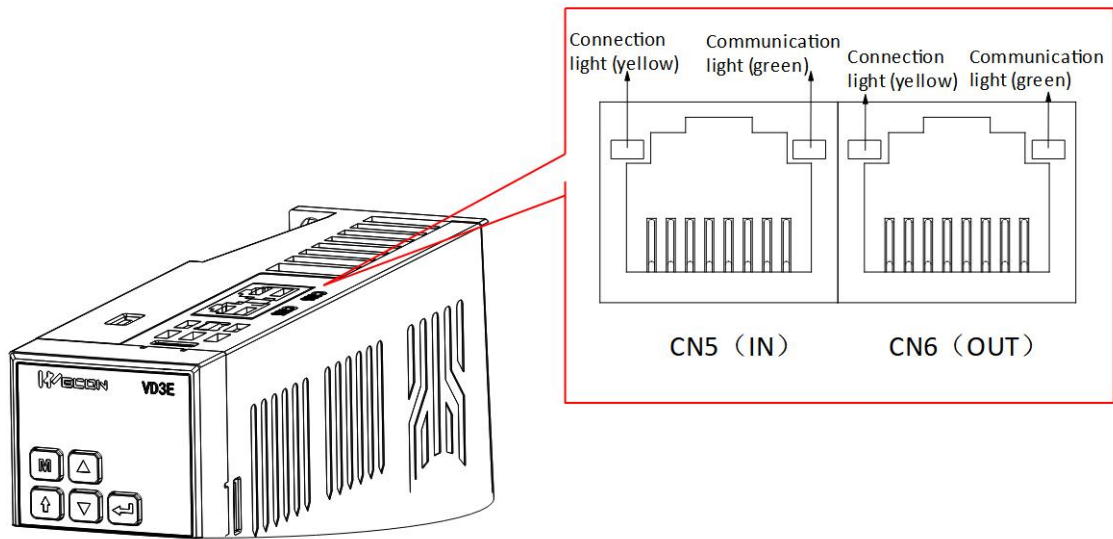


Figure 6-4 Communication indicator position

#### (1) Connection lamp (yellow)

Used to display the status of CN5 and CN6 communication interfaces, and the display contents are shown in the following table.

| Connection lamp status | Explanation                                    |
|------------------------|--|
| OFF                    | The port is not connected to the network cable |
| ON                     | The port is connected to the network cable     |

#### (2) Communication lamp (green)

Used to display the status of CN5 and CN6 communication connections, as shown in the following table.

| Connection lamp status | Explanation   |
|------------------------|---|
| ON                     | No communication connection was established with the master station     |
| BLINKING               | A communication connection has been established with the master station |

### 6.2.5 Process Data PDO

PDO outputs process data in real time. PDO can be divided into RPDO (for receiving instructions from master station) and TPDO (for feeding back its own status from slave station).

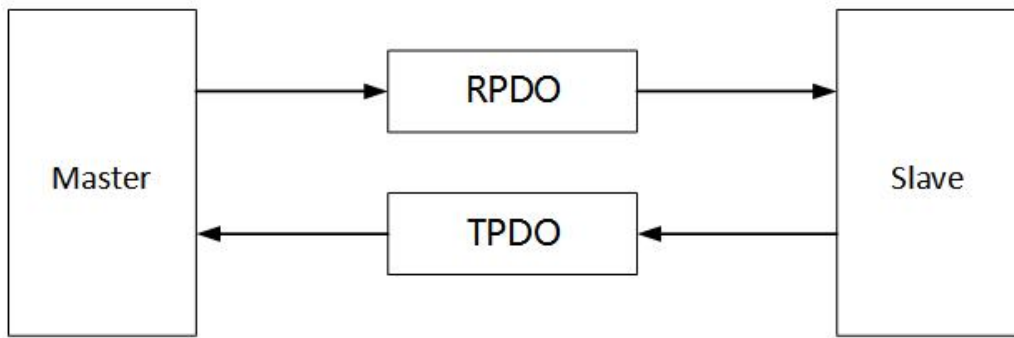


Figure 6-6 PDO schematic diagram

## (1) PDO mapping parameters

PDO mapping is used to establish the mapping relationship between object dictionary and PDO. 1600h-17FFh is RPDO, 1A00h-1BFFh is TPDO:

| Name | Parameter     | Nature           |
|------|---------------|------------------|
| RPDO | 1600h         | Variable mapping |
|      | 1701h ~ 1705h | Fixed mapping    |
| TPDO | 1A00h         | Variable mapping |
|      | 1B01h ~ 1B04h | Fixed mapping    |

The following figure is an example of RxPDO mapping.

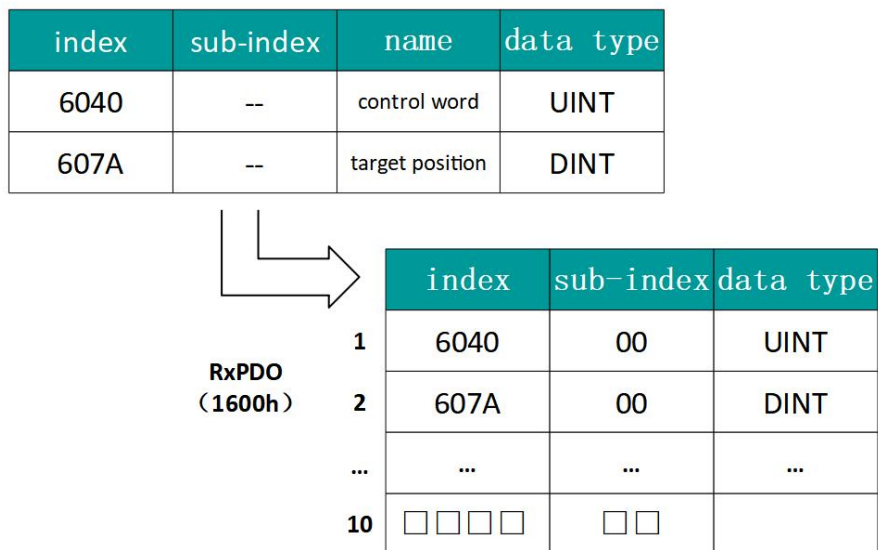


Figure 6-7 Examples of RxPDO mapping

The data type is defined as follows:

| Data type | Description    | Numerical range            |
|-----------|----------------|----------------------------|
| SINT      | Signed 8bit    | -128 ~ 127                 |
| USINT     | Unsigned 8bit  | 0 ~ 255                    |
| INT       | Signed 16bit   | -32768 ~ 32767             |
| UINT      | Unsigned 16bit | 0~65535                    |
| DINT      | Signed 32bit   | -21247483648 ~ 21247483647 |

|        |                |                |
|--------|----------------|----------------|
| UDINT  | Unsigned 32bit | 0 ~ 4294967295 |
| STRING | String Value   | ASCII          |

The following figure is an example of TxPDO mapping.

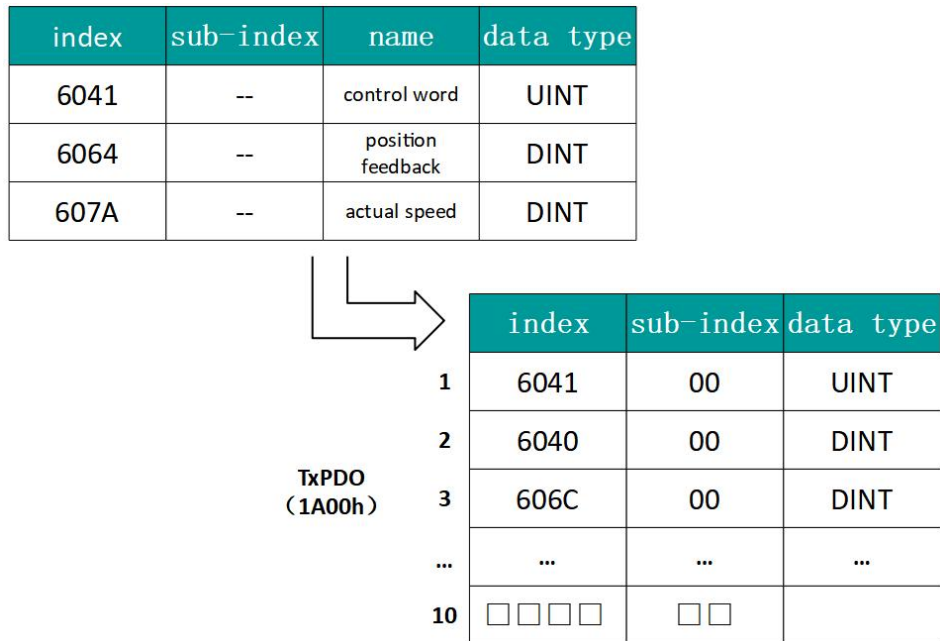


Figure 6-8 Examples of TxPDO mapping

The following figure is an example of a SyncManager PDO mapping.

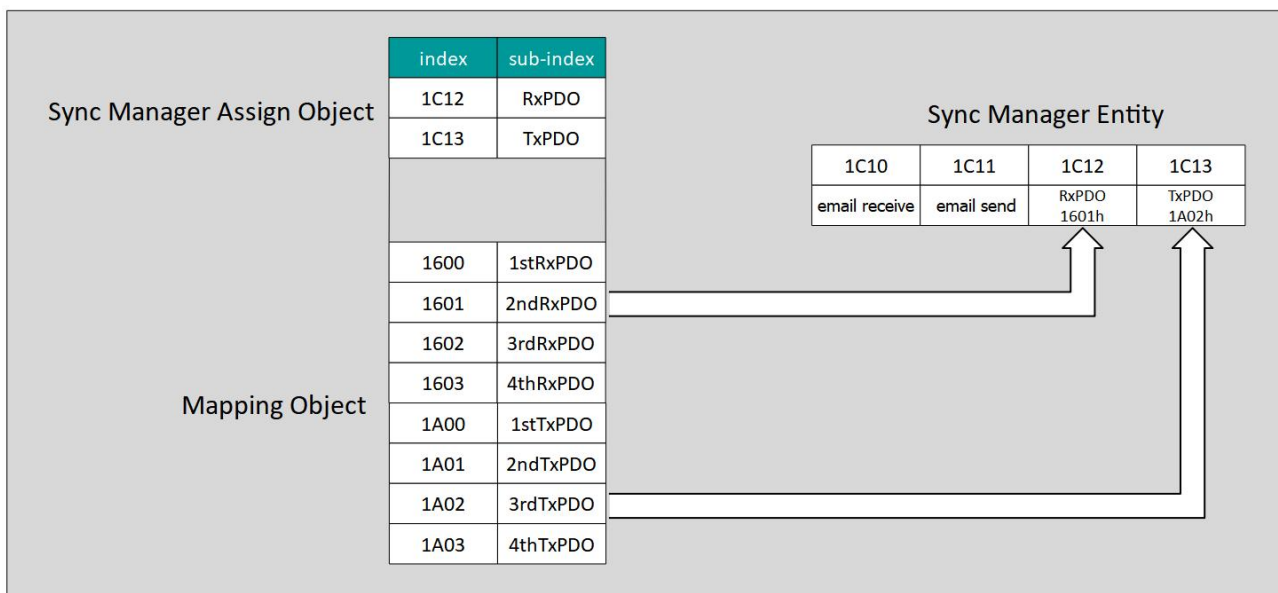


Figure 6-8 SyncManager PDO Mapping Example

## (2) Synchronize management of PDO allocation settings

In EtherCAT periodic data communication, process data can contain multiple PDO mapping data objects. The data objects 0x1C10 ~ 0x1C2F used in CoE protocol define the corresponding PDO mapping object list of SM (Synchronous Management Channel), and multiple PDO can be mapped in different sub-indexes.

| Index (hex) | Sub-index (hex) | Content   |
|-------------|-----------------|---|
| 1C12        | 01              | Choose to use one of 0x1600, 0x1701-0x1705 as the actual RPDO |

|      |    |   |
|------|----|---|
| 1C13 | 01 | Select to use one of 0x1A00, 0x1B01-0x1B04 as the actual TPDO |
|------|----|---|

### (3) PDO configuration

The PDO mapping parameter contains a pointer to the PDO corresponding process data that the PDO needs to send or receive, including index, sub-index and mapping object length. The sub-index 0 records the number N of objects mapped by the PDO, and the length of each PDO data can reach 4N bytes at most, which can map one or more objects at the same time. Sub-index ~ N is the mapping content. The mapping parameter content is defined as follows:

| Number of digits | 31    | ... | 16 | 15        | ... | 8 | 7             | ... | 0 |
|------------------|-------|-----|----|-----------|-----|---|---------------|-----|---|
| Description      | Index |     |    | Sub-index |     |   | Object length |     |   |

The index and sub-index together determine the position of the object in the object dictionary, and the object length indicates the specific bit length of the object (hexadecimal representation)

| Object length | bit length |
|---------------|------------|
| 08h           | 8          |
| 10h           | 16         |
| 20h           | 32         |

For example, the mapping parameter of 6040h-00 (control word) is 60400010h



### Notice

The PDO configuration can only be designed when the EtherCAT communication state machine is in pre-operation (Pro-Operation, panel display 2), otherwise an error will be reported.

The PDO configuration parameters cannot be stored in the EEPROM. Therefore, after each power-on, please reconfigure the mapping object, otherwise, the mapping object is the default parameter of the drive

The SDO fault codes are returned when:

Modify PDO parameters in non-pre-operation state;

Pre-write values other than 1600/1701 ~ 1705 in 1C12; Values other than 1A00/1B01 ~ 1B04 are pre-written in 1C13.

### 6.2.6 Email Data SDO

EtherCAT Email data SDO is used to transmit aperiodic data, such as configuration of communication parameters, servo drive operation parameters and so on. EtherCAT's CoE service types include:

(1) Emergency information; (2) SDO request; (3) SDO response; (4) TxPDO; (5) RxPDO; (6) Remote TxPDO sending request; (7) Remote RxPDO sending request; (7) SDO information.

Wecon VD3E series bus servo drives currently support (2) SDO requests; (3) SDO response.

### 6.2.7 Distributed Clock

Distributed clock enables all EtherCAT devices to use the same system time, thus controlling the synchronous execution of tasks of each device. The slave station device can generate a synchronization signal according to the synchronized system time. Wecon VD3E series bus servo drives only support DC synchronous mode.

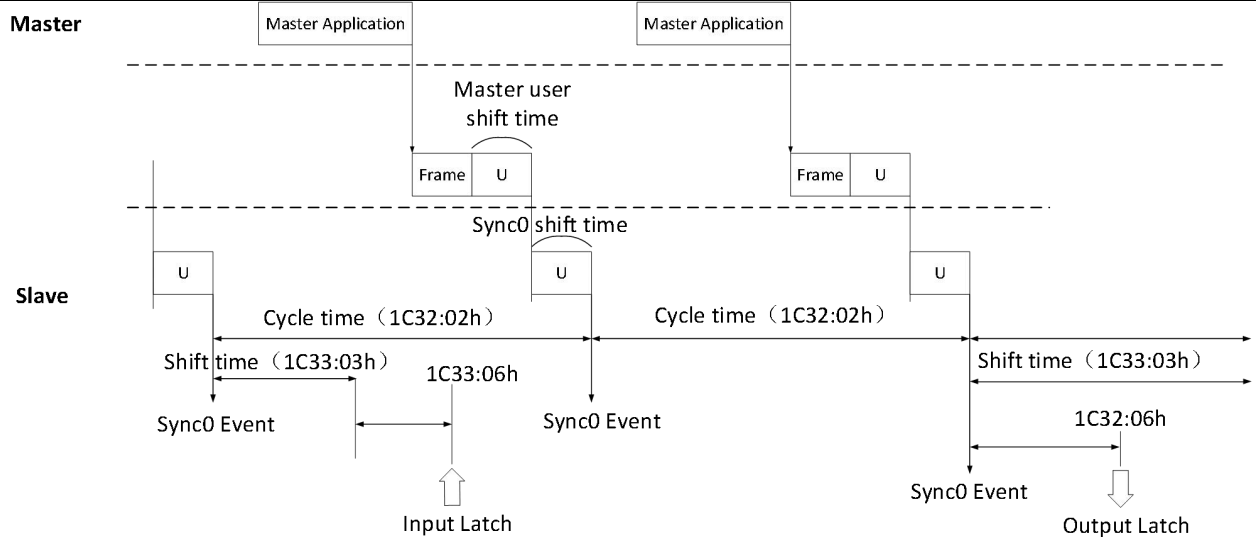


Figure 6-9 DC Synchronous Mode Schematic Diagram

### 6.2.8 Status Indication

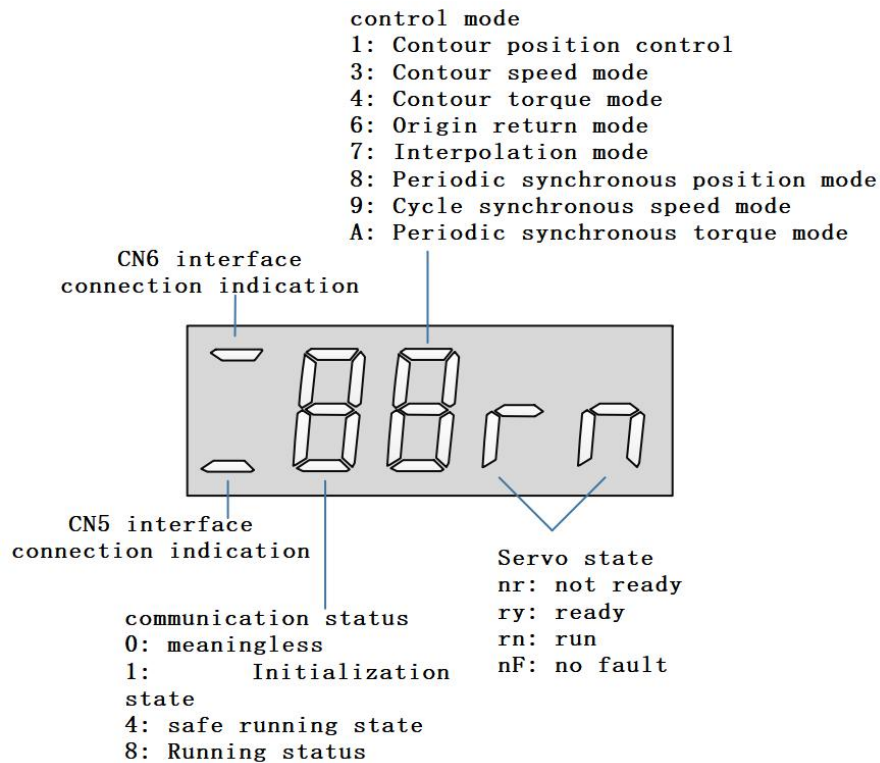


Figure 6-10 Status indication schema

#### Description:

##### (1) Communication connection status


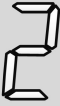


The first digit tube from the left of the 5-bit LED indicator on the servo drive panel is used to display the connection status of the two Ethernet communication ports: upper "-" CN6 (OUT) and lower "-" CN5 (IN)

Long dark: No communication connection detected

Long Bright: A communication connection has been established







##### (2) Communication Operating status

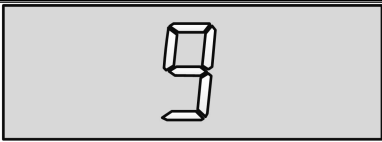
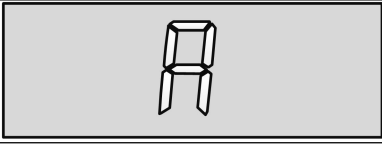
The servo drive panel of the 5-bit LED indicator lamp is the second digit tube from the left, which is used to display the EtherCAT state machine status of the slave station in character form.

| Panel display   | Meaning               |
|---|-----------------------|
|  | Initialization state  |
|  | Pre-operation status  |
|  | Safe operation status |
|  | Operating status      |

### (3) Display of servo operation mode

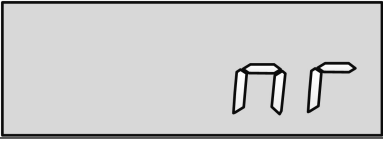
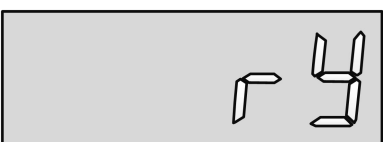
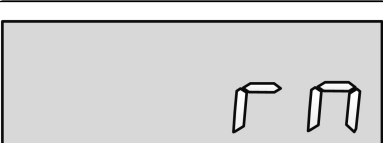

Servo drive panel 5-bit LED indicator from the left of the third digit tube, used to display hexadecimal digital form display servo drive current operation mode.

| Panel display   | Meaning                          |
|---|----------------------------------|
|  | Contour position control mode    |
|  | Contour speed control mode       |
|  | Contour torque control mode      |
|  | Origin return mode               |
|  | Interpolation mode               |
|  | Cyclic Synchronous Position mode |

|  |   |  |                                  |
|--|---|--|----------------------------------|
|  |  |  | Periodic synchronous speed mode  |
|  |  |  | Periodic synchronous torque mode |

**(4) Servo status display**

Servo drive panel 5-bit LED indicator from the left of the fourth and fifth digit tube, used to display the servo status of the slave station.

| Panel display |   | Meaning         |
|---------------|---|-----------------|
|               |    | Not ready nr    |
|               |    | Get ready ry    |
|               |   | Run rn          |
|               |  | Failure-free nF |

### 6.2.9 Introduction to CiA402 Control

The use of Wecon VD3E Series Bus Type servo drives must be guided according to the procedure specified in Standard 402 Protocol.

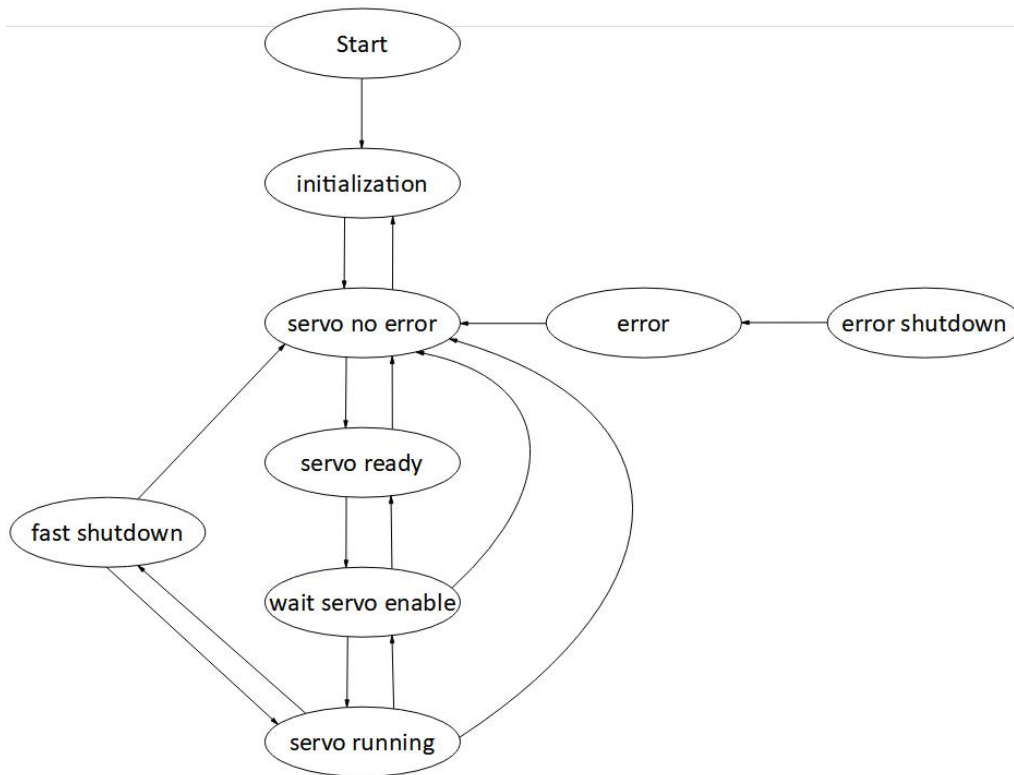


Figure 6-11 CiA402 state machine switching schema

| Status                       | Description   |
|------------------------------|---|
| nitilization                 | Drive initialization, internal self-test has completed. Parameters cannot be set, and servo drive function cannot be performed. |
| Servo trouble-free           | There is no fault in the servo drive. Parameters can be set.  |
| Servo ready                  | Servo drives are ready. Parameters can be set.  |
| Wait to turn on servo enable | The servo drive waits to turn on the servo enable. Parameters can be set.   |
| Servo operation              | The servo drive is running normally.  |
| Quick shutdown               | The servo drive is performing the quick shutdown function. Only function codes with the attribute "Run valid" can be set.       |
| Malfunction shutdown         | The servo drive is performing the fault shutdown function. Only function codes with the attribute "Run valid" can be set.       |
| fault                        | Failure shutdown is complete, and all drive functions are disabled. Allow parameters to be changed to troubleshoot.             |



### 6.2.10 Basic Characteristics

The EtherCAT network cable is connected to the CN5 (IN), CN6 (OUT) interfaces, and its electrical characteristics conform to IEEE 802.3 standard.

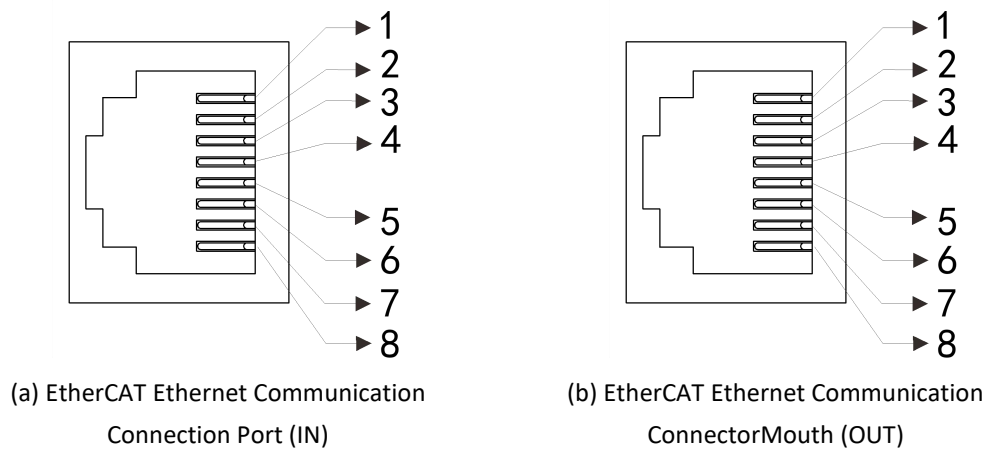


Figure 6-12 Communication port

| Pin | Name | Function description |
|-----|------|----------------------|
| 1   | TX+  | Sending data+        |
| 2   | TX-  | Sending data-        |
| 3   | RX+  | Receiving data+      |
| 4   | -    | -                    |
| 5   | -    | -                    |
| 6   | RX-  | Receiving data-      |
| 7   | -    | -                    |
| 8   | -    | -                    |

EtherCAT communication topology connections are very flexible, taking linear connections and ring connections as examples:

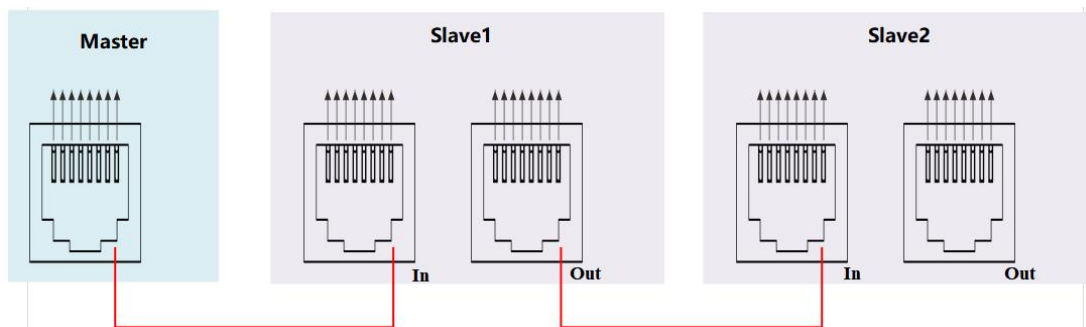


Figure 6-13 Linear connection

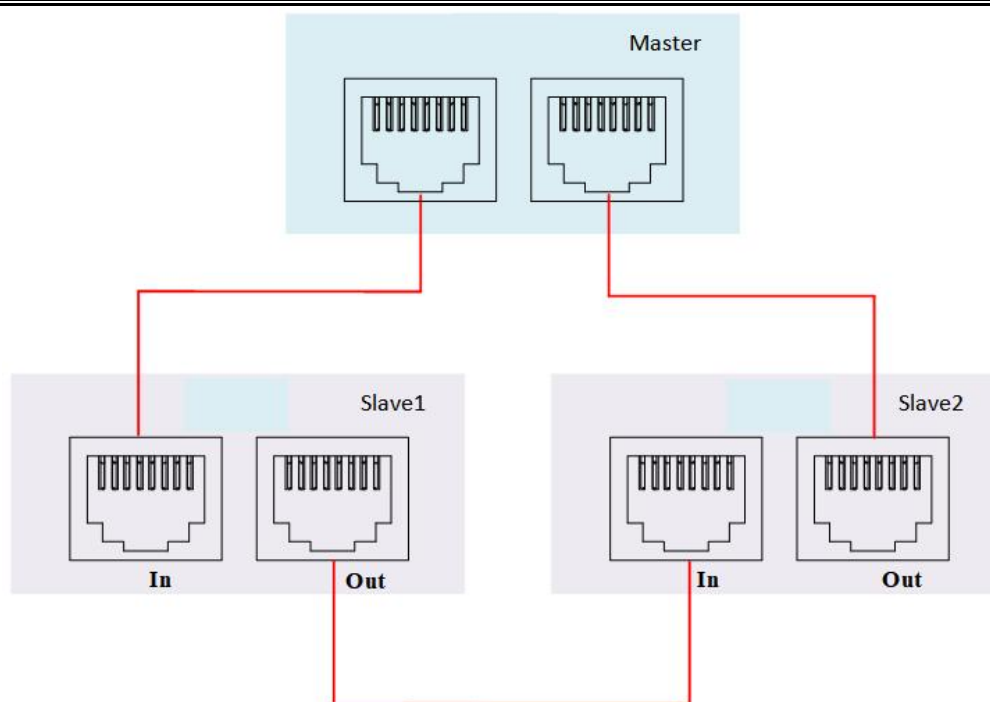


Figure 6-114 Ring connection

## Chapter 7 Operation Running

### 7.1 Basic Settings

#### 7.1.1 Pre-operation Inspection

Table 7-1 Check contents before operation

| Number                    | Content  |
|---------------------------|--|
| Wiring                    |  |
| 1                         | The main circuit input terminals (L1, L2 and L3) of servo drive must be properly connected.  |
| 2                         | The main circuit output terminals (U, V, W) of the servo drive and the main circuit cables (U, V, W) of the servo motor must have the same phase and be connected correctly. |
| 3                         | The main circuit power input terminals (L1, L2 and L3) and the main circuit output terminals (U, V and W) of servo drive cannot be short-circuited.                          |
| 4                         | The wiring of each control signal cable of the servo drive is correct: the external signal wires such as brake and overtravel protection have been reliably connected.       |
| 5                         | Servo drive and servo motor must be grounded reliably.   |
| 6                         | When using an external braking resistor, the short wiring between drive C and D must be removed.   |
| 7                         | The force of all cables is within the specified range.   |
| 8                         | The wiring terminals have been insulated.  |
| Environment and Machinery |  |
| 1                         | There is no iron filings, metal, etc. that can cause short circuits inside or outside the servo drive.   |
| 2                         | The servo drive and external braking resistor are not placed on combustible objects.   |
| 3                         | The installation, shaft and mechanical structure of the servo motor have been firmly connected.  |

#### 7.1.2 Power on

##### Connect the main circuit power supply

(1) After power on the main circuit, the bus voltage indicator shows no abnormality, and the panel display "ry", indicating that the servo drive is in an operational state, waiting for the upper computer to give the servo enable signal.

If the drive panel displays other fault codes, please refer to [“Chapter 10 Faults”](#) to analyze and eliminate the cause of the fault.

(2) Set the servo drive enable (S-ON) to invalid (OFF)

Please refer to "6.2.9 CiA402 Control Introduction" for relevant process description

#### 7.1.3 Jog Operation

Inching operation is used to judge whether the servo motor can rotate normally, and whether there is abnormal vibration and abnormal sound when rotating. Inching operation can be through panel inching operation function, and the motor takes the current stored value of object dictionary P10-01 (200A-01) as inching speed.

#### (1) Panel jog operation

Enter P10-01 (200A-01) through panel key operation. After pressing the confirmation key, the panel will display the current inching speed. At this time, the inching running speed can be adjusted by pressing the "up" or "down" key; After adjusting the inching speed, press the "Confirm" key. At this time, the panel displays "JOG" and is in a flashing state. Press the "Confirm" key again to enter the inching operation mode (at this time, the motor is powered on!). Press the "up" key and "down" key for a long time to realize the continuous forward or reverse rotation of the motor. Press the "Mode" key to exit the inching operation mode. Please refer to "5.3.2 Inching display".

| Index code | Name      | Setting method  | Valid time        | Default | Range  | Definition | Unit |
|------------|-----------|-----------------|-------------------|---------|--------|------------|------|
| 200A-01    | JOG speed | Execute Setting | Valid immediately | 0       | 0~3000 | JOG speed  | rpm  |

#### (2) Jog operation of the servo debugging platform

Open the jog operation interface of the software "Wecon SCTool", set the jog speed value in the "set rotating speed" in the "manual operation", click the "servo on" button on the interface, and then achieve the jog forward and reverse function through the "forward rotation" or "reverse rotation" button on the interface. After clicking the "Servo Close" button, exit the inching operation mode.



#### Notice

The communication control function of EtherCAT master station and the inching operation of servo drive can not be used at the same time;

If you enter the inching mode, you need to exit the inching operation before you can use EtherCAT to control;

If you enter the EtherCAT activation step, you need to exit the EtherCAT control before you can perform the inching operation of the servo drive.

#### 7.1.4 Rotation Direction Selection

By setting the rotate direction, the rotate direction of the motor can be changed without changing the polarity of the input command

| Index code | Name             | Setting method   | Valid time        | Default | Range  | Definition  | Unit |
|------------|------------------|------------------|-------------------|---------|--------|---|------|
| 2000-04    | Rotate direction | Shutdown Setting | Valid immediately | 0       | 0 to 1 | Forward rotation: Face the motor shaft to watch<br>0: standard setting (CW is forward rotation) | -    |

|  |  |  |  |  |  |   |  |
|--|--|--|--|--|--|---|--|
|  |  |  |  |  |  | 1: reverse mode (CCW is forward rotation) |  |
|--|--|--|--|--|--|---|--|

### 7.1.5 Braking Resistance

The servo motor is in the generator state when decelerating or stopping, the motor will transfer energy back to the drive, which will increase the bus voltage. When the bus voltage exceeds the braking point, The drive can consume the feedback energy in the form of thermal energy through the braking resistor. braking resistors can be built-in or external, but they cannot be used at the same time. When selecting an external braking resistor, the short tab on the servo drive needs to be removed.

The basis for judging whether the braking resistor is built-in or external.

- (1) The maximum brake energy calculated value > the maximum brake energy absorbed by capacitor, and the brake power calculated value ≤ the built-in braking resistor power, use the built-in braking resistor.
- (2) The maximum brake energy calculated value > the maximum brake energy absorbed by capacitor, and the brake power calculated value > the built-in braking resistor power, use external braking resistor.

| Index code | Name                                 | Setting method  | Valid time        | Default | Range       | Definition   | Unit |
|------------|--------------------------------------|-----------------|-------------------|---------|-------------|--|------|
| 2000-09    | Braking resistance setting           | Execute Setting | Valid immediately | 0       | 0 to 3      | 0: use built-in braking resistor<br>1: use external braking resistor and natural cooling<br>2: use external braking resistor and forced air cooling; (cannot be set)<br>3: No braking resistor is used, it is all absorbed by capacitor. | -    |
| 2000-0A    | External braking resistor resistance | Execute Setting | Valid immediately | 50      | 0~65<br>535 | Used to set the resistance value of the external braking resistor of a certain type of drive   | Ω    |
| 2000-0B    | External braking resistor power      | Execute Setting | Valid immediately | 100     | 0~65<br>535 | It is used to set the external braking resistor power of a certain type of drive.  | W    |

### 7.1.6 Servo Operation

- (1) Set servo enable (S-ON) to active (ON)

The servo drive is in a operation state, and the monitor displays "rn", but because there is no command input at this time, the servo motor does not rotate and is in a locked state.

S-ON can be configured and selected according to the function selection of DI terminal in DIDO configuration of object dictionary.

### (2) Input the instruction and the motor rotates

Input appropriate instructions during operation, first run the motor at a low speed, and observe the rotation to see if it conforms to the set rotation direction. Through Wecon SCTools software, the actual running speed, bus voltage and other parameters of the motor were observed.

### (3) Timing diagram of power on

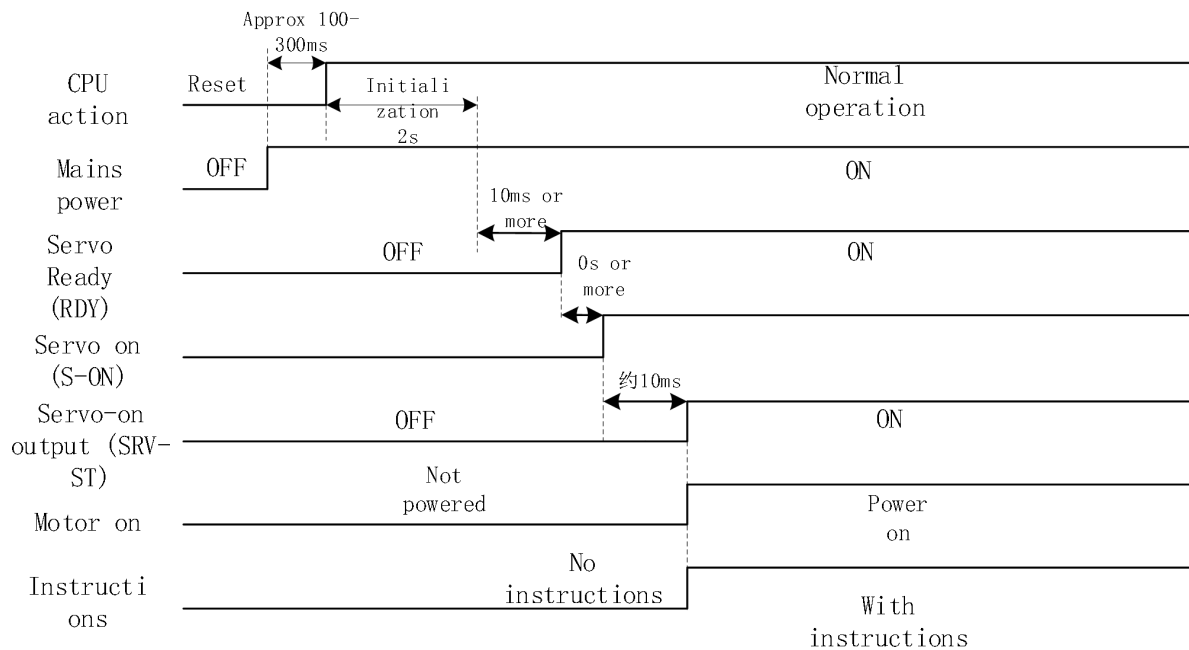


Figure 7-1 Power on timing diagram

### 7.1.7 Servo Stop

According to different shutdown modes, it can be divided into free shutdown and zero-speed shutdown, and their respective characteristics are shown in Table 7-2. According to the shutdown state, it can be divided into free running state and position keeping lock, as shown in Table 7-3:

Table 7-2 Comparison of two shutdown modes

| Shutdown mode       | Shutdown description   | Shutdown characteristics  |
|---------------------|--|---|
| Free shutdown       | Servo motor is not energized and decelerates freely to 0. The deceleration time is affected by factors such as mechanical inertia and mechanical friction. | Smooth deceleration, small mechanical shock, but slow deceleration process. |
| Zero-speed shutdown | The servo drive outputs reverse braking torque, and the motor quickly decelerates to zero-speed.   | Rapid deceleration with mechanical shock, but fast deceleration process.    |

Table 7-3 Comparison of two shutdown states

| Shutdown status | Free operation status | Position locked |
|-----------------|-----------------------|-----------------|
|-----------------|-----------------------|-----------------|

|                 |  |   |
|-----------------|--|---|
| Characteristics | After the motor stops rotating, the motor is not energized, and the motor shaft can rotate freely. | After the motor stops rotating, the motor shaft is locked and cannot rotate freely. |
|-----------------|--|---|

### Servo enable (S-ON) OFF shutdown

Relevant parameters of servo OFF shutdown mode are shown in Table 7-4.

Table 7-4 Parameter details of servo OFF shutdown mode

| Index code | Name                    | Setting method   | Valid time        | Default | Range  | Definition  | Unit |
|------------|-------------------------|------------------|-------------------|---------|--------|---|------|
| 2000-05    | Servo OFF shutdown mode | Shutdown Setting | Valid immediately | 0       | 0 to 1 | 0: Free shutdown, and the motor shaft remains free state;<br>1: Zero speed shutdown, and the motor shaft remains in a free state. | -    |

#### (2) Emergency shutdown

It is free shutdown mode at present, and the motor shaft remains in a free state. The corresponding configuration and selection could be selected through the DI terminal function of the function code "DIDO configuration".

#### (3) Overtravel shutdown

Overtravel means that the movable part of the machine exceeds the set area. In some occasions where the servo moves horizontally or vertically, it is necessary to limit the movement range of the workpiece. The overtravel is generally detected by limit switches, photoelectric switches or the multi-turn position of the encoder, that is, hardware overtravel or software overtravel.

Once the servo drive detects the action of the limit switch signal, it will immediately force the speed in the current direction of rotation to 0 to prevent it from continuing, and it will not be affected for reverse rotation. The overtravel shutdown is fixed at zero speed and the motor shaft remains locked.

The corresponding configuration and selection can be selected through the DI terminal function of the object dictionary "DIDO configuration". The default function of DI3 is POT and DI4 is NOT, as shown

#### (4) Malfunction shutdown

When the machine fails, the servo will perform a fault shutdown operation. The current shutdown mode is fixed to the free shutdown mode, and the motor shaft remains in a free state.

### 7.1.8 Brake Holding Device

The brake is a mechanism that prevents the servo motor shaft from moving when the servo drive is in a non-operating state, and keeps the motor locked in position, so that the moving part of the machine will not move due to its own weight or external force.



### Notice

The brake device is built into the servo motor, which is only used as a non-energized fixed special mechanism. It cannot be used for braking purposes, and can only be used when the servo motor is kept stopped;

✎ After the servo motor stops, turn off the servo enable (S-ON) in time;

✎ The brake coil has no polarity;

✎ When the brake coil is energized (that is, the brake is open), magnetic flux leakage may occur at the shaft end and other parts. If users need to use magnetic sensors and other device near the motor, please pay attention!

✎ When the motor with built-in brake is in operation, the brake device may make a clicking sound, which does not affect the function.

### (1) Wiring of brake device

Brake input signal is no polar. You need to use 24V power . The standard wiring between brake signal BK and brake power is as below.

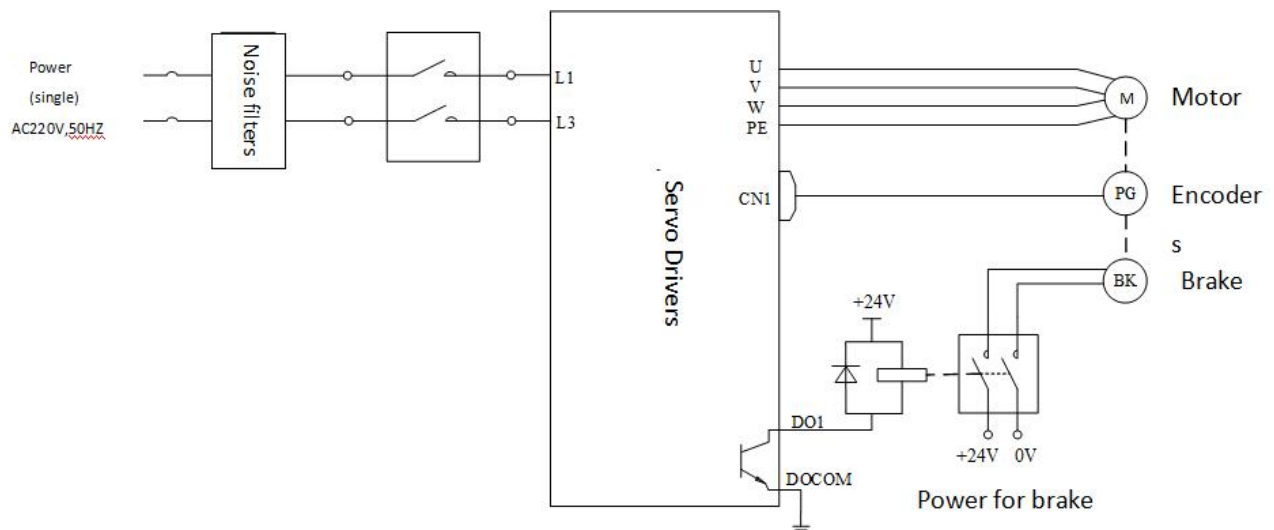


Figure 7-2 Brake wiring



### Notice

① The length of the motor brake cable needs to fully consider the voltage drop caused by the cable resistance, and the brake operation needs to ensure that the voltage input is 24V.

② It is recommended to use the power supply alone for the brake device. If the power supply is shared with other electrical device, the voltage or current may decrease due to the operation of other electrical device, which may cause the brake to malfunction.

③ It is recommended to use cables above 0.5 mm<sup>2</sup>.



**(2) Brake software setting**

For a servo motor with brake, one DO terminal of servo drive must be configured as function 141 (BRK-OFF, brake output), and the valid logic of the DO terminal must be determined.

Related function code

| DO function code | Function name         | Function  |
|------------------|-----------------------|---|
| 141              | BRK-OFF, brake output | The output signal indicates that the brake of the servo motor is released |

Table 7-6 Relevant parameters of brake setting

| Index code | Name   | Setting method  | Valid time        | Default | Range  | Definition   | Unit |
|------------|--|-----------------|-------------------|---------|--------|--|------|
| 2001-1E    | Delay from brake output to instruction reception                                       | Execute Setting | Valid immediately | 250     | 0~500  | Set delay that from the brake (BRK-OFF) output is ON to servo drive allows to receive input instruction. Between. When the brake output (BRK-OFF) is not allocated, this function code has no effect.                              | ms   |
| 2001-1F    | In the static state, delay from the brake output is OFF to the motor is not energized. | Execute Setting | Valid immediately | 150     | 1~1000 | When the motor is in a static state, set the delay time from the brake (BRK-OFF) output is OFF to the servo drive is in the non-powered state. When the brake output (BRK-OFF) is not allocated, this function code has no effect. | ms   |
| 2001-20    | Rotation status, when the brake output OFF, the speed threshold.                       | Execute Setting | Valid immediately | 30      | 0~3000 | When the motor is rotating, the motor speed threshold that is allowed when the brake (BRK-OFF) output is OFF. When the brake output (BRK-OFF) is not allocated, this function code has no effect.                                  | rpm  |
| 2001-21    | Rotation status, servo enable OFF to brake output OFF Delay                            | Execute Setting | Valid immediately | 500     | 1~1000 | The motor is rotating, the delay time that is allowed from the brake (BRK-OFF) output OFF to the servo enable (S-ON) OFF. When the brake output (BRK-OFF) is not allocated,  | ms   |

|  |  |  |  |  |  |                                   |  |
|--|--|--|--|--|--|-----------------------------------|--|
|  |  |  |  |  |  | this function code has no effect. |  |
|--|--|--|--|--|--|-----------------------------------|--|

According to the state of the servo drive, the working sequence of the brake mechanism can be divided into the brake sequence in the normal state of the servo drive and the brake sequence in the fault state of the servo drive.

### (3) Servo drive brake timing in normal state

The brake timing of the normal state can be divided into:

The servo motor is stationary (the actual speed of the motor is lower than 20rpm) and the servo motor is rotating (the actual speed of the motor is 20 rpm and above).

#### 1) Brake timing when the servo motor is stationary

When the servo enable is changed from ON to OFF, if the actual speed of the current motor is lower than 20rpm, the servo drive acts according to the stationary braking timing, and the specific timing actions are as follows Figure 7-18As shown in.



#### Notice

(1) After the brake output is set from OFF to ON, do not input the position/speed/torque command during 2001-1Eh, otherwise the command will be lost or run incorrectly.

⚠ When applied to a vertical axis, the external force or the weight of the mechanical moving part may cause the machine to move slightly. When the servo motor is stationary, and the servo enable is OFF, the brake output will be OFF immediately. However, the motor is still powered on within the time of 2001-1Fh to prevent mechanical movement due to its own weight or external force.

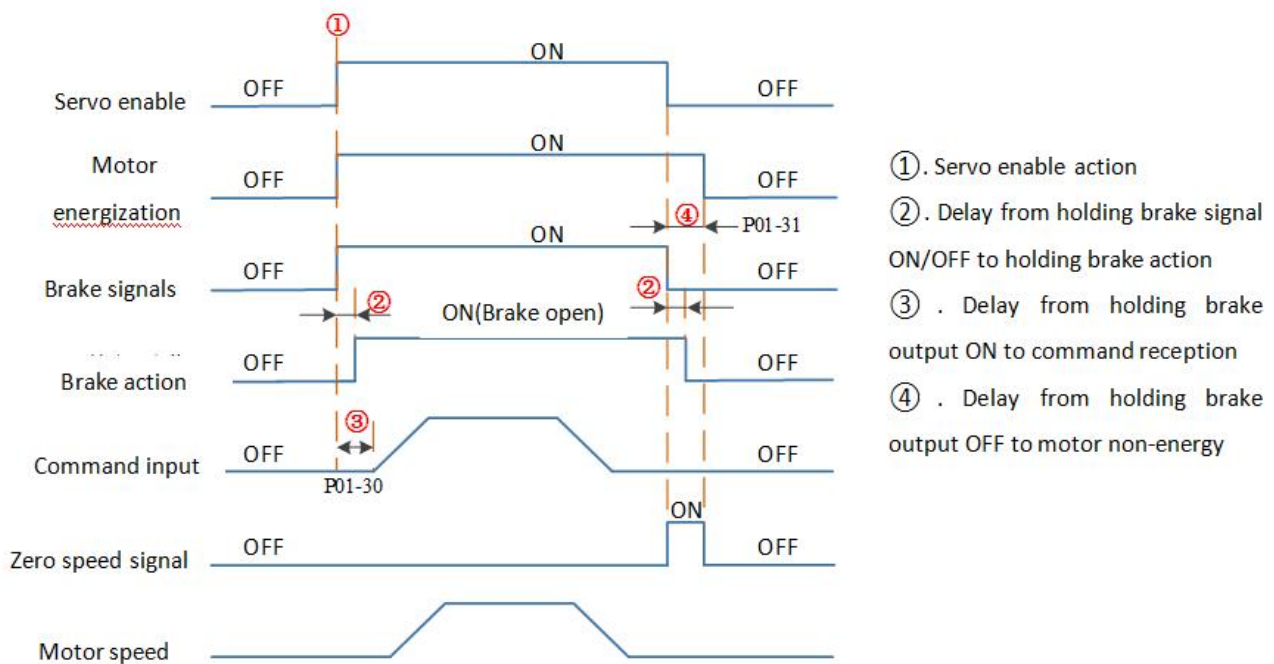


Figure 7-3 Braking timing when the motor is stationary

Note: Please refer to the relevant specifications of the motor for the delay time of the brake contact at ② in the figure.

#### 2) The brake timing when the servo motor is rotating

When the servo enable is from ON to OFF, if the actual motor speed is greater than or equal to 20 rpm, the drive will act in accordance with the rotation brake sequence. The specific sequence action is shown in Figure 7-4.



### Notice

When the servo enable is turned from OFF to ON, within 2001-30, do not input position, speed or torque instructions, otherwise the instructions will be lost or operation errors will be caused;

When the servo motor rotates, the servo enable is OFF and the servo motor is in the zero-speed shutdown state, but the brake output must meet any of the following conditions before it could be set OFF:

2001-21h time has not arrived, but the motor has decelerated to the speed set in 2001-20h;

2001-21h time is up, but the motor speed is still higher than the set value of 2001-20h.

After the brake output changes from ON to OFF, the motor is still in communication within 50ms to prevent the mechanical movement from moving due to its own weight or external force.

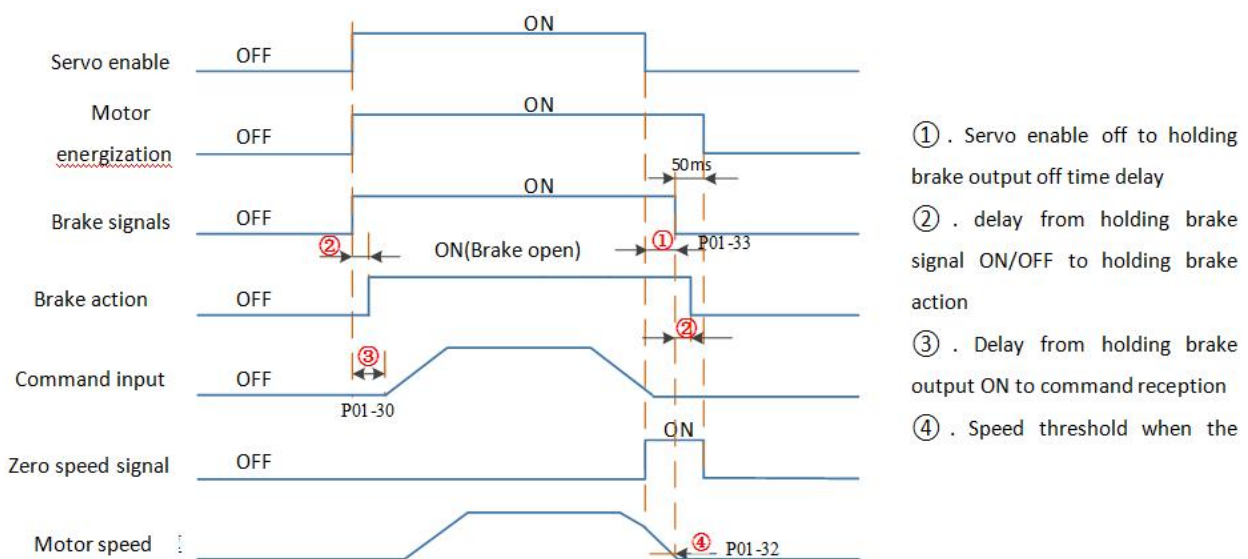


Figure 7-4 Braking timing when the motor rotates

#### (4) Brake timing when the servo drive fails

The brake timing (free shutdown) in the fault status is as follows.

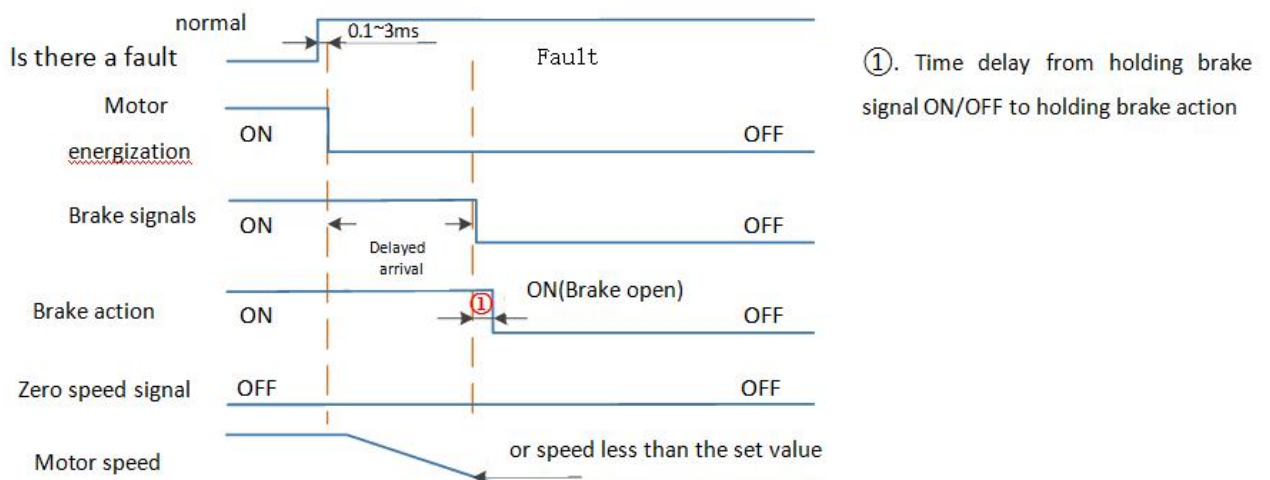


Figure 7-5 Braking timing in fault state (free shutdown)

Note: The "delay arrival" of the brake signal is about 20ms, and the actual parameter is subject to the motor manufacturer.

## 7.2 Servo State Setting

The use of Wecon VD3E Series Bus Type servo drives must be guided according to the procedure specified in Standard 402 Protocol.

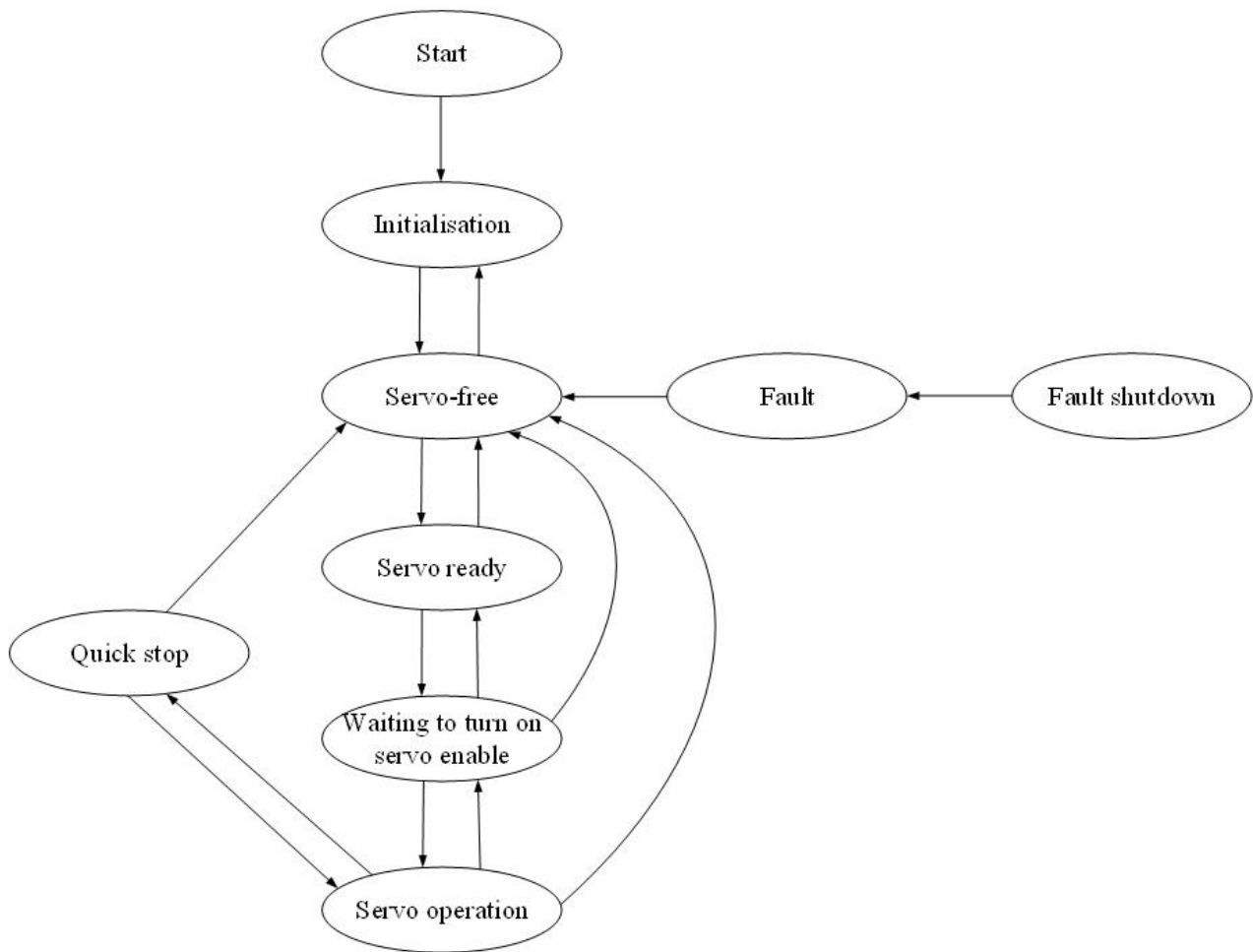


Figure 7-6 CiA402 state machine switching schema

| Status                       | Description   |
|------------------------------|---|
| Initialization               | Drive initialization, internal self-test has completed. Parameters cannot be set, and servo drive function cannot be performed. |
| Servo trouble-free           | There is no fault in the servo drive. Parameters can be set.  |
| Servo ready                  | Servo drives are ready. Parameters can be set.  |
| Wait to turn on servo enable | The servo drive waits to turn on the servo enable. Parameters can be set.   |
| Servo operation              | The servo drive is running normally.  |
| Quick shutdown               | The servo drive is performing the quick shutdown function. Only function codes with the attribute "Run valid" can be set.       |
| Malfunction shutdown         | The servo drive is performing the fault shutdown function. Only function codes with the attribute "Run valid" can be set.       |
| Fault                        | Failure shutdown is complete, and all drive functions are disabled. Allow parameters to be changed to troubleshoot.             |

| State switching                                   | Control word 6040h   |
|---|--|
| Power on =>Initialization                         | Natural transition without control command   |
| Initialization =>Servo trouble-free               | Natural transition without control command<br>If there is an error in the initialization process, go directly to the "failure shutdown" state. |
| Servo trouble-free =>Servo ready                  | 0x0006   |
| Servo ready =>Wait to turn on servo enable        | 0x0007   |
| Wait to turn on servo enable =>Servo operation    | 0x000F   |
| Servo operation =>Wait to turn on servo enable    | 0x0007   |
| Wait to turn on servo enable =>Servo ready        | 0x0006   |
| Servo ready =>Servo trouble-free                  | 0x0000   |
| Servo operation =>Servo ready                     | 0x0006   |
| Servo operation =>Servo trouble-free              | 0x0000   |
| Wait to turn on servo enable =>Servo trouble-free | 0x0000   |
| Servo operation =>Quick shutdown                  | 0x0002   |
| Quick shutdown =>Servo trouble-free               | The quick shutdown mode 605A is selected as 0 ~ 3. After the shutdown is completed, it will transition naturally without control instruction.  |
| =>Failure shutdown                                | Once the servo drive fails, it automatically switches to the "fault shutdown" state without control instruction.                               |
| Failure shutdown =>Malfunction                    | After the fault shutdown is completed, it will make a natural transition without control instructions.   |
| Failure =>Servo trouble-free                      | 0x80   |
| Quick shutdown =>Servo operation                  | The quick shutdown mode 605A is selected as 0 ~ 3, and 0x0F is sent after the shutdown is completed.   |

### 7.2.1 Control Word

| 6040h | Name         | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------|--------------|-------------------|-------------------|---------|-----------|----------------------|------|
|       | Control word | Operation setting | Valid immediately | 0       | 0~65535   | Basic settings       | -    |

Used to set control instructions. It is meaningless to assign each bit of a control word separately, and it must be combined with other bits to form a certain control instruction.

bit0 ~ bit3 have the same meaning in each control mode of servo drive, and commands must be sent in sequence before the servo drive can be switched according to CiA402 state machine.

| bit   | Name                           | Description  |
|-------|--------------------------------|--|
| 0     | Servo operation can be started | 0: Invalid   |
|       |                                | 1: valid   |
| 1     | Turn on the main circuit       | 0: Invalid   |
|       |                                | 1: valid   |
| 2     | Quick shutdown                 | 0: Invalid   |
|       |                                | 1: valid   |
| 3     | Servo operation                | 0: Invalid   |
|       |                                | 1: valid   |
| 4 ~ 6 | Operation mode                 | It is related to the operation mode of servo drive   |
| 7     | Fault reset                    | Used to clear reset faults:<br>The rising edge of bit7 is valid;<br>bit7 is kept at 1, and other control instructions are invalid. |

### 7.2.2 Status Word

| 6041h | Name        | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------|-------------|-------------------|-------------------|---------|-----------|----------------------|------|
|       | Status word | Operation setting | Valid immediately | 0       | 0~65535   | -                    | -    |

Used to reflect the status of servo drive.

| bit   | Name                                  | Description |
|-------|---------------------------------------|-------------|
| 0     | Servo ready                           | 0: Invalid  |
|       |                                       | 1: Valid    |
| 1     | Servo operation can be started        | 0: Invalid  |
|       |                                       | 1: Valid    |
| 2     | Servo operation                       | 0: Invalid  |
|       |                                       | 1: Valid    |
| 3     | fault                                 | 0: Invalid  |
|       |                                       | 1: Valid    |
| 4     | Electrical connection of main circuit | 0: Invalid  |
|       |                                       | 1: Valid    |
| 5     | Quick shutdown                        | 0: Invalid  |
|       |                                       | 1: Valid    |
| 6     | Servo is not operational              | 0: Invalid  |
|       |                                       | 1: Valid    |
| 7     | Warning                               | 0: Invalid  |
|       |                                       | 1: Valid    |
| 8     | -                                     | -           |
| 9     | Remote control                        | 0: Invalid  |
|       |                                       | 1: Valid    |
| 10    | Target arrival                        | 0: Invalid  |
|       |                                       | 1: Valid    |
| ..... |                                       |             |

Bit 0 ~ bit 9 have the same meaning in all control modes of servo drive. After the control word 6040h sends commands in sequence, the servo feeds back the determined state.



| Setting value (binary number) | Description                |
|-------------------------------|----------------------------|
| xxxx xxxx x0xx 0000           | Servo is not ready         |
| xxxx xxxx x1xx 0000           | Startup failure            |
| xxxx xxxx x01x 0001           | Servo ready                |
| xxxx xxxx x01x 0011           | Start up                   |
| xxxx xxxx x01x 0111           | Servo enable               |
| xxxx xxxx x00x 0111           | Malfunction shutdown valid |
| xxxx xxxx x0xx 1111           | Fault response valid       |
| xxxx xxxx x0xx 1000           | Fault                      |

## 7.3 Servo Mode Settings

### 7.3.1 Servo Mode Introduction

The object dictionary 6060h is used to display servo modes supported by servo drives.

| 6060h | Name                 | Setting method   | Valid time        | Default | Set range | Application category | Unit |
|-------|----------------------|------------------|-------------------|---------|-----------|----------------------|------|
|       | Servo mode selection | Shutdown setting | Valid immediately | 0       | 0 ~ 10    | -                    | -    |

Used to set the operation mode of servo drive.

| Setting value | Name                             | Remark   |
|---------------|----------------------------------|--|
| 0             | -                                |  |
| 1             | Contour position control mode    |  |
| 2             | -                                |  |
| 3             | Contour speed control mode       |  |
| 4             | Contour torque control mode      |  |
| 5             | -                                |  |
| 6             | Origin return mode               | Please refer to "7.5 Origin return Mode (HM)" for details                |
| 7             | Interpolation mode               |  |
| 8             | Cyclic Synchronous Position mode | Please refer to "7.4 Cyclic Synchronous Position mode (CSP)" for details |
| 9             | Periodic synchronous speed mode  | -  |
| 10            | Periodic synchronous torque mode |  |

### 7.3.2 Mode Switching

Pay attention to the following when switching modes:

- ① Whatever the servo drive state is, the unexecuted position command will be discarded after switching from the Cyclic Synchronous Position mode to other modes.
- ② Whatever the servo drive state is, after switching into other modes from the periodic synchronous speed mode, servo first executes ramp shutdown, and then switch into other modes after the shutdown is completed.
- ③ When the servo drive is running the origin return mode, it is not allowed to switch to other modes; When origin return is completed or interrupted (failure or invalid enable), other modes can be switched into.
- ④ When the servo drive is in run state, when switching from other modes to periodic synchronous mode, please send command at an interval of at least 1ms, otherwise instructions will be lost or wrong.

### 7.3.3 Communication Cycles Supported by Different Modes

| Mode       | Cyclic Synchronous Position mode | Periodic synchronous speed mode | Homing Mode |
|------------|----------------------------------|---------------------------------|-------------|
| Cycle time |                                  |                                 |             |
| 125us      | ✓                                | ✓                               | ✓           |

## 7.4 Cyclic Synchronous Position Mode (CSP)

### 7.4.1 Control Block Diagram

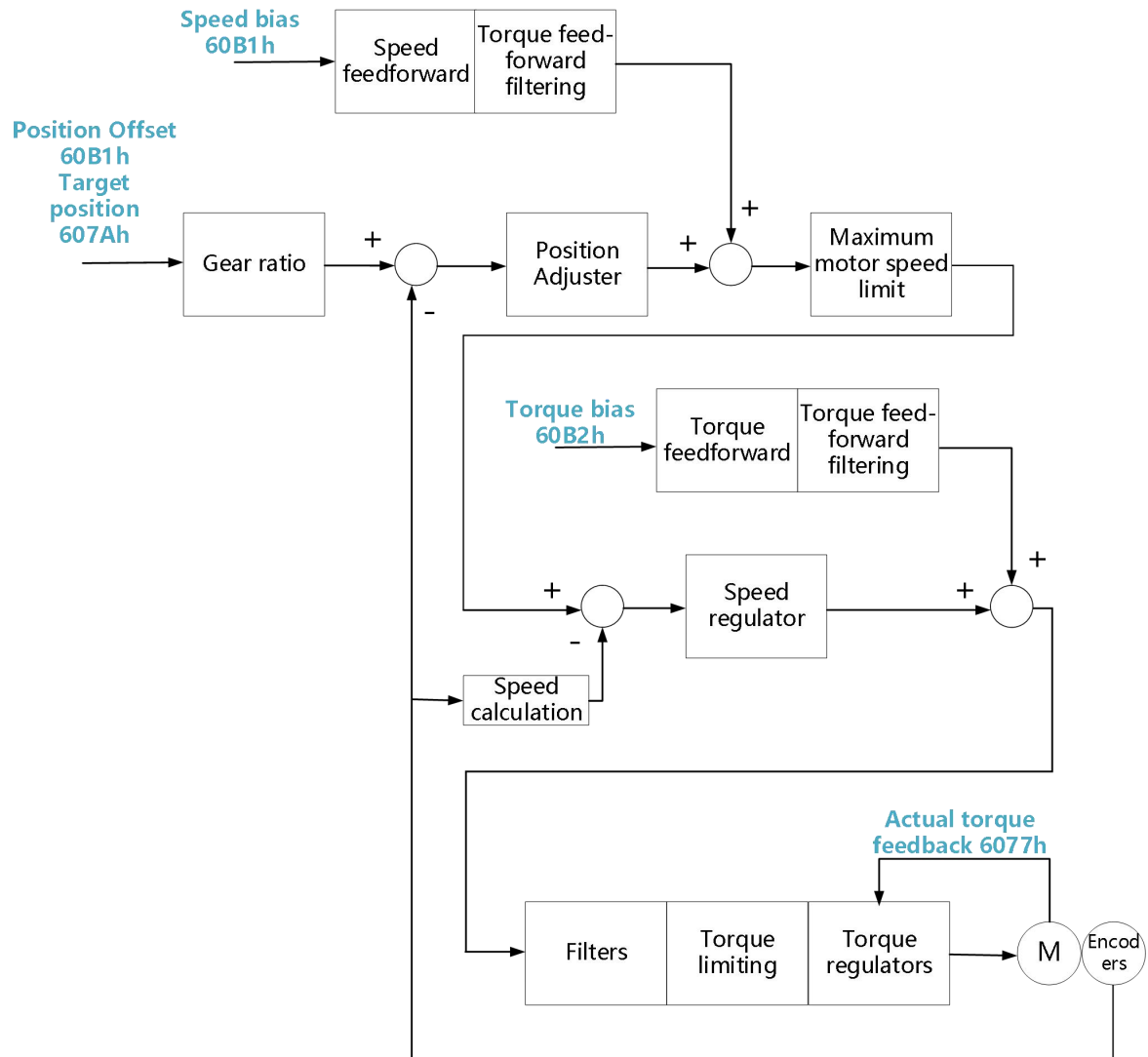
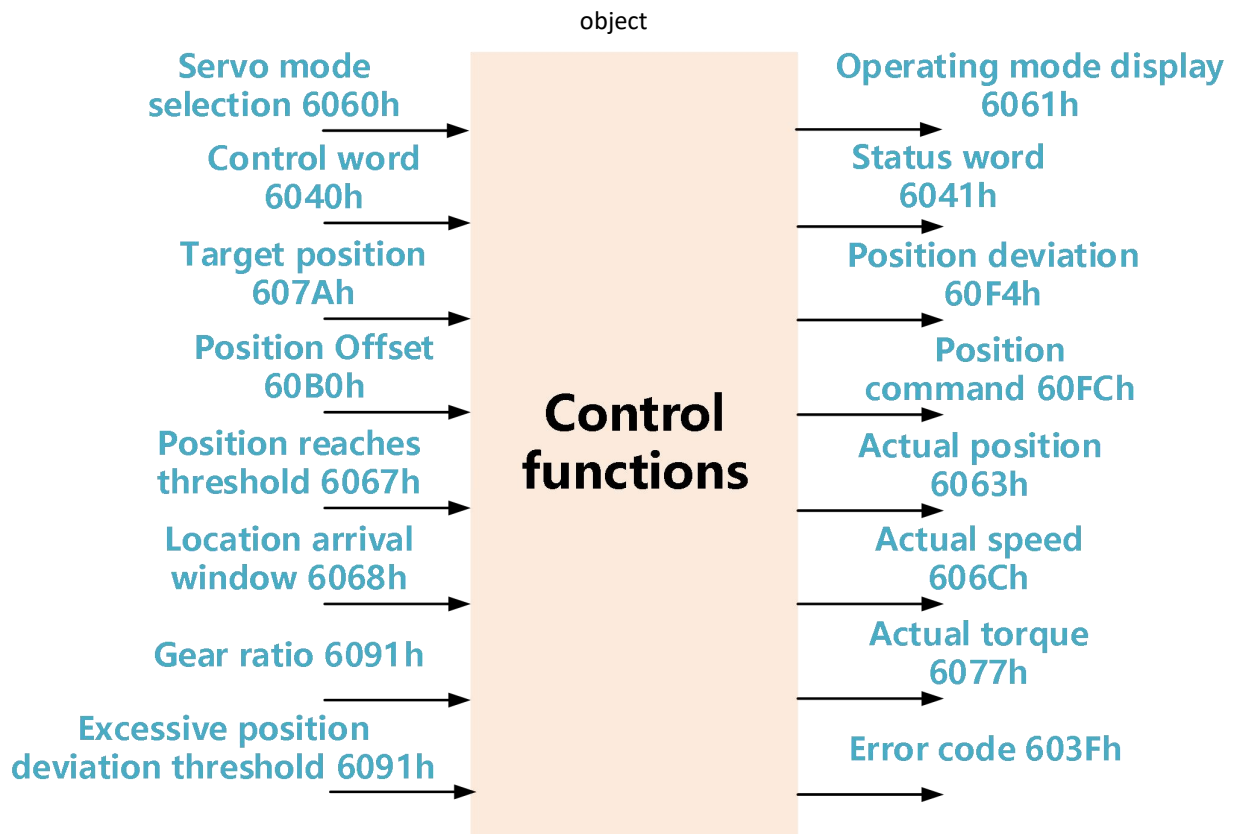


Figure 7-7 Input and output



#### 7.4.2 Related Objects

##### (1) Control word 6040h

| bit | Name                           | Description  |
|-----|--------------------------------|--|
| 0   | Servo operation can be started | When bit0 to bit3 are all 1, it indicates the start of operation |
| 1   | Turn on the main circuit       |  |
| 2   | Quick shutdown                 |  |
| 3   | Servo operation                |  |

##### (2) Status word 6041h

| bit | Name                                    | Description |
|-----|---|-------------|
| 10  | Target arrival                          | -           |
| 11  | Software internal position overrun      | -           |
| 12  | Slave station following instruction     | -           |
| 13  | Following error                         | -           |
| 14  | DDL motor angle identification complete | -           |
| 15  | Origin return completed                 | -           |

| Index (Hex) | Object dictionary name                    | Accessibility  | Unit               | Bit length | Set range               |
|-------------|---|----------------|--------------------|------------|-------------------------|
| 603F        | Error code                                | Read only      | -                  | 16         | 0~65535                 |
| 6040        | Control word                              | Read and write | -                  | 16         | 0~65535                 |
| 6041        | Status word                               | Read only      | -                  | 16         | 0~65535                 |
| 6060        | Servo mode selection                      | Read and write | -                  | 8          | 0 ~ 10                  |
| 6061        | Run mode display                          | Read only      | -                  | 8          | 0 ~ 10                  |
| 6062        | position command                          | Read only      | Instruction unit   | 32         | $1 \sim 2^{32}-1$       |
| 6063        | Position feedback                         | Read only      | Encoder unit       | 32         | $1 \sim 2^{32}-1$       |
| 6064        | Position feedback                         | Read only      | Instruction unit   | 32         | -                       |
| 6065        | Threshold of excessive position deviation | Read and write | Instruction unit   | 32         | $1 \sim 2^{32}-1$       |
| 6067        | Position reaches threshold                | Read and write | Encoder unit       | 32         | 0~65535                 |
| 6068        | Position arrival window                   | Read and write | ms                 | 32         | 0~65535                 |
| 606C        | Actual speed                              | Read only      | Instruction unit/s |            | -                       |
| 6072        | Max Torque                                |                | 0.1%               |            | 0~5000                  |
| 6077        | Actual torque                             | Read only      | 0.1%               |            | -5000~5000              |
| 607A        | Target location                           | Read and write | Instruction unit   | 32         | $-2^{31} \sim 2^{31}-1$ |
| 6091: 01    | Electronic gear ratio numerator           | Read and write | -                  | 32         | $0 \sim 2^{32}-1$       |
| 6091: 02    | Electronic gear ratio denominator         | Read and write | -                  | 32         | $0 \sim 2^{32}-1$       |
| 2002-01     | 1st position loop gain                    | Read and write | 0.1Hz              | 16         | 0~6200                  |
| 2002-02     | 1st speed loop gain                       | Read and write | 0.1Hz              | 16         | 0~35000                 |
| 2002-03     | 1st speed loop integral time constant     | Read and write | 0.1ms              | 16         | 100~65535               |
| 2002-09     | Speed feedforward gain                    | Read and write | 0.1%               | 16         | 0~1000                  |
| 2002-0A     | Speed feedforward filter time constant    | Read and write | 0.01ms             | 16         | 0~10000                 |
| 2002-0B     | Torque feedforward gain                   | Read and write | 0.1%               | 16         | 0~2000                  |
| 2002-0C     | Torque feedforward filter time constant   | Read and write | 0.01ms             | 16         | 0~10000                 |

### 7.4.3 Related Function Settings

#### (1) Positioning Completed

| Index (Hex) | Name                             | Content  |
|-------------|----------------------------------|--|
| 6067        | Positioning completion threshold | When the position deviation is in the range of 6067 and the time reaches 6068, the positioning completion signal is valid. |
| 6068        | Positioning completion window    |  |

**(2) Position deviation limit**

| Index (Hex) | Name                                      | Content   |
|-------------|---|---|
| 6065        | Threshold of excessive position deviation | When the position deviation is greater than the set value of this parameter, Er.36 (excessive position deviation) will occur. |

**7.4.4 Recommended Configuration**

Please refer to the following table for the basic configuration of this mode:

| RPDO                        | TPDO                     | Remark   |
|-----------------------------|--------------------------|----------|
| 6040 (control word)         | 6041 (status word)       | Required |
| 607A (target location)      | 6064 (position feedback) | Optional |
| 6060 (servo mode selection) | 6061 (run mode display)  | Optional |

## 7.5 Homing Mode (HM)

The mode of origin returning to zero is used to find the mechanical origin and locate the positional relationship between the mechanical origin and the mechanical zero.

Mechanical origin: A fixed position on the machine can correspond to a certain origin switch, which can correspond to the Z signal of the motor.

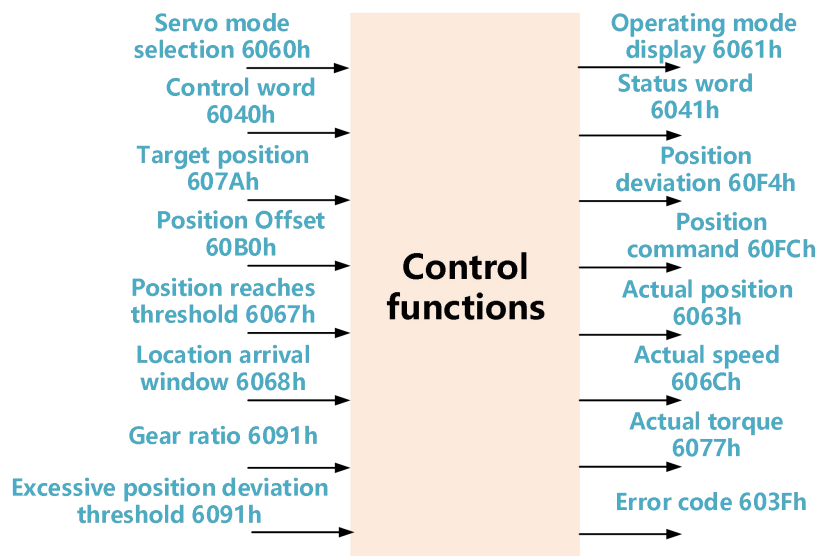
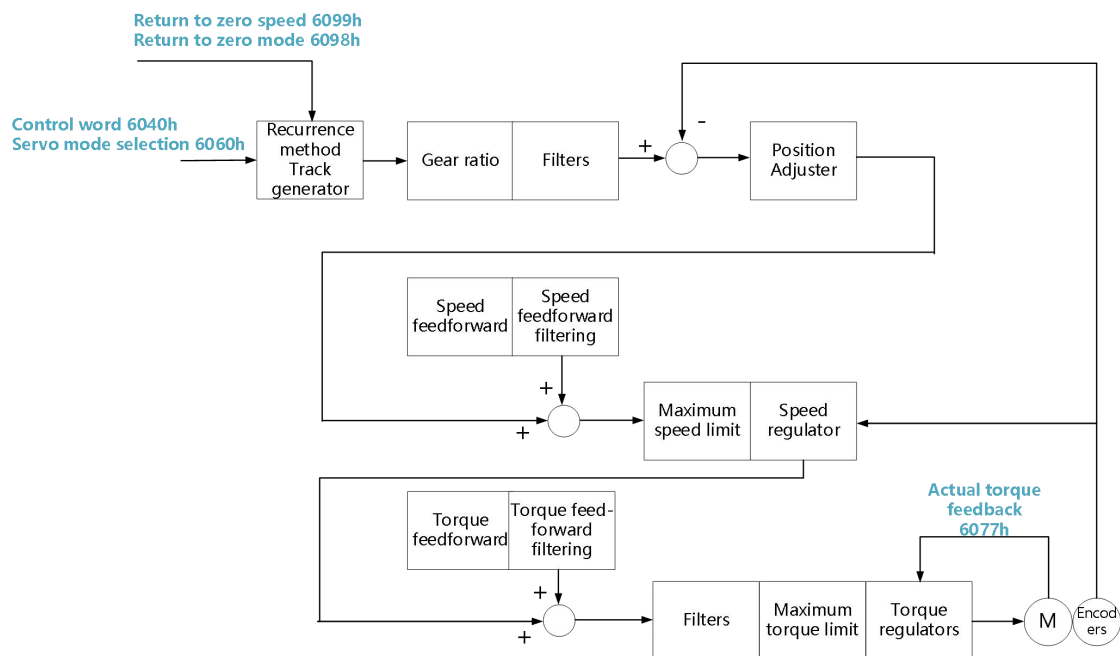
Mechanical origin: Mechanical absolute origin position.

After the origin returns to zero, the stop position of the motor is the mechanical origin. By setting 607Ch, the relationship between the mechanical origin and the mechanical zero can be set:

Mechanical origin = mechanical zero + 607Ch (origin offset)

When 607Ch=0, the mechanical origin is the same with mechanical zero.

### 7.5.1 Control Block Diagram



### 7.5.2 Related Objects

#### (1) Control word 6040h

| bit | Name                           | Description  |
|-----|--------------------------------|--|
| 0   | Servo operation can be started | When bit0 to bit3 are all 1, it indicates the start of operation |
| 1   | Turn on the main circuit       |  |
| 2   | Quick shutdown                 |  |
| 3   | Servo operation                |  |
| 4   | return to zero                 | 0 → 1: Start return to zero<br>1 → 0: End return to zero         |

#### (2) Status word 6041h

| bit | Name                                | Description |
|-----|-------------------------------------|-------------|
| 10  | Target arrival                      | -           |
| 12  | Slave station following instruction | -           |
| 13  | Following error                     | -           |
| 15  | Origin return completed             | -           |

### 7.5.3 Related Function Settings

#### Current Position Calculation Method

| Index | Sub-index | Name                                | Description  |
|-------|-----------|-------------------------------------|--|
| 60E6  | 00        | Current position calculation method | 60E6=0 (absolute return to zero):<br>After returning to zero, 6064h is set to 607Ch<br>60E6 = 1 (relative return to zero):<br>After returning to zero, the position feedback 6064h superimposes the position offset 607C on the original basis |



### 7.5.4 Introduction of Zero Return Mode

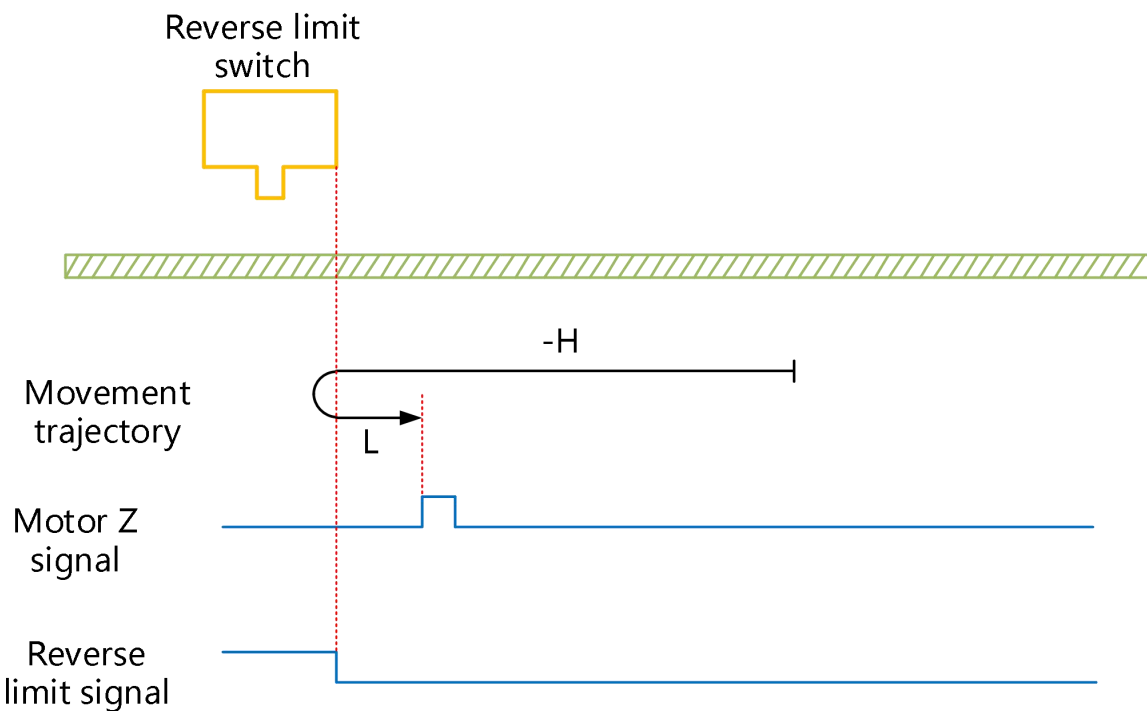
Note: In the figure, "H" stands for 6099: 01h (search for deceleration point signal speed), and "L" stands for 6099: 02h (search for origin signal speed).

#### (1) 6098H = 1

Mechanical origin: Z signal of motor

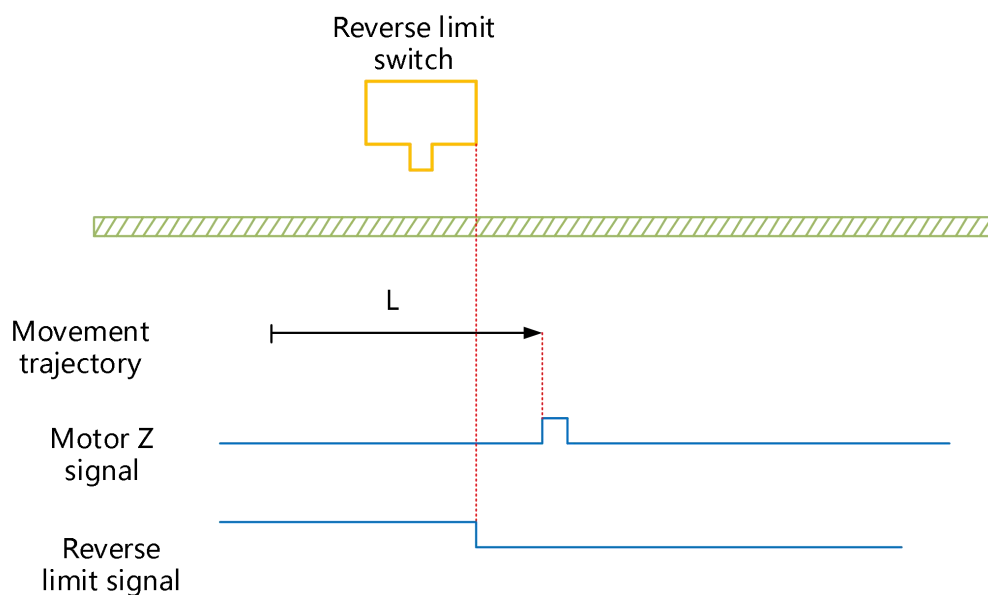
Deceleration point: Reverse limit switch (NOT)

- ① The deceleration point signal is invalid when starting to return to zero



NOT=0 when starting to return to zero, start to return to zero in reverse direction at high speed. After the rising edge of NOT, slow down, change running direction and run in forward direction at low speed, and stop at first Z signal when encountering the falling edge of NOT.

- ② The deceleration point signal is valid when starting to return to zero



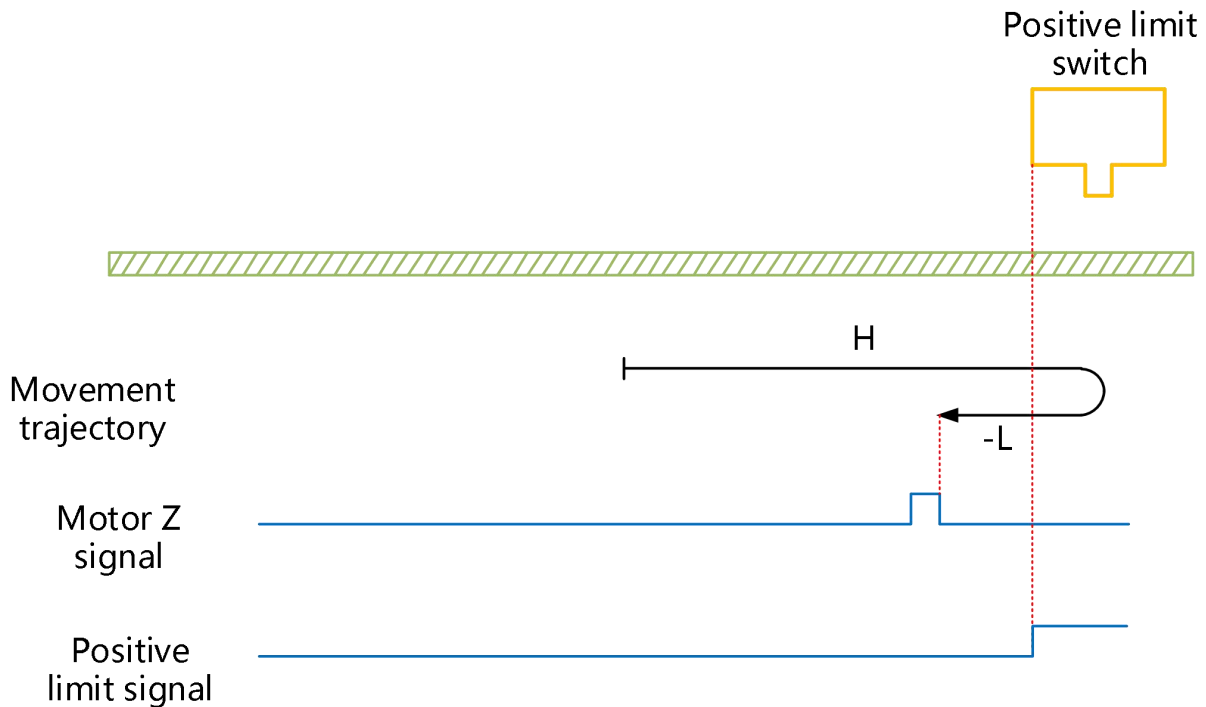
NOT=1 when starting to return to zero, run in forward direction immediately at low speed and start to return to zero, and stop at the first Z signal when encountering the falling edge of NOT.

**(2) 6098H = 2**

Mechanical origin: Z signal of motor

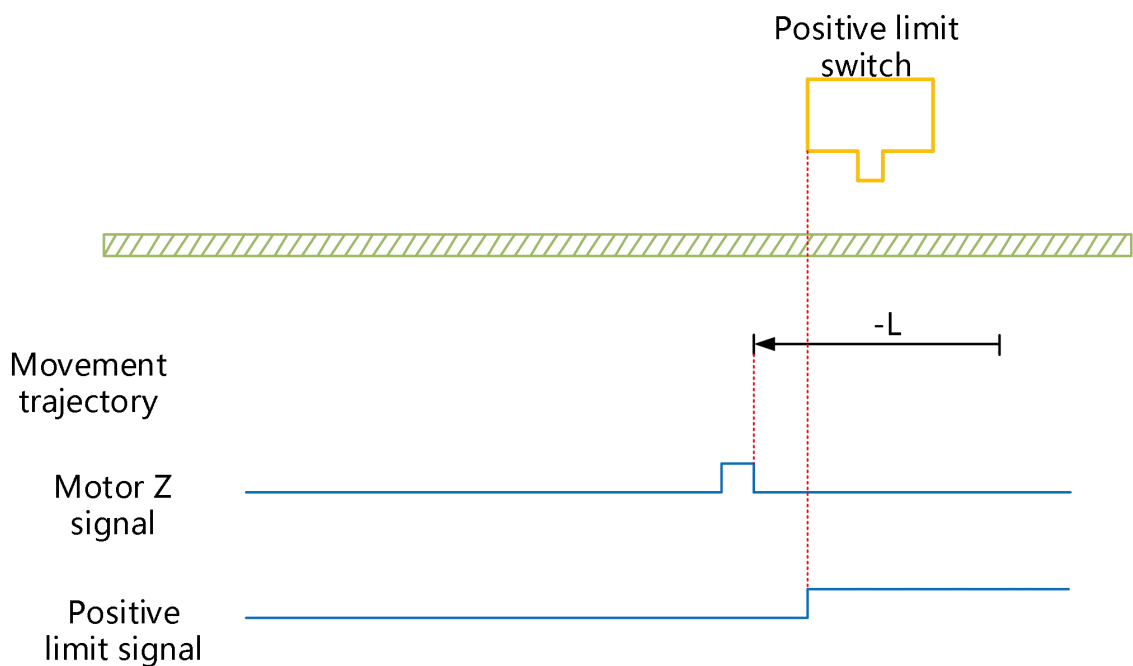
Deceleration point: Forward limit switch (POT)

- ① The deceleration point signal is invalid when starting to return to zero



POT=0 when starting to return to zero, run at a high speed in the forward direction. After encountering the rising edge of POT, motor will decelerate, run in reverse direction at low speed, and stop at the first Z signal after encountering the falling edge of POT.

- ② The deceleration point signal is valid when starting to return to zero



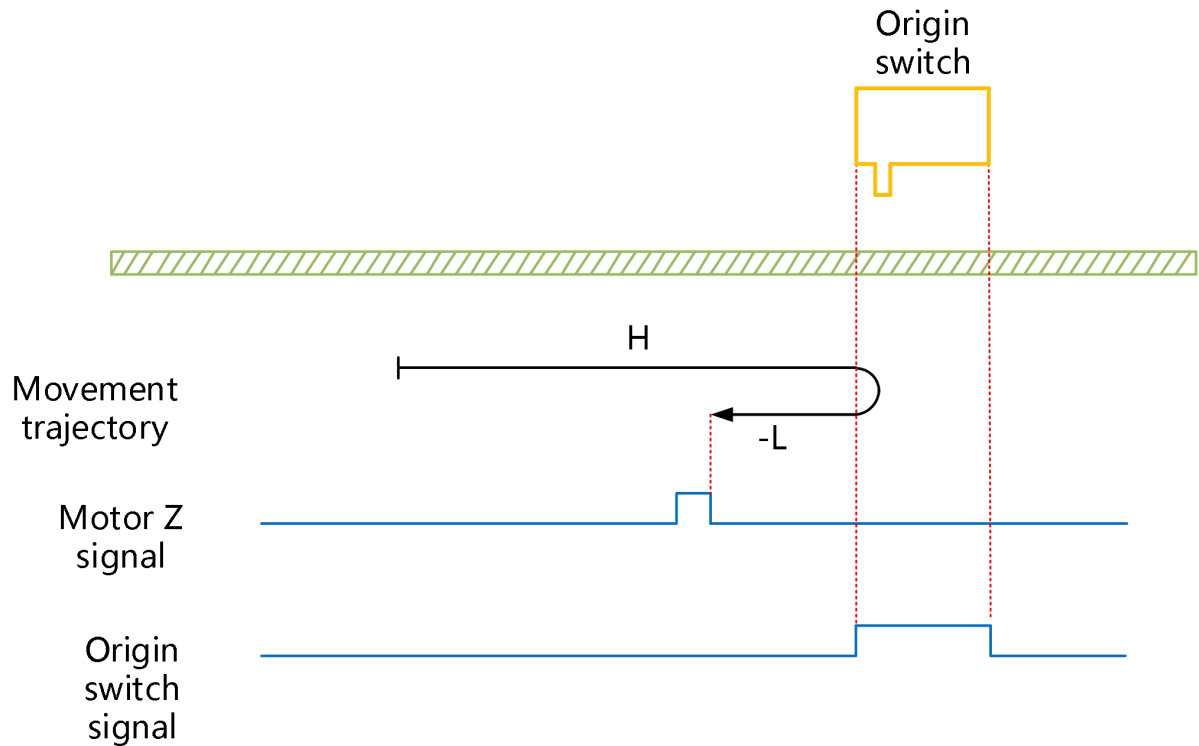
POT=1 when starting to return to zero, run at low speed directly in the reverse direction, and stops at the first Z signal after encountering the falling edge of POT.

**(3) 6098H = 3**

Mechanical origin: Z signal of motor

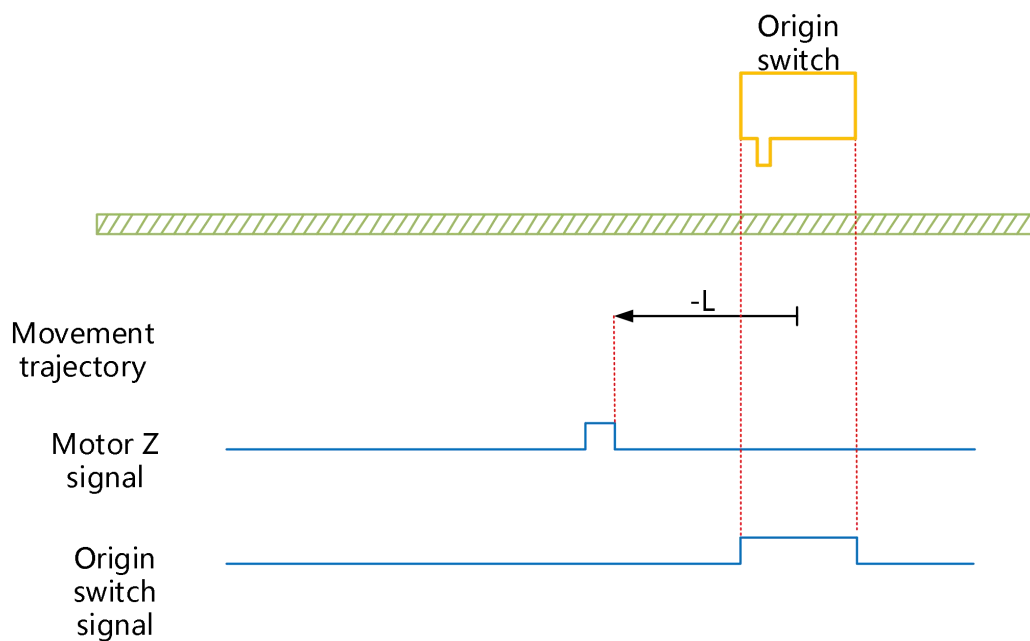
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zero in forward direction at high speed. After encountering rising edge of HW, slow down, run in reverse direction at low speed. After encountering the falling edge of HW, continue to run, and then stop when encountering the first Z signal.

- ② The deceleration point signal is valid when starting to return to zero



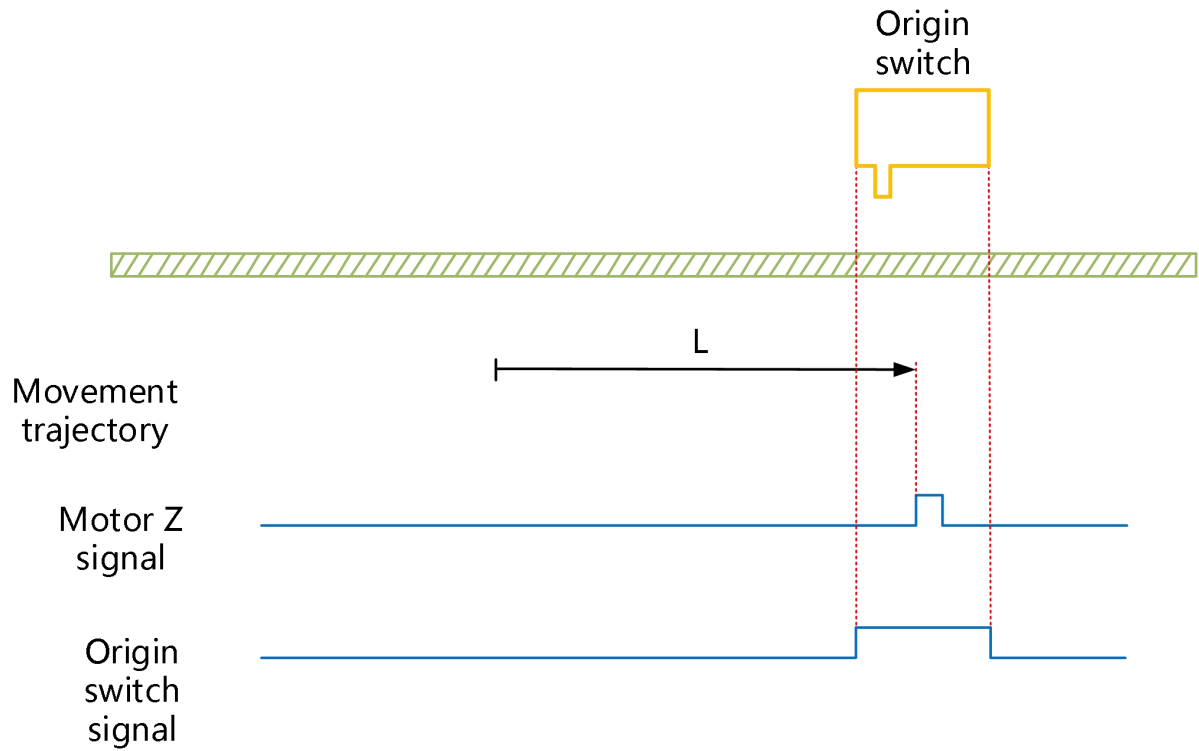
HW=1 when starting to return to zero, start to return to zero at low speed in reverse direction directly, and stop at the first Z signal after encountering the falling edge of HW;

**(4) 6098H = 4**

Mechanical origin: Z signal of motor

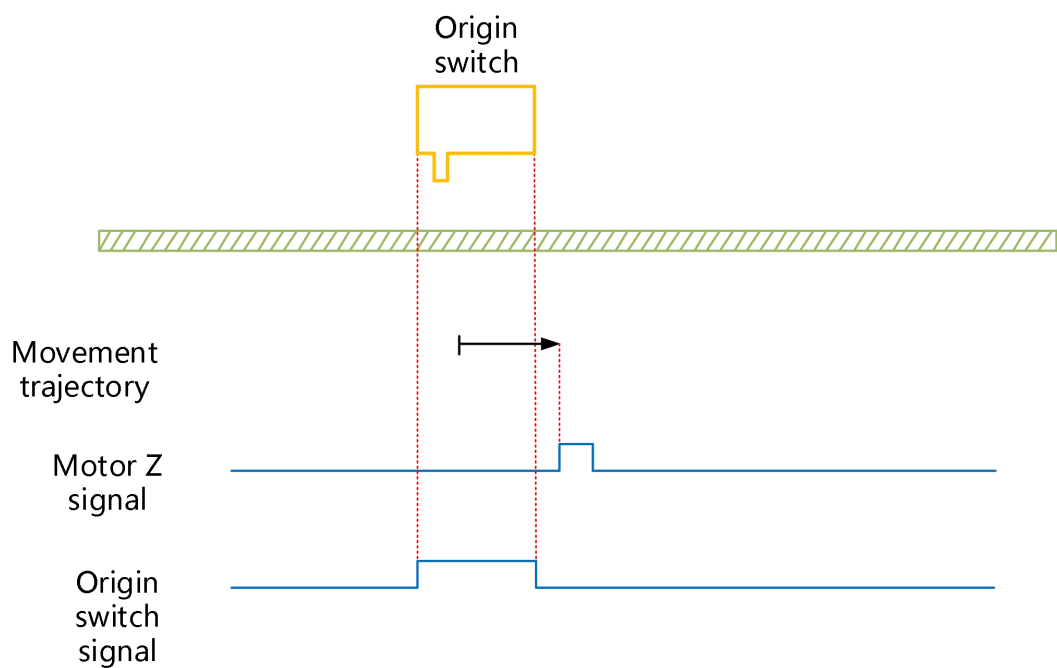
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zero at low speed in forward direction directly, and stop at the first Z signal after encountering the rising edge of HW;

- ② The deceleration point signal is valid when starting to return to zero



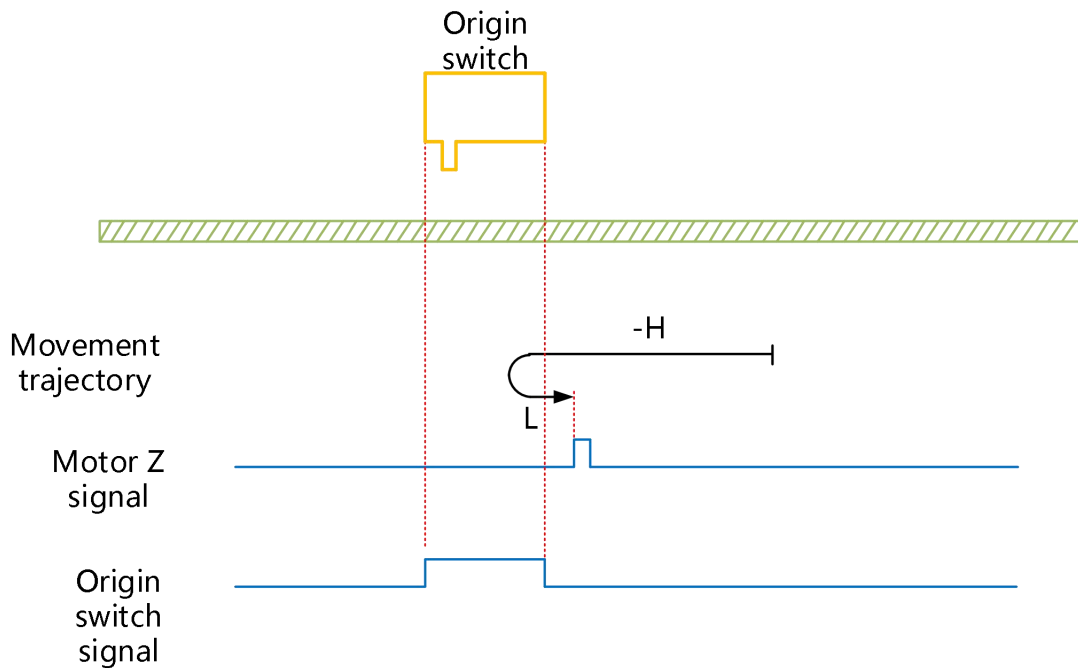
HW=1 when starting to return to zero, start return to zero at high speed in reverse direction, slow down after encountering the falling edge of HW, change running direction and run in forward direction at low speed, and stop at the first Z signal after encountering the rising edge of HW;

**(5) 6098H = 5**

Mechanical origin: Z signal of motor

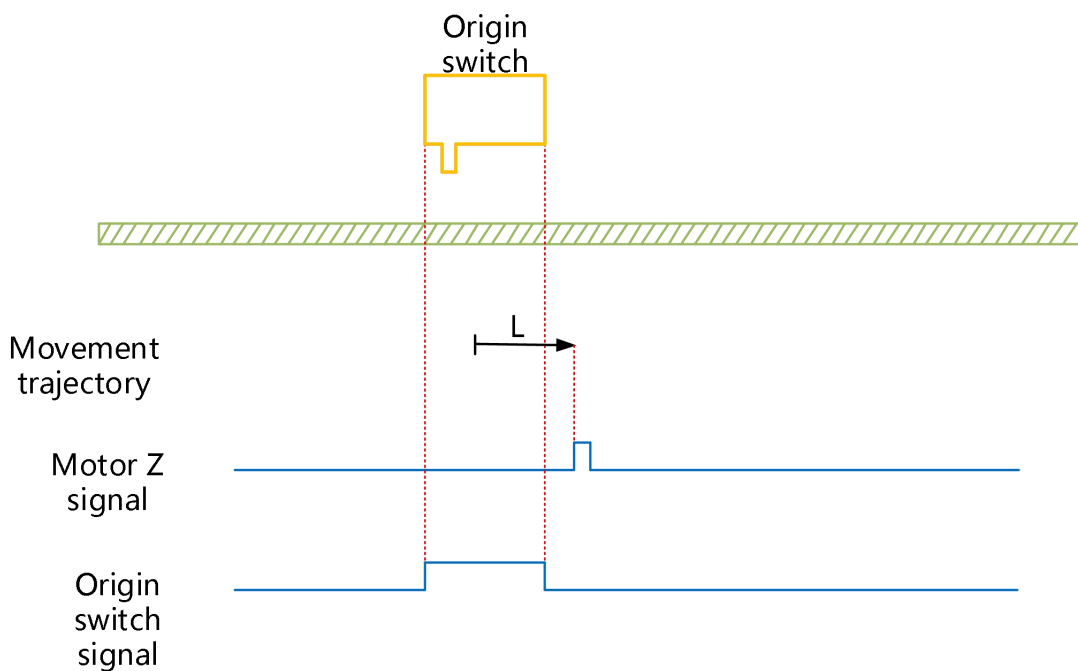
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zero at high speed in reverse direction, slow down after encountering the rising edge of HW, change running direction and run in forward direction at low speed, and stop at the first Z signal after encountering the falling edge of HW;

- ② The deceleration point signal is valid when starting to return to zero



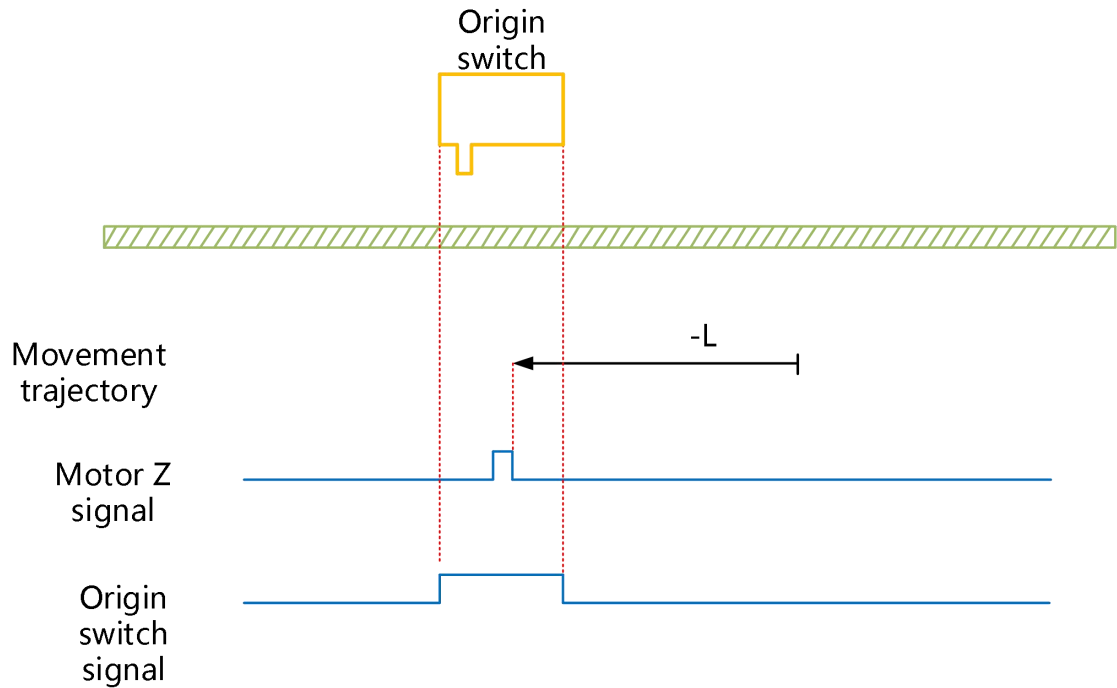
HW=1 when starting to return to zero, start to return to zero at low speed in forward direction directly, and stop at the first Z signal after encountering the falling edge of HW will stop;

**(6) 6098H = 6**

Mechanical origin: Z signal of motor

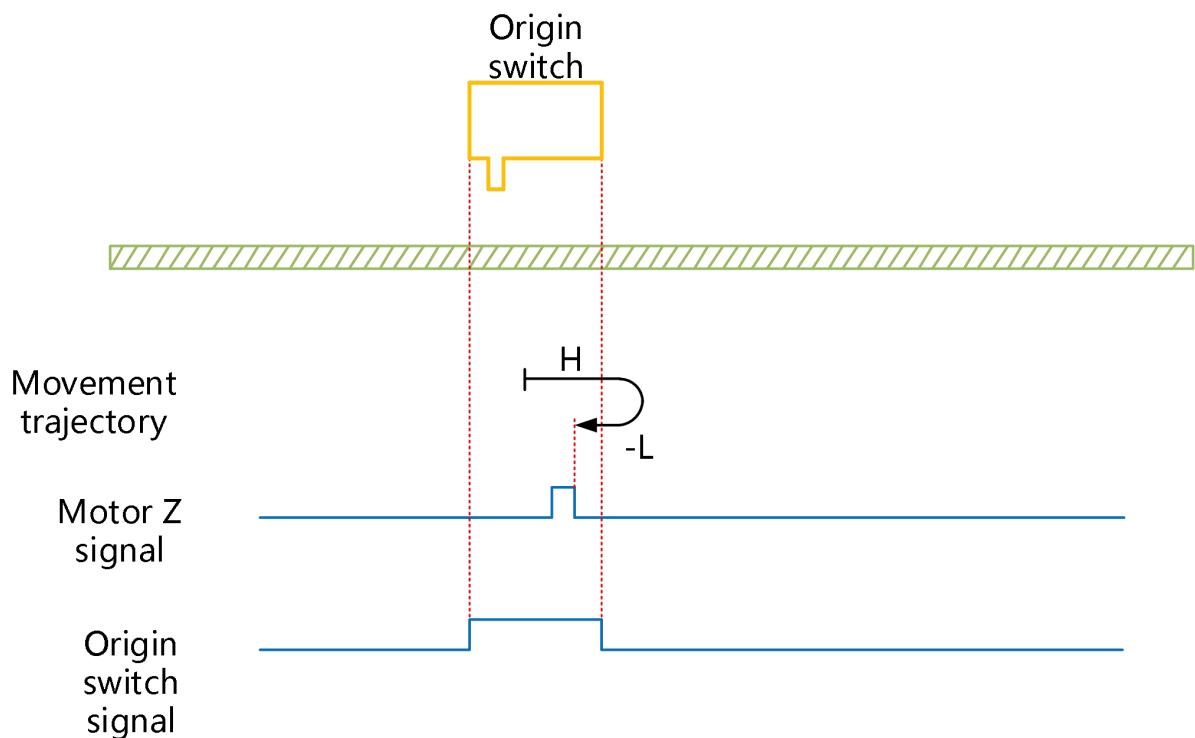
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zero at low speed in reverse direction directly, and stop at the first Z signal after encountering the rising edge of HW;

- ② The deceleration point signal is valid when starting to return to zero



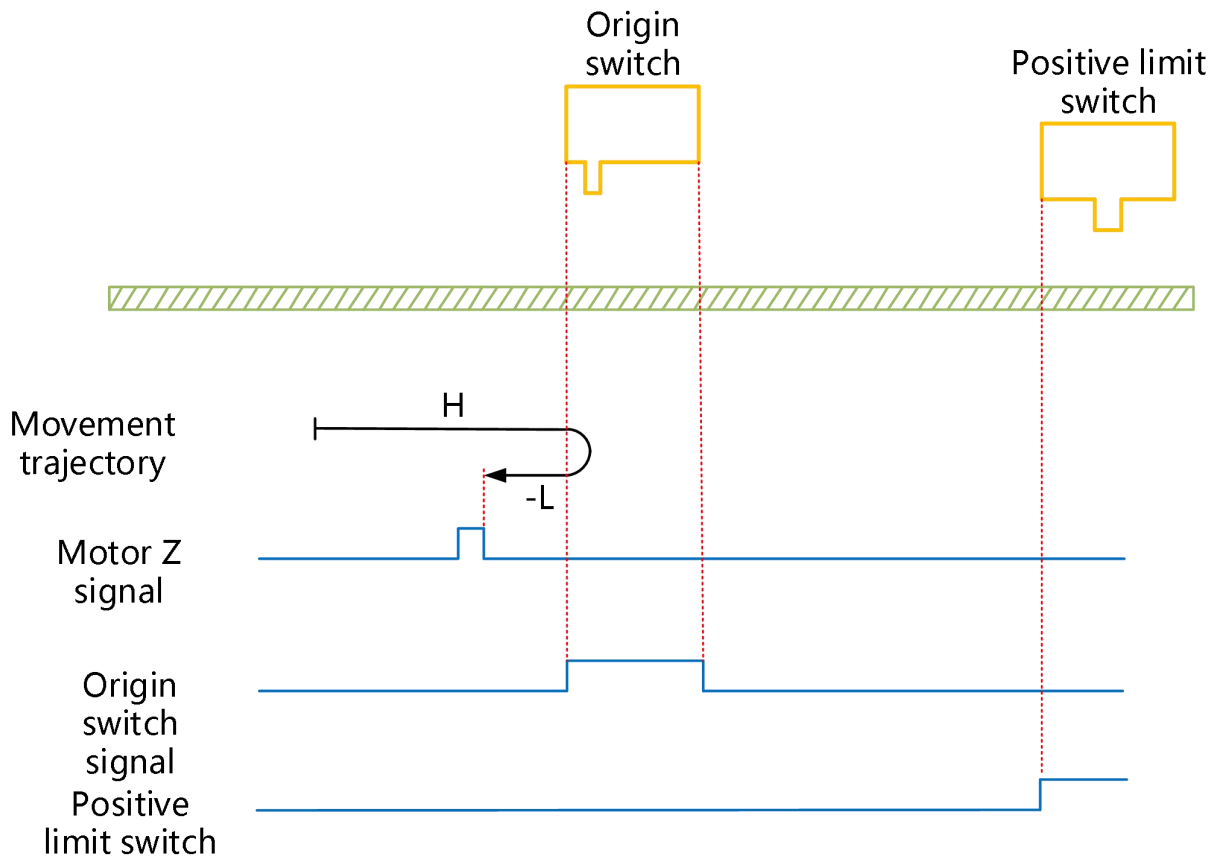
HW=1 when starting to return to zero, start to return to zero at high speed in forward direction, slow down after encountering the falling edge of HW, change running direction and run in reverse direction at low speed, and stop at the first Z signal after encountering the rising edge of HW;

**(7) 6098H = 7**

Mechanical origin: Z signal of motor

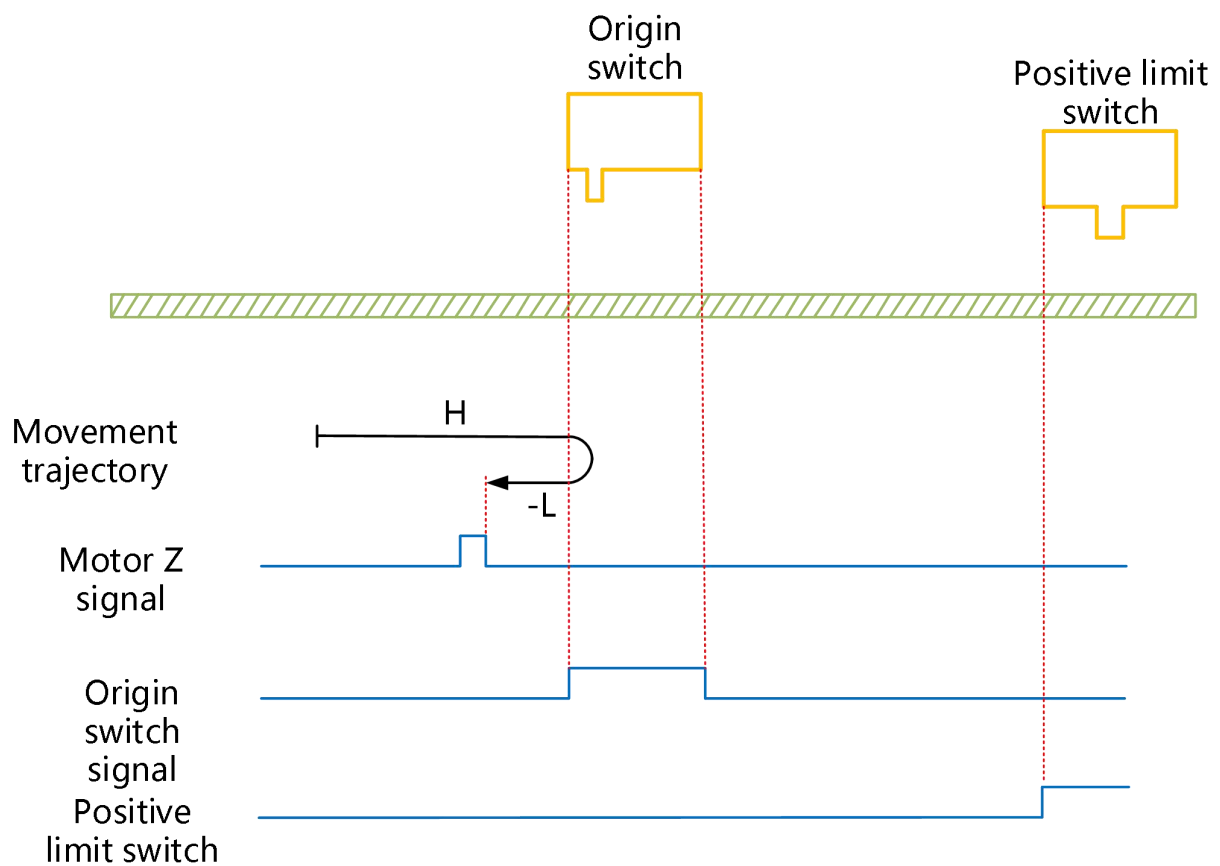
Deceleration point: Origin switch (HW)

① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



HW=0 when starting to return to zero, start to return to zero at high speed in forward direction. If the limit switch is not encountered, after encountering the rising edge of HW, slow down, change running direction and run in reverse direction at low speed, and stop at the first Z signal after encountering the falling edge of HW;

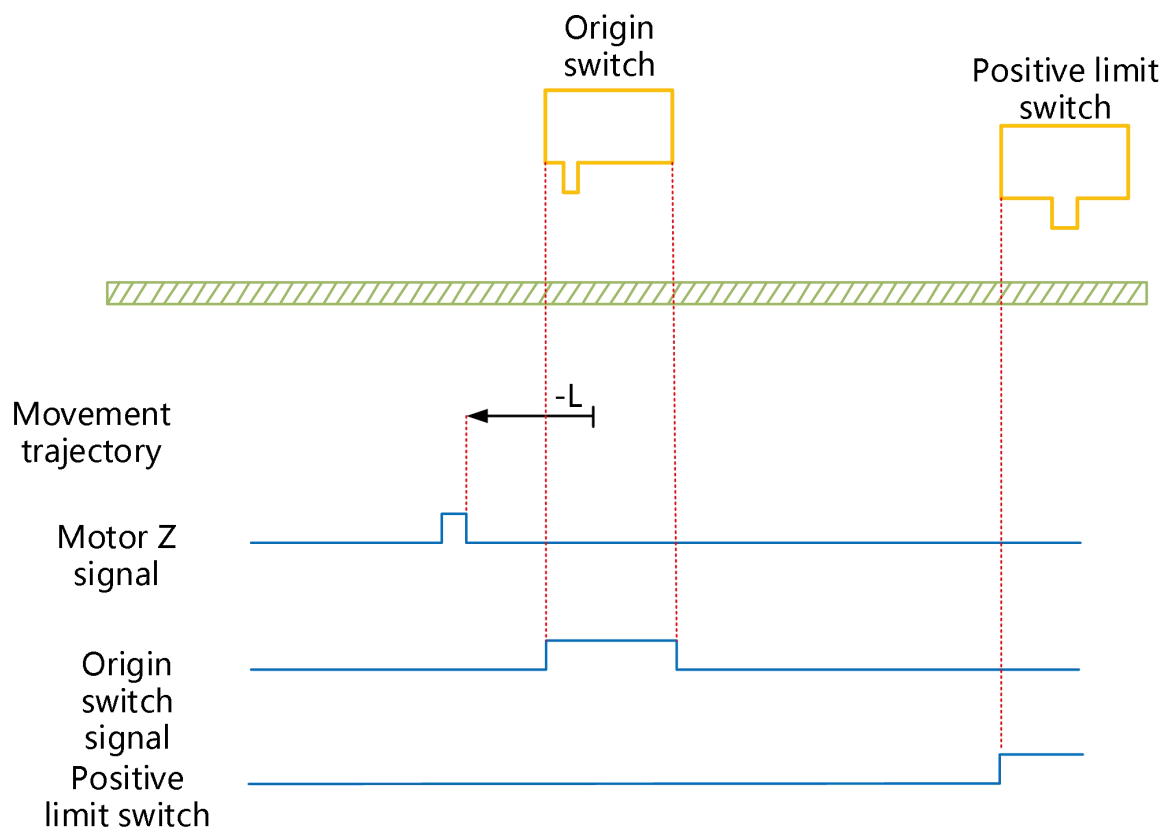
② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered



HW=0 when starting to return to zero, start to return to zero at high speed in forward direction. If the limit switch is encountered, automatically change running direction and run in reverse direction at high speed. After encountering HW rising edge, slow down and continue to run at low speed in reverse direction, stop at the first Z signal after encountering the falling edge of HW;

- ③ The deceleration point signal is valid when starting to return to zero





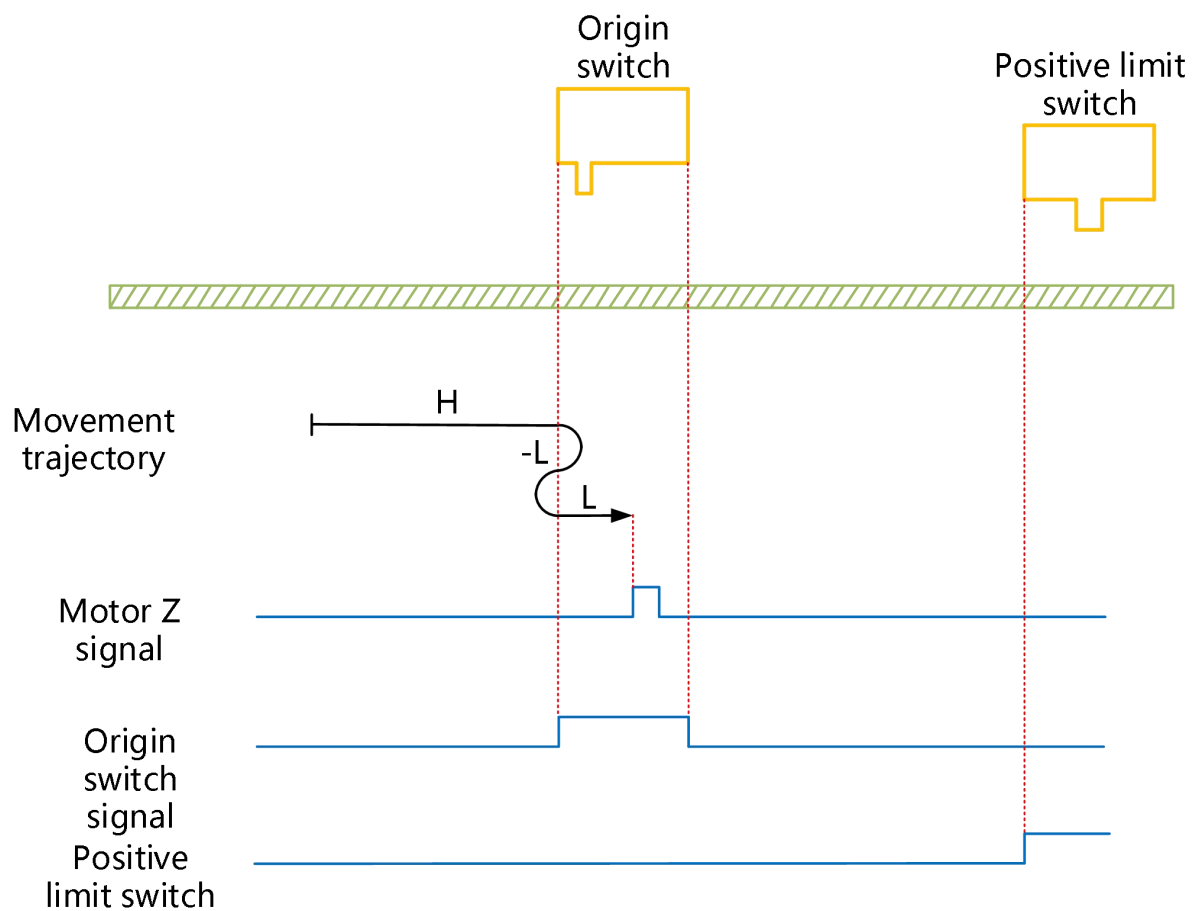
HW=1 when starting to return to zero, start to return to zero at low speed in reverse direction directly, and stop at the first Z signal after encountering the falling edge of HW;

**(8) 6098H = 8**

Mechanical origin: Z signal of motor

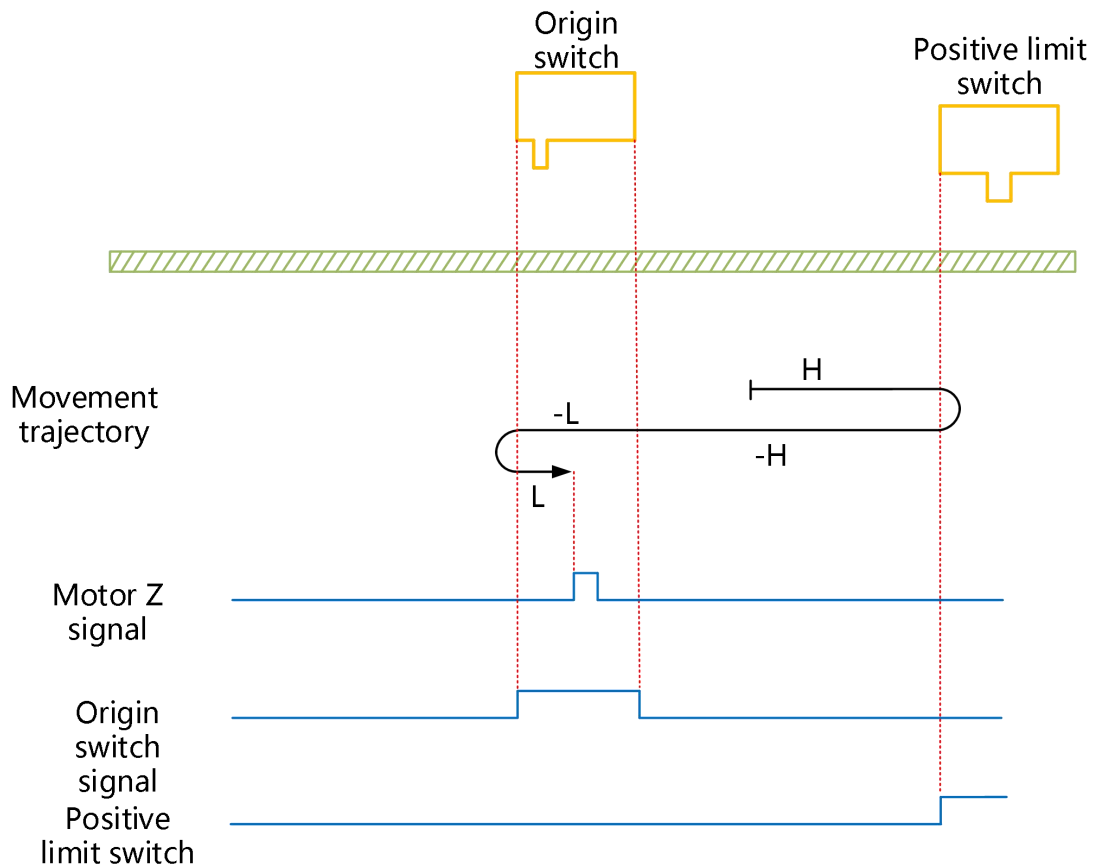
Deceleration point: Origin switch (HW)

① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



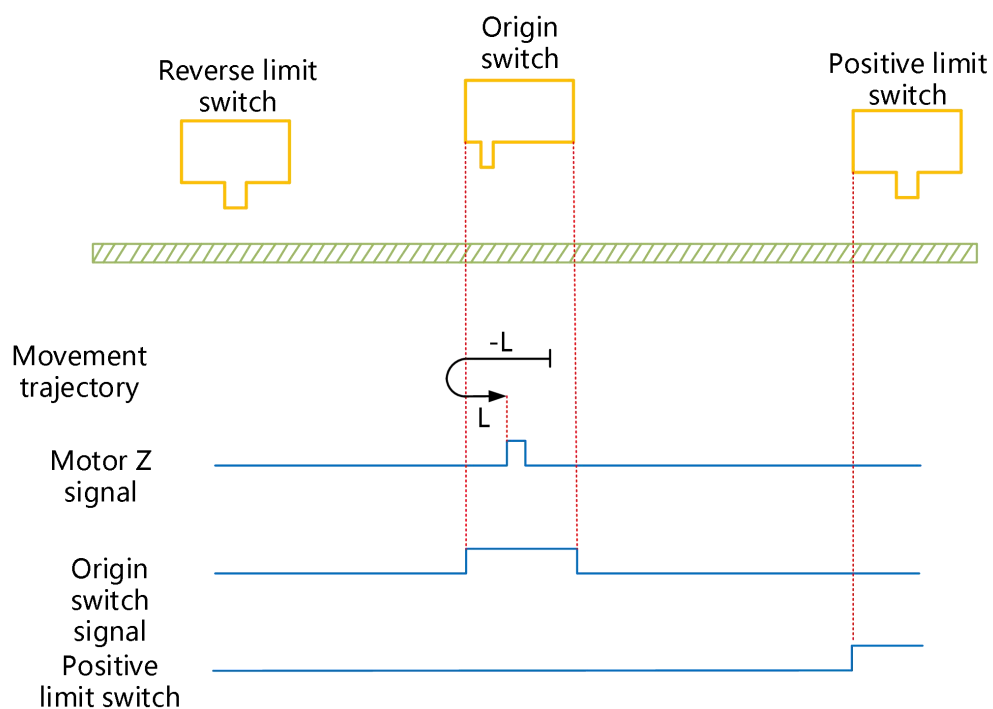
HM-0 when starting to return to zero, start to return to zero at high speed in forward direction. If the limit switch is not encountered, after encountering the rising edge of HW, slow down and change running direction and run in reverse direction at low speed. After encountering the falling edge of HW, change the running direction and run in forward direction at low speed, and stop at the first Z signal after encountering the rising edge of HW;

② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered



HW=0 when starting to return to zero, start to return to zero at high speed in forward direction. If limit switch is encountered, automatically change running direction and run in reverse direction at high speed, slow down and run in reverse direction at low speed after encountering HW rising edge; change running direction and run in reverse direction at low speed after encountering HW falling edge, and stop at the first Z signal after encountering HW rising edge;

③ The deceleration point signal is valid when starting to return to zero



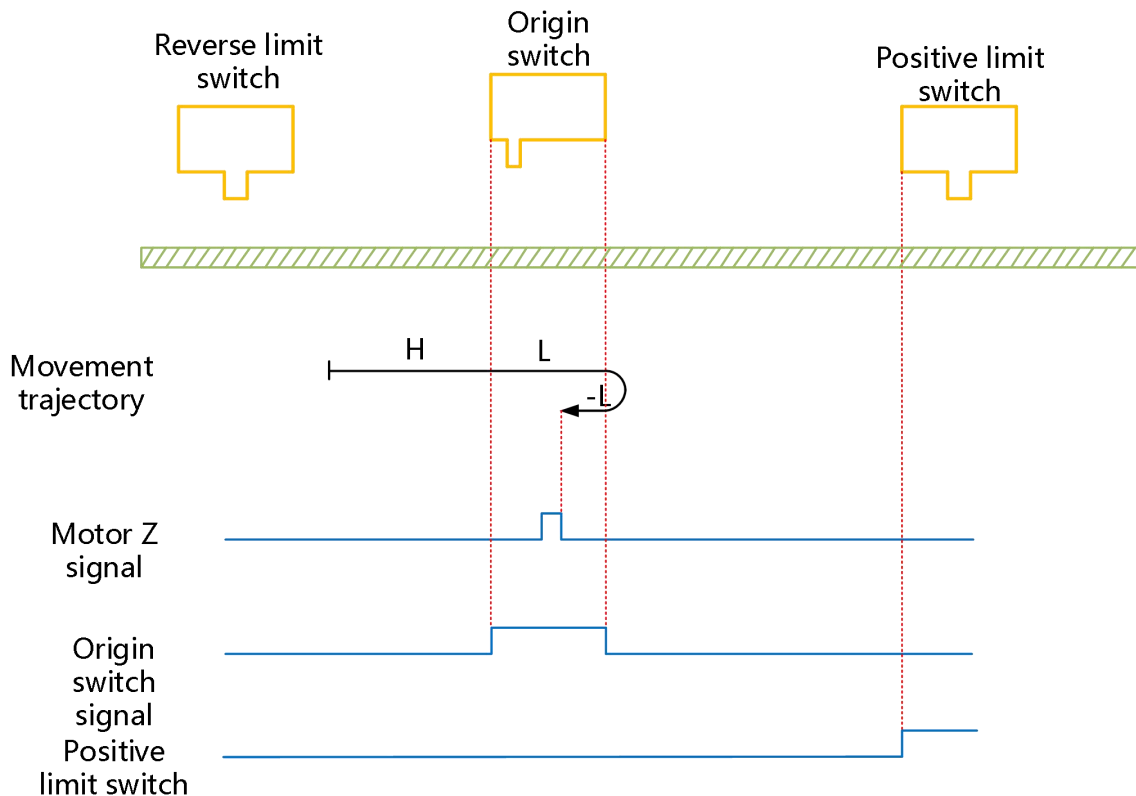
HM=-1 when starting to return to zero, start to return to zero at low speed in reverse direction directly. After encountering the falling edge of HW, change running direction and run in forward direction at low speed, and stop at the first Z signal after encountering the rising edge of HW;

**(9) 6098H = 9**

Mechanical origin: Z signal of motor

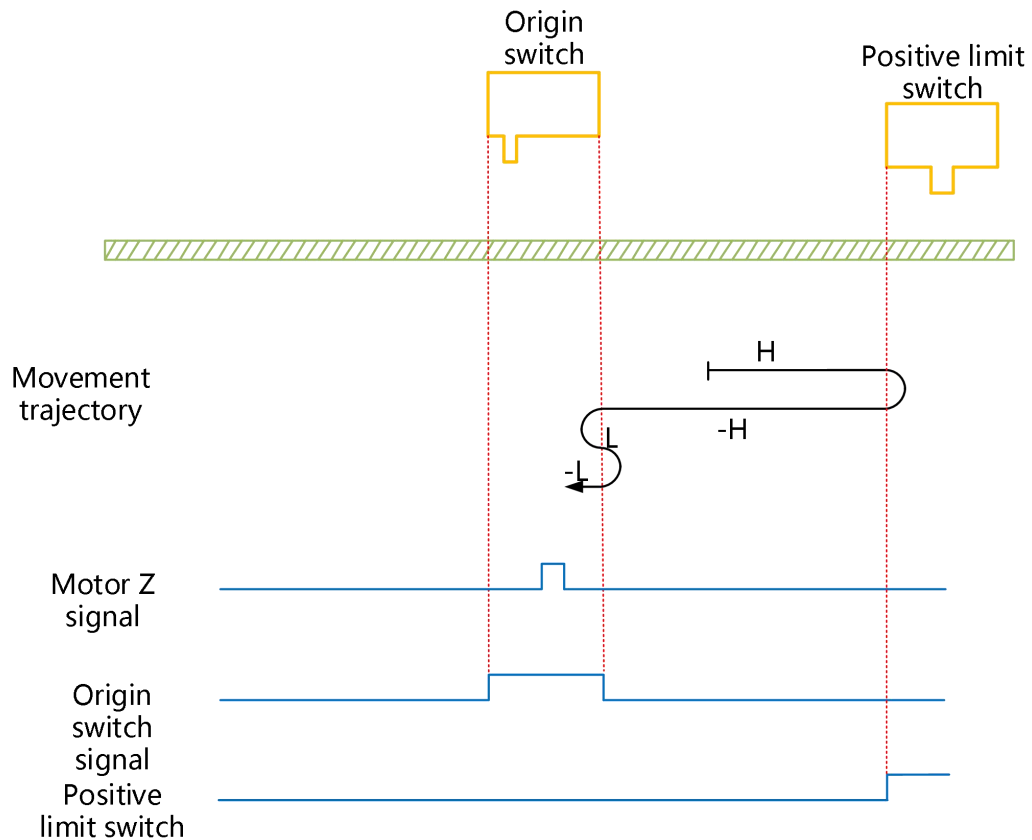
Deceleration point: Origin switch (HW)

① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



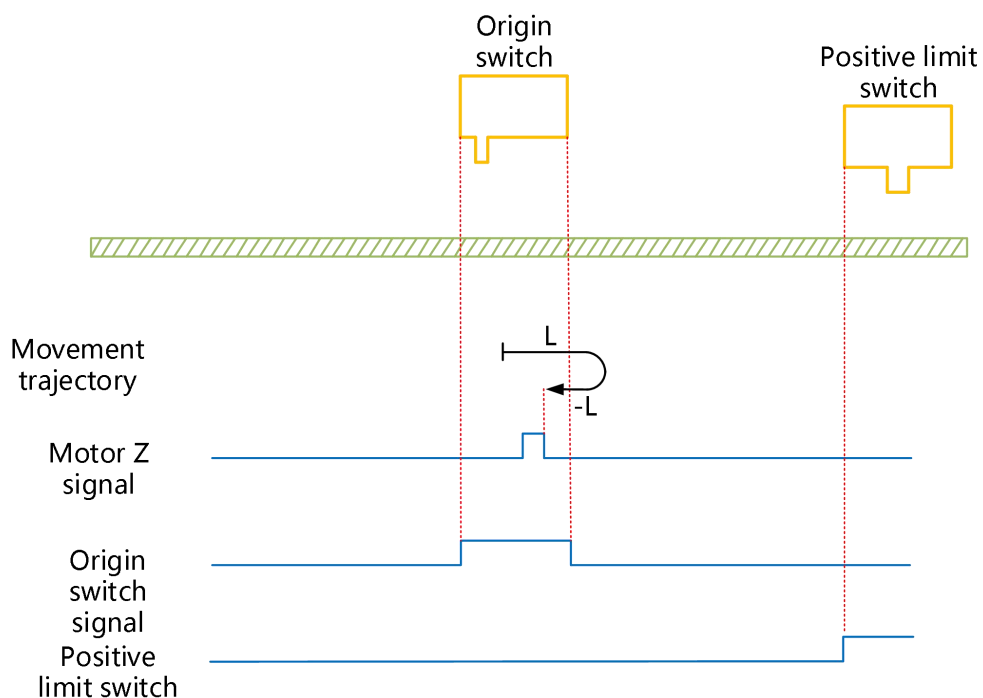
HW=0 when starting to return to zero, start to return to zero at high speed in forward direction. If the limit switch is not encountered, slow down after encountering the rising edge of HW, run at low speed in forward direction; change running direction and run in reverse direction at low speed after encountering the falling edge of HW, and stop at the first Z signal after encountering the rising edge of HW;

② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered



HW=0 when starting to return to zero, start to return to zero at high speed in forward direction. If the limit switch is encountered, change the running direction automatically and run in reverse direction at high speed; slow down and change the running direction after encountering the rising edge of HW to resume forward operation. Run in forward direction at low speed and change the running direction after encountering the falling edge of HW; stops at first Z signal after encountering the rising edge of HW during running in reverse direction at low speed;

- ③ The deceleration point signal is valid when starting to return to zero



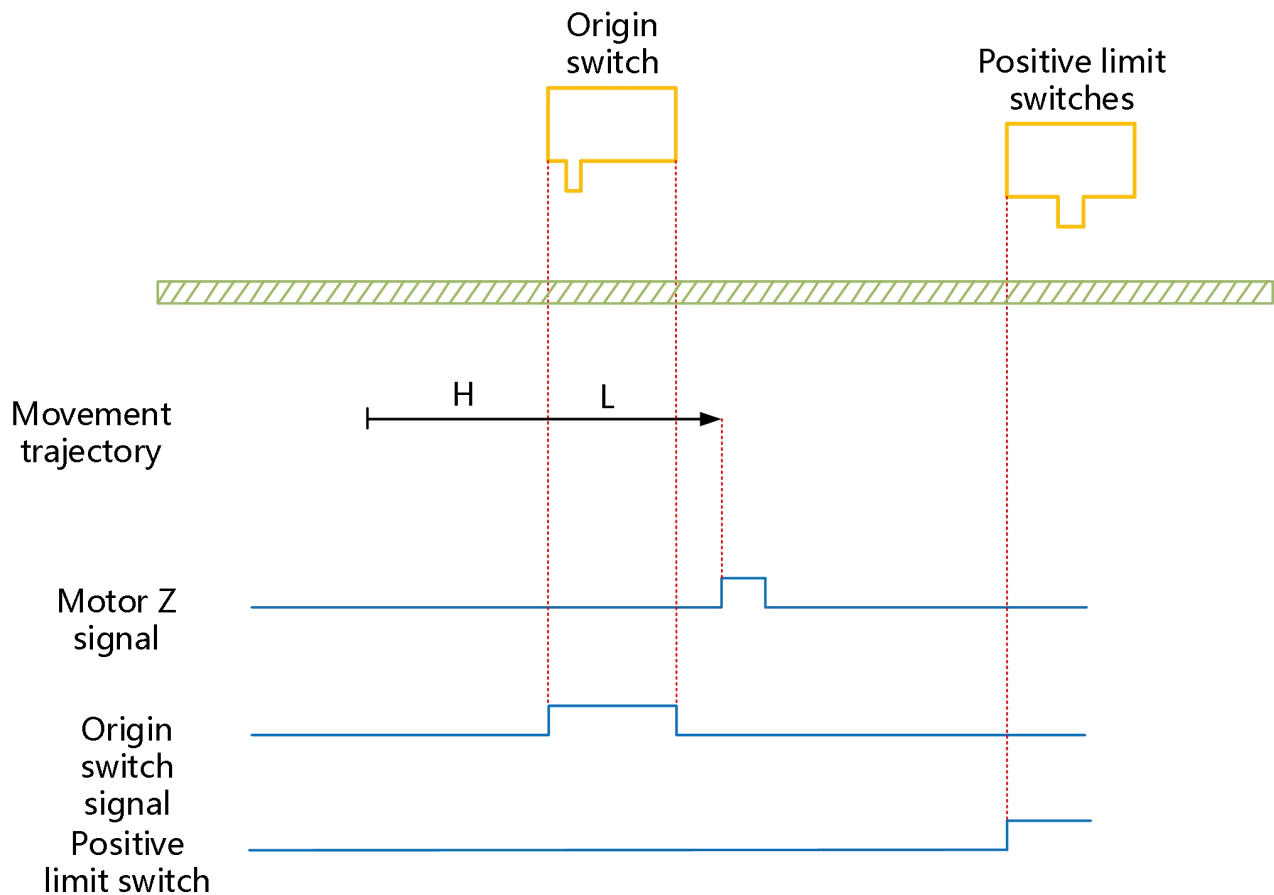
HW=1 when starting to return to zero, start to return to zero directly at low speed in forward direction. After encountering the falling edge of HW, change the running direction and stop at the first Z signal after encountering the rising edge of HW during running in reverse direction at low speed;

**(10) 6098H=10**

Mechanical origin: Z signal of motor

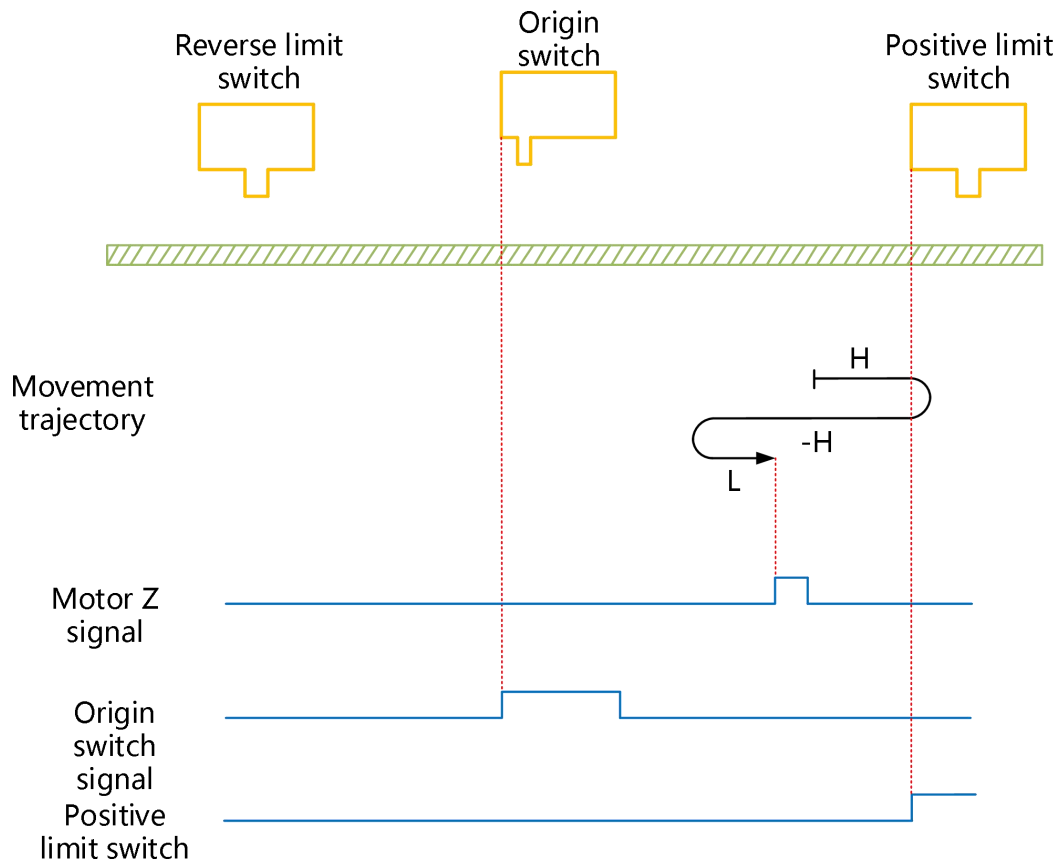
Deceleration point: Origin switch (HW)

① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



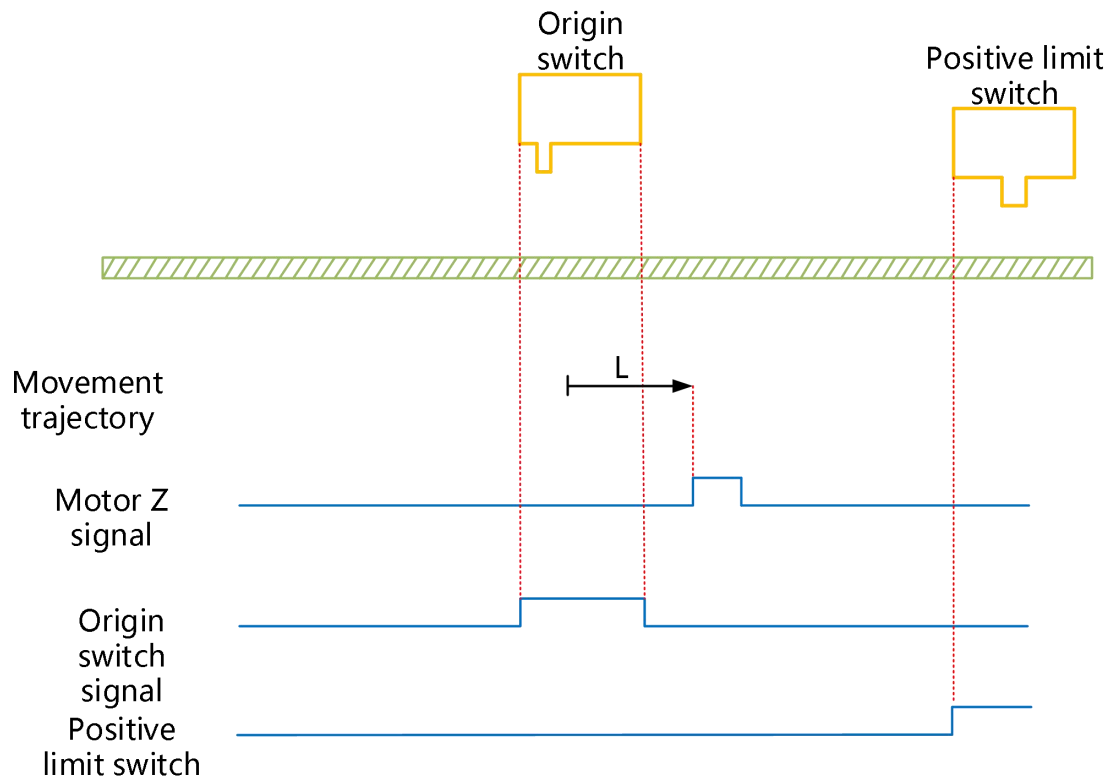
HW=0 when starting to return to zero, start to return to zero at high speed in forward direction. If the limit switch is not encountered, slow down and run at low speed in forward direction after encountering the rising edge of HW. After encountering the falling edge of HW, continue to run at low speed in forward , and then stop at the first Z signal encountered;

② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered



HW=0 when starting to return to zero, start to return to zero at high speed in forward direction. If the limit switch is encountered, change the running direction automatically and run in reverse direction at high speed. After encountering the rising edge of HW, slow down and change the running direction to resume forward operation, and stop at the first Z signal after encountering the falling edge of HW during running in forward direction at low speed;

③ The deceleration point signal is valid when starting to return to zero



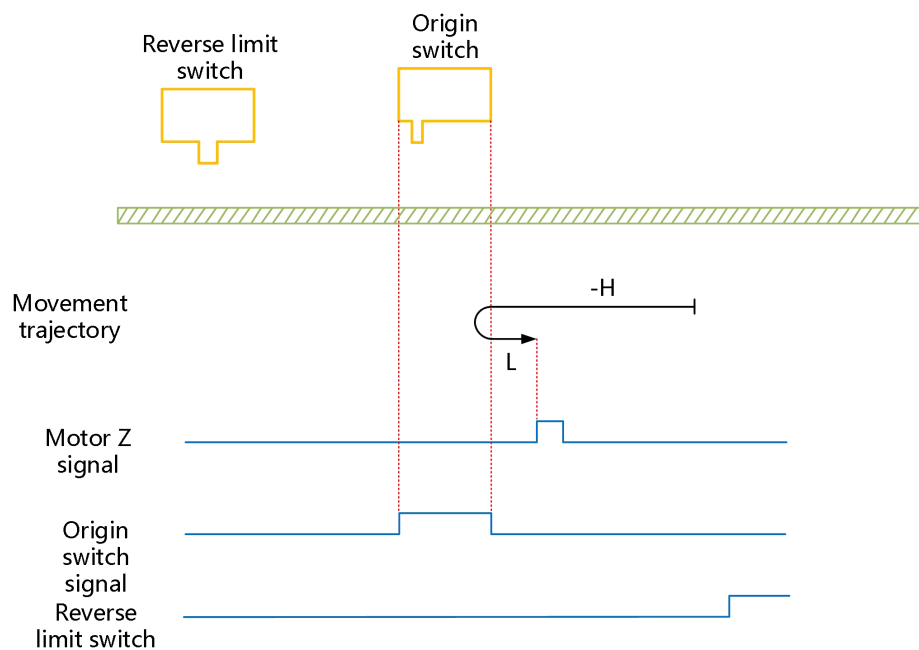
HW=1 when starting to return to zero, start to return to zero directly in forward direction at low speed, and stop at the first Z signal after encountering the falling edge of HW;

#### (11) 6098H=11

Mechanical origin: Z signal of motor

Deceleration point: Origin switch (HW)

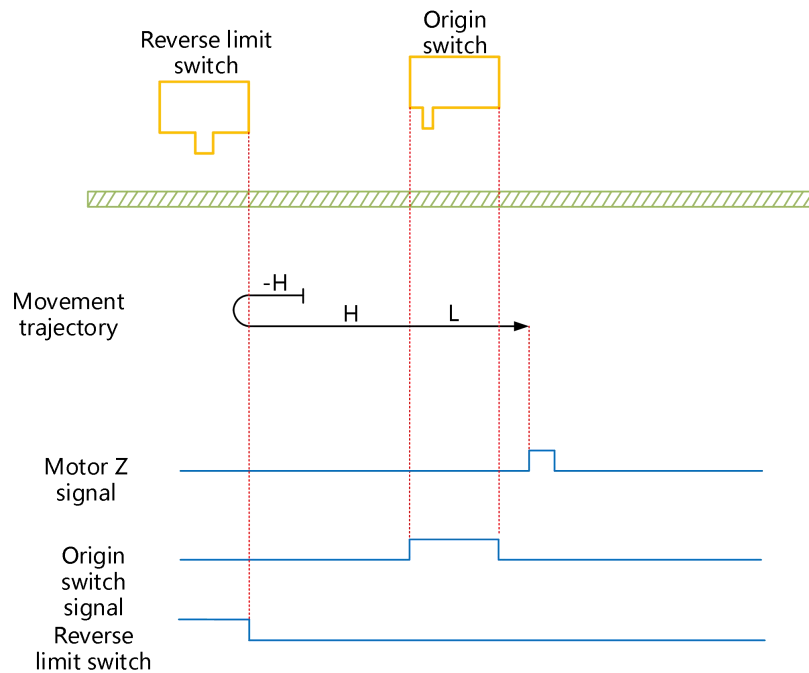
- ① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered





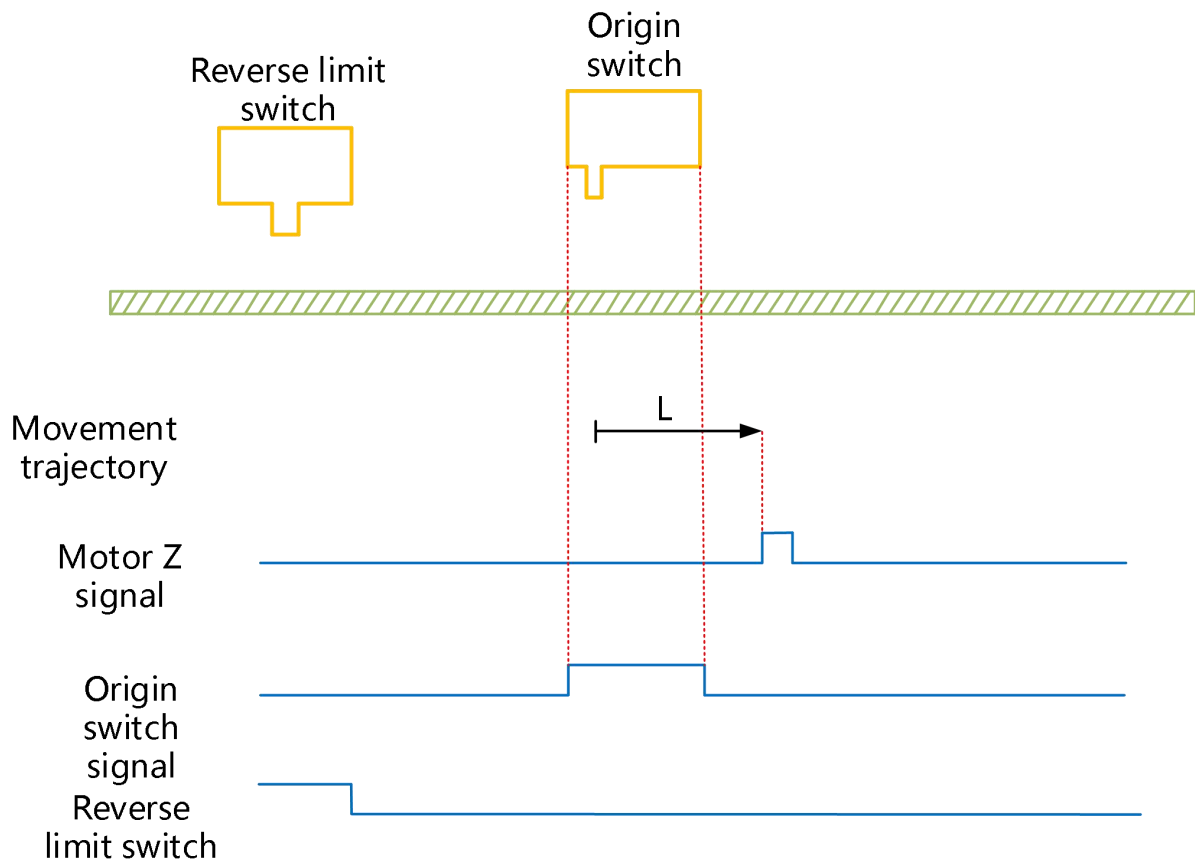
HW=0 when starting to return to zero, start to return to zero at high speed in reverse direction. If the limit switch is not encountered, slow down and change the running direction after encountering the rising edge of HW, and run in forward direction at low speed and stop at the first Z signal after encountering the falling edge of HW;

② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered



HW=0 when starting to return to zero, start to return to zero at high speed in reverse direction. If limit switch is encountered, change the running direction automatically and run in forward direction at high speed. After encountering HW rising edge, slow down and continue to run in forward direction at low speed. Stop at the first Z signal after encountering HW falling edge;

③ The deceleration point signal is valid when starting to return to zero



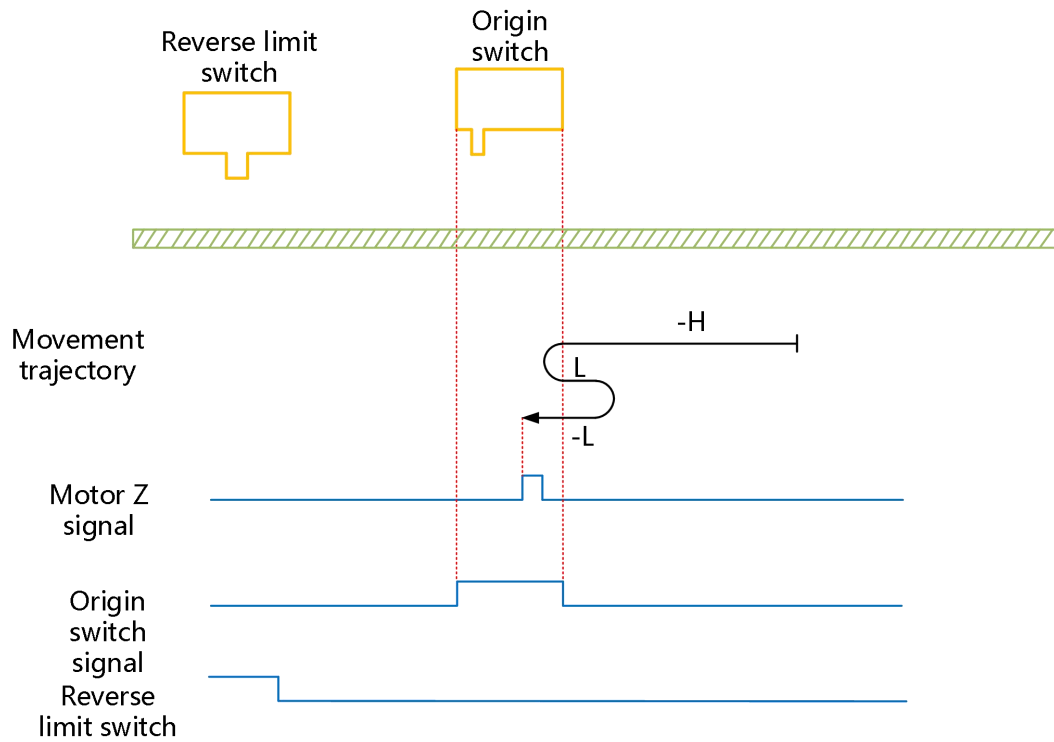
HW=1 when starting to return to zero, it will start to return to zero directly in forward direction at low speed, and stop at the first Z signal after encountering the falling edge of HW;

**(12) 6098H=12**

Mechanical origin: Z signal of motor

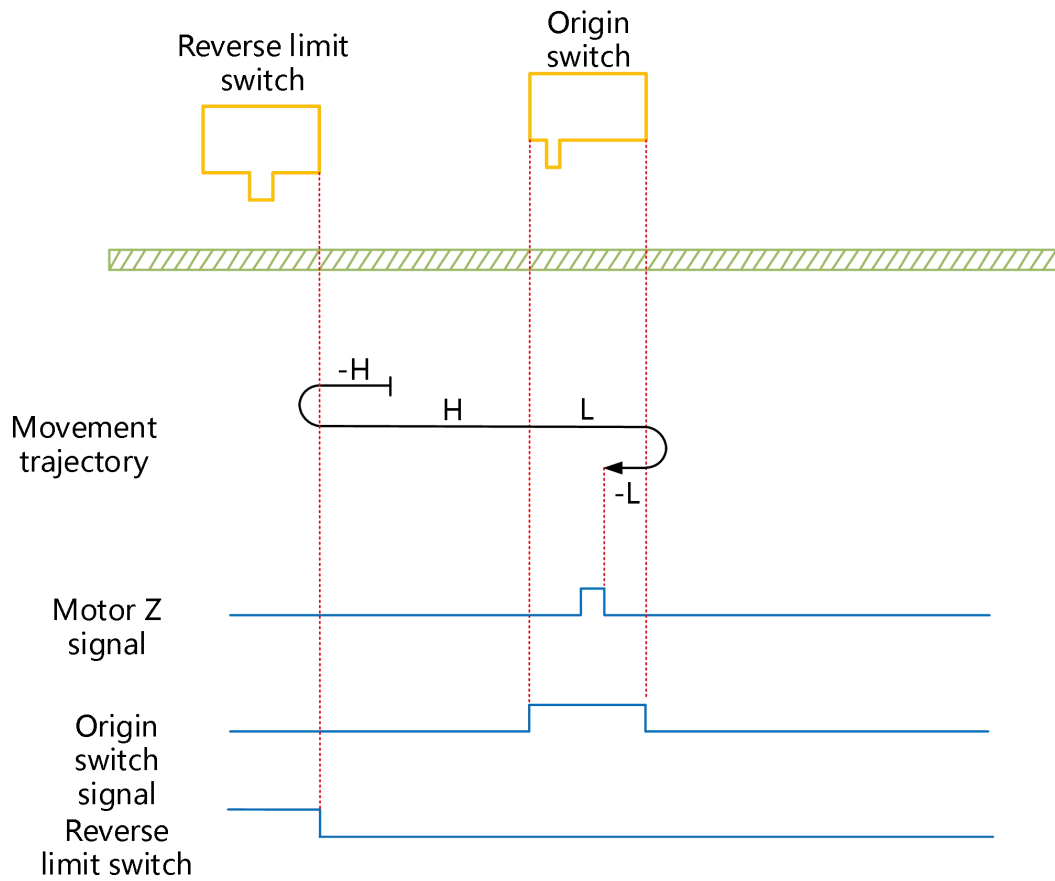
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered



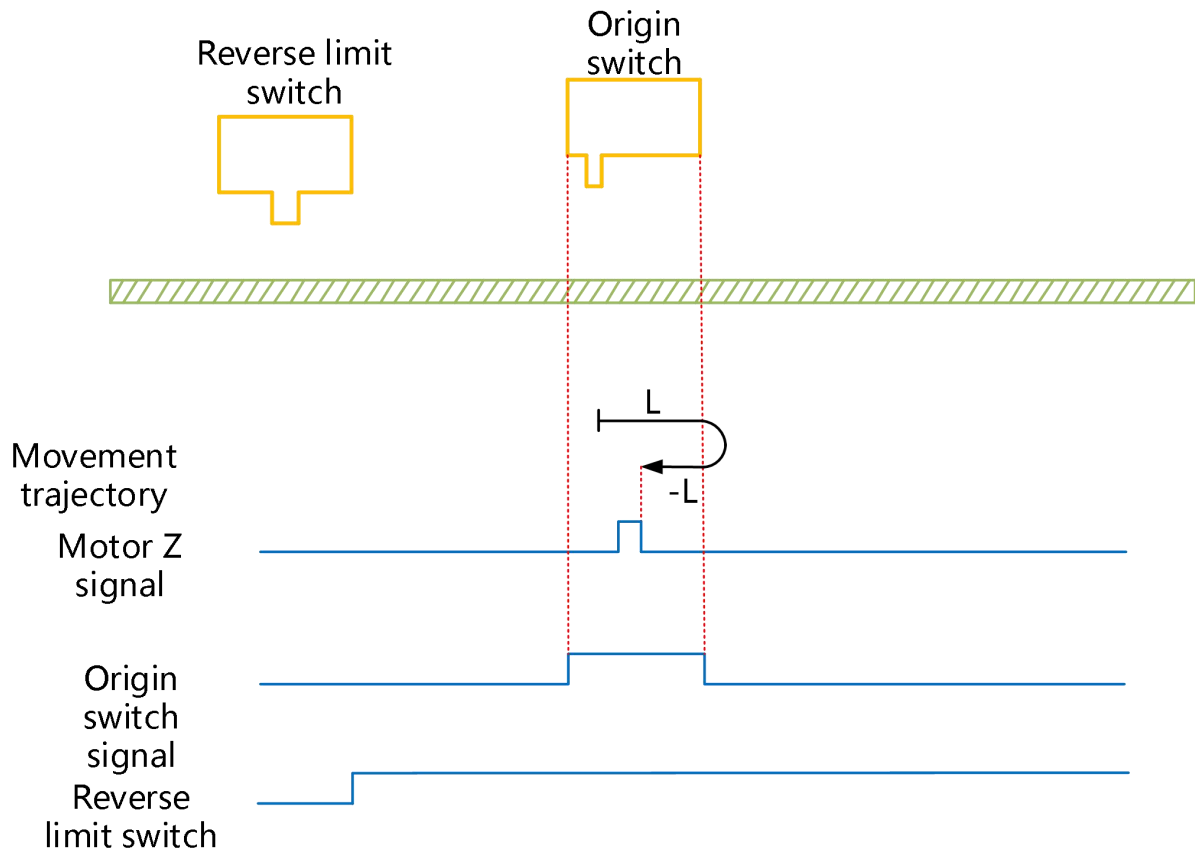
HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed; if limit switch is not encountered; slow down and change the running direction after encountering HW rising edge, run in forward direction at low speed; after encountering HW falling edge, change the running direction and run in reverse direction at low speed and stop at the first Z signal after encountering HW rising edge;

② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed, change the running direction automatically when encountering limit switch and run in forward direction at high speed; slow down after encountering HW rising edge and run in forward direction at low speed; change the running direction after encountering HW falling edge, and run in reverse direction at low speed and stop at the first Z signal after encountering HW rising edge;

③ The deceleration point signal is valid when starting to return to zero



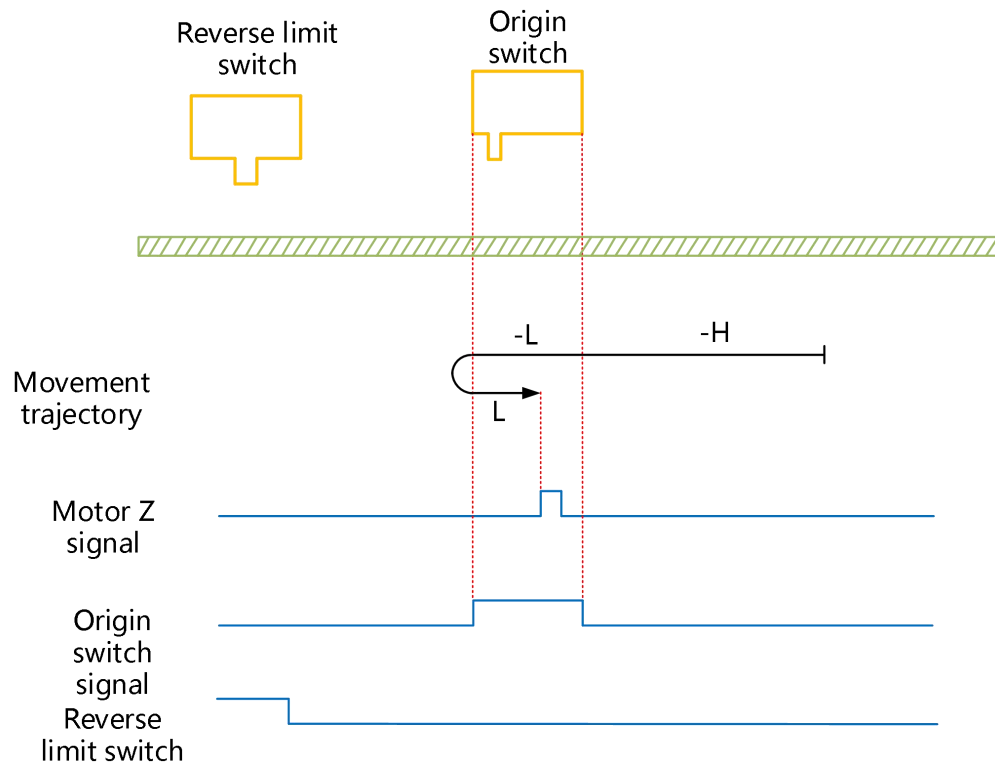
HW=1 when starting to return to zero, start to return to zero in forward direction at low speed. After encountering the falling edge of HW, change the running direction and run in reverse direction at low speed, and stop at the first Z signal after encountering the rising edge of HW;

**(13) 6098H=13**

Mechanical origin: Z signal of motor

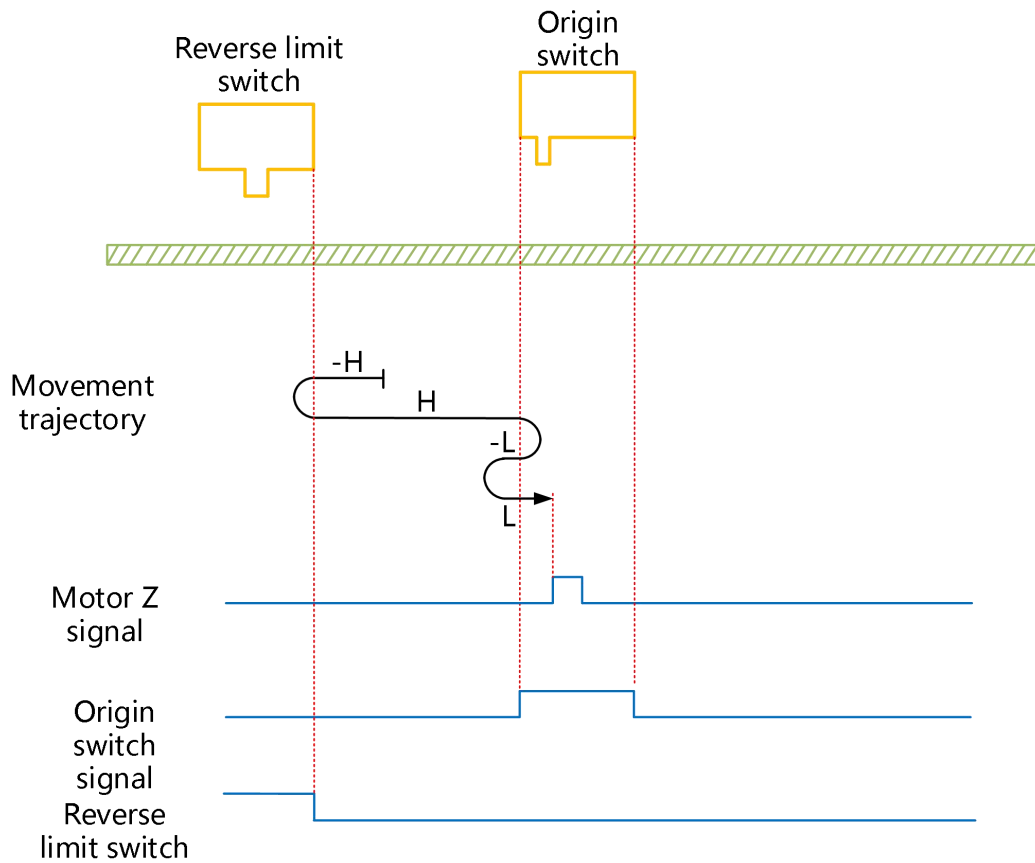
Deceleration point: Origin switch (HW)

① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered



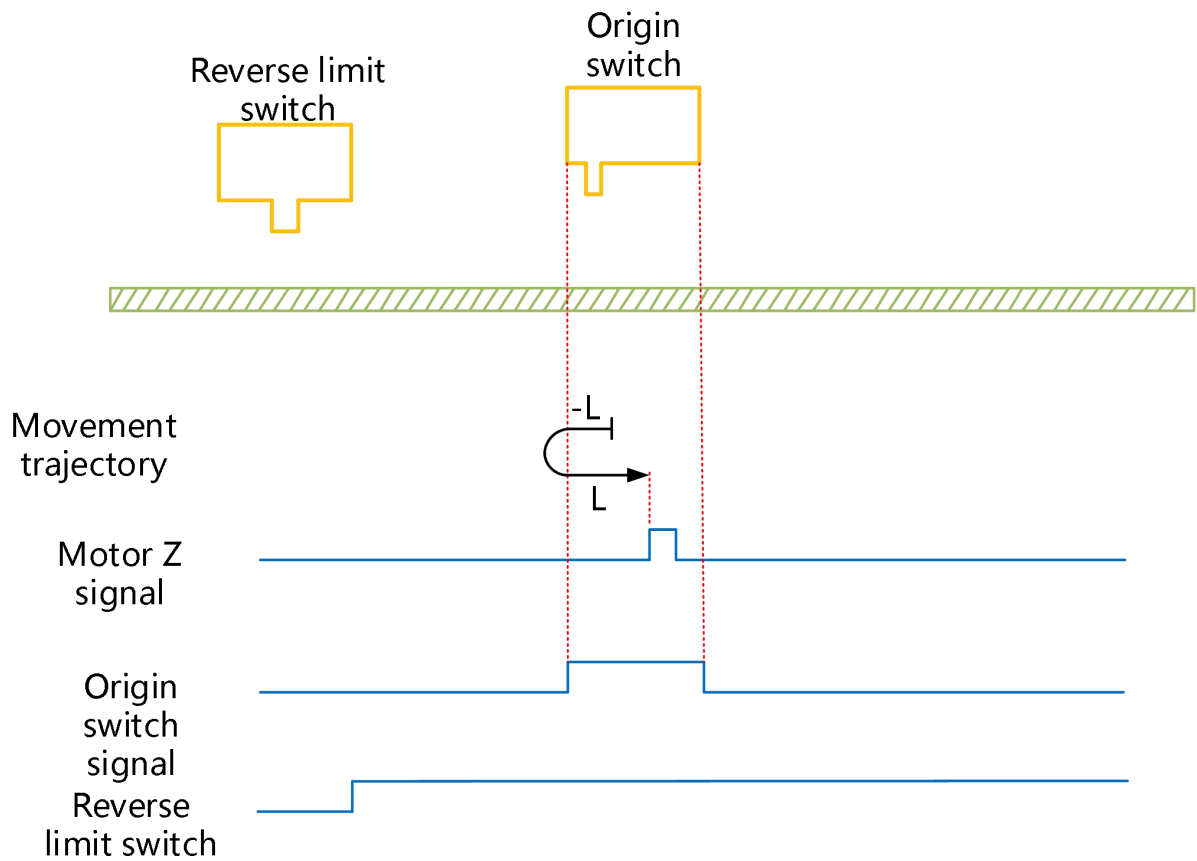
HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed. If the limit switch is not encountered, slow down and run in reverse direction at low speed after encountering the rising edge of HW. After encountering the falling edge of HW, change the running direction and run in forward direction at low speed, and stop at the first Z signal after encountering the rising edge of HW;

② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed, change the running direction automatically and run in forward direction at high speed when encountering limit switch, slow down and change the running direction after encountering HW rising edge; run in reverse direction at low speed and change the running direction after encountering HW falling edge; stop at the first Z signal after encountering HW rising edge during running in forward direction at low speed;

③ The deceleration point signal is valid when starting to return to zero



HW=1 when starting to return to zero, start to return to zero directly in reverse direction at low speed. After encountering the falling edge of HW, change the running direction; stop at the first Z signal after encountering the rising edge of HW during running in forward direction at low speed;

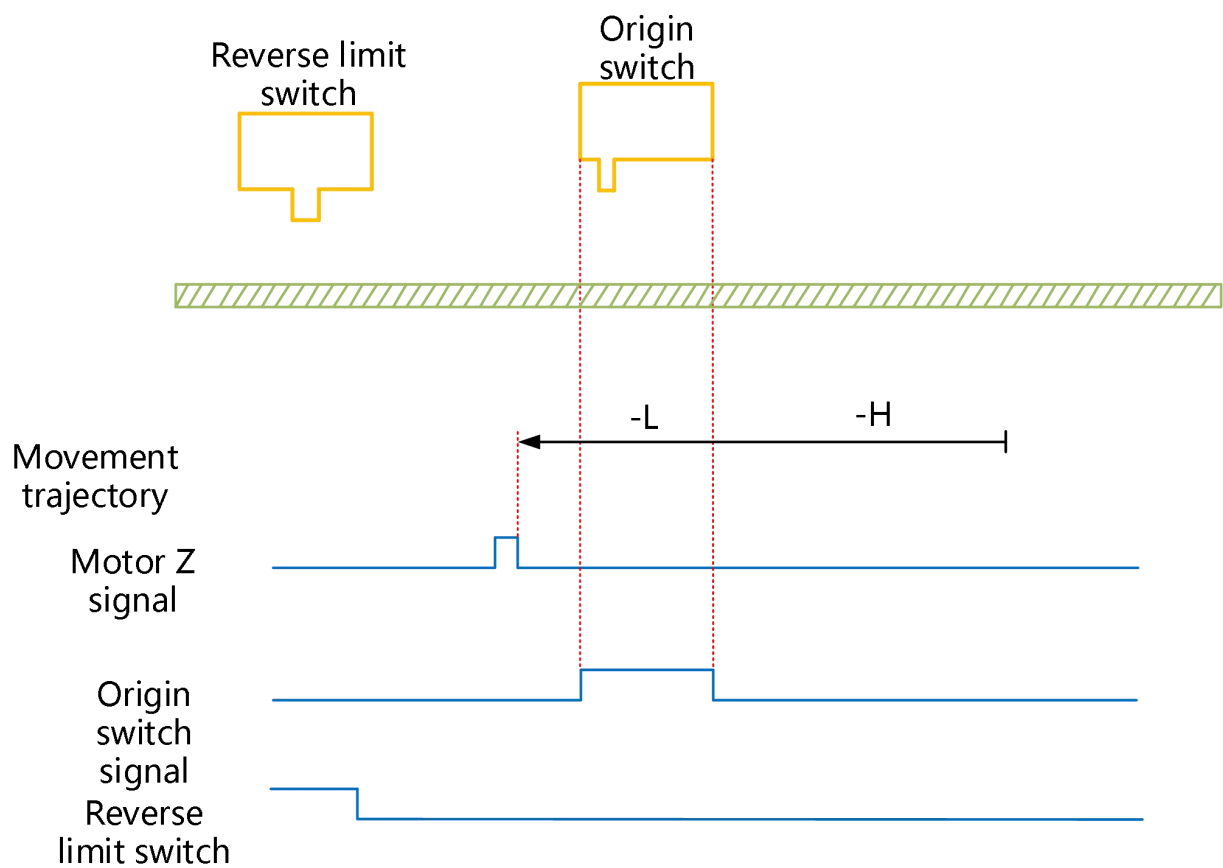
**(14) 6098H=14**

Mechanical origin: Z signal of motor

Deceleration point: Origin switch (HW)

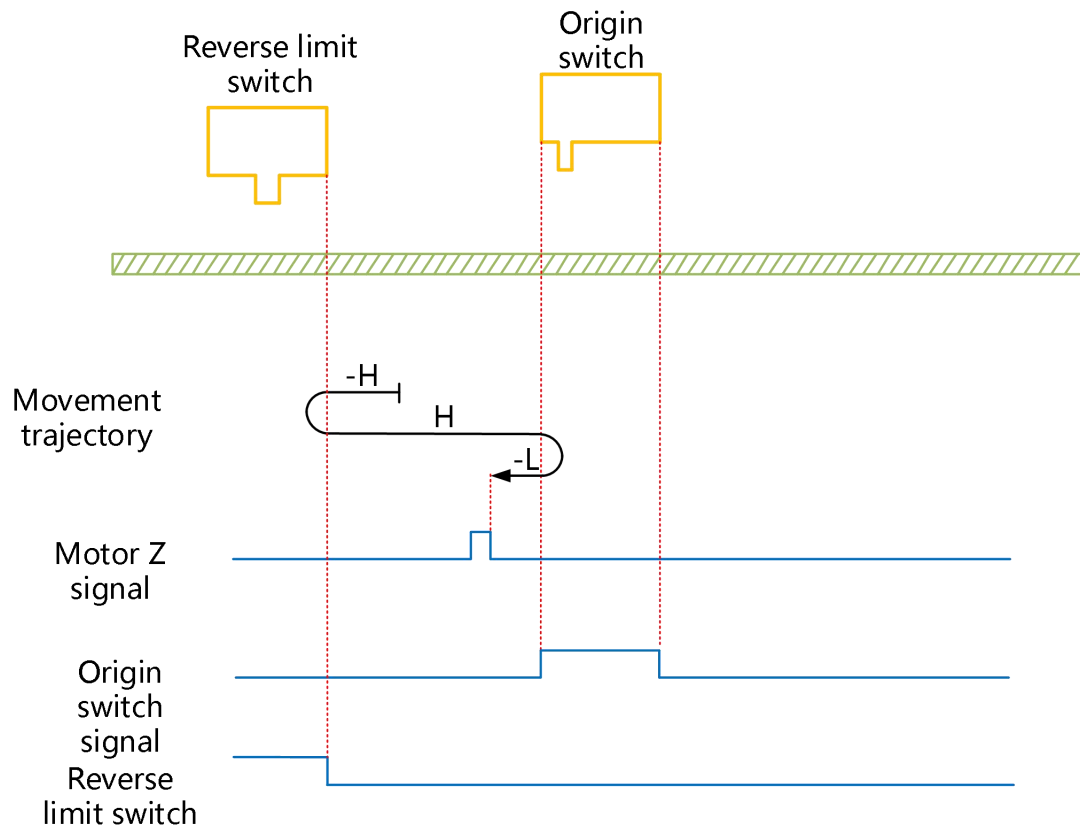
① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered





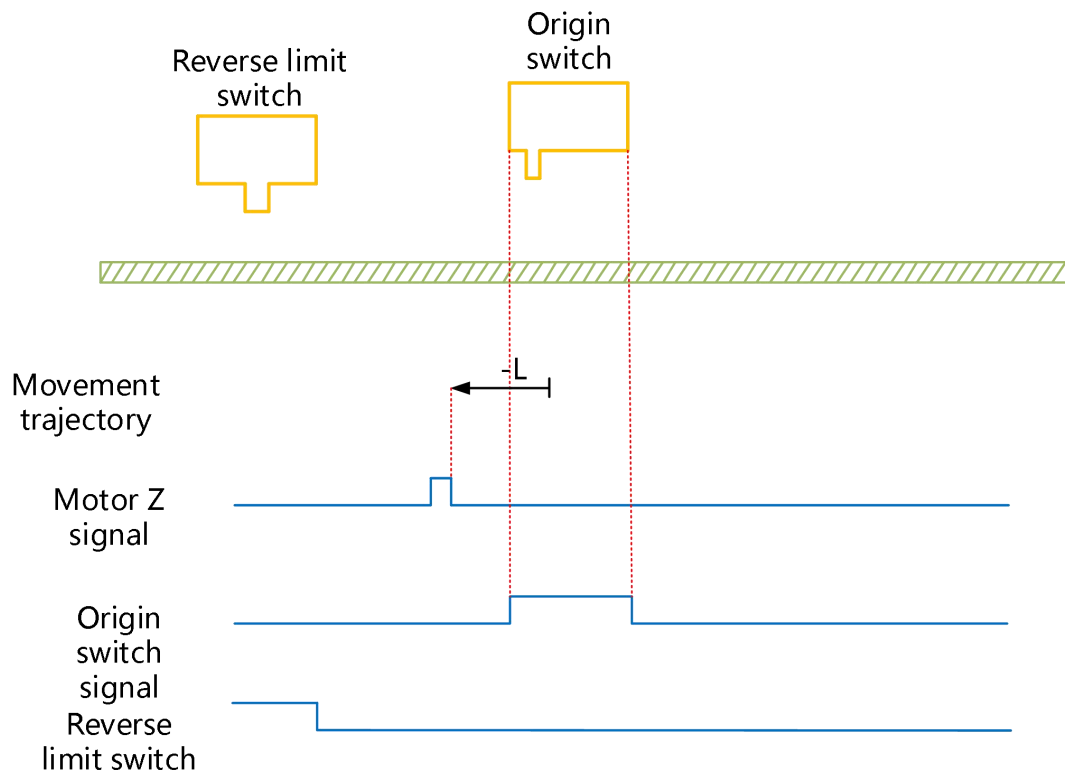
HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed; if limit switch is not encountered; slow down and run in reverse direction at low speed after encountering HW rising edge; after encountering HW falling edge, continue to run in reverse direction at low speed, and then stop at the first Z signal encountered;

② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed; change the running direction automatically and run in forward direction at high speed when encountering limit switch; slow down and change the running direction when encountering HW rising edge, and stop at the first Z signal after encountering HW falling edge during running in reverse direction at low speed;

- ③ The deceleration point signal is valid when starting to return to zero



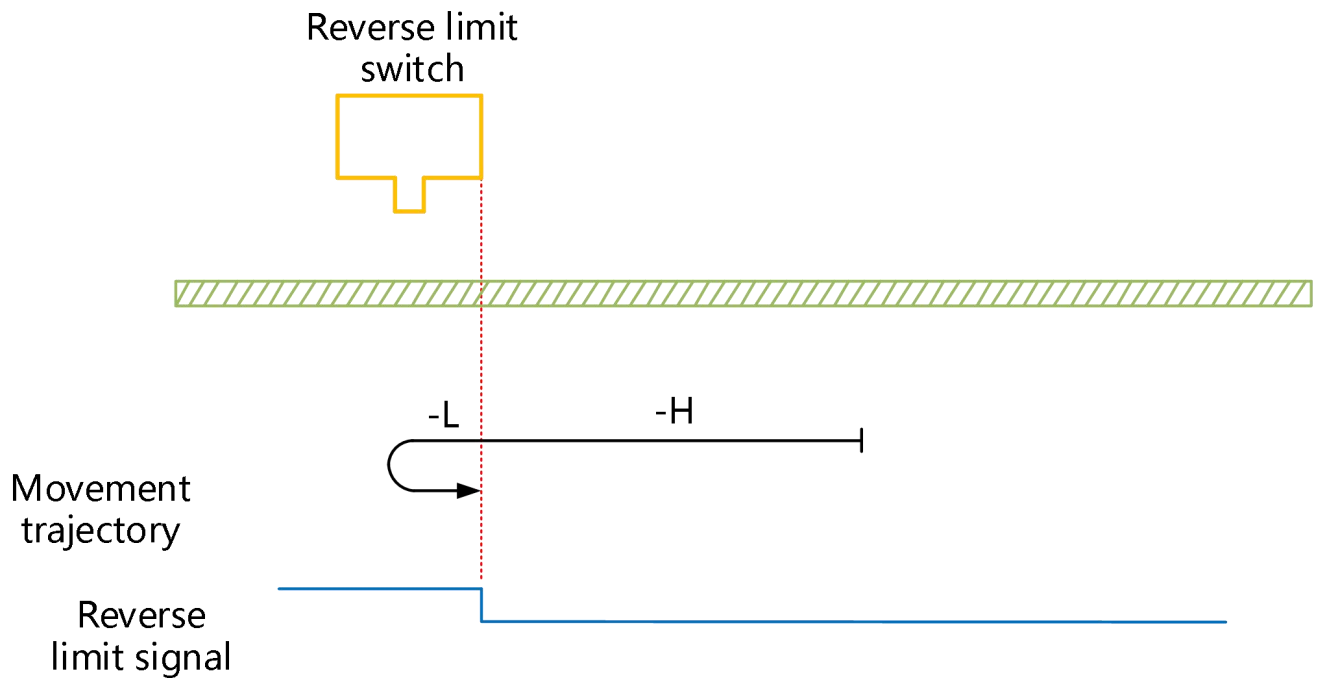
HW=1 when starting to return to zero, start to return to zero in reverse direction at low speed directly, and stop at the first Z signal after encountering the falling edge of HW;

**(15) 6098H=17**

Mechanical origin: reverse overtravel switch (NOT)

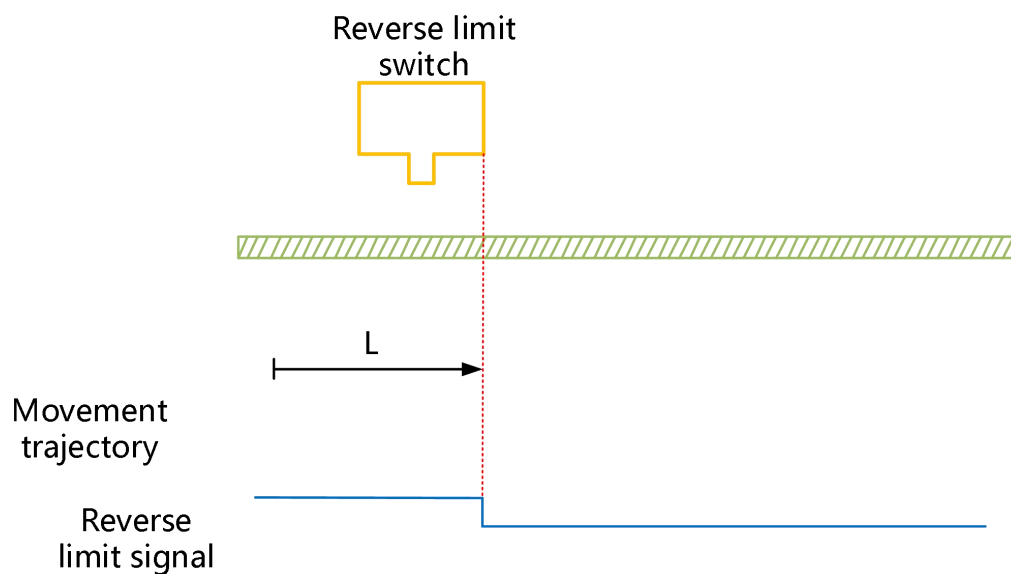
Deceleration point: Reverse overtravel switch (NOT)

- ① The deceleration point signal is invalid when starting to return to zero



NOT=0 when starting to return to zero, start to return to zero in reverse direction at high speed, slow down and change the running direction after encountering the rising edge of NOT, and run in forward direction at low speed, and stop after encountering the falling edge of NOT;

- ② The deceleration point signal is valid when starting to return to zero



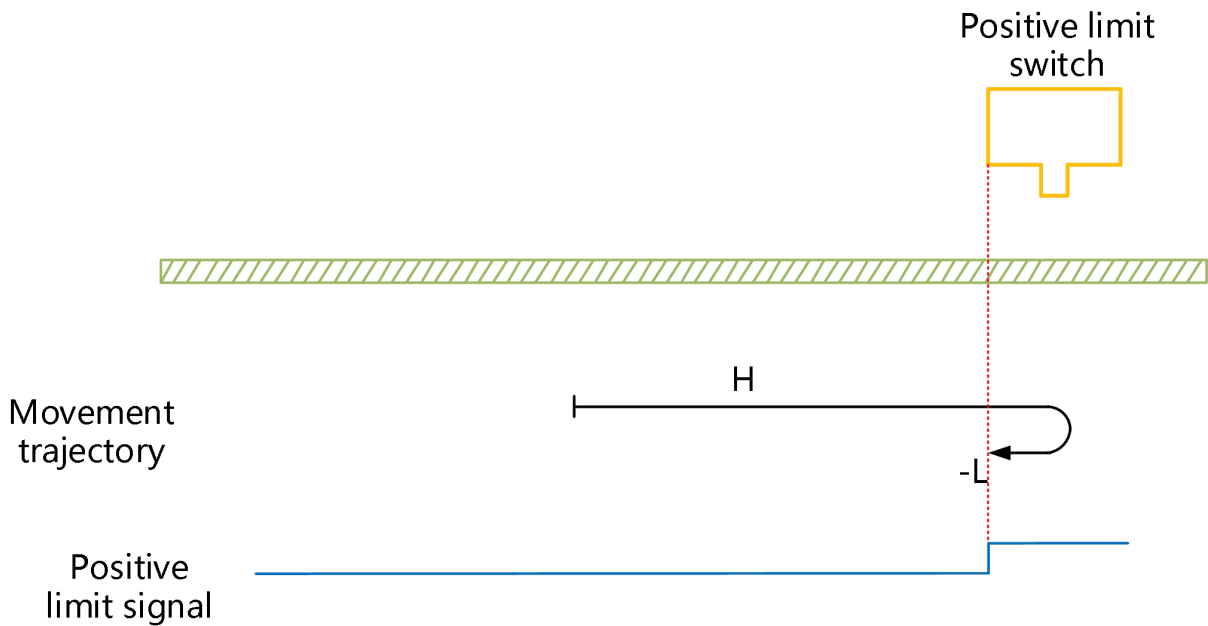
NOT = 1 when starting to return to zero, start to return to zero in forward direction at low speed directly, and stop after encountering the falling edge of NOT.

**(16) 6098H=18**

Mechanical origin: Forward overtravel switch (POT)

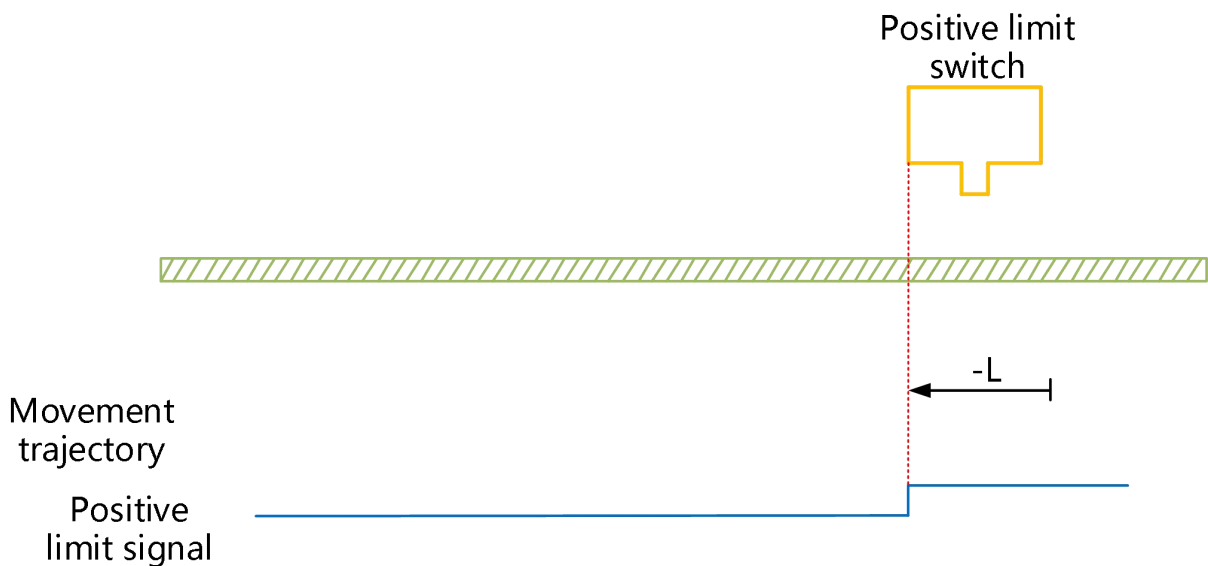
Deceleration point: Forward overtravel switch (POT)

- ① The deceleration point signal is invalid when starting to return to zero



POT=0 when starting to return to zero, start to return to zero in forward direction at high speed, slow down and change the running direction after encountering the rising edge of POT, run in reverse direction at low speed, and stop after encountering the falling edge of POT;

- ② The deceleration point signal is valid when starting to return to zero



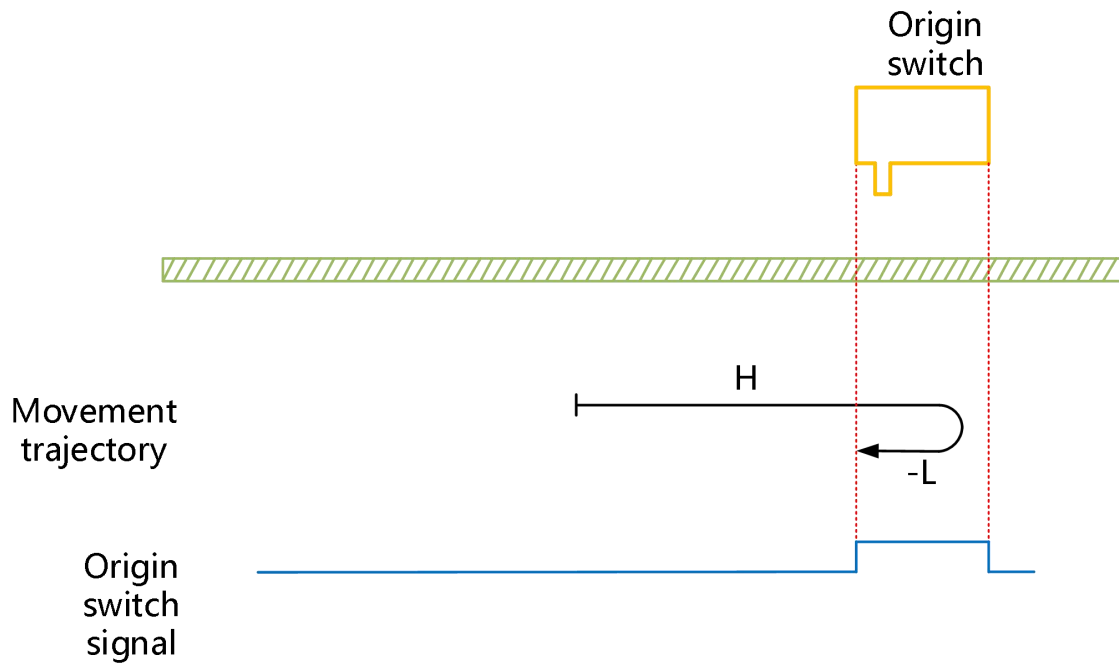
POT=1 when starting to return to zero, start to return to zero in reverse direction at low speed directly, and stop when encountering POT falling edge;

**(17) 6098H=19**

Mechanical Origin: Origin Switch (HW)

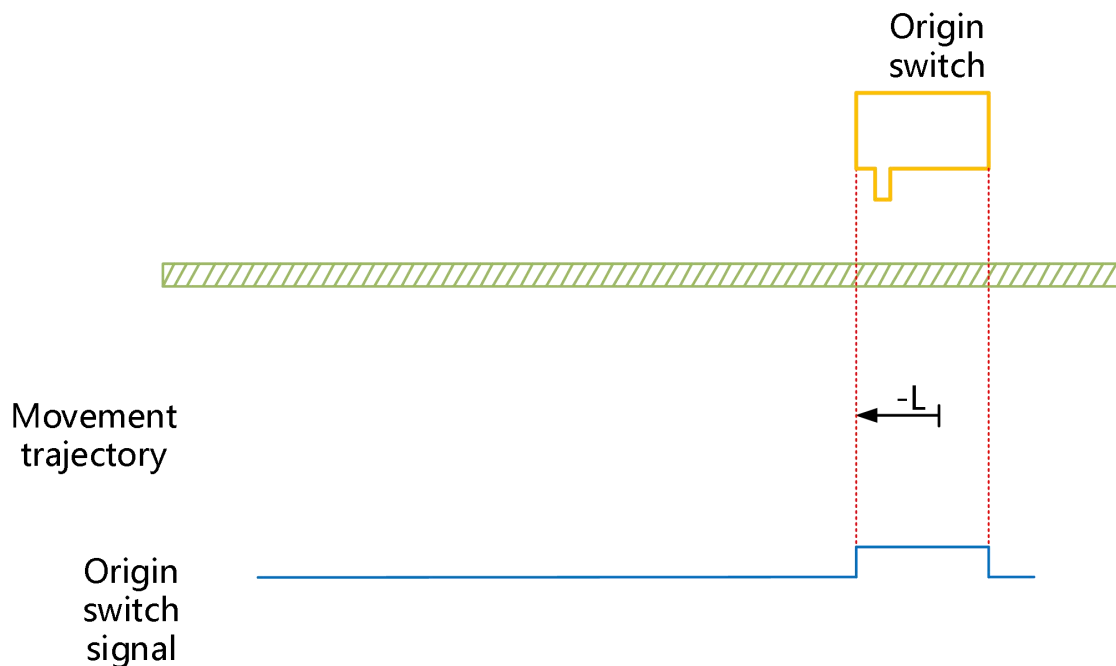
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zero in forward direction at high speed, slow down and change the running direction after encountering the rising edge of HW, and run in reverse direction at low speed, and stop when encountering the falling edge of HW;

- ② The deceleration point signal is valid when starting to return to zero



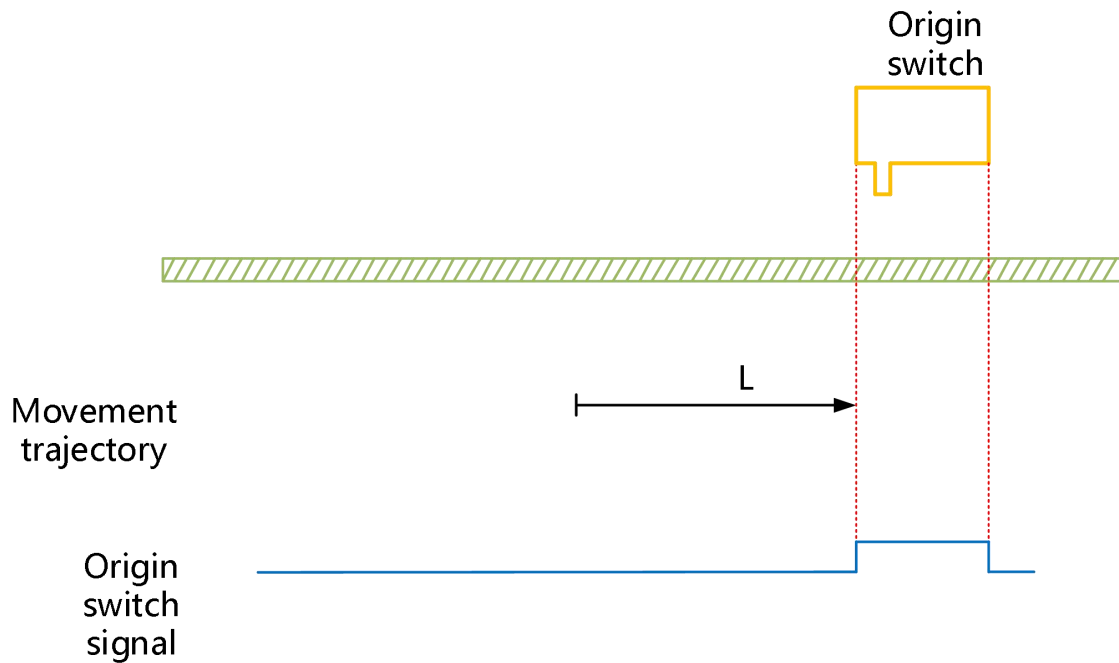
HW=1 when starting to return to zero, start to return to zero in reverse direction at low speed directly, and stop when encountering HW falling edge;

**(18) 6098H=20**

Mechanical Origin: Origin Switch (HW)

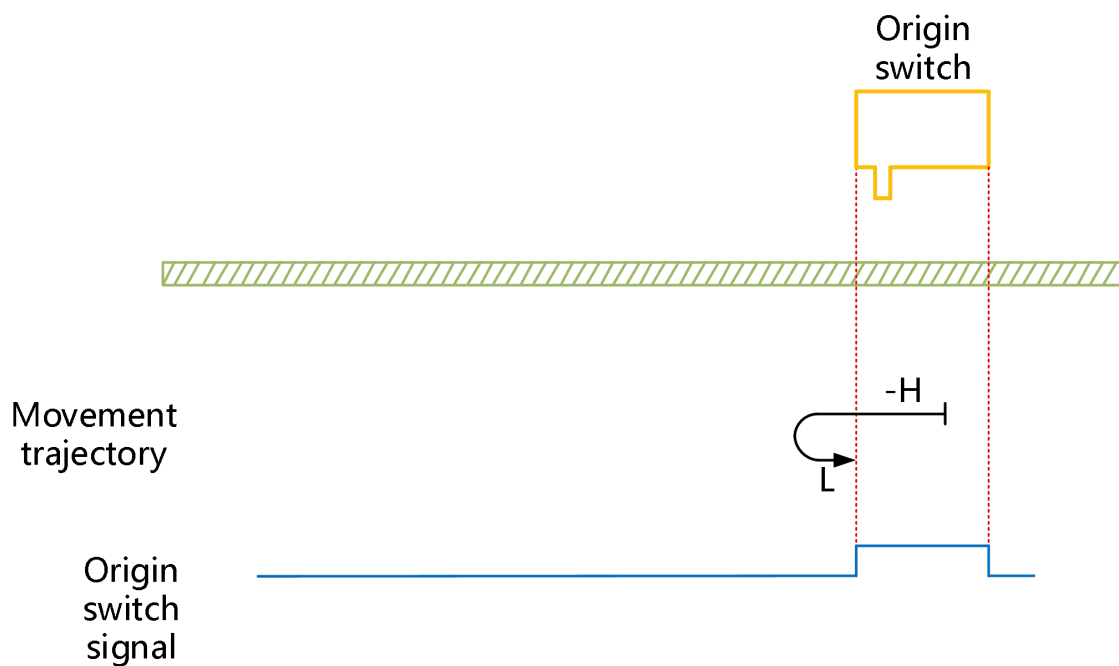
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zero in forward direction at low speed directly, and stop after encountering the rising edge of HW;

- ② The deceleration point signal is valid when starting to return to zero



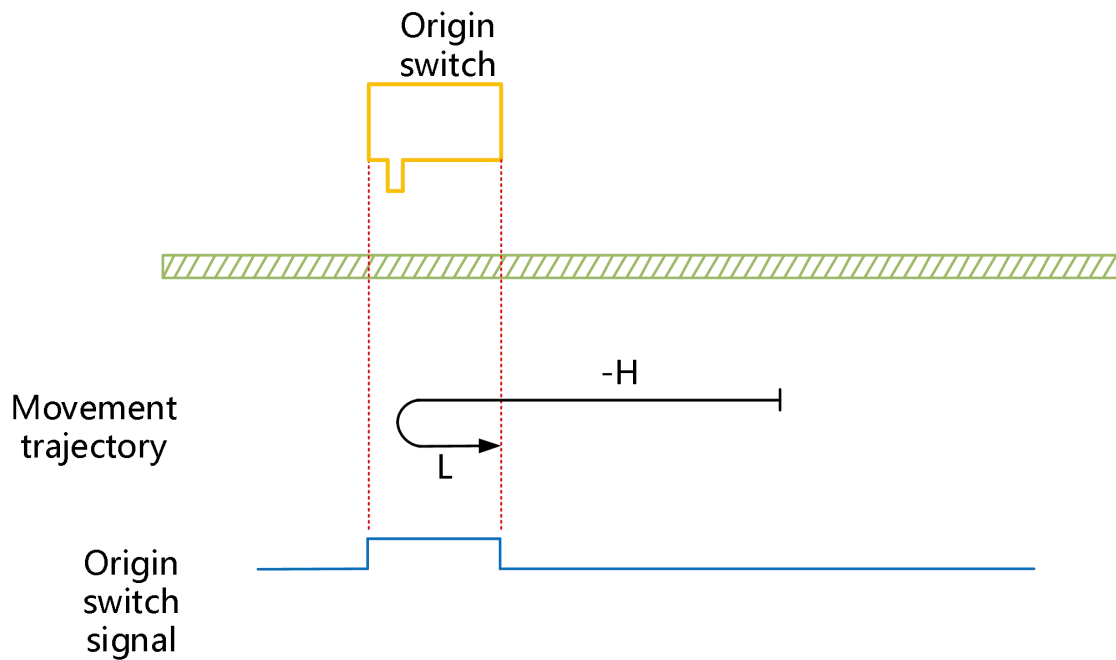
HW=1 when starting to return to zero, start to return to zero in reverse direction at high speed, slow down and change the running direction after encountering HW falling edge, run in forward direction at low speed, and stop when encountering HW rising edge;

**(19) 6098H=21**

Mechanical Origin: Origin Switch (HW)

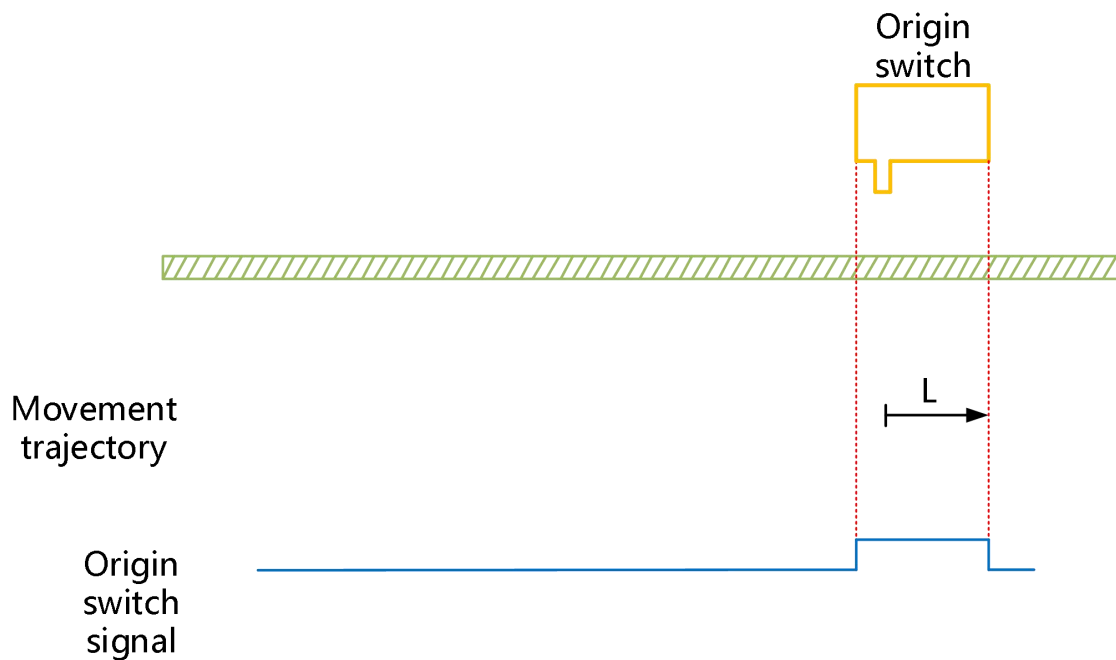
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed, slow down and change the running direction after encountering the rising edge of HW, run in forward direction at low speed, and stop when encountering the falling edge of HW;

- ② The deceleration point signal is valid when starting to return to zero



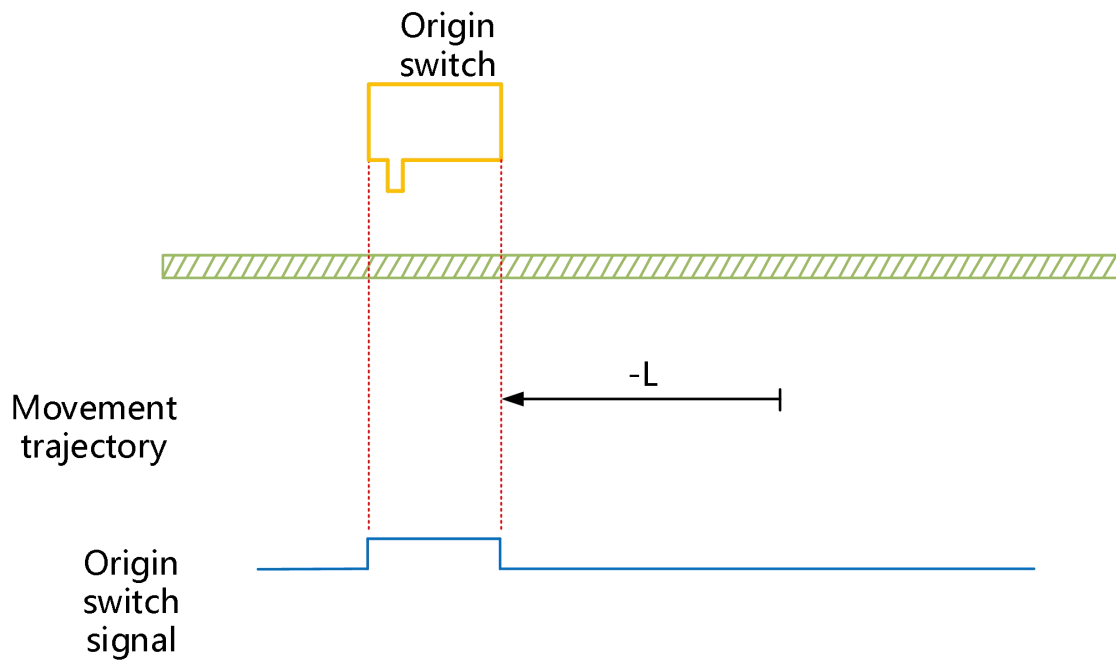
HW=1 when starting to return to zero, start to return to zero in forward direction at low speed directly, and stop after encountering the falling edge of HW;

**(20)6098H=22**

Mechanical Origin: Origin Switch (HW)

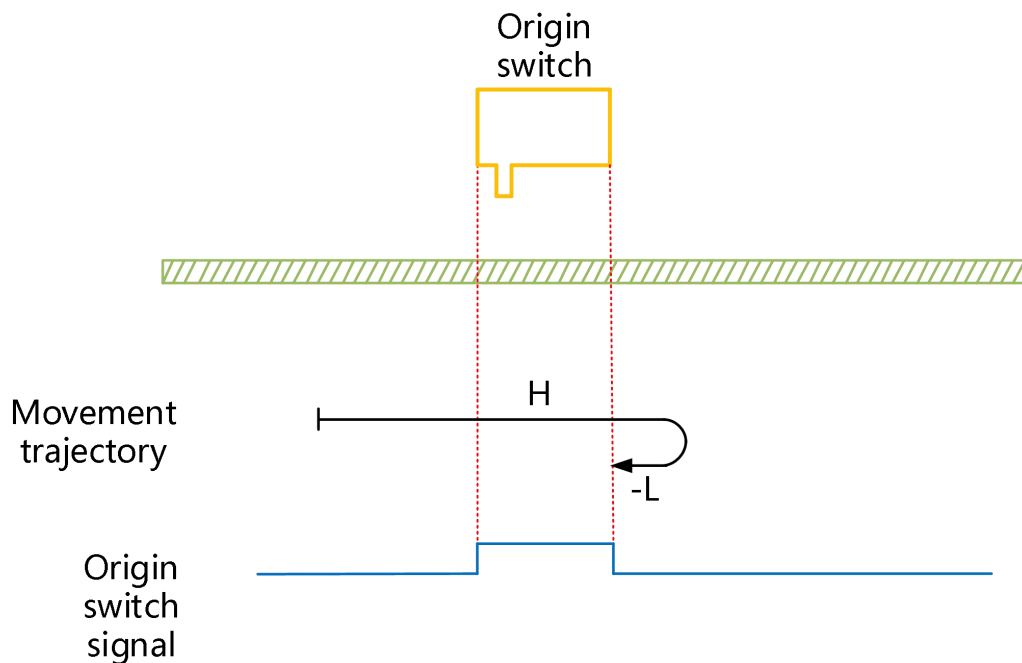
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero



HW=0 when starting to return to zero, start to return to zone in reverse direction at low speed directly and stop when encountering HW rising edge;

- ② The deceleration point signal is valid when starting to return to zero



HW=1 when starting to return to zero, start to return to zero in forward direction at high speed, slow down and change the running direction after encountering HW falling edge, run in reverse direction at low speed, and stop when encountering HW rising edge;

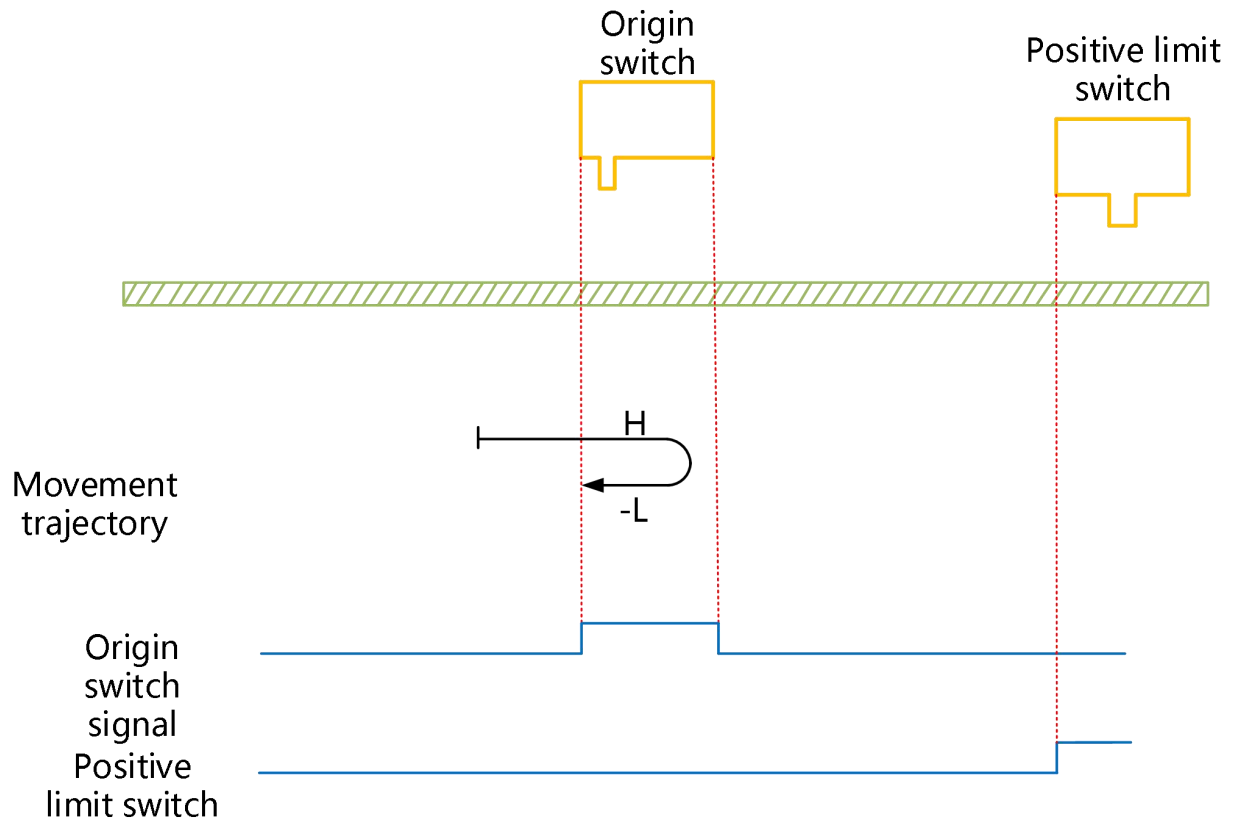


**(21)6098H=23**

Mechanical Origin: Origin Switch (HW)

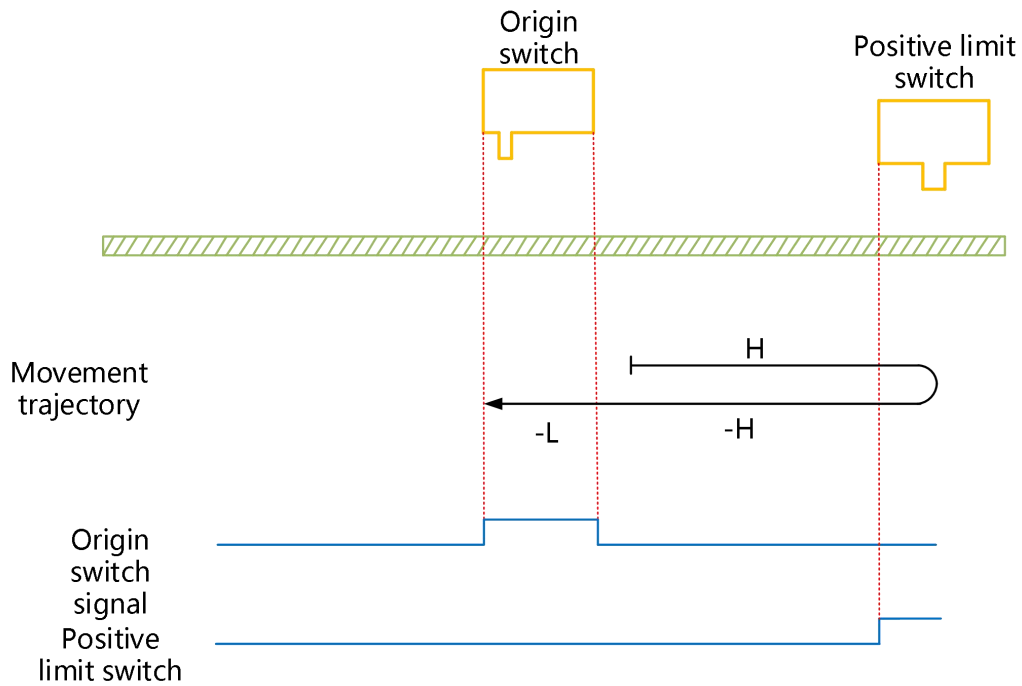
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



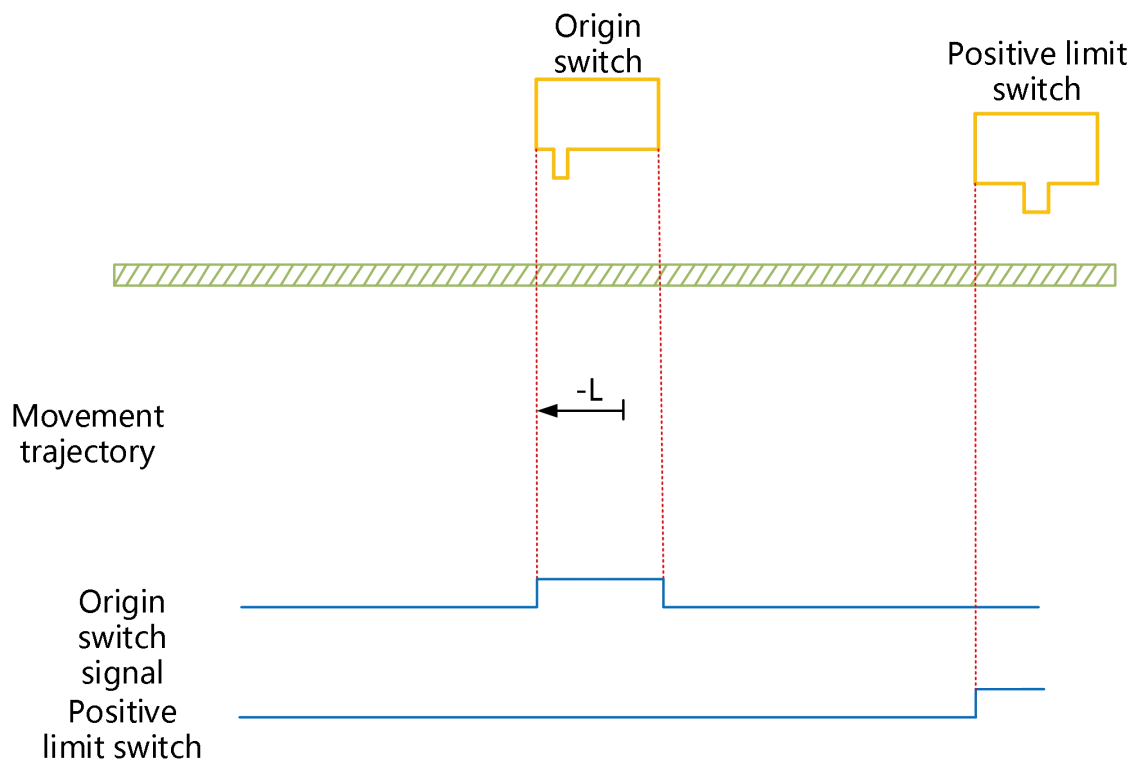
HW=0 when starting to return to zero, start to return to zero in forward direction at high speed; limit switch is not encountered; slow down and change the running direction after encountering HW rising edge; run in reverse direction at low speed and stop when encountering HW falling edge;

- ② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in forward direction at high speed, change the running direction automatically when encountering limit switch, run in reverse direction at high speed and slow down when encountering HW rising edge, continue to run in reverse direction at low speed, and stop when encountering HW falling edge;

- ③ The deceleration point signal is valid when starting to return to zero



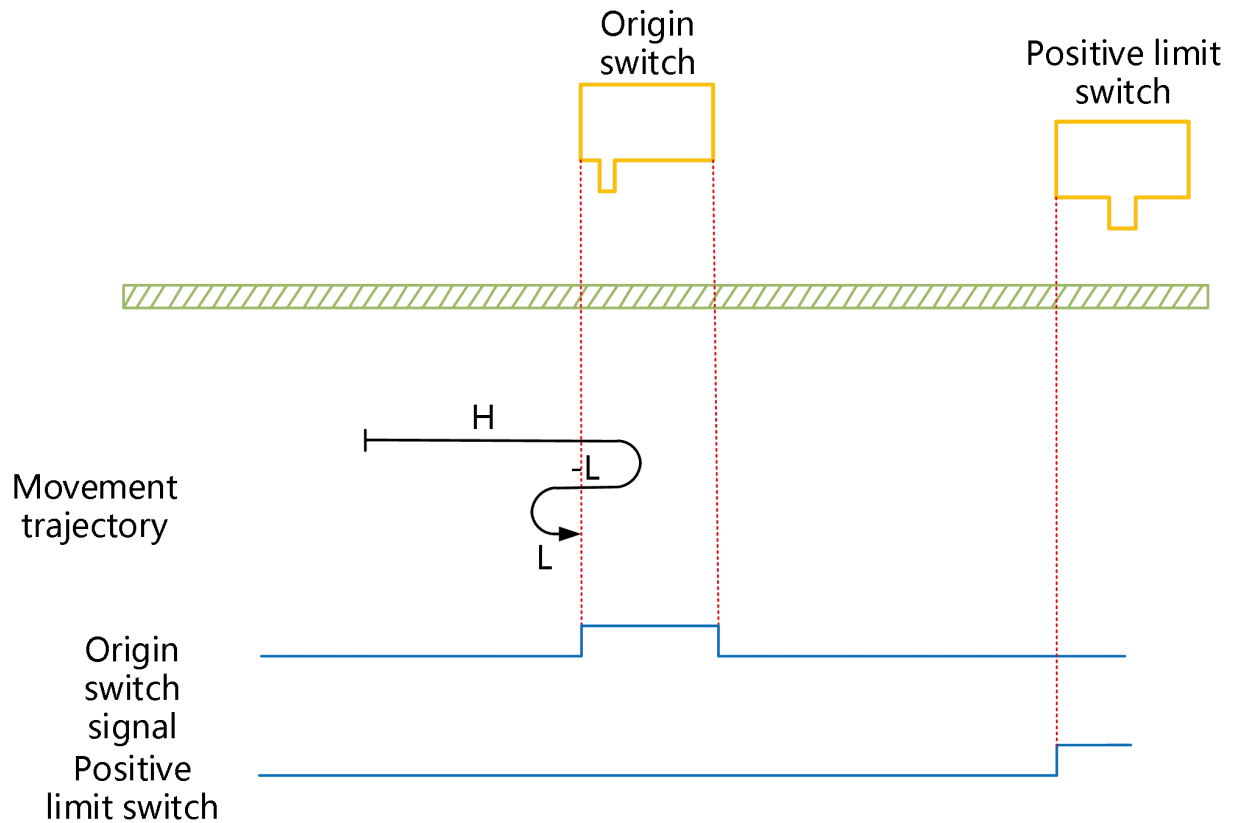
HW=0 when starting to return to zero, start to return to zero in forward direction at high speed, change the running direction automatically when encountering limit switch, run in reverse direction at high speed and slow down when encountering HW rising edge, continue to run in reverse direction at low speed, and stop when encountering HW falling edge;

**(22)6098H=24**

Mechanical Origin: Origin Switch (HW)

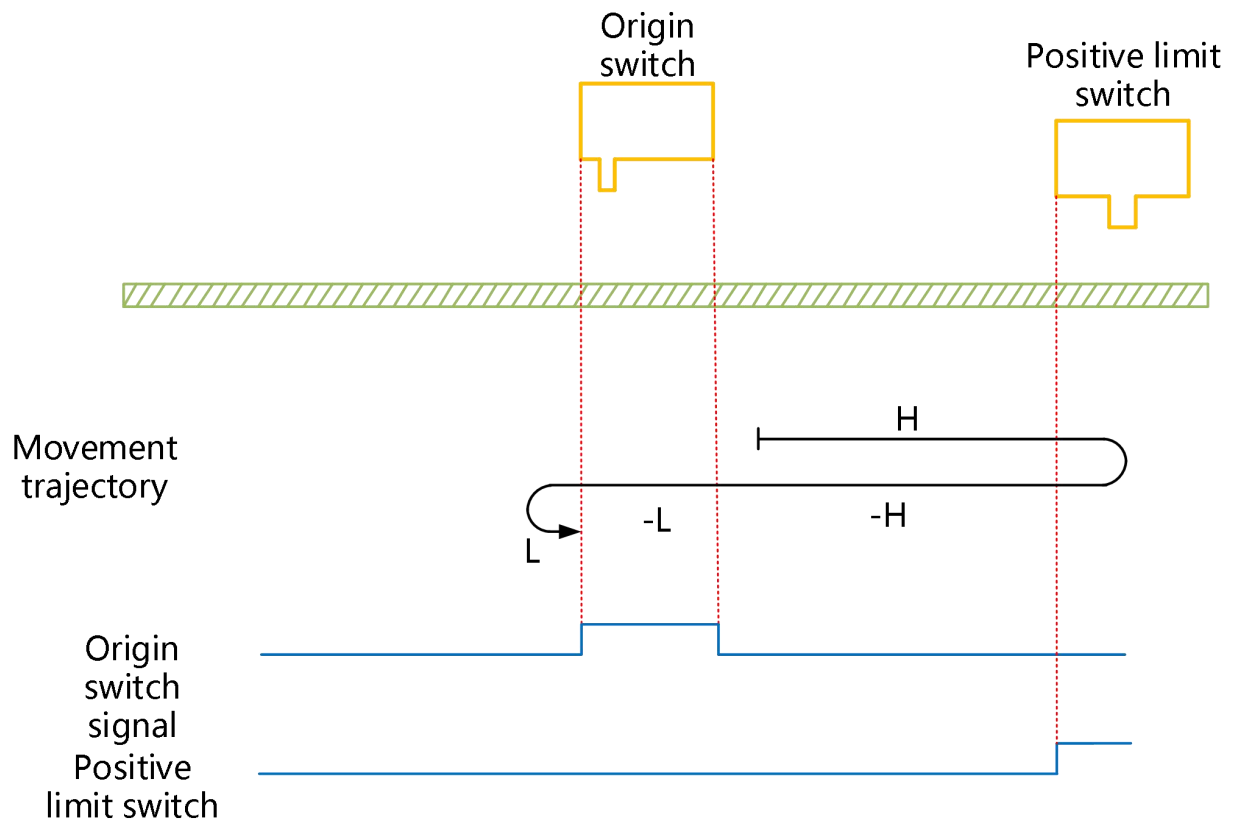
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



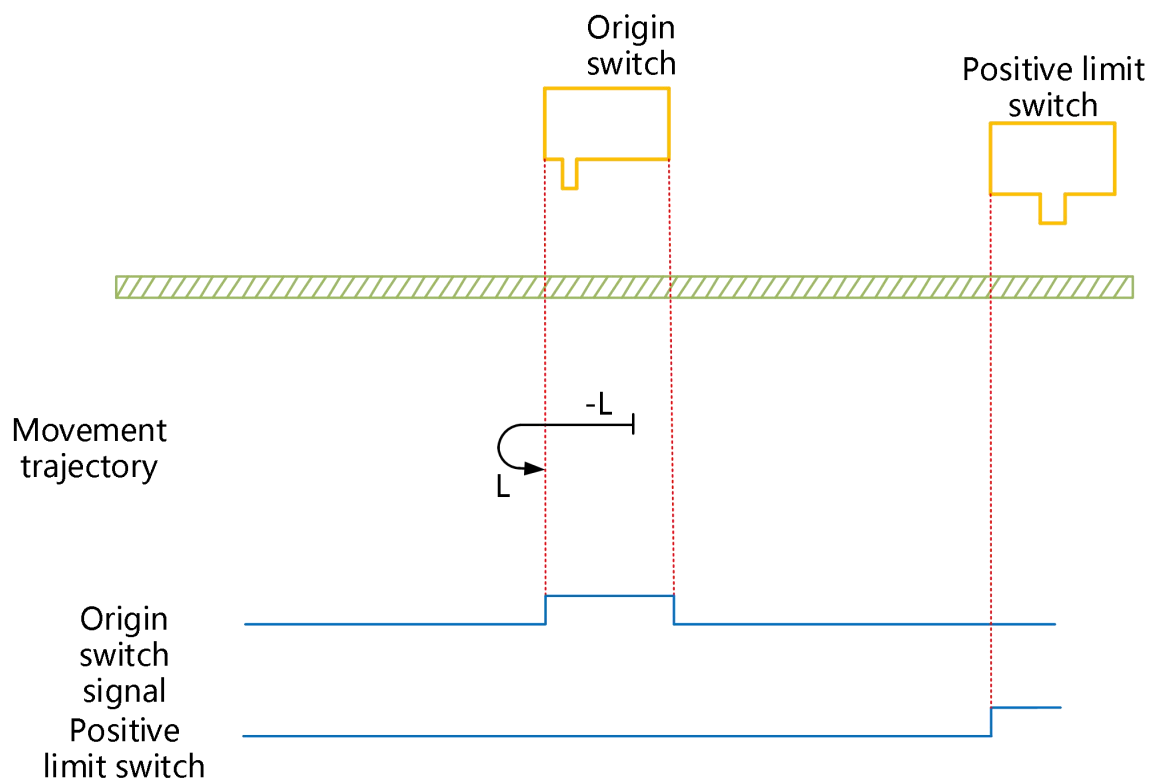
HW=0 when starting to return to zero, start to return to zero in forward direction at high speed; limit switch is not encountered; slow down and change the running direction after encountering HW rising edge, then run in reverse direction at low speed, and change the running direction when encountering HW falling edge, run in forward direction at low speed and stop when encountering HW rising edge;

- ② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in forward direction at high speed; change the running direction automatically when encountering limit switch, run in reverse direction at high speed and slow down and run in reverse direction at low speed when encountering HW rising edge; change the running direction and run in forward direction at low speed when encountering HW falling edge, and stop when encountering HW rising edge;

- ③ The deceleration point signal is valid when starting to return to zero



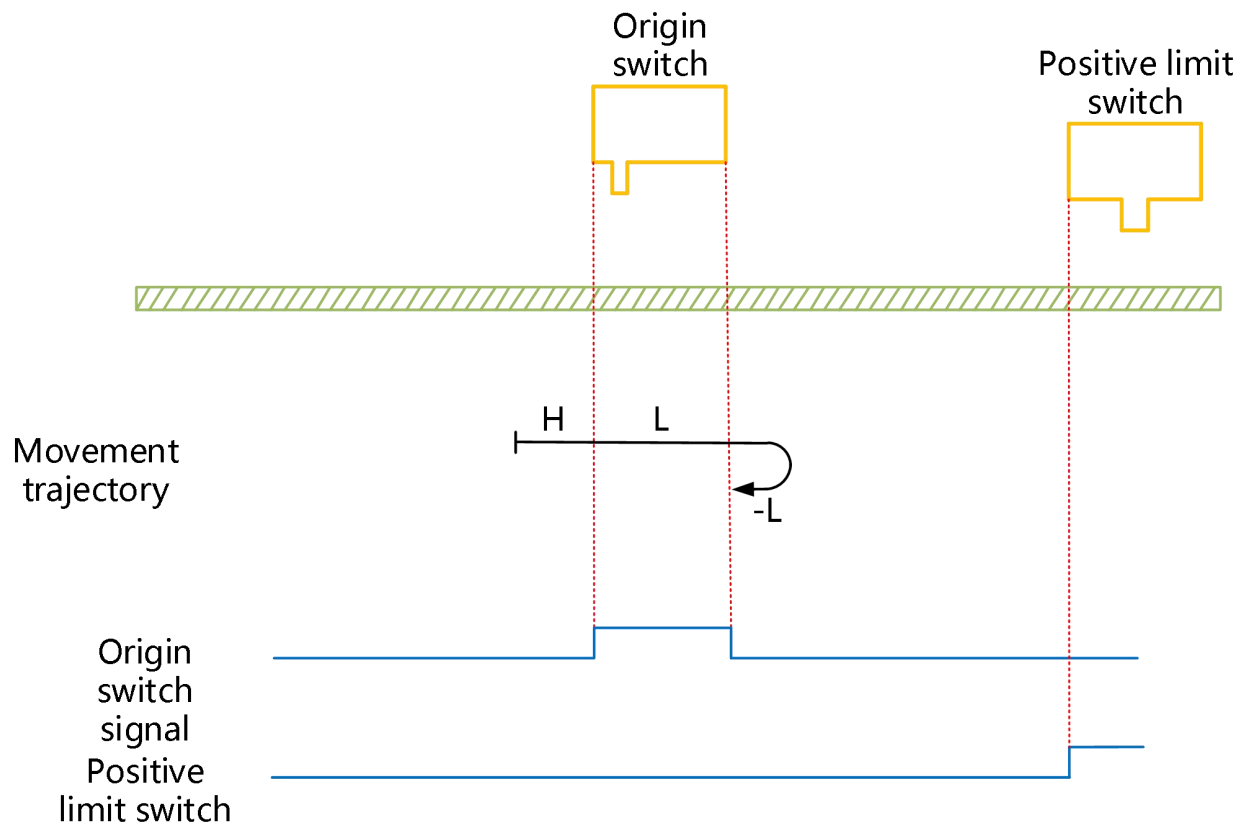
HW=1 when starting to return to zero, start to return to zero in reverse direction at low speed directly; after encountering the falling edge of HW, change the running direction and run in forward direction at low speed, and stop when encountering the rising edge of HW;

#### **(23)6098H=25**

Mechanical Origin: Origin Switch (HW)

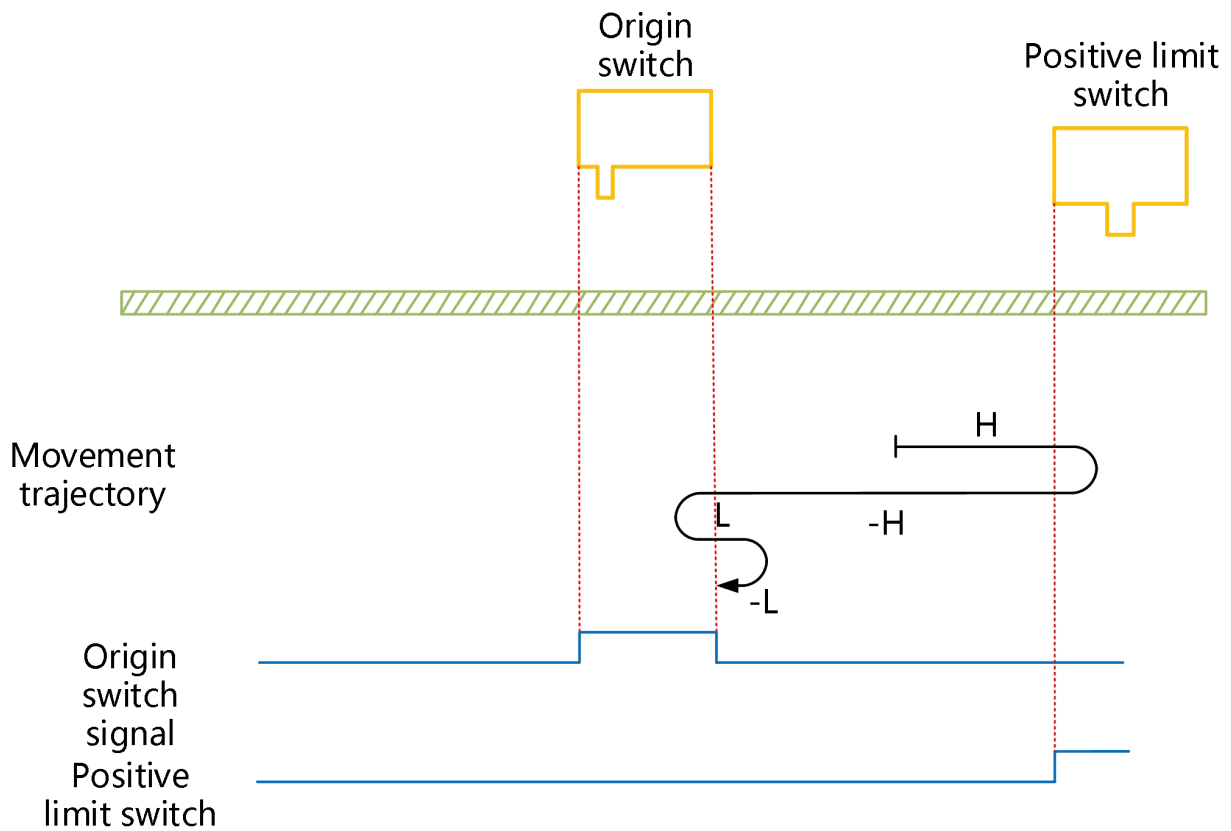
Deceleration point: Origin switch (HW)

① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



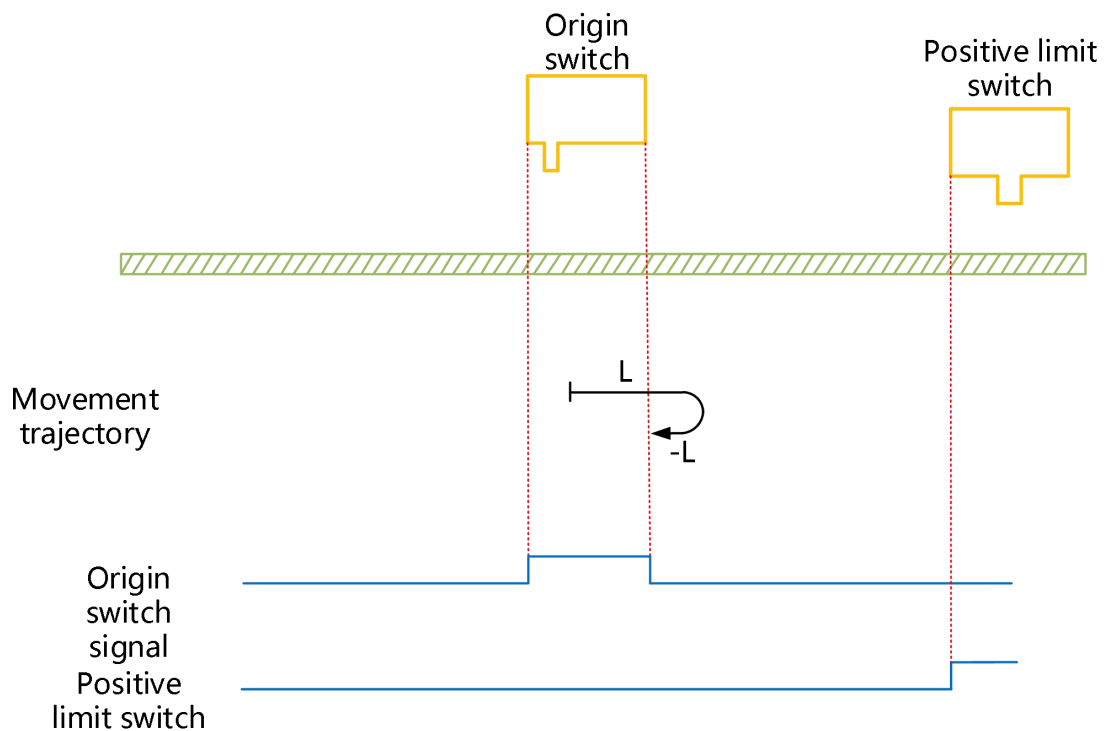
HW=0 when starting to return to zero, start to return to zero in forward direction at high speed; limit switch is not encountered; slow down after encountering HW rising edge, run in forward direction at low speed, change the running direction and run in reverse direction at low speed after encountering HW falling edge, and stop when encountering HW rising edge;

② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in forward direction at high speed, change the running direction automatically and run in reverse direction at high speed when encountering limit switch; slow down and change the running direction after encountering HW rising edge to resume forward operation; run in forward direction at low speed and change the running direction after encountering HW falling edge; run in reverse direction at low speed and stop when encountering HW rising edge;

③ The deceleration point signal is valid when starting to return to zero



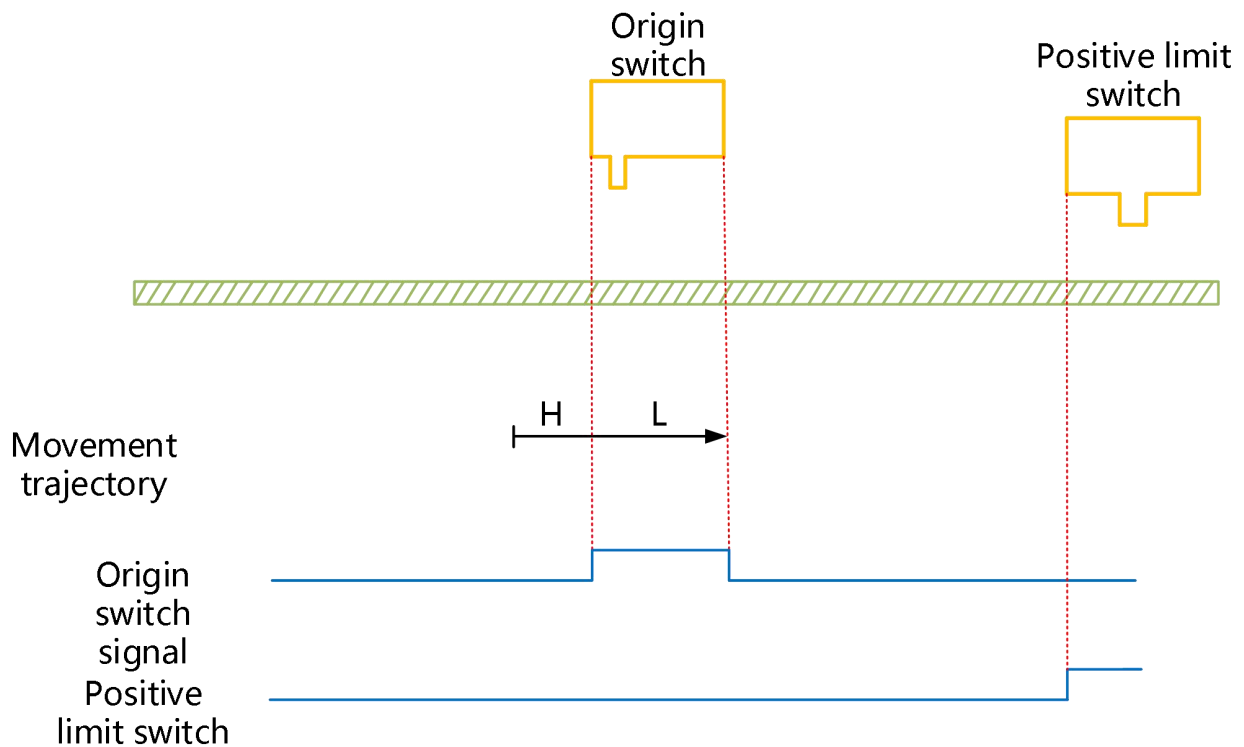
HW=1 when starting to return to zero, when, start to return to zero in the forward direction at low speed directly. After encountering the falling edge of HW, change the running direction and run in verse direction at low speed and stop when encountering the rising edge of HW.

**(24) 6098H=26**

Mechanical Origin: Origin Switch (HW)

Deceleration point: Origin switch (HW)

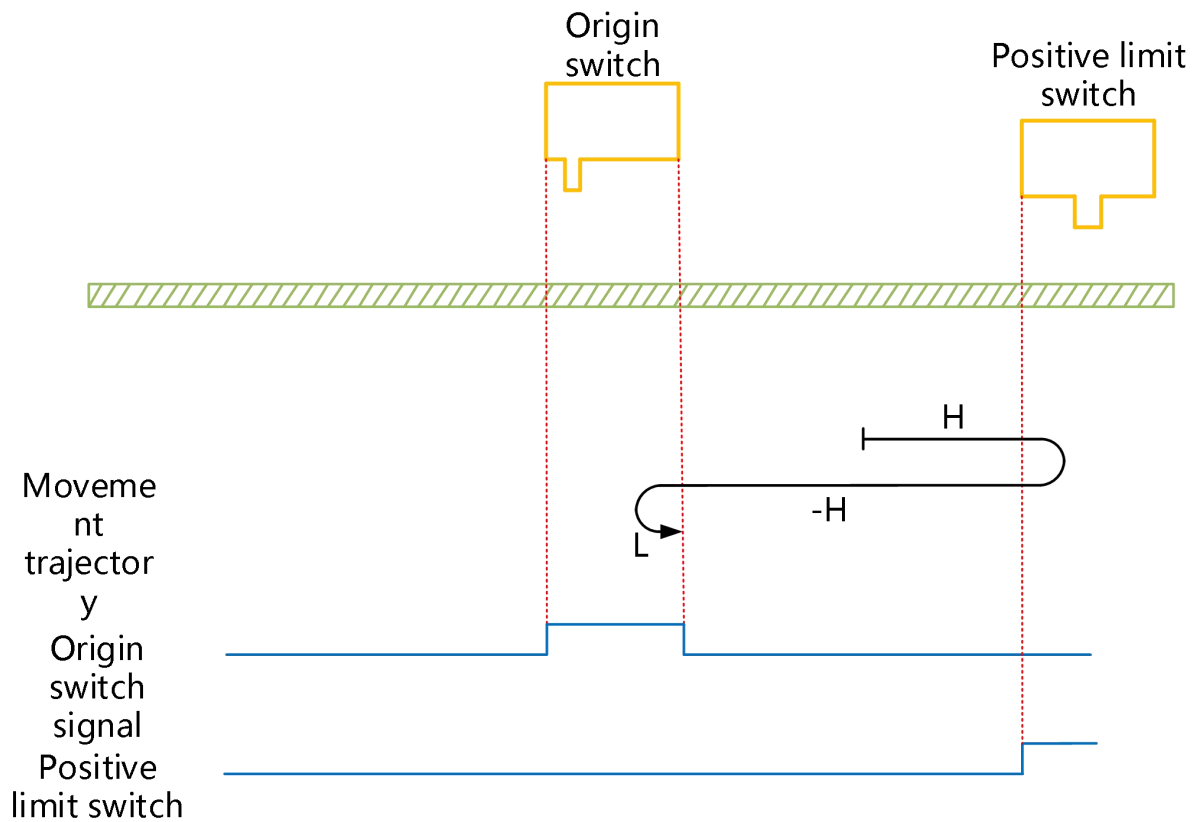
- ① The deceleration point signal is invalid when starting to return to zero, the forward limit switch is not encountered



HW=0 wWhen starting to return to zero, start to return to zero in forward direction at high speed; limit switch is not encountered; slow down after encountering HW rising edge, run in forward direction at low speed, and stop when encountering HW falling edge;

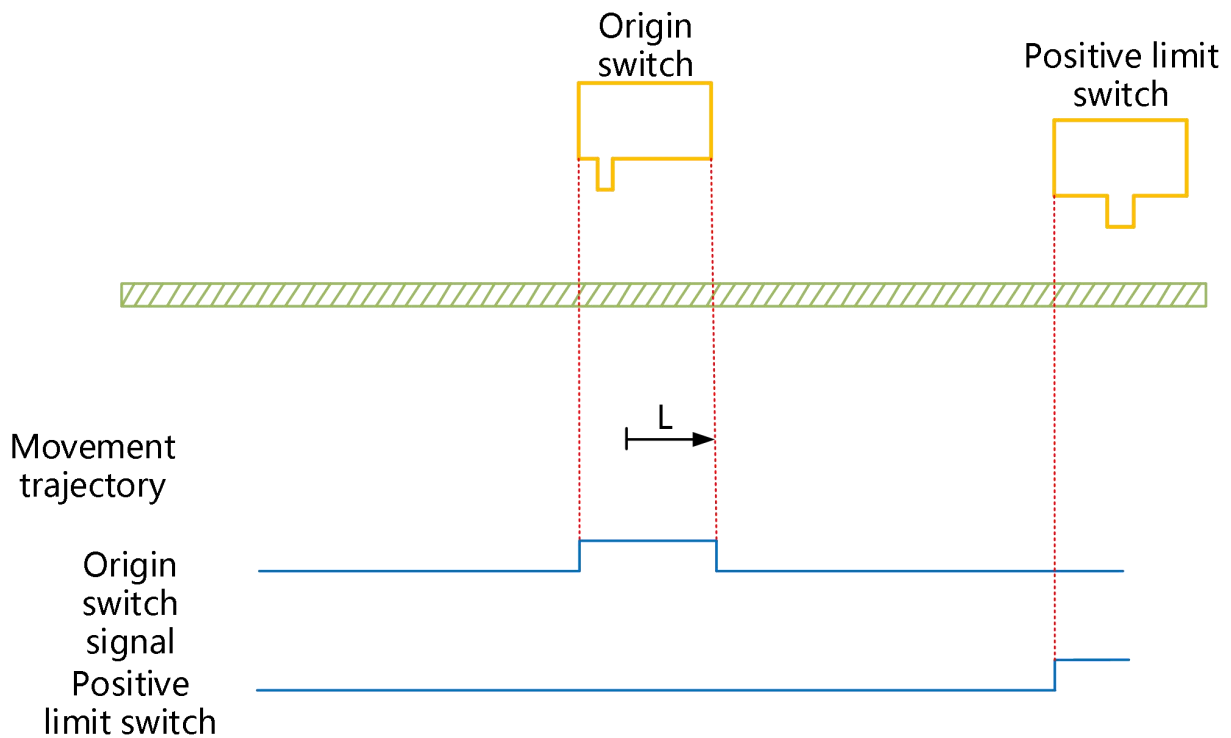
- ② The deceleration point signal is invalid when starting to return to zero, the forward limit switch is encountered





HW=0 when starting to return to zero, start to return to zero in forward direction at high speed, change the running direction automatically and run in reverse direction at high speed when encountering limit switch; slow down and change the running direction when encountering HW rising edge to resume forward operation, run in forward direction at low speed and stop when encountering HW falling edge;

③ The deceleration point signal is valid when starting to return to zero



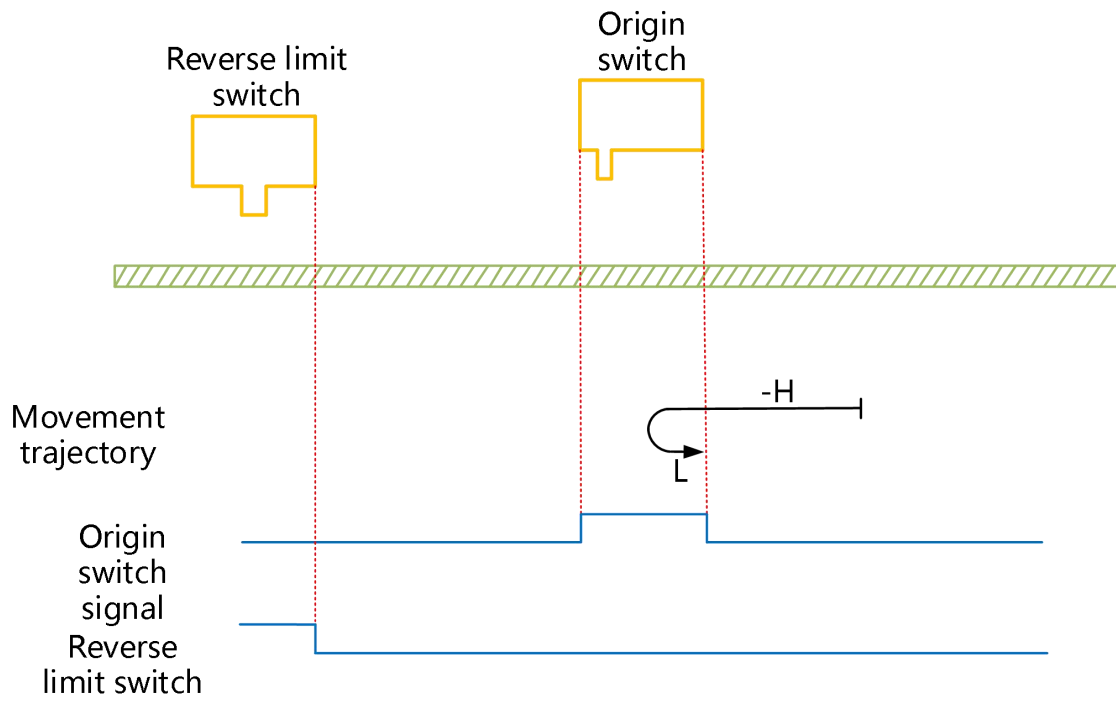
HW=1 when starting to return to zero, start to return to zero in forward direction at low speed directly, and stop when encountering HW falling edge;

**(25) 6098H=27**

Mechanical Origin: Origin Switch (HW)

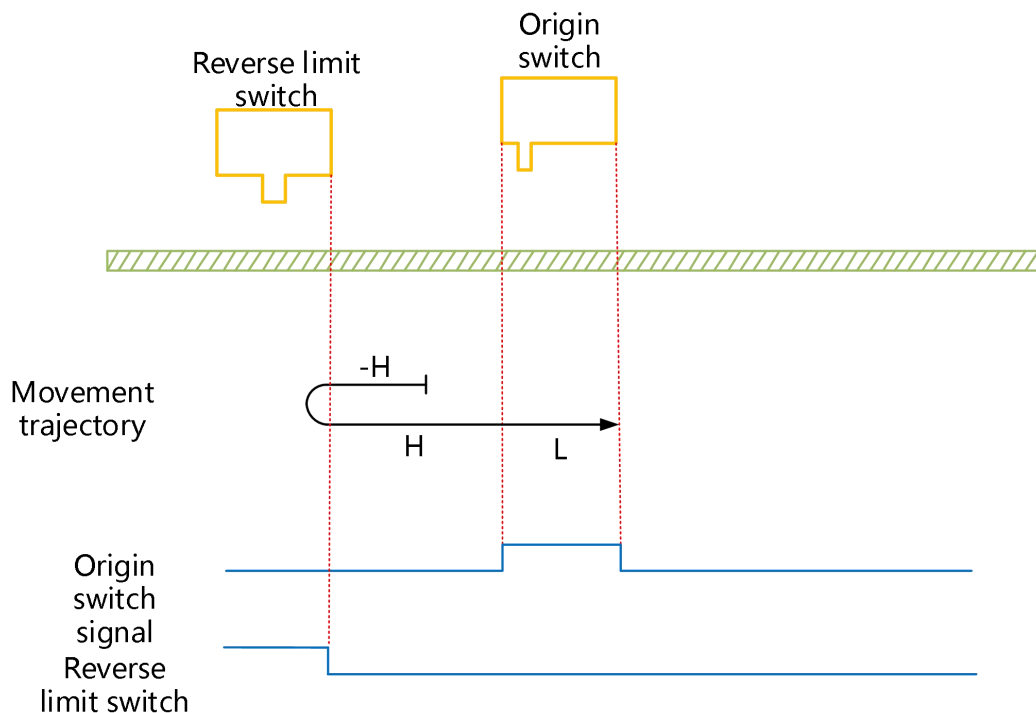
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered



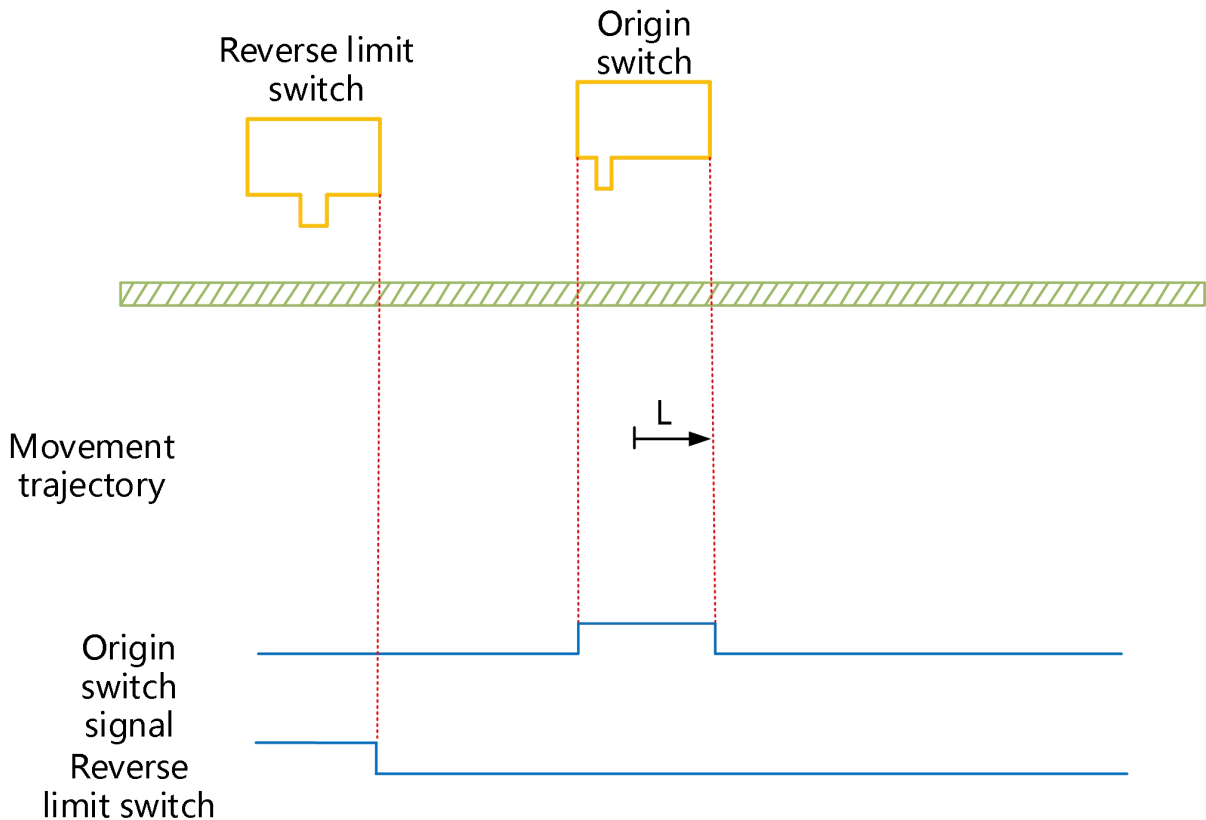
HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed; limit switch is not encountered; slow down and change the running direction after encountering rising edge of HW, run in forward direction at low speed and stop when encountering HW falling edge;

- ② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed, change the running direction automatically when encountering limit switch and run in forward direction at high speed; slow down when encountering HW rising edge, continue to run in forward direction at low speed and stop when encountering HW falling edge;

- ③ The deceleration point signal is valid when starting to return to zero



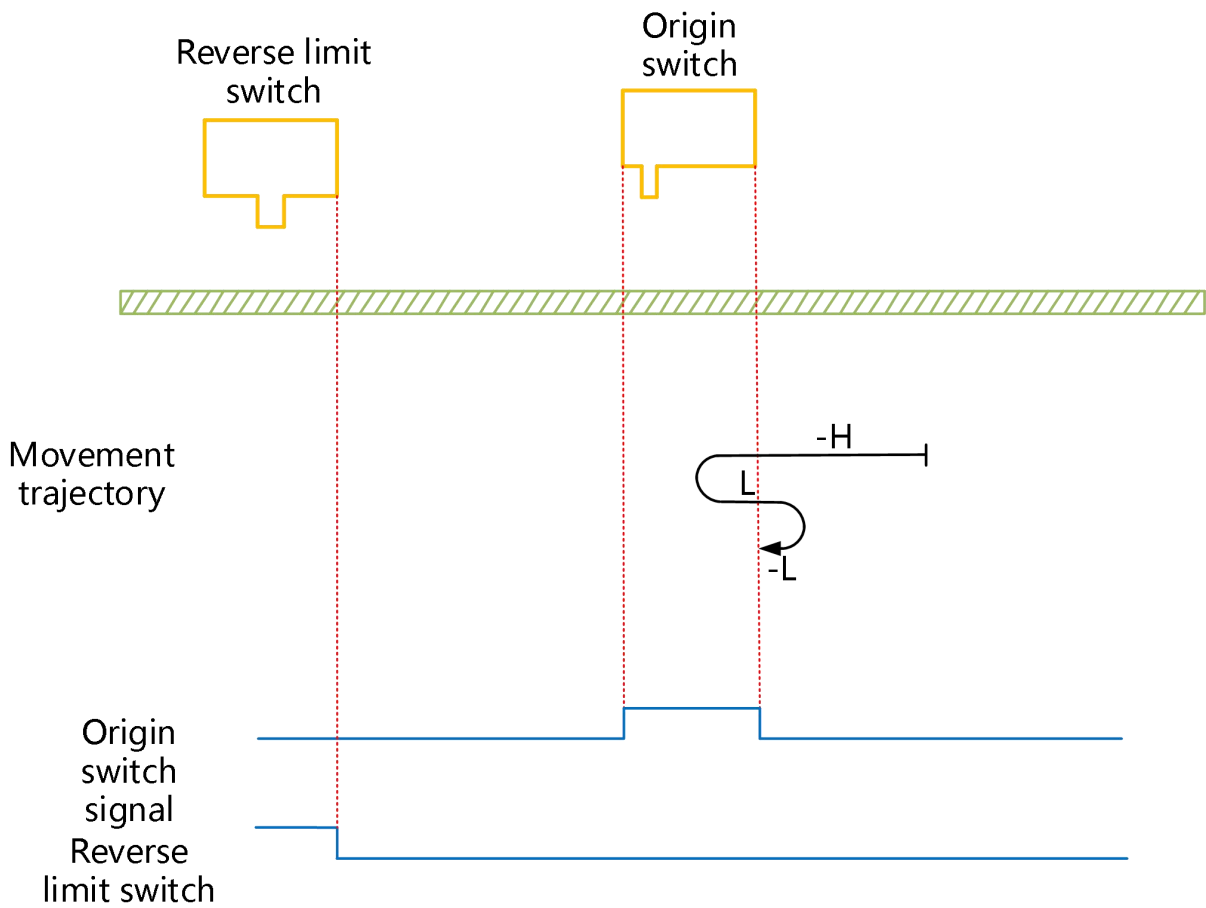
HW=1 when starting to return to zero, start to return to zero in forward direction at low speed directly, and stop when encountering HW falling edge;

#### (26) 6098H=28

Mechanical Origin: Origin Switch (HW)

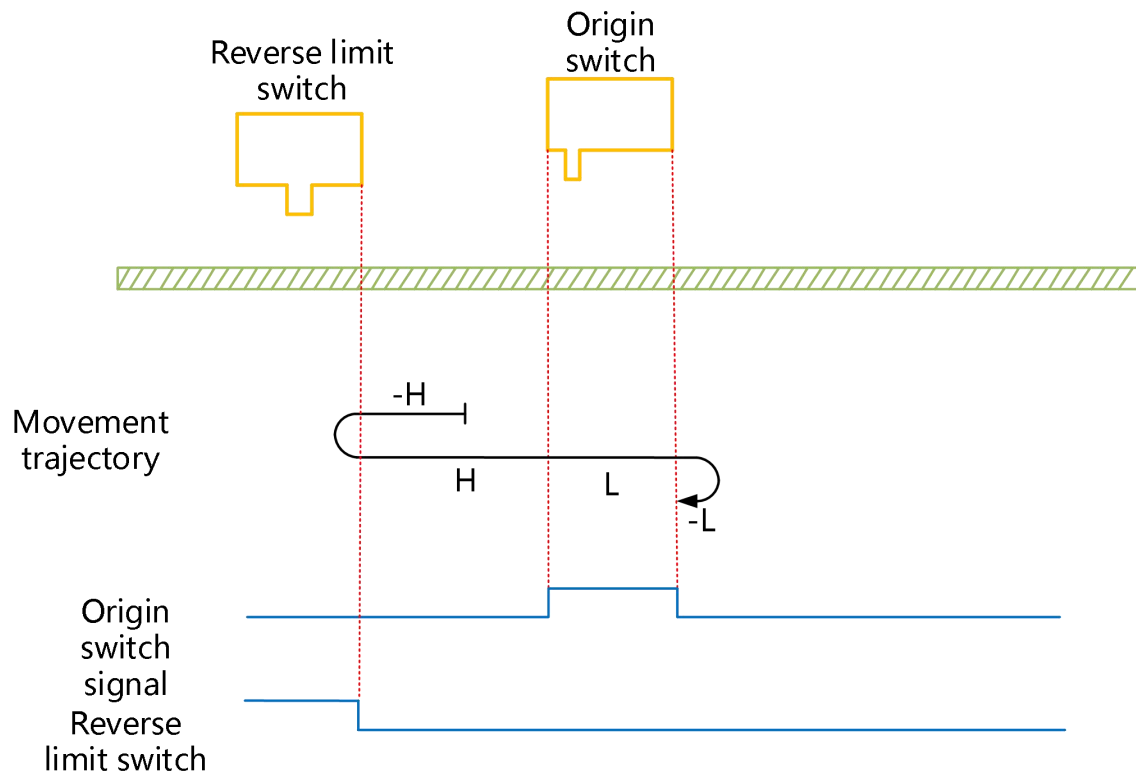
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered



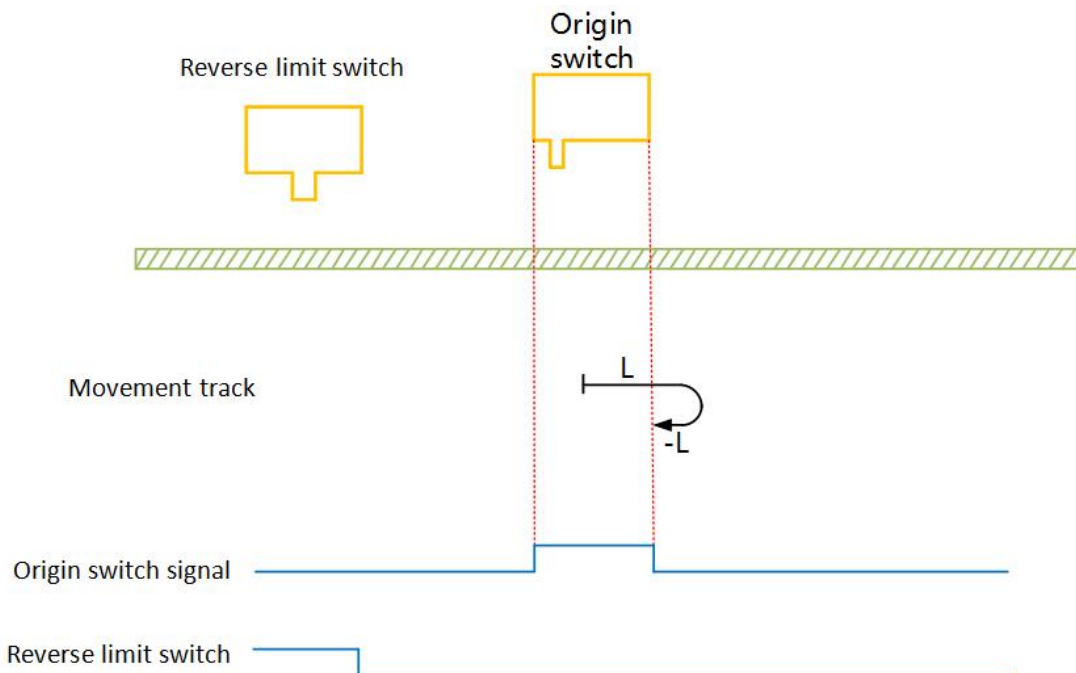
HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed; limit switch is not encountered; slow down and change the running direction after encountering HW rising edge, run in forward direction at low speed; change the running direction after encountering HW falling edge, run in reverse direction at low speed and stop when encountering HW rising edge;

- ② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed, change the running direction automatically when encountering limit switch and run in forward direction at high speed; slow down and run in forward direction at low speed when encountering HW rising edge; change the running direction and run in reverse direction at low speed when encountering HW falling edge, and stop when encountering HW rising edge;

③ The deceleration point signal is valid when starting to return to zero



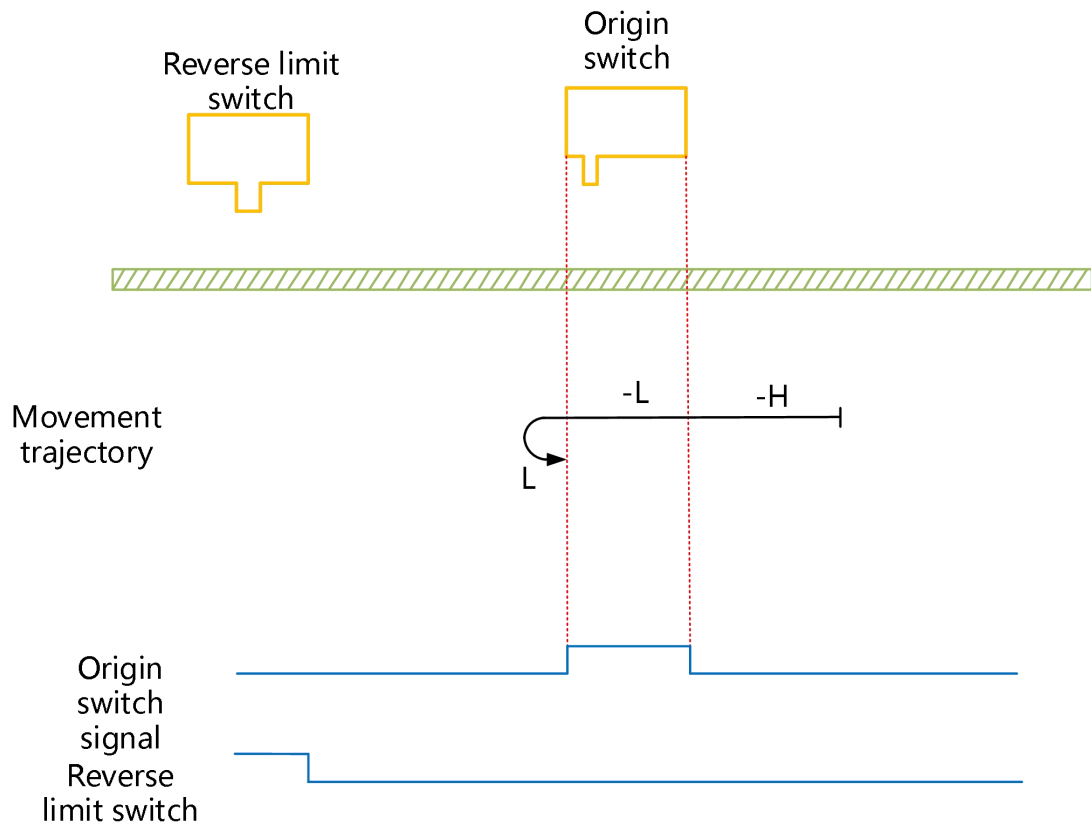
HW=1 when starting to return to zero, start to return to zero in forward direction at low speed directly. After encountering the falling edge of HW, change the running direction and run in reverse direction at low speed and stop when encountering the rising edge of HW;

**(27) 6098H=29**

Mechanical Origin: Origin Switch (HW)

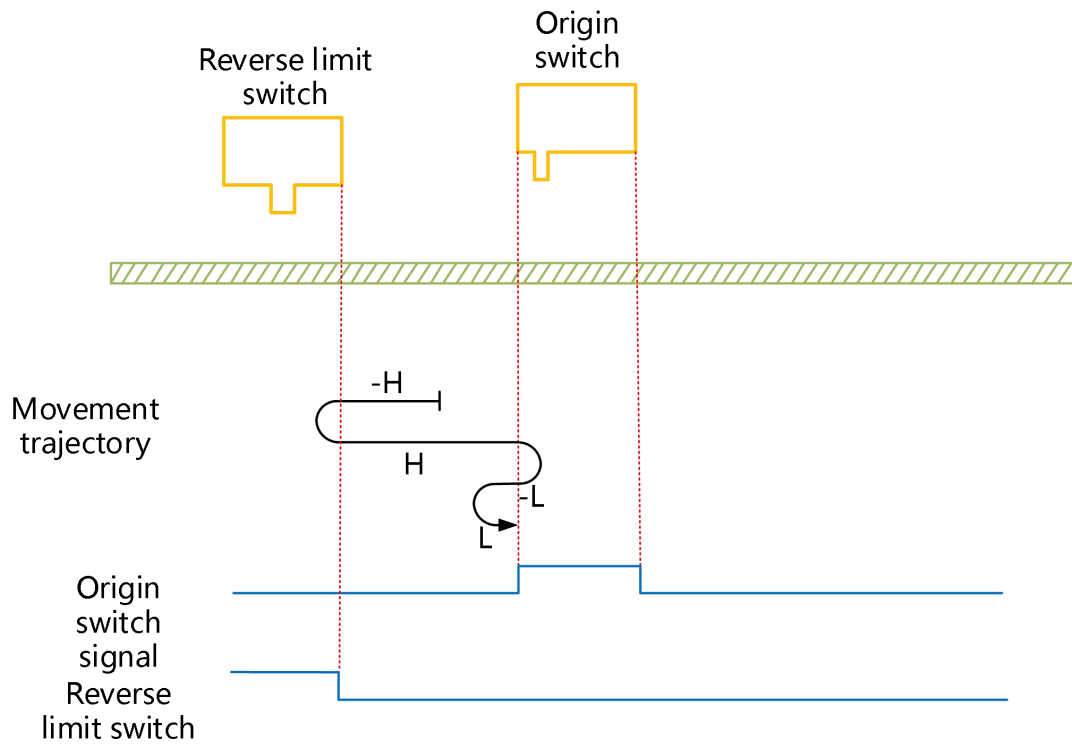
Deceleration point: Origin switch (HW)

- ① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered



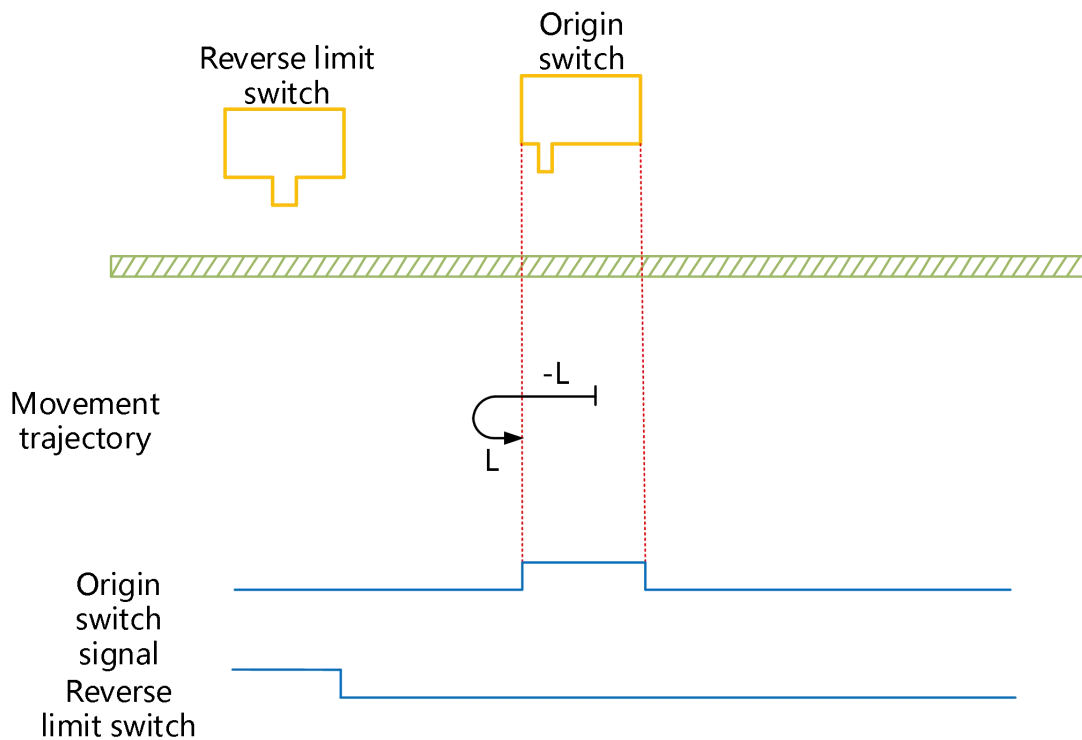
HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed directly; limit switch is not encountered; slow down after encountering HW rising edge, run in reverse direction at low speed; change the running direction after encountering HW falling edge and run in forward direction at low speed and stop when encountering HW rising edge;

- ② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed, change the running direction automatically when encountering limit switch and run in forward direction at high speed; slow down and change the running direction when encountering HW rising edge; run in reverse direction at low speed; change the running direction after encountering the falling edge of HW, then run in forward direction at low speed and stop when encountering HW rising edge;

③ The deceleration point signal is valid when starting to return to zero



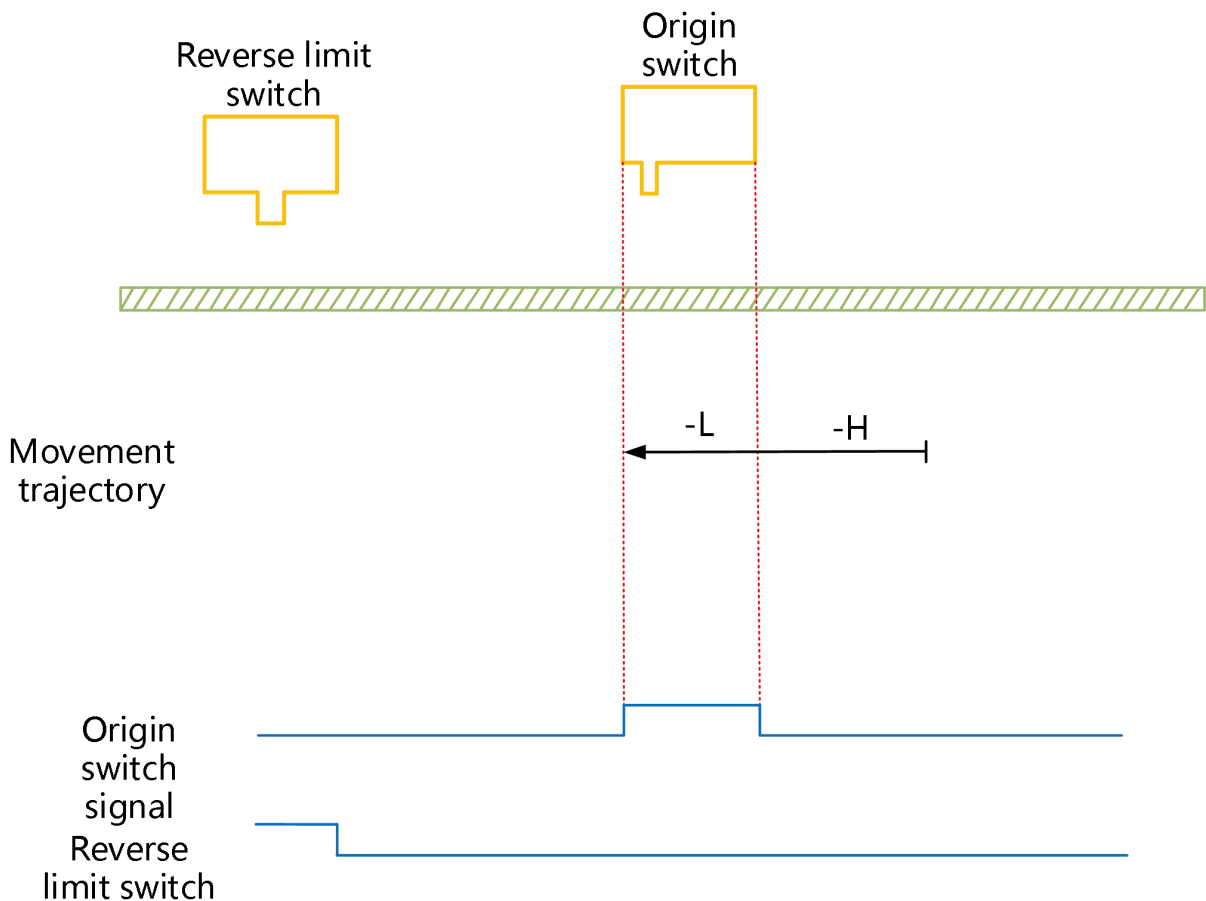
HW=1 when starting to return to zero, start to return to zero in reverse direction at low speed directly. After encountering the falling edge of HW, change the running direction; stop when encountering the rising edge of HW during running in forward direction at low speed.

**(28) 6098H=30**

Mechanical Origin: Origin Switch (HW)

Deceleration point: Origin switch (HW)

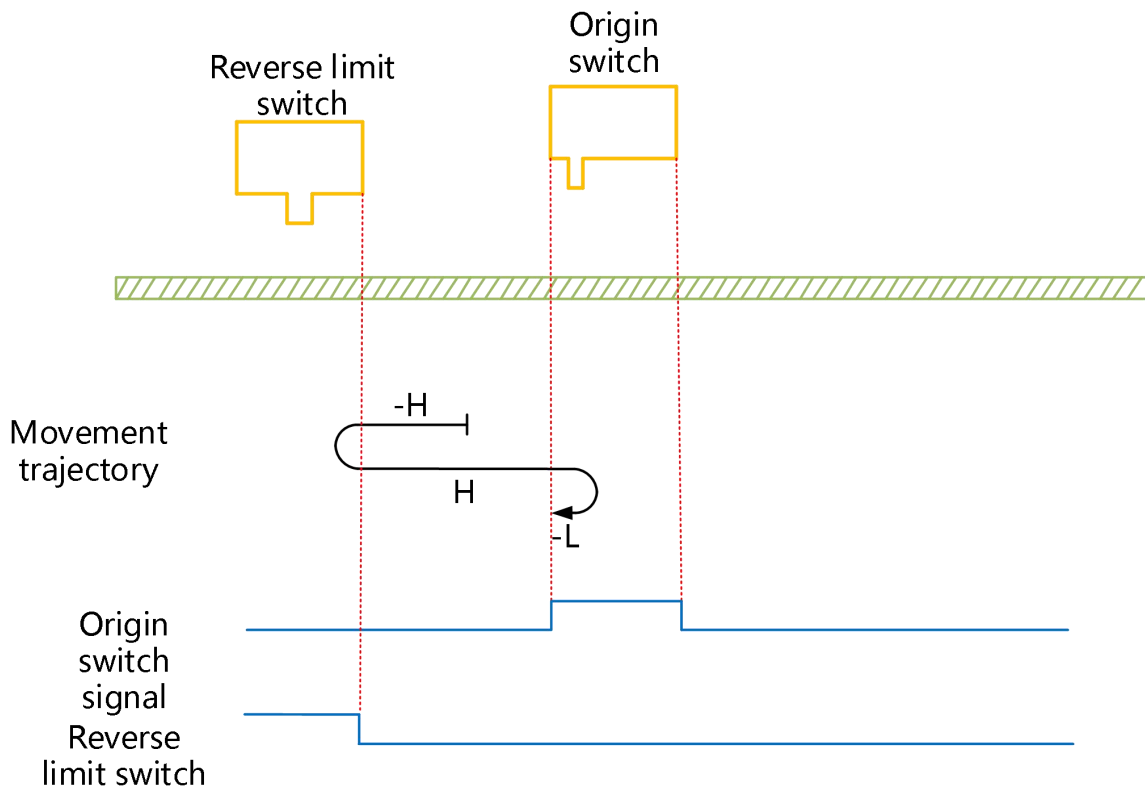
① The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is not encountered



HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed; limit switch is not encountered; slow down after encountering HW rising edge, run in reverse direction at low speed, and stop when encountering HW falling edge;

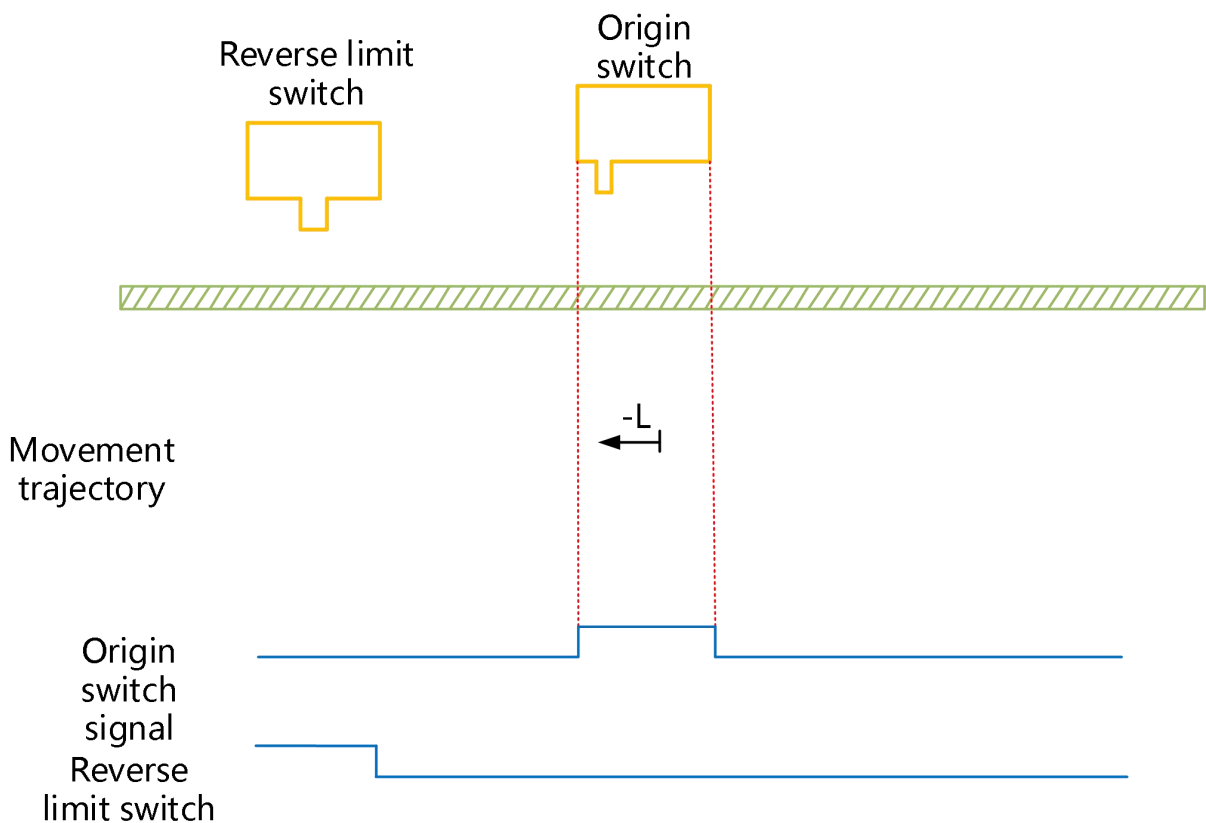
② The deceleration point signal is invalid when starting to return to zero, the reverse limit switch is encountered





HW=0 when starting to return to zero, start to return to zero in reverse direction at high speed, change the running direction automatically when encountering limit switch and run in forward direction at high speed; slow down and change the running direction when encountering HW rising edge, and stop when encountering HW falling edge during running in reverse direction at low speed;

③ The deceleration point signal is valid when starting to return to zero



HW=1 when starting to return to zero, start to return to zero in reverse direction at low speed directly, and stop when encountering HW falling edge;

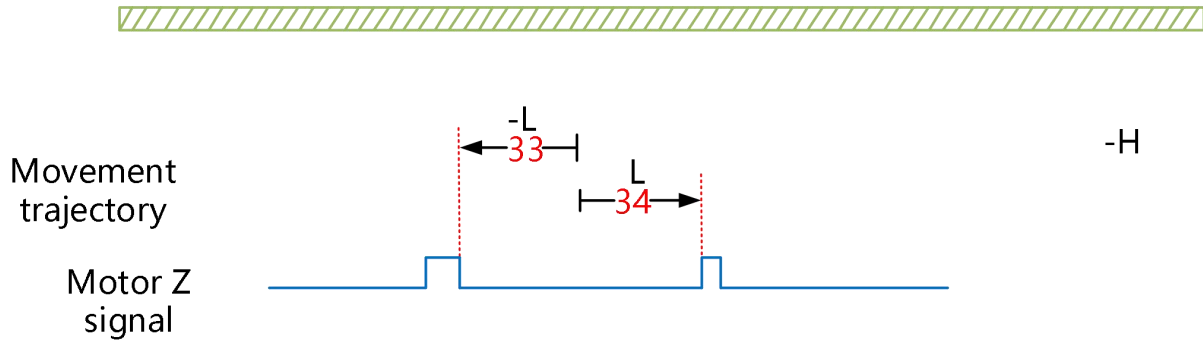
**(29) 6098H=33 and 34**

Mechanical origin: Z signal

Deceleration point: None

Zero return mode 33: running in reverse direction at low speed, stop at the first Z signal encountered

Zero return mode 34: running in forward direction at low speed, stop at the first Z signal encountered



**(30) 6098h=35**

Zero returning mode 35: take the current position as the mechanical origin, and after triggering the origin to return to zero (6040 control word: 0x0F → 0x1F):

The 60E6=0 (absolute return to zero)

After the zero return is completed, the position feedback 6064h is set to the origin offset 607Ch

The 60E6=1 (relative return to zero):

After returning to zero, the position feedback 6064h superimposes the position offset 607C on the original basis

## Chapter 8 Object Dictionary

### 8.1 Overview of Object Dictionaries

#### 8.1.1 Object Dictionary Area Allocation

The object dictionary of CoE (CANopen over EtherCAT) specified in CIA 402 and the object dictionary of VD3E series are composed as follows:

| Index         | Content                             |
|---------------|-------------------------------------|
| 0000h ~ 0FFFh | Data type region                    |
| 1000h ~ 1FFFh | Communication subprotocol area      |
| 2000h ~ 5FFFh | Vendor customized area              |
| 6000h ~ 9FFFh | Standard equipment subprotocol area |
| A000h ~ FFFFh | Reserved                            |

#### 8.1.2 Explanation of Related Terms in Object Dictionary

★Index: The position of objects of the same class in the object dictionary, expressed in hexadecimal.

★Sub-index: Under the same index, there are multiple objects, and each object is biased under the same index.

★Accessibility: See the following table for details:

| Accessibility | Description            |
|---------------|------------------------|
| RW            | Read and write         |
| RO            | Read only              |
| WR_PREOP      | Writable in preop mode |

★Can you map: See the following table for details:

| Accessibility | Description         |
|---------------|---------------------|
| NO (NO)       | Unmappable          |
| RPDO          | Can be used as RPDO |
| TPDO          | Can be used as TPDO |

★Set to take effect: See the following table for details:

| Set conditions   | Description                         |
|------------------|-------------------------------------|
| Shutdown setting | It can be set in the shutdown state |

| Set conditions    | Description   |
|-------------------|---|
| Valid immediately | The set value will take effect immediately after the parameter is modified and downloaded |

|                   |                         |                |   |
|-------------------|-------------------------|----------------|---|
| Operation setting | Can be set in any state | Power-on again | After the parameters are modified and downloaded, the servo drive needs to be powered down and then powered up, and the set value can take effect |
|-------------------|-------------------------|----------------|---|

★Data display range: upper and lower limits of parameters.

★Default value: The factory setting value of the parameter.

★Data type: The type of data, as shown in the following table:

| Data type | Description    | Numerical range            |
|-----------|----------------|----------------------------|
| SINT      | Signed 8bit    | -128 ~ 127                 |
| USINT     | Unsigned 8bit  | 0 ~ 255                    |
| INT       | Signed 16bit   | -32768 ~ 32767             |
| UINT      | Unsigned 16bit | 0~65535                    |
| DINT      | Signed 32bit   | -21247483648 ~ 21247483647 |
| UDINT     | Unsigned 32bit | 0 ~ 4294967295             |
| STRING    | String Value   | ASCII                      |

★Related modes: See the following table for specific contents:

| Accessibility | Description  |
|---------------|--|
| ALL           | This parameter is related to all modes                   |
| CSP/CSV/HM    | This parameter is only related to the corresponding mode |
| -             | This parameter is independent of the control mode        |

## 8.2 Communication Sub-protocol Area (1000h to 1FFFh)

| 1000  | Parameter name            | Accessibility | Data mapping | Data type | Data display range | Default | Correlation mode |
|---|---------------------------|---------------|--------------|-----------|--------------------|---------|------------------|
|   | Device Type (Device Type) | RO            | No           | UDINT     | -                  | -       | -                |
| Used to describe the CoE device subprotocol type. |                           |               |              |           |                    |         |                  |

| 1001                            | Parameter name                  | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|---------------------------------|---------------------------------|---------------|--------------|----------------|--------------------|---------|------------------|
|                                 | Error register (Error register) | RO            | No           | USINT          | -                  | 0x00    | -                |
| Used to describe error records. |                                 |               |              |                |                    |         |                  |

| 1008                              | Parameter name            | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|-----------------------------------|---------------------------|---------------|--------------|----------------|--------------------|---------|------------------|
|                                   | Device name (Device name) | RO            | No           | STRING         | -                  | -       | -                |
| Used to describe the device name. |                           |               |              |                |                    |         |                  |

| 1009   | Parameter name   | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|----------------|--------------------|---------|------------------|
|  | Manufacturer hardware version<br>(Manufacturer Hardware Version) | RO            | No           | STRING         | -                  | -       | -                |
| Used to describe the manufacturer hardware version |  |               |              |                |                    |         |                  |

| 100A   | Parameter name   | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|----------------|--------------------|---------|------------------|
|  | Manufacturer software version<br>(Manufacturer Software Version) | RO            | No           | STRING         | -                  | -       | -                |
| Used to describe the Manufacturer software version |  |               |              |                |                    |         |                  |

| 1018                                 | Parameter name        | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|--------------------------------------|-----------------------|---------------|--------------|----------------|--------------------|---------|------------------|
|                                      | ID Object (ID Object) | -             | -            | -              | -                  | -       | -                |
| Used to describe device information. |                       |               |              |                |                    |         |                  |

| 01h                                       | Parameter name        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|---|-----------------------|---------------|--------------|----------------|--------------------|------------|------------------|
|   | Vendor ID (Vendor ID) | RO            | No           | UDINT          | -                  | 0x000000FF | -                |
| Serial number used to describe the drive. |                       |               |              |                |                    |            |                  |

| 02h | Parameter name              | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|-----|-----------------------------|---------------|--------------|----------------|--------------------|------------|------------------|
|     | Product Code (Product Code) | RO            | No           | UDINT          | -                  | 0x10003101 | -                |

|   |                                   |               |              |                |                    |            |                  |
|---|-----------------------------------|---------------|--------------|----------------|--------------------|------------|------------------|
| Used to describe the encoding inside the drive.   |                                   |               |              |                |                    |            |                  |
| 03h   | Parameter name                    | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|   | Revision Number (Revision Number) | RO            |              | UDINT          | -                  | 0x00000001 | -                |
| Upgrade record number used to describe the drive. |                                   |               |              |                |                    |            |                  |
| 04h   | Parameter name                    | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|   | Serial Number (Serial Number)     | RO            | No           | UDINT          | -                  | 0x00001419 | -                |
| Used to describe a serial number.                 |                                   |               |              |                |                    |            |                  |

|                                    |                                   |               |              |                |                    |            |                  |
|------------------------------------|-----------------------------------|---------------|--------------|----------------|--------------------|------------|------------------|
| 1600                               | Parameter name                    | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | RxPDO                             | -             | -            | -              | -                  | -          | -                |
| Mapping object for setting RxPDO.  |                                   |               |              |                |                    |            |                  |
| 01h                                | Parameter name                    | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | First mapping object (RxPDO_S11)  | RW            | RPDO         | UDINT          | -                  | 0x60400010 | -                |
| Mapping object for setting RxPDO1. |                                   |               |              |                |                    |            |                  |
| 02h                                | Parameter name                    | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Second mapping object (RxPDO_S12) | RW            | RPDO         | UDINT          | -                  | 0x607A0020 | -                |
| Mapping object for setting RxPDO2. |                                   |               |              |                |                    |            |                  |
| 03h                                | Parameter name                    | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Third mapping object (RxPDO_S13)  | RW            | RPDO         | UDINT          | -                  | 0x60B80010 | -                |
| Mapping object for setting RxPDO3. |                                   |               |              |                |                    |            |                  |
| 04h                                | Parameter name                    | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Fourth mapping object (RxPDO_S13) | RW            | RPDO         | UDINT          | -                  | 0x60600008 | -                |
| Mapping object for setting RxPDO4. |                                   |               |              |                |                    |            |                  |

|                                   |                |               |              |                |                    |         |                  |
|-----------------------------------|----------------|---------------|--------------|----------------|--------------------|---------|------------------|
| 1701                              | Parameter name | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|                                   | RxPDO          | -             | -            | -              | -                  | -       | -                |
| Mapping object for setting RxPDO. |                |               |              |                |                    |         |                  |
| 01h                               | Parameter name | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |

|                                    |  |               |              |                |                    |            |                  |
|------------------------------------|--|---------------|--------------|----------------|--------------------|------------|------------------|
|                                    | First mapping object<br>(RxPDO_SI1)      | RW            | RPDO         | UDINT          | -                  | 0x60400010 | -                |
| Mapping object for setting RxPDO1. |  |               |              |                |                    |            |                  |
| 02h                                | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Second mapping object<br>(RxPDO_SI2)     | RW            | RPDO         | UDINT          | -                  | 0x607A0020 | -                |
| Mapping object for setting RxPDO2. |  |               |              |                |                    |            |                  |
| 03h                                | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Third mapping object<br>(RxPDO_SI3)      | RW            | RPDO         | UDINT          | -                  | 0x60B80010 | -                |
| Mapping object for setting RxPDO3. |  |               |              |                |                    |            |                  |
| 04h                                | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The fourth mapping object<br>(RxPDO_SI4) | RW            | RPDO         | UDINT          | -                  | 0x60600008 | -                |
| Mapping object for setting RxPDO4. |  |               |              |                |                    |            |                  |

|                                    |  |               |              |                |                    |            |                  |
|------------------------------------|--|---------------|--------------|----------------|--------------------|------------|------------------|
| 1702                               | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | RxPDO                                    | -             | -            | -              | -                  | -          | -                |
| Mapping object for setting RxPDO.  |  |               |              |                |                    |            |                  |
| 01h                                | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | First mapping object<br>(RxPDO_SI1)      | RW            | RPDO         | UDINT          | -                  | 0x60400010 | -                |
| Mapping object for setting RxPDO1. |  |               |              |                |                    |            |                  |
| 02h                                | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Second mapping object<br>(RxPDO_SI2)     | RW            | RPDO         | UDINT          | -                  | 0x607A0020 | -                |
| Mapping object for setting RxPDO2. |  |               |              |                |                    |            |                  |
| 03h                                | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Third mapping object<br>(RxPDO_SI3)      | RW            | RPDO         | UDINT          | -                  | 0x60FF0020 | -                |
| Mapping object for setting RxPDO3. |  |               |              |                |                    |            |                  |
| 04h                                | Parameter name                           | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The fourth mapping object<br>(RxPDO_SI4) | RW            | RPDO         | UDINT          | -                  | 0x60710008 | -                |
| Mapping object for setting RxPDO4. |  |               |              |                |                    |            |                  |

| 05h                                | Parameter name                         | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|------------------------------------|--|---------------|--------------|----------------|--------------------|------------|------------------|
|                                    | The fifth mapping object (RxPDO_SI5)   | RW            | RPDO         | UDINT          | -                  | 0x60600008 | -                |
| Mapping object for setting RxPDO5. |  |               |              |                |                    |            |                  |
| 06h                                | Parameter name                         | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Sixth mapping object (RxPDO_SI6)       | RW            | RPDO         | UDINT          | -                  | 0x60B80010 | -                |
| Mapping object for setting RxPDO6. |  |               |              |                |                    |            |                  |
| 07h                                | Parameter name                         | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The seventh mapping object (RxPDO_SI7) | RW            | RPDO         | UDINT          | -                  | 0x607F0020 | -                |
| Mapping object for setting RxPDO7. |  |               |              |                |                    |            |                  |

| 1A00                               | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|------------------------------------|---------------------------------------|---------------|--------------|----------------|--------------------|------------|------------------|
|                                    | TxPDO                                 | -             | -            | -              | -                  | -          | -                |
| Mapping object for setting TxPDO.  |                                       |               |              |                |                    |            |                  |
| 01h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | First mapping object (TxPDO_SI1)      | RW            | TPDO         | UDINT          | -                  | 0x60410010 | -                |
| Mapping object for setting TxPDO1. |                                       |               |              |                |                    |            |                  |
| 02h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Second mapping object (TxPDO_SI2)     | RW            | TPDO         | UDINT          | -                  | 0x60640020 | -                |
| Mapping object for setting TxPDO2. |                                       |               |              |                |                    |            |                  |
| 03h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Third mapping object (TxPDO_SI3)      | RW            | TPDO         | UDINT          | -                  | 0x60B90010 | -                |
| Mapping object for setting TxPDO3. |                                       |               |              |                |                    |            |                  |
| 04h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The fourth mapping object (TxPDO_SI4) | RW            | TPDO         | UDINT          | -                  | 0x60BA0020 | -                |
| Mapping object for setting TxPDO4. |                                       |               |              |                |                    |            |                  |
| 05h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The fifth mapping object              | RW            | TPDO         | UDINT          | -                  | 0x60BC0020 | -                |



|                                    |  |               |              |                |                    |            |                  |
|------------------------------------|--|---------------|--------------|----------------|--------------------|------------|------------------|
|                                    | (TxPDO_SI5)                            |               |              |                |                    |            |                  |
| Mapping object for setting TxPDO5. |  |               |              |                |                    |            |                  |
| 06h                                | Parameter name                         | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Sixth mapping object (TxPDO_SI6)       | RW            | TPDO         | UDINT          | -                  | 0x603F0010 | -                |
| Mapping object for setting TxPDO6. |  |               |              |                |                    |            |                  |
| 07h                                | Parameter name                         | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The seventh mapping object (TxPDO_SI7) | RW            | TPDO         | UDINT          | -                  | 0x60610008 | -                |
| Mapping object for setting TxPDO7. |  |               |              |                |                    |            |                  |

|                                    |                                       |               |              |                |                    |            |                  |
|------------------------------------|---------------------------------------|---------------|--------------|----------------|--------------------|------------|------------------|
| 1B01                               | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | TxPDO                                 | -             | -            | -              | -                  | -          | -                |
| Mapping object for setting TxPDO.  |                                       |               |              |                |                    |            |                  |
| 01h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | First mapping object (TxPDO_SI1)      | RW            | TPDO         | UDINT          | -                  | 0x603F0010 | -                |
| Mapping object for setting TxPDO1. |                                       |               |              |                |                    |            |                  |
| 02h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Second mapping object (TxPDO_SI2)     | RW            | TPDO         | UDINT          | -                  | 0x60410010 | -                |
| Mapping object for setting TxPDO2. |                                       |               |              |                |                    |            |                  |
| 03h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | Third mapping object (TxPDO_SI3)      | RW            | TPDO         | UDINT          | -                  | 0x60640020 | -                |
| Mapping object for setting TxPDO3. |                                       |               |              |                |                    |            |                  |
| 04h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The fourth mapping object (TxPDO_SI4) | RW            | TPDO         | UDINT          | -                  | 0x60770010 | -                |
| Mapping object for setting TxPDO4. |                                       |               |              |                |                    |            |                  |
| 05h                                | Parameter name                        | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|                                    | The fifth mapping object (TxPDO_SI5)  | RW            | TPDO         | UDINT          | -                  | 0x60F40020 | -                |
| Mapping object for setting TxPDO5. |                                       |               |              |                |                    |            |                  |
| 06h                                | Parameter name                        | Accessibility | Data         | Data           | Data display       | Default    | Correlation      |

|                                    |                                     |    | mapping | structure | range |             | mode |
|------------------------------------|-------------------------------------|----|---------|-----------|-------|-------------|------|
|                                    | Sixth mapping object<br>(TxPDO_SI6) | RW | TPDO    | UDINT     | -     | 0x606100108 | -    |
| Mapping object for setting TxPDO6. |                                     |    |         |           |       |             |      |

| 1C12                             | Parameter name | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|----------------------------------|----------------|---------------|--------------|----------------|--------------------|---------|------------------|
|                                  | RxPDO assign   | -             | -            | -              | -                  | -       | -                |
| Used to set up RPDO assignments. |                |               |              |                |                    |         |                  |

| 01h | Parameter name  | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|-----|---|---------------|--------------|----------------|--------------------|---------|------------------|
|     | Index of objects allocated by<br>RPDO<br>(RPDO Index) | RW            | No           | ARR            | -                  | 0x1701  | -                |

The index used to set the allocation object of RPDO.

| 1C13 | Parameter name | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|------|----------------|---------------|--------------|----------------|--------------------|---------|------------------|
|      | TxPDO assign   | -             | -            | -              | -                  | -       | -                |

Used to set TPDO assignments.

| 01h | Parameter name                                       | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|-----|--|---------------|--------------|----------------|--------------------|---------|------------------|
|     | Index of objects assigned by<br>TPDO<br>(TPDO Index) | RW            | No           | ARR            | -                  | 0x0001  | -                |

The index of the allocation object used to set TPDO.

| 1C32 | Parameter name  | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|------|---|---------------|--------------|----------------|--------------------|---------|------------------|
|      | Synchronize management of<br>output parameters<br>(SM output parameter) | -             | -            | -              | -                  | -       | -                |

Used to describe synchronization management output parameters.

| 01h | Parameter name                                 | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|-----|--|---------------|--------------|----------------|--------------------|---------|------------------|
|     | Synchronization type<br>(Synchronization Type) | RW            | No           | UINT           | -                  | 0x0001  | -                |

Used to set the synchronization type.

| 04h | Parameter name   | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|-----|--|---------------|--------------|----------------|--------------------|---------|------------------|
|     | Synchronization Types support<br>(Synchronization Types support) | RO            | No           | UDINT          | -                  | 0x8007  | -                |

Displays the type of distributed clock.

| 05h   | Parameter name                             | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|---|--|---------------|--------------|----------------|--------------------|------------|------------------|
|   | Minimum cycle time<br>(Minimum Cycle Time) | RO            | No           | UINT           | -                  | 0x0001E848 | -                |
| Displays the minimum synchronization period supported by the slave station in ns. |  |               |              |                |                    |            |                  |

| 1C33 | Parameter name                             | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|------|--|---------------|--------------|----------------|--------------------|---------|------------------|
|      | SM input parameter<br>(SM input parameter) | -             | -            | -              | -                  | -       | -                |

Used to describe synchronization management input parameters.

| 01h | Parameter name                                 | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|-----|--|---------------|--------------|----------------|--------------------|---------|------------------|
|     | Synchronization type<br>(Synchronization Type) | RW            | No           | UINT           | -                  | 0x0022  | -                |

Used to set the synchronization type.

| 04h | Parameter name   | Accessibility | Data mapping | Data structure | Data display range | Default | Correlation mode |
|-----|--|---------------|--------------|----------------|--------------------|---------|------------------|
|     | Synchronization Types support<br>(Synchronization Types support) | RO            | No           | UDINT          | -                  | 0x8007  | -                |

Displays the type of distributed clock.

| 05h | Parameter name                             | Accessibility | Data mapping | Data structure | Data display range | Default    | Correlation mode |
|-----|--|---------------|--------------|----------------|--------------------|------------|------------------|
|     | Minimum cycle time<br>(Minimum Cycle Time) | RO            | No           | UINT           | -                  | 0x0001E848 | -                |

Displays the minimum synchronization period supported by the slave station in ns.

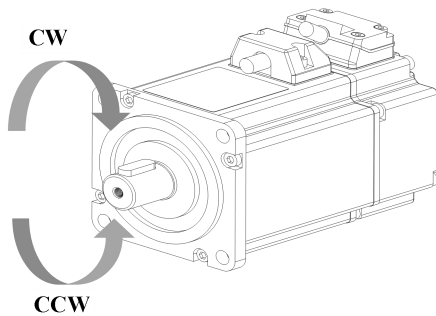
### 8.3 Vendor Customized Area (2000h to 2FFFh)

#### Group 2000h: Basic Settings

| P00-04<br>2000-04 | Parameter name                  | Setting method   | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---------------------------------|------------------|-------------------|---------|-----------|----------------------|------|
|                   | Rotate direction<br>RotationDir | Shutdown setting | Valid immediately | 0       | 0 to 1    | Basic settings       | -    |

Set the positive direction of the motor rotation when viewed from the motor axis.

| Setting value | Rotation direction                | Remark   |
|---------------|-----------------------------------|--|
| 0             | Take CW as the forward direction  | Viewed from the motor axis, the motor rotates clockwise        |
| 1             | Take CCW as the forward direction | Viewed from the motor axis, the motor rotates counterclockwise |



| P00-09<br>2000-09 | Parameter name                          | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | Braking resistance setting<br>ExtResSel | Operation setting | Valid immediately | 0       | 0 to 3    | Basic settings       | -    |

Used to set the mode of absorbing and releasing braking energy.

| Setting value | Brake resistance setting  | Remark   |
|---------------|---|--|
| 0             | Use built-in braking resistor                                       | Please refer to "7.1. 5 Braking Resistance" to select the appropriate braking mode |
| 1             | Use external braking resistor and natural cooling                   |  |
| 2             | Use external braking resistor and forced air cooling (not settable) |  |
| 3             | No braking resistors are used, and all are absorbed by capacitance  |  |

| P00-10 | Parameter name | Setting method | Valid time | Default | Set range | Application category | Unit |
|--------|----------------|----------------|------------|---------|-----------|----------------------|------|
|--------|----------------|----------------|------------|---------|-----------|----------------------|------|

|   |  |                      |                      |    |         |                   |   |
|---|--|----------------------|----------------------|----|---------|-------------------|---|
| <b>2000-0A</b>  | External braking<br>resistor resistance<br><br>ExtResVal | Operation<br>setting | Valid<br>immediately | 50 | 0~65535 | Basic<br>settings | Ω |
| <p>Used to set the power of external braking resistor of servo drive. When the maximum braking energy calculated value is greater than the maximum braking energy absorbed by capacitor, and the braking power calculated value is greater than the built-in braking resistor power, use external braking resistor.</p> <p>If the value of P00-10 is too large, Er.25 (too large braking resistor value) or Er.22 (main power supply is over voltage) will occur.</p> <p>When external braking resistor is connected, please disconnect the short tab between C and D and connect the external braking resistor between P + and C. Please refer to "2.1.2 Composition of servo drive" for specific operation.</p> |  |                      |                      |    |         |                   |   |

| P00-11<br>2000-0B | Parameter name                               | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | External braking resistor power<br>ExtResPwr | Operation setting | Valid immediately | 100     | 0~65535   | Basic settings       | W    |

Used to set the power of the external braking resistor of the servo drive.

External braking resistor power "P00-11" is not allowed to be less than the calculated value of braking resistor power!

| P00-30<br>2000-1E | Parameter name  | Setting method    | Valid time     | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|----------------|---------|-----------|----------------------|------|
|                   | Shield multi-turn absolute encoder battery fault<br>EncBatErrMask | Operation setting | Power-on again | 0       | 0 to 1    | Basic settings       | -    |

Used to set the battery fault alarm setting function of multi-turn absolute value encoder.

| Setting value | Function   | Remark  |
|---------------|------------|---|
| 0             | Unshielded | Detect battery undervoltage and battery low voltage faults of multi-turn absolute value encoder   |
| 1             | Shield     | Shield multi-turn absolute encoder battery under voltage and battery low-voltage fault. This would cause mechanical failure, please use with caution. |

## Group 2001h: Control Parameters

| P01-10<br>2001-0A  | Parameter name                           | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|--|--|-------------------|-------------------|---------|-----------|----------------------------|------|
|  | Maximum speed threshold<br>MaxSpeedLimit | Operation setting | Valid immediately | 3600    | 0~5000    | Protection and restriction | rpm  |
| Used to set the maximum speed limit value. If the actual speed of motor exceeds this value, Er.32 would occur (Exceed the maximum speed of motor). |  |                   |                   |         |           |                            |      |

| P01-11<br>2001-0B  | Parameter name                         | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|--|--|-------------------|-------------------|---------|-----------|----------------------------|------|
|  | Warning speed threshold<br>WarmSpeedTh | Operation setting | Valid immediately | 3300    | 0 ~5000   | Protection and restriction | rpm  |
| Used to set the limit value of maximum speed. If the actual speed of motor exceeds this value, A-81 would occur (Exceed the maximum speed of motor). |  |                   |                   |         |           |                            |      |

| P01-12<br>2001-0C                             | Parameter name                        | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|---|---------------------------------------|-------------------|-------------------|---------|-----------|----------------------------|------|
|   | Forward speed threshold<br>PosSpeedTh | Operation setting | Valid immediately | 3000    | 0~5000    | Protection and restriction | rpm  |
| Used to set the limit value of forward speed. |                                       |                   |                   |         |           |                            |      |

| P01-13<br>2001-0D                            | Parameter name           | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|--|--------------------------|-------------------|-------------------|---------|-----------|----------------------------|------|
|  | NegSpeedTh<br>NegSpeedTh | Operation setting | Valid immediately | 3000    | 0~5000    | Protection and restriction | rpm  |
| Used to set the limit value of reverse speed |                          |                   |                   |         |           |                            |      |

| P01-14<br>2001-0E                    | Parameter name                     | Setting method   | Valid time            | Default   | Set range | Application category       | Unit |
|--------------------------------------|------------------------------------|------------------|-----------------------|---|-----------|----------------------------|------|
|                                      | Torque limit source<br>ToqLimitSrc | Shutdown setting | Valid immediately     | 0   | 0 to 1    | Protection and restriction | -    |
| Used to set the torque limit source. |                                    |                  |                       |   |           |                            |      |
|                                      |                                    | Setting value    | Restricted source     | Remarks   |           |                            |      |
|                                      |                                    | 0                | Internal              | It is an internal torque limit.   |           |                            |      |
|                                      |                                    | 1                | External (AI_2 given) | For external torque limitation, please refer to "AI_2 hardware wiring"Chapter IV Wiring". |           |                            |      |

| P01-15<br>2001-0F | Parameter name                  | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|-------------------|---------------------------------|-------------------|-------------------|---------|-----------|----------------------------|------|
|                   | Forward torque limit<br>FToqLim | Operation setting | Valid immediately | 3000    | 0~3000    | Protection and restriction | 0.1% |

When P01-14 is set to 0 (internal), the set value of this function code is used as the limit value of positive torque.

If the value of P01-15 and P01-16 is set too small, the servo motor may be insufficient torque phenomenon when performing acceleration and deceleration movements. Please refer to "6.4.3 Torque command limit".

| P01-16<br>2001-10 | Parameter name                  | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|-------------------|---------------------------------|-------------------|-------------------|---------|-----------|----------------------------|------|
|                   | Reverse torque limit<br>RToqLim | Operation setting | Valid immediately | 3000    | 0~3000    | Protection and restriction | 0.1% |

When P01-14 is set to 0 (internal) , the setting value of this function code is reverse torque limit value

| P01-19<br>2001-13 | Parameter name                  | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|-------------------|---------------------------------|-------------------|-------------------|---------|-----------|----------------------------|------|
|                   | Torque Limit Time<br>ToqLimTime | Operation setting | Valid immediately | 1000    | 0~65535   | Protection and restriction | ms   |

When torque is limited by the setting value of P01-15 or P01-16, and exceeds the setting time, drive would report fault "abnormal torque saturation".

**Note:** When the value of this function code is set to 0, the torque saturation timeout fault detection is not done, and this fault is ignored.

| P01-30<br>2001-1E | Parameter name  | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | Delay from brake output<br>ON to instruction<br>reception<br>BK_ONtoCmdEnaDelay | Operation setting | Valid immediately | 250     | 0~500     | -                    | ms   |

Used to set the braking (BRK-OFF) output ON, until the servo drive allows the start of receiving the input command. When the brake output (BRK-OFF) is not allocated, this function code has no effect.

| P01-31<br>2001-1F | Parameter name  | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | In the static state, delay from the brake output is OFF to the motor is not energized.<br>BK_OFFtoPwmOFFDelay | Operation setting | Valid immediately | 150     | 1~1000    | -                    | ms   |



When the motor is in a static state, set the delay time from the brake (BRK-OFF) output is OFF to the servo drive is in the non-powered state. When the brake output (BRK-OFF) is not allocated, this function code has no effect.

|                                 | Parameter name  | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
| <b>P01-32</b><br><b>2001-20</b> | Rotation status, when the brake output OFF, the speed threshold.<br>BK_OFFSpdTh | Operation setting | Valid immediately | 30      | 0~3000    | -                    | rpm  |

When the motor is rotating, the motor speed threshold that is allowed when the brake (BRK-OFF) output is OFF. When the brake output (BRK-OFF) is not allocated, this function code has no effect.

|                                 | Parameter name  | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
| <b>P01-33</b><br><b>2001-21</b> | Rotation status, Delay from servo enable OFF to brake output OFF<br>BK_OFFSinceSofDelay | Operation setting | Valid immediately | 500     | 1~1000    | -                    | ms   |

When the motor rotates, the delay time from the servo enable (S-ON) OFF to the brake (BRK-OFF) output OFF is allowed. When the brake output (BRK-OFF) is not allocated, this function code has no effect.

**Group 2002h: Gain Adjustment**

| P02-01<br>2002-01   | Parameter name                           | Setting method    | Valid time         | Default | Set range | Application category | Unit  |
|---|--|-------------------|--------------------|---------|-----------|----------------------|-------|
|   | 1st position loop gain<br>PosLoop1stGain | Operation setting | Vvalid immediately | 400     | 0~6200    | Gain control         | 0.1Hz |
| It is used for setting the proportional gain of the first position loop to determine the responsiveness of the position control system. |  |                   |                    |         |           |                      |       |

| P02-02<br>2002-02   | Parameter name                              | Setting method    | Valid time        | Default | Set range | Application category | Unit  |
|---|---|-------------------|-------------------|---------|-----------|----------------------|-------|
|   | The first speed loop gain<br>SpdLoop1stGain | Operation setting | valid immediately | 65      | 0~35000   | Gain control         | 0.1Hz |
| It is used for setting the proportional gain of the first position loop to determine the responsiveness of the position control system. |   |                   |                   |         |           |                      |       |

| P02-03<br>2002-03   | Parameter name                                     | Setting method    | Valid time        | Default | Set range | Application category | Unit  |
|---|--|-------------------|-------------------|---------|-----------|----------------------|-------|
|   | speed loop 1st integral time<br>SpdLoop1stIntgTime | Operation setting | Valid immediately | 1000    | 100~65535 | Gain control         | 0.1ms |
| Used to set the integral constant of the first speed loop. The smaller the set value, the stronger the integral effect. |  |                   |                   |         |           |                      |       |

| P02-09<br>2002-09  | Parameter name                               | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|--|--|-------------------|-------------------|---------|-----------|----------------------|------|
|  | Speed feedforward gain<br>SpdFeedForwardGain | Operation setting | Valid immediately | 0       | 0~1000    | Gain control         | 0.1% |
| It is used for setting the proportional gain of the second position loop to determine the responsiveness of the position control system. |  |                   |                   |         |           |                      |      |

| P02-10<br>2002-0A   | Parameter name                                    | Setting method    | Valid time        | Default | Set range | Application category | Unit   |
|---|---|-------------------|-------------------|---------|-----------|----------------------|--------|
|   | Speed feed forward filter<br>SpdFeedForwardFilter | Operation setting | Valid immediately | 50      | 0~10000   | Gain control         | 0.01ms |
| The time constant of the primary delay filter associated with the speed feedforward input is set. |   |                   |                   |         |           |                      |        |

| P02-11<br>2002-0B                        | Parameter name                                | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|--|---|-------------------|-------------------|---------|-----------|----------------------|------|
|  | Torque feedforward gain<br>ToqFeedForwardGain | Operation setting | Valid immediately | 0       | 0~2000    | Gain control         | 0.1% |
| Used to set the torque feedforward gain. |   |                   |                   |         |           |                      |      |

| P02-10<br>2002-0C | Parameter name  | Setting method    | Valid time        | Default | Set range | Application category | Unit   |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|--------|
|                   | Torque feedforward filter time constant<br>ToqFeedForwardFilter | Operation setting | Valid immediately | 50      | 0~10000   | Gain control         | 0.01ms |

Used to set the time constant of the primary delay filter associated with the torque feedforward input.

### Group 2003h: Self-adjusting Parameters

| P03-01<br>2003-01 | Parameter name                      | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|-------------------|-------------------------------------|-------------------|-------------------|---------|-----------|----------------------------|------|
|                   | Load inertia ratio<br>LoadInerRatio | Operation setting | Valid immediately | 300     | 100~10000 | Automatic parameter tuning | 0.01 |

Used to set the load inertia ratio, 1.00 ~ 100.00 times.

| P03-02<br>2003-02 | Parameter name                         | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------------|------|
|                   | Load rigidity selection<br>RigiditySel | Operation setting | Valid immediately | 14*     | 0~31      | Automatic parameter tuning | -    |

Used to set the load inertia ratio, 1.00 ~ 100.00 times.

| P03-03<br>2003-03 | Parameter name                                  | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------------|------|
|                   | Self-adjusting mode selection<br>SelfAdjustMode | Operation setting | Valid immediately | 0       | 0 to 2    | Automatic parameter tuning | -    |

Used for setting different gain adjustment modes, the related gain parameters can be set manually or automatically according to the rigidity grade table.

| Setting value | Function                             | Description  |
|---------------|--------------------------------------|--|
| 0             | Self-adjusting mode.                 | Position loop gain, speed loop gain, speed loop integral time constant, torque filter parameter settings are automatically adjusted according to the rigidity grade setting. |
| 1             | Manual setting                       | The user manually sets the position loop gain, speed loop gain, speed loop integral time constant and torque filter parameter settings.                                      |
| 2             | Online automatic self-adjusting mode | Not yet realized.  |

| P03-04<br>2003-04 | Parameter name  | Setting method    | Valid time        | Default | Set range | Application category       | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------------|------|
|                   | Online inertia identification sensitivity<br>InerIdOnline | Operation setting | Valid immediately | 0       | 0 to 2    | Automatic parameter tuning | -    |
| Not yet realized. |   |                   |                   |         |           |                            |      |

| P03-05<br>2003-05   | Parameter name   | Setting method   | Valid time        | Default | Set range | Application category       | Unit   |
|---|--|------------------|-------------------|---------|-----------|----------------------------|--------|
|   | Number of cycles of inertia identification<br>InerIdCircle | Shutdown setting | Valid immediately | 2       | 1 to 20   | Automatic parameter tuning | Circle |
| Used to set the load inertia identification process and set the number of rotations of the motor. |  |                  |                   |         |           |                            |        |

| P03-06<br>2003-06   | Parameter name  | Setting method   | Valid time        | Default | Set range   | Application category       | Unit |
|---|---|------------------|-------------------|---------|-------------|----------------------------|------|
|   | Maximum speed of inertia identification<br>InerIdMaxSpd | Shutdown setting | Valid immediately | 1000    | 300 to 2000 | Automatic parameter tuning | rpm  |
| Used to set the maximum allowable motor speed command in offline inertia identification mode. The faster the speed during inertia identification, the more accurate the identification result will be. Generally, keep the default value. |   |                  |                   |         |             |                            |      |

| P03-07<br>2003-07   | Parameter name  | Setting method   | Valid time                                 | Default | Set range | Application category       | Unit |
|---|---|------------------|--|---------|-----------|----------------------------|------|
|   | Parameter identification rotation direction<br>InerIdRollMode | Shutdown setting | Valid immediately                          | 0       | 0 to 2    | Automatic parameter tuning | -    |
| Used to set parameters identification rotation direction. |   |                  |  |         |           |                            |      |
|   |   | Setting value    | Rotation direction                         |         |           |                            |      |
|   |   | 0                | Forward and reverse reciprocating rotation |         |           |                            |      |
|   |   | 1                | Forward one-way rotation                   |         |           |                            |      |
|   |   | 2                | Reverse one-way rotation                   |         |           |                            |      |

| P03-08<br>2003-08   | Parameter name  | Setting method      | Valid time           | Default | Set range    | Application category             | Unit |
|---|---|---------------------|----------------------|---------|--------------|----------------------------------|------|
|   | Parameter<br>identification waiting<br>time<br>InerIdWaitTime | Shutdown<br>setting | Valid<br>immediately | 1000    | 300 to 10000 | Automatic<br>parameter<br>tuning | ms   |
| During offline inertia identification, the time interval between two consecutive speed instructions |   |                     |                      |         |              |                                  |      |

## Group 2004h: Vibration Suppression

| P04-01<br>2004-01 | Parameter name  | Setting method   | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|------------------|-------------------|---------|-----------|----------------------|------|
|                   | Pulse instruction filtering method<br>PulseFilterType | Shutdown setting | Valid immediately | 0       | 0 to 1    | Position mode        | -    |

Used for setting different gain adjustment modes, the related gain parameters can be set manually or automatically according to the rigidity grade table.

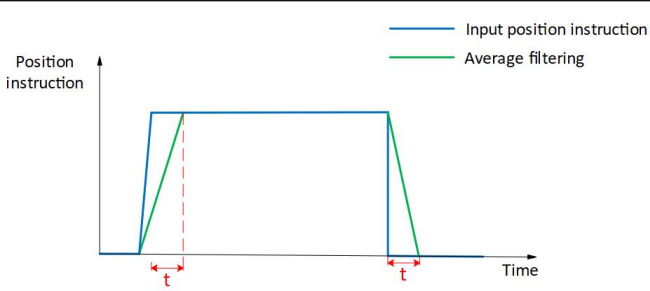
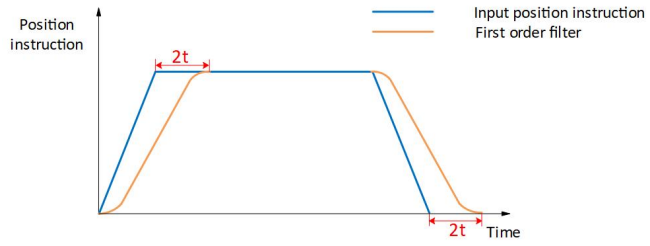
| Setting value | Filtering method                      |
|---------------|---------------------------------------|
| 0             | First-order low-pass filtering method |
| 1             | Mean filtering method                 |

| P04-02<br>2004-02 | Parameter name   | Setting method   | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|------------------|-------------------|---------|-----------|----------------------|------|
|                   | Position command first-order low-pass Filtering time constant<br>LowpassFilterTime | Shutdown setting | Valid immediately | 0       | 0~1000    | Position mode        | ms   |

It is used to set the filtering time constant of the first-order low-pass filtering mode.

|   |  |
|---|--|
| <p>The position commands is rectangular waves</p> |  |
|   |  |

| P04-03<br>2004-03 | Parameter name                       | Setting method   | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--------------------------------------|------------------|-------------------|---------|-----------|----------------------|------|
|                   | position command average filter time | Shutdown setting | Valid immediately | 0       | 0 to 128  | Position mode        | ms   |

|  |                     |  |  |  |  |  |  |
|--|---------------------|--|--|--|--|--|--|
|  | constant            |  |  |  |  |  |  |
|  | AveragingFilterTime |  |  |  |  |  |  |
| Used to set average filtering time constant. |                     |  |  |  |  |  |  |
| The position commands is rectangular waves   |                     |  |  |  |  |  |  |
| The position command is trapezoidal wave     |                     |  |  |  |  |  |  |

| P04-04  | Parameter name                               | Setting method    | Valid time        | Default | Set range | Application category  | Unit   |
|---|--|-------------------|-------------------|---------|-----------|-----------------------|--------|
| 2004-04   | Torque filter time constant<br>TogFilterTime | Operation setting | Valid immediately | 50      | 10~2500   | Vibration suppression | 0.01ms |
| Used to set torque filtering time constant. When the function code P03-03(Self-adjustment mode selection) is set to 0, the parameter is automatically set by servo. |  |                   |                   |         |           |                       |        |

| P04-05   | Parameter name                                  | Setting method    | Valid time        | Default | Set range   | Application category  | Unit |
|--|---|-------------------|-------------------|---------|-------------|-----------------------|------|
| 2004-05  | 1st notch filter frequency<br>NotchFilter1_Freq | Operation setting | Valid immediately | 300     | 250 to 5000 | Vibration suppression | Hz   |
| Use to set the center frequency of the 1st notch filter. When the function code is set to 5000, the function of the notch filter is invalid. |   |                   |                   |         |             |                       |      |

| P04-06  | Parameter name                              | Setting method    | Valid time        | Default | Set range | Application category  | Unit |
|---|---|-------------------|-------------------|---------|-----------|-----------------------|------|
| 2004-06   | 1st notch filter depth<br>NotchFilter1_Deep | Operation setting | Valid immediately | 100     | 0 to 100  | Vibration suppression | -    |
| It is use to set the notch filter depth grade (the ratio between input and output at the center frequency of the notch filter).The larger the set value of this function code is, the smaller the notch filter depth is, and the weaker the suppression effect of mechanical vibration is. However, setting too large could cause system instability. |   |                   |                   |         |           |                       |      |

| P04-07  | Parameter name         | Setting method | Valid time | Default | Set range | Application category | Unit |
|---------|------------------------|----------------|------------|---------|-----------|----------------------|------|
| 2004-07 | 1st notch filter width | Operation      | Valid      | 4       | 0 to 12   | Vibration            | -    |

|  |                   |         |             |  |  |             |  |
|--|-------------------|---------|-------------|--|--|-------------|--|
|  | NotchFilter1_Band | setting | immediately |  |  | suppression |  |
| Use to set the notch filter width grade (the ratio between input and output at the center frequency of the notch filter) |                   |         |             |  |  |             |  |

| P04-08<br>nixon2004-08   | Parameter name                                  | Setting method    | Valid time        | Default | Set range   | Application category  | Unit |
|--|---|-------------------|-------------------|---------|-------------|-----------------------|------|
|  | 2nd notch filter frequency<br>NotchFilter2_Freq | Operation setting | Valid immediately | 500     | 250 to 5000 | Vibration suppression | Hz   |
| Use to set the center frequency of the 2nd notch filter. When the function code is set to 5000, the function of the notch filter is invalid. |   |                   |                   |         |             |                       |      |

| P04-09<br>2004-09 | Parameter name                              | Setting method    | Valid time        | Default | Set range | Application category  | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|-----------------------|------|
|                   | 2nd notch filter depth<br>NotchFilter2_Deep | Operation setting | Valid immediately | 100     | 0 to 100  | Vibration suppression | -    |

| P04-10<br>2004-0A | Parameter name                              | Setting method    | Valid time        | Default | Set range | Application category  | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|-----------------------|------|
|                   | 2nd notch filter width<br>NotchFilter2_Band | Operation setting | Valid immediately | 4       | 0 to 12   | Vibration suppression | -    |

### Group 2005h: Signal Input and Output

| P05-16<br>2005-10  | Parameter name                                      | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|--|---|-------------------|-------------------|---------|-----------|----------------------|------|
|  | Rotation detection speed threshold<br>RotateSpdDtTh | Operation setting | Valid immediately | 20      | 0~1000    | Speed mode           | rpm  |
| Set the speed threshold that triggers the motor rotation signal. The motor rotation signal (TGON) is used to confirm that the motor has rotated. |   |                   |                   |         |           |                      |      |

| P05-19<br>2005-13   | Parameter name                                     | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---|--|-------------------|-------------------|---------|-----------|----------------------|------|
|   | Zero speed output signal threshold<br>SpdZeroOutTh | Operation setting | Valid immediately | 10      | 0~6000    | Speed mode           | rpm  |
| Use to set the speed threshold that triggers the motor rotation signal. Motor output zero speed signal (ZSP) means that the actual speed of the motor is close to stationary. |  |                   |                   |         |           |                      |      |



## Group 2006h: DIDO Configuration

| P06-02<br>2006-02 | Parameter name                               | Setting method    | Valid time     | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|----------------|---------|-----------|----------------------|------|
|                   | DI_1 channel function selection<br>Di1FunSel | Operation setting | Power-on again | 0       | 0~32      | DI/DO                | -    |

Set DI functions corresponding to hardware DI\_1. Refer to the following table for the functions corresponding to the set value:

| Setting value | DI channel function             | Setting value | DI channel function            |
|---------------|---------------------------------|---------------|--------------------------------|
| 0             | OFF (not used)                  | 6             | CL (deviation counter cleared) |
| 1             | SON (servo enabled)             | 8             | E-STOP (Emergency stop)        |
| 2             | A-CLR (Fault and warning clear) | 26            | HOMEORG (origin signal)        |
| 3             | POT (Forward drive prohibition) | Remaining     | None                           |
| 4             | NOT (Reverse drive prohibition) |               |                                |

If P06-02 is set to a value other than that in the preceding table, the DI port function is not require

The same DI channel function could not be allocated to multiple DI ports, otherwise servo drive will occur A-89 (duplicate DI port configuration)

| P06-03<br>2006-03 | Parameter name                            | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DI_1 channel logic selection<br>Di1LogSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

DI port input logic validity function selection

| Setting value | Content  | Specification |
|---------------|--|---------------|
| 0             | Normally open input. Active low level (switch on);     |               |
| 1             | Normally closed input. Active high level (switch off); |               |

| P06-04<br>2006-04 | Parameter name                           | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DI_1 input source selection<br>Di1SrcSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

Select the enabled DI\_1 port type

| Setting value | Port category                |
|---------------|------------------------------|
| 0             | Hardware DI_1 input terminal |

|  |   |                              |  |
|--|---|------------------------------|--|
|  | 1 | Virtual VDI_1 input terminal |  |
|--|---|------------------------------|--|

| P06-05<br>2006-05 | Parameter name                               | Setting method    | Valid time     | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|----------------|---------|-----------|----------------------|------|
|                   | DI_2 channel function selection<br>Di2FunSel | Operation setting | Power-on again | 2       | 0~32      | DI/DO                | -    |

| P06-06<br>2006-06 | Parameter name                            | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DI_2 channel logic selection<br>Di2LogSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| P06-07<br>2006-07 | Parameter name                           | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DI_2 input source selection<br>Di2SrcSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| P06-08<br>2006-08 | Parameter name                               | Setting method    | Valid time     | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|----------------|---------|-----------|----------------------|------|
|                   | DI_3 channel function selection<br>Di3FunSel | Operation setting | Power-on again | 3       | 0~32      | DI/DO                | -    |

| P06-09<br>2006-09 | Parameter name                            | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DI_3 channel logic selection<br>Di3LogSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| P06-10<br>2006-0A | Parameter name                           | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DI_3 input source selection<br>Di3SrcSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| P06-11<br>2006-0B | Parameter name        | Setting method | Valid time | Default | Set range | Application category | Unit |
|-------------------|-----------------------|----------------|------------|---------|-----------|----------------------|------|
|                   | DI_4 channel function | Operation      | Power-on   | 4       | 0~32      | DI/DO                | -    |

|  |                        |         |       |  |  |  |  |
|--|------------------------|---------|-------|--|--|--|--|
|  | selection<br>Di4FunSel | setting | again |  |  |  |  |
|--|------------------------|---------|-------|--|--|--|--|

| <b>P06-12</b><br><b>2006-0C</b> | Parameter name                            | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                                 | DI_4 channel logic selection<br>Di4LogSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| <b>P06-13</b><br><b>2006-0D</b> | Parameter name                           | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                                 | DI_4 input source selection<br>Di4SrcSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| <b>P06-14</b><br><b>2006-0E</b> | Parameter name                               | Setting method    | Valid time     | Default | Set range | Application category | Unit |
|---------------------------------|--|-------------------|----------------|---------|-----------|----------------------|------|
|                                 | DI_5 channel function selection<br>Di5FunSel | Operation setting | Power-on again | 0       | 0~32      | DI/DO                | -    |

| <b>P06-15</b><br><b>2006-0F</b> | Parameter name                            | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                                 | DI_5 channel logic selection<br>Di5LogSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| <b>P06-16</b><br><b>2006-10</b> | Parameter name                           | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                                 | DI_5 input source selection<br>Di5SrcSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| <b>P06-17</b><br><b>2006-11</b> | Parameter name                               | Setting method    | Valid time     | Default | Set range | Application category | Unit |
|---------------------------------|--|-------------------|----------------|---------|-----------|----------------------|------|
|                                 | DI_6 channel function selection<br>Di6FunSel | Operation setting | Power-on again | 0       | 0~32      | DI/DO                | -    |

| <b>P06-18</b><br><b>2006-12</b> | Parameter name | Setting method | Valid time | Default | Set range | Application category | Unit |
|---------------------------------|----------------|----------------|------------|---------|-----------|----------------------|------|
|---------------------------------|----------------|----------------|------------|---------|-----------|----------------------|------|

|  |   |                   |                   |   |        |       |   |
|--|---|-------------------|-------------------|---|--------|-------|---|
|  | DI_6 channel logic selection<br>Di6LogSel | Operation setting | Valid immediately | 0 | 0 to 1 | DI/DO | - |
|--|---|-------------------|-------------------|---|--------|-------|---|

| <b>P06-19</b><br><b>2006-13</b> | Parameter name                           | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                                 | DI_6 input source selection<br>Di6SrcSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| <b>P06-26</b><br><b>2006-1A</b> | Parameter name                               | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                                 | DO_1 channel function selection<br>Do1FunSel | Operation setting | Valid immediately | 132     | 128 ~ 148 | DI/DO                | -    |

Use to set DO functions corresponding to hardware DO\_1. Refer to the following table for the functions corresponding to the set value:

| Setting value | DI channel function            | Setting value | DI channel function                  |
|---------------|--------------------------------|---------------|--------------------------------------|
| 128           | OFF (not used)                 | 139           | T-LIMIT (Torque limit)               |
| 129           | RDY (Servo ready)              | 140           | V-LIMIT (speed limited)              |
| 130           | ALM (fault signal)             | 141           | BRK-OFF (brake output)               |
| 131           | WARN (warning signal)          | 142           | SRV-ST (Servo on state output)       |
| 132           | TGON (rotation detection)      | 145           | COM_VDO1 (communication VDO1 output) |
| 133           | ZSP (zero speed signal)        | 146           | COM_VDO1 (communication VDO1 output) |
| 134           | P-COIN (positioning completed) | 147           | COM_VDO1 (communication VDO1 output) |
| 137           | V-NEAR (speed approach)        | Others        | None                                 |
| 138           | T-COIN (torque arrival)        |               |                                      |

If P06-26 is set to a value other than that in the preceding table, the DO port function is not required

The same DO channel function could not be allocated to multiple DO ports, otherwise servo drive will occur A-90 (duplicate DO port configuration)

| <b>P06-27</b><br><b>2006-1B</b> | Parameter name                            | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---------------------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                                 | DO_1 channel logic selection<br>Do1LogSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

DO Port input logic validity function selection.

| Setting value | Content  |
|---------------|--|
| 0             | Output transistor is on when the output is valid, and output transistor is off when the output is invalid. |
| 1             | Output transistor is off when the output is valid, and output transistor is on when the output is invalid. |

| P06-28<br>2006-1C | Parameter name                               | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DO_2 channel function selection<br>Do2FunSel | Operation setting | Valid immediately | 130     | 128 ~ 148 | DI/DO                | -    |
| P06-29<br>2006-1D | Parameter name                               | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|                   | DO_2 channel logic selection<br>Do2LogSel    | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

| P06-30<br>2006-1E | Parameter name                               | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DO_3 channel function selection<br>Do3FunSel | Operation setting | Valid immediately | 129     | 128 ~ 148 | DI/DO                | -    |

| P06-31<br>2006-1F | Parameter name                            | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|---|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | DO_3 channel logic selection<br>Do3LogSel | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

## Group 200Ah: Auxiliary Function


| P10-01<br>200A-01     | Parameter name         | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-----------------------|------------------------|-------------------|-------------------|---------|-----------|----------------------|------|
|                       | JOG speed<br>SpdRefJOG | Operation setting | Valid immediately | 100     | 0~3000    | Auxiliary function   | rpm  |
| Used to set JOG speed |                        |                   |                   |         |           |                      |      |

| P10-02<br>200A-02   | Parameter name                        | Setting method   | Valid time                    | Default | Set range | Application category | Unit |
|---|---------------------------------------|------------------|-------------------------------|---------|-----------|----------------------|------|
|   | Factory value resetting<br>RstFuncFac | Shutdown setting | Valid immediately             | 0       | 0 to 1    | Auxiliary function   | -    |
| Used to restore function code parameters to factory values. |                                       |                  |                               |         |           |                      |      |
|   |                                       | Setting value    | Operational meaning           |         |           |                      |      |
|   |                                       | 0                | No operation                  |         |           |                      |      |
|   |                                       | 1                | Restore factory setting value |         |           |                      |      |

|                   |                                 |                   |                   |         |           |                      |      |
|-------------------|---------------------------------|-------------------|-------------------|---------|-----------|----------------------|------|
| P10-03<br>200A-03 | Parameter name                  | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|                   | Fault clearing<br>ServoErrClear | Operation setting | Valid immediately | 0       | 0 to 1    | Auxiliary function   | -    |

Fault reset operation selection

| Setting value | Function       | Remark   |
|---------------|----------------|--|
| 0             | No operation   | -  |
| 1             | Fault clearing | For clearable faults, after the cause of fault is removed, and write 1 to the function code, the drive will stop the fault display and enter the Rdy (or RUN) state again. |

 Note: If the servo S-ON is valid, when the fault is removed and cleared, the servo will directly enter the Run state. When performing fault clearing actions, be sure to stop sending control instructions such as pulses to ensure personal safety.

| P10-04<br>200A-04   | Parameter name   | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|---|--|-------------------|-------------------|---------|-----------|----------------------|------|
|   | Motor overload protection time factor<br>MotOLProtect_Coef | Operation setting | Valid immediately | 100     | 0 to 800  | Accessibility        | %    |
| Set the time for code A-82 (Motor overload warning) and Er.34 (Motor overload protection fault) through this function code. |  |                   |                   |         |           |                      |      |
| According to the heating condition of the motor, modifying this value can make the overload protection time                 |  |                   |                   |         |           |                      |      |

fluctuate up and down the reference value, 50 corresponds to 50%, that is, the time is reduced by half; 300 corresponds to 300%, that is, the time is extended to 3 times. When it is set to 0, the overload protection fault detection function will be shielded, so please use it carefully!

| P10-06<br>200A-06 | Parameter name                                 | Setting method   | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|------------------|-------------------|---------|-----------|----------------------|------|
|                   | Multi-turn absolute encoder reset<br>AbsEncRst | Shutdown setting | Valid immediately | 0       | 0 to 1    | Accessibility        | -    |

Used to clear the rotation number of multi-turn absolute encoder (U0-55), current position (U0-56) or clear the encoder fault alarms

| Setting value | Function   |
|---------------|--|
| 0             | No operation   |
| 1             | Clear multi-turn data, encoder current position and encoder fault alarms |

**Note:** After reset (P10-06 is set to 1), the absolute position of the encoder will change suddenly, and the mechanical origin return operation is required.

### Group 200Dh Communication Input and Output Terminal

| P13-01<br>200D-01 | Parameter name                         | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | Virtual VDI_1 input value<br>CommVdi_1 | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

When P06-04 is set to 1, DI\_1 channel logic is controlled by this function code.

| Setting value | VDI_1 input level |
|---------------|-------------------|
| 0             | Low level         |
| 1             | High level        |

| P13-02<br>200D-02 | Parameter name                         | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | Virtual VDI_2 input value<br>CommVdi_2 | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

When P06-07 is set to 1, DI\_2 channel logic is controlled by this function code.

| P13-03<br>200D-03 | Parameter name                         | Setting method    | Valid time        | Default | Set range | Application category | Unit |
|-------------------|--|-------------------|-------------------|---------|-----------|----------------------|------|
|                   | Virtual VDI_3 input value<br>CommVdi_3 | Operation setting | Valid immediately | 0       | 0 to 1    | DI/DO                | -    |

When P06-10 is set to 1, DI\_3 channel logic is control by this function code.

| P13-04<br>200D-04 | Parameter name | Setting method | Valid time | Default | Set range | Application category | Unit |
|-------------------|----------------|----------------|------------|---------|-----------|----------------------|------|
|                   |                |                |            |         |           |                      |      |



|   |  |                      |                      |   |        |       |   |
|---|--|----------------------|----------------------|---|--------|-------|---|
|   | Virtual VDI_4 input value<br>CommVdi_4 | Operation<br>setting | Valid<br>immediately | 0 | 0 to 1 | DI/DO | - |
| When P06-13 is set to 1, DI_4 channel logic is control by this function code. |  |                      |                      |   |        |       |   |

| P13-05<br>200D-05   | Parameter name                         | Setting<br>method    | Valid time           | Default | Set range | Application<br>category | Unit |
|---|--|----------------------|----------------------|---------|-----------|-------------------------|------|
|   | Virtual VDI_5 input value<br>CommVdi_5 | Operation<br>setting | Valid<br>immediately | 0       | 0 to 1    | DI/DO                   | -    |
| When P06-16 is set to 1, DI_5 channel logic is control by this function code. |  |                      |                      |         |           |                         |      |

| P13-06<br>200D-06   | Parameter name                         | Setting<br>method    | Valid time           | Default | Set range | Application<br>category | Unit |
|---|--|----------------------|----------------------|---------|-----------|-------------------------|------|
|   | Virtual VDI_6 input value<br>CommVdi_6 | Operation<br>setting | Valid<br>immediately | 0       | 0 to 1    | DI/DO                   | -    |
| When P06-19 is set to 1, DI_6 channel logic is control by this function code. |  |                      |                      |         |           |                         |      |

| P13-11<br>200D-0B   | Parameter name                             | Setting<br>method    | Valid time           | Default | Set range | Application<br>category | Unit |
|---|--|----------------------|----------------------|---------|-----------|-------------------------|------|
|   | Virtual VDO_1 output<br>value<br>CommVdo_1 | Operation<br>setting | Valid<br>immediately | 0       | 0 to 1    | DI/DO                   | -    |
| Used to set the input level logic when the DO function selected by VDO_1 is active. |  |                      |                      |         |           |                         |      |
|   |  | Setting<br>value     | VDO_1 input level    |         |           |                         |      |
|   |  | 0                    | Low level            |         |           |                         |      |
|   |  | 1                    | High level           |         |           |                         |      |

| P13-12<br>200D-0C | Parameter name                             | Setting<br>method    | Valid time           | Default | Set range | Application<br>category | Unit |
|-------------------|--|----------------------|----------------------|---------|-----------|-------------------------|------|
|                   | Virtual VDO_2 output<br>value<br>CommVdo_2 | Operation<br>setting | Valid<br>immediately | 0       | 0 to 1    | DI/DO                   | -    |

| P13-13<br>200D-0D | Parameter name                             | Setting<br>method    | Valid time           | Default | Set range | Application<br>category | Unit |
|-------------------|--|----------------------|----------------------|---------|-----------|-------------------------|------|
|                   | Virtual VDO_3 output<br>value<br>CommVdo_3 | Operation<br>setting | Valid<br>immediately | 0       | 0 to 1    | DI/DO                   | -    |

## Group 201Eh Universal Monitoring

| U0-01<br>201E-01 | Monitoring name           | Range | Category  | Panel display | Unit | Data type |
|------------------|---------------------------|-------|-----------|---------------|------|-----------|
|                  | Servo status<br>SrvStatus | 0 ~8  | Universal | Decimal       | -    | 16 Bit    |

Display the status of servo drive.

| Display value | Status                 | Display value | Status               |
|---------------|------------------------|---------------|----------------------|
| 0             | Power-on               | 5             | Servo operation      |
| 1             | Initialization         | 6             | Quick shutdown       |
| 2             | Failure-free (nF)      | 7             | Malfunction shutdown |
| 3             | Servo ready (Ry)       | 8             | Fault                |
| 4             | Wait for servo enabled |               |                      |

| U0-02<br>201E-02 | Monitoring name               | Range      | Category  | Panel display | Unit | Data type |
|------------------|-------------------------------|------------|-----------|---------------|------|-----------|
|                  | Servo motor speed<br>SpeedDis | -5000~5000 | Universal | Decimal       | rpm  | 16 Bit    |

Display the actual speed of servo drive. The accuracy is 1 rpm. The display of servo drive panel is as below.

| 500rpm display | -500rpm display |
|----------------|-----------------|
|                |                 |

| U0-03<br>201E-03 | Monitoring name                      | Range      | Category  | Panel display | Unit | Data type |
|------------------|--------------------------------------|------------|-----------|---------------|------|-----------|
|                  | Input speed<br>instruction<br>SpdCmd | -5000~5000 | Universal | Decimal       | rpm  | 16 Bit    |

Display servo input speed instruction. The accuracy is 1 rpm. The display of servo drive panel is as below.

| 3000rpm display | -3000rpm display |
|-----------------|------------------|
|                 |                  |

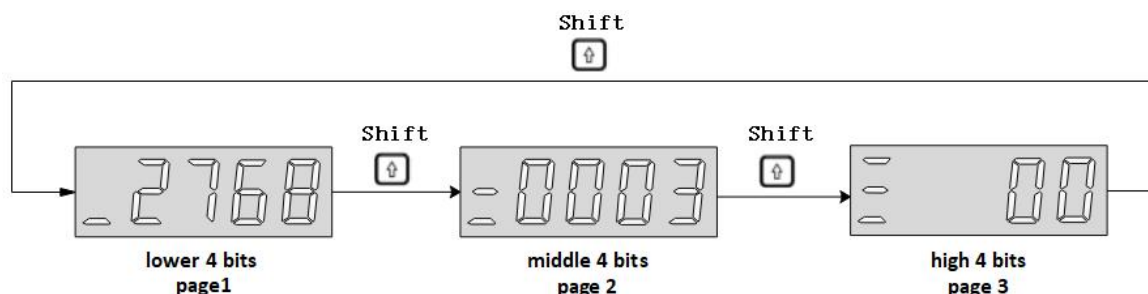
| U0-04<br>201E-04 | Monitoring name  | Range      | Category  | Panel display | Unit | Data type |
|------------------|--|------------|-----------|---------------|------|-----------|
|                  | Corresponding speed<br>of position<br>command<br>PosCmdToSpd | -5000~5000 | Universal | Decimal       | rpm  | 16 Bit    |

Display the current speed instruction value of servo drive in position mode. The accuracy is 1 rpm. The display of servo drive panel is as below.

| 3000rpm display | -3000rpm display |
|-----------------|------------------|
|                 |                  |

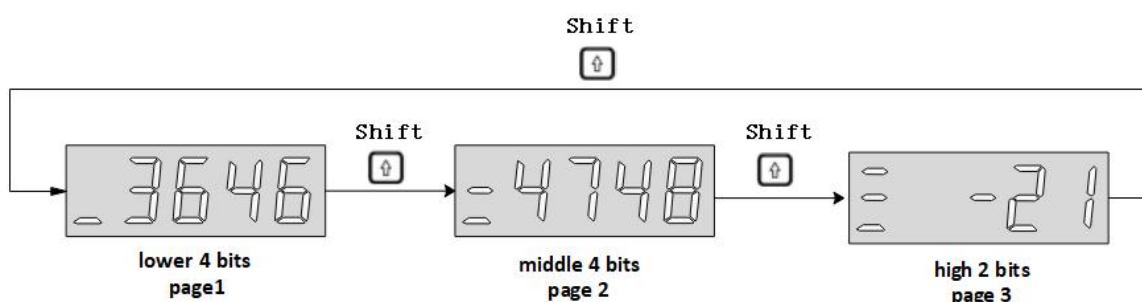
| U0-05<br>201E-05 | Monitoring name            | Range                 | Category  | Panel display | Unit                       | Data type |
|------------------|----------------------------|-----------------------|-----------|---------------|----------------------------|-----------|
|                  | Pulse deviation<br>PulsErr | $-2^{31} \sim 2^{31}$ | Universal | Decimal       | Equivalent pulse deviation | 32 Bit    |

Display pulse deviation. If U0-05 is 32768, the display of the servo drive panel is:



| U0-09<br>201E-09 | Monitoring name                             | Range                 | Category  | Panel display | Unit             | Data type |
|------------------|---|-----------------------|-----------|---------------|------------------|-----------|
|                  | Input instruction pulse number<br>PulsTotal | $-2^{31} \sim 2^{31}$ | Universal | Decimal       | Instruction unit | 32 Bit    |

Display instruction pulse number that input the servo drive. If U0-09 is set to -2147483646, the panel of servo drive is displayed as below.



| U0-13<br>201E-0D | Monitoring name  | Range                 | Category  | Panel display | Unit         | Data type |
|------------------|--|-----------------------|-----------|---------------|--------------|-----------|
|                  | Encoder cumulative position<br>(Low 32 bits)<br>EncTotal_LowWord | $-2^{31} \sim 2^{31}$ | Universal | Decimal       | Encoder unit | 32 Bit    |

| U0-15<br>201E-0F | Monitoring name  | Range                 | Category  | Panel display | Unit         | Data type |
|------------------|--|-----------------------|-----------|---------------|--------------|-----------|
|                  | Encoder cumulative position<br>(High 32 bits)<br>EncTotal_HighWord | $-2^{31} \sim 2^{31}$ | Universal | Decimal       | Encoder unit | 32 Bit    |

Display the cumulative data of encoder position. It is used with U0-13 cooperatively.

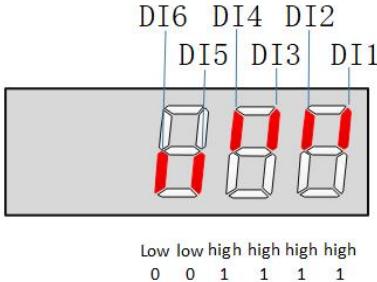
| U0-17 | Monitoring name | Range | Category | Panel display | Unit | Data type |
|-------|-----------------|-------|----------|---------------|------|-----------|
|-------|-----------------|-------|----------|---------------|------|-----------|

|                |                                   |                       |           |        |              |        |
|----------------|-----------------------------------|-----------------------|-----------|--------|--------------|--------|
| <b>201E-11</b> | DI input signal status<br>DiData1 | 00000000~<br>11111111 | Universal | Binary | Encoder unit | 16 Bit |
|----------------|-----------------------------------|-----------------------|-----------|--------|--------------|--------|

Displays the current level status of 6 DI terminals.

Display mode: The upper part of the digital tube of the servo drive panel is bright to indicate high level (represented by "1"); The lower light indicates low level (denoted by "0").

Take the DI1~DI4 terminal as the high level and DI5~DI6 as the low level as the example: the corresponding binary code is "001111", and Wecon servo control device debugging platform U0-17 displays the 0b0000 1111. The panel of servo drive is displayed as below:



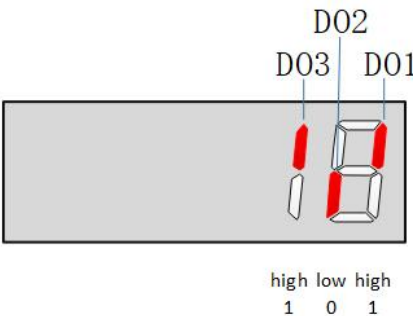
DI6 DI5 DI4 DI3 DI2 DI1  
 Low low high high high high  
 0 0 1 1 1 1

|                                | Monitoring name                       | Range                 | Category  | Panel display | Unit         | Data type |
|--------------------------------|---------------------------------------|-----------------------|-----------|---------------|--------------|-----------|
| <b>U0-19</b><br><b>201E-13</b> | DO output signal<br>status<br>DoData1 | 00000000~<br>00001111 | Universal | Binary        | Encoder unit | 16 Bit    |

Displays the current level status of 3 DO terminals.

Display mode: The upper part of the digital tube of the servo drive panel is bright to indicate high level (represented by "1"); The lower light indicates low level (denoted by "0").

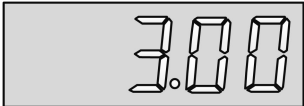
Take the DO1, DO2 and DO3 terminals as the high level and DO2 as the low level as an example. The corresponding binary code is "101", and Wecon servo upper computer debugging platform U0-17 displays the current binary value is 0b0000 0101. The panel of servo drive is displayed as below.



DO3 DO2 DO1  
 high low high  
 1 0 1

|                                | Monitoring name                                  | Range | Category  | Panel display | Unit | Data type |
|--------------------------------|--|-------|-----------|---------------|------|-----------|
| <b>U0-20</b><br><b>201E-14</b> | Real-time load<br>inertia ratio<br>InerRatioReal | -     | Universal | Decimal       | %    | 16 Bit    |

Displays the current load inertia ratio. If the load inertia ratio is 3 times (300%) , the panel of servo drive is displayed as below.

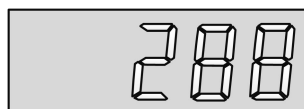


| U0-23<br>201E-17 | Monitoring name                   | Range | Category  | Panel display | Unit | Data type |
|------------------|-----------------------------------|-------|-----------|---------------|------|-----------|
|                  | Vibration Frequency<br>DisVibFreq | -     | Universal | Decimal       | Hz   | 16 Bit    |

| U0-24<br>201E-18 | Monitoring name                  | Range | Category  | Panel display | Unit | Data type |
|------------------|----------------------------------|-------|-----------|---------------|------|-----------|
|                  | Vibration Amplitude<br>DisVibMag | -     | Universal | Decimal       | rpm  | 16 Bit    |

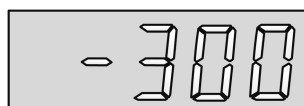
| U0-25<br>201E-19 | Monitoring name                               | Range | Category  | Panel display | Unit | Data type |
|------------------|---|-------|-----------|---------------|------|-----------|
|                  | Forward torque limit<br>value<br>PToqLimitDis | 0~300 | Universal | Decimal       | %    | 16 Bit    |

Display the set value of P01-15 (forward torque limit) of servo drive. If U0-25 is 288%, the panel of servo drive is displayed as below.



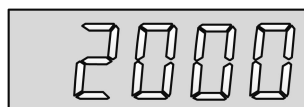
| U0-26<br>201E-1A | Monitoring name                               | Range  | Category  | Panel display | Unit | Data type |
|------------------|---|--------|-----------|---------------|------|-----------|
|                  | Reverse torque limit<br>value<br>NToqLimitDis | -300~0 | Universal | Decimal       | %    | 16 Bit    |

Display the set value of P01-16 (reverse torque limit) of servo drive. If U0-26 is 300%, the panel of servo drive is displayed as below.



| U0-27<br>201E-1B | Monitoring name                              | Range  | Category  | Panel display | Unit | Data type |
|------------------|--|--------|-----------|---------------|------|-----------|
|                  | Forward speed limit<br>value<br>PSpdLimitDis | 0~5000 | Universal | Decimal       | rpm  | 16 Bit    |

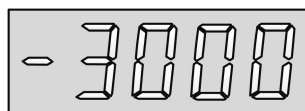
Display the set value of P01-12 (forward speed threshold) of servo drive. If P01-12 is set to 2000, the panel of servo drive is displayed as below.



| U0-28<br>201E-1C | Monitoring name                              | Range   | Category  | Panel display | Unit | Data type |
|------------------|--|---------|-----------|---------------|------|-----------|
|                  | Reverse speed limit<br>value<br>NSpdLimitDis | -5000~0 | Universal | Decimal       | rpm  | 16 Bit    |

Display the set value of P01-13 (reverse speed threshold) of servo drive. If P01-13 is set to 3000, the panel of servo drive

is displayed as below.



| U0-29<br>201E-1D | Monitoring name                  | Range | Category  | Panel display | Unit | Data type |
|------------------|----------------------------------|-------|-----------|---------------|------|-----------|
|                  | Mechanical angle<br>MachineAngle | 0~359 | Universal | Decimal       | °    | 16 Bit    |

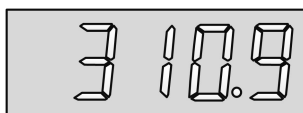
Display current mechanical angle of motor. 0 corresponds to a mechanical angle of 0 degree.

| U0-30<br>201E-1E | Monitoring name               | Range | Category  | Panel display | Unit | Data type |
|------------------|-------------------------------|-------|-----------|---------------|------|-----------|
|                  | Electrical angle<br>ElecAngle | 0~359 | Universal | Decimal       | °    | 16 Bit    |

Display current electrical angle of motor. The accuracy is 1°. When the motor rotates, the electrical angle range is 360°. When the motor is 4 poles, every time the motor is rotated one turn, it undergoes a change process of 0° to 359° for four times.

| U0-31<br>dai201E<br>-1F | Monitoring name              | Range | Category  | Panel display | Unit | Data type |
|-------------------------|------------------------------|-------|-----------|---------------|------|-----------|
|                         | Bus voltage<br>DcBusVoltDisp | -     | Universal | Decimal       | V    | 16 Bit    |

Display the DC bus voltage of the main circuit input voltage of servo drive after rectification.  
If the bus voltage is 310.9, the panel of servo drive is displayed as below.



| U0-32<br>201E-20 | Monitoring name                            | Range | Category  | Panel display | Unit | Data type |
|------------------|--|-------|-----------|---------------|------|-----------|
|                  | Radiator<br>temperature<br>Temperature_IPM | -     | Universal | Decimal       | °C   | 16 Bit    |

| U0-33<br>201E-21 | Monitoring name                                  | Range | Category  | Panel display | Unit | Data type |
|------------------|--|-------|-----------|---------------|------|-----------|
|                  | Instantaneous output<br>power<br>OutputPowerInst | -     | Universal | Decimal       | W    | 16 Bit    |

| U0-34<br>201E-22 | Monitoring name                               | Range | Category  | Panel display | Unit | Data type |
|------------------|---|-------|-----------|---------------|------|-----------|
|                  | Average output<br>power<br>OutputPowerAverage | -     | Universal | Decimal       | W    | 16 Bit    |

| U0-35 | Monitoring name | Range | Category | Panel display | Unit | Data type |
|-------|-----------------|-------|----------|---------------|------|-----------|
|-------|-----------------|-------|----------|---------------|------|-----------|

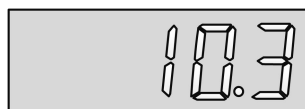
|                |  |   |           |         |   |        |
|----------------|--|---|-----------|---------|---|--------|
| <b>201E-23</b> | Total operation time<br>(hour)<br>HourTotalRun | - | Universal | Decimal | h | 16 Bit |
|----------------|--|---|-----------|---------|---|--------|

|                          | Monitoring name                                 | Range | Category  | Panel display | Unit | Data type |
|--------------------------|---|-------|-----------|---------------|------|-----------|
| <b>U0-37<br/>201E-25</b> | Total operation time<br>(minute)<br>MinTotalRun | -     | Universal | Decimal       | min  | 16 Bit    |

|                          | Monitoring name                                 | Range | Category  | Panel display | Unit | Data type |
|--------------------------|---|-------|-----------|---------------|------|-----------|
| <b>U0-38<br/>201E-26</b> | Total operation time<br>(second)<br>SecTotalRun | -     | Universal | Decimal       | s    | 16 Bit    |

|                          | Monitoring name                      | Range | Category  | Panel display | Unit | Data type |
|--------------------------|--------------------------------------|-------|-----------|---------------|------|-----------|
| <b>U0-39<br/>201E-27</b> | Load torque percentage<br>ToqOutRate | -     | Universal | Decimal       | %    | 16 Bit    |

Display current load torque percentage. If the current load torque percentage is 10.3%, the panel of servo drive is displayed as below.



|                          | Monitoring name                                    | Range | Category  | Panel display | Unit | Data type |
|--------------------------|--|-------|-----------|---------------|------|-----------|
| <b>U0-40<br/>201E-28</b> | Current operation time<br>(hour)<br>HourCurrentRun | -     | Universal | Decimal       | h    | 16 Bit    |

|                          | Monitoring name                                     | Range | Category  | Panel display | Unit | Data type |
|--------------------------|---|-------|-----------|---------------|------|-----------|
| <b>U0-42<br/>201E-2A</b> | Current operation time<br>(minute)<br>MinCurrentRun | -     | Universal | Decimal       | min  | 16 Bit    |

|                          | Monitoring name                                  | Range | Category  | Panel display | Unit | Data type |
|--------------------------|--|-------|-----------|---------------|------|-----------|
| <b>U0-43<br/>201E-2B</b> | Current operation time (second)<br>SecCurrentRun | -     | Universal | Decimal       | s    | 16 Bit    |

|                          | Monitoring name                      | Range | Category  | Panel display | Unit | Data type |
|--------------------------|--------------------------------------|-------|-----------|---------------|------|-----------|
| <b>U0-44<br/>201E-2C</b> | Instantaneous braking resistor power | -     | Universal | Decimal       | W    | 16 Bit    |

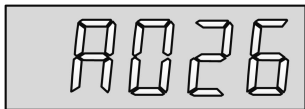
|  |            |  |  |  |  |  |
|--|------------|--|--|--|--|--|
|  | DisPwrInst |  |  |  |  |  |
|--|------------|--|--|--|--|--|

|                  | Monitoring name                | Range | Category  | Panel display | Unit | Data type |
|------------------|--------------------------------|-------|-----------|---------------|------|-----------|
| U0-46<br>201E-2E | Average braking resistor power | -     | Universal | Decimal       | W    | 16 Bit    |
|                  | DisPwrAvg                      |       |           |               |      |           |

|                  | Monitoring name | Range | Category  | Panel display | Unit  | Data type |
|------------------|-----------------|-------|-----------|---------------|-------|-----------|
| U0-48<br>201E-30 | Power-on times  | -     | Universal | Decimal       | Times | 16 Bit    |
|                  | PwrUpCount      |       |           |               |       |           |

|  | Monitoring name                                  | Range               | Category  | Panel display | Unit   | Data type |
|--|--|---------------------|-----------|---------------|--------|-----------|
| U0-50<br>201E-32   | Motor cumulative number of circles (Low 32 bits) | $0 \sim (2^{32}-1)$ | Universal | Decimal       | Circle | 32 Bit    |
|  | MotoTotal_LowWord                                |                     |           |               |        |           |
| Displays the cumulative number of revolutions of the motor. It is used with U0-13 cooperatively. |  |                     |           |               |        |           |

|                  | Monitoring name                                   | Range               | Category  | Panel display | Unit   | Data type |
|------------------|---|---------------------|-----------|---------------|--------|-----------|
| U0-51<br>201E-33 | Motor cumulative number of circles (High 32 bits) | $0 \sim (2^{32}-1)$ | Universal | Decimal       | Circle | 32 Bit    |
|                  | MotoTotal_HighWord                                |                     |           |               |        |           |

|  | Monitoring name  | Range | Category  | Panel display | Unit | Data type |
|--|------------------|-------|-----------|---------------|------|-----------|
| U0-53<br>201E-35   | Motor model code | -     | Universal | Hexadecimal   | -    | 16 Bit    |
|  | MotoModel        |       |           | I             |      |           |
| Displays the Motor Code of the current servo drive connected motor. Taking WD80M-07530S-A1F (A026) as an example, the description panel is displayed as below: |                  |       |           |               |      |           |
|   |                  |       |           |               |      |           |

|   | Monitoring name                    | Range               | Category  | Panel display | Unit         | Data type |
|---|------------------------------------|---------------------|-----------|---------------|--------------|-----------|
| U0-54<br>201E-36  | Absolute encoder position in 1 lap | $0 \sim (2^{32}-1)$ | Universal | Decimal       | Encoder unit | 32 Bit    |
|   | AbsEncln1Cycle                     |                     |           |               |              |           |
| Display the single turn position feedback value of absolute encoder |                                    |                     |           |               |              |           |

|                  | Monitoring name                    | Range      | Category  | Panel display | Unit   | Data type |
|------------------|------------------------------------|------------|-----------|---------------|--------|-----------|
| U0-55<br>201E-37 | Absolute encoder number of circles | 0 to 65535 | Universal | Decimal       | Circle | 32 Bit    |
|                  |                                    |            |           |               |        |           |



|   |                 |  |  |  |  |  |
|---|-----------------|--|--|--|--|--|
|   | AbsEncMultiTurn |  |  |  |  |  |
| Circle numbers of multi-turn absolute encoder |                 |  |  |  |  |  |

|  | Monitoring name             | Range                 | Category  | Panel display | Unit             | Data type |
|--|-----------------------------|-----------------------|-----------|---------------|------------------|-----------|
| U0-56<br>201E-38   | Multi-turn absolute value   |                       |           |               |                  |           |
|  | Current position of encoder | $-2^{31} \sim 2^{31}$ | Universal | Decimal       | Instruction unit | 32 Bit    |
|  | EncTotal_CmdUnit            |                       |           |               |                  |           |
| Display the absolute position of motor (instruction unit). It is only valid in multi-turn absolute encoder motor |                             |                       |           |               |                  |           |

**201Fh Group: Warning Monitoring**

| U1-01<br>201F-01 | Monitoring name                    | Range | Category | Panel display | Unit | Data type |
|------------------|------------------------------------|-------|----------|---------------|------|-----------|
|                  | Current error code<br>NowErrorCode | -     | Warning  | -             | -    | 16 Bit    |

If there is fault in servo drive, it would display the corresponding fault. If not, the panel displays “---”, Taking the failure of “encoder disconnection” as an example, the panel of servo drive is displayed as below.

|   |                          |
|---|--------------------------|
| Servo drive has an fault “ encoder disconnection” | Servo drive has no fault |
|   |                          |

| U1-02<br>201F-02 | Monitoring name                     | Range | Category | Panel display | Unit | Data type |
|------------------|-------------------------------------|-------|----------|---------------|------|-----------|
|                  | Current warning code<br>NowWarmCode | -     | Warning  | -             | -    | 16 Bit    |

If there is warning in servo drive, it would display the corresponding warning. If not, the panel displays “---”. Taking the warning of “duplicate DI port configuration” as an example, the panel is displayed as below.

|  |                            |
|--|----------------------------|
| Servo drive has an warning “duplicate DI port configuration” | Servo drive has no warning |
|  |                            |

| U1-03<br>201F-03 | Monitoring name                                  | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | U phase current when faults occur<br>IuWarmOccur | -     | Warning  | Decimal       | A    | 16 Bit    |

| U1-04<br>201F-04 | Monitoring name                                  | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | V phase current when faults occur<br>IvWarmOccur | -     | Warning  | Decimal       | A    | 16 Bit    |

| U1-05<br>201F-05 | Monitoring name                               | Range | Category | Panel display | Unit | Data type |
|------------------|---|-------|----------|---------------|------|-----------|
|                  | Bus voltage when faults occur<br>UdcWarmOccur | -     | Warning  | Decimal       | V    | 16 Bit    |

| U1-06<br>201F-06 | Monitoring name                                      | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | IGBT temperature when faults occur<br>T_IPMWarmOccur | -     | Warning  | Decimal       | °C   | 16 Bit    |

|                  | Monitoring name                                   | Range | Category | Panel display | Unit | Data type |
|------------------|---|-------|----------|---------------|------|-----------|
| U1-07<br>201F-07 | Torque component when faults occur<br>IqWarmOccur | -     | Warning  | Decimal       | %    | 16 Bit    |

|                  | Monitoring name                                       | Range | Category | Panel display | Unit | Data type |
|------------------|---|-------|----------|---------------|------|-----------|
| U1-08<br>201F-08 | Excitation component when faults occur<br>IdWarmOccur | -     | Warning  | Decimal       | %    | 16 Bit    |

|                  | Monitoring name   | Range | Category | Panel display | Unit         | Data type |
|------------------|---|-------|----------|---------------|--------------|-----------|
| U1-09<br>201F-09 | Position deviation when faults occur<br>PosErrWarmOccur | -     | Warning  | Decimal       | Encoder unit | 32 Bit    |

|                  | Monitoring name                               | Range | Category | Panel display | Unit | Data type |
|------------------|---|-------|----------|---------------|------|-----------|
| U1-10<br>201F-0A | Speed value when faults occur<br>SpdWarmOccur | -     | Warning  | Decimal       | rpm  | 16 Bit    |

|                  | Monitoring name                                 | Range | Category | Panel display | Unit | Data type |
|------------------|---|-------|----------|---------------|------|-----------|
| U1-11<br>201F-0B | Time when the fault occurred<br>Time 1WarmOccur | -     | Warning  | Decimal       | s    | 16 Bit    |

|                  | Monitoring name   | Range | Category | Panel display | Unit | Data type |
|------------------|---|-------|----------|---------------|------|-----------|
| U1-12<br>201F-0C | Number of faults during current operation<br>ErrCntCurRun | -     | Warning  | Decimal       | -    | 16 Bit    |

|                  | Monitoring name  | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
| U1-13<br>201F-0D | Number of warnings during current operation<br>WarmCntCurRun | -     | Warning  | Decimal       | -    | 16 Bit    |

|                  | Monitoring name                                    | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
| U1-14<br>201F-0E | Total number of historical faults<br>ErrorTotalCnt | -     | Warning  | Decimal       | -    | 16 Bit    |

| U1-15<br>201F-0F | Monitoring name                                     | Range | Category | Panel display | Unit | Data type |
|------------------|---|-------|----------|---------------|------|-----------|
|                  | Total number of historical warnings<br>WarmTotalCnt | -     | Warning  | Decimal       | -    | 16 Bit    |

| U1-16<br>201F-10   | Monitoring name                         | Range | Category | Panel display | Unit | Data type |
|--|---|-------|----------|---------------|------|-----------|
|  | Latest 1st fault code<br>ErrCodeLast1st | -     | Warning  | -             | -    | 16 Bit    |
| Display the 1st fault code of the most recent of servo drive |   |       |          |               |      |           |

| U1-17<br>201F-11 | Monitoring name                          | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Latest 2nd fault code<br>ErrCodeLast2nd  | -     | Warning  | -             | -    | 16 Bit    |
| U1-18<br>201F-12 | Monitoring name                          | Range | Category | Panel display | Unit | Data type |
|                  | Latest 3rd fault code<br>ErrCodeLast 3rd | -     | Warning  | -             | -    | 16 Bit    |

| U1-19<br>201F-13 | Monitoring name                          | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Latest 4th fault code<br>ErrCodeLast 4th | -     | Warning  | -             | -    | 16 Bit    |

| U1-20<br>201F-14 | Monitoring name                          | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Latest 5th fault code<br>ErrCodeLast 5th | -     | Warning  | -             | -    | 16 Bit    |

| U1-21<br>201F-15   | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|--|--|-------|----------|---------------|------|-----------|
|  | Latest 1st warning code<br>WarmCodeLast1st | -     | Warning  | -             | -    | 16 Bit    |
| Display the 1st warning code of the most recent of servo drive |  |       |          |               |      |           |

| U1-22<br>201F-16 | Monitoring name                              | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Latest 2nd warning code<br>WarmCodeLast 2 nd | -     | Warning  | -             | -    | 16 Bit    |

| U1-23<br>201F-17 | Monitoring name                              | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Latest 3rd warning code<br>WarmCodeLast 3 rd | -     | Warning  | -             | -    | 16 Bit    |

| U1-24<br>201F-18 | Monitoring name                              | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Latest 4th warning code<br>WarmCodeLast 4 th | -     | Warning  | -             | -    | 16 Bit    |

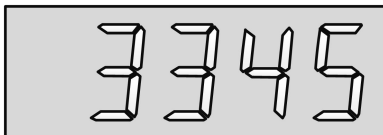
| U1-25<br>201F-18 | Monitoring name                              | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Latest 5th warning code<br>WarmCodeLast 5 th | -     | Warning  | -             | -    | 16 Bit    |

## 2020h Group: Device Monitoring

| U2-01<br>2020-01 | Monitoring name              | Range | Category | Panel display | Unit | Data type |
|------------------|------------------------------|-------|----------|---------------|------|-----------|
|                  | Product series<br>ProductSer | -     | Device   | Hexadecimal   | -    | 16 Bit    |

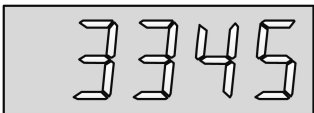
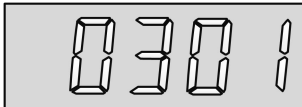
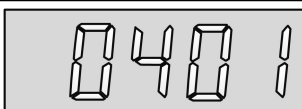


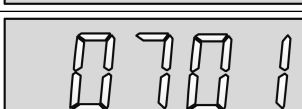
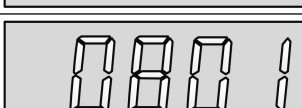
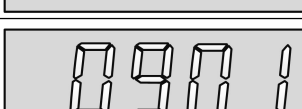
Display the product series code of servo drive.

The VD3E servo drive code is 0x3345. The panel is displayed as below:



| U2-02<br>2020-02 | Monitoring name | Range | Category | Panel display | Unit | Data type |
|------------------|-----------------|-------|----------|---------------|------|-----------|
|                  | Model<br>Model1 | -     | Device   | Hexadecimal   | -    | 16 Bit    |

Display the servo drive model.

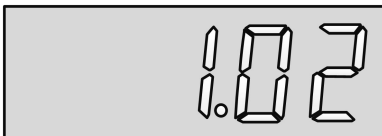
| U2-01 display   | U2-02 display  | Model        |
|---|--|--------------|
|  |   | VD3E-010SA1G |
|   |  | VD3E-014SA1G |
|   |  | VD3E-016SA1G |
|   |  | VD3E-019SA1G |
|   |  | VD3E-021SA1G |
|   |  | VD3E-025SA1G |
|   |  | VD3E-030SA1G |

| U2-03<br>2020-03 | Monitoring name | Range | Category | Panel display | Unit | Data type |
|------------------|-----------------|-------|----------|---------------|------|-----------|
|                  | Model<br>Model2 | -     | Device   | Hexadecimal   | -    | 16 Bit    |

| U2-04<br>2000-04 | Monitoring name                 | Range | Category | Panel display | Unit | Data type |
|------------------|---------------------------------|-------|----------|---------------|------|-----------|
|                  | Firmware version<br>FirewareVer | -     | Device   | Decimal       | -    | 16 Bit    |

Display the firmware version.

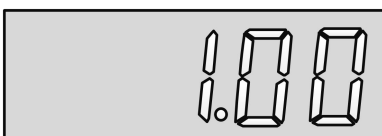
Display format: X.YY. For example, 1.02. The panel is displayed as below.



| U2-05<br>2000-05 | Monitoring name                 | Range | Category | Panel display | Unit | Data type |
|------------------|---------------------------------|-------|----------|---------------|------|-----------|
|                  | Hardware version<br>HardwareVer | -     | Device   | Decimal       | -    | 16 Bit    |

Display the Servo Hardware (FPGA) version.

Display format: X.YY, 2 decimal places. For example 1.00, the servo drive panel is displayed as follows:






| U2-06<br>2000-06 | Monitoring name                       | Range | Category | Panel display | Unit | Data type |
|------------------|---------------------------------------|-------|----------|---------------|------|-----------|
|                  | Firmware time (year)<br>ExFactoryYear | -     | Device   | Decimal       | Year | 16 Bit    |

| U2-07<br>2000-07 | Monitoring name                         | Range | Category | Panel display | Unit  | Data type |
|------------------|---|-------|----------|---------------|-------|-----------|
|                  | Firmware time (month)<br>ExFactoryMonth | -     | Device   | Decimal       | Month | 16 Bit    |

| U2-08<br>2000-08 | Monitoring name                     | Range | Category | Panel display | Unit | Data type |
|------------------|-------------------------------------|-------|----------|---------------|------|-----------|
|                  | Firmware Date (Day)<br>ExFactoryDay | -     | Device   | Decimal       | Day  | 16 Bit    |

Display the production date of display firmware.

Taking the “VD3E-014SA1G\_V1. 03 firmware production date is January 10, 2022” as an example, the drive panel is displayed as below:

| U2-06   | U2-07   | U2-08   |
|---|---|---|
|  |  |  |

| U2-09<br>2000-09 | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>1<br>DeviceSerNum1 | -     | Device   | Decimal       | -    | 16 Bit    |

| U2-10<br>2000-0A | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>2<br>DeviceSerNum2 | -     | Device   | Decimal       | -    | 16 Bit    |

| U2-11<br>2000-0B | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>3<br>DeviceSerNum3 | -     | Device   | Decimal       | -    | 16 Bit    |

| U2-12<br>2000-0C | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>4<br>DeviceSerNum4 | -     | Device   | Decimal       | -    | 16 Bit    |

| U2-13<br>2000-0D | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>5<br>DeviceSerNum5 | -     | Device   | Decimal       | -    | 16 Bit    |

| U2-14<br>2000-0E | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>6<br>DeviceSerNum6 | -     | Device   | Decimal       | -    | 16 Bit    |

| U2-15<br>2000-0F | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>7<br>DeviceSerNum7 | -     | Device   | Decimal       | -    | 16 Bit    |



| U2-16<br>2000-10 | Monitoring name                            | Range | Category | Panel display | Unit | Data type |
|------------------|--|-------|----------|---------------|------|-----------|
|                  | Device serial number<br>8<br>DeviceSerNum8 | -     | Device   | Decimal       | -    | 16 Bit    |

## 8.4 Standard Equipment Sub-protocol Area (6000h to 6FFFh)

| 603F | Parameter name          | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|-------------------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | Error Code (Error Code) | RO            | TPDO         | -                  | 0~65535            | -       | ALL              |

When the drive has an error described by DSP402 sub-protocol, 603F is consistent with DS402 protocol;  
603F is 65280 when a user-specified exception occurs on the drive.

|      | Parameter name              | Accessibility | Data mapping | Set to take effect                             | Data display range | Default | Correlation mode |
|------|-----------------------------|---------------|--------------|--|--------------------|---------|------------------|
| 6040 | Control Word (Control Word) | RW            | TPDO         | Set value takes effect at the time of shutdown | 0 ~65535           | 0       | ALL              |

Used to set control instructions. It is meaningless to assign each bit of a control word separately, and it must be combined with other bits to form a certain control instruction.

bit0 ~ bit3 have the same meaning in each control mode of servo drive, and commands must be sent in sequence before the servo drive can be switched according to CiA402 state machine.

| Bit   | Name                           | Description  |
|-------|--------------------------------|--|
| 0     | Servo operation can be started | 0: Invalid<br>1: Valid   |
| 1     | Turn on the main circuit       | 0: Invalid<br>1: Valid   |
| 2     | Quick shutdown                 | 0: Invalid<br>1: Valid   |
| 3     | Servo operation                | 0: Invalid<br>1: Valid   |
| 4 ~ 6 | Operation mode                 | It is related to the operation mode of servo drive   |
| 7     | Fault reset                    | Used to clear reset faults:<br>The rising edge of bit7 is valid;<br>bit7 is kept at 1, and other control instructions are invalid. |

| 6041 | Parameter name            | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|---------------------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | Status Word (Status Word) | RO            | TPDO         | -                  | 0 ~65535           | 0       | ALL              |

Used to display servo drive status.

| Bit | Name                                  | Description |
|-----|---------------------------------------|-------------|
| 0   | Servo ready                           | 0: Invalid  |
|     |                                       | 1: Valid    |
| 1   | Servo operation can be started        | 0: Invalid  |
|     |                                       | 1: Valid    |
| 2   | Servo operation                       | 0: Invalid  |
|     |                                       | 1: Valid    |
| 3   | fault                                 | 0: Invalid  |
|     |                                       | 1: Valid    |
| 4   | Electrical connection of main circuit | 0: Invalid  |
|     |                                       | 1: Valid    |
| 5   | Quick shutdown                        | 0: Invalid  |
|     |                                       | 1: Valid    |
| 6   | Servo is not operational              | 0: Invalid  |
|     |                                       | 1: Valid    |
| 7   | Warning                               | 0: Invalid  |
|     |                                       | 1: Valid    |
| 8   | -                                     | -           |
| 9   | Remote control                        | 0: Invalid  |
|     |                                       | 1: Valid    |
| 10  | Target arrival                        | 0: Invalid  |
|     |                                       | 1: Valid    |

Bit 0 ~ bit 9 have the same meaning in all control modes of servo drive. After the control word 6040h sends commands in sequence, the servo feeds back the determined state.

| Setting value (binary number) | Description                |
|-------------------------------|----------------------------|
| xxxx xxxx x0xx 0000           | Servo is not ready         |
| xxxx xxxx x1xx 0000           | Startup failure            |
| xxxx xxxx x01x 0001           | Servo ready                |
| xxxx xxxx x01x 0011           | start up                   |
| xxxx xxxx x01x 0111           | Servo enable               |
| xxxx xxxx x00x 0111           | Malfunction shutdown valid |

|  |                     |                      |  |
|--|---------------------|----------------------|--|
|  | xxxx xxxx x0xx 1111 | Fault response valid |  |
|  | xxxx xxxx x0xx 1000 | Fault                |  |

| 605A                             | Parameter name  | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|----------------------------------|---|---------------|--------------|--------------------|--------------------|---------|------------------|
|                                  |   |               |              |                    |                    |         |                  |
|                                  | Quick stop option selection<br>(Quick-stop option code) | RW            | NO           | -                  | 0 ~ 7              | 2       | ALL              |
| Used to set the quick stop mode. |   |               |              |                    |                    |         |                  |

| 605D                             | Parameter name                         | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|----------------------------------|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|                                  |  |               |              |                    |                    |         |                  |
|                                  | Halt option code<br>(Halt option code) | RW            | NO           | -                  | 1 ~ 3              | 1       | ALL              |
| Used to set the quick stop mode. |  |               |              |                    |                    |         |                  |

| 6060 | Parameter name                               | Accessibility | Data mapping | Set to take effect                             | Data display range | Default | Correlation mode |
|------|--|---------------|--------------|--|--------------------|---------|------------------|
|      |  |               |              |  |                    |         |                  |
|      | Servo mode selection<br>(Modes of operation) | RW            | RPDO         | Set value takes effect at the time of shutdown | 0 ~ 10             | 0       | ALL              |

Used to set the operation mode of servo drive.

| Setting value | Name                             | Remarks  |
|---------------|----------------------------------|--|
| 1             | Contour position control mode    | -  |
| 3             | Contour speed control mode       | -  |
| 4             | Contour torque control mode      | -  |
| 6             | Origin return mode               | Please refer to "7.5 Origin Regression Mode" for details                 |
| 7             | Interpolation mode               | -  |
| 8             | Cyclic Synchronous Position mode | Please refer to "7.4 Cyclic Synchronous Position mode (CSP)" for details |

|  |    |                                  |   |  |
|--|----|----------------------------------|---|--|
|  | 9  | Periodic synchronous speed mode  | - |  |
|  | 10 | Periodic synchronous torque mode | - |  |

| 6061 | Parameter name                     | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|------------------------------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | Run mode display (Modes operation) | RO            | TPDO         | -                  | 0 ~ 10             | 0       | ALL              |

Used to display the current operation mode of servo drive.

| Setting value | Name                             | Remarks  |
|---------------|----------------------------------|--|
| 1             | Contour position control mode    | -  |
| 3             | Contour speed control mode       | -  |
| 4             | Contour torque control mode      | -  |
| 6             | Origin return mode               | Please refer to "7.5 Origin Regression Mode" for details                 |
| 7             | Interpolation mode               | -  |
| 8             | Cyclic Synchronous Position mode | Please refer to "7.4 Cyclic Synchronous Position mode (CSP)" for details |
| 9             | Periodic synchronous speed mode  | -  |
| 10            | Periodic synchronous torque mode | -  |

| 6062 | Parameter name                           | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | position command (Position demand value) | RO            | TPDO         | -                  | -                  | 0       | CSP HM PP        |

It is used to reflect the position command (command unit) that has been input by the servo in the enabled state.

| 6063 | Parameter name                            | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|---|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | Position feedback (Position actual value) | RO            | TPDO         | -                  | -                  | 0       | ALL              |

Used to reflect the absolute position of motor.

| 6064 | Parameter name                               | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | Position feedback<br>(Position actual value) | RO            | TPDO         | -                  | -                  | 0       | ALL              |

Used to reflect real-time absolute position.

"Position Feedback 6064h" \* "Gear Ratio 6091h" = "Position Feedback 6063h"

| 6065 | Parameter name  | Accessibility | Data mapping | Set to take effect                             | Data display range  | Default | Correlation mode |
|------|---|---------------|--------------|--|---------------------|---------|------------------|
|      | Threshold of excessive position deviation<br>(Following error window) | RW            | RPDO         | Set value takes effect at the time of shutdown | $0 \sim (2^{31}-1)$ | 0       | CSP HM PP        |

Used to set the position deviation excess threshold.

When the position deviation exceeds the set value of 6065h, Er.36 (excessive position deviation) will occur in servo.

| 6067 | Parameter name                                  | Accessibility | Data mapping | Set to take effect                             | Data display range | Default | Correlation mode |
|------|---|---------------|--------------|--|--------------------|---------|------------------|
|      | Position arrival threshold<br>(Position window) | RW            | RPDO         | Set value takes effect at the time of shutdown | $0 \sim 2^{32}$    | 0       | CSP HM PP        |

Used to set the threshold value for position arrival.

When the position deviation is within the set value of  $\pm 6067h$ , the position is determined to have arrived.

In position mode, bit10=1 for status word 6041

| 6068 | Parameter name | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|----------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|      |                |               |              |                    |                    |         |                  |

|  |  |    |      |  |          |   |           |
|--|--|----|------|--|----------|---|-----------|
|  | Position window time<br>(Position window time) | RW | RPDO | Set value<br>takes effect<br>at the time<br>of<br>shutdown | 0 ~65535 | 0 | PP IP CSP |
| Used to set the position window time of the servo drive under the position mode. |  |    |      |  |          |   |           |

| 606C  | Parameter name                             | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|---|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|   | Actual velocity<br>(Velocity actual value) | RO            | TPDO         | -                  | -                  | -       | ALL              |
| Used to display the actual rotating speed of the servo drive. |  |               |              |                    |                    |         |                  |

| 606D   | Parameter name                                  | Accessibility | Data mapping | Set to take effect   | Data display range | Default | Correlation mode |
|--|---|---------------|--------------|--|--------------------|---------|------------------|
|  | Velocity arrival threshold<br>(Velocity window) | RW            | RPDO         | Set value<br>takes effect<br>at the time<br>of<br>shutdown | -0 ~65535          | 10      | PV               |
| Used to set the velocity arrival threshold of servo drive under the velocity mode. |   |               |              |  |                    |         |                  |

| 606E   | Parameter name                                 | Accessibility | Data mapping | Set to take effect   | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|--|--------------------|---------|------------------|
|  | Velocity window time<br>(Velocity window time) | RW            | RPDO         | Set value<br>takes effect<br>at the time<br>of<br>shutdown | -0 ~65535          | 10      | PV               |
| Used to set the velocity window time of servo drive under the velocity mode. |  |               |              |  |                    |         |                  |

| 6071 | Parameter name | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|----------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|------|----------------|---------------|--------------|--------------------|--------------------|---------|------------------|

|   |                                  |    |      |  |            |   |        |
|---|----------------------------------|----|------|--|------------|---|--------|
|   | Target torque<br>(Target torque) | RW | RPDO | Set value<br>takes effect<br>at the time<br>of<br>shutdown | -5000~5000 | 0 | PT CST |
| Used to set the target torque of servo drive under the torque mode. |                                  |    |      |  |            |   |        |

|  | Parameter name                             | Accessibility | Data mapping | Set to take effect   | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|--|--------------------|---------|------------------|
| 6072   | Maximum torque instruction<br>(Max torque) | RW            | RPDO         | Set value<br>takes effect<br>at the time<br>of<br>shutdown | 0~5000             | 0       | PT CST           |
| Used to set the maximum torque instruction of servo drive under the torque mode. |  |               |              |  |                    |         |                  |

|  | Parameter name                          | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|--|---|---------------|--------------|--------------------|--------------------|---------|------------------|
| 6074   | Torque given by user<br>(Torque demand) | RO            | TPDO         | -                  | -5000~5000         | 0       | PT CST           |
| Used to display the torque of servo drive given by user under the torque mode. |   |               |              |                    |                    |         |                  |

|   | Parameter name                         | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|---|--|---------------|--------------|--------------------|--------------------|---------|------------------|
| 6077  | Actual torque<br>(Torque actual value) | RO            | TPDO         | -                  | -5000~5000         | 0       | PT CST           |
| Used to display the actual torque value of servo drive under the torque mode. |  |               |              |                    |                    |         |                  |

|  | Parameter name                       | Accessibility | Data mapping | Set to take effect   | Data display range          | Default | Correlation mode |
|--|--------------------------------------|---------------|--------------|--|-----------------------------|---------|------------------|
| 607A   | Target location<br>(target position) | RW            | RPDO         | Set value<br>takes effect<br>at the time<br>of<br>shutdown | $(-2^{31}) \sim (2^{31}-1)$ | 0       | CSP HM PP        |
| Used to set the servo target position of the servo drive in the periodic synchronous mode (CSP). |                                      |               |              |  |                             |         |                  |



| 607C | Parameter name               | Accessibility | Data mapping | Set to take effect                             | Data display range          | Default | Correlation mode |
|------|------------------------------|---------------|--------------|--|-----------------------------|---------|------------------|
|      |                              |               |              |  |                             |         |                  |
|      | Home offset<br>(Home offset) | RW            | RPDO         | Set value takes effect at the time of shutdown | $(-2^{31}) \sim (2^{31}-1)$ | 0       | HM               |

Used to set the physical position of the mechanical Origin return mode from the motor origin in home return mode. This object dictionary only takes effect when the servo is powered on, the origin return operation is completed, and the status word 6041 is bit15=1.

| 607D | Parameter name  | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|---|---------------|--------------|--------------------|--------------------|---------|------------------|
|      |   |               |              |                    |                    |         |                  |
|      | Software absolute position limit<br>(Software position limit) | -             | -            | -                  | -                  | -       | ALL              |

Set the minimum value and maximum value of the software absolute position limit.

Minimum software absolute position limit: 607D-1h:

Maximum software absolute position limit: 607D-2h.

The internal position limit of the software is used to judge the absolute position and the internal position limit of software is meaningless when the servo does not perform the origin regression.

| 01h | Parameter name   | Accessibility | Data mapping | Set to take effect                             | Data display range        | Default   | Correlation mode |
|-----|--|---------------|--------------|--|---------------------------|-----------|------------------|
|     |  |               |              |  |                           |           |                  |
|     | Minimum software absolute position limit<br>(Min position limit) | RW            | RPDO         | Set value takes effect at the time of shutdown | $-2^{31} \sim (2^{31}-1)$ | $-2^{31}$ | ALL              |

Used to set the motor resolution.

| 02h | Parameter name   | Accessibility | Data mapping | Set to take effect                             | Data display range  | Default    | Correlation mode |
|-----|--|---------------|--------------|--|---------------------|------------|------------------|
|     |  |               |              |  |                     |            |                  |
|     | Maximum software absolute position limit<br>(Max position limit) | RW            | RPDO         | Set value takes effect at the time of shutdown | $1 \sim (2^{32}-1)$ | $2^{31}-1$ | ALL              |

Set the maximum software absolute position limit, i.e. the position that corresponds to the mechanical zero.

| 607E | Parameter name | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|----------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|      |                |               |              |                    |                    |         |                  |

|  |                        |            |   |  |        |   |     |
|--|------------------------|------------|---|--|--------|---|-----|
|  | Polarity<br>(Polarity) | RW         | TPDO  | Set value<br>takes effect<br>at the time<br>of<br>shutdown | 00~ FF | 0 | ALL |
| Set the polarity of position command, velocity instruction and torque instruction. |                        |            |   |  |        |   |     |
|  |                        | <b>Bit</b> | <b>Description</b>  |  |        |   |     |
|  |                        | 0-4        | Reserved  |  |        |   |     |
|  |                        | 5          | Polarity of torque instruction:<br>0: remain the existing value;<br>1: follow the opposite instruction.   |  |        |   |     |
|  |                        | 6          | Polarity of velocity instruction:<br>0: remain the existing value;<br>1: follow the opposite instruction. |  |        |   |     |
|  |                        | 7          | Polarity of position command:<br>0: remain the existing value;<br>1: follow the opposite instruction.     |  |        |   |     |

|  | Parameter name                                     | Accessibility | Data<br>mapping | Set to take<br>effect                                      | Data display<br>range    | Default | Correlation<br>mode |
|--|--|---------------|-----------------|--|--------------------------|---------|---------------------|
| <b>607F</b>  | Maximum profile velocity<br>(Max profile velocity) | RW            | RPDO            | Set value<br>takes effect<br>at the time<br>of<br>shutdown | 0 ~ (2 <sup>31</sup> -1) | 0       | ALL                 |
| Set the maximum operating speed of user.   |  |               |                 |  |                          |         |                     |
| The set value takes effect when the velocity instruction of slave station changes. |  |               |                 |  |                          |         |                     |

|  | Parameter name                         | Accessibility | Data<br>mapping | Set to take<br>effect                                      | Data display<br>range    | Default | Correlation<br>mode |
|--|--|---------------|-----------------|--|--------------------------|---------|---------------------|
| <b>6081</b>  | Profile velocity<br>(Profile velocity) | RW            | RPDO            | Set value<br>takes effect<br>at the time<br>of<br>shutdown | 0 ~ (2 <sup>31</sup> -1) | 100     | PP                  |
| Set the constant operating speed of the shift instruction under the profile position mode. |  |               |                 |  |                          |         |                     |
| The set value takes effect after the slave station receives the shift instruction.         |  |               |                 |  |                          |         |                     |

| 6083 | Parameter name                                 | Accessibility | Data mapping | Set to take effect                             | Data display range  | Default | Correlation mode |
|------|--|---------------|--------------|--|---------------------|---------|------------------|
|      |  |               |              |  |                     |         |                  |
|      | Profile acceleration<br>(Profile acceleration) | RW            | RPDO         | Set value takes effect at the time of shutdown | $0 \sim (2^{31}-1)$ | 100     | PP PV            |

Set the acceleration under the profile position mode and profile velocity mode.

Under the profile position mode, the set value takes effect after the position command is triggered. The minimum value of the periodic position command increment of each position loop is 1.

Under the profile velocity mode, the operation takes effect.

If the parameter value is set to be 0, it will be converted to 1 compulsorily.

| 6084 | Parameter name                                 | Accessibility | Data mapping | Set to take effect                             | Data display range  | Default | Correlation mode    |
|------|--|---------------|--------------|--|---------------------|---------|---------------------|
|      |  |               |              |  |                     |         |                     |
|      | Profile deceleration<br>(Profile deceleration) | RW            | RPDO         | Set value takes effect at the time of shutdown | $0 \sim (2^{31}-1)$ | 100     | PP PV<br>CSP<br>CSV |

Set the deceleration under the profile position mode and profile velocity mode.

Under the profile position mode, the set value takes effect after the position command is triggered.

Under the profile velocity mode, the operation takes effect.

Under PP CSV PV mode, the quick-stop option code (605A) is equal to 1 or 5, the deceleration of slope shutdown takes effect when the quick-stop command is valid;

Under PP CSV PV mode, the halt option code (605D) is equal to 1, the deceleration of slope shutdown takes effect when halt command is valid.

| 6085   | Parameter name                                       | Accessibility | Data mapping | Set to take effect                             | Data display range       | Default | Correlation mode       |
|--|--|---------------|--------------|--|--------------------------|---------|------------------------|
|  |  |               |              |  |                          |         |                        |
|  | Quick stop deceleration<br>(Quick stop deceleration) | RW            | RPDO         | Set value takes effect at the time of shutdown | 0 ~ (2 <sup>31</sup> -1) | 100     | PP PV<br>HM<br>CSP CSV |
| <p>Under PP CSV PV HM mode, the quick-stop option code (605A) is equal to 2 or 6, the deceleration of slope shutdown takes effect when the quick-stop command is valid.</p> <p>Under PP CSV PV HM mode, the halt option code (605D) is equal to 2, the deceleration of slope shutdown takes effect when the halt command is valid.</p> |  |               |              |  |                          |         |                        |

| 6086  | Parameter name                               | Accessibility | Data mapping | Set to take effect                             | Data display range                     | Default | Correlation mode |
|---|--|---------------|--------------|--|--|---------|------------------|
|   |  |               |              |  |  |         |                  |
|   | Motion profile type<br>(Motion profile type) | RW            | RPDO         | Set value takes effect at the time of shutdown | 2 <sup>15</sup> ~ (2 <sup>15</sup> -1) | 0       | --               |
| <p>Set the profile type of the motor position command or velocity command.</p> <p>0: linear</p> |  |               |              |  |  |         |                  |

| 6087   | Parameter name                 | Accessibility | Data mapping | Set to take effect                             | Data display range       | Default | Correlation mode |
|--|--------------------------------|---------------|--------------|--|--------------------------|---------|------------------|
|  |                                |               |              |  |                          |         |                  |
|  | Torque slope<br>(Torque slope) | RW            | RPDO         | Set value takes effect at the time of shutdown | 0 ~ (2 <sup>31</sup> -1) | 100     | PT<br>CST        |
| <p>Set the torque command acceleration under the profile torque mode, which means the torque command increment per second.</p> |                                |               |              |  |                          |         |                  |

| 6091 | Parameter name | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode    |
|------|----------------|---------------|--------------|--------------------|--------------------|---------|---------------------|
|      |                |               |              |                    |                    |         |                     |
|      | Gear Ratio     | -             | -            | -                  | -                  | -       | CSP HM PP<br>PV CSV |

Set range of electronic gear ratio: "0.001\* encoder resolution/10000, 4000\* encoder resolution/10000"

Beyond this set range, Er.35 (electronic gear ratio overrun) will occur in servo drive.

| 01h | Parameter name   | Accessibility | Data mapping | Set to take effect                             | Data display range       | Default | Correlation mode |
|-----|--|---------------|--------------|--|--------------------------|---------|------------------|
|     |  |               |              |  |                          |         |                  |
|     | Electronic gear ratio numerator<br>(Motor revolutions) | RW            | RPDO         | Set value takes effect at the time of shutdown | 1 ~ (2 <sup>32</sup> -1) | 1       | -                |

Used to set the motor resolution.

| 02h | Parameter name  | Accessibility | Data mapping | Set to take effect                             | Data display range       | Default | Correlation mode |
|-----|---|---------------|--------------|--|--------------------------|---------|------------------|
|     |   |               |              |  |                          |         |                  |
|     | Electronic gear ratio denominator<br>(Shaft revision) | RW            | RPDO         | Set value takes effect at the time of shutdown | 1 ~ (2 <sup>32</sup> -1) | 1       | -                |

Used to set the load shaft resolution.

| 6098 | Parameter name                      | Accessibility | Data mapping | Set to take effect                             | Data display range | Default | Correlation mode |
|------|-------------------------------------|---------------|--------------|--|--------------------|---------|------------------|
|      |                                     |               |              |  |                    |         |                  |
|      | Zero return mode<br>(Homing method) | RW            | RPDO         | Set value takes effect at the time of shutdown | 1 ~ 35             | 1       | HM               |

| Used to select homing method. |                           |                           |        |                    |                  |  |  |  |
|-------------------------------|---------------------------|---------------------------|--------|--------------------|------------------|--|--|--|
| method                        | Deceleration point        | Origin                    | method | Deceleration point | Origin           |  |  |  |
| 1                             | Reverse overtravel switch | Motor Z signal            | 19     | Origin switch      | Origin switch    |  |  |  |
| 2                             | Forward overtravel switch | Motor Z signal            | 20     | Origin switch      | Origin switch    |  |  |  |
| 3                             | Origin switch             | Motor Z signal            | 21     | Origin switch      | Origin switch    |  |  |  |
| 4                             | Origin switch             | Motor Z signal            | 22     | Origin switch      | Origin switch    |  |  |  |
| 5                             | Origin switch             | Motor Z signal            | 23     | Origin switch      | Origin switch    |  |  |  |
| 6                             | Origin switch             | Motor Z signal            | 24     | Origin switch      | Origin switch    |  |  |  |
| 7                             | Origin switch             | Motor Z signal            | 25     | Origin switch      | Origin switch    |  |  |  |
| 8                             | Origin switch             | Motor Z signal            | 26     | Origin switch      | Origin switch    |  |  |  |
| 9                             | Origin switch             | Motor Z signal            | 27     | Origin switch      | Origin switch    |  |  |  |
| 10                            | Origin switch             | Motor Z signal            | 28     | Origin switch      | Origin switch    |  |  |  |
| 11                            | Origin switch             | Motor Z signal            | 29     | Origin switch      | Origin switch    |  |  |  |
| 12                            | Origin switch             | Motor Z signal            | 30     | Origin switch      | Origin switch    |  |  |  |
| 13                            | Origin switch             | Motor Z signal            | 33     | None               | Motor Z signal   |  |  |  |
| 14                            | Origin switch             | Motor Z signal            | 34     | None               | Motor Z signal   |  |  |  |
| 17                            | Reverse overtravel switch | Reverse overtravel switch | 35     | -                  | Current position |  |  |  |
| 18                            | Forward overtravel switch | Forward overtravel switch |        |                    |                  |  |  |  |

| 6099   | Parameter name  | Accessibility | Data mapping | Set to take effect                             | Data display range        | Default | Correlation mode |
|--|---|---------------|--------------|--|---------------------------|---------|------------------|
|  | Homing speed<br>(Homing speeds)                                 | -             | -            | -  | -                         | -       | HM               |
| Used to set two speed values in homing mode  |   |               |              |  |                           |         |                  |
| 01   | Parameter name  | Accessibility | Data mapping | Set to take effect                             | Data display range        | Default | Correlation mode |
|  | Speed during search for switch (Speed during search for switch) | RW            | RPDO         | Set value takes effect at the time of shutdown | 0 ~ (2 <sup>32</sup> -1)  | 100     | HM               |
| Used to set the speed of searching deceleration point signal. It is recommended to set the speed to a higher value to prevent Er.44 (back-to-original timeout fault) caused by too long zero return time |   |               |              |  |                           |         |                  |
| 02   | Parameter name  | Accessibility | Data mapping | Set to take effect                             | Data display range        | Default | Correlation mode |
|  | Speed during search for zero (Speed during search for zero)     | RW            | RPDO         | Set value takes effect at the time             | 10 ~ (2 <sup>32</sup> -1) | 100     | HM               |

|  |  |  |  |                |  |  |  |
|--|--|--|--|----------------|--|--|--|
|  |  |  |  | of<br>shutdown |  |  |  |
| Used to set the speed of searching origin signal. It is recommended to be set to a lower value to prevent overshoot caused by high-speed stop. |  |  |  |                |  |  |  |

| 609A  | Parameter name                           | Accessibility | Data mapping | Set to take effect                             | Data display range  | Default | Correlation mode |
|---|--|---------------|--------------|--|---------------------|---------|------------------|
|   | Home acceleration<br>(Home acceleration) | RW            | RPDO         | Set value takes effect at the time of shutdown | $0 \sim (2^{32}-1)$ | 100     | HM               |
| Used to set the acceleration in homing mode. When the origin zero return operation is started, the set value takes effect. Home acceleration refers to the increment of position command (command unit) per second. |  |               |              |  |                     |         |                  |

| 60B0  | Parameter name                       | Accessibility | Data mapping | Set to take effect                             | Data display range          | Default | Correlation mode |
|---|--------------------------------------|---------------|--------------|--|-----------------------------|---------|------------------|
|   | Position offset<br>(Position offset) | RW            | RPDO         | Set value takes effect at the time of shutdown | $(-2^{31}) \sim (2^{31}-1)$ | 0       | CSP              |
| Used to set the servo position command offset amount in the Cyclic Synchronous Position mode (CSP).<br>After offset, servo target position = 607A (target position) + 60B0 (position offset). |                                      |               |              |  |                             |         |                  |

| 60B1   | Parameter name                       | Accessibility | Data mapping | Set to take effect                             | Data display range          | Default | Correlation mode |
|--|--------------------------------------|---------------|--------------|--|-----------------------------|---------|------------------|
|  | Velocity offset<br>(Velocity offset) | RW            | RPDO         | Set value takes effect at the time of shutdown | $(-2^{31}) \sim (2^{31}-1)$ | 0       | CSP/CSV          |
| Used to set the EtherCAT external velocity feedforward signal under the periodic synchronization position mode.<br>Used to set the servo torque command offset amount under the periodic synchronization velocity mode; after offset, servo target torque = 60FFh + 60B1h. |                                      |               |              |  |                             |         |                  |

| 60B2 | Parameter name                   | Accessibility | Data mapping | Set to take effect   | Data display range         | Default | Correlation mode |
|------|----------------------------------|---------------|--------------|--|----------------------------|---------|------------------|
|      | Torque offset<br>(Torque offset) | RW            | RPDO         | Set<br>value takes<br>effect at the<br>time of<br>shutdown | -5000~ 5000<br>(unit 0.1%) | 0       | CSP/CSV/CST      |

Used to set the EtherCAT external velocity feedforward signal under the periodic synchronization position mode and periodic synchronization velocity;

Used to set the servo torque command offset amount under the periodic synchronization torque mode; after offset, servo target torque=6071h+60B2h.

| 60B8 | Parameter name                                 | Accessibility | Data mapping | Set to take effect   | Data display range | Default | Correlation mode |
|------|--|---------------|--------------|--|--------------------|---------|------------------|
|      | Touch probe function<br>(Touch probe function) | RW            | RPDO         | Set<br>value takes<br>effect at the<br>time of<br>shutdown | 0~65535            | 100     | -                |

Used to set the function of probe 1 and probe 2.

| 60B9 | Parameter name                             | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | Touch probe status<br>(Touch probe status) | RO            | TPDO         | -                  | -                  | -       | -                |

Used to read the status of probe 1 and probe 2.

| 60BA | Parameter name   | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|      | Probe 1 rising edge<br>position value<br>(Touch Probe Pos1 Pos<br>Value) | RO            | TPDO         | -                  | -                  | -       | -                |

Used to display the rising edge and position value of probe 1 signal (command unit).

| 60BB | Parameter name | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|------|----------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|      |                |               |              |                    |                    |         |                  |



|   |   |    |      |   |   |   |   |
|---|---|----|------|---|---|---|---|
|   | Probe 1 falling edge position value<br>(Touch Probe Pos1 Neg Value) | RO | TPDO | - | - | - | - |
| Used to display the falling edge and position value of probe 1 signal (command unit). |   |    |      |   |   |   |   |

|  | Parameter name   | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|--------------------|--------------------|---------|------------------|
| 60BC   | Probe 2 rising edge position value<br>(Touch Probe Pos2 Pos Value) | RO            | TPDO         | -                  | -                  | -       | -                |
| Used to display the rising edge and position value of probe 2 signal (command unit). |  |               |              |                    |                    |         |                  |

|   | Parameter name  | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|---|---|---------------|--------------|--------------------|--------------------|---------|------------------|
| 60BD  | Probe 2 falling edge position value<br>(Touch Probe Pos2 Neg Value) | RO            | TPDO         | -                  | -                  | -       | -                |
| Used to display the falling edge and position value of probe 2 signal (command unit). |   |               |              |                    |                    |         |                  |

|  | Parameter name   | Accessibility | Data mapping | Set to take effect                             | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|--|--------------------|---------|------------------|
| 60E0   | Forward direction maximum torque limit<br>(Forward Direction Torque Limit Value) | RW            | RPDO         | Set value takes effect at the time of shutdown | 0~5000             | 5000    | ALL              |
| Used to set the forward direction maximum torque limit value of servo. |  |               |              |  |                    |         |                  |

|  | Parameter name   | Accessibility | Data mapping | Set to take effect                             | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|--|--------------------|---------|------------------|
| 60E1   | Reverse direction maximum torque limit<br>(Reverse Direction Torque Limit Value) | RW            | RPDO         | Set value takes effect at the time of shutdown | 0~5000             | 5000    | ALL              |
| Used to set the reverse direction maximum torque limit value of servo. |  |               |              |  |                    |         |                  |

| 60F4   | Parameter name                                       | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|--|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|  |  |               |              |                    |                    |         |                  |
|  | Position deviation<br>(Following error actual value) | RO            | TPDO         | -                  | -                  | -       | PP HM CSP        |
| Used to display following error actual value (command unit). |  |               |              |                    |                    |         |                  |

| 60FC  | Parameter name                                   | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|---|--|---------------|--------------|--------------------|--------------------|---------|------------------|
|   |  |               |              |                    |                    |         |                  |
|   | Position demand value<br>(Position demand value) | RO            | TPDO         | -                  | -                  | -       | PP HM CSP        |
| <p>Used to display the position demand value (encoder unit).</p> <p>When the servo is enabled, if there is no warning, the relationship between the position demand value (encoder unit) and position demand value (command unit) is shown as follows:</p> <p>Position demand value 60FCh (encoder unit)= position demand value 6062h (command unit)* gear ratio (6091h).</p> |  |               |              |                    |                    |         |                  |

| 60FD   | Parameter name                | Accessibility | Data mapping | Set to take effect | Data display range | Default | Correlation mode |
|--|-------------------------------|---------------|--------------|--------------------|--------------------|---------|------------------|
|  |                               |               |              |                    |                    |         |                  |
|  | Digital input (Digital Input) | RO            | TPDO         | -                  | -                  | -       | -                |
| <p>Used to reflect the current DI terminal logic of drive:</p> <p>0 -logic invalid;</p> <p>1- logic valid.</p> |                               |               |              |                    |                    |         |                  |

| 60FF  | Parameter name                      | Accessibility | Data mapping | Set to take effect | Data display range          | Default | Correlation mode |
|---|-------------------------------------|---------------|--------------|--------------------|-----------------------------|---------|------------------|
|   |                                     |               |              |                    |                             |         |                  |
|   | Profile velocity (Profile velocity) | RW            | RPDO         | -                  | $(-2^{31}) \sim (2^{31}-1)$ | 0       | PV CSV           |
| Used to set the user velocity command under the profile velocity mode and periodic synchronization velocity mode. |                                     |               |              |                    |                             |         |                  |

## Chapter 9 Adjustments

### 9.1 Overview

The servo drive needs to make the motor work without delay as much as possible in accordance with the instructions issued by the host controller. In order to make the motor run based on command as much as possible and maximize the mechanical performance, it is necessary to adjust the gain. The flow of gain adjustment is as shown in Figure 9-1.

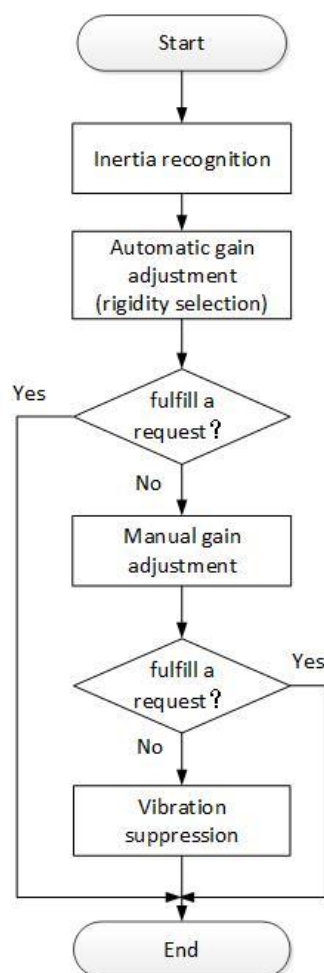


Figure 9-1 Gain adjustment process

The servo gain is composed of multiple sets of parameters such as position loop, speed loop, filter, load inertia ratio, etc., and they affect each other. In the process of setting the servo gain, the balance between the setting values of each parameter must be considered.



#### Notice

Before adjusting the gain, it is recommended to carry out inching test run first! Ensure that the servo motor can operate normally!

The gain adjustment process description is shown in Table 9-1.

Table 9-1 Gain adjustment process description

| Gain adjustment process |                           |                      | Function   | Detailed chapter |
|-------------------------|---------------------------|----------------------|--|------------------|
| 1                       | Inertia identification    |                      | Automatic load inertia ratio identification is carried out by using the upper computer debugging platform software matched with the drive. | 9.2              |
| 2                       | Automatic gain adjustment |                      | On the premise of setting the inertia ratio correctly, the drive automatically adjusts a set of matching gain parameters.                  | 9.3.1            |
| 3                       | Manual gain adjustment    | Basic gain           | On the basis of automatic gain adjustment, if the expected effect is not achieved, manually fine-tune the gain to optimize the effect.     | 9.3.2            |
|                         |                           | Feedforward gain     | The feedforward function is enabled to improve the followability.  | 9.3.3            |
| 4                       | Vibration suppression     | Mechanical resonance | The notch filter function is enabled to suppress mechanical resonance.   | 9.4.1            |

## 9.2 Inertia identification

Load inertia ratio "2003-01" refers to:

$$\text{Load inertia ratio} = \frac{\text{Total moment of inertia of mechanical load}}{\text{Moment of inertia of the motor}}$$

Load inertia ratio is an important parameter of servo system. Correct setting of load inertia ratio is helpful to complete debugging quickly.



### Notice

**Before performing online load inertia identification, the following conditions should be met:**

The maximum speed of the motor should be greater than 300rpm;

The actual load inertia ratio is 0.00~Between 100.00;

The load torque is relatively stable, and the load cannot change drastically during the measurement process;

The backlash of the load transmission mechanism is within a certain range;

**The motor's movable stroke should meet following two requirements:**

There is a movable stroke of more than 1 circle in both forward and reverse directions between the mechanical limit switches. Before performing online inertia identification, please make sure that

the limit switch has been installed on the machine, and the motor has a movable stroke of more than 1 circle respectively in the forward and reverse directions to prevent overtravel during the inertia identification process, which may cause accidents.

Meet the requirements of inertia identification turns [2003-05]; make sure that the motor's movable stroke at the stop position is greater than the set value of the number of inertia identification circles [2003-05], otherwise the maximum speed of inertia identification [2003-06] should be appropriately reduced.

During the automatic load inertia identification process, if vibration occurs, the load inertia identification should be stopped immediately.

Related function codes are shown in Table 9-2.

Table 9-2 Details of inertia identification related parameters

| Function code | Name                                    | Setting method   | valid time        | Default | Range     | Definition  | Unit   |
|---------------|---|------------------|-------------------|---------|-----------|---|--------|
| 2003-01       | Load inertia ratio                      | OperationSetting | valid immediately | 300     | 100~10000 | Set load inertia ratio, 0.00~100.00 times   | 0.01   |
| 2003-05       | Inertia identificationcircles           | Shutdown Setting | valid immediately | 2       | 1~20      | Offline load inertia identification process, motor rotation number setting  | Circle |
| 2003-06       | Maximum speed of inertia identification | Shutdown Setting | valid immediately | 1000    | 300~2000  | Set the allowable maximum motor speed instruction in offline inertia identification mode.<br>The faster the speed during inertia identification is, the more accurate the identification result will be. Generally, keep the default value. | rpm    |

|         |  |                     |                      |   |        |  |   |
|---------|--|---------------------|----------------------|---|--------|--|---|
| 2003-07 | Parameter<br>identification of<br>rotation direction | Shutdown<br>Setting | valid<br>immediately | 0 | 0 to 2 | 0: Forward and<br>reverse<br>reciprocating<br>rotation<br>1: Forward<br>one-way rotation<br>2: Reverse<br>one-way rotation | - |
|---------|--|---------------------|----------------------|---|--------|--|---|

### 9.3 Gain Adjustment

In order to optimize the responsiveness of the servo drive, the gain set in the servo drive needs to be adjusted. Servo gain needs to set multiple parameter combinations, which will affect each other. Therefore, the adjustment of servo gain must consider the relationship between each parameter.

Under normal circumstances, high-rigidity machinery can improve the response performance by increasing the servo gain. But for machines with lower rigidity, when the servo gain is increased, vibration may occur, which will affect the increase in gain. Therefore, selecting appropriate servo gain parameters can achieve higher response and stable performance.

The servo supports automatic gain adjustment and manual gain adjustment. It is recommended to use automatic gain adjustment first.

#### 9.3.1 Automatic Gain Adjustment

Automatic gain adjustment means that through the rigidity level selection function [2003-02], the servo drive will automatically generate a set of matching gain parameters to meet the requirements of rapidity and stability.

The rigidity of the servo refers to the ability of the motor rotor to resist load inertia, that is, the self-locking ability of the motor rotor. The stronger the servo rigidity is, the greater the corresponding position loop gain and speed loop gain can achieve, and the faster the response speed of the system will be.



#### Notice

Before adjusting the rigidity grade, set the appropriate load inertia ratio correctly[2003-01].

The value range of rigidity grade is between 0~ 31. The value range of the rigidity grade is between 0 and 31. Grade 0 corresponds to the weakest rigidity and minimum gain, and grade 31 corresponds to the strongest rigidity and maximum gain. According to different load types, Table 9-3 Empirical values can be used for reference.

Table 9-3 Experience reference of rigidity grade

| Rigidity grade | Load mechanism type   |
|----------------|---|
| Grade 4 to 8   | Some large machinery  |
| Grade 8 to 15  | Low rigidity applications such as belts                             |
| Grade 15 to 20 | High rigidity applications such as ball screw and direct connection |

When the function code [2003-03] is set to 0, the gain parameters are stored in the first gain by modifying the rigidity grade.

When debugging with the upper computer debugging software, automatic rigidity level measurement can be carried out, which is used to select a set of appropriate rigidity grades as operating parameters. The operation steps are as follows:

Step 1 Confirm that the servo is in the ready state, the panel displays “ry”, and the communication line is connected;

Step 2 Open the servo drive debugging software, enter the trial run interface, set the corresponding parameters, and click "Servo on";

Step 3 Click the “forward” or “reverse” button to confirm the travel range of the servo operation;

Step 4 After the "Start Identification" of inertia identification lights up, click "Start Identification" to start inertia identification to measure the load inertia.

Step 5 After the inertia identification test is completed, click "Save inertia value";

Step 6 Click "Next" at the bottom right to go to the parameter adjustment interface, click "Parameter Measurement" to start parameter measurement.

Step 7 After the parameter measurement is completed, the servo drive debugging software will pop up a confirmation window for parameter writing and saving.

There may be a short mechanical whistling sound during the test. Generally, the servo will automatically stop the test. If it does not stop automatically or in other abnormal situations, you can click the "Servo Off" button on the interface to turn off the servo, or power off the machine!

For the detailed operation of the upper computer debugging software, please refer to "Wecon SCTool Software User Manual".

Table 9-4 Self-tuning mode selection parameter details

| Index code | Name                | Setting method   | Valid time        | Default | Range  | Definition  | Unit |
|------------|---------------------|------------------|-------------------|---------|--------|---|------|
| 2003-03    | Self-adjusting mode | OperationSetting | Valid immediately | 0       | 0 to 2 | 0: Rigidity grade self-adjusting mode. Position loop gain, speed loop gain, | -    |

|  |           |  |  |  |  |  |  |
|--|-----------|--|--|--|--|--|--|
|  | selection |  |  |  |  | <p>speed loop integral time constant, torque filter parameter settings are automatically adjusted according to the rigidity grade setting.</p> <p>1: Manual setting. Users need to manually set the position loop gain, speed loop gain, speed loop integral time constant, and torque filter parameter setting</p> <p>2: Online automatic parameter self-adjusting mode (Not implemented yet)</p> |  |
|--|-----------|--|--|--|--|--|--|

### 9.3.2 Manual Gain Adjustment

When the servo automatic gain adjustment fails to achieve the desired result, you can manually fine-tune the gain to achieve better results.

The servo system consists of three control loops, from the outside to the inside are the position loop, the speed loop and the current loop. The basic control block diagram is shown as below.

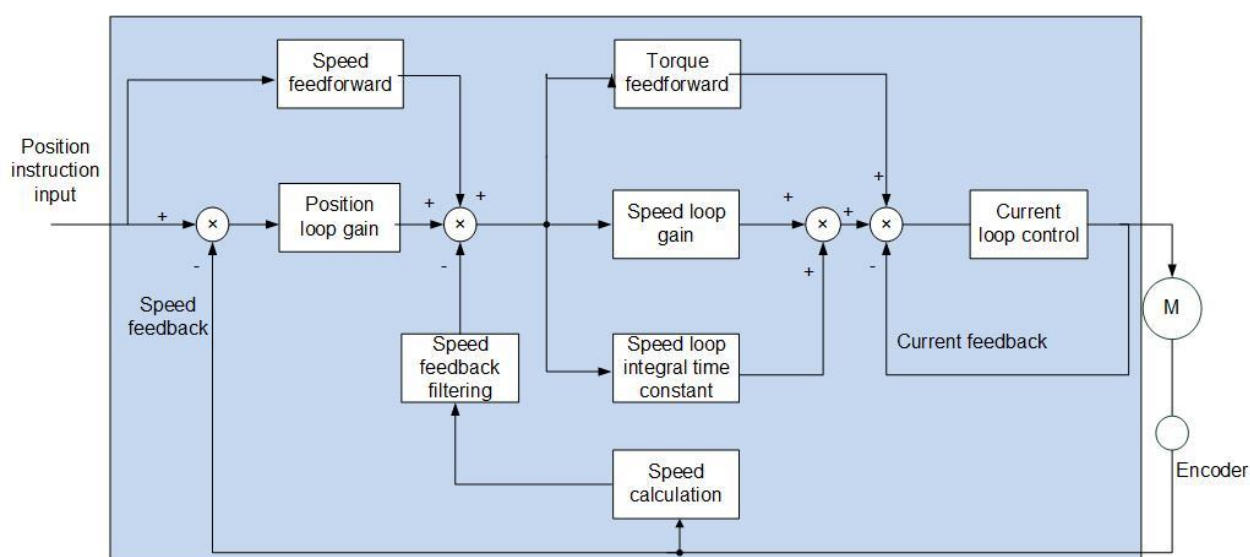


Figure 9-2 Basic block diagram of servo loop gain

The more the inner loop is, the higher the responsiveness is required. Failure to comply with this principle may lead to system instability!

The default current loop gain of the servo drive has ensured sufficient responsiveness, generally no adjustment is required, only the position loop gain, speed loop gain and other auxiliary gains need to be adjusted.

#### (1) Speed loop gain

The speed loop gain determines the highest frequency of the changing speed command that the speed loop can follow.



In the case of no vibration or noise in the mechanical system, the larger the speed loop gain setting value is, the better the response of servo system and the better the speed followability can achieve. When noise occurs in the system, reduce the speed loop gain. Related function codes are shown in Table 9-5.

Table 9-5 Details of speed loop gain parameters

| Index code | Name                | Setting method   | Valid time        | Default | Range   | Definition  | Unit  |
|------------|---------------------|------------------|-------------------|---------|---------|---|-------|
| 2002-02    | 1st speed loop gain | OperationSetting | Valid immediately | 65      | 0~35000 | Set the speed loop proportional gain to determine the responsiveness of the speed loop. | 0.1Hz |

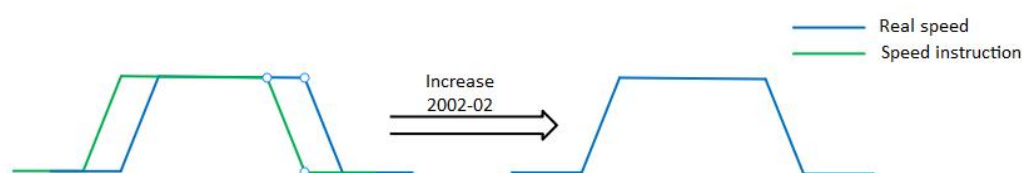


Figure 9-3 Gain Effect Schematic Diagram of Velocity Loop

## (2) Speed loop integral time constant

The speed loop integral time constant is used to eliminate the speed loop deviation. Decreasing the integral time constant of the speed loop can increase the speed of the speed following. If the set value is too small, it will easily cause speed overshoot or vibration. When the setting value of time constant is too large, the integral action will be weakened, resulting in a deviation of the speed loop. Related function codes are shown in Table 9-6.

Table 9-6 Details of speed loop integral time constant parameters

| Index code | Name                         | Setting method   | Valid time        | Default | Range     | Definition  | Unit  |
|------------|------------------------------|------------------|-------------------|---------|-----------|---|-------|
| 2002-03    | speed loop 1st integral time | OperationSetting | Valid immediately | 1000    | 100~65535 | Set the speed loop integral constant. The smaller the set value is, the stronger the integral effect will be. | 0.1ms |

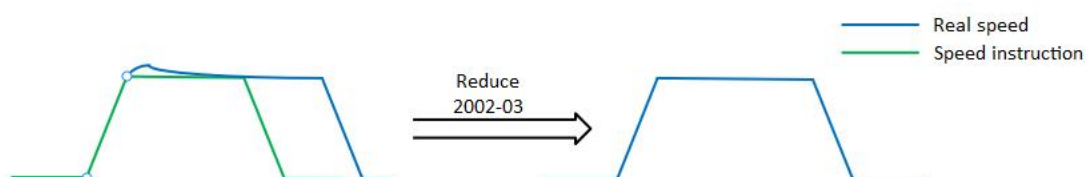


Figure 9-4 Sketch for the effect of integrating time constant of velocity loop

### (3) Position loop gain

Determine the highest frequency of the position command that the position loop can follow the change. Increasing this parameter can speed up the positioning time and improve the ability of the motor to resist external disturbances when the motor is stationary. However, if the setting value is too large, the system may be unstable and disrupted. Related function codes are shown in Table 9-7.

Table 9-7 Details of position loop gain parameters

| Index code | Name                   | Setting method   | Valid time        | Default | Range  | Definition  | Unit  |
|------------|------------------------|------------------|-------------------|---------|--------|---|-------|
| 2002-01    | 1st position loop gain | OperationSetting | Valid immediately | 400     | 0~6200 | Set the position loop proportional gain to determine the responsiveness of the position control system. | 0.1Hz |

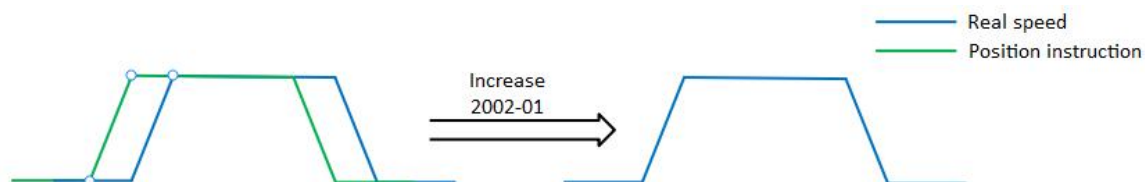


Figure 9-5 Gain effect schematic diagram of position loop

### (4) Torque instruction filter time

Selecting an appropriate torque filter time constant could suppress mechanical resonance. The larger the value of this parameter, the stronger the suppression ability. If the setting value is too large, it will decrease the current loop response frequency and cause needle movement. Related function codes are shown in Table 9-8.

Table 9-8 Details of torque filter time constant parameters

| Index code | Name                           | Setting method    | Valid time        | Default | Range   | Definition  | Unit   |
|------------|--------------------------------|-------------------|-------------------|---------|---------|---|--------|
| 2004-04    | Torque filtering time constant | Operation Setting | Valid immediately | 50      | 10~2500 | This parameter is automatically set when "Self-adjusting Mode Selection" is selected as 0 | 0.01ms |

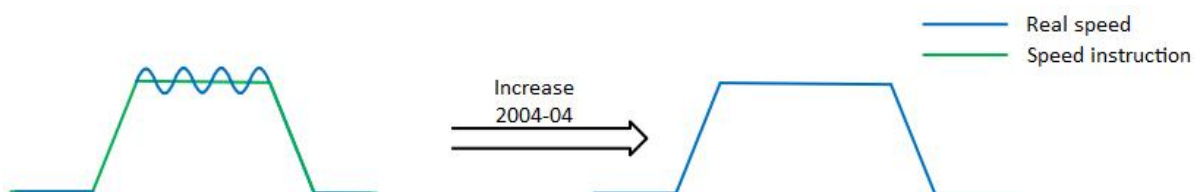


Figure 9-6 Time Constant Effect Schematic Diagram of Torque Filtering

### 9.3.3 Feedforward Gain

Speed feedforward could be used in position control mode and full closed-loop function. It could improve the response to the speed instruction and reduce the position deviation with fixed speed. Speed feedforward parameters are shown in Table 9-9. See Table 9-10 for details of torque feedforward parameters.

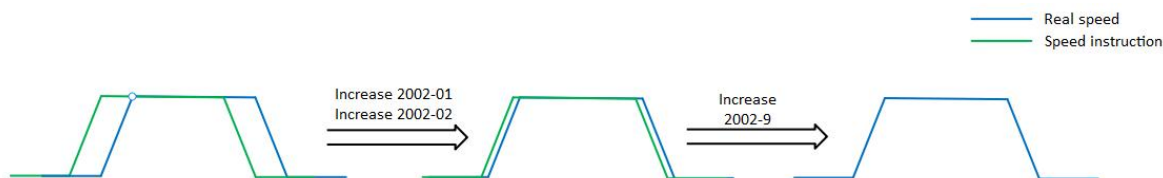


Figure 9-7 Effect schematic of speed feedforward parameters

Table 9-9 Speed feedforward parameters

| Index code | Name                                      | Adjustment description  |
|------------|---|---|
| 2002-09    | Speed feedforward gain                    | When the speed feedforward filter is set to 50 (0.5 ms), gradually increase the speed feedforward gain, and the speed feedforward will take effect. The position deviation during operation at a constant speed becomes smaller according to the value of the speed feedforward gain as shown in the following formula.<br>Position deviation (pulse instruction) = instruction speed[instruction unit/s]÷position loop gain [1/s]×(100—speed feedforward gain [%])÷100 |
| 2002-0A    | Speed feedforward filtering time constant |   |

Torque feedforward can improve torque command response and reduce position deviation during fixed acceleration and deceleration.

Table 9-10 Torque feedforward parameters

| Index code | Name                                    | Adjustment description  |
|------------|---|---|
| 2002-0B    | Torque feedforward gain                 | Increase the torque feedforward gain, because the position deviation during certain acceleration and deceleration can be close to 0, so under the ideal condition that the torque does not act when the external disturbance occurs, when driving under the trapezoidal speed model, the position deviation can be made in the entire action range close to 0. In fact, there must be external disturbance torque, so the position deviation cannot be 0. In addition, like the speed feedforward, the larger the constant of the torque feedforward filter is, the smaller the action will be, with greater positional deviation of the acceleration change point. |
| 2002-0C    | Torque feedforward filter time constant |   |

## 9.4 Mechanical Resonance Suppression

### 9.4.1 Mechanical Resonance Suppression Methods

When the mechanical rigidity is low, vibration and noise may occur due to resonance caused by shaft twisting, and it may not be possible to increase the gain setting. In this case, by using a notch filter to reduce the gain at a specific frequency, the servo gain can continue to increase after the resonance is validly suppressed. There are 2 methods to suppress mechanical resonance.

**(1) Torque instruction filter**

By setting the filter time constant, the torque instruction is attenuated in the high frequency range above the cutoff frequency, so as to achieve the expectation of suppressing mechanical resonance. The cut-off frequency of the torque instruction filter could be calculated by the following formula:

$$\text{Filter cutoff frequency } f_c(\text{Hz}) = \frac{1}{2\pi * \text{Set parameter value} * 0.001}$$

**(2) Notch filter**

The notch filter can achieve the expectation of suppressing mechanical resonance by reducing the gain at a specific frequency. When setting the notch filter correctly, the vibration can be validly suppressed. You can try to increase the servo gain. The principle of notch filter is shown in Figure Figure 9-8.

**9.4.2 Notch Filter**

VD3E Ethernet servo drive have 2 sets of notch filters, each of which has 3 parameters, namely notch frequency, width grade and depth grade.

**(1) Width grade of notch filter**

The notch width grade is used to express the ratio of the notch width to the center frequency of the notch:

$$\text{Notch filter width grade} = \frac{f_H - f_L}{f_T} \quad (9-1)$$

In formula (9-1),  $f_T$  It is the center frequency of notch filter, that is, the mechanical resonance frequency;  $f_H - f_L$  is the width of notch filter, which represents the frequency bandwidth with an amplitude attenuation rate of -3dB relative to the center frequency of notch filter.

**(2) Depth grade of notch filter**

The depth grade of notch filter represents the ratio relationship between input and output at center frequency. When the depth level of notch filter is 0, the input is completely suppressed at the center frequency; When the notch filter depth level is 100, the input is completely passable at the center frequency. Therefore, the smaller the the notch filter depth grade is set, the deeper the the notch filter depth will be, and the stronger the suppression of mechanical resonance can achieve, but it may lead to system instability, so attention should be paid when using it. Specific relationships are shown in Figure 9-9.

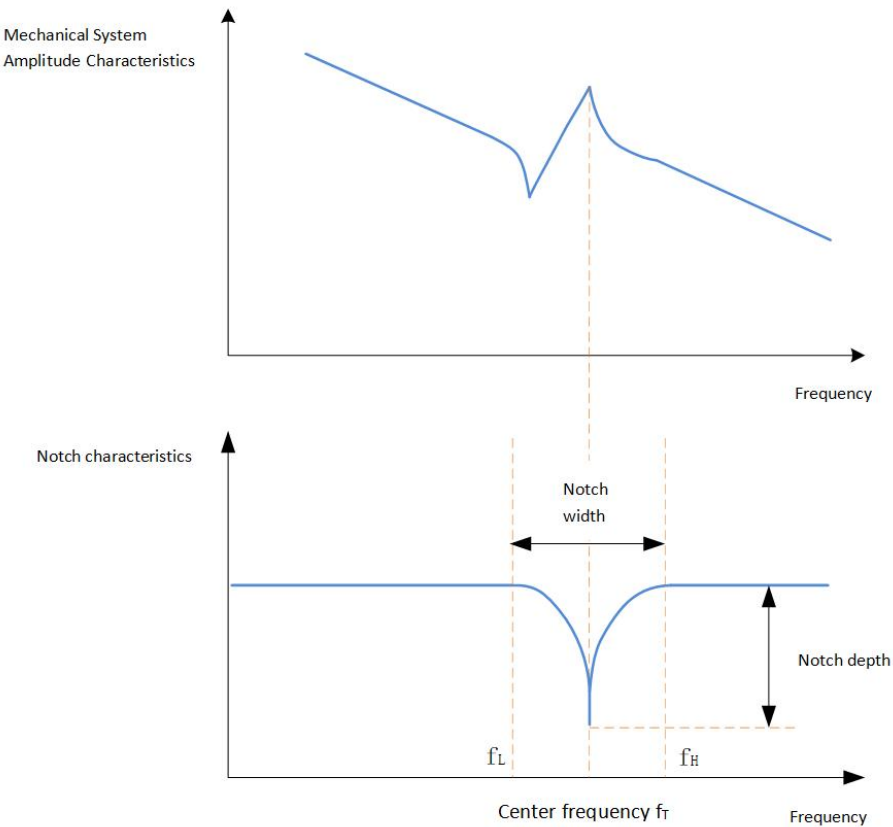


Figure 9-8 Notch characteristics, notch width and notch depth

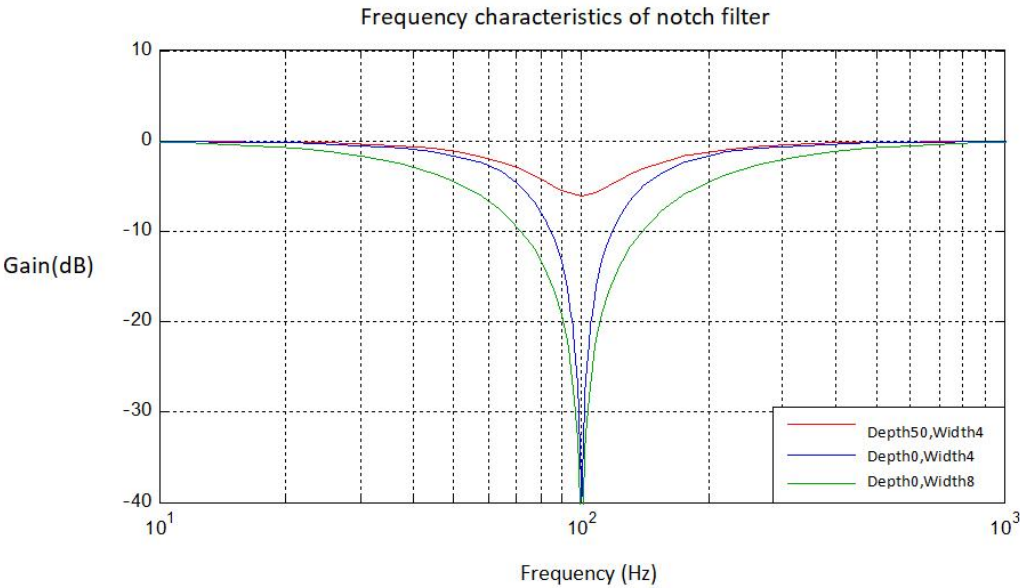


Figure 9-9 Frequency characteristics of notch filter

Table 9-11 Details of notch filter function code parameters

| Index code | Name                       | Setting method       | Valid time        | Default | Range    | Definition   | Unit |
|------------|----------------------------|----------------------|-------------------|---------|----------|--|------|
| 2004-05    | 1st notch filter frequency | Operation<br>Setting | Valid immediately | 300     | 250~5000 | Set the center frequency of the 1st notch filter.<br>When the set value is 5000, | Hz   |

Chapter 9 Adjustments

|         |                        |                   |                   |     |       |  |   |
|---------|------------------------|-------------------|-------------------|-----|-------|--|---|
|         |                        |                   |                   |     |       | the function of the notch filter is invalid. |   |
| 2004-06 | 1st notch filter depth | Operation Setting | Valid immediately | 100 | 0~100 | 0: all truncated<br>100: All passed          | - |

|         |                            |                   |                   |     |          |   |    |
|---------|----------------------------|-------------------|-------------------|-----|----------|---|----|
| 2004-07 | 1st notch filter width     | Operation Setting | Valid immediately | 4   | 0~12     | 0: 0.5 times the bandwidth<br>4: 1 times the bandwidth<br>8: 2 times the bandwidth<br>12: 4 times the bandwidth               | -  |
| 2004-08 | 2nd notch filter frequency | Operation Setting | Valid immediately | 500 | 250~5000 | Set the center frequency of the 2nd notch filter.<br>When the set value is 5000, the function of the notch filter is invalid. | Hz |
| 2004-09 | 2nd notch filter depth     | Operation Setting | Valid immediately | 100 | 0~100    | 0: all truncated<br>100: All passed   | -  |
| 2004-0A | 2nd notch filter width     | Operation Setting | Valid immediately | 4   | 0~12     | 0: 0.5 times the bandwidth<br>4: 1 times the bandwidth<br>8: 2 times the bandwidth<br>12: 4 times the bandwidth               | -  |

## Chapter 10 Malfunctions

### 10.1 Faults and Warnings Handling at Startup

| Boot process          | Fault phenomenon  | Reason  | Confirmation method            |
|-----------------------|---|---|--------------------------------|
| Power supply (L1, L3) | ① Digital tube is not bright                                    | ① The power terminal is disconnected  | ☆Rewiring                      |
|                       | ② Not display "ry"  | ② Servo drive failure   | ☆Contact technician for repair |
|                       | Panel display "Er.xx"   | Refer to"10.2 Faults and warnings handling during operation" to find the cause and troubleshoot |                                |
|                       | After troubleshooting, the servo drive panel should display"ry" |   |                                |

### 10.2 Faults and Warnings Handling During Operation

#### 10.2.1 Overview

The faults and warnings of Wecon VD3E series servo drives are graded according to their severity, which can be divided into four grades: Category 1, Category 2, Category 3, Category 4.

Severity level: Category 1 > Category 2 > Category 3 > Category 4. The specific types are as follows:

Category 2: non-clearable faults;

Category 2: clearable faults;

Category 3: clearable faults;

Category 4: clearable warning.

Among them, "clearable" means that the panel stops the fault display state by giving a "clear signal". The specific operations are as follows:

- ① Set the parameters 200A-03=1 (fault clearing) or use DI function 02 (02-A-CLR, fault and warning clearing) and set it to logic valid, which can stop the fault display on the panel.
- ② The clearing method of category 2 and category 3 clearable faults: first turn off the servo enable signal (set S-ON to OFF), then set P10-03=1 or use DI function 2.
- ③ The clearing method of category 4 of clearable warnings: set 200A-03=1 or use DI function 2.




#### Notice

For some faults and warnings, please change the settings to eliminate the causes before they can be cleared, but clearing does not mean that the changes take effect. For the changes that need the device to be



re-powered to take effect, the device must be re-powered; for the changes that need to stop the device to take effect, the servo must be disabled. After the changes take effect, the servo drive is running normally.

Associated function code:

| Function code | Name           | Setting method    | Valid time        | Default | Range  | Definition   |
|---------------|----------------|-------------------|-------------------|---------|--------|--|
| 200A-03=1     | Fault clearing | Operation Setting | Valid immediately | 0       | 0 to 1 | <p>0: No operation</p> <p>1: For clearable faults, after the cause of fault is removed, and write 1 to the function code, the drive will stop the fault display and enter the Rdy (or RUN) state again.</p> <p> <b>Note:</b> If the servo S-ON is valid, when the fault is removed and cleared, the servo will directly enter the Run state. When performing fault clearing actions, be sure to stop sending control instructions such as pulses to ensure personal safety.</p> |

Associated function number:

| Number | Name  | Function name           | Function   |
|--------|-------|-------------------------|--|
| 2      | A-CLR | Fault and warning clear | <p>Invalid, does not reset faults and warnings</p> <p>valid, reset faults and warnings</p> |

Wecon VD3E series bus servo drives have a fault recording function, which could record the latest 5 faults and the latest 5 warning names and the status parameters of servo drive when the fault or warning occurs. After the fault or warning is cleared, the fault record will still save the fault and warning.

The current fault code could be viewed through the monitoring parameter U1-01, and the current warning code could be viewed through U1-02. The monitoring U1-16 to U1-25 could display the latest 5 fault codes and warning codes. Please refer to "[201Fh Group: warning monitoring](#)".

## 10.2.2 Fault and Warning Code Table

| Category   | Fault/warning name                           | Fault code | Can it be cleared |
|------------|--|------------|-------------------|
| Category 1 | Parameter damage                             | Er.01      | No                |
| Category 1 | Parameter storage error                      | Er.02      | No                |
| Category 1 | ADC reference source error                   | Er.03      | No                |
| Category 1 | AD current sampling conversion error         | Er.04      | No                |
| Category 1 | Abnormal FPGA communication                  | Er.05      | No                |
| Category 1 | Wrong FPGA program version                   | Er.06      | No                |
| Category 1 | Clock abnormality                            | Er.07      | No                |
| Category 1 | ADC conversion is not completed              | Er.60      | No                |
| Category 1 | Internal software fault                      | Er.61      | No                |
| Category 1 | Internal software fault                      | Er.62      | No                |
| Category 1 | Internal software fault                      | Er.63      | No                |
| Category 1 | Internal software fault                      | Er.64      | No                |
| Category 1 | Internal software fault                      | Er.65      | No                |
| Category 1 | Wrong motor model                            | Er.26      | No                |
| Category 1 | Encoder Z pulse is lost                      | Er.28      | No                |
| Category 1 | Encoder UVW signal error                     | Er.30      | No                |
| Category 1 | Exceeding motor maximum speed                | Er.32      | No                |
| Category 1 | Overcurrent                                  | Er.20      | No                |
| Category 1 | The braking resistor is turned on abnormally | Er.24      | No                |
| Category 2 | Main power supply is overvoltage             | Er.22      | Yes               |
| Category 2 | Encoder is disconnected                      | Er.27      | Yes               |
| Category 2 | Power line disconnection                     | Er.31      | Yes               |

|            |  |       |     |
|------------|--|-------|-----|
| Category 2 | Abnormal network status switching                        | Er.09 | Yes |
| Category 2 | Loss of synchronization                                  | Er.10 | Yes |
| Category 2 | Unburned XML configuration file                          | Er.11 | Yes |
| Category 2 | Network initialization failed                            | Er.12 | Yes |
| Category 2 | Synchronization period setting error                     | Er.13 | Yes |
| Category 2 | Synchronization period error is too large                | Er.14 | Yes |
| Category 3 | Main power supply is undervoltage                        | Er.21 | Yes |
| Category 3 | Braking resistor is not connected                        | Er.23 | Yes |
| Category 3 | Wrong motor model  | Er.25 | Yes |
| Category 3 | Power module is over temperature                         | Er.33 | Yes |
| Category 3 | Motor overload protection                                | Er.34 | Yes |
| Category 3 | Electronic gear ratio exceeds limit                      | Er.35 | Yes |
| Category 3 | Position deviation is too large                          | Er.36 | Yes |
| Category 3 | Abnormal torque saturation                               | Er.37 | Yes |
| Category 3 | Main circuit electrical phase loss                       | Er.38 | Yes |
| Category 3 | Emergency stop   | Er.39 | Yes |
| Category 3 | Encoder battery failure                                  | Er.40 | Yes |
| Category 3 | Motor (encoder) over temperature                         | Er.41 | Yes |
| Category 3 | Encoder write failure                                    | Er.42 | Yes |
| Category 3 | Back to original timeout fault                           | Er.44 | Yes |
| Category 4 | Over speed alarm   | A-81  | Yes |
| Category 4 | Overload   | A-82  | Yes |
| Category 4 | Braking resistor is over temperature or overload         | A-83  | Yes |
| Category 4 | Parameter modification that needs to be powered on again | A-84  | Yes |

|            |  |      |     |
|------------|--|------|-----|
| Category 4 | Main circuit instantaneous power failure                           | A-88 | Yes |
| Category 4 | Duplicate DI port configuration                                    | A-89 | Yes |
| Category 4 | Duplicate DO port configuration                                    | A-90 | Yes |
| Category 4 | Parameter modification is too frequent                             | A-91 | Yes |
| Category 4 | Encoder battery voltage low warning                                | A-92 | Yes |
| Category 4 | Encoder read and write check is abnormal and frequency is too high | A-93 | Yes |

### 10.2.3 Troubleshooting

#### Er.01 Parameter damage

##### (1) Fault phenomenon

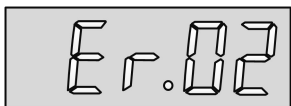
| Servo drive panel display   | Fault name       |
|---|------------------|
|  | Parameter damage |

##### (2) Troubleshooting methods

| Reason                               | Troubleshooting methods   | Handling   |
|--------------------------------------|---|--|
| EEPROM could not be read and written | Restore factory setting [200A-02=1] and power on again.If the servo drive still alarms after multiple operations, it is faulty. | ■ Contact the manufacturer's technician personnel for maintenance. |

#### Er.02 Parameter storage error

##### (1) Fault phenomenon

| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Parameter storage error |

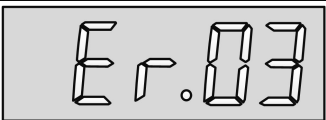
Reason: The total number of function codes or content transmission changes. It usually occur after firmware upgrade.

##### (2) Troubleshooting methods

| Reason                              | Troubleshooting methods   | Handling  |
|-------------------------------------|---|---|
| Firmware upgraded                   | ●Check whether the program has been upgraded.   | ■Repower the servo drive.   |
| Parameter read and write exceptions | ●After a parameter is changed, power it on again and check whether the parameter is saved   | ■If the parameters are not saved and the problem persists after multiple power-on, contact the manufacturer's technical personnel for repair. |
|                                     | ●Restore factory setting [200A-02=1] and power on again..If the servo drive still alarms after multiple operations, it is faulty. | ■ Contact the manufacturer's technician personnel for maintenance.  |

### Er.03 ADC reference source error

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                 |
|---|----------------------------|
|  | ADC reference source error |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods   | Handling   |
|---|---|--|
| The internal analog reference source of the drive is not accurate | Restore factory setting [200A-02=1] and power on again.If the servo drive still alarms after multiple operations, it is faulty. | ■ If servo still have alarm after powering on several times, contact the manufacturer's technicians for maintenance. |

### Er.04 AD current sampling conversion error

#### (1) Fault phenomenon

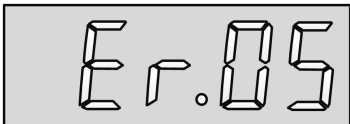
| Servo drive panel display   | Fault name                           |
|---|--------------------------------------|
|  | AD current sampling conversion error |

#### (2) Troubleshooting methods

| Reason                   | Troubleshooting methods   | Handling   |
|--------------------------|---|--|
| Current sampling timeout | Restore factory setting [200A-02=1] and power on again.If the servo drive still alarms after multiple operations, it is faulty. | ■ If servo still have alarm after powering on several times, contact the manufacturer's technicians for maintenance. |
| Current sensor error     |   |  |

### Er.05 Abnormal FPGA communication

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                  |
|---|-----------------------------|
|  | Abnormal FPGA communication |

#### (2) Troubleshooting methods

| Reason                      | Troubleshooting methods   | Handling   |
|-----------------------------|---|--|
| Abnormal FPGA communication | Restore factory setting [200A-02=1] and power on again.If the servo drive still | ■ If servo still have alarm after powering on several times, contact the |

|  |   |   |
|--|---|---|
|  | alarms after multiple operations, it is faulty. | manufacturer's technicians for maintenance. |
|--|---|---|

#### Er.06 Wrong FPGA program version

##### (1) Fault phenomenon

| Servo drive panel display   | Fault name                 |
|---|----------------------------|
|  | Wrong FPGA program version |

##### (2) Troubleshooting methods

| Reason   | Troubleshooting methods  | Handling   |
|--|--|--|
| The FPGA program version does not match firmware version | <ul style="list-style-type: none"> <li>Check whether the servo drive monitoring quantities 2020-04 (firmware version) and 2020-05 (hardware version) conform to the corresponding relationship.</li> </ul> | <ul style="list-style-type: none"> <li>Contact the manufacturer's technician to upgrade FPGA (hardware version).</li> </ul>  |
| Servo drive fault  | Restore factory setting [200A-02=1] and power on again.If the servo drive still alarms after multiple operations, it is faulty.  | <ul style="list-style-type: none"> <li>If servo still have alarm after powering on several times, contact the manufacturer's technicians for maintenance.</li> </ul> |

#### Er.07 Clock abnormality

##### (1) Fault phenomenon

| Servo drive panel display   | Fault name        |
|---|-------------------|
|  | Clock abnormality |

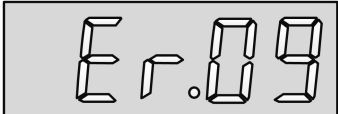
##### (2) Troubleshooting methods

| Reason                | Troubleshooting methods  | Handling  |
|-----------------------|--|---|
| External interference | <ul style="list-style-type: none"> <li>Check whether there are strong magnetic fields nearby</li> </ul>  | <ul style="list-style-type: none"> <li>Eliminate the interference of strong magnetic field nearby.</li> </ul>   |
|                       | <ul style="list-style-type: none"> <li>Check whether there are sources of interference such as power supply inverter equipment nearby</li> </ul>                       | <ul style="list-style-type: none"> <li>Try to separate the strong and weak currents in the wiring, ensure that the motor and the servo drive are well grounded, and keep away from the power cables.</li> </ul> |
| Servo drive fault     | <ul style="list-style-type: none"> <li>Restore factory setting [200A-02=1] and power on again.If the servo drive still alarms after multiple operations, it</li> </ul> | <ul style="list-style-type: none"> <li>If servo still have alarm after powering on several times, contact the manufacturer's technicians for</li> </ul>   |

|  |            |              |
|--|------------|--------------|
|  | is faulty. | maintenance. |
|--|------------|--------------|

### Er.09 Abnormal network status switching

#### (1) Fault phenomenon

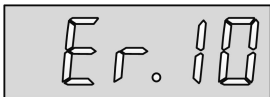
| Servo drive panel display   | Fault name                        |
|---|-----------------------------------|
|  | Abnormal network status switching |

#### (2) Troubleshooting methods

| Reason                               | Troubleshooting methods  | Handling  |
|--------------------------------------|--|---|
| Master station operation error       | ●Check whether the master station switches the network status when the servo drive is enabled. | ■ Correct the upper computer network switching program. |
| Communication cable connection error | ●Check whether the communication cable is properly connected.                                  | ■ Correctly connect the communication cable.            |

### Er.10 Loss of synchronization

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Loss of synchronization |

#### (2) Troubleshooting methods

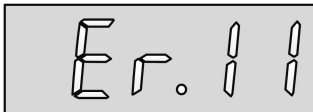
| Reason                     | Troubleshooting methods  | Handling  |
|----------------------------|--|---|
| Communication is disturbed | ●Check whether the servo drive network port is damaged. (Displayed by the first digital tube from the left of the servo drive panel) | ■ If damaged, contact the manufacturer's technician for repair.   |
|                            | ●Check whether the communication cable is damaged.   | ■ If damaged, replace a reliable communication cable, it is recommended to use twisted-pair shielded cable with shielding function. |
|                            | ●Check whether the servo drive is well grounded.   | ■The servo drive is well grounded.  |
| Communication wiring error | ●Check whether the communication connection follows the sequence of CN5 port in and CN6 port out to connect each slave station.      | ■ Correctly connect the communication cable.  |



|   |   |   |
|---|---|---|
| Master station configuration error                    | <ul style="list-style-type: none"> <li>●Cross-verification, using normal PLC for comparative test.</li> </ul> | <ul style="list-style-type: none"> <li>■If it is determined that the configuration of the master station is wrong, correct the relevant procedures of the master station configuration.</li> </ul>  |
| The upper computer is shut down or stuck              | <ul style="list-style-type: none"> <li>●Check whether the upper computer is shut down or stuck.</li> </ul>    | <ul style="list-style-type: none"> <li>■Restart the upper computer.</li> </ul>  |
| Upper computer synchronization clock is not in effect | <ul style="list-style-type: none"> <li>●Measure the synchronization period by oscilloscope.</li> </ul>        | <ul style="list-style-type: none"> <li>■ If the synchronization period is 0, first check whether the communication cable connection mode is correct, and then restart the network.</li> <li>■ If the synchronization period is not 0, contact the manufacturer's technician.</li> </ul> |
| Servo drive fault                                     | <ul style="list-style-type: none"> <li>●None of the above methods can solve the fault.</li> </ul>             | <ul style="list-style-type: none"> <li>■ If damaged, contact the manufacturer's technician for repair.</li> </ul>   |

### Er.11 Unburned XML configuration file

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                      |
|---|---------------------------------|
|  | Unburned XML configuration file |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling   |
|---|--|--|
| Unburned device configuration file (XML file) | <ul style="list-style-type: none"> <li>● After the upper computer scans the slave station, check whether the slave station ID is empty.</li> </ul> | Contact the manufacturer's technician to burn the device file.   |
| Servo drive fault                             | <ul style="list-style-type: none"> <li>●After burning the configuration file, the fault still not be solved.</li> </ul>                            | <ul style="list-style-type: none"> <li>■ Contact the manufacturer's technician personnel for maintenance.</li> </ul> |

### Er.12 Network initialization failed

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                    |
|---|-------------------------------|
|  | Network initialization failed |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling   |
|---|--|--|
| Unburned device configuration file (XML file) | <ul style="list-style-type: none"> <li>●After the upper computer scans the slave station, check whether the slave</li> </ul> | Contact the manufacturer's technician to burn the device file. |

|                   |  |  |
|-------------------|--|--|
|                   | station ID is empty.   |  |
| Servo drive fault | <ul style="list-style-type: none"> <li>After burning the configuration file, the fault still not be solved.</li> </ul> | <ul style="list-style-type: none"> <li>Contact the manufacturer's technician personnel for maintenance.</li> </ul> |

### Er.13 Synchronization period setting error

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                           |
|---|--------------------------------------|
|  | Synchronization period setting error |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling  |
|---|--|---|
| The synchronization period is not an integer multiple of 125us or 250us | <ul style="list-style-type: none"> <li>Check the setting value of synchronization period.</li> </ul> | <ul style="list-style-type: none"> <li>Modify the synchronization period to an integer multiple of 125us or 250us.</li> </ul> |

### Er.14 Synchronization period error is too large

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                                |
|---|---|
|  | Synchronization period error is too large |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling   |
|---|--|--|
| Device profile mismatch                                     | <ul style="list-style-type: none"> <li>Check whether this fault occurs every time, the device profile does not match.</li> </ul> | <ul style="list-style-type: none"> <li>Contact the manufacturer technician to update the device configuration file (XML file) inside the servo drive to the latest version.</li> </ul> |
| The synchronization period error of the controller is large | <ul style="list-style-type: none"> <li>Check whether this fault is accidental.</li> </ul>  | <ul style="list-style-type: none"> <li>Check the upper computer.</li> </ul>  |

### Er.20 Overcurrent

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name  |
|---|-------------|
|  | Overcurrent |

---


(2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling  |
|---|--|---|
| Motor power cable UVW phase sequence is wrong | ●Check whether the phase sequence of the motor power cable on the servo drive side and motor side corresponds to each other. | ■ According to the drive side UVW, connect the motor side UVW correctly.    |
| Motor power line short circuit                | ●Check whether power line UVW is short-circuited to PE   | ■ Replace the power cable.  |
| Poor connection of motor power line terminal  | ●Check whether the motor power line connection port is connected reliably  | ■ Tighten the fixing screws at the connection port of the motor power wire. |

|  |  |   |
|--|--|---|
| Abnormal braking resistance            | <ul style="list-style-type: none"> <li>●Internal brake resistance wiring error: check whether C, D are connected to the shorting cap and the contact is normal</li> </ul>  | <ul style="list-style-type: none"> <li>■Ensure reliable connection between C and D shorting cap or short wiring.</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>●External braking resistor wiring error: Check whether the external resistor is connected reliably between P+ and C.</li> </ul>   | <ul style="list-style-type: none"> <li>■The external braking resistor is reliably connecting between P + and C.</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>●Short-circuit of the built-in brake resistance: Check whether the built-in brake resistance is short-circuit.</li> </ul>   | <ul style="list-style-type: none"> <li>■Remove the shorting cap between C and D, and connect the external braking resistors with equal resistance between P + and C.</li> <li>■Contact the manufacturer's technician to replace the internal braking resistor.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>●The resistance value of the external braking resistor is too small: Test the resistance value of the external braking resistor actually selected and compare it with the recommended braking resistor to confirm whether the resistance value of the actual resistor is too small</li> </ul> | <ul style="list-style-type: none"> <li>■Select the appropriate external braking resistor.</li> </ul>  |
| Encoder wiring error; loose plug       | <ul style="list-style-type: none"> <li>●Check whether the cable port (CN2) of the encoder is properly connected</li> </ul>   | <ul style="list-style-type: none"> <li>■Tighten the fixing screws for CN2 port.</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>●Check whether the servo drive CN2 port jack is deformed</li> </ul>   | <ul style="list-style-type: none"> <li>■Replace the cable or cable port if deformed.</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>●Check whether both ends of the rectangular connector are reliably connected</li> </ul>   | <ul style="list-style-type: none"> <li>■Ensure reliable connection at both ends of rectangular connection port;</li> <li>■Replace with an encoder cable with higher connection reliability.</li> </ul>  |
| Improper parameter setting             | <ul style="list-style-type: none"> <li>●Check whether 2003-02 (load rigidity level) is set properly</li> </ul>   | <ul style="list-style-type: none"> <li>■Appropriately increase the setting value of 2003-02 (load rigidity level).</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>●Check whether the gain parameters are set properly, resulting in overshoot</li> </ul>  | <ul style="list-style-type: none"> <li>■Reasonably adjust the gain parameters.</li> </ul>   |
| Frequent acceleration and deceleration | <ul style="list-style-type: none"> <li>●Check whether frequent acceleration and deceleration are performed and whether the acceleration and deceleration time is too short.</li> </ul>   | <ul style="list-style-type: none"> <li>■Appropriately extend the acceleration and deceleration time.</li> </ul>   |
| Internal servo drive fault             | <ul style="list-style-type: none"> <li>●Cross-verification. Use the normal motor, encoder cable to connect to the servo drive, only connect the encoder cable. If the servo drive still alarm, it is failure.</li> </ul>   | <ul style="list-style-type: none"> <li>■Contact the manufacturer's technician personnel for maintenance.</li> </ul>   |

## Er.21 Main power supply undervoltage

### (1) Fault phenomenon

| Servo drive panel display   | Fault name                        |
|---|-----------------------------------|
|  | Main power supply is undervoltage |

Reason: DC bus voltage is lower than the fault value.

○220V drive: The normal value of DC bus voltage is 310V, and the fault value of DC bus voltage is 200V;

○380V drive: The normal value of DC bus voltage is 540V, and the fault value of DC bus voltage is 420V.

### (2) Troubleshooting methods

| Reason  | Troubleshooting methods   | Handling   |
|---|---|--|
| Power-off when VD3E drive is enabled                            | ●Check whether the servo drive is power off when logic is valid and the S-ON function is enabled in the 2006 Group "DIDO Function configuration parameter".   | ■ It is servo internal software logic, and the alarm will be automatically released after the indicator light of servo drive panel is off. |
| The power supply is unstable or off                             | ●Observe whether the monitoring quantity 201E-1f (bus voltage) is in the following range:<br>220V drive: 201E-1F less than 200V;<br>380V drive: 201E-1F less than 420V.   | ■ Run servo after the power supply is stable;<br>■ Increase power capacity.  |
| The voltage drops during operation of the servo drive           | ●Check whether the servo drive shares the same power supply with other high loads   | ■ Turn off other loads of the same main circuit power supply;<br>■ Servo drive uses a separate power supply                                |
| Phase loss (three phase power is running on single phase power) | ●Check if the main circuit wiring is correct<br>VD3E A: single-phase 220V input connected to L1, L3;<br>VD3E B: single-phase 220V input connected to L1, L3;<br>three-phase 220V input connected to L1, L2, L3. | ■ Correctly connect the main circuit wiring.   |

## Er.22 Main power supply overvoltage

### (1) Fault phenomenon

| Servo drive panel display | Fault name |
|---------------------------|------------|
|---------------------------|------------|

|   |                                  |
|---|----------------------------------|
| <div> </div> | Main power supply is overvoltage |
|---|----------------------------------|

Reason: DC bus voltage is higher than the fault value.

○220V drive: The normal value of DC bus voltage is 310V, and the fault value of DC bus voltage is 390V;

○380V drive: The normal value of DC bus voltage is 540V, and the fault value of DC bus voltage is 670V.

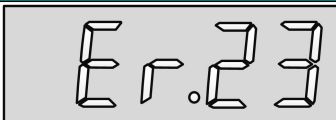
## (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling  |
|---|--|---|
| The input voltage is too high                         | <ul style="list-style-type: none"> <li>●Check that the drive input power specifications meet the specifications:<br/>220V drive: valid value : 198V ~ 242V;<br/>380V drive: valid values : 342V ~ 418V.</li> </ul> | <ul style="list-style-type: none"> <li>■Change or adjust the power supply.</li> </ul>   |
| The power supply is not stable or struck by lightning | <ul style="list-style-type: none"> <li>●Check whether the input power supply of the servo drive meets the specifications and monitor whether it has been struck by lightning.</li> </ul>                           | <ul style="list-style-type: none"> <li>■ Run servo after the power supply is stable;</li> <li>■ Connect the surge suppressor, please contact the technical personnel of the manufacturer for the specific connection method.</li> </ul> |

|   |         |  |  |
|---|---------|--|--|
| Abnormal resistance   | braking | <ul style="list-style-type: none"> <li>●Internal braking resistor wiring error: check whether C, D are connected to the shorting cap and the connection is normal</li> </ul>   | <ul style="list-style-type: none"> <li>■ Reliable connection between C and D shorting cap or short wiring.</li> </ul>  |
|   |         | <ul style="list-style-type: none"> <li>●External braking resistor wiring error: Check whether the external resistor is connected reliably between P+ and C.</li> </ul>   | <ul style="list-style-type: none"> <li>■ The external braking resistor is reliably connected between P + and C.</li> </ul>   |
|   |         | <ul style="list-style-type: none"> <li>●Short-circuit of the built-in braking resistor: Check whether the built-in braking resistor suffers from short-circuit.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Remove the shorting cap between C and D, and reliably connect the external braking resistors with equal resistance between P + and C.</li> <li>■ Contact the manufacturer's technician to replace the internal braking resistor.</li> </ul> |
|   |         | <ul style="list-style-type: none"> <li>●The resistance value of the external braking resistor is too large: Check the resistance value of the external braking resistor actually selected and compare it with the recommended braking resistor to confirm whether the resistance value of the actual resistor is too large.</li> </ul> | <ul style="list-style-type: none"> <li>■ Select the appropriate external braking resistor.</li> </ul>  |
| The motor is in a state of rapid acceleration and deceleration motion |         | <ul style="list-style-type: none"> <li>●Monitor the servo drive monitoring quantity 201E-1F (bus voltage) to confirm whether the voltage exceeds the fault value when the motor is in the deceleration section.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Ensure that the input voltage is within the specification range and increase the acceleration and deceleration time.</li> </ul>   |
| Internal servo drive fault  |         | <ul style="list-style-type: none"> <li>●The servo drive is still faulty after power on again</li> </ul>  | <ul style="list-style-type: none"> <li>■ Servo drive may be damaged, contact the manufacturer's technician for repair.</li> </ul>  |

### Er.23 Braking resistor is not connected

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                        |
|---|-----------------------------------|
|  | Braking resistor is not connected |

#### (2) Troubleshooting methods

| Reason                                 | Troubleshooting methods   | Handling  |
|--|---|---|
| Internal braking resistor wiring error | <ul style="list-style-type: none"> <li>●Check whether C, D are connected to the shorting cap and the connection is</li> </ul> | <ul style="list-style-type: none"> <li>■ When internal braking resistors are used, ensure the shorting caps or short</li> </ul> |

|  |   |   |
|--|---|---|
|  | normal  | wires are reliably connected between C and D.   |
| External braking resistor wiring error | <ul style="list-style-type: none"> <li>● Check whether the external resistor is connected reliably between P+ and C.</li> </ul>           | <ul style="list-style-type: none"> <li>■ When external braking resistors are used, ensure the external resistors are reliably strung between P + and C.</li> </ul>  |
| Internal braking resistor damaged      | <ul style="list-style-type: none"> <li>● The servo drive is powered off. Detect whether the resistance between P+ and D is 50Ω</li> </ul> | <ul style="list-style-type: none"> <li>■ Contact the manufacturer's technician to replace the internal braking resistor.</li> <li>■ Use the external braking resistor and change the relevant parameters in servo drive 2000 group "basic settings".</li> </ul> |



## Er.24 Braking resistor turns on abnormally

### (1) Fault phenomenon

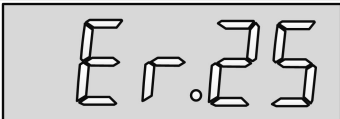
| Servo drive panel display   | Fault name                                   |
|---|--|
|  | The braking resistor is turned on abnormally |

### (2) Troubleshooting methods

| Reason                                   | Troubleshooting methods                               | Handling   |
|--|---|--|
| Internal hardware of servo drive damaged | ●The servo drive is still faulty after power on again | ■ Contact the manufacturer's technician for maintenance. |

## Er.25 Braking resistor resistance is too large

### (1) Fault phenomenon

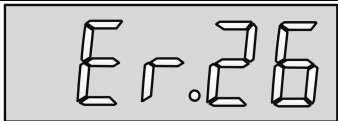
| Servo drive panel display  | Fault name                               |
|--|--|
|  | Braking resistor resistance is too large |

### (2) Troubleshooting methods

| Reason   | Troubleshooting methods  | Handling   |
|--|--|--|
| The resistance value of the external braking resistor is large | ●Check the resistance value of the external braking resistor actually selected and compare it with the recommended braking resistor to confirm whether the resistance value of the actual resistor is too large. | ■ Use an appropriate external braking resistor.                                      |
| Improper parameter setting                                     | ●Check whether the value of servo drive 2000-0A (external brake resistance) is set too high  | ■ Reasonably set the parameter value of 2000-0A (external braking resistance value). |

## Er.26 Wrong motor model

### (1) Fault phenomenon

| Servo drive panel display   | Fault name        |
|---|-------------------|
|  | Wrong motor model |

### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling   |
|---|--|--|
| The motor is not supported by the servo drive | ●Check whether the servo drive model supports the motor              | ■ Contact the manufacturer's technician to obtain the appropriate servo drive model and motor model. |
| Wrong motor model                             | ●Check whether the Motor Code is consistent with the motor nameplate | ■ Contact technician to record the motor Motor Code  |

## Er.27 Encoder disconnection

### (1) Fault phenomenon


| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Encoder is disconnected |

### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling   |
|---|--|--|
| Poor contact on CN2 port                                    | ●Check whether the cable port (CN2) of the encoder is properly connected     | ■ Tighten the fixing screws for CN2 port.  |
|   | ●Check whether the servo drive CN2 port jack is deformed                     | ■ Replace the cable or cable port if deformed.   |
| Poor contact on adapter port (Rectangular connection cable) | ●Check whether both ends of the rectangular connector are reliably connected | ■ Ensure reliable connection at both ends of rectangular connection port;<br>■ Replace with an encoder cable with higher connection reliability. |
| Wrong encoder cable wiring                                  | ●Check whether the both ends of the encoder cable are correctly connected    | ■ Adjust the wiring according to the corresponding relationship of pins;<br>■ Preferably use the standard encoder cable of the manufacturer.     |

## Er.28 Encoder Z pulse lost

### (1) Fault phenomenon

| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Encoder Z pulse is lost |

### (2) Troubleshooting methods

| Reason                | Troubleshooting methods  | Handling   |
|-----------------------|--|--|
| Wrong motor model     | ●Check whether the servo drive model supports the motor  | ■ Contact the manufacturer's technician to obtain the appropriate servo drive model and motor model.   |
| External interference | ●Check whether there are strong magnetic fields nearby   | ■ Eliminate the interference of strong magnetic field nearby.  |
|                       | ●Check whether there are sources of interference such as power supply inverter equipment nearby  | ■ Try to separate the strong and weak currents in the wiring, ensure that the motor and the servo drive are well grounded, and keep away from the power cables.    |
| Encoder fault         | ●Manually rotate the motor shaft counterclockwise or clockwise to observe whether the monitoring quantity U0-30 (electrical angle) changes regularly | ■ If the value of U0-30 (electric angle) changes abruptly or does not change, there may be a problem with the encoder itself. Please replace the motor or encoder. |

## Er.30 Encoder UVW signal error

### (1) Fault phenomenon

| Servo drive panel display   | Fault name               |
|---|--------------------------|
|  | Encoder UVW signal error |

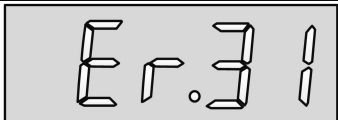
### (2) Troubleshooting methods

| Reason                | Troubleshooting methods   | Handling  |
|-----------------------|---|---|
| External interference | ●Check that the motor and servo drive are well grounded                                 | ■ Ensure the motor and servo drive are well grounded.               |
| Encoder cable fault   | ●Cross-verification. Use the normal motor, encoder cable to connect to the servo drive. | ■ Replace with an encoder cable with higher connection reliability. |
| Servo drive fault     | ●The servo drive is still faulty after  | ■ Contact the manufacturer's technician for                         |

|  |                |              |
|--|----------------|--------------|
|  | power on again | maintenance. |
|--|----------------|--------------|

### Er.31 Power line disconnection

#### (1) Fault phenomenon

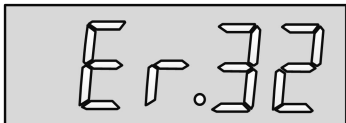
| Servo drive panel display   | Fault name               |
|---|--------------------------|
|  | Power line disconnection |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling  |
|---|--|---|
| Poor contact of motor power wiring port                     | ●Check whether the motor power wiring port is connected reliably             | ■ Tighten the fixing screws at the wiring port of the motor power wire.   |
| Power line disconnection                                    | ●Check whether both ends of the power cable are disconnected                 | ■ Replace the power cable and repower   |
| Poor contact on adapter port (rectangular connection cable) | ●Check whether both ends of the rectangular connector are reliably connected | ■ Ensure reliable connection at both ends of rectangular connection port;<br>■ Replace with a power cable with higher connection reliability. |

### Er.32 Exceeding motor maximum speed

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                    |
|---|-------------------------------|
|  | Exceeding motor maximum speed |

#### (2) Troubleshooting methods

| Reason                                     | Troubleshooting methods  | Handling  |
|--|--|---|
| Motor power cable UVW phase sequence error | ●Check whether the phase sequence of the motor power cable on the servo drive side and motor side corresponds to each other.   | ■ According to the drive side UVW, the motor side UVW is connected correctly.   |
| 2001-0A parameter setting is not proper    | ●Check that the parameter value of 2001-0A (maximum speed threshold) is less than the maximum speed required for the actual operation of the motor<br>●Check whether the motor rotating speed corresponding to the input command exceeds 2001-0A (maximum speed threshold) | ■ Reset 2001-0A (maximum speed threshold) according to mechanical requirements. |

|                       |   |  |
|-----------------------|---|--|
| Motor speed overshoot | <ul style="list-style-type: none"> <li>●Check whether the gain parameters are set properly, resulting in overshoot</li> </ul> | <ul style="list-style-type: none"> <li>■Reasonably adjust the gain parameters.</li> </ul>            |
| Servo drive fault     | <ul style="list-style-type: none"> <li>●The servo drive is still faulty after power on again</li> </ul>                       | <ul style="list-style-type: none"> <li>■ Servo drive may be damaged, replace servo drive.</li> </ul> |

### Er.33 Power module over temperature

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                       |
|---|----------------------------------|
|  | Power module is over temperature |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling   |
|---|--|--|
| Ambient temperature is too high   | <ul style="list-style-type: none"> <li>●Measure the ambient temperature.</li> </ul>  | <ul style="list-style-type: none"> <li>■Reduce the ambient temperature of the servo drive.</li> </ul>                                      |
| Servo drive fan failure   | <ul style="list-style-type: none"> <li>●Check whether the servo drive fan is blocked or damaged</li> </ul>                   | <ul style="list-style-type: none"> <li>■ Contact the manufacturer's technician to repair or replace the fan.</li> </ul>                    |
| The servo drive is mounted in an unreasonable orientation or the spacing between the servo drives is unreasonable | <ul style="list-style-type: none"> <li>●Check whether the servo drive installation is reasonable</li> </ul>                  | <ul style="list-style-type: none"> <li>■ Contact the manufacturer's technician to obtain the servo drive installation standard.</li> </ul> |
| Servo drive fault   | <ul style="list-style-type: none"> <li>●Fault is still reported when restarting after ten minutes of power cutoff</li> </ul> | <ul style="list-style-type: none"> <li>■ Servo drive may be damaged, contact the manufacturer's technician for repair.</li> </ul>          |

### Er.34 Motor overload protection

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                |
|---|---------------------------|
|  | Motor overload protection |

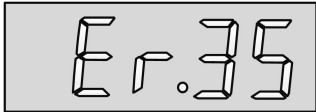
#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling  |
|---|--|---|
| Motor power cable, encoder cable wiring error | <ul style="list-style-type: none"> <li>●Check whether the motor power cable and encoder cable wiring are correct.</li> </ul> | <ul style="list-style-type: none"> <li>■ Connect according to the correct connection method;</li> <li>■ Preferably use the motor power lines and encoder cables standard by manufacturers.</li> </ul> |
| The load is too large                         | <ul style="list-style-type: none"> <li>●Check overload characteristics of motor or servo drive</li> </ul>                    | <ul style="list-style-type: none"> <li>■Reduce the load;</li> <li>■ Contact the manufacturer's technician</li> </ul>  |

|  |  |   |
|--|--|---|
|  |  | to obtain the drive and motor model with appropriate capacity.  |
| Frequent acceleration and deceleration   | <ul style="list-style-type: none"> <li>●Check whether frequent acceleration and deceleration are performed and whether the acceleration and deceleration time is too short.</li> </ul> | <ul style="list-style-type: none"> <li>■ Appropriately extend the acceleration and deceleration time.</li> </ul>  |
| Motor model and servo drive do not match | <ul style="list-style-type: none"> <li>●Check the monitoring quantity 201E-35 (motor model code).</li> </ul>   | <ul style="list-style-type: none"> <li>■ Contact the manufacturer's technician to obtain the matching motor model.</li> </ul>   |
| Unreasonable parameters                  | <ul style="list-style-type: none"> <li>●Use Wecon SCTools to obtain the actual torque waveform and observe whether overshoot is obvious</li> </ul>                                     | <ul style="list-style-type: none"> <li>■ Set the appropriate loop gain parameters.</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>●Observe whether the motor vibrates during operation</li> </ul>   | <ul style="list-style-type: none"> <li>■Set the appropriate rigidity level.</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>●Check whether 200A-04 (motor overload protection time coefficient) parameter is reasonable</li> </ul>  | <ul style="list-style-type: none"> <li>■ Increase 200A-04 (motor overload protection time coefficient) under the premise that the motor will not burn out.</li> </ul> |
| The motor is locked                      | <ul style="list-style-type: none"> <li>●Check whether the brake output function is enabled by mistake, resulting in the motor locking.</li> </ul>                                      | <ul style="list-style-type: none"> <li>■Disable the brake output function.</li> </ul>   |
| Servo drive fault                        | <ul style="list-style-type: none"> <li>●The servo drive is still faulty after power on again</li> </ul>  | <ul style="list-style-type: none"> <li>■ Servo drive may be damaged, contact the manufacturer's technician for repair.</li> </ul>                                     |

### Er.35 Electronic gear ratio exceeds limit

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                          |
|---|-------------------------------------|
|  | Electronic gear ratio exceeds limit |

#### (2) Troubleshooting methods

| Reason   | Troubleshooting methods   | Handling   |
|--|---|--|
| The electronic gear ratio setting is greater than the settable range | Check whether the ratio of object dictionaries 6091: 01 to 6091: 02 is within the following range: <ul style="list-style-type: none"> <li>●The upper limit of 17bit absolute value encoder can be set to 52428;</li> <li>●The upper limit of 23bit absolute value encoder can be set to 3355443.</li> </ul> | <ul style="list-style-type: none"> <li>■ After modifying the corresponding function code according to the settable range, set 200A-03 (fault clearing) to 1</li> </ul> |
| The electronic gear ratio setting is less than the settable range    | Check whether the ratio of object dictionaries 6091: 01 to 6091: 02 is within the following range:  |  |

|  |  |  |
|--|--|--|
|  | <ul style="list-style-type: none"> <li>●The lower limit of 17bit absolute value encoder can be set to 0.01;</li> <li>●The lower limit of 23bit absolute value encoder can be set to 0.83.</li> </ul> |  |
|--|--|--|

### Er.36 Position deviation is too large

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name                      |
|---|---------------------------------|
|  | Position deviation is too large |

#### (2) Troubleshooting methods

| Reason  | Troubleshooting methods  | Handling   |
|---|--|--|
| Cable problem   | ●Check whether the phase sequence of the motor power cable on the servo drive side and motor side corresponds to each other.                         | ■ According to the drive side UVW, connect the motor side UVW correctly.   |
|   | ●Check whether both ends of power cable are disconnected   | ■ Replace the power cable and repower  |
| Improper parameter setting                            | ●Check whether 2003-02 (load rigidity level) is set properly   | ■ Appropriately increase the setting value of 2003-02 (load rigidity level).   |
|   | ●Check whether the gain parameters are set properly; if not, it may result in overshoot  | ■ Reasonably adjust the gain parameters.   |
|   | ●Check whether 6065 (position deviation threshold) is set properly   | ■ Appropriately increase the setting value of 6065 (excessive position deviation threshold)  |
|   | ●Use Wecon SCTools to obtain the equivalent speed of the position command and check whether the speed is greater than the motor rotating speed limit | ■ Increase the setting values of 2001-0C (forward speed threshold) and 2001-0D (reverse speed threshold) according to mechanical requirements. |
| Motor is locked                                       | ●Check whether motor is locked due to mechanical jamming   | ■ Solve the problem of mechanical jamming.   |
| Brake is not opened                                   | ●Check whether the brake device is opened normally, and check whether the output voltage of the brake is 24V   | ■ Check the logic of brake power supply or brake output signal.  |
| Position command equivalent speed changes too quickly | ●Check whether the position command equivalent speed changes too quickly   | ■ Properly increase the acceleration and deceleration time and reduce the change rate of the rotating speed.                                   |



## Er.37 Abnormal torque saturation

### (1) Fault phenomenon

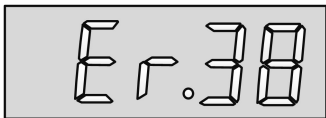
| Servo drive panel display   | Fault name                 |
|---|----------------------------|
|  | Abnormal torque saturation |

### (2) Troubleshooting methods

| Reason                                       | Troubleshooting methods  | Handling   |
|--|--|--|
| Motor power cable UVW phase sequence error   | ●Check whether the phase sequence of the motor power cable on the servo drive side and motor side corresponds to each other. | ■ According to the drive side UVW, connect the motor side UVW correctly.   |
| Improper parameter setting                   | ●Check whether 2001-13 (torque saturation timeout) is set properly   | ■ Appropriately increase the setting value of 2001-13 (torque saturation timeout time).                            |
|  | Check whether 2001-0F (forward torque limit) and 2001-10 (reverse torque limit) are set reasonably                           | ■ Appropriately increase the setting values of 2001-0F (positive torque limit) and 2001-10 (reverse torque limit). |
|  | ●Check whether the gain parameters are set properly  | ■ Reasonably adjust the gain parameters.   |
|  | ●Check whether the acceleration and deceleration time are set properly   | ■ Appropriately increase the acceleration and deceleration time.   |
| The load is too large                        | ●Check whether the load is too large   | ■ Reduce the load.   |
| Motor is locked                              | ●Check whether the motor is locked due to mechanical jamming of the load.  | ■ Solve the problem of mechanical jamming.   |
| Limit switches are mounted beyond the travel | ●Check whether the limit switch is installed beyond the travel   | ■ Adjust the installation position of the limit switch.  |
| The brake is not opened                      | ●Check whether the brake device is opened normally, and check whether the output voltage of the brake is 24V                 | ■ Check the logic of brake power supply or brake output signal.  |

## Er.38 Main circuit electrical phase loss

### (1) Fault phenomenon

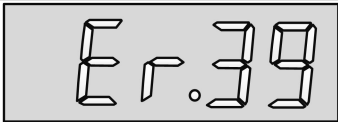
| Servo drive panel display   | Fault name                         |
|---|------------------------------------|
|  | Main circuit electrical phase loss |

## (2) Troubleshooting methods

| Reason  | Troubleshooting methods   | Handling  |
|---|---|---|
| Cable problem   | ●Check whether the motor power wiring port is connected reliably  | ■Tighten the fixing screws at the wiring port of the motor power wire.                  |
|   | ●Check whether both ends of the power cable are disconnected  | ■Replace the power cable and repower  |
| Three-phase specification drives run on single-phase power supplies | ●Check whether the three-phase drive has a single-phase power supply  | ■ Re-connect the three-phase power supply according to the power supply specifications. |
| The power supply is unstable or off                                 | ●Check that the drive input power specifications meet the specifications:<br>220V drive: valid value : 198V ~ 242V;;<br>380V drive: valid values : 342V ~ 418V. | ■Run servo after the power supply is stable.  |
| Servo drive fault   | ●The servo drive is still faulty after power on again   | ■ Servo drive may be damaged, contact the manufacturer's technician for repair.         |

### Er.39 Emergency stop

#### (1) Fault phenomenon

| Servo drive panel display   | Fault name     |
|---|----------------|
|  | Emergency stop |

#### (2) Troubleshooting methods

| Reason   | Troubleshooting methods  | Handling                      |
|--|--|-------------------------------|
| Servo drive receives emergency stop instructions | ●Check whether emergency stop protection is triggered manually   | ■Repower the servo drive.     |
|  | ●Check whether the servo drive has mistakenly triggered the emergency stop signal.<br>Check whether function 08 (E-STOP) is configured in "DI "port function selection" of the 2006 group "DIDO configuration" function code group and whether the DI port wiring is normal. | ■Reasonably wire the DI port. |

## Er.40 Encoder battery failure

### (1) Fault phenomenon

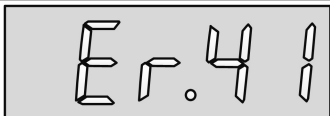
| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Encoder battery failure |

### (2) Troubleshooting methods

| Reason  | Troubleshooting methods   | Handling   |
|---|---|--|
| Multi-turn absolute encoder is not connected to the battery when the servo drive is power off | ●Check if the encoder is connected to the battery during the power off of the servo | ■Set 200A-03 (fault clearing) to 1.  |
| The voltage of multi-turn absolute encoder battery is low                                     | ●Measure battery voltage  | ■Contact the manufacturer's technician to replace the new encoder battery. |

## Er.41 Motor (encoder) over temperature

### (1) Fault phenomenon

| Servo drive panel display   | Fault name                       |
|---|----------------------------------|
|  | Motor (encoder) over temperature |

### (2) Troubleshooting methods

| Reason                  | Troubleshooting methods                | Handling          |
|-------------------------|--|-------------------|
| The motor is overloaded | ●Check whether the motor is overloaded | ■Reduce the load. |

## Er.42 Encoder write fault

### (1) Fault phenomenon

| Servo drive panel display   | Fault name          |
|---|---------------------|
|  | Encoder write fault |

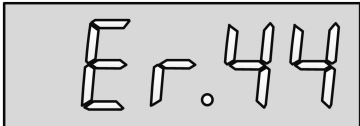
### (2) Troubleshooting methods

| Reason                   | Troubleshooting methods  | Handling                                 |
|--------------------------|--|--|
| Poor contact on CN1 port | ●Check whether the cable port (CN1) of the encoder is properly connected | ■Tighten the fixing screws for CN2 port. |

|   |   |   |
|---|---|---|
|   | <ul style="list-style-type: none"> <li>●Check whether the servo drive CN1 port jack is deformed</li> </ul>  | <ul style="list-style-type: none"> <li>■ Replace the cable or cable port if deformed.</li> </ul>  |
| Poor contact on adapter port (rectangular connection cable) | <ul style="list-style-type: none"> <li>●Check whether both ends of the rectangular connector are reliably connected</li> </ul>                    | <ul style="list-style-type: none"> <li>■Ensure reliable connection at both ends of rectangular connection port;</li> <li>■Replace with an encoder cable with higher connection reliability.</li> </ul>            |
| External interference                                       | <ul style="list-style-type: none"> <li>●Check whether there are strong magnetic fields nearby</li> </ul>  | <ul style="list-style-type: none"> <li>■ Eliminate the interference of strong magnetic field nearby.</li> </ul>   |
|   | <ul style="list-style-type: none"> <li>●Check whether there are sources of interference such as power supply inverter equipment nearby</li> </ul> | <ul style="list-style-type: none"> <li>■ Try to separate the strong and weak currents in the wiring, ensure that the motor and the servo drive are well grounded, and keep away from the power cables.</li> </ul> |
| Servo drive fault   | <ul style="list-style-type: none"> <li>●The servo drive is still faulty after power on again</li> </ul>   | <ul style="list-style-type: none"> <li>■Servo drive may be damaged, contact the manufacturer's technician for repair.</li> </ul>  |

#### Er.44 Homing timeout fault

##### (1) Fault phenomenon

| Servo drive panel display   | Fault name           |
|---|----------------------|
|  | Homing timeout fault |

##### (2) Troubleshooting methods

| Reason   | Troubleshooting methods   | Handling  |
|--|---|---|
| Fault of homing switch   | <p>Check whether homing is always in a high-speed search instead of a low-speed search.</p> <p>Check whether homing high-speed search has been in the reverse low-speed search process.</p> | <ul style="list-style-type: none"> <li>■First confirm whether the DI function 26 is set in group 2006, and then check the connection of the DI terminal. When manually changing the logic of the DI terminal, check whether the servo drive receives the corresponding DI level signal through 201E-11. If not, it means that the DI wiring is wrong, please wire correctly.</li> <li>■Manually make DI terminal logic change, if received level signal, indicating the homing operation is wrong, please operate correctly.</li> </ul> |
| The speed of searching the home switch signal at high speed is too small | <ul style="list-style-type: none"> <li>●Check whether the 6099: 01h setting value is too small.</li> </ul>  | <ul style="list-style-type: none"> <li>■Increase the 6099: 01h setting value.</li> </ul>  |

|   |   |  |
|---|---|--|
| Hardware switch setting is unreasonable | <ul style="list-style-type: none"> <li>●Confirm whether the limit switch signals on both sides are valid at the same time.</li> <li>●Confirm whether a limit switch signal and the deceleration point signal or origin signal are valid at the same time</li> </ul> | <ul style="list-style-type: none"> <li>■ Set the hardware switch position reasonably.</li> </ul> |
|---|---|--|

#### Er.60 ADC conversion is not completed

##### (1) Fault phenomenon

| Servo drive panel display   | Fault name                      |
|---|---------------------------------|
|  | ADC conversion is not completed |

##### (2) Troubleshooting methods

| Reason                | Troubleshooting methods   | Handling  |
|-----------------------|---|---|
| External interference | <ul style="list-style-type: none"> <li>●Check whether there are strong magnetic fields nearby</li> </ul>  | <ul style="list-style-type: none"> <li>■ Eliminate the interference of strong magnetic field nearby.</li> </ul>   |
|                       | <ul style="list-style-type: none"> <li>●Check whether there are sources of interference such as power supply inverter equipment nearby</li> </ul>                                   | <ul style="list-style-type: none"> <li>■ Try to separate the strong and weak currents in the wiring, ensure that the motor and the servo drive are well grounded, and keep away from the power cables.</li> </ul> |
| Servo drive fault     | <ul style="list-style-type: none"> <li>●Restore factory setting [200A-02=1] and power on again. If the servo drive still alarms after multiple operations, it is faulty.</li> </ul> | <ul style="list-style-type: none"> <li>■ If servo still give alarm after powering on several times, contact the manufacturer's technicians for maintenance.</li> </ul>  |

#### Er.61 Internal software fault

##### (1) Fault phenomenon

| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Internal software fault |

##### (2) Troubleshooting methods

| Reason            | Troubleshooting methods   | Handling   |
|-------------------|---|--|
| Servo drive fault | <ul style="list-style-type: none"> <li>●Restore factory setting [200A-02=1] and power on again. If the servo drive still alarms after multiple operations, it is faulty.</li> </ul> | <ul style="list-style-type: none"> <li>■ If servo still give alarm after powering on several times, contact the manufacturer's technicians for maintenance.</li> </ul> |

## Er.62 Internal software fault

### (1) Fault phenomenon

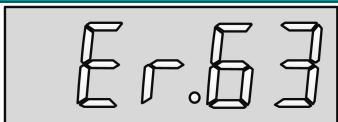
| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Internal software fault |

### (2) Troubleshooting methods

| Reason            | Troubleshooting methods   | Handling   |
|-------------------|---|--|
| Servo drive fault | ●Restore factory setting [200A-02=1] and power on again. If the servo drive still alarms after multiple operations, it is faulty. | ■ If servo still give alarm after powering on several times, contact the manufacturer's technicians for maintenance. |

## Er.63 Internal software fault

### (1) Fault phenomenon

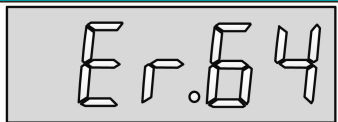
| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Internal software fault |

### (2) Troubleshooting methods

| Reason            | Troubleshooting methods   | Handling   |
|-------------------|---|--|
| Servo drive fault | ●Restore factory setting [200A-02=1] and power on again. If the servo drive still alarms after multiple operations, it is faulty. | ■ If servo still give alarm after powering on several times, contact the manufacturer's technicians for maintenance. |

## Er.64 Internal software fault

### (1) Fault phenomenon

| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Internal software fault |

### (2) Troubleshooting methods

| Reason            | Troubleshooting methods  | Handling  |
|-------------------|--|---|
| Servo drive fault | ●Restore factory setting [200A-02=1] and power on again. If the servo drive still alarms after multiple operations, it | ■ If servo still give alarm after powering on several times, contact the manufacturer's technicians for |

|  |            |              |
|--|------------|--------------|
|  | is faulty. | maintenance. |
|--|------------|--------------|

### Er.65 Internal software fault

#### (1) Fault phenomenon

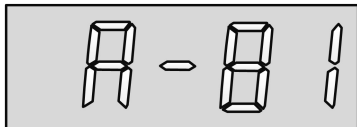
| Servo drive panel display   | Fault name              |
|---|-------------------------|
|  | Internal software fault |

#### (2) Troubleshooting methods

| Reason            | Troubleshooting methods   | Handling   |
|-------------------|---|--|
| Servo drive fault | <ul style="list-style-type: none"> <li>●Restore factory setting [200A-02=1] and power on again. If the servo drive still alarms after multiple operations, it is faulty.</li> </ul> | <ul style="list-style-type: none"> <li>■ If servo still give alarm after powering on several times, contact the manufacturer's technicians for maintenance.</li> </ul> |

### A-81 Overspeed alarm

#### (1) Fault phenomenon

| Servo drive panel display   | Warning name    |
|---|-----------------|
|  | Overspeed alarm |

#### (2) Troubleshooting methods

| Reason                                     | Troubleshooting methods  | Handling   |
|--|--|--|
| Motor power cable UVW phase sequence error | <ul style="list-style-type: none"> <li>●Check whether the phase sequence of the motor power cable on the servo drive side and motor side corresponds to each other.</li> </ul> | <ul style="list-style-type: none"> <li>■ According to the drive side UVW, connect the motor side UVW correctly.</li> </ul>   |
| 2001-0B parameter setting is not proper    | <ul style="list-style-type: none"> <li>●Check whether the value of 2001-0B (warning speed threshold) is less than the max speed required for the operation of motor</li> </ul> | <ul style="list-style-type: none"> <li>■ Reset 2001-0B (warning speed threshold) according to mechanical requirements.</li> </ul>  |
| Input speed instruction is too high        | <ul style="list-style-type: none"> <li>●Check whether the motor speed corresponding to the input command exceeds 2001-0B (warning speed threshold)</li> </ul>                  | <ul style="list-style-type: none"> <li>■ Reduce the input speed command while ensuring mechanical requirements;</li> <li>■ Reasonably increase 2001-0B (warning speed threshold).</li> </ul> |

**A-82 Overload**

## (1) Fault phenomenon

| Servo drive panel display   | Warning name |
|---|--------------|
|  | Overload     |

## (2) Troubleshooting methods

| Reason  | Troubleshooting methods   | Handling   |
|---|---|--|
| Motor power cable, encoder cable wiring error | <ul style="list-style-type: none"> <li>● Check whether the motor power cable and encoder cable wiring are correct.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Complete wiring according to the correct wiring method;</li> <li>■ Preferably use the standard motor power lines and encoder cables provided by manufacturers.</li> </ul> |
| The load is too large                         | <ul style="list-style-type: none"> <li>● Perform inertia identification and check the inertia ratio.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Reduce the load;</li> <li>■ Contact the manufacturer's technician to obtain the drive and motor model with appropriate capacity.</li> </ul>                               |
| Frequent acceleration and deceleration        | <ul style="list-style-type: none"> <li>● Check whether frequent acceleration and deceleration are performed and whether the acceleration and deceleration time is too short.</li> </ul> | <ul style="list-style-type: none"> <li>■ Appropriately extend the acceleration and deceleration time.</li> </ul>   |
| Motor model and servo drive do not match      | <ul style="list-style-type: none"> <li>● Check the monitoring quantity 201E-35 (motor model code).</li> </ul>   | <ul style="list-style-type: none"> <li>■ Contact the manufacturer's technician to obtain the matching motor model.</li> </ul>  |
| Unreasonable parameters                       | <ul style="list-style-type: none"> <li>● Use Wecon SCTools to obtain the actual torque waveform and observe whether overshoot is obvious</li> </ul>                                     | <ul style="list-style-type: none"> <li>■ Set the appropriate loop gain parameters.</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>● Observe whether the motor vibrates during operation</li> </ul>   | <ul style="list-style-type: none"> <li>■ Set the appropriate rigidity level.</li> </ul>  |

**A-83 Braking resistor is over temperature or overloaded**

## (1) Fault phenomenon

| Servo drive panel display   | Warning name                                       |
|---|--|
|  | Braking resistor is over temperature or overloaded |

## (2) Troubleshooting methods

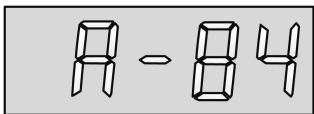
| Reason | Troubleshooting methods | Handling |
|--------|-------------------------|----------|
|--------|-------------------------|----------|



|  |  |  |
|--|--|--|
| Improper wiring of internal braking resistor                       | <ul style="list-style-type: none"> <li>● Check whether C, D are connected to the shorting cap and the contact is normal</li> </ul>   | <ul style="list-style-type: none"> <li>■ When internal braking resistors are used, ensure the shorting caps or short wires are reliably connected between C and D.</li> </ul>  |
| Improper wiring of external braking resistor                       | <ul style="list-style-type: none"> <li>● Remove the external braking resistor and measure whether the resistance value is "<math>\infty</math>" (Infinity).</li> </ul>   | <ul style="list-style-type: none"> <li>■ Replace with a new external braking resistor, after ensuring that the resistance value of the resistor is consistent with the nominal value, connect it in series between P+ and C.</li> </ul>  |
| The resistance value of the external braking resistor is too large | <ul style="list-style-type: none"> <li>● Test the actual external braking resistor resistance and compare it with the recommended braking resistor to make sure the actual resistance is not too large.</li> </ul>                                   | <ul style="list-style-type: none"> <li>■ Use an appropriate external braking resistor.</li> </ul>  |
| Improper parameter setting   | <p>When using an external braking resistor, check the following parameters.</p> <p>Whether the value of 2000-09 (brake setting) is reasonable</p> <p>Whether the value of 2000-10 (resistance value of external braking resistor) is reasonable.</p> | <ul style="list-style-type: none"> <li>■ Reasonably set the parameter value of 2000-09 (brake setting setting):<br/>2000-09=1 (external braking resistor is used, natural cooling)<br/>2000-09=3 (no braking resistor is used, and all are absorbed by capacitance)</li> <li>■ The parameter value of 2000-0A (external braking resistor) should be the same as the actual external braking resistance.</li> </ul> |

#### A-84 Parameter modification that needs device to be powered on again

##### (1) Fault phenomenon

| Servo drive panel display   | Warning name  |
|---|---|
|  | Parameter modification that needs device to be powered on again |

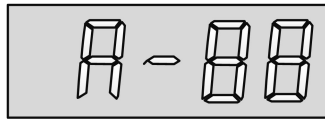
##### (2) Troubleshooting methods

| Reason   | Troubleshooting methods  | Handling   |
|--|--|--|
| Modified the valid timing parameter to "power on again". | <ul style="list-style-type: none"> <li>● Check whether the servo drive has modified the valid timing parameter to "power on again".</li> </ul> | <ul style="list-style-type: none"> <li>■ Power it on again.</li> </ul> |

#### A-88 Main circuit instantaneous power failure

##### (1) Fault phenomenon

| Servo drive panel display | Warning name |
|---------------------------|--------------|
|---------------------------|--------------|



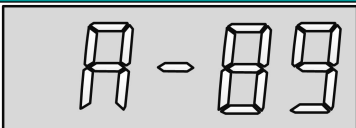
Main circuit instantaneous power failure

## (2) Troubleshooting methods

| Reason            | Troubleshooting methods  | Handling   |
|-------------------|--|--|
| Power failure     | <ul style="list-style-type: none"> <li>● Check that the drive input power specifications meet the specifications:<br/>220V drive: valid value : 198V ~ 242V;;<br/>380V drive: valid values : 342V ~ 418V.</li> </ul> | <ul style="list-style-type: none"> <li>■ If the mains input has no voltage or is unstable, wait for the power supply to stabilize before use.</li> </ul> |
| Servo drive fault | When the mains power is confirmed to be normal, the servo drive is still faulty after power on again   | <ul style="list-style-type: none"> <li>■ Servo drive may be damaged, please contact the manufacturer's technician.</li> </ul>                            |

**A-89 Duplicate DI port configuration**

## (1) Fault phenomenon

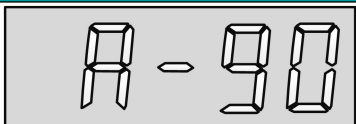
| Servo drive panel display   | Fault name                      |
|---|---------------------------------|
|  | Duplicate DI port configuration |

## (2) Troubleshooting methods

| Reason   | Troubleshooting methods  | Handling  |
|--|--|---|
| The same non-zero DI function is assigned to multiple DI ports | Check whether the "DI port function selection" of the "DIDO Configuration" function code group of the 2006 group is configured with the same DI function | <ul style="list-style-type: none"> <li>■ Set different DI functions for different DI port, and repower the servo;</li> <li>■ Configure the function of unnecessary DI port to 0 (off), and repower servo;</li> <li>■ Restore parameters to factory settings through setting 200A-02 as 1, and power it on again.</li> </ul> |

**A-90 Duplicate DO port configuration**

## (1) Fault phenomenon

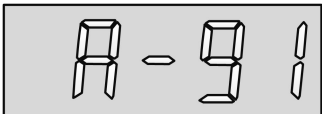
| Servo drive panel display   | Fault name                      |
|---|---------------------------------|
|  | Duplicate DO port configuration |

## (2) Troubleshooting methods

| Reason   | Troubleshooting methods  | Handling  |
|--|--|---|
| The same non-zero DO function is assigned to multiple DO ports | Check whether the "DO port function selection" of the "DIDO Configuration" function code group of the 2006 group is configured with the same DO function | <ul style="list-style-type: none"> <li>■ Set different DO functions for different DO port;</li> <li>■ Configure the function of unnecessary DO port to 128 (off);</li> <li>■ Restore parameters to factory settings through setting 200A-02 as 1, and power it on again.</li> </ul> |

**A-91 Parameter modification is too frequent**

## (1) Fault phenomenon

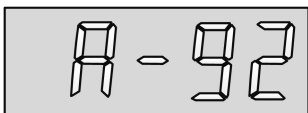
| Servo drive panel display   | Fault name                             |
|---|--|
|  | Parameter modification is too frequent |

## (2) Troubleshooting methods

| Reason                                 | Troubleshooting methods   | Handling   |
|--|---|--|
| Parameter modification is too frequent | <ul style="list-style-type: none"> <li>● Check whether the upper computer frequently modifies the write parameters</li> </ul> | <ul style="list-style-type: none"> <li>■ Under the condition of machine working normally, reduce the frequency of modifying and writing parameters by the upper computer.</li> </ul> |

**A-92 Low encoder battery voltage warning**

## (1) Fault phenomenon

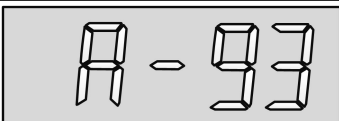
| Servo drive panel display   | Fault name                          |
|---|-------------------------------------|
|  | Low encoder battery voltage warning |

## (2) Troubleshooting methods

| Reason                                    | Troubleshooting methods   | Handling  |
|---|---|---|
| Encoder battery voltage is less than 3.1V | <ul style="list-style-type: none"> <li>● Measure encoder battery voltage</li> </ul> | <ul style="list-style-type: none"> <li>■ Contact the manufacturer's technician to replace the new encoder battery.</li> </ul> |

**A-93 Encoder read and write check is abnormal and frequency is too high**

## (1) Fault phenomenon

| Servo drive panel display   | Fault name   |
|---|--|
|  | Encoder read and write check is abnormal and frequency is too high |

## (2) Troubleshooting methods

| Reason                | Troubleshooting methods   | Handling  |
|-----------------------|---|---|
| External interference | <ul style="list-style-type: none"> <li>● Check whether there are strong magnetic fields nearby</li> </ul> | <ul style="list-style-type: none"> <li>■ Eliminate the interference of strong magnetic field nearby.</li> </ul> |

|                   |   |  |
|-------------------|---|--|
|                   | <ul style="list-style-type: none"> <li>● Check whether there are sources of interference such as power supply inverter equipment nearby</li> </ul>  | <ul style="list-style-type: none"> <li>■ Try to separate the strong and weak currents in the wiring, ensure that the motor and the servo drive are well grounded, and keep away from the power cables.</li> </ul>      |
| Encoder fault     | <ul style="list-style-type: none"> <li>● Manually rotate the motor shaft counterclockwise or clockwise to observe whether the monitoring quantity 201E-1E (electrical angle) changes regularly</li> </ul> | <ul style="list-style-type: none"> <li>■ If the value of 201E-1E (electric angle) changes abruptly or does not change, there may be a problem with the encoder itself. Please replace the motor or encoder.</li> </ul> |
| Servo drive fault | <ul style="list-style-type: none"> <li>● Cross-verification. Use the normal motor and cable to connect the servo drive. If the servo drive still gives alarm, it is faulty.</li> </ul>                    | <ul style="list-style-type: none"> <li>■ Servo drive may be damaged, please contact the manufacturer's technician.</li> </ul>  |

## Chapter 11 Appendix

### 11.1 Object Dictionary List

#### Group 1000

| Object dictionary (Hex) | Name                              | Accessibility | Data mapping | Default    | Data range | Unit | Data Type | Page number |
|-------------------------|-----------------------------------|---------------|--------------|------------|------------|------|-----------|-------------|
| 1000                    | Device type                       | RO            | No           | 0x00020192 | -          | -    | UDINT     | 112         |
| 1001                    | Error record                      | RO            | No           | 0x00       | -          | -    | USINT     | 112         |
| 1008                    | Device name                       | RO            | No           | -          | -          | -    | STRING    | 112         |
| 1009                    | Manufacturer's hardware equipment | RO            | No           | -          | -          | -    | STRING    | 112         |
| 100A                    | Manufacturer software version     | RO            | No           | -          | -          | -    | STRING    | 112         |
| 1018: 01                | Vendor ID                         | RO            | No           | 0x00000EFF | -          | -    | UDINT     | 112         |
| 1018: 02                | Product code                      | RO            | No           | 0x10003101 | -          | -    | UDINT     | 112         |
| 1018: 03                | Revision number                   | RO            | No           | 0x00000001 | -          | -    | UDINT     | 112         |
| 1018: 04                | Serial number                     | RO            | No           | 0x00001419 | -          | -    | UDINT     | 112         |
| 1600: 01                | First mapping object              | RW            | RPDO         | 0x60400010 | -          | -    | UDINT     | 113         |
| 1600: 02                | Second mapping object             | RW            | RPDO         | 0x607A0020 | -          | -    | UDINT     | 113         |
| 1600: 03                | Third mapping object              | RW            | RPDO         | 0x60B80010 | -          | -    | UDINT     | 113         |
| 1600: 04                | Fourth mapping object             | RW            | RPDO         | 0x60600008 |            |      | UDINT     | 113         |
| 1701: 01                | First mapping object              | RW            | RPDO         | 0x60400010 | -          | -    | UDINT     | 113         |
| 1701: 02                | Second mapping object             | RW            | RPDO         | 0x607A0020 | -          | -    | UDINT     | 113         |
| 1701: 03                | Third mapping object              | RW            | RPDO         | 0x60B80010 | -          | -    | UDINT     | 113         |
| 1701: 04                | Fourth mapping object             | RW            | RPDO         | 0x60600008 | -          | -    | UDINT     | 113         |
| 1702: 01                | First mapping object              | RW            | RPDO         | 0x60400010 | -          | -    | UDINT     | 114         |
| 1702: 02                | Second mapping object             | RW            | RPDO         | 0x607A0020 | -          | -    | UDINT     | 114         |
| 1702: 03                | Third mapping object              | RW            | RPDO         | 0x60FF0020 | -          | -    | UDINT     | 114         |
| 1702: 04                | Fourth mapping object             | RW            | RPDO         | 0x60710010 | -          | -    | UDINT     | 114         |
| 1702: 05                | Fifth mapping object              | RW            | RPDO         | 0x60600008 | -          | -    | UDINT     | 114         |
| 1702: 06                | Sixth mapping object              | RW            | RPDO         | 0x60B80010 | -          | -    | UDINT     | 114         |
| 1702: 07                | Seventh mapping object            | RW            | RPDO         | 0x607F0020 | -          | -    | UDINT     | 114         |

## Chapter 11 Appendix

|          |                                       |    |      |            |   |   |       |     |
|----------|---------------------------------------|----|------|------------|---|---|-------|-----|
| 1A00: 01 | First mapping object                  | RW | TPDO | 0x60410010 | - | - | UDINT | 114 |
| 1A00: 02 | Second mapping object                 | RW | TPDO | 0x60640020 | - | - | UDINT | 114 |
| 1A00: 03 | Third mapping object                  | RW | TPDO | 0x60B90010 | - | - | UDINT | 114 |
| 1A00: 04 | Fourth mapping object                 | RW | TPDO | 0x60BA0020 | - | - | UDINT | 114 |
| 1A00: 05 | Fifth mapping object                  | RW | TPDO | 0x60BC0020 | - | - | UDINT | 114 |
| 1A00: 06 | Sixth mapping object                  | RW | TPDO | 0x603F0010 | - | - | UDINT | 114 |
| 1A00: 07 | Seventh mapping object                | RW | TPDO | 0x60610008 | - | - | UDINT | 114 |
| 1B01: 01 | First mapping object                  | RO | TPDO | 0x603F0010 | - | - | UDINT | 115 |
| 1B01: 02 | Second mapping object                 | RO | TPDO | 0x60410010 | - | - | UDINT | 115 |
| 1B01: 03 | Third mapping object                  | RO | TPDO | 0x60640020 | - | - | UDINT | 115 |
| 1B01: 04 | Fourth mapping object                 | RO | TPDO | 0x60770010 | - | - | UDINT | 115 |
| 1B01: 05 | Fifth mapping object                  | RO | TPDO | 0x60F40020 | - | - | UDINT | 115 |
| 1B01: 06 | Sixth mapping object                  | RO | TPDO | 0x60610008 | - | - | UDINT | 115 |
| 1C12: 01 | Index of objects allocated<br>by RPDO | RW | RPDO | 0x1701     | - | - | ARR   | 115 |
| 1C13: 01 | Index of objects assigned<br>by TPDO  | RW | No   | 0x0001     | - | - | ARR   | 115 |
| 1C32: 01 | Synchronization type                  | RW | No   | 0x0002     | - | - | UINT  | 116 |
| 1C32: 04 | Synchronization types<br>supported    | RO | No   | 0x0005     | - | - | UDINT | 116 |
| 1C32: 05 | Minimum cycle time                    | RO | No   | 0x0001E848 | - | - | UINT  | 116 |
| 1C33: 01 | Synchronization type                  | RW | No   | 0x0002     | - | - | UINT  | 116 |
| 1C33: 04 | Synchronization types<br>supported    | RO | No   | 0x0005     | - | - | UDINT | 116 |
| 1C33: 05 | Minimum cycle time                    | RO | No   | 0x0001E848 | - | - | UINT  | 116 |

**Group 2000**

| Object dictionary<br>(Hex) |           | Function<br>code<br>(Dec) | Name   | Setting<br>method    | Valid time           | Default | Range   | Unit | Data<br>type | Page<br>number |
|----------------------------|-----------|---------------------------|--|----------------------|----------------------|---------|---------|------|--------------|----------------|
| Index                      | Sub-index |                           |  |                      |                      |         |         |      |              |                |
| 2000                       | 04        | P00-04                    | Rotation<br>direction  | Shutdown<br>setting  | Valid<br>immediately | 0       | 0 to 1  | -    | 16<br>Bit    | 117            |
| 2000                       | 09        | P00-09                    | Braking<br>resistance<br>setting                             | Operation<br>setting | Valid<br>immediately | 0       | 0 to 3  | -    | 16<br>Bit    | 117            |
| 2000                       | 0A        | P00-10                    | External<br>braking resistor<br>resistance                   | Operation<br>setting | Valid<br>immediately | 50      | 0~65535 | Ω    | 16<br>Bit    | 117            |
| 2000                       | 0B        | P00-11                    | External<br>braking resistor<br>power                        | Operation<br>setting | Valid<br>immediately | 100     | 0~65535 | W    | 16<br>Bit    | 117            |
| 2000                       | 1E        | P00-30                    | Shield<br>multi-turn<br>absolute<br>encoder<br>battery fault | Operation<br>setting | Power-on<br>again    | 0       | 0 to 1  | -    | 16<br>Bit    | 117            |

**Group 2001**

| Object dictionary<br>(Hex) |           | Function<br>code<br>(Dec) | Name          | Setting<br>method    | Valid time           | Default | Range  | Unit | Data<br>type | Page<br>number |
|----------------------------|-----------|---------------------------|---------------|----------------------|----------------------|---------|--------|------|--------------|----------------|
| Index                      | Sub-index |                           |               |                      |                      |         |        |      |              |                |
| 2001                       | 0A        | P01-10                    | MaxSpeedLimit | Operation<br>setting | Valid<br>immediately | 3600    | 0~5000 | rpm  | 16<br>Bit    | 118            |
| 2001                       | 0B        | P01-11                    | WarmSpeedTh   | Operation<br>setting | Valid<br>immediately | 3300    | 0~5000 | rpm  | 16<br>Bit    | 118            |
| 2001                       | 0C        | P01-12                    | PosSpeedTh    | Operation<br>setting | Valid<br>immediately | 3000    | 0~5000 | rpm  | 16<br>Bit    | 118            |
| 2001                       | 0D        | P01-13                    | NegSpeedTh    | Operation<br>setting | Valid<br>immediately | 3000    | 0~5000 | rpm  | 16<br>Bit    | 118            |



|      |    |        |  |                   |                   |      |         |       |        |     |
|------|----|--------|--|-------------------|-------------------|------|---------|-------|--------|-----|
| 2001 | 0E | P01-14 | ToqLimitSrc  | Shutdown setting  | Valid immediately | 0    | 0 to 1  | -     | 16 Bit | 118 |
| 2001 | 0F | P01-15 | PToqLim  | Operation setting | Valid immediately | 3000 | 0~3000  | 0.1 % | 16 Bit | 118 |
| 2001 | 10 | P01-16 | NToqLim  | Operation setting | Valid immediately | 3000 | 0~3000  | 0.1 % | 16 Bit | 119 |
| 2001 | 13 | P01-19 | ToqLimTime   | Operation setting | Valid immediately | 1000 | 0~65535 | ms    | 16 Bit | 119 |
| 2001 | 1E | P01-30 | Delay from brake output ON to instruction reception                                      | Operation setting | Valid immediately | 250  | 0~500   | ms    | 16 Bit | 119 |
| 2001 | 1F | P01-31 | In the static state, delay from the "brake output is OFF to the motor is not energized". | Operation setting | Valid immediately | 150  | 1~1000  | ms    | 16 Bit | 119 |
| 2001 | 20 | P01-32 | Rotation status, when the brake output is OFF, the speed threshold.                      | Operation setting | Valid immediately | 30   | 0~3000  | rpm   | 16 Bit | 119 |
| 2001 | 21 | P01-33 | Rotation status, delay from servo enable OFF to brake output OFF                         | Operation setting | Valid immediately | 500  | 1~1000  | ms    | 16 Bit | 119 |

**Group 2002**

| Object | Function | Name | Setting | Valid | Default | Range | Unit | Date | Page |
|--------|----------|------|---------|-------|---------|-------|------|------|------|
|--------|----------|------|---------|-------|---------|-------|------|------|------|

| dictionary (Hex) |               | n code<br>(Dec) |                          | method                | time                     | t    |               |            | a<br>typ<br>e | numbe<br>r |
|------------------|---------------|-----------------|--------------------------|-----------------------|--------------------------|------|---------------|------------|---------------|------------|
| Inde<br>x        | Sub-inde<br>x |                 |                          |                       |                          |      |               |            |               |            |
| 2002             | 01            | P02-01          | PosLoop1stGain           | Operatio<br>n setting | Valid<br>immediate<br>ly | 400  | 0~6200        | 0.1Hz      | 16<br>Bit     | 120        |
| 2002             | 02            | P02-02          | SpdLoop1stGain           | Operatio<br>n setting | Valid<br>immediate<br>ly | 65   | 0~35000       | 0.1Hz      | 16<br>Bit     | 120        |
| 2002             | 03            | P02-03          | SpdLoop1stIntgTim<br>e   | Operatio<br>n setting | Valid<br>immediate<br>ly | 1000 | 100~6553<br>5 | 0.1ms      | 16<br>Bit     | 120        |
| 2002             | 09            | P02-09          | SpdFeedForwardGa<br>in   | Operatio<br>n setting | Valid<br>immediate<br>ly | 0    | 0~1000        | 0.1%       | 16<br>Bit     | 120        |
| 2002             | 0A            | P02-10          | SpdFeedForwardFil<br>ter | Operatio<br>n setting | Valid<br>immediate<br>ly | 50   | 0~10000       | 0.01m<br>s | 16<br>Bit     | 120        |
| 2002             | 0B            | P02-11          | ToqFeedForwardGa<br>in   | Operatio<br>n setting | Valid<br>immediate<br>ly | 0    | 0~2000        | 0.1%       | 16<br>Bit     | 120        |
| 2002             | 0C            | P02-12          | ToqFeedForwardFilt<br>er | Operatio<br>n setting | Valid<br>immediate<br>ly | 50   | 0~10000       | 0.01m<br>s | 16<br>Bit     | 120        |

**Group 2003**

| Object<br>dictionary (Hex) |               | Functio<br>n code<br>(Dec) | Name               | Setting<br>method     | Valid time               | Defaul<br>t | Range         | Unit | Dat<br>a<br>typ<br>e | Page<br>numbe<br>r |
|----------------------------|---------------|----------------------------|--------------------|-----------------------|--------------------------|-------------|---------------|------|----------------------|--------------------|
| Inde<br>x                  | Sub-inde<br>x |                            |                    |                       |                          |             |               |      |                      |                    |
| 2003                       | 01            | P03-01                     | Load InerRatio     | Operatio<br>n setting | Valid<br>immediatel<br>y | 300         | 100~1000<br>0 | 0.01 | 16<br>Bit            |                    |
| 2003                       | 02            | P03-02                     | RigiditySel        | Operatio<br>n setting | Valid<br>immediatel<br>y | 14          | 0~31          | -    | 16<br>Bit            |                    |
| 2003                       | 03            | P03-03                     | SelfAdjustMo<br>de | Operatio<br>n setting | Valid<br>immediatel<br>y | 0           | 0 to 2        | -    | 16<br>Bit            |                    |
| 2003                       | 04            | P03-04                     | InerIdOnline       | Operatio<br>n setting | Valid<br>immediatel      | 0           | 0 to 2        | -    | 16<br>Bit            |                    |

|      |    |        |                    |                      |                          |      |                 |            |           |  |
|------|----|--------|--------------------|----------------------|--------------------------|------|-----------------|------------|-----------|--|
|      |    |        |                    |                      | y                        |      |                 |            |           |  |
| 2003 | 05 | P03-05 | InerIdCircle       | Shutdow<br>n setting | Valid<br>immediatel<br>y | 2    | 1 to 20         | Circl<br>e | 16<br>Bit |  |
| 2003 | 06 | P03-06 | InerIdMaxSpd       | Shutdow<br>n setting | Valid<br>immediatel<br>y | 1000 | 300 to<br>2000  | rpm        | 16<br>Bit |  |
| 2003 | 07 | P03-07 | InerIdRollMod<br>e | Shutdow<br>n setting | Valid<br>immediatel<br>y | 0    | 0 to 2          | -          | 16<br>Bit |  |
| 2003 | 08 | P03-08 | InerIdWaitTim<br>e | Shutdow<br>n setting | Valid<br>immediatel<br>y | 1000 | 300 to<br>10000 | ms         | 16<br>Bit |  |

**Group 2004**

| Object<br>dictionary (Hex) |               | Functio<br>n code<br>(Dec) | Name                    | Setting<br>method     | Valid time               | Defaul<br>t | Range          | Unit       | Dat<br>a<br>typ<br>e | Page<br>numbe<br>r |
|----------------------------|---------------|----------------------------|-------------------------|-----------------------|--------------------------|-------------|----------------|------------|----------------------|--------------------|
| Inde<br>x                  | Sub-inde<br>x |                            |                         |                       |                          |             |                |            |                      |                    |
| 2004                       | 01            | P04-01                     | PulseFilterType         | Shutdow<br>n setting  | Valid<br>immediatel<br>y | 0           | 0 to 1         | -          | 16<br>Bit            |                    |
| 2004                       | 02            | P04-02                     | LowpassFilterTime       | Shutdow<br>n setting  | Valid<br>immediatel<br>y | 0           | 0~1000         | ms         | 16<br>Bit            |                    |
| 2004                       | 03            | P04-03                     | AveragingFilterTim<br>e | Shutdow<br>n setting  | Valid<br>immediatel<br>y | 0           | 0 to 128       | ms         | 16<br>Bit            |                    |
| 2004                       | 04            | P04-04                     | TogFilterTime           | Operatio<br>n setting | Valid<br>immediatel<br>y | 50          | 10~250<br>0    | 0.01m<br>s | 16<br>Bit            |                    |
| 2004                       | 05            | P04-05                     | NotchFilter1_Freq       | Operatio<br>n setting | Valid<br>immediatel<br>y | 300         | 250 to<br>5000 | Hz         | 16<br>Bit            |                    |
| 2004                       | 06            | P04-06                     | NotchFilter1_Deep       | Operatio<br>n setting | valid<br>immediatel<br>y | 100         | 0 to 100       | -          | 16<br>Bit            |                    |
| 2004                       | 07            | P04-07                     | NotchFilter1_Band       | Operatio<br>n setting | Valid<br>immediatel<br>y | 4           | 0 to 12        | -          | 16<br>Bit            |                    |
| 2004                       | 08            | P04-08                     | NotchFilter2_Freq       | Operatio              | Valid                    | 500         | 250 to         | Hz         | 16                   |                    |

|      |    |        |                   |                   |                   |     |          |   |        |  |
|------|----|--------|-------------------|-------------------|-------------------|-----|----------|---|--------|--|
|      |    |        |                   | n setting         | immediately       |     | 5000     |   | Bit    |  |
| 2004 | 09 | P04-09 | NotchFilter2_Deep | Operation setting | Valid immediately | 100 | 0 to 100 | - | 16 Bit |  |
| 2004 | 0A | P04-10 | NorthFilter2_Band | Operation setting | Valid immediately | 4   | 0 to 12  | - | 16 Bit |  |

**Group 2005**

| Object dictionary<br>(Hex) |           | Function<br>code<br>(Dec) | Name          | Setting<br>method | Valid time        | Default | Range  | Unit | Data<br>type | Page<br>number |
|----------------------------|-----------|---------------------------|---------------|-------------------|-------------------|---------|--------|------|--------------|----------------|
| Index                      | Sub-index |                           |               |                   |                   |         |        |      |              |                |
| 2005                       | 10        | P05-16                    | RotateSpdDtTh | Operation setting | Valid immediately | 20      | 0~1000 | rpm  | 16 Bit       |                |
| 2005                       | 13        | P05-19                    | SpdZeroOutTh  | Operation setting | Valid immediately | 10      | 0~6000 | rpm  | 16 Bit       |                |

**Group 2006**

| Object dictionary<br>(Hex) |           | Function<br>code<br>(Dec) | Name      | Setting<br>method | Valid time        | Default | Range  | Unit | Data<br>type | Page<br>number |
|----------------------------|-----------|---------------------------|-----------|-------------------|-------------------|---------|--------|------|--------------|----------------|
| Index                      | Sub-index |                           |           |                   |                   |         |        |      |              |                |
| 2006                       | 02        | P06-02                    | Di1FunSel | Operation setting | Power-on again    | 0       | 0~32   | -    | 16 Bit       |                |
| 2006                       | 03        | P06-03                    | Di1LogSel | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit       |                |
| 2006                       | 04        | P06-04                    | Di1SrcSel | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit       |                |
| 2006                       | 05        | P06-05                    | Di2FunSel | Operation setting | Power-on again    | 2       | 0~32   | -    | 16 Bit       |                |
| 2006                       | 06        | P06-06                    | Di2LogSel | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit       |                |
| 2006                       | 07        | P06-07                    | Di2SrcSel | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit       |                |
| 2006                       | 08        | P06-08                    | Di3FunSel | Operation setting | Power-on again    | 3       | 0~32   | -    | 16 Bit       |                |
| 2006                       | 09        | P06-09                    | Di3LogSel | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit       |                |
| 2006                       | 0A        | P06-10                    | Di3SrcSel | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit       |                |
| 2006                       | 0B        | P06-11                    | Di4FunSel | Operation         | Power-on          | 4       | 0~32   | -    | 16           |                |

## Chapter 11 Appendix

|      |    |        |           | setting              | again                |     |              |   | Bit       |  |
|------|----|--------|-----------|----------------------|----------------------|-----|--------------|---|-----------|--|
| 2006 | 0C | P06-12 | Di4LogSel | Operation<br>setting | Valid<br>immediately | 0   | 0 to 1       | - | 16<br>Bit |  |
| 2006 | 0D | P06-13 | Di4SrcSel | Operation<br>setting | Valid<br>immediately | 0   | 0 to 1       | - | 16<br>Bit |  |
| 2006 | 0E | P06-14 | Di5FunSel | Operation<br>setting | Power-on<br>again    | 0   | 0~32         | - | 16<br>Bit |  |
| 2006 | 0F | P06-15 | Di5LogSel | Operation<br>setting | Valid<br>immediately | 0   | 0 to 1       | - | 16<br>Bit |  |
| 2006 | 10 | P06-16 | Di5SrcSel | Operation<br>setting | Valid<br>immediately | 0   | 0 to 1       | - | 16<br>Bit |  |
| 2006 | 11 | P06-17 | Di6FunSel | Operation<br>setting | Power-on<br>again    | 0   | 0~32         | - | 16<br>Bit |  |
| 2006 | 12 | P06-18 | Di6LogSel | Operation<br>setting | Valid<br>immediately | 0   | 0 to 1       | - | 16<br>Bit |  |
| 2006 | 13 | P06-19 | Di6SrcSel | Operation<br>setting | Valid<br>immediately | 0   | 0 to 1       | - | 16<br>Bit |  |
| 2006 | 1A | P06-26 | Do1FunSel | Operation<br>setting | Valid<br>immediately | 132 | 128 ~<br>148 | - | 16<br>Bit |  |

Chapter 11 Appendix

|      |    |        |           |                   |                   |     |           |   |        |  |
|------|----|--------|-----------|-------------------|-------------------|-----|-----------|---|--------|--|
| 2006 | 1B | P06-27 | Do1LogSel | Operation setting | Valid immediately | 0   | 0 to 1    | - | 16 Bit |  |
| 2006 | 1C | P06-28 | Do2FunSel | Operation setting | Valid immediately | 130 | 128 ~ 148 | - | 16 Bit |  |
| 2006 | 1D | P06-29 | Do2LogSel | Operation setting | Valid immediately | 0   | 0 to 1    | - | 16 Bit |  |
| 2006 | 1E | P06-30 | Do3FunSel | Operation setting | Valid immediately | 129 | 128 ~ 148 | - | 16 Bit |  |
| 2006 | 1F | P06-31 | Do3LogSel | Operation setting | Valid immediately | 0   | 0 to 1    | - | 16 Bit |  |

**Group 200A**

| Object dictionary<br>(Hex) |           | Function code<br>(Dec) | Name               | Setting method    | Valid time        | Default | Range    | Unit | Data type | Page number |
|----------------------------|-----------|------------------------|--------------------|-------------------|-------------------|---------|----------|------|-----------|-------------|
| Index                      | Sub-index |                        |                    |                   |                   |         |          |      |           |             |
| 200A                       | 01        | P10-01                 | SpdRefJOG          | Operation setting | Valid immediately | 100     | 0~3000   | rpm  | 16 Bit    |             |
| 200A                       | 02        | P10-02                 | RstFuncFac         | Shutdown setting  | Valid immediately | 0       | 0 to 1   | -    | 16 Bit    |             |
| 200A                       | 03        | P10-03                 | ServoErrClear      | Operation setting | Valid immediately | 0       | 0 to 1   | -    | 16 Bit    |             |
| 200A                       | 04        | P10-04                 | MotOLProtect_Coeff | Operation setting | Valid immediately | 100     | 0 to 800 | %    | 16 Bit    |             |
| 200A                       | 06        | P10-06                 | AbsEncRst          | Shutdown setting  | Valid immediately | 0       | 0 to 1   | -    | 16 Bit    |             |

**Group 200D**

| Object dictionary<br>(Hex) |           | Function code<br>(Dec) | Name      | Setting method    | Valid time        | Default | Range  | Unit | Data type | Page number |
|----------------------------|-----------|------------------------|-----------|-------------------|-------------------|---------|--------|------|-----------|-------------|
| Index                      | Sub-index |                        |           |                   |                   |         |        |      |           |             |
| 200D                       | 01        | P13-01                 | CommVdi_1 | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit    |             |
| 200D                       | 02        | P13-02                 | CommVdi_2 | Operation setting | Valid immediately | 0       | 0 to 1 | -    | 16 Bit    |             |
| 200D                       | 03        | P13-03                 | CommVdi_3 | Operation         | Valid             | 0       | 0 to 1 | -    | 16        |             |

## Chapter 11 Appendix

|      |    |        |           | setting              | immediately          |   |        |   | Bit       |  |
|------|----|--------|-----------|----------------------|----------------------|---|--------|---|-----------|--|
| 200D | 04 | P13-04 | CommVdi_4 | Operation<br>setting | Valid<br>immediately | 0 | 0 to 1 | - | 16<br>Bit |  |
| 200D | 05 | P13-05 | CommVdi_5 | Operation<br>setting | Valid<br>immediately | 0 | 0 to 1 | - | 16<br>Bit |  |
| 200D | 06 | P13-06 | CommVdi_6 | Operation<br>setting | Valid<br>immediately | 0 | 0 to 1 | - | 16<br>Bit |  |
| 200D | 0B | P13-11 | CommVdo_1 | Operation<br>setting | Valid<br>immediately | 0 | 0 to 1 | - | 16<br>Bit |  |
| 200D | 0C | P13-12 | CommVdo_2 | Operation<br>setting | Valid<br>immediately | 0 | 0 to 1 | - | 16<br>Bit |  |
| 200D | 0D | P13-13 | CommVdo_3 | Operation<br>setting | Valid<br>immediately | 0 | 0 to 1 | - | 16<br>Bit |  |

**DI/DO channel function definition**

| DI channel function definition |         |                           |  |        |
|--------------------------------|---------|---------------------------|--|--------|
| Channel function code          | Name    | Function name             | Description  | Remark |
| 0                              | -       | OFF (not used)            | -  | -      |
| 1                              | S-ON    | Servo enabled             | Invalid: Servo motor enabled function prohibited;<br>Valid: Servo motor power-on enabled.                            | -      |
| 2                              | A-CLR   | Fault and warning cleared | Invalid: Do not reset faults or warnings<br>Valid: Reset fault or warning.   | -      |
| 3                              | POT     | Forward drive prohibited  | Invalid: Forward drive allowed;<br>Valid: Forward drive prohibited.  | -      |
| 4                              | NOT     | Reverse drive prohibited  | Invalid: Reverse drive allowed;<br>Valid: Reverse drive prohibited.  | -      |
| 6                              | CL      | Clear deviation counter   | Invalid: The position deviation is not cleared;<br>Valid: Position deviation is cleared.                             | -      |
| 8                              | E-STOP  | Emergency stop            | Invalid: Position lock after zero speed stop;<br>Valid: Do not affect the current running state.                     | -      |
| 26                             | HOMEORG | Origin signal             | Invalid: Do not affect the current operation of servo motor<br>Valid: Servo motor implements origin regression mode. | -      |

| DO channel function definition |      |                    |  |        |
|--------------------------------|------|--------------------|--|--------|
| Channel function code          | Name | Function name      | Description  | Remark |
| 128                            | -    | OFF (not used)     | -  | -      |
| 129                            | RDY  | Servo ready        | Servo is ready, and could receive S-ON signal.<br>Invalid: Servo is not ready<br>Valid: Servo is ready   | -      |
| 130                            | ALM  | Fault signal       | Valid when the fault is detected   | -      |
| 131                            | WARN | Warning signal     | Valid when warning signals are output  | -      |
| 132                            | TGON | Rotation detection | When the absolute value of servo motor speed is higher than 2005-10 set value:<br>Invalid: The motor rotation detection signal is invalid<br>Valid: The motor rotation detection signal is valid | -      |
| 133                            | ZSP  | Zero speed signal  | The signal output by the servo motor when it stops:<br>Invalid: Motor zero speed signal is invalid<br>Valid: Motor zero speed signal is valid  | -      |



|     |          |                              |   |  |
|-----|----------|------------------------------|---|--|
| 134 | P-COIN   | Positioning completed        | In the position control mode, the absolute value of the position deviation meets the setting conditions of the object dictionary 6067h and 6068h, indicating that the servo positioning is completed. | -  |
| 137 | V-NEAR   | Speed approach               | -   | -  |
| 138 | T-COIN   | Torque arrival               | Invalid: The absolute value of torque command is less than the set value<br>Valid: The absolute value of torque command reaches the set value   | -  |
| 139 | T-LIMIT  | Torque limit                 | The confirmation signal of torque limit.<br>Invalid: Motor torque is not limited<br>Valid: Motor torque is limited  | -  |
| 140 | V-LIMIT  | Speed limited                | The confirmation signal of speed limit in torque mode.<br>Invalid: Motor speed is not limited<br>Valid: Motor speed is limited  | -  |
| 141 | BRK-OFF  | Brake output                 | Outputting this signal indicates that the brake of the servo motor is released.   | To use this DO function, you need to power it on again |
| 142 | SRV-ST   | Servo start state<br>Output  | Invalid: servo drive is in non-running mode<br>Valid: servo drive in running mode   | -  |
| 145 | COM_VDO1 | Communication<br>VDO1 output | Use communication VDO   | -  |
| 146 | COM_VDO2 | Communication<br>VDO2 output | Use communication VDO   |  |
| 147 | COM_VDO3 | Communication<br>VDO3 output | Use communication VDO   |  |

**Group 201E**

| Object dictionary<br>(Hex) |           | Monitoring<br>Quantity<br>(Dec) | Monitoring name                  | Category  | Unit                     | Data type | Page<br>number |
|----------------------------|-----------|---------------------------------|----------------------------------|-----------|--------------------------|-----------|----------------|
| Index                      | Sub-index |                                 |                                  |           |                          |           |                |
| 201E                       | 01        | U0-01                           | SrvStatus                        | Universal | -                        | 16 Bit    |                |
| 201E                       | 02        | U0-02                           | SpeedDis                         | Universal | rpm                      | 16 Bit    |                |
| 201E                       | 03        | U0-03                           | SpdCmd                           | Universal | rpm                      | 16 Bit    |                |
| 201E                       | 04        | U0-04                           | PosCmdToSpd                      | Universal | rpm                      | 16 Bit    |                |
| 201E                       | 05        | U0-05                           | PulsErr                          | Universal | Equivalent<br>pulse unit | 32 Bit    |                |
| 201E                       | 09        | U0-09                           | PulsTotal                        | Universal | Instruction<br>unit      | 32 Bit    |                |
| 201E                       | 0D        | U0-13                           | EncTotal_LowWord (Low 32 bits)   | Universal | Encoder unit             | 32 Bit    |                |
| 201E                       | 0F        | U0-15                           | EncTotal_HighWord (High 32 bits) | Universal | Encoder unit             | 32 Bit    |                |
| 201E                       | 11        | U0-17                           | DiData1                          | Universal | -                        | 16 Bit    |                |
| 201E                       | 13        | U0-19                           | DoData1                          | Universal | -                        | 16 Bit    |                |
| 201E                       | 14        | U0-20                           | InerRatioReal                    | Universal | %                        | 16 Bit    |                |
| 201E                       | 17        | U0-23                           | DisVibFreq                       | Universal | Hz                       | 16 Bit    |                |
| 201E                       | 18        | U0-24                           | DisVibMag                        | Universal | rpm                      | 16 Bit    |                |
| 201E                       | 19        | U0-25                           | PToqLimitDis                     | Universal | %                        | 16 Bit    |                |
| 201E                       | 1A        | U0-26                           | NToqLimitDis                     | Universal | %                        | 16 Bit    |                |
| 201E                       | 1B        | U0-27                           | PSpdLimitDis                     | Universal | rpm                      | 16 Bit    |                |
| 201E                       | 1C        | U0-28                           | NSpdLimitDis                     | Universal | rpm                      | 16 Bit    |                |
| 201E                       | 1D        | U0-29                           | MachineAngle                     | Universal | °                        | 16 Bit    |                |
| 201E                       | 1E        | U0-30                           | ElecAngle                        | Universal | °                        | 16 Bit    |                |
| 201E                       | 1F        | U0-31                           | DcBusVoltDisp                    | Universal | V                        | 16 Bit    |                |
| 201E                       | 20        | U0-32                           | Temperature_IPM                  | Universal | °C                       | 16 Bit    |                |
| 201E                       | 21        | U0-33                           | OutputPowerInst                  | Universal | W                        | 16 Bit    |                |
| 201E                       | 22        | U0-34                           | OutputPowerAverage               | Universal | W                        | 16 Bit    |                |
| 201E                       | 23        | U0-35                           | HourTotalRun                     | Universal | h                        | 16 Bit    |                |

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|      |    |       |                                   |           |                  |        |  |
|------|----|-------|-----------------------------------|-----------|------------------|--------|--|
| 201E | 25 | U0-37 | MinTotalRun                       | Universal | min              | 16 Bit |  |
| 201E | 26 | U0-38 | SecTotalRun                       | Universal | s                | 16 Bit |  |
| 201E | 27 | U0-39 | ToqOutRate                        | Universal | %                | 16 Bit |  |
| 201E | 28 | U0-40 | HourCurrentRun                    | Universal | h                | 16 Bit |  |
| 201E | 2A | U0-42 | MinCurrentRun                     | Universal | min              | 16 Bit |  |
| 201E | 2B | U0-43 | SecCurrentRun                     | Universal | s                | 16 Bit |  |
| 201E | 2C | U0-44 | DisPwrInst                        | Universal | W                | 16 Bit |  |
| 201E | 2E | U0-46 | DisPwrAvg                         | Universal | W                | 16 Bit |  |
| 201E | 30 | U0-48 | PwrUpCount                        | Universal | Times            | 16 Bit |  |
| 201E | 32 | U0-50 | MotoTotal_LowWord (lower 32 bits) | Universal | Circle           | 32 Bit |  |
| 201E | 33 | U0-51 | MotoTotal_HighWord (high 32 bits) | Universal | Circle           | 32 Bit |  |
| 201E | 35 | U0-53 | MotoModel                         | Universal | -                | 16 Bit |  |
| 201E | 36 | U0-54 | AbsEncIn1Cycle                    | Universal | Encoder unit     | 32 Bit |  |
| 201E | 37 | U0-55 | AbsEncMultiTurn                   | Universal | Circle           | 32 Bit |  |
| 201E | 38 | U0-56 | EncTotal_CmdUnit                  | Universal | Instruction unit | 32 Bit |  |

**Group 201F**

| Object dictionary<br>(Hex) |           | Monitoring<br>Quantity<br>(Dec) | Monitoring name | Category | Unit             | Data type | Page<br>number |
|----------------------------|-----------|---------------------------------|-----------------|----------|------------------|-----------|----------------|
| Index                      | Sub-index |                                 |                 |          |                  |           |                |
| 201F                       | 01        | U1-01                           | NowErrorCode    | Warning  | -                | 16 Bit    |                |
| 201F                       | 02        | U1-02                           | NowWarmCode     | Warning  | -                | 16 Bit    |                |
| 201F                       | 03        | U1-03                           | IuWarmOccur     | Warning  | A                | 16 Bit    |                |
| 201F                       | 04        | U1-04                           | IvWarmOccur     | Warning  | A                | 16 Bit    |                |
| 201F                       | 05        | U1-05                           | UdcWarmOccur    | Warning  | V                | 16 Bit    |                |
| 201F                       | 06        | U1-06                           | T_IPMWarmOccur  | Warning  | °C               | 16 Bit    |                |
| 201F                       | 07        | U1-07                           | IqWarmOccur     | Warning  | %                | 16 Bit    |                |
| 201F                       | 08        | U1-08                           | IdWarmOccur     | Warning  | %                | 16 Bit    |                |
| 201F                       | 09        | U1-09                           | PosErrWarmOccur | Warning  | Encoder<br>Units | 32 Bit    |                |
| 201F                       | 0A        | U1-10                           | SpdWarmOccur    | Warning  | rpm              | 16 Bit    |                |
| 201F                       | 0B        | U1-11                           | Time1WarmOccur  | Warning  | s                | 16 Bit    |                |
| 201F                       | 0C        | U1-12                           | ErrCntCurRun    | Warning  | -                | 16 Bit    |                |
| 201F                       | 0D        | U1-13                           | WarmCntCurRun   | Warning  | -                | 16 Bit    |                |
| 201F                       | 0E        | U1-14                           | ErrorTotalCnt   | Warning  | -                | 16 Bit    |                |
| 201F                       | 0F        | U1-15                           | WarmTotalCnt    | Warning  | -                | 16 Bit    |                |
| 201F                       | 10        | U1-16                           | ErrCodeLast1st  | Warning  | -                | 16 Bit    |                |
| 201F                       | 11        | U1-17                           | ErrCodeLast2nd  | Warning  | -                | 16 Bit    |                |
| 201F                       | 12        | U1-18                           | ErrCodeLast3rd  | Warning  | -                | 16 Bit    |                |
| 201F                       | 13        | U1-19                           | ErrCodeLast4th  | Warning  | -                | 16 Bit    |                |
| 201F                       | 14        | U1-20                           | ErrCodeLast5th  | Warning  | -                | 16 Bit    |                |

|      |    |       |                 |         |   |        |  |
|------|----|-------|-----------------|---------|---|--------|--|
| 201F | 15 | U1-21 | WarmCodeLast1st | Warning | - | 16 Bit |  |
| 201F | 16 | U1-22 | WarmCodeLast2nd | Warning | - | 16 Bit |  |
| 201F | 17 | U1-23 | WarmCodeLast3rd | Warning | - | 16 Bit |  |
| 201F | 18 | U1-24 | WarmCodeLast4th | Warning | - | 16 Bit |  |
| 201F | 19 | U1-25 | WarmCodeLast5th | Warning | - | 16 Bit |  |

**Group 2020**

| Object dictionary<br>(Hex) |           | Monitoring<br>Quantity<br>(Dec) | Monitoring name | Category | Unit  | Data type | Page<br>number |
|----------------------------|-----------|---------------------------------|-----------------|----------|-------|-----------|----------------|
| Index                      | Sub-index |                                 |                 |          |       |           |                |
| 2020                       | 01        | U2-01                           | ProductSer      | Device   | -     | 16 Bit    |                |
| 2020                       | 02        | U2-02                           | Model1          | Device   | -     | 16 Bit    |                |
| 2020                       | 03        | U2-03                           | Model2          | Device   | -     | 16 Bit    |                |
| 2020                       | 04        | U2-04                           | FirewareVer     | Device   | -     | 16 Bit    |                |
| 2020                       | 05        | U2-05                           | HardwareVer     | Device   | -     | 16 Bit    |                |
| 2020                       | 06        | U2-06                           | ExFactoryYear   | Device   | Year  | 16 Bit    |                |
| 2020                       | 07        | U2-07                           | ExFactoryMonth  | Device   | Month | 16 Bit    |                |
| 2020                       | 08        | U2-08                           | ExFactoryDay    | Device   | Day   | 16 Bit    |                |
| 2020                       | 09        | U2-09                           | DeviceSerNum1   | Device   | -     | 16 Bit    |                |
| 2020                       | 0A        | U2-10                           | DeviceSerNum2   | Device   | -     | 16 Bit    |                |
| 2020                       | 0B        | U2-11                           | DeviceSerNum3   | Device   | -     | 16 Bit    |                |
| 2020                       | 0C        | U2-12                           | DeviceSerNum4   | Device   | -     | 16 Bit    |                |
| 2020                       | 0D        | U2-13                           | DeviceSerNum5   | Device   | -     | 16 Bit    |                |
| 2020                       | 0E        | U2-14                           | DeviceSerNum6   | Device   | -     | 16 Bit    |                |
| 2020                       | 0F        | U2-15                           | DeviceSerNum7   | Device   | -     | 16 Bit    |                |

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|      |    |       |               |        |   |        |  |
|------|----|-------|---------------|--------|---|--------|--|
| 2020 | 10 | U2-16 | DeviceSerNum8 | Device | - | 16 Bit |  |
|------|----|-------|---------------|--------|---|--------|--|

## Group 6000

| Object dictionary (Hex) | Name                     | Accessibility | Data mapping | Default | Data range          | Unit               | Data type | Page number |
|-------------------------|--------------------------|---------------|--------------|---------|---------------------|--------------------|-----------|-------------|
| 603F                    | Error code               | RO            | TPDO         | 0       | 0~65535             | -                  | 16 Bit    | 142         |
| 6040                    | Control word             | RW            | TPDO         | 0       | 0~65535             | -                  | 16 Bit    | 142         |
| 6041                    | Status word              | RO            | TPDO         | 0       | 0~65535             | -                  | 16 Bit    | 143         |
| 605A                    | Quick-stop option code   | RW            | No           | 2       | 0 to 7              | -                  | 16 Bit    | 143         |
| 605D                    | Halt option code         | RW            | No           | 1       | 1 to 3              | -                  | 16 Bit    | 143         |
| 6060                    | Modes of servo operation | RW            | RPDO         | 0       | 0 ~ 10              | -                  | 8 bit     | 144         |
| 6061                    | Modes operation          | RO            | TPDO         | 0       | 0 ~ 10              | -                  | 8 bit     | 144         |
| 6062                    | Position demand value    | RO            | TPDO         | 0       | -                   | Instruction unit   | 32 Bit    | 144         |
| 6063                    | Position actual value    | RO            | TPDO         | 0       | -                   | Encoder Units      | 32 Bit    | 144         |
| 6064                    | Position actual value    | RO            | TPDO         | 0       | -                   | Instruction unit   | 32 Bit    | 144         |
| 6065                    | Following error window   | RW            | RPDO         | 524288  | 1 to ( $2^{32}-1$ ) | Instruction unit   | 32 Bit    | 145         |
| 6067                    | Position window          | RW            | RPDO         | 0       | 0 to $2^{32}$       | Encoder Units      | 32 Bit    | 145         |
| 6068                    | Position window time     | RW            | RPDO         | 0       | 0~65535             | 1ms                | 16 Bit    | 145         |
| 606C                    | Velocity actual value    | RW            | TPDO         | 0       | -                   | Instruction unit/s | 32 Bit    | 145         |
| 606D                    | Velocity window          | RW            | RPDO         | 10      | 0~65535             | rpm                | 16 Bit    | 145         |
| 606E                    | Velocity window time     | RW            | RPDO         | 0       | 0~65535             | ms                 | 16 Bit    | 145         |
| 6071                    | Target torque            | RW            | RPDO         | 0       | -5000~5000          | 0.1%               | 16 Bit    | 145         |
| 6072                    | Max torque               | RW            | RPDO         | 5000    | 0~5000              | 0.1%               | 16 Bit    | 145         |
| 6074                    | Torque demand            | RO            | TPDO         | 0       | -5000~5000          | 0.1%               | 16 Bit    | 146         |

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|          |                     |    |      |           |                                |                          |           |     |
|----------|---------------------|----|------|-----------|--------------------------------|--------------------------|-----------|-----|
| 6077     | Torque actual value | RO | TPDO | 0         | -5000~5000                     | 0.1%                     | 16<br>Bit | 146 |
| 607A     | Target position     | RW | RPDO | 0         | $-2^{31}$ to<br>( $2^{31}-1$ ) | Instruction<br>unit      | 32<br>Bit | 146 |
| 607C     | Home offset         | RW | RPDO | 0         | $-2^{31}$ to<br>( $2^{31}-1$ ) | Instruction<br>unit      | 32<br>Bit | 146 |
| 607D: 01 | Min position limit  | RW | RPDO | $-2^{31}$ | $-2^{31}$ to<br>( $2^{31}-1$ ) | User<br>position<br>unit | 32<br>Bit | 146 |



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|          |                                |    |      |             |                           |                                 |        |     |
|----------|--------------------------------|----|------|-------------|---------------------------|---------------------------------|--------|-----|
| 607D: 02 | Max position limit             | RW | RPDO | $-2^{31}-1$ | $-2^{31}$ to $(2^{31}-1)$ | User position unit              | 32 Bit | 146 |
| 607E     | Command polarity               | RW | RPDO | 0           | 0 ~ 255                   | -                               | 8 bit  | 147 |
| 607F     | Max profile velocity           | RW | RPDO |             | 0 to $(2^{32}-1)$         | Instruction unit/s              | 32 Bit | 147 |
| 6081     | Profile velocity               | RW | RPDO | 0           | 0 to $(2^{32}-1)$         | User position speed unit        | 32 Bit | 147 |
| 6083     | Profile acceleration           | RW | RPDO | 100         | 0 to $(2^{32}-1)$         | Instruction unit/s <sup>2</sup> | 32 Bit | 147 |
| 6084     | Profile deceleration           | RW | RPDO | 100         | 0 to $(2^{32}-1)$         | Instruction unit/s <sup>2</sup> | 32 Bit | 147 |
| 6085     | Quick stop deceleration        | RW | RPDO | 100         | 0 to $(2^{32}-1)$         | User acceleration unit          | 32 Bit | 148 |
| 6086     | Motion profile type            | RW | RPDO | 0           | $-2^{15}$ to $(2^{15}-1)$ | -                               | 16 Bit | 148 |
| 6087     | Torque slope                   | RW | RPDO | $2^{32}-1$  | 0 to $(2^{32}-1)$         | 0.1%/s                          | 32 Bit | 148 |
| 6091: 01 | Gear ratio                     | RW | RPDO | 1           | 1 to $(2^{32}-1)$         | -                               | 32 Bit | 148 |
| 6091: 02 | Motor revolutions              | RW | RPDO | 1           | 1 to $(2^{32}-1)$         | -                               | 32 Bit | 148 |
| 6098     | Homing method                  | RW | RPDO | 1           | 1 to 35                   | -                               | 8 bit  | 149 |
| 6099: 01 | Speed during search for switch | RW | RPDO | 100         | 0 to $(2^{32}-1)$         | Instruction unit/s              | 32 Bit | 149 |
| 6099: 02 | Speed during search for zero   | RW | RPDO | 100         | 0 to $(2^{32}-1)$         | Instruction unit/s              | 32 Bit | 149 |
| 609A     | Home acceleration              | RW | RPDO | 100         | 0 to $(2^{32}-1)$         | Instruction unit/s <sup>2</sup> | 32 Bit | 149 |
| 60B0     | Position offset                | RW | RPDO | 0           | $-2^{31}$ to $(2^{31}-1)$ | Instruction unit                | 32 Bit | 149 |
| 60B1     | Velocity offset                | RW | RPDO | 0           | $-2^{31}$ to $(2^{31}-1)$ | Instruction unit/s              | 32 Bit | 150 |
| 60B2     | Torque offset                  | RW | RPDO | 0           | -5000~5000                | 0.1%                            | 16 Bit | 150 |
| 60B8     | Touch probe function           | RW | RPDO | 0           | 0~65535                   | -                               | 16 Bit | 150 |
| 60B9     | Touch probe status             | RO | TPDO | 0           | 0~65535                   | -                               | 16 Bit | 150 |
| 60BA     | Touch probe Pos1 Pos Value     | RO | TPDO | 0           | $-2^{31}$ to $(2^{31}-1)$ | Instruction unit                | 32 Bit | 150 |
| 60BB     | Touch Probe Pos1 Neg Value     | RO | TPDO | 0           | $-2^{31}$ to $(2^{31}-1)$ | Instruction unit                | 32 Bit | 150 |

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|      |                                      |    |      |      |                           |                    |        |     |
|------|--------------------------------------|----|------|------|---------------------------|--------------------|--------|-----|
| 60BC | Touch Probe Pos2 Pos Value           | RO | TPDO | 0    | $-2^{31}$ to $(2^{31}-1)$ | Instruction unit   | 32 Bit | 150 |
| 60BD | Touch Probe Pos2 Neg Value           | RO | TPDO | 0    | $-2^{31}$ to $(2^{31}-1)$ | Instruction unit   | 32 Bit | 150 |
| 60E0 | Forward Direction Torque Limit Value | RW | RPDO | 5000 | 0~5000                    | 0.1%               | 16 Bit | 150 |
| 60E1 | Reverse Direction Torque Limit Value | RW | RPDO | 5000 | 0~5000                    | 0.1%               | 16 Bit | 151 |
| 60F4 | Following error actual value         | RO | RPDO | -    | -                         | Instruction unit   | 32 Bit | 151 |
| 60FC | Position demand value                | RO | TPDO | -    | -                         | Encoder Units      | 32 Bit | 151 |
| 60FD | Digital Input                        | RO | PDO  | -    | 0 to $2^{32}$             | -                  | 32 Bit | 151 |
| 60FF | Profile velocity                     | RW | RPDO | 0    | -                         | Instruction unit/s | 32 Bit | 151 |

## 11.2 List of Fault and Warning Codes

Clearable: the panel can stop the fault display state by giving a "clear signal".

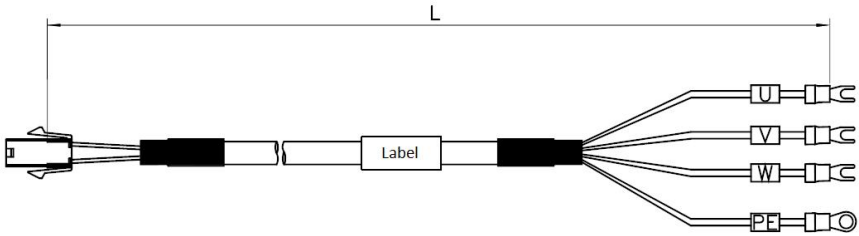
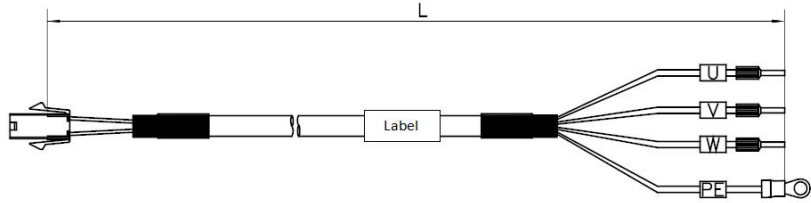
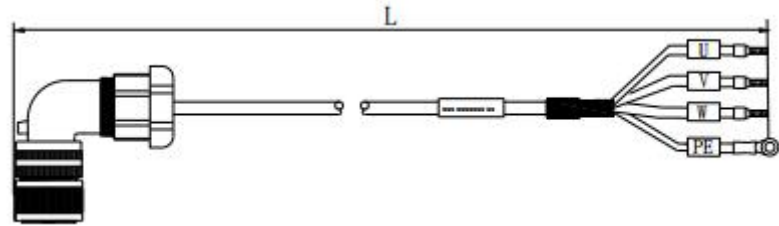
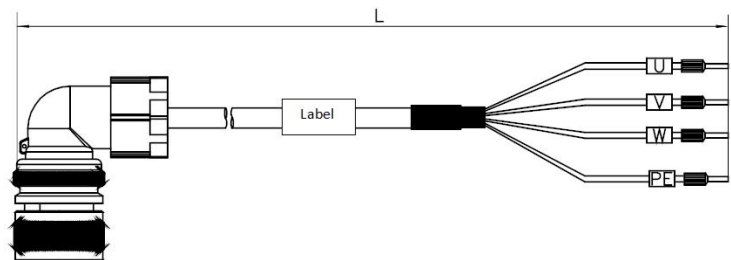
Stop immediately: The control action state stops immediately.

| Code  | Content                                   | Cleanable | Immediately Stop | Code  | Content                             | Cleanable | Immediately Stop |
|-------|---|-----------|------------------|-------|-------------------------------------|-----------|------------------|
| Er.01 | Parameter damage                          |           | ○                | Er.34 | Motor overload protection           | ✓         | ○                |
| Er.02 | Parameter storage error                   |           | ○                | Er.35 | Electronic gear ratio exceeds limit | ✓         | ○                |
| Er.03 | ADC reference source error                |           | ○                | Er.36 | Position deviation is too large     | ✓         | ○                |
| Er.04 | AD current sampling conversion error      |           | ○                | Er.37 | Abnormal torque saturation          | ✓         | ○                |
| Er.05 | Abnormal FPGA communication               |           | ○                | Er.38 | Main circuit electrical phase loss  | ✓         | ○                |
| Er.06 | Wrong FPGA program version                |           | ○                | Er.39 | Emergency stop                      | ✓         | ○                |
| Er.07 | Clock exception                           |           | ○                | Er.40 | Encoder battery failure             | ✓         | ○                |
| Er.09 | Abnormal network status switching         | ✓         | ○                | Er.41 | Motor (encoder) over temperature    | ✓         | ○                |
| Er.10 | Loss of synchronization                   | ✓         | ○                | Er.42 | Encoder write failure               | ✓         | ○                |
| Er.11 | Unburned XML configuration file           | ✓         | ○                | Er.44 | Back to original timeout fault      | ✓         | ○                |
| Er.12 | Network initialization failed             | ✓         | ○                | Er.60 | ADC conversion is not completed     |           | ○                |
| Er.13 | Synchronization period setting error      | ✓         | ○                | Er.61 | Internal software fault             |           | ○                |
| Er.14 | Synchronization period error is too large | ✓         |                  | Er.62 | Internal software fault             |           | ○                |
| Er.20 | Overcurrent                               |           | ○                | Er.63 | Internal software fault             |           | ○                |
| Er.21 | Main power supply is undervoltage         | ✓         | ○                | Er.64 | Internal software fault             |           | ○                |

|       |  |   |   |       |  |   |   |
|-------|--|---|---|-------|--|---|---|
| Er.22 | Main power supply is overvoltage             | ✓ | ○ | Er.65 | Internal software fault  |   | ○ |
| Er.23 | Braking resistor is not connected            | ✓ | ○ | A-81  | Over speed alarm   | ✓ |   |
| Er.24 | The braking resistor is turned on abnormally |   | ○ | A-82  | Overload   | ✓ |   |
| Er.25 | Wrong motor model                            | ✓ | ○ | A-83  | Braking resistor is over temperature or overload                   | ✓ |   |
| Er.26 | Wrong motor model                            |   | ○ | A-84  | Parameter modification that needs to be powered on again           | ✓ |   |
| Er.27 | Encoder is disconnected                      | ✓ | ○ | A-88  | Main circuit instantaneous power failure                           | ✓ |   |
| Er.28 | Encoder Z pulse is lost                      |   | ○ | A-89  | Duplicate DI port configuration                                    | ✓ |   |
| Er.30 | Encoder UVW signal error                     |   | ○ | A-90  | Duplicate DO port configuration                                    | ✓ |   |
| Er.31 | Power line disconnection                     | ✓ | ○ | A-91  | Parameter modification is too frequent                             | ✓ |   |
| Er.32 | Exceeding motor maximum speed                |   | ○ | A-92  | Encoder battery voltage low warning                                | ✓ |   |
| Er.33 | Power module is over temperature             | ✓ | ○ | A-93  | Encoder read and write check is abnormal and frequency is too high | ✓ |   |

### 11.3 Wire

Table 11-1 Appearance of servo motor power cable

| Wire type           | Cable length L | Appearance drawing of cable  |
|---------------------|----------------|--|
| P-Z3O1-R4M-3MX4     | 3 meters       |  <p>Suitable for [VD3E type A drive], which can connect [60/80 flange conductor motor]</p>     |
| P-Z3O1-R4M-5MX4     | 5 meters       |  |
| P-Z3O1-R4M-10MX4    | 10 meters      |  |
| P-U3O1-R4M-3MX4     | 3 meters       |  <p>Suitable for [VD3E type B drive], which can connect [80 flange conductor motor]</p>        |
| P-U3O1-R4M-5MX4     | 5 meters       |  |
| P-U3O1-R4M-10MX4    | 10 meters      |  |
| P-Z3O1-H28J4M-3MX4  | 3 meters       |  <p>Suitable for [VD3E type A drive], which can connect [110/130 flange conductor motor]</p> |
| P-Z3O1-H28J4M-5MX4  | 5 meters       |  |
| P-Z3O1-H28J4M-10MX4 | 10 meters      |  |
| P-U3O1-H28J4M-3MX4  | 3 meters       |  <p>Suitable for [VD3E type B drive], which can connect [110/130 flange conductor motor]</p> |
| P-U3O1-H28J4M-5MX4  | 5 meters       |  |
| P-U3O1-H28J4M-10MX4 | 10 meters      |  |

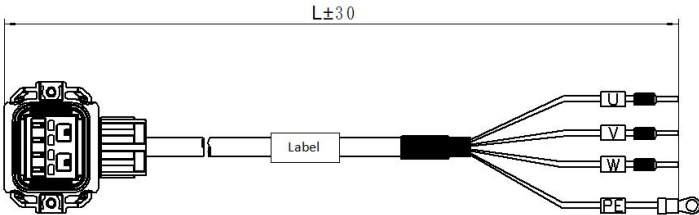
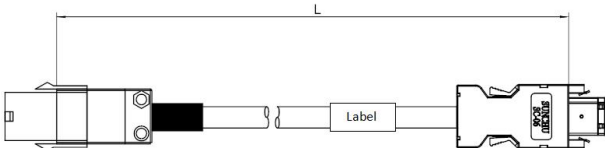
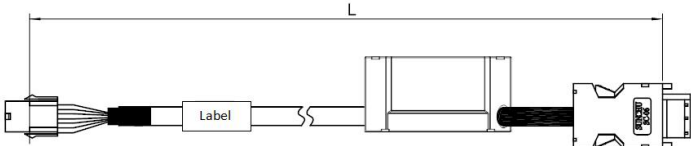
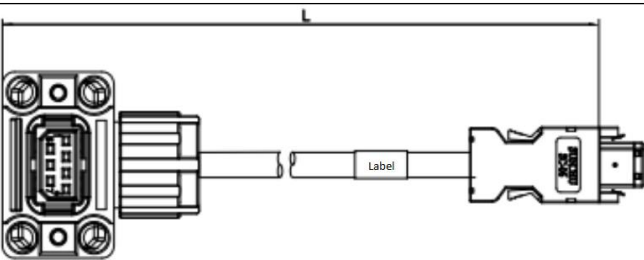
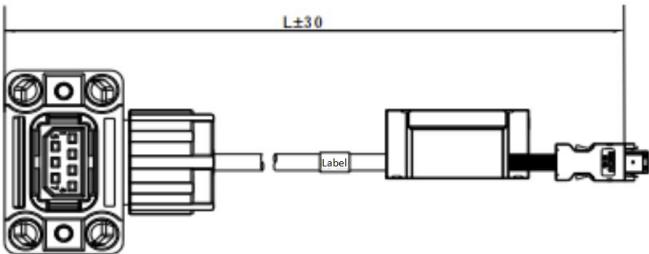
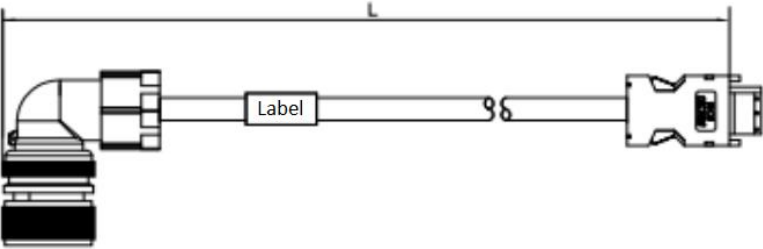
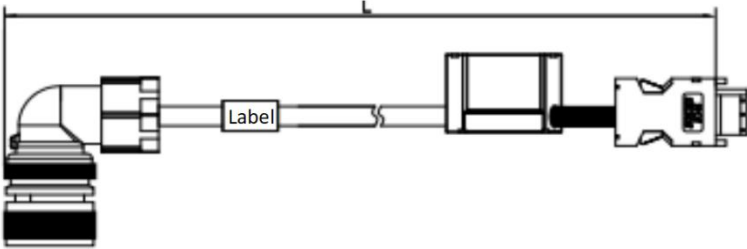
|                     |                  |  |
|---------------------|------------------|--|
| P-Z3O1-MC4S-3MX4    | 3<br>meter<br>s  |  <p>Suitable for [VD3E type A drive], which can connect [60/80 flange conductor motor]</p>                       |
| P-Z3O1-MC4S-5MX4    | 5<br>meter<br>s  |  |
| P-Z3O1-MC4S-10MX4   | 10<br>meter<br>s |  |
| E-J1394-R9M-3MX5-A  | 3<br>meter<br>s  |  <p>Suitable for [VD3E series drive], which can connect [60/80 flange conductor motor (single-turn encoder)]</p> |
| E-J1394-R9M-5MX5-A  | 5<br>meter<br>s  |  |
| E-J1394-R9M-10MX5-A | 10<br>meter<br>s |  |

Table 11-2 Appearance diagram of servo encoder cable

| Wire type             | Cable length L | Appearance drawing of cable  |
|-----------------------|----------------|--|
| E-J1394-R9M-3MX7-A1   | 3 meters       |  <p>Suitable for [VD3E series drive], which can connect [60/80 flange conductor motor (multi-turn encoder)]</p>  |
| E-J1394-R9M-5MX7-A1   | 5 meters       |  |
| E-J1394-R9M-10MX7-A1  | 10 meters      |  |
| E-J1394-MC7S-3MX5-A   | 3 meters       |  <p>Suitable for [VD3E series drive], which can connect [60/80 flange connector motor (single-turn encoder)]</p> |
| E-J1394-MC7S-5MX5-A   | 5 meters       |  |
| E-J1394-MC7S-10MX5-A  | 10 meters      |  |
| E-J1394-MC7S-3MX7-A1  | 3 meters       |    |
| E-J1394-MC7S-5MX7-A1  | 5 meters       |  |
| E-J1394-MC7S-10MX7-A1 | 10 meters      |  |

|                             |           |   |
|-----------------------------|-----------|---|
|                             |           | Suitable for [VD3E series drive], which can connect [60/80 flange connector motor (multi-turn encoder)] |
| E-J1394-H28K7M-3<br>MX5-A   | 3 meters  |                       |
| E-J1394-H28K7M-5<br>MX5-A   | 5 meters  |   |
| E-J1394-H28K7M-1<br>OMX5-A  | 10 meters |   |
| E-J1394-H28K7M-3<br>MX7-A1  | 3 meters  |                       |
| E-J1394-H28K7M-5<br>MX7-A1  | 5 meters  |   |
| E-J1394-H28K7M-1<br>OMX7-A1 | 10 meters |   |