# ES3-BAI Series
# ES3-BAI 系列

**AC Servo Drive**
**交流伺服驱动器**

**V1.2 User Manual (Lite version V1.2)**
**V1.2 用户手册（精简版 V1.2）**


**2024-01-12**

**SHENZHEN YAKO AUTOMATION TECHNOLOGY CO., LTD.**
**深圳研控自动化科技股份有限公司**
**www.yankong.com**

# Content 目录

# Chapter 1 Selection of Servo System
# 第一章伺服系统选型

## 1.1 Drive specifications 驱动器规格

Table 1-1 ES3 Series Servo Drive Basic Specifications
表 1-1 ES3 系列伺服驱动器基本规格

| | | | | | |
|---|---|---|---|---|---|
| 基本规格 | Model<br>驱动器型号 | ES3-02BAI | ES3-04BAI | ES3-08BAI | ES3-10BAI |
| | Continuous Output Current Arms<br>连续输出电流 Arms | 1.6 | 2.8 | 5.0 | 6 |
| | Maximum Output Current Arms<br>最大输出电流 Arms | 5.8 | 10 | 13.5 | 17 |
| | Power Supply Input<br>电源输入 | Single phase, AC200~240V,50/60HZ<br>单相, AC200~240V, 50/60HZ | | | |
| | Use Environment<br>使用环境 | Temperature<br>温度 | Operation Temperature：0℃～55℃<br>使用温度：0℃～+55℃<br>Storage Temperature：：-20℃～+70℃<br>储存温度：-20℃～+70℃ | | |
| | | Humidity<br>湿度 | 0～90% RH（No dew environment）<br>0～90% RH 以下（无结露环境） | | |
| | | Using Height<br>使用高度 | Elevation ≤1000m<br>海拔 1000m 以下 | | |
| | | Vibration/Strike<br>振动/冲击 | Vibration <0.5G/ Strike <2G<br>振动<0.5G/冲击<2G | | |
| | | IP Grade / Contamination<br>IP 等级/污染度 | IP20/ Contamination Rating 2<br>IP20/污染等级 2 | | |
| | Control Method<br>控制方法 | | IGBT PWM Space Vector Control<br>IGBT PWM 空间向量控制 | | |
| | Encoder<br>编码器 | | 17bit Serial Incremental Type/ 17bit Serial absolute value Type/ 23bit Serial Incremental Type/ 23bit Serial absolute value Type<br>17bit 串行增量型/17bit 串行绝对值型/23bit 串行增量型/23bit 串行绝对型 | | |
| | I/O Ports<br>输入输出端口 | IO Signal<br>IO 信号 | Input<br>输入 | 8 pcs (General)<br>8 个（通用） | |
| | | | Output<br>输出 | 5 pcs (General)<br>5 个（通用） | |
| | | Pulse Signal<br>脉冲量信号 | Input<br>输入 | 4 pcs (Low Speed Pulse, High Speed Pulse)<br>4 个（低速脉冲，高速脉冲） | |
| | | | Output<br>输出 | 4 pcs (3 Frequency Output, 1 Open Collector Output)<br>4 个（分频输出 3，集电极开路输出 1） | |
| | Communication<br>通信功能 | RS-232 | Connected to PC for debugging servo drive<br>与 PC 连接，调试伺服驱动器用 | | |
| | Panel Operator<br>面板操作器 | | LED Display<br>LED 显示 | | |
| | Regeneration Function<br>再生回路功能 | | Over 400W built-in braking resistor<br>400W 及以上规格含内置再生电阻 | | |
| | Protection Function<br>保护功能 | | Overcurrent, Overload, Overvoltage, Low Voltage, over speed, Overheat, Encoder error, Communication error, Position deviation<br>过电流、过载、过电压、低电压、过速度、过热、编码器异常、通信异常、位置偏差过大等 | | |
| | Control Mode<br>控制模式 | | Position Control Mode; Speed Control Mode; Torque Control Mode; Mixed-mode Switching<br>位置控制；速度控制；转矩控制；混合模式切换 | | |
| 功能规格 | Position Control Mode<br>位置控制模式 | Location Command Format<br>位置命令格式 | PULSE/DIR;<br>脉冲/方向（PULSE/DIR）；<br>CW/CCW;<br>正/反脉冲（CW/CCW）；<br>A, B Phase Cross Pulse<br>A、B 相正交脉冲； | | |
| | | Position Input Circuit<br>位置输入电路 | Line Driver；Open Collector | | |

| | | | | |
|---|---|---|---|---|
| | | Maximum Input Frequency<br>最大输入频率 | | Line Driver Low Speed 500Kpps<br>Line Driver 低速 500Kpps<br>Line Driver High Speed 3Mpps<br>Line Driver 高速 3Mpps<br>Open Collector 200Kpps<br>Open Collector 200Kpps |
| | | Smoothing Filter<br>平滑滤波器 | | Smoothing treatment for position command, ensuring motor running more stable<br>对位置指令做平滑处理，使电机运转更平滑稳定 |
| | | Electronic Gear<br>电子齿轮 | | Two sets of electronic gear ratios available<br>提供 2 组电子齿轮比 |
| | | Vibration Suppression Filter<br>抑振滤波器 | | Effectively inhibit external signal interference and the system resonant frequency, to ensure stable operation<br>可以有效抑制外部信号干扰，及机械系统共振，保证设备运行稳定 |
| | Speed Control Mode<br>速度控制<br>模式 | Command Form<br>命令形态 | | Internal speed command<br>内部速度命令 |
| | | Speed Change Fate<br>速度变动率 | Voltage Fluctuation<br>电压波动 | Rated voltage ±10%：0.5%（Rated speed）<br>额定电压±10%：0.5%（额定转速下） |
| | | | Load Fluctuation<br>负载波动 | 0-100% load：- 0.5% (Rated speed)<br>0-100%负载时：≤ 0.5%(额定转速下) |
| | | | Temperature Fluctuation<br>温度波动 | 25±25℃：≤0.5% (Rated speed)<br>25±25℃：≤ 0.5%(额定转速下) |
| | | Acceleration/Deceleration Setting Range<br>加减速设定范围 | | 0-10S |
| | Torque Control Mode<br>转矩控制模式 | Command Form<br>命令形态 | | Internal torque command<br>内部转矩指令 |
| | Common Spec<br>共同 | Self-tuning Function 自整定功能 | | Identifying inertia, rigidity tuning<br>惯量识别、刚性整定 |
| | | Encoder Feedback Electronic Gear<br>编码器反馈电子齿轮 | | Free set<br>自由设定 |
| | | Error Record<br>异常信息记录 | | 9 sets of historical information records<br>9 组历史信息记录 |

## 1.2 Servo motors and drives model description 伺服电机及驱动器型号说明

### 1.2.1 Drive Model Description 驱动器型号说明

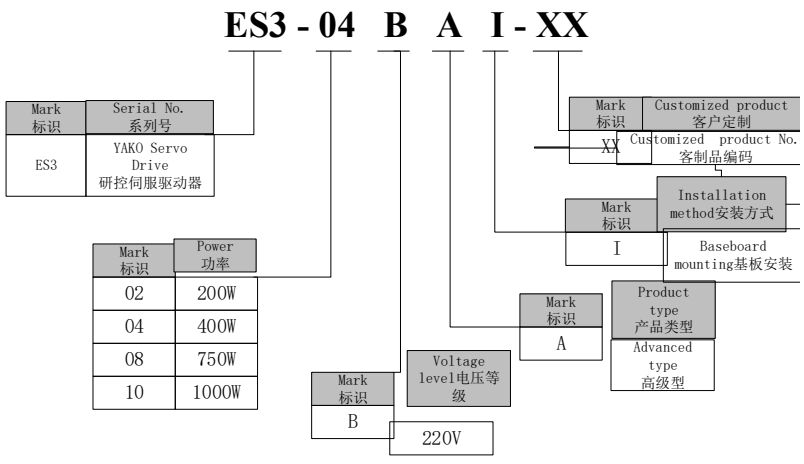



Figure 1-1 Naming rule of drive
图1-1 驱动器命名规则

### 1.2.2 Servo Motor Model Description 伺服电机型号说明

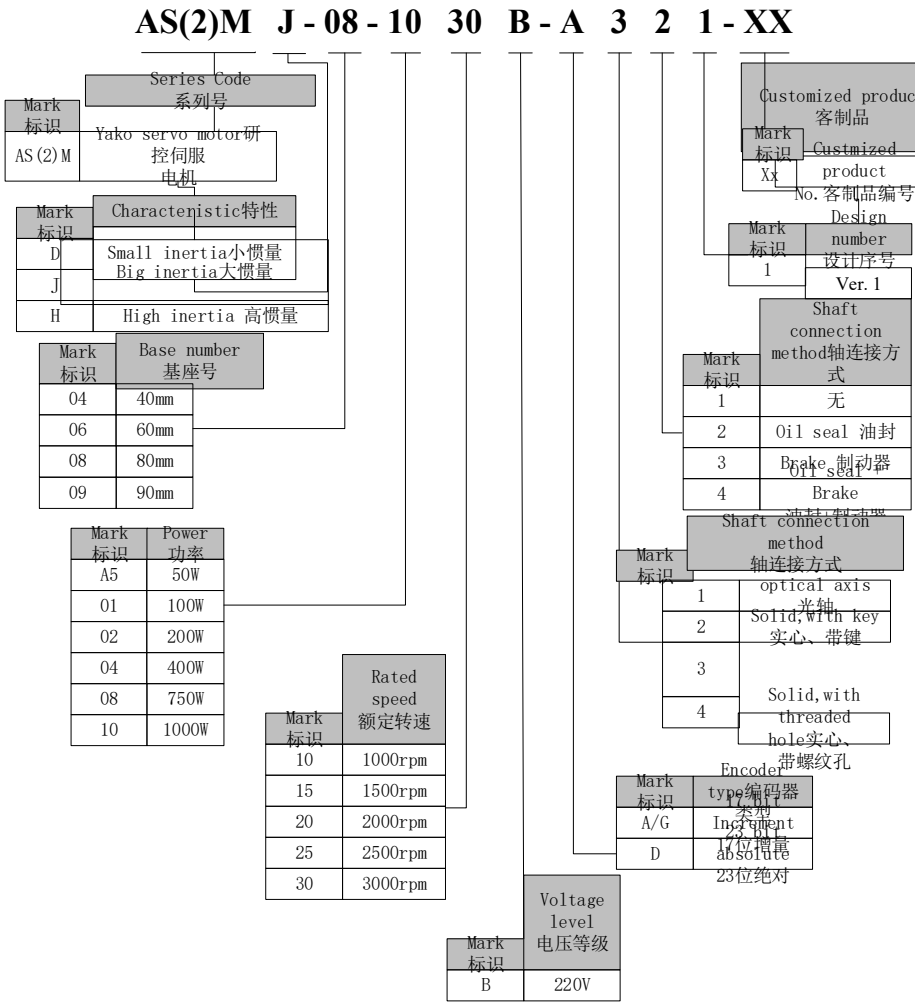



Figure 1-2 Naming rule of motor
图1-2 电机命名规则

## 1.3 Servo drive and servo motor matching list 伺服驱动器和伺服电机配套一览表

Table 1-2 Servo drive and motor matching table
表 1-2 伺服驱动器与电机配套表

| Servo motor models 伺服电机型号 | | Flange 电机框 | Capacity 容量 | Drive model 驱动器型号 | Drive 驱动器 | Matching cable 配套线缆 |
|---|---|---|---|---|---|---|
| | | | | ES3-□□BAI | SIZE | |
| Small inertia 小惯量 | ASMD-04-A530B | 40 | 50W | 02 | B | P1-AS3<br>E1-AS3 |
| | ASMD-04-0130B | 40 | 100W | 02 | B | |
| | AS2MD-04-A530B-G*** | 40 | 50W | 02 | B | |
| | AS2MD-04-0130B-G*** | 40 | 100W | 02 | B | |
| Large inertia 大惯量 | ASMJ-06-0230B | 60 | 200W | 02 | B | |
| | ASMJ-06-0430B | 60 | 400W | 04 | B | |
| | ASMJ-08-0830B | 80 | 750W | 10 | C | |
| | ASMJ-09-1030B | 90 | 1KW | 10 | C | |
| | AS2MJ-06-0230B-G*** | 60 | 200W | 02 | B | |
| | AS2MJ-06-0430B-G*** | 60 | 400W | 04 | B | |
| | AS2MJ-08-0830B-G*** | 80 | 750W | 10 | C | |
| | AS2MJ-08-1030B-G*** | 80 | 1.0KW | 10 | C | |

## 1.4 Matching motor parameters 配套电机参数

Table 1-3 Motor parameters table
表 1-3 电机参数表

| Motor specifications 电机规格型号 | Rated output 额定输出 KW | Rated torque 额定转矩 Nm | Maximum torque 最大转矩 Nm | Rated current 额定电流 Arms | Maximum current 最大电流 Arms | Rated speed 额定转速 $min^{-1}$ | Maximum speed 最高转速 $min^{-1}$ | Rotor inertia 转子惯量 $10^{-4}$ $Kgm^2$ |
|---|---|---|---|---|---|---|---|---|
| ASMD-04-A530B | 0.05 | 0.159 | 0.477 | 0.69 | 2.07 | 3000 | 5000 | 0.025 |
| ASMD-04-0130B | 0.1 | 0.318 | 0.954 | 1.27 | 3.81 | 3000 | 5000 | 0.046 |
| ASMJ-06-0230B | 0.2 | 0.64 | 1.92 | 1.7 | 5.1 | 3000 | 5000 | 0.42 |
| ASMJ-06-0430B | 0.4 | 1.27 | 3.81 | 2.8 | 8.4 | 3000 | 5000 | 0.68 |
| ASMJ-08-0830B | 0.75 | 2.39 | 7.17 | 4.5 | 13.5 | 3000 | 4500 | 1.53 |
| ASMJ-09-1030B | 1 | 3.18 | 9.54 | 4.5 | 13.5 | 3000 | 4000 | 2.38 |
| AS2MD-04-A530B-G*** | 0.05 | 0.16 | 0.48 | 0.67 | 2.01 | 3000 | 5000 | 0.025 |
| AS2MD-04-0130B-G*** | 0.1 | 0.31 | 0.95 | 1.27 | 3.81 | 3000 | 5000 | 0.05 |
| AS2MJ-06-0230B-G*** | 0.2 | 0.64 | 1.92 | 1.7 | 5.1 | 3000 | 5000 | 0.42 |
| AS2MJ-06-0430B-G*** | 0.4 | 1.27 | 3.81 | 2.7 | 8.1 | 3000 | 5000 | 0.68 |
| AS2MJ-08-0830B-G*** | 0.75 | 2.39 | 7.17 | 4.5 | 13.5 | 3000 | 4500 | 1.50 |
| AS2MJ-08-1030B-G*** | 1 | 3.18 | 9.52 | 6.5 | 19.5 | 3000 | 4500 | 1.70 |

## 1.5 Matching Cable 配套线缆

The naming rules of motor power cable are as follows:
电机动力线命名规则如下：

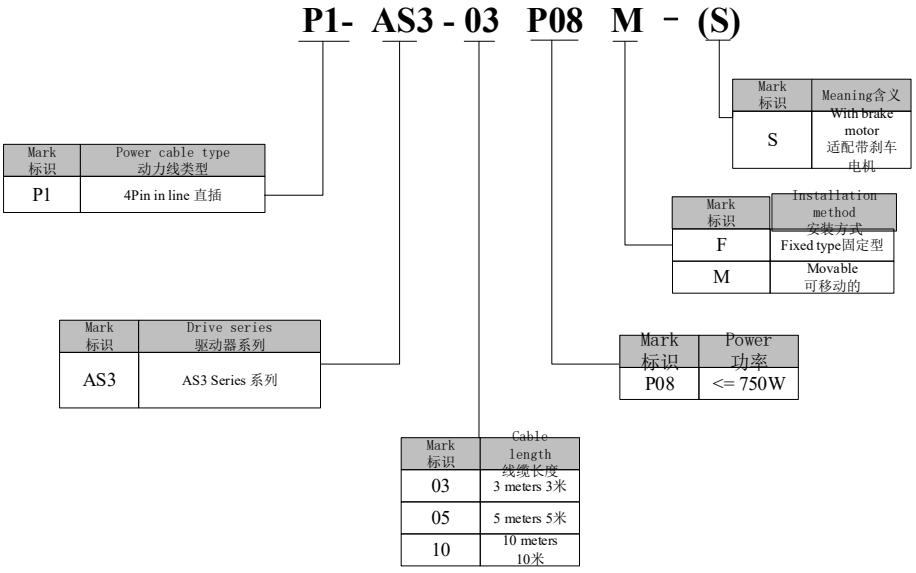
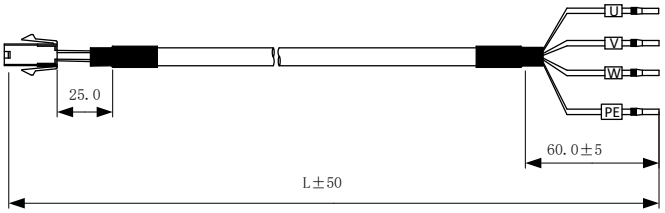
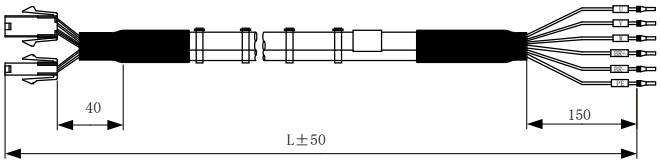



Figure 1-3 Power cable naming rules
图 1-3 动力线命名规则

The structure of diagram of the motor power cable is shown in the table below:
电机动力线结构图如下表：

Table 1-4 Power cable structure diagram

表 1-4 动力线电缆结构图

| Cable model 线缆型号 | Cable length 线缆长度 L(mm) | SIZE-C |
|---|---|---|
| P1-AS3-03P08M | 3000 |  |
| P1-AS3-05P08M | 5000 | |
| P1-AS3-10P08M | 10000 | |
| P1-AS3-03P08M-S | 3000 |  |
| P1-AS3-05P08M-S | 5000 | |
| P1-AS3-10P08M-S | 10000 | |

The naming rule for motor encoder lines are as follows:

电机编码器线命名规则如下：

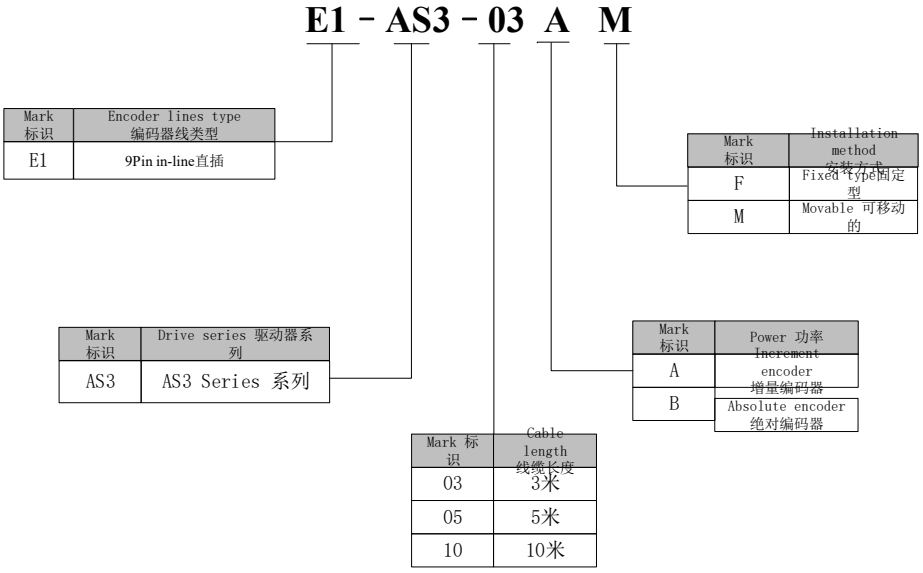



Figure 1-4 Encoder lines naming rules

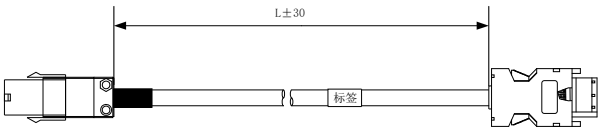
图 1-4 编码器线命名规则

Encoder matching cable structure diagram shown in table below:

编码器配套线缆结构图如下表：

Table 1-5 Encoder cable structure diagram

表 1-5 编码器线电缆结构图

| Cable model 线缆型号 | Cable length 线缆长度 L(mm) | SIZE-C |
|---|---|---|
| E1-AS3-1A5AM | 1500 |  |
| E1-AS3-03AM*1 | 3000 | |
| E1-AS3-05AM | 5000 | |
| E1-AS3-08AM | 8000 | |
| E1-AS3-10AM | 10000 | |

**Note 注：**

*1： A indicates increment encoder, B indicates absolute encoder
A 表示增量式编码器，B 表示绝对值编码器。

## 1.6 Accessories 配件包

Table 1-6 Cable accessories

表 1-6 电缆配件包

| Accessories name 配件包名称 | Model 内含配件型号 | Quantity 数量 | Picture 配件图 | Accessories name 配件名称 | No need matched cable model 无需配线线材型号 | Matched motor type 适配电机类型 (Flange size 法兰大小) |
|---|---|---|---|---|---|---|
| SA-C5 | DB plug Plastic case DB 座插头塑胶外壳 | 1 |  | Plug-in accessories between encoder lines and drive 编码器线与驱动器之间的对插配件 | E1-AS3-03AM | 40、60、80/90 |
| | DB head-6P DB 座-6P | 1 | | | | |
| | AMP-172161-1 | 1 |  | 9P Connector case Metal terminal 9P connector tail clip kit 连接器塑壳 金属端子 9P 连接器尾夹套件 | | |
| | AMP-170361-1 | 10 | | | | |
| | AMP-316454-1 | 2 | | | | |
| | AMP-172159-1 | 1 |  | 4PConnector case Metal terminal 2P connector case 连接器塑壳 金属端子 2P 连接器塑壳 | P1-AS3-03P08M P1-AS3-03P08M-S | |
| | AMP-170362-1 | 8 | | | | |
| | AMP-172157-1 | 1 | | | | |

# Chapter 2 Dimensions and Product Installation
# 第二章 产品外形尺寸及安装

## 2.1 Servo drive dimensions 伺服驱动器外形尺寸

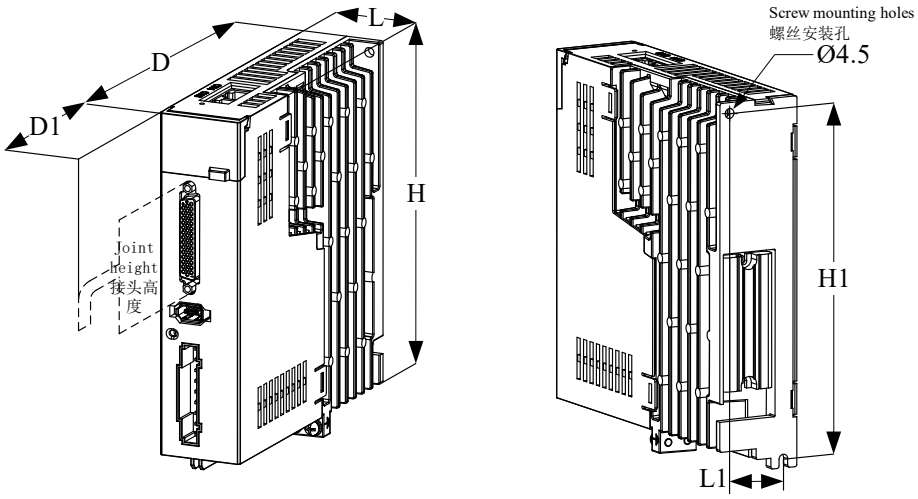



Figure 2-1 drive structure diagram
图2-1 驱动器结构图

**Note 注：**

Frame B:ES3-02B, ES3-04B
Frame C:ES3-08B, ES3-10B

Table 1-2 The dimension of drive 表 2-1 驱动器外形尺寸

| Model 型号 | L(mm) | H(mm) | D(mm) | L1(mm) | H1(mm) | D1(mm) | Screw hole 螺丝孔 |
|---|---|---|---|---|---|---|---|
| Frame B | 40 | 170 | 153 | 28 | 161 | 75 | 2-M4 |
| Frame C | 50 | 170 | 173 | 37 | 161 | 75 | 2-M4 |

## 2.2 Servo Drive Installation 伺服驱动器的安装

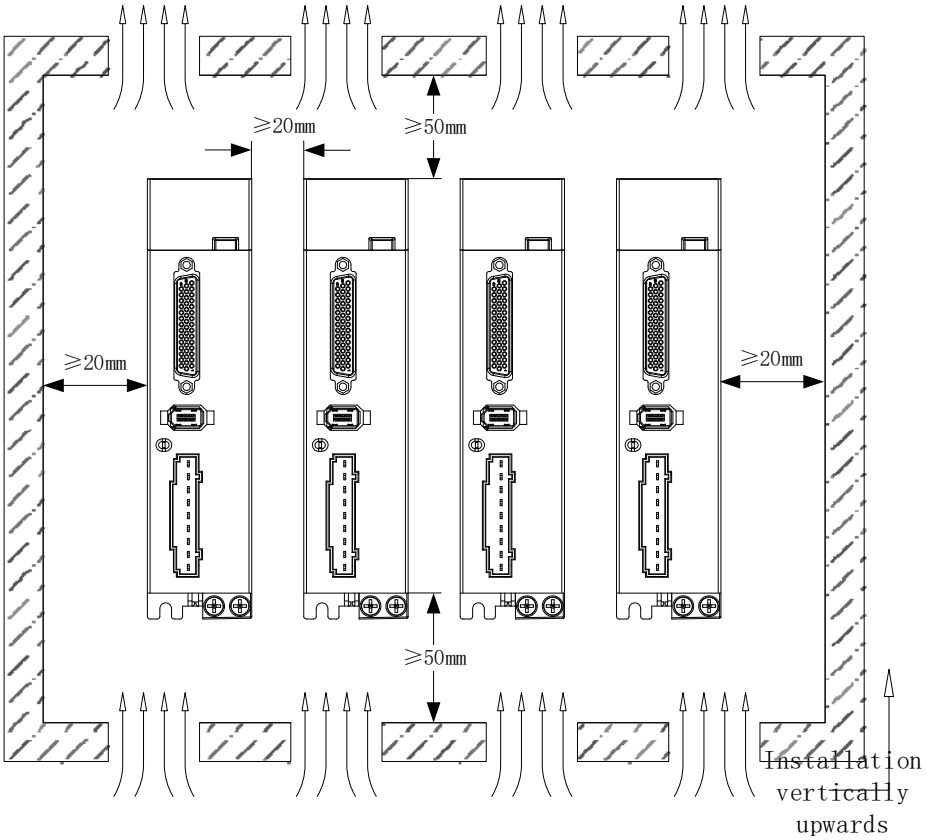



Figure 2-2 Servo drive installation
图2-2伺服驱动器安装

# Chapter 3 Servo Drive and Motor Connection
# 第三章伺服驱动器与电机连接

## 3.1 System structure diagram 系统结构图


Figure 3-1 System structure diagram
图3-1系统结构图

The names, functions and specifications of each part of the drive are as follows.
驱动器各部位名称、功能及规格如下。

Table 3-1 Servo drive main circuit terminal name and function
表 3-1 伺服驱动器主电路端子名称与功能

| No.<br>编号 | Name<br>名称 | Description<br>描述 |
|---|---|---|
| 1 | L1、L2<br>AC Power terminal<br>电源端子 | Input control circuit power according to specifications<br>按规格输入控制回路电源 |
| 2 | P、C、D、N<br>Regenerative resistor terminal<br>再生电阻端子 | 1Kw models default P, D short connection, and it has been connected to the built-in resistance. When the braking capacity is insufficient, connect P and C with an external brake resistor (to use the external resistor, remove the short wiring and keep P and D open).<br>400W models P and C have been connected with their own external brake resistance |

| | | |
|---|---|---|
| | | P, N DC bus terminal, when multiple machines in parallel can be connected to a common bus<br>1Kw 机型默认 P、D 短接，已连接内置电阻。制动能力不足时，请使 P、C 之间连接外置制动电阻（使用外置电阻需去除短接线，保持 P、D 开路）。<br>400W 机型 P、C 已连接外接制动电阻<br>P、N 直流母线端子，在多机并联时可进行共母线连接 |
| 3 | U、V、W、PE<br>Motor power cable terminal<br>电机动力线端子 | Connect servo motor three-phase and ground wire<br>连接伺服电机三相及地线 |
| 4 | Communication control<br>通讯控制 CN3,CN4 | Connected to RS485 command device or RS232 command device<br>可与 RS485 指令装置或 RS232 指令装置连接 |
| 5 | Control port<br>控制端口 CN1 | Connect to host controller for IO signal control<br>连接上位控制器，进行 IO 信号控制 |
| 6 | Encoder feedback port<br>编码器反馈端口 CN2 | Connected to the motor encoder cable<br>与电机编码器线缆连接 |

## 3.2 Main Circuit 主回路

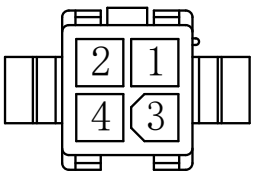
The functions, names and specifications of each part of the main circuit are as follows:
主回路各部分功能、名称及规格如下。

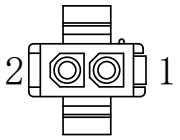
Table 3-2 Servo drive main circuit terminal function specifications
表3-2 伺服驱动器主电路端子功能规格

| Name<br>名称 | Terminal mark<br>端子记号 | Function, specification<br>功能、规格 |
|---|---|---|
| Power input terminal<br>电源输入端子 | L1、L2 | Single-phase AC220V power input<br>单相 AC220V 电源输入 |
| regenerative resistor connection terminal<br>再生电阻连接端子 | P、C、D | 1Kw models default P, D short connection, and it has been connected to the built-in resistance. When the braking capacity is insufficient, connect P and C with an external brake resistor (to use the external resistor, remove the short wiring and keep P and D open).<br>400W models P and C have been connected with their own external brake resistance<br>1Kw 机型默认 P、D 短接，已连接内置电阻。制动能力不足时，请使 P、C 之间连接外置制动电阻（使用外置电阻需去除短接线，保持 P、D 开路）。<br>400W 机型 P、C 已连接自带外接制动电阻 |
| DC bus terminal<br>直流母线端子 | P、N | Servo DC bus terminal for common bus connection when multiple units are connected in parallel<br>伺服的直流母线端子，在多机并联时可进行共母线连接 |
| Motor power line connection terminal<br>电机动力线连接端子 | U、V、W | Connected to the U, V, W of the motor.<br>与电机的 U，V，W 相连接。 |
| Ground terminal<br>接地端子 | PE | Two grounding terminals are connected to the power grounding terminal and the motor grounding terminal.<br><br>Be sure to ground the entire system.<br>两处接地端子，与电源接地端子及电机接地端子连接。<br>请务必将整个系统进行接地处理。 |

## 3.3 Power cable and brake connector 动力线及抱闸接口

Table 3-3 Power cable and brake connection
表3-3 动力线及刹车接口

<table>
<tr><th colspan="2">Terminal pin distributed<br>端子引脚分布</th><th>Matched motor series<br>适 配电机系列</th><th>Connector picture 连接器外形图</th></tr>
<tr><td colspan="2">4Pin connector 接插件</td><td>40、60、80、90</td><td rowspan="6"> 
</td></tr>
<tr><td>Pin No.<br>针脚号</td><td>Signal name<br>信号名称</td><td rowspan="5">Plastic shell胶壳：AMP 172159-1<br>Terminal 端子：AMP 170362-1</td></tr>
<tr><td>1</td><td>U</td></tr>
<tr><td>2</td><td>V</td></tr>
<tr><td>3</td><td>W</td></tr>
<tr><td>4</td><td>PE</td></tr>
</table>

| 2Pin connector 接插头 | | | |
|---|---|---|---|
| Pin No.<br>针脚号 | Signal Name<br>信号名称 | Plastic shell胶壳：AMP 172157-1<br>Terminal 端子：AMP 170362-1 |  |
| 1 | BK+ | | |
| 2 | BK- | | |

### 3.4 Encoder connector 编码器接口

The encoder lines drive connector PIN distribution diagram is as follows:
编码器线驱动器端连接器 PIN 脚分布示意图如下：

Table 3-4 Encoder cable servo drive terminal pin distribution
表 3-4 编码器线缆伺服驱动器侧端子引脚分布

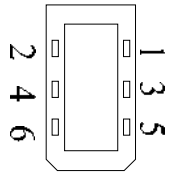
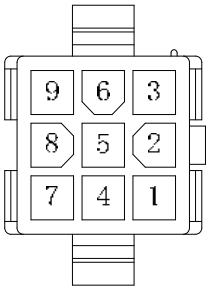
| Pin 引脚 | Encoder signal<br>编码器信号 | Function description<br>功能描述 | Picture<br>图片 |
|---|---|---|---|
| 1 | +5V | +5V Power output 电源输出 |  |
| 2 | GND | Power GND output 电源 GND 输出 | |
| 5 | SD+ | Encoder signal 编码器信号 | |
| 6 | SD- | | |
| Shell<br>外壳 | PE | | |

Table 3-5 Servo motor connector
表 3-5 伺服电机侧连接器

| Terminal PIN distribution<br>端子引脚分布 | | | Matched motor series<br>适 配电机系列 | Connector picture<br>连接器外形图 |
|---|---|---|---|---|
| 9 Pin connector<br>9Pin接插件 | | | 40、60、80 |  |
| Pin No.<br>针脚号 | 2500 lines signal<br>2500线信号 | 17/23 bits signal<br>17/23位信号 | Plastic shell 胶壳：<br>AMP 172161-1<br>Terminal 端子：AMP<br>170361-1 | |
| 3 | A+ | - | | |
| 6 | A- | - | | |
| 2 | B+ | SD+ | | |
| 5 | B- | SD- | | |
| 1 | Z+ | BAT+ | | |
| 4 | Z- | BAT- | | |
| 9 | +5V | +5V | | |
| 8 | GND | GND | | |
| 7 | PE | PE | | |

### 3.5 Control Signal CN1 控制信号 CN1

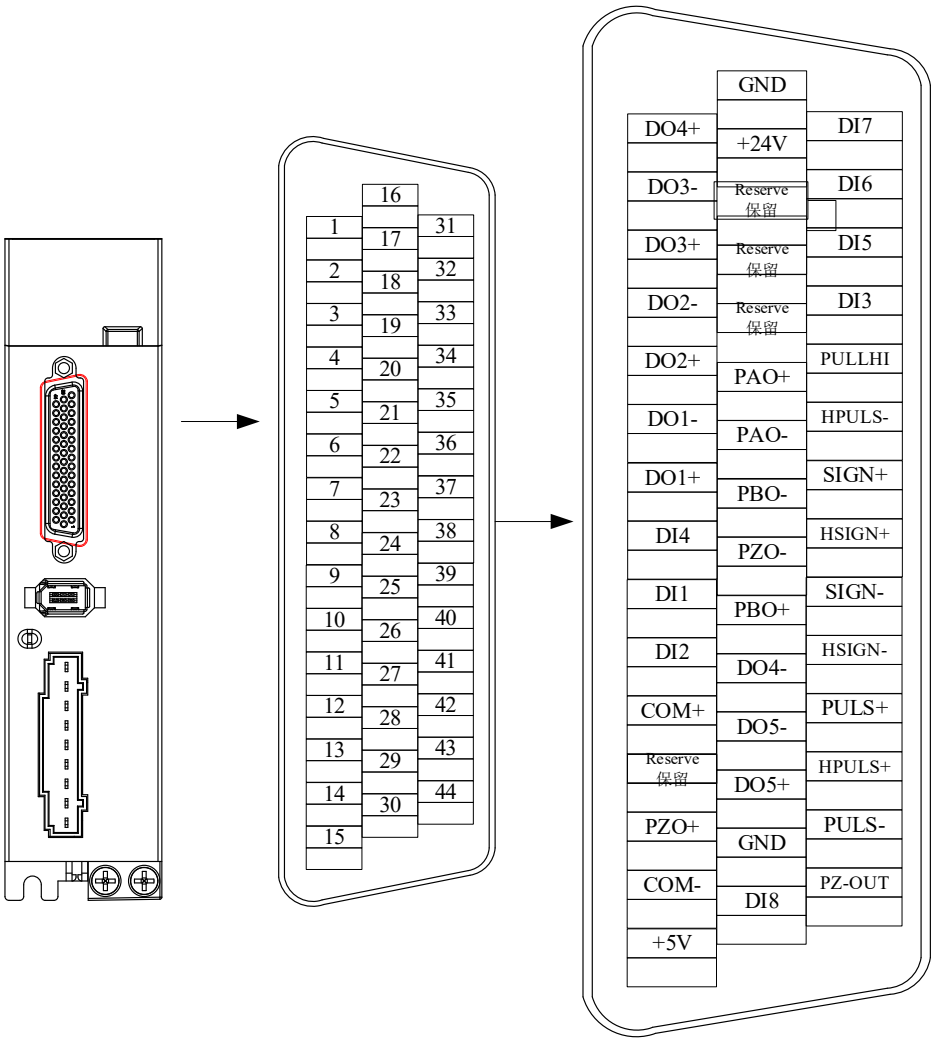



Figure 3-2 CNI connector diagram
图 3-2 CN1 接口示意图

**Note 注：**

Control port PIN definition table is shown in the next page
控制端口引脚定义表见下页。

Table 3-6 Control port PIN definition table
表 3-6 控制端口引脚定义表

| Definition 定义 | | PIN 引脚 | Function 功能 | |
|---|---|---|---|---|
| Position command 位置指令 | PULS+ | 41 | Low speed pulse command (differential or single ended) 低速脉冲指令(差分或者单端) | Differential drive input or open collector input 差分驱动输入或集电极开路输入 |
| | PULS- | 43 | | |
| | SIGN+ | 37 | Low speed pulse command (differential or single ended) 低速脉冲指令(差分或者单端) | |
| | SIGN- | 39 | | |
| | HPULS+ | 42 | High speed pulse command input, differential input required 高速脉冲指令输入，必须差分输入 | |
| | HPULS- | 36 | | |
| | HSIGN+ | 38 | High speed pulse direction input, differential input required 高速脉冲方向输入，必须差分输入 | |
| | HSIGN- | 40 | | |
| | PULLHI | 35 | COM+，power input port, internal connected with current limited resistor 电源输入端口，内部连接限流电阻 | |
| | GND | 29 | Differential signal ground 差分信号地 | |
| Encoder output 编码器输出 | PAO+ | 21 | Encoder pulse division output 编码器脉冲分频输出 | |
| | PAO- | 22 | | |
| | PBO+ | 25 | | |
| | PBO- | 23 | | |
| | PZO+ | 13 | | |
| | PZO- | 24 | | |
| | PZ-OUT | 44 | Z phase pulse open collector output Z 相脉冲集电极开路输出 | |
| | GND | 29 | Z phase pulse open collector output signal ground; Differential open collector output signal ground; Differential signal ground Z 相脉冲集电极开路输出信号地；差分信号地 | |
| | +5V | 15 | Internal 5V supply power with maximum output current 200mA 内部 5V 电源，最大输出电流 200mA | |
| | GND | 16 | | |
| | PE | Shell 外壳 | | |
| 通用输入输出信号 | | | Default function 默认功能 | Function description 功能说明 |
| | DI1 | 9 | P-OT | Prohibit forward drive 禁止正向驱动 |
| | DI2 | 10 | N-OT | Prohibit reverse drive 禁止反向驱动 |
| | DI3 | 34 | INHIBIT | Pulse inhibit 脉冲禁止 |
| | DI4 | 8 | ALM-RST | Alarm inhibit 报警复位 |
| | DI5 | 33 | S-ON | Servo enable 伺服使能 |
| | DI6 | 32 | ZCLAMP | Zero fixed 零位固定 |
| | DI7 | 31 | GAIN-SEL | Gain switching 增益切换 |
| | DI8 | 30 | Home Switch | Home switching 原点开关 |
| | +24V | 17 | | Internal DC24 power supply , voltage range 24V±10%，maximum output current 200mA 内部 DC24 电源，电压范围 24V±10%，最大输出电流 200mA |
| | COM- | 14 | | Internal DC24V ground; Open collector pulse input ground 内部 DC24V 地；集电极开路脉冲输入地； |
| | COM+ | 11 | | DI connector power supply input port, 24V DI 接口电源输入端，24V |
| | DO1+ | 7 | S-RDY+ | Servo ready 伺服准备好 |
| | DO1- | 6 | S-RDY- | |
| | DO2+ | 5 | COIN+ | Position arrival 位置到达 |
| | DO2- | 4 | COIN- | |
| | DO3+ | 3 | ZERO+ | Zero speed 零速 |
| | DO3- | 2 | ZERO- | |
| | DO4+ | 1 | ALM+ | Servo error output 伺服故障输出 |
| | DO4- | 26 | ALM- | |
| | DO5+ | 28 | BKOFF+ | Output with brake 抱闸输出 |
| | DO5- | 27 | BKOFF- | |

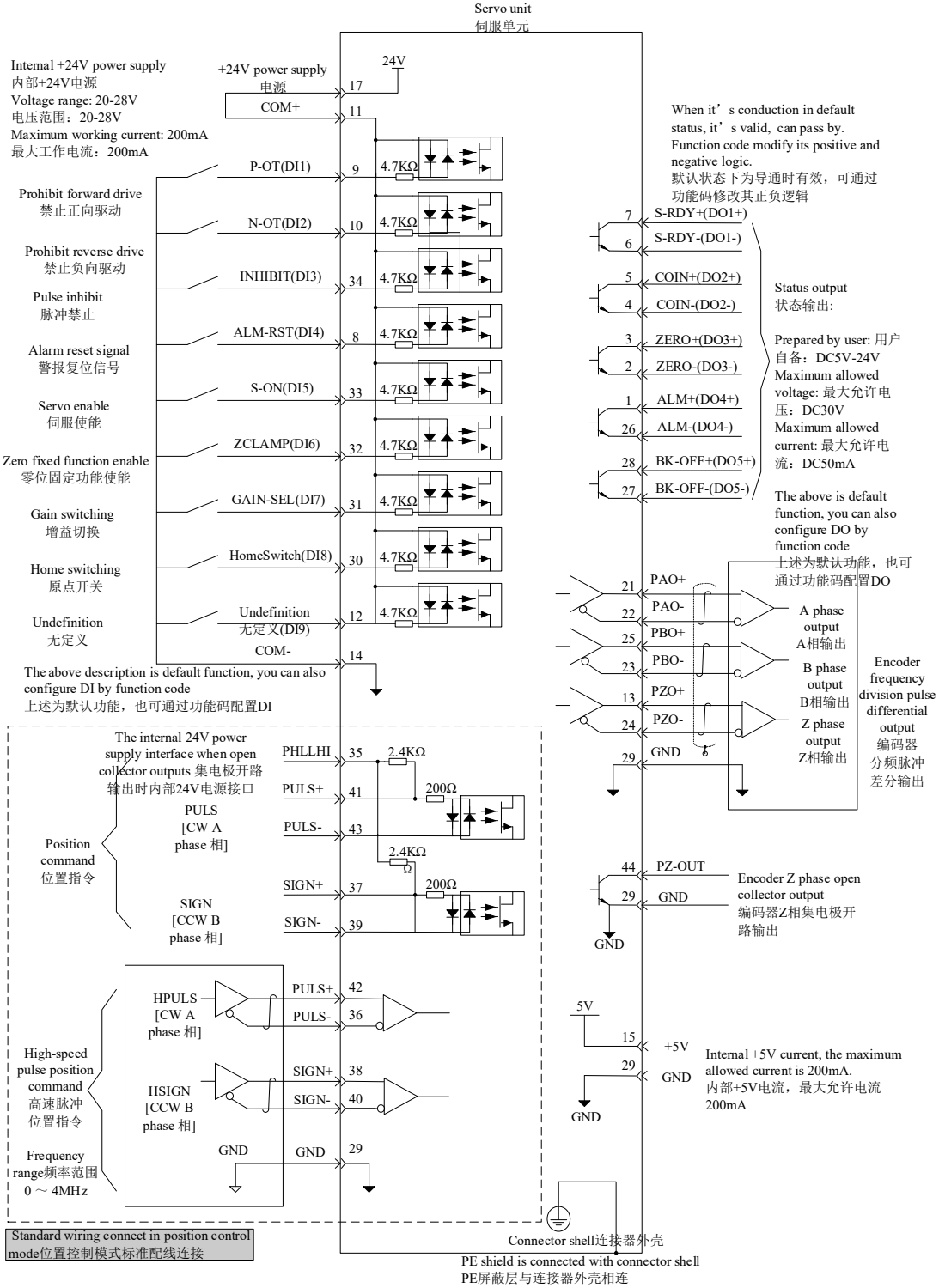



Figure 3-3 Control mode diagram
图3-3控制模式总图

### 3.5.1 Digital input and output signal 数字量输入输出信号

#### 3.5.1.1Digital input circuit 数字量输入电路

Take DI1 as example, DI1~DI8 is the same.
以 DI1 为例说明，DI1~DI8 接口电路相同。

**a) When the host computer is relay output：**

**上位机为继电器输出时：**

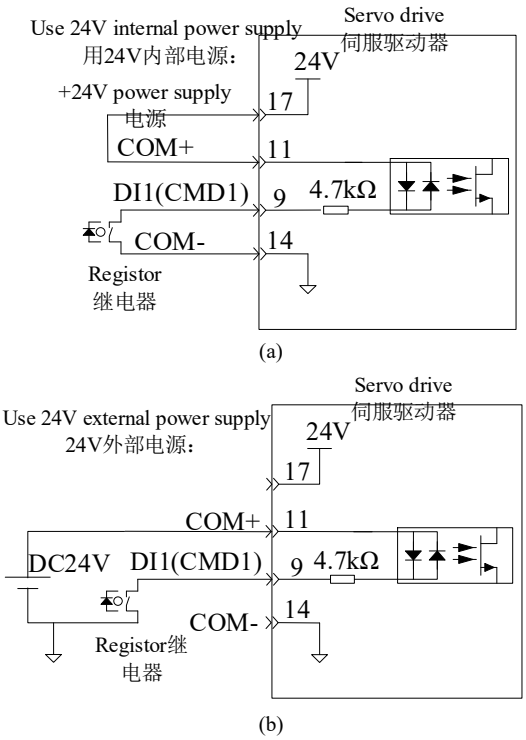
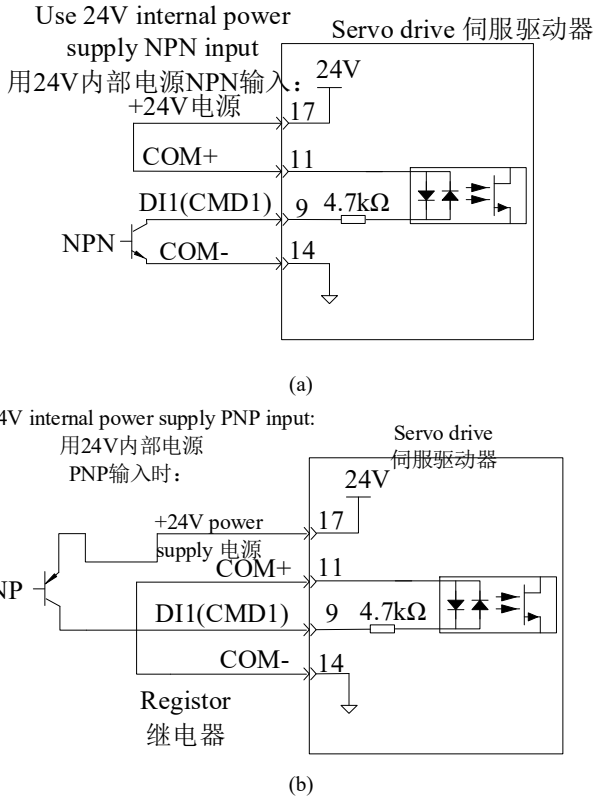
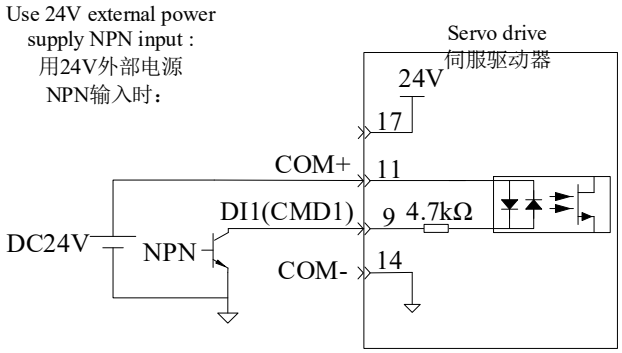


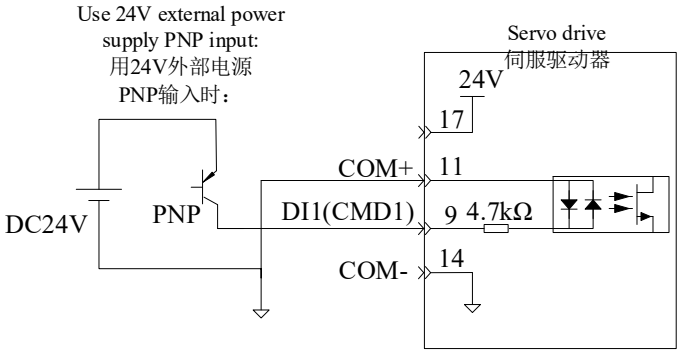

Figure 3-4 The DI wiring diagram of host computer output for relay
图 3-4 上位机为继电器输出时 DI 接线图

**b) When the host computer is output for open collector:**
**当上位机为集电极开路输出时：**






(c)




(d)

Figure 3-5 The DI wiring diagram of the host computer output for open collector
图 3-5 上位机为集电极开路输出时 DI 接线图

**Note 注：**

The mixing of NPN and PNP inputs is not supported.
不支持 NPN 型和 PNP 型输入混用。

### 3.5.1.2Digital output circuit 数字量输出电路

Take DO1 as example, DO1~DO5 is the same.
以 DO1 为例说明，DO1~DO5 接口电路相同。

**a) When host computer input for relay 当上位机为继电器输入时**

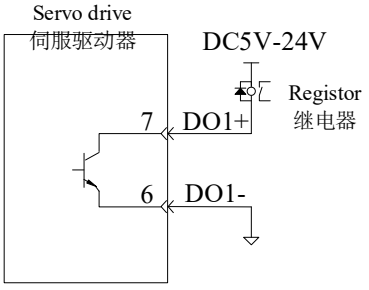



Figure 3-6 The DO wiring diagram of host computer input for relay
图 3-6 上位机为继电器输入时 DO 接线图

**Note 注：**

When the host computer input for relay, be sure connect freewheeling diode, and ensure the correct direction, otherwise may damage DO port
当上位机为继电器输入时，请务必接入续流二极管，且方向正确，否则可能损坏 DO 端口。

**b) When host computer input for optocoupler 当上位机为光耦输入时**

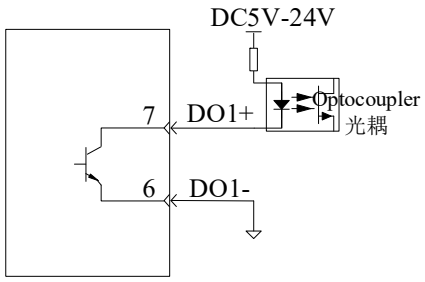



Figure 3-7 The DO wiring diagram of host computer input for optocoupler
图 3-7 上位机为光耦输入时 DO 接线图

**Note 注：**

1、 Be sure connect limited current resistor;
务必接入限流电阻；

2、 Servo drive internal optocoupler maximum allowed voltage and maximum current is shown as below:
伺服驱动器内部光耦电路最大允许电压、最大允许电流如下：
Voltage 电压：DC30V（Maximum 最大）
Current 电流：DC50mA（Maximum 最大）

### 3.5.2 Position command input signal 位置指令输入信号

Table 3-8 The corresponding relationship between pulse input frequency and pulse width
表 3-8 脉冲输入频率与脉宽对应关系

| Pulse method 脉冲方式 | | Maximum frequency 最大频率（HZ） | Minimum width 最小带宽（us） |
|---|---|---|---|
| Low speed 低速 | Differential 差分 | 500K | 1 |
| | Open collector 集电极开路 | 200K | 2.5 |
| High-speed differential 高速差分 | | 3M | 0.166 |

**Note 注：**

The pulse width of host computer should not be less than the minimum pulse width, otherwise the driver may receive pulse error
上位机脉冲宽度不可小于最小脉宽，否则可能导致驱动器接收脉冲错误

#### 3.5.2.1Common pulse command input 普通脉冲指令输入

**a) Differential mode 差分方式时**

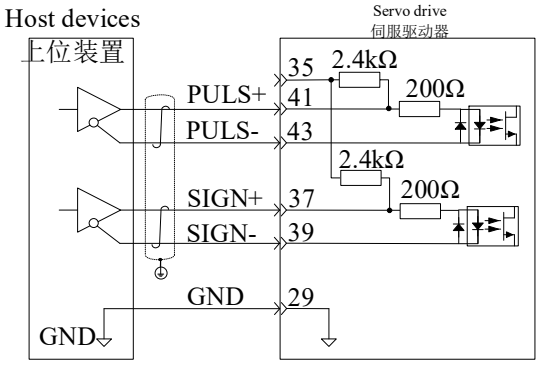
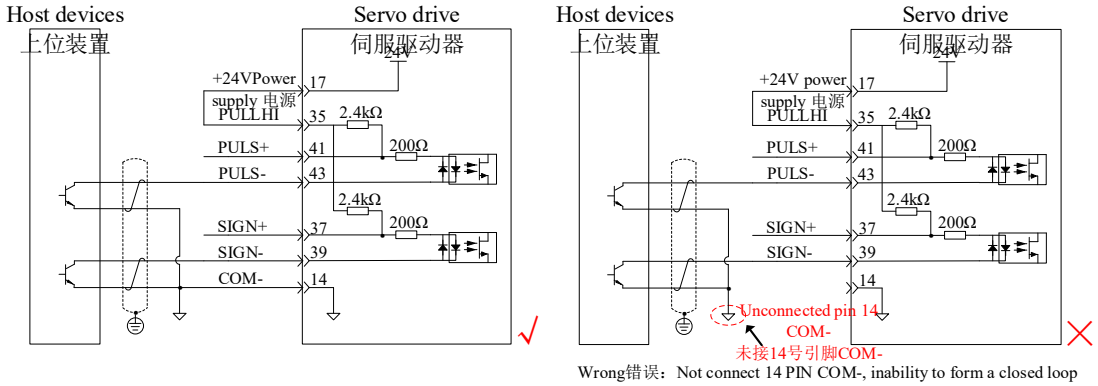



Figure 3-8 Wiring diagram of differential input
图 3-8 差分输入时接线图

**b) Open collector method 集电极开路方式时**

**Use drive internal 24V power supply**
**使用驱动器内部 24V 电源。**

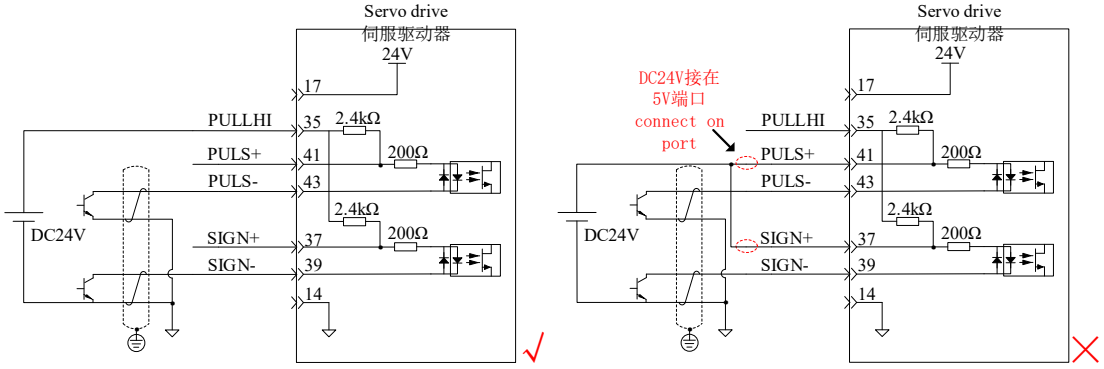



Wrong错误：Not connect 14 PIN COM-, inability to form a closed loop
未接14引脚COM-，无法形成闭合回路

Figure 3-9 The wiring diagram of using internal 24V power supply
图 3-9 使用内部 24V 电源时接线图

**Use external power supply 使用外部电源。**

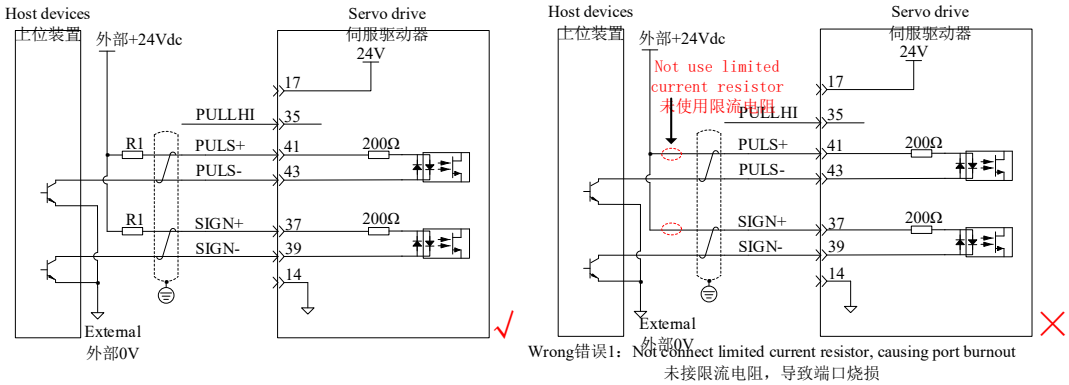
Option 1: Use the driver's internal resistor (recommended)
方案一：使用驱动器内部电阻（推荐）




Wrong错误：DC24V connect on 5V port, causing the damage of internal components
DC24V接在5V端口上，导致内部器件损坏

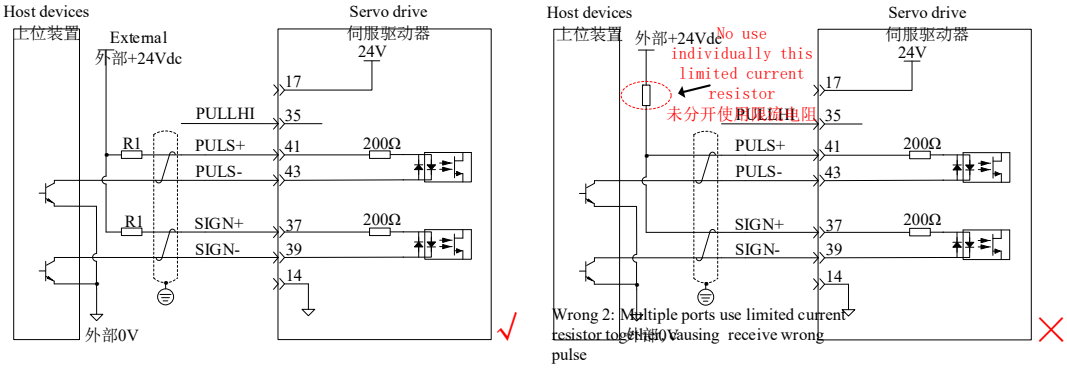
Figure 3-10 The wiring diagram of using external power supply and internal resistor
图 3-10 使用外部电源和内部电阻时接线图

Option 2: Use external resistor and NPN mode
方案二：使用外部电阻且 NPN 型




Wrong错误1：Not connect limited current resistor, causing port burnout
未接限流电阻，导致端口烧损

a）Wrong situation 1
错误情况1

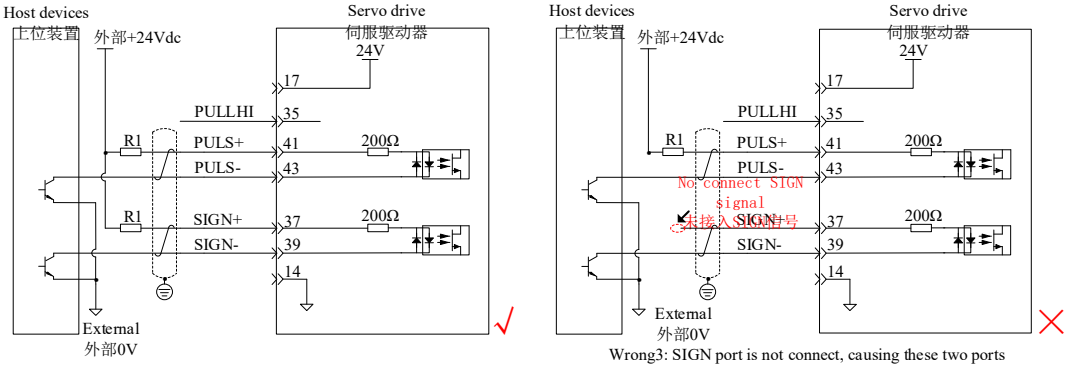



Wrong 2: Multiple ports use limited current resistor together causing receive wrong pulse

错误2：多个端口共用限流电阻，导致脉冲接收错误

b）Wrong situation 2

错误情况2

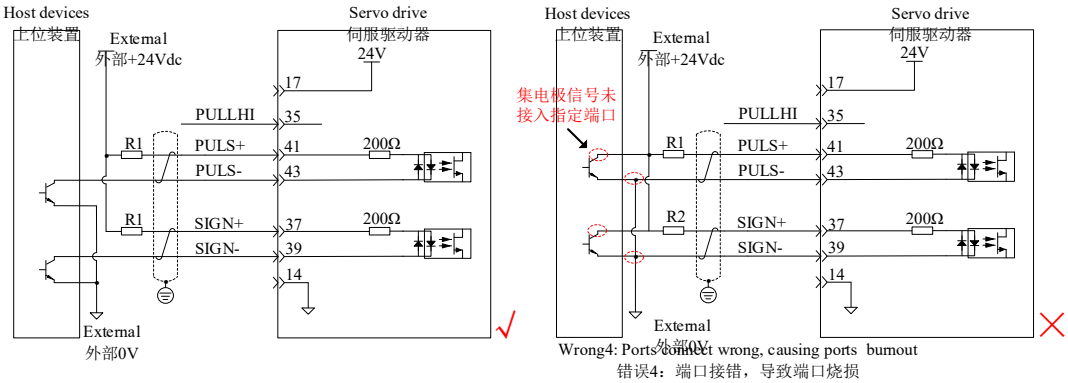



Wrong3: SIGN port is not connect, causing these two ports cannot receive pulse

错误3：SIGN端口未接，导致这两个端口收不到脉冲

c）Wrong situation 3

错误情况3

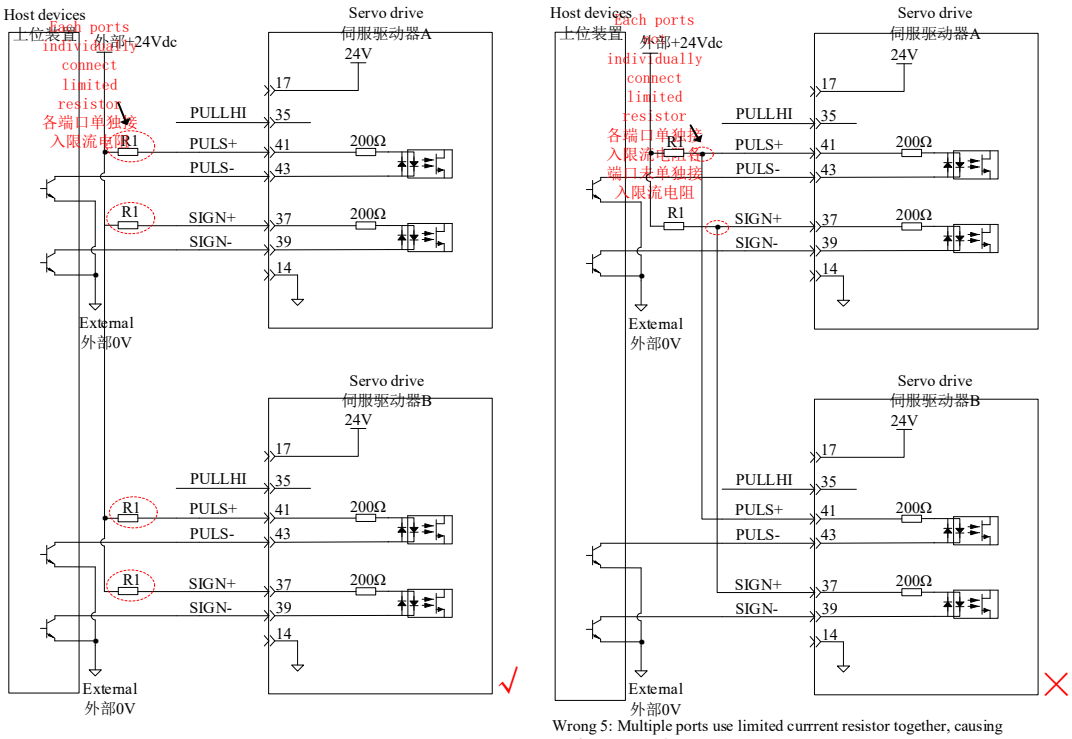



Wrong4: Ports connect wrong, causing ports burnout

错误4：端口接错，导致端口烧损

d）Wrong situation 4

错误情况4




e）Wrong situation 5
错误情况5

Figure 3-11 The wiring diagram of using external power supply and external resistor and NPN
图 3-11 使用外部电源和外部电阻且为 NPN 输入时接线图

Option 3: Using external resistor and PNP mode
方案三：使用外部电阻且 PNP 型

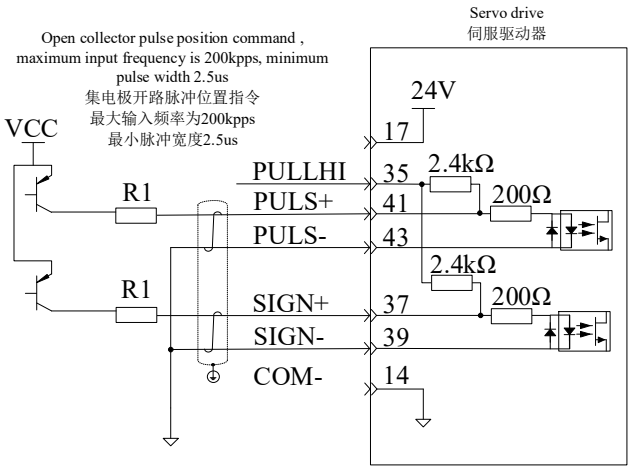



Figure 3-12 The wiring diagram of using external power supply and external resistor and PNP mode
图 3-12 使用外部电源和外部电阻且为 PNP 输入时接线图

Resistor R1 select please satisfy formula:
电阻 R1 选取请满足公式：$\frac{Vcc-1.5}{R1+200}=10mA$
R1 recommend value 推荐值

Table 3-9 R1 recommend value
表 3-9 R1 推荐值

| VCC voltage 电压 | R1 resistor 阻值 | R1 power 功率 |
|---|---|---|
| 24V | 2.4KΩ | 0.5W |

| | | |
|---|---|---|
| 12V | 1.5KΩ | 0.5W |
| 5V | 200Ω | 0.5W |

Option 4: Use internal resistor and PNP mode
方案四：使用内部电阻且 PNP 型

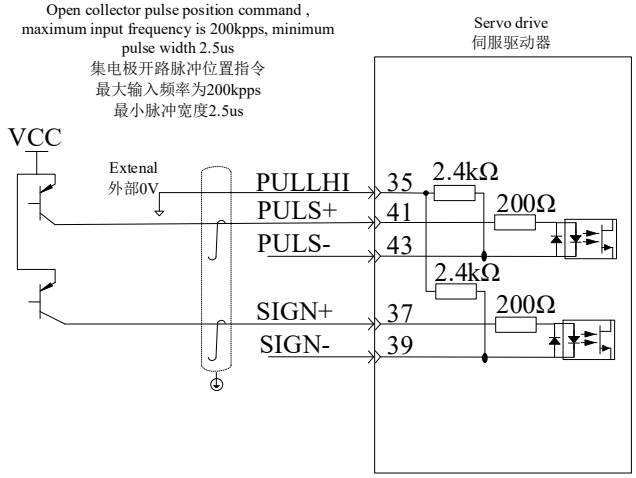



Figure 3-13 The wiring diagram of using external power supply and internal resistor and PNP mode
图 3-13 使用外部电源和内部电阻且为 PNP 输入时接线图

### 3.5.2.2 High-speed pulse command input 高速脉冲指令输入

High speed pulse command only supports differential input
高速脉冲指令仅支持差分输入。

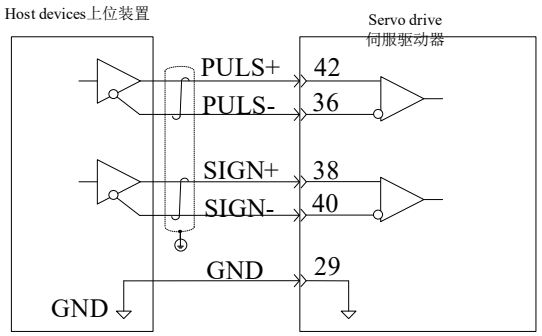



Figure 3-14 The wiring diagram of high-speed pulse command differential
图 3-14 高速脉冲指令差分输入接线图

**Note 注：**

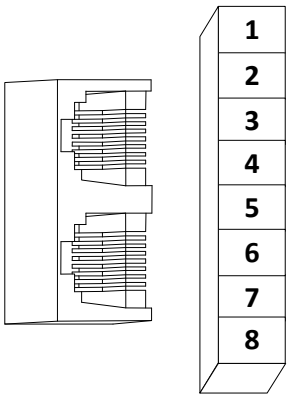
1. Please be sure differential input is 5V system, otherwise servo drive input pulse id unstable, will causing situation as follows:
   请务必保证差分输入为 5V 系统，否则伺服驱动器的输入脉冲不稳定。会导致以下情况：
   a) When input command pulse, pulse lose occurs. 在输入指令脉冲时，出现脉冲丢失现象；
   b) When input command direction, command reverse situation occurs. 在输入指令方向时，出现指令取反现象。
2. Please be sure that connect the 5V ground of host devices and GND of drive, to reduce noise interference
   请务必将上位装置的 5V 地与驱动器的 GND 连接，以降低噪声干扰。

## 3.6 Communication signal 通信信号

### 3.6.1 Industrial bus port CN3/CN4 工业总线端口 CN3/CN4

CN3 and CN4 is used to connect industrial bus port and host computer communication port.
CN3 和 CN4 作为工业总线通讯端口及上位机通信接口使用。

Table 3-10 Communication line connector PIN definition
表 3-10 通信线连接器引脚定义

| PIN<br>引脚 | Definition<br>定义 | Function<br>功能 | PIN distribution<br>引脚分布 |
|---|---|---|---|
| 1 | -- | |  |
| 2 | -- | | |
| 3 | GND（RS485） | RS485<br>Communication port<br>通讯端口*1 | |
| 4 | RS485+ | | |
| 5 | RS485- | | |
| 6 | RS232-TXD | RS232<br>Communication port<br>通信接口 | |
| 7 | RX232-RXD | | |
| 8 | GND(RS232) | | |
| 外壳 | PE | Shield 屏蔽 | |



**Note 注：**

*1： ES3-**BAI-RS version has RS485 communication port 版本才有 RS485 通讯口

# Chapter 4 Panel Display
# 第四章面板显示

## 4.1 Panel operator description 面板操作器说明

### 4.1.1 Interface introduction 界面介绍

The servo driver's operation interface consists 5-digit 7 segment LED digital tube and 5 buttons, which is used for servo drive's interface display and parameters setting. The interface is as follows:

伺服驱动器的操作界面由 5 位 7 段 LED 数码管和 5 个按键组成，用于伺服驱动器的界面显示和参数设定。界面如下：

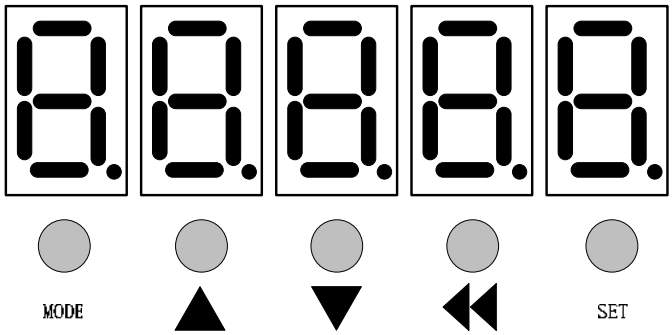
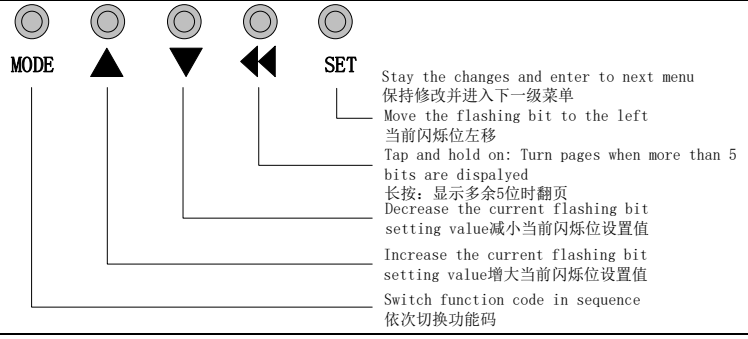



Figure 4-1 Interface of operation and display
图 4-1 操作与显示界面

**1、 Button name and function operation 按键名称及功能操作**

Table 4-1 Function of button operation
表 4-1 按键操作器功能

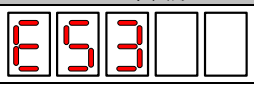
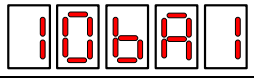
| Digital display tube<br>数码显示管 | 5-digit seven-segment LED digital tube is used to display the running status and parameters setting of the Servo<br>5 位 7 段 LED 数码管用于显示伺服的运行状态及参数设定 |
|---|---|
| Button operator<br>按键操作器 |  |

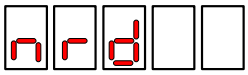
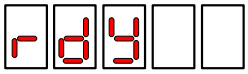
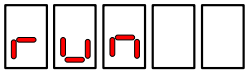
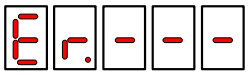
**2、 Servo drive status display 伺服驱动器状态显示**

The running status of servo drive is displayed by display character of 5 digit seven-segment LED digital tube, which are shown individually in the following table:

伺服驱动器的运行状态由 5 只七段 LED 数码管的显示字符显示，分别显示如下表：

Table 4-2 Digital tube display status description
表 4-2 数码管显示状态说明

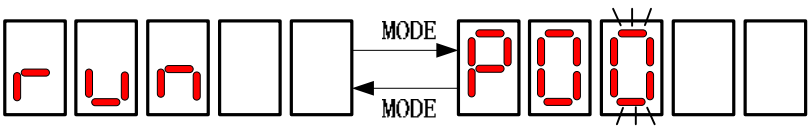
| Symbol<br>符号 | LED display figure<br>LED 显示图形 | Status description and character meaning description<br>状态描述及字符含义说明 |
|---|---|---|
| "ES3" |  | When the power-on initialization status digital tube displays this character, indicating the serial number of the drive.<br>上电初始化状态数码管显示该字符，表明为驱动器系列号 |
| "10bA1"<br>（ Example<br>例） |  | When the power-on initialization status digital tube displays this character, indicating the mode of drive.<br>上电初始化状态数码管显示该字符，表明为驱动器型号 |

| Symbol<br>符号 | LED display figure<br>LED 显示图形 | Status description and character meaning description<br>状态描述及字符含义说明 |
|---|---|---|
| “nrd” |  | After it starts or resets, the servo is not ready, for example, the main circuit is not powered.<br>启动或复位完成之后，伺服尚未准备好，如主电路未上电。 |
| “rdy” |  | The servo system passed self-test, waiting for host control device to give a servo enable signal.<br>伺服系统自检正常，等待上位控制装置给出伺服使能信号。 |
| “run” |  | The servo is in normal running state. At this time, the servo running status and each variable can be viewed through the P18 group function code.伺服正常运行状态，此时可以通过 P18 组功能码查看伺服运行状态和各变量。 |
| “Er.xxx” |  | Servo system has an error. The three digits of “xxx” represent error code. For the error code, please refer to Chapter 8.<br>伺服系统发生故障，“xxx”三位数字代表故障码，故障码请参考第八章。 |

**3、How to browse and modify parameters of servo drive 伺服驱动器参数的浏览与修改操作方法**

To view the variable status of the servo, you need to press the MODE button to switch the P** group of function code to choose the corresponding function code:

若要查看伺服的变量状态，需要按 MODE 键切换到功能码的 P**组选择相应的功能码：




Running status display mode parameters browsing or setting mode
运行状态显示模式参数浏览或设置模式
Figure 4-2 “0” level menu diagram
图 4-2 “0”级菜单示意图

When switching to the parameter display mode, the parameter group number is displayed first in three digits of “Pxx.”, also called “level 0 menu”. One of the displayed bits is flashing. At this time, press the up ▲or down ▼button, the number of the flashing digit will increase or decrease by 1; if the double left ◀◀button is pressed, the flashing digit will move, which is convenient to set to the desired group number:

切换到参数显示模式时，首先显示的是参数组号，以“Pxx.”三位显示，也称“0 级菜单”。其中的一个显示位为闪烁显示状态，此时按▲键或▼键，该闪烁位的数字会增 1 或减 1；若按◀◀键，闪烁位会移动，便于设置为所需的组号：

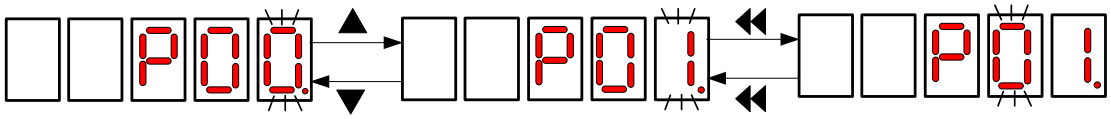


Figure 4-3 “I level menu” diagram
图 4-3 “I 级菜单”示意图

When the desired group number is set, press the SET button to enter the setting status of the parameter number in the group, at this time, it displays “Pxx.xx”, also called “Level I menu”. After the desired function code number is set, press the SET button to enter the parameters setting status of this function code, also called “Level II menu”, if the parameter can be modified, the lowest bit will flash, then press ◀◀、▲、▼ to modify, as shown below:

当设定了所需的组号后，按下 SET 键，即可进入该组内的参数序号的设置状态，此时显示“Pxx.xx”，也称“I 级菜单”，当设置为所需要的功能码序号后，按 SET 键，即可进入该功能码的参数设置状态，也称“II 级菜单”, 若参数可以修改，其最低位会闪烁显示，此时按◀◀、▲、▼等键进行修改，如下图：

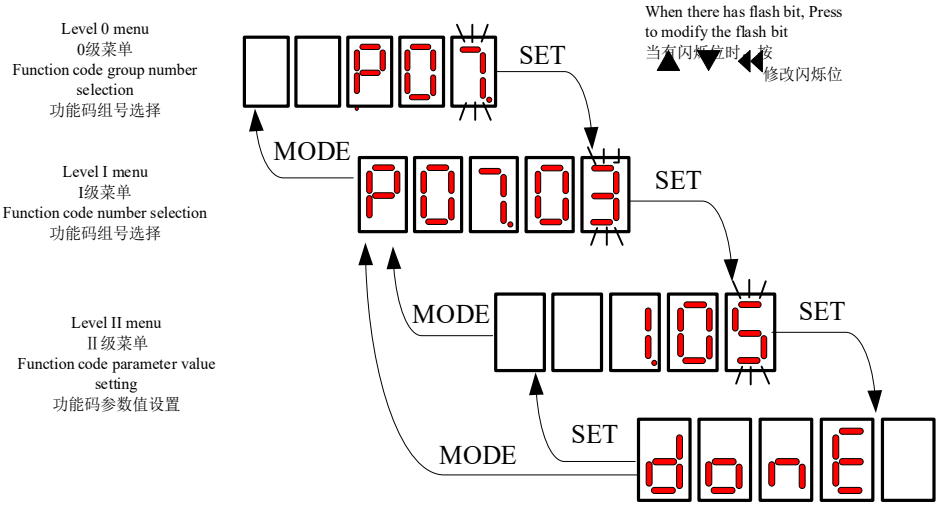



Figure 4-4 Operation panel diagram
图 4-4 操作面板使用示意图

When the SET button is press and successfully save after modification, the word “done” will be displayed. If the modified value is not changed, the word “done” will not be displayed. Press the MODE button to exit status monitoring mode and enter parameter mode for parameter viewing and modification.

当修改后按下 SET 键成功保存后，会显示 “done”字样，若修改值没改变则不显示“done”字样。按 MODE 键可以退出状态监控模式，进入到参数模式进行参数查看修改等操作。

### 4.1.2 Parameter setting and display 参数设置与显示

**1、Modify properties and display features of parameters 参数的修改属性和显示特点**

Some parameters can only be viewed and cannot be modified, for example, after enter to the Level II menu for running parameters, the display parameters does not flash, at this time, press the ◀◀、▲、▼ button will not response.

Some parameters can only be set in the stop state. Before modifying these parameters, the servo motor needs to be stopped.

有些参数只能浏览，不能修改, 如运行参数，在进入到 II 级菜单后，这些参数的显示时没有闪烁显示位，此时按◀◀、▲、▼SET 按键也不会有响应。

有些参数只有在停机状态才能设定，修改参数之前，需要断使能，使伺服停止运行。

**2、Five bits parameters set 五位以下参数的设定**

When setting the parameter is between 【-9999～99999】, the displayed parameters in five, 5 digit tube display screen can be displayed or edited at once.

当设定参数在【-9999～99999】范围内，为五位以内参数的显示，在 5 位数码管显示屏可以一次性显示或编辑。

**3、Six and more bits parameters set 六位以上参数的设定**

When the setting parameter range exceeds the range of 【-9999～99999】, it exceeds the display range of five digital tubes, so six bits and more digital tube characters are required for display. In this system, the display is performed by a method of displaying 4 digits by 3 pages. At this time, there is a flashing “—“ segment in the leftmost character of each screen, which is used to indicate the screen number of the current character. For example, if the parameter value to be displayed is -10501080.10, it will be divided into three pages as【-10】【5010】【80.10】 to show in the screen. And change pages by press◀◀. As shown below:

当设定参数范围超出【-9999～99999】范围时，超过了五位数码管的显示范围，需六位和更多的数码管字符进行显示。在本系统中采取最多分 4 位×3 页显示的方法进行显示，此时每屏的最左一位字符中有一个闪烁的笔段，用于指示当前字符的屏序号。例如，要显示的参数值为-10501080.10，就分成【-10】【5010】【80.10】三页进行显示，按◀◀能够实现翻页。如下图所示：

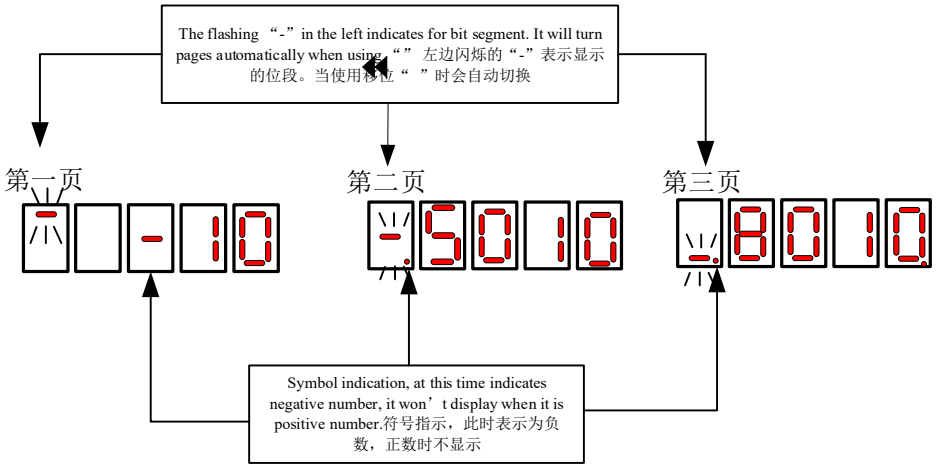



Figure 4-5 Parameters display diagram
图 4-5 参数显示示意图

When using SHIFT button to move position will switch to corresponding display bit segment automatically. For example, if the current flashing bit is thousands bit, using SHIFT button to move position will switch to the display of middle four bit, and the ten thousand bit (It is to say the rightmost in this segment) flashing display. At this time, press ▲、▼, the increase or decrease is 10000. For parameters that can be modified, corresponding modifications can be made through ◀◀ shifting. If it is a read-only parameter, the page display can only be displayed by pressing and holding the ◀◀.

当使用 SHIFT 按键移位时会自动切换到相应的显示位段。例如：假定当前闪烁位为千位，使用 SHIFT 移位时会自动切换到中间四位的显示，且万位（即此段的最右边一位）闪烁显示。此时按▲、▼，增减量为 10000。对于可以修改的参数，通过◀◀移位可进行相应得修改。如果是只读型参数，此时只能通过长按◀◀键进行翻页显示。

### 4.1.3 Monitorable parameter list 可监视参数一览表

The monitor display is a function for displaying the command value set in the servo driver, the state of the input/output signal, and the internal state of the servo driver. The parameters to display are shown in "Chapter 9 group P18 parameters."

监视显示是针对伺服驱动器中设定的指令值、输入输出信号的状态以及伺服驱动器的内部状态进行显示的功能。可显示参数见"第九章 P18 组参数"

**Note 注：**

**DI/DO terminal status method**

**DI/DO 端子状态显示方法**

1、A digital tube displays two DI/DO, the short "|" in high position indicates invalid status and low position "|" indicates valid status.

一个数码管显示两个 DI/DO，上面短画亮对应输入无效状态，下面亮对应输入有效状态。

2、The status of DIDO is represented by 8 status bits. Currently, the standard DI is 8 channels and DO is 5 channels. The figure below shows the status of the DI input terminal.

DIDO 的状态采用了 8 个状态位来表示, 目前标配的 DI 为 8 路，DO 为 5 路，下图显示了 DI 端子输入是否有效的状态。

Figure 4-6 The display diagram of DI status
图4-6 DI状态显示示意图

The indications of above figure are: DI1＝1；DI2＝0；DI3＝1；DI4＝1；DI5＝1；DI6＝0；DI7＝1；DI8＝1
上图中的指示依次为：DI1＝1；DI2＝0；DI3＝1；DI4＝1；DI5＝1；DI6＝0；DI7＝1；DI8＝1。

# Chapter 5 Control
# 第五章控制

## 5.1 Basic control 基本控制

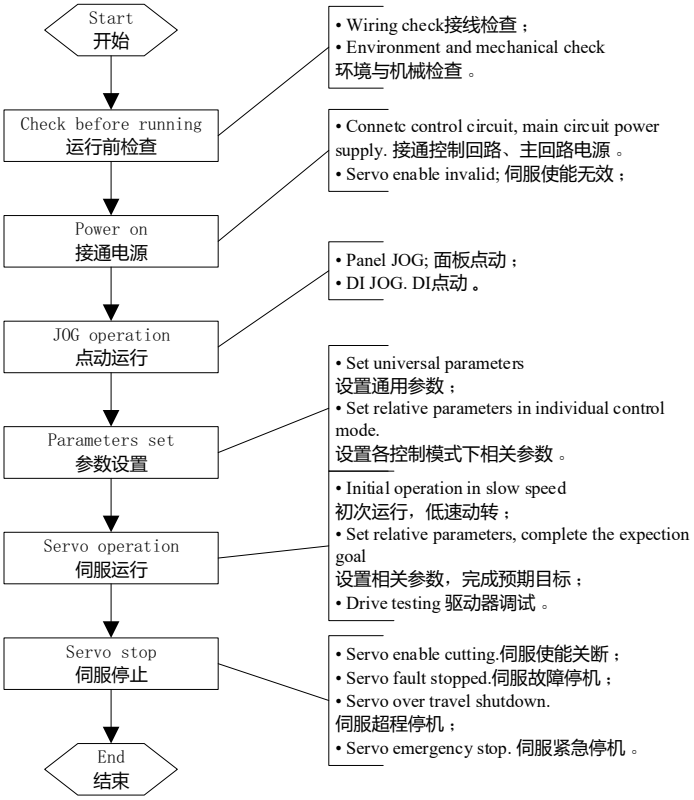



Figure 5-1 Servo setting process
图 5-1 伺服设定流程

### 5.1.1 Check before running 运行前检查

The following checks need to be carried out before running the servo drive and servo motor.
伺服驱动器和伺服电机运行之前需进行以下检查：

Table 5-1 The check steps before running
表5-1 运行前检查步骤

| Record 记录 | NO. 序号 | Content 内容 |
|---|---|---|
| Wiring 接线 | | |
| □ | 1 | The power input terminal (L1、L2)of servo drive must be connected correctly. 伺服驱动器的电源输入端子(L1、L2) 必须正确连接。 |
| □ | 2 | The main circuit output terminal(U、V、W) of servo drive and main circuit cable (U、V、W) of servomotor must be in same phase and connected correctly. 伺服驱动器主回路输出端子(U、V、W) 和伺服电机主电路电缆(U、V、W) 必须相位一致, 且正确连接。 |
| □ | 3 | The individual control signal cable of servo drive is wiring correctly: External signal lines such as brake and overtravel protection have been reliably connected. 伺服驱动器各控制信号线缆接线正确：抱闸、超程保护等外部信号线已可靠连接。 |
| □ | 4 | The servo drive and servo motor must be reliably grounded.伺服驱动器和伺服电机必须可靠接地。 |
| □ | 5 | The stress of all cable is within the specified range. 所有电缆的受力在规定范围之内。 |
| □ | 6 | The wiring terminals are insulated. 配线端子已进行绝缘处理。 |
| Environment and mechanical 环境与机械 | | |

| | | |
|---|---|---|
| □ | 1 | There are no foreign objects such as wire ends or metal shavings inside or outside the servo drive that may cause short circuits in signal lines and power lines.伺服驱动器内外部没有会造成信号线、电源线短路的电线头、金属屑等异物。 |
| □ | 2 | The servo drive and external braking resistor are not placed on flammable objects.<br>伺服驱动器和外置制动电阻未放置于可燃物体上。 |
| □ | 3 | The installation of the servo motor and the connection between the shaft and the machine must be reliable.<br>伺服电机的安装、轴和机械的连接必须可靠。 |
| □ | 4 | The servo motor and connected machinery must be in an operable condition.<br>伺服电机和所连接的机械必须处于可以运行的状况。 |

### 5.1.2 Power on 接通电源

**1）Turn on the input power 接通输入电源(L1、L2)**

●After connect the control circuit and main circuit power supply, the bus voltage indicator light shows no abnormality, and the panel display displays “rdy”, indicating that the servo drive is in an operable state and is waiting for the servo enable signal from the host computer.

接通控制回路电源和主回路电源后，母线电压指示灯显示无异常，且面板显示器显示“rdy”，表明伺服驱动器处于可运行的状态，等待上位机给出伺服使能信号。

●If the drive panel always display “nrd”, please check wiring and eliminate the fault cause.

若驱动器面板显示器一直显示“nrd”，请检查配线并排除故障原因。

●If the drive panel display displays other fault code, please refer to “ Chapter 8 Fault and Handling” , analyze and eliminate the fault cause.

若驱动器面板显示器显示其他故障代码，请参考“第八章故障及处理”，分析并排除故障原因。

**2）Configure the servo enable (S-ON) to invalid (OFF) 将伺服使能(S-ON) 置为无效(OFF)**

When using servo enable, please configure the one DI terminal (Default D15) of servo drive to function 1 (FunIN.1: S-ON, Servo enable) first, and confirm the DI terminal valid logic. Then configure it to invalid through the host computer or external switch.

使用伺服使能时，请首先将伺服驱动器的1个DI 端子(默认为DI5)配置为功能1(FunIN.1：S-ON，伺服使能)，并确定DI端子有效逻辑。然后通过上位机通信或者外部开关将其置为无效。

☆Associated function No.关联功能编号：

| No.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunIN.1 | S-ON | Servo enable<br>伺服使能 | Invalid, the servo motor is not powered. 无效，伺服电机不通电；<br>Valid, the servo motor powered.有效，伺服电机通电。 |

### 5.1.3 JOG operation 点动运行

Please use JOG operation to confirm whether the servo motor can rotate normally and there is no abnormal vibration or abnormal sound during rotation. You can use the JOG operation function through the panel and configure two external DI methods. The motor uses the current stored value of function code P05.04 as the jogging speed.请使用点动运行确认伺服电机是否可以正常旋转，转动时无异常振动和异常声响。可以通过面板、配置两个外部DI方式使用点动运行功能。电机以当前功能码P05.04存储值作为点动速度。

**1）Panel JOG 面板点动**

Enter the JOG operation mode through panel operation P11.00. At this time, the panel displays the default value of 200rpm JOG speed. Adjust the jog operation speed through the UP/DOWN key. Press the SET key to enter the jog state. At this time, the panel displays the "JOG" state, forward and reverse jog operation can be achieved through the UP/DOWN keys. When pressing the MODE key to exit the JOG operation mode, the previously set JOG operation speed value is not saved. 通过面板操作P11.00进入点动运行模式，此时面板显示200rpm点动速度默认值，通过UP/DOWN 键调整点动运行速度，按SET键进入点动状态，此时面板显示“JOG”状态，通过UP/DOWN 键可实现正反转点动运行。当按MODE键退出点动运行模式时，之前设置的点动运行速度值不保存。

☆Associated function code 关联功能码：

| Function code<br>功能码 | Name<br>名称 | Setting range<br>设定范围 | Unit<br>单位 | Function<br>功能 | Setting method<br>设定方式 | Valid time<br>生效时间 | Factory setting<br>出厂设定 |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| P05.04 | JOG speed setting value 点动速度设定值 | 0~6000 | rpm | Set the speed instruct value of JOG forma 对 JOG 点动形式的速度指令值进行设置 | Running set 运行设定 | Effective immediately 立即生效 | 200 |

**2） DI JOG operation DI 点动运行**

Configure 2 external DI terminal to FunIN.17、FunIN.18 functions individually, after setting P05.04 JOG speed value, open the servo enable S-ON, JOG running through DI status.

配置2个外部DI端子，分别置为FunIN.17、FunIN.18功能，设置P05.04点动速度值后，打开伺服使能S-ON，通过DI 状态点动运行。

☆Associated function NO.关联功能编号：

| NO.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunIN.17 | JOGCMD+ | Positive JOG<br>正向点动 | Valid-input according the given instructions 有效- 按照给定指令输入；<br>Invalid- Stop input the motion instruction 无效- 运行指令停止输入。 |
| FunIN.18 | JOGCMD- | Negative JOG<br>负向点动 | Valid- Reverse input according to the given instruction 有效- 按照给定指令反向输入；<br>Invalid- Stop input the motion instruction 无效- 运行指令停止输入。 |

**Note注：**

DI JOG operation is not affected by servo control mode, that is, the DI JOG operation function can be performed in any control mode.

DI点动运行不受伺服控制模式的影响，即在任何控制模式下，均可以进行DI点动运行功能。

### 5.1.4 Rotation direction select 旋转方向选择

By setting "Rotation direction selection (P00.01)", you can change the rotation direction of the motor without changing the input command polarity.

通过设置“旋转方向选择(P00.01)”，可以在不改变输入指令极性的情况下，改变电机的旋转方向。

☆Associated function code 关联功能码：

| Function code<br>功能码 | Name<br>名称 | Setting range<br>设定范围 | Unit<br>单位 | Function<br>功能 | Setting method<br>设定方式 | Effective time<br>生效时间 | Factory setting<br>出厂设定 |
|---|---|---|---|---|---|---|---|
| P00.01 | Rotation direction select<br>旋转方向选择 | 0- Take the CCW direction as the forward direction<br>以 CCW 方向为正转方向<br>1- Take the CW direction as the forward direction<br>以 CW 方向为正转方向 | - | Set the positive direction of motor rotation when observe from the motor shaft end<br>设置从电机轴端观察时，电机旋转正方向 | Shutdown settings<br>停机设定 | Power on again<br>再次通电 | 0 |

**Note 注：**

When the rotation direction selection (P00.01) is changed, the shape of the servo drive output pulse and the positive and negative of the monitoring parameters will not change.

The "forward drive" setting in the overtravel prevention function is consistent with the rotation direction selection (P00.01) setting.

旋转方向选择(P00.01) 改变时，伺服驱动器输出脉冲的形态、监控参数的正负不会改变。

超程防止功能中“正向驱动”与旋转方向选择(P00.01) 设置一致。

### 5.1.5 Frequency division output function selection 分频输出功能选择

The frequency division output function of servo drive refers to outputting the position command pulse or the position pulse fed back by the encoder in the form of A/B phase quadrature pulse or pulse + direction.

伺服驱动器的分频输出功能是指将位置指令脉冲或编码器反馈的位置脉冲以 A /B 相正交脉冲或脉冲+方向的形式输出。

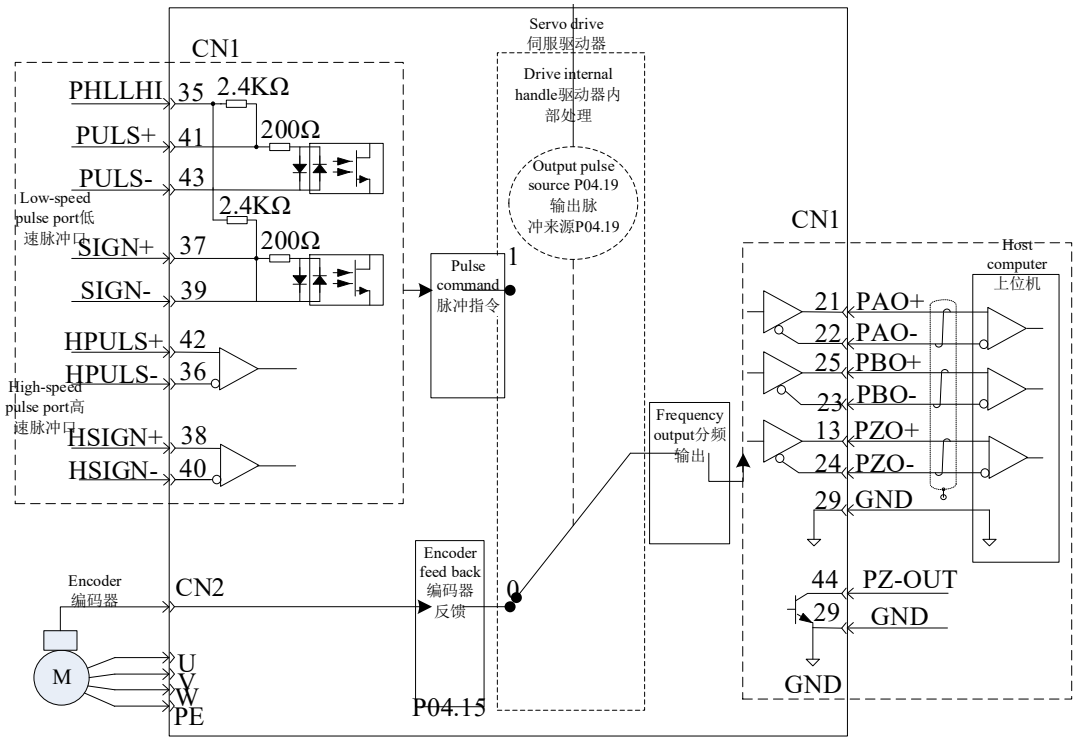



Figure 5-2 Frequency division output principle schematic diagram
图5-2 分频输出原理示意图

Among them, when multi-axis servo pulse synchronous tracking, it is recommended to use the pulse command synchronous output method, that is, P04.19=1; When the host computer is used for close-loop feedback, it is recommend to use encoder frequency division output method, that is, P04.19=0.

其中，多轴伺服脉冲同步跟踪时，建议采用脉冲指令同步输出方式，即P04.19=1；上位机用作闭环反馈时，建议采用编码器分频输出方式，即P04.19=0。

The servo drive has one set of frequency output terminal:

A phase pulse: PAO+、PAO-, differential output, the maximum output pulse frequency is 2Mpps.

B phase pulse: PBO+、PBO-, differential output, the maximum output pulse frequency is 2Mpps.

Z phase pulse: PZO+、 PZO-, differential output, the maximum output pulse frequency is 2Mpps.

PZ-OUT, GND, open collector output, the maximum output pulse frequency is 100kpps.

伺服驱动器有1 组分频输出端子：

A 相脉冲：PAO+、PAO-，差分输出，最大输出脉冲频率为2Mpps。

B 相脉冲：PBO+、PBO-，差分输出，最大输出脉冲频率为2Mpps。

Z 相脉冲：PZO+、 PZO-，差分输出，最大输出脉冲频率为2Mpps。

PZ-OUT，GND，集电极开路输出，最大输出脉冲频率为100kpps。

When using the frequency division output function, the source of output(P04.19)、output pulse shape(P04.20)、phase(P00.02)、resolution(P04.15)、Z phase pulse polarity(P04.18) and Z phase pulse width(P09.14) should be set individually.

使用分频输出功能时，应根据需要对输出脉冲的来源(P04.19)、输出脉冲形态(P04.20)、相位(P00.02)、分辨率(P04.15) 、Z 相脉冲极性(P04.18) 以及Z 相脉冲宽度(P09.14)分别进行设置。

☆Associated function code 关联功能码：

| Function code 功能码 | | Name 名称 | Set range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 02 | Definition of pulse output forward direction 脉冲输出正方向定义 | 0- CCW direction is forward direction (When the pulse output OA leads OB, the corresponding motor rotation direction) CCW 方向为正转方向 (脉冲输出 OA 超前 OB 时,对应的电机旋转方向) 1- CW direction is positive direction (Reverse mode, OA lags OB) CW 方向为正转方向 （反转模式，OA 滞后 OB） | 1 | 0 | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P04 | 15 | Pulse output resolution (32 bits) 脉冲输出分辨率 (32 位） | 16PPR～1073741824PPR (Calculate the number of corresponding lines according to the incremental photoelectric encoder*4)（按增量光电编码器计算对应线数*4) | 1PPR | 10000 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P04 | 18 | Pulse output Z polarity 脉冲输出 Z 极性 | 0-Z When the pulse rush arrives, it is high level 脉冲到来时为高电平 1-Z When the pulse rush arrives, it is low level 脉冲到来时为低电平 | 1 | 0 | N/A | Reserve parameters 保留参数 | P |
| P04 | 19 | Pulse output function select 脉冲输出功能选择 | 0- Encoder frequency division output 编码器分频输出 1- Pulse command synchronous output 脉冲指令同步输出 | 1 | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P04 | 20 | Frequency division pulse form 分频输出脉冲形式 | 0- AB Orthogonal signal 正交信号 1- Pulse direction 脉冲+方向 | 1 | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P09 | 14 | Encoder Z signal output width 编码器 Z 信号输出宽度 | 0-60000 | 200ns | 10000 | Power on again 再次通电 | Shutdown setting 停机设定 | PST |

### 5.1.6 Brake setting 抱闸设置

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

抱闸是在伺服驱动器处于非运行状态时，防止伺服电机轴运动，使电机保持位置锁定，以使机械的运动部分不会因为自重或外力移动的机构。

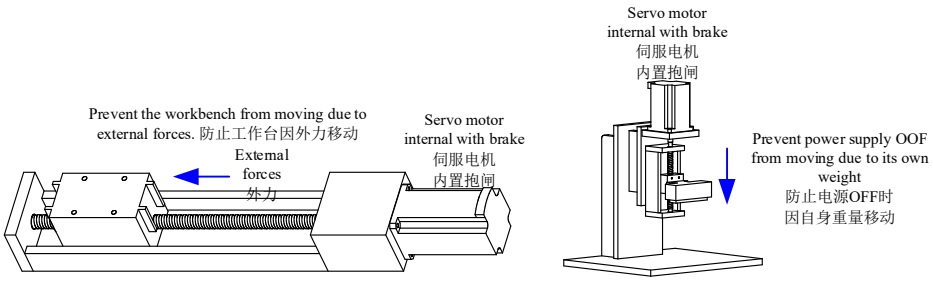



Figure 5-3 Brake application schematic diagram
图5-3 抱闸应用示意图

**Note注：**

- The brake mechanism built into the servo motor is a non-energized fixed dedicated mechanism and cannot be used for braking. It is only used to keep the servo motor in a stopped state.

内置于伺服电机中的抱闸机构是非通电动作型的固定专用机构，不可用于制动用途，仅在使伺服电机保持停止状态时使用。

• Brake coil has no polarity. 抱闸线圈无极性。

• Servo motor shutdown, and should close the servo enable(S-ON). 伺服电机停机后，应关闭伺服使能(S-ON)。

• When the motor with brake running, the brake may make a clicking sound, but it has no functional impact.
内置抱闸的电机运转时，抱闸可能会发出咔嚓声，功能上并无影响。

• When the brake coil is energized (the brake is open), magnetic flux leakage may occur at the shaft end and other parts. Please be careful when using instruments such as magnetic sensors near motors.
抱闸线圈通电时(抱闸开放状态)，在轴端等部位可能发生磁通泄漏。在电机附近使用磁传感器等仪器时，请注意。

**a）Brake wiring 抱闸接线**

The connection of brake input signal has no polarity and requires the user to prepare a 24V power supply. The standard connection examples for brake signal BK and brake power supply are as follows:

抱闸输入信号的连接没有极性，需要用户准备24V电源。抱闸信号BK和抱闸电源的标准连线实例如下：

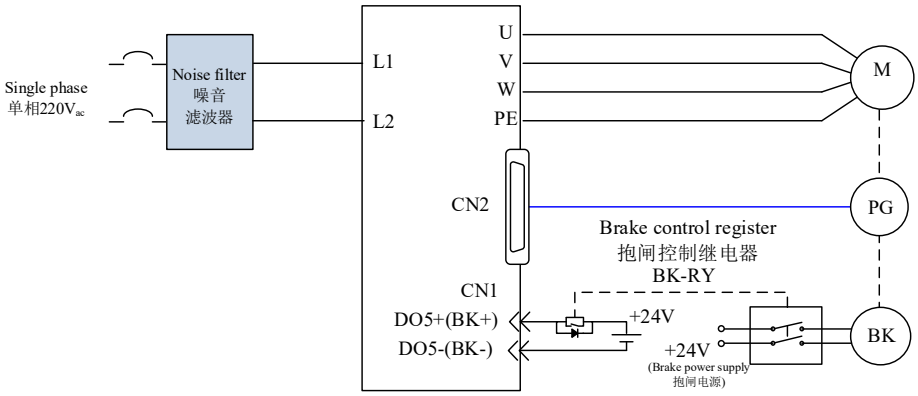



Figure 5-4 Brake wiring diagram
图5-4 抱闸配线图

**Note 注：**

●The length of the motor brake cable needs to fully consider the voltage drop caused the cable resistance, the brake operation needs to ensure that the input voltage is at least 21.6V.
电机抱闸线缆长度需要充分考虑线缆电阻导致的压降，抱闸工作需要保证输入电压至少 21.6V。

●It's better not to share the power supply of the holding brake with other electrical appliances to prevent the voltage or current from reduced due to the work of other electrical appliances and eventually causing the brake to malfunction.
抱闸最好不要与其他用电器共用电源，防止因为其他用电器的工作导致电压或者电流降低最终导致抱闸误动作。

●When connect register, please be sure connect the freewheeling diode(It is recommended to use super-fast recovery diode, 1A, 1000V model: UF1010G), and direction is correct, or may damage the DO port.
当连接继电器时，请务必接入续流二极管（推荐使用超快恢复二极管，1A,1000V 型号：UF1010G ），且方向正确，否则可能损坏DO端口。

●It is recommended to use cables above 0.5mm$^2$
推荐用 0.5mm$^2$ 以上线缆。

**b）Brake software settings 抱闸软件设置**

For a servo motor with brake, one DO terminal of servo drive is must be configured as function 11(FunOUT.11：BK, output with brake), and the valid logic of DO terminal must be determined.

对于带抱闸的伺服电机，必须将伺服驱动器的1个DO 端子配置为功能11(FunOUT.11：BK，抱闸输出)，并确定DO端子有效逻辑。

☆Associated function NO.：关联功能编号：

| No.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunOUT.11 | BK | Output with brake<br>抱闸输出 | Invalid, cut off the brake power supply, brake motion, the motor is in position locked state;<br>无效，抱闸电源断开，抱闸动作，电机处于位置锁定状态；<br>Valid, connect the brake power supply, brake is released and the motor can rotate. 有效，抱闸电源接通，抱闸解除，电机可旋转； |

According to the current status of 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.

根据伺服驱动器当前状态，抱闸机构的工作时序可分为伺服驱动器正常状态抱闸时序和伺服驱动器故障状态抱闸时序

**c）The brake sequence in the normal state of the servo drive 伺服驱动器正常状态抱闸时序**

The brake sequence in normal state can be divided into motor stopped state and motor rotate state two situation, the detail is in “Chapter 5.1.8 Servo running”.

正常状态的抱闸时序可分为电机静止和电机旋转两种情况，详细见“5.1.8 伺服运行”章节。

### 5.1.7 Brake setting 制动设置

When the torque of motor is reverse from rotation direction, the energy is transmitted back from motor end to drive, causing the bus voltage value increase, when it reaches the braking point, the energy can be only consumed through the braking resistor. At this time, the braking energy must be consumed according to the braking requirements, otherwise the servo drive will be damaged. The braking resistor can be built-in or external. Built-in and external braking resistors cannot be used at the same time. The relevant specifications of the ES3 BAI driver braking resistor are as follows:

当电机的转矩和转速方向相反时，能量从电机端传回驱动器内，使得母线电压值升高，当升高到制动点时，能量只能通过制动电阻来消耗。此时，制动能量必须根据制动要求被消耗，否则将损坏伺服驱动器。制动电阻可以内置，也可以外接。内置与外置制动电阻不能同时使用。ES3 BAI驱动器制动电阻相关规格如下：

Table 5-2 ES3 BAI braking resistor specifications
表5-2ES3 BAI系列制动电阻规格

| Servo drive model 伺服驱动器型号 | | Internal braking resistor specification 内置制动电阻规格 | | The minimum allowed resistor value 最小允许电阻值(Ω) | Capacitor can absorb maximum braking energy 电容可吸收最大制动能量(J) |
|---|---|---|---|---|---|
| | | Resistor 电阻(Ω) | Capacity 容量(W) | | |
| Single phase 单相 220V | ES3-02BAI | - | - | 100 | 9 |
| | ES3-04BAI | 100 | 40 | 100 | 18 |
| | ES3-08BAI | 50 | 50 | 50 | 22 |
| | ES3-10BAI | 50 | 75 | 50 | 26 |

☆Associated function code 关联功能码：

| Function code 功能码 | | Name 名称 | Set range 设定范围 | Minimum unit 最小单位 | Factory settings set 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 18 | Energy consumption resistor setting 能耗电阻设置 | 0-Use internal energy consumption resistor 使用内置能耗电阻<br>1- Use external energy consumption resistor and natural cooling 使用外置能耗电阻并且自然冷却<br>1- Use external energy resistor and forced air cooling 使用外置能耗电阻并且强迫风冷<br>2- Not use energy consumption resistor, all is absorbed by capacitors 不用能耗电阻，全靠电容吸收 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 19 | External resistor power capacity 外置电阻功率容量 | 1～65535 | 1W | Model parameters 机型参数 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 20 | External resistor value 外置电阻阻值 | Users can set it themselves 可自行设置<br>1～1000 | 1Ω | Model parameters 机型参数 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |

| Function code 功能码 | | Name 名称 | Set range 设定范围 | Minimum unit 最小单位 | Factory settings set 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 21 | External resistor heating time constant 外置电阻发热时间常数 | Users can set it themselves 用户可自行设置 1000~65535 | 1ms | Model parameters 机型参数 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 22 | Energy consumption braking starting voltage 能耗制动开始电压 | 0~410 | 1V | Model parameters 机型参数 | Effective immediately 立即生效 | Running set 运行设定 | PST |

### 5.1.8 Servo running 伺服运行

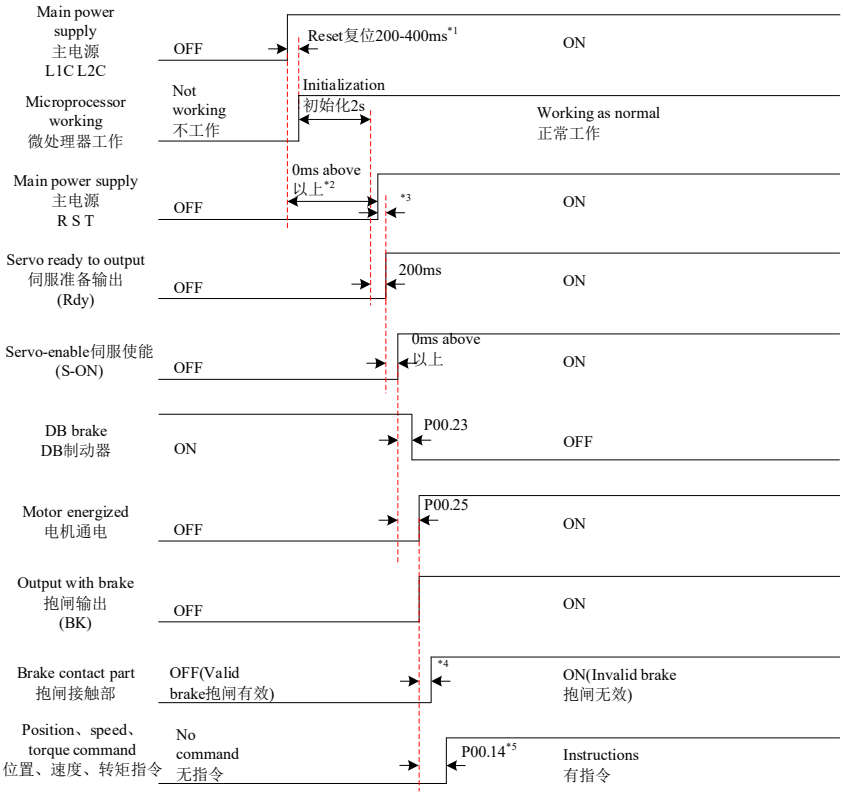
Configure the servo enable(S-ON) to valid (ON), the servo drive is in runnable status, the display shows the current speed value; But due to no command input, the servo motor didn't rotate and in locked status. After input instruction, the servo motor rotate.

将伺服使能(S-ON) 置为有效(ON)，伺服驱动器处于可运行状态，显示器显示当前速度值；但由于此时无指令输入，伺服电机不旋转，处于锁定状态。输入指令后，伺服电机旋转。

Table 5-3 Servo running operation description
表5-3伺服运行操作说明

| NO. 序号 | Content 内容 |
|---|---|
| 1 | When running for the first time, appropriate instructions should be set to make the motor rotate at low speed and confirm whether the motor rotation is correct.初次运行时，应设置合适的指令，使电机低速旋转，确认电机旋转情况是否正确。 |
| 2 | Observe whether the motor rotation direction is correct. If observe the motor rotation direction is reverse with expectation, please check the input signal、command direction set signal. 观察电机旋转方向是否正确。若发现电机转向与预计的相反，请检查输入指令信号、指令方向设置信号。 |
| 3 | If the motor rotates in correct direction, you can use the drive panel or YAKO host computer software to observe the motor's actual speed P18.01, average load rate P18.02 and other parameters. 若电机旋转方向正确，可利用驱动器面板或研控上位机软件观察电机的实际速度P18.01、平均负载率P18.02等参数。 |
| 4 | After the above motor operating conditions are checked, the relevant parameters can be adjusted to make the motor work under the expected operating conditions. 以上电机运行状况检查完毕之后，可以调整相关参数使电机工作于预期工况。 |
| 5 | Refer to Chapter 6 "Operation Performance Adjustment" to debug the servo drive. 参考第六章"运行性能调整"，对伺服驱动器进行调试。 |

**1）Power on timing diagram 电源接通时序图**




**Note 注：**

*1：Reset time is determined by microprocessor +5V power supply-built time.

复位时间，由微处理器+5V电源建立时间决定；

*2：0ms above, which is refer to the time is determined by the time of actual main power supply connect motion.

0ms以上，是指时间由实际主电源接通动作时刻决定；

*3：When the control power supply and main power supply are powered on at the same time, this time is the same as the time from the completion of microprocessor initialization to Rdy becoming effective;

当控制电源和主电源同时上电时，该时间和微处理初始化完成到Rdy有效的时间相同；

*4：The delay time of brake contact part motion please refer to the relevant specifications of the motor.

抱闸接触部动作的延迟时间请参考电机相关规格；

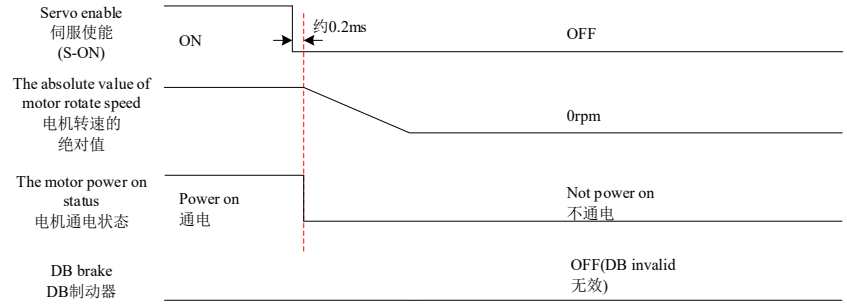
*5：When DO function 11 (FunOUT.11: BK) is not assigned, P00.14 has no effect.

未分配DO功能11(FunOUT.11：BK) 时，P00.14 无作用。

**2）The timing diagram of servo enable OFF、warning or fault occurs 伺服使能 OFF、发生警告或故障时停机时序图**

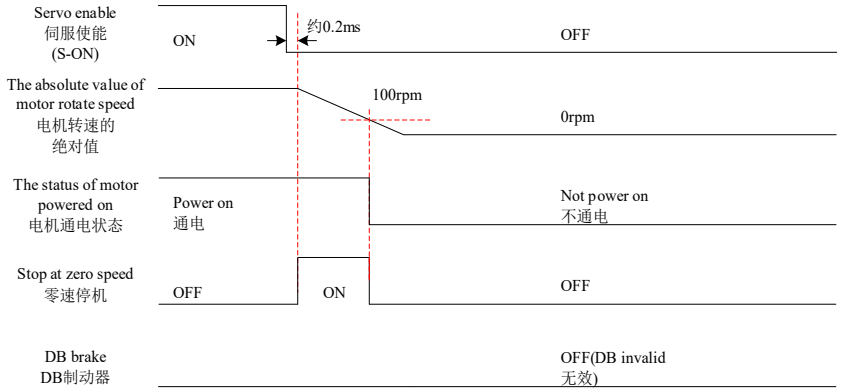
**a） Servo enable OFF non-holding brake: Free to shut down, keeps free running state(P00.10=0)**

**伺服使能 OFF 非抱闸：自由停机，保持自由运行状态(P00.10=0)**

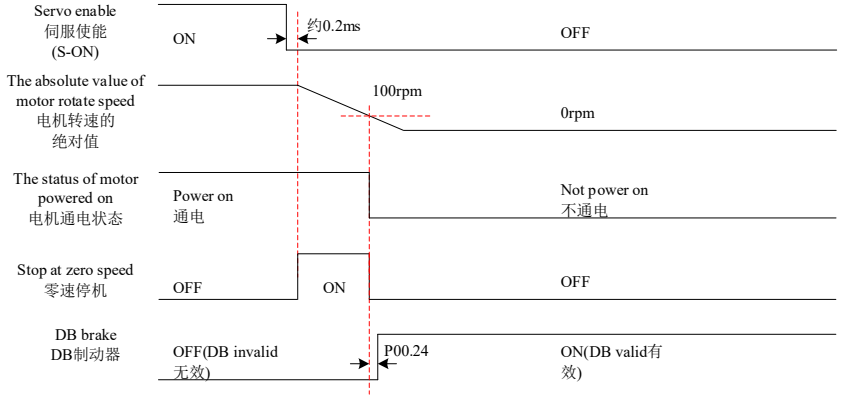



**b） Servo enable OFF non-holding brake: Stop at zero speed, maintain free running state(P00.10=1)**

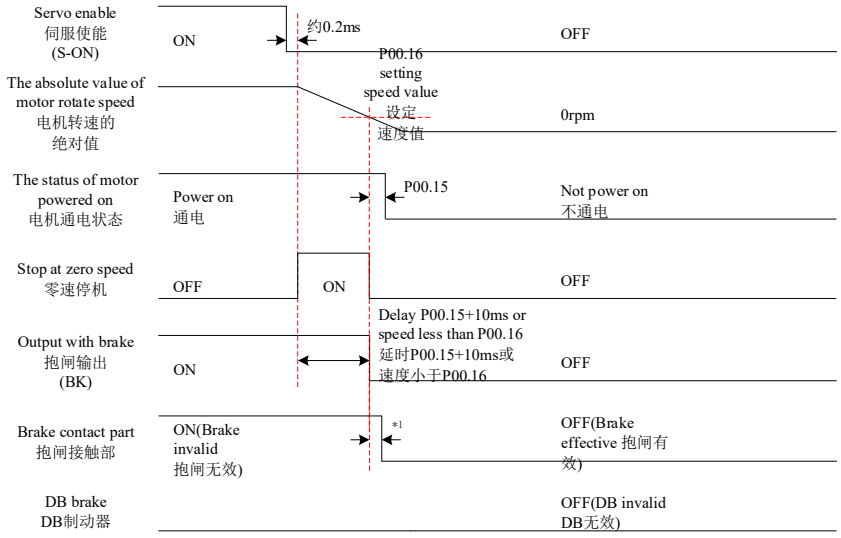
**伺服使能 OFF 非抱闸：零速停机，保持自由运行状态(P00.10=1)**




**c） Servo enable OFF non-holding brake: Stop at zero speed, maintain free running state(P00.10=2)**
**伺服使能 OFF 非抱闸：零速停机，保持 DB 状态(P00.10=2)**



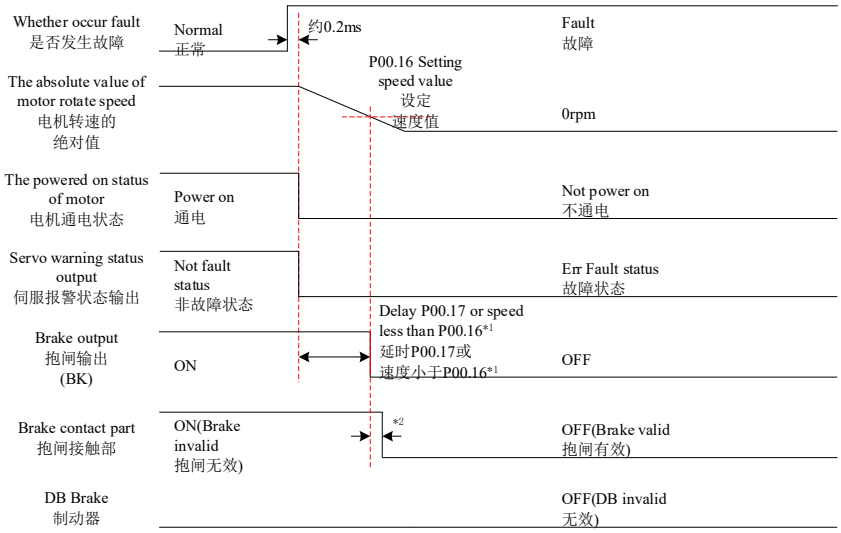

**d） Servo enable OFF with brake: Forced to stop at zero speed, maintain free state**
**伺服使能 OFF 带抱闸：强制为零速停机，保持自由状态**




**Note 注：**

*1：The delay time of brake contact part motion please refer to the relevant specifications of the motor.
抱闸接触部动作的延迟时间请参考电机相关规格。

**e）Category 1 fault: Free shutdown, maintain free running state(P00.11=0)**
**第 1 类故障：自由停机，保持自由运行状态(P00.11=0)**




**Note注：**

*1：When DO function 11 (FunOUT.11: BK) is not assigned, P00.16 and P00.17 have no effect.

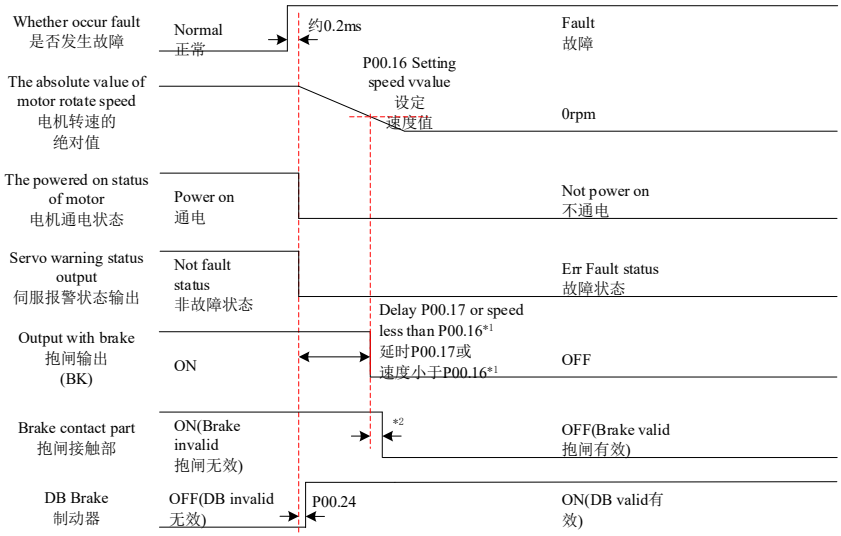
未分配DO功能11(FunOUT.11：BK) 时，P00.16和P00.17无作用。

*2：The delay time of brake contact part motion please refer to the relevant specifications of the motor.

抱闸接触部动作的延迟时间请参考电机相关规格；

**f）Category 1 fault: DB shutdown, maintain DB state(P00.11=1)**

**第 1 类故障：DB 停机，保持 DB 状态(P00.11=1)**




**注：**

*1：When DO function 11 (FunOUT.11: BK) is not assigned, P00.16 and P00.17 have no effect.

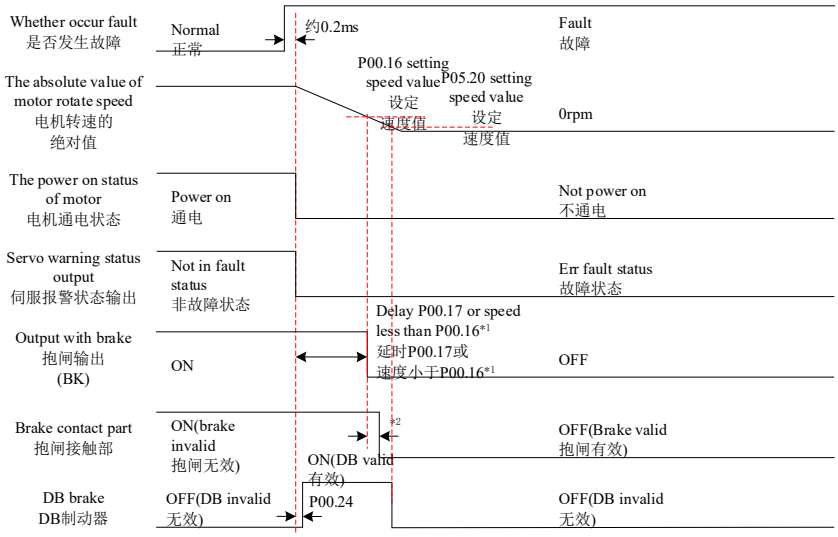
未分配DO功能11(FunOUT.11：BK) 时，P00.16和P00.17无作用。

*2：The delay time of brake contact part motion please refer to the relevant specifications of the motor.

抱闸接触部动作的延迟时间请参考电机相关规格；

**g）Category 1 fault: DB shutdown, maintain free running state(P00.11=2)**

**第 1 类故障：DB 停机，保持自由运行状态(P00.11=2)**




**Note注：**

*1：When DO function 11 (FunOUT.11: BK) is not assigned, P00.16 and P00.17 have no effect.

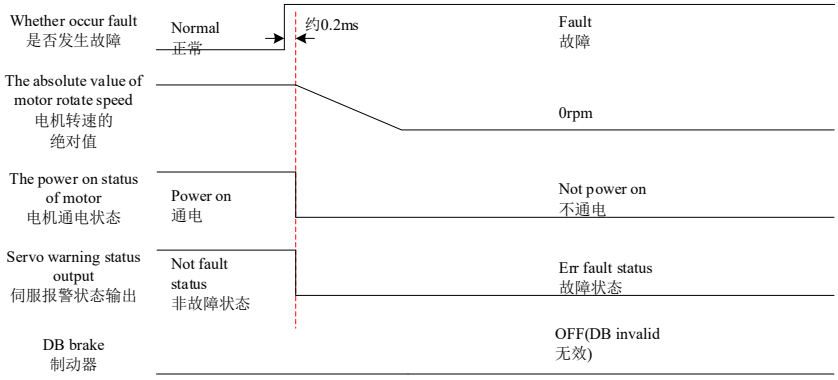
未分配DO功能11(FunOUT.11：BK) 时，P00.16和P00.17无作用。

*2：The delay time of brake contact part motion please refer to the relevant specifications of the motor.

抱闸接触部动作的延迟时间请参考电机相关规格；

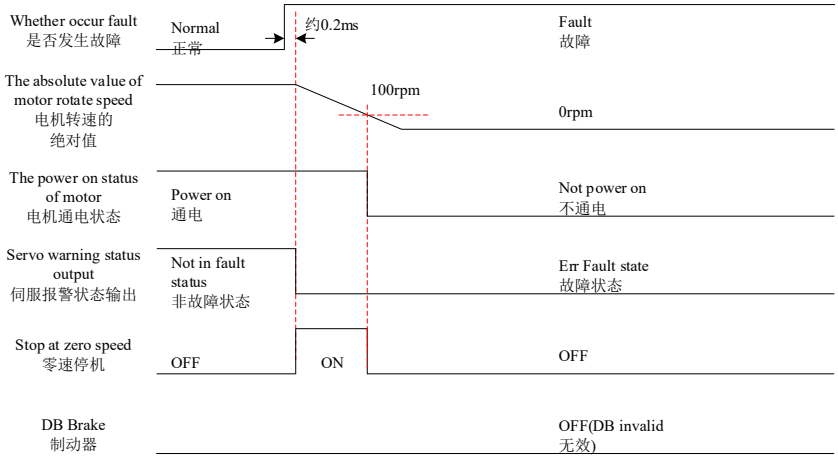
**h）Category 2 fault non-holding brake: Free shutdown, maintain free running state(P00.12=0)**

**第 2 类故障非抱闸：自由停机，保持自由运行状态(P00.12=0)**



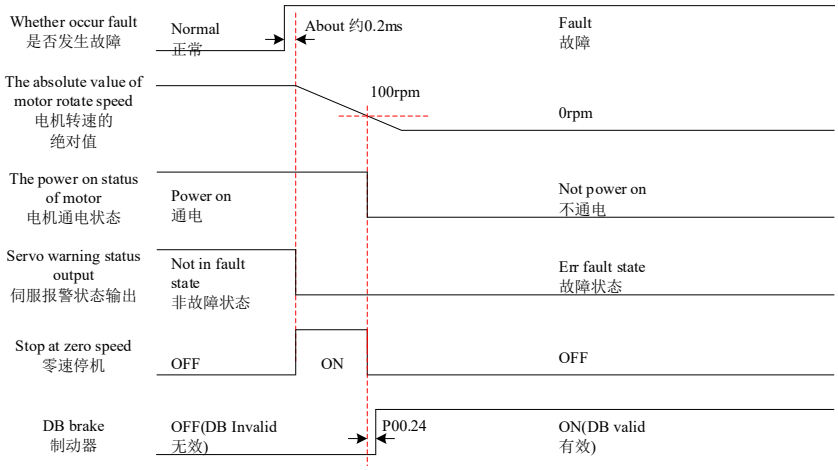

**i) Category 2 fault non-holding brake: Stop at zero speed, maintain free running state(P00.12=1)**

**第 2 类故障非抱闸：零速停机，保持自由运行状态(P00.12=1)**



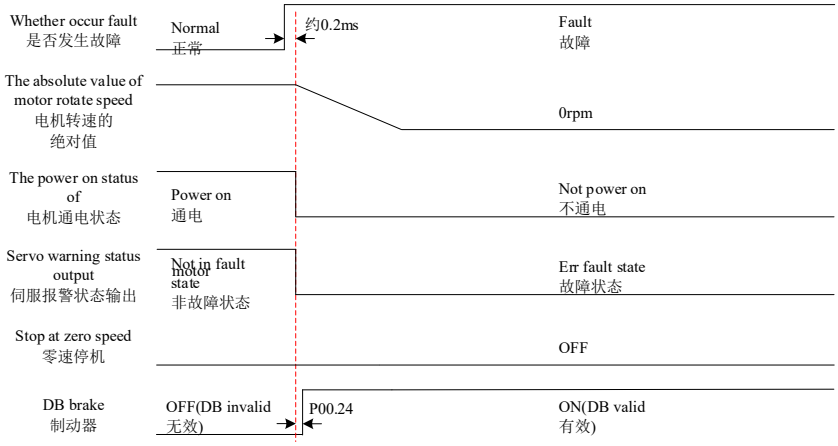

**j）Category 2 fault non-holding brake: Stop at zero speed, maintain DB status(P00.12=2)**

**第 2 类故障非抱闸：零速停机，保持 DB 状态(P00.12=2)**



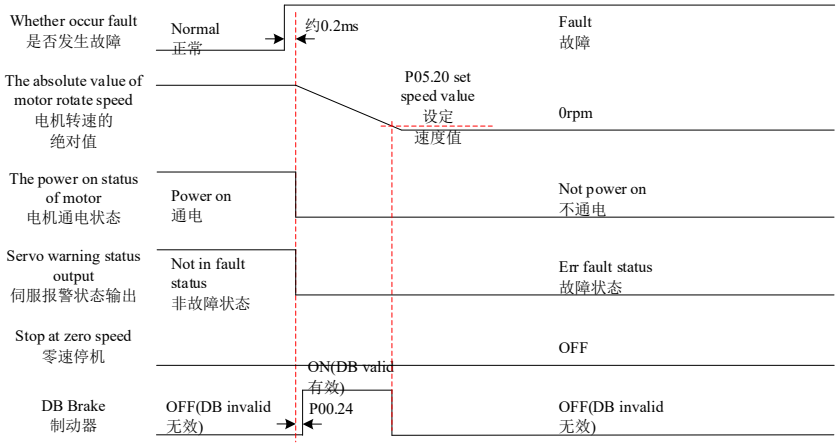

**k）Category 2 fault non-holding brake: DB shutdown, maintain DB status(P00.12=3)**

**第 2 类故障非抱闸：DB 停机，保持 DB 状态(P00.12=3)**



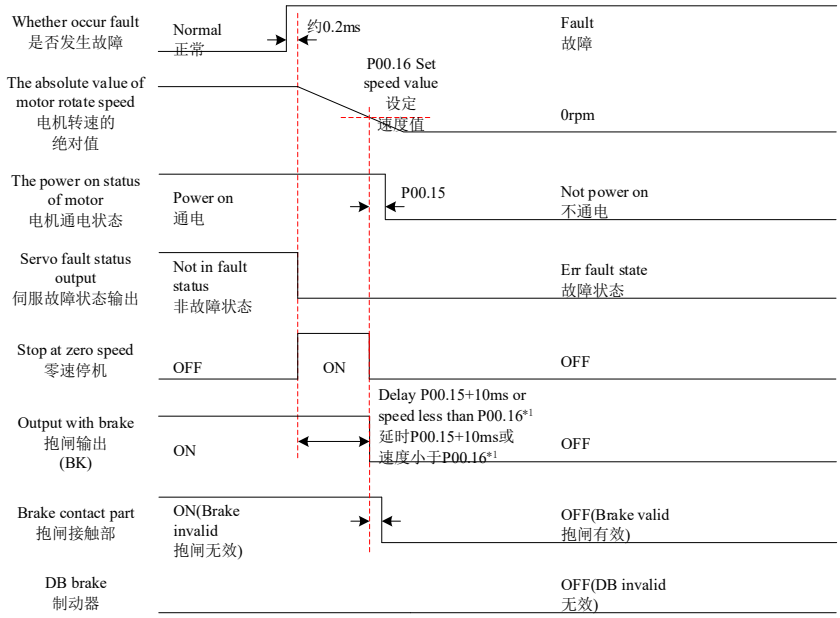

**l）Category 2 fault non-holding brake: DB shutdown, maintain free running state(P00.12=4)**

**第 2 类故障非抱闸：DB 停机，保持自由运行状态(P00.12=4)**




**m）Category 2 fault with brake: Forced to stop at zero speed, maintain free running status**

**第 2 类故障带抱闸：强制为零速停机，保持自由运行状态**



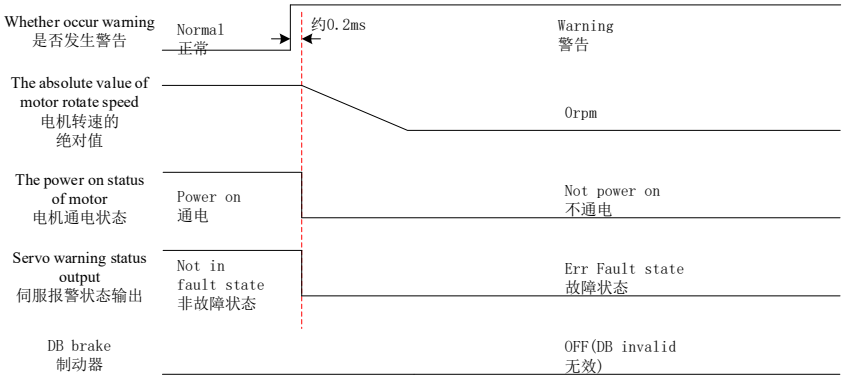

**Note注：**

*1：The delay time of brake contact part motion please refer to the relevant specifications of the motor.

抱闸接触部动作的延迟时间请参考电机相关规格；

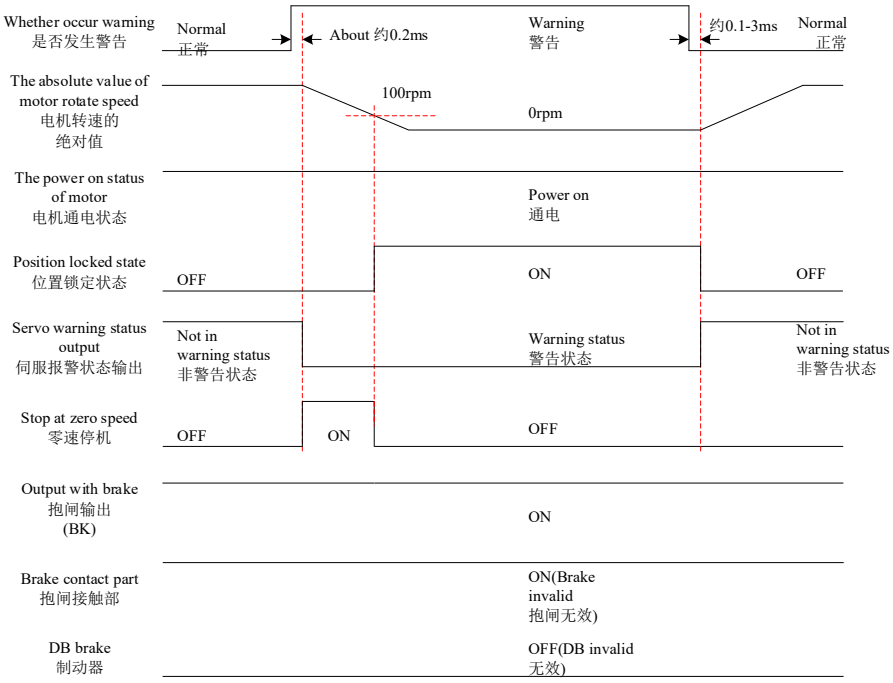
**n）Overtravel shutdown warning non-holding brake: Free shutdown, maintain free running status(P00.13=0)**

**超程停机警告非抱闸：自由停机，保持自由运行状态(P00.13=0)**



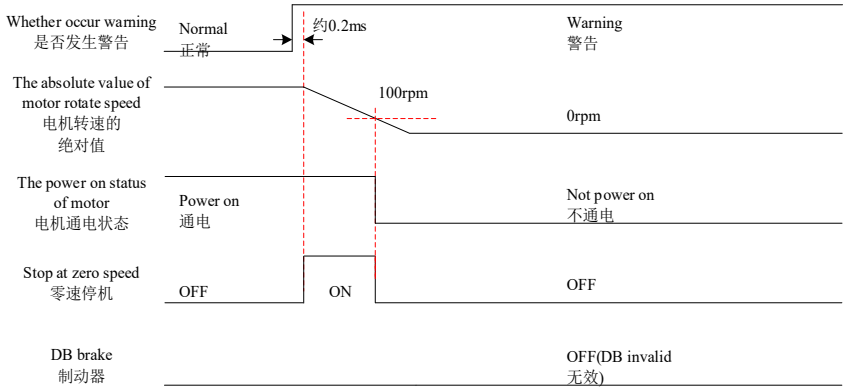

**o）Overtravel and brake shutdown warning: Stop at zero speed, keep position locked status(P00.13=1)**

**超程、刹车停机警告：零速停机，保持位置锁定状态(P00.13=1)**



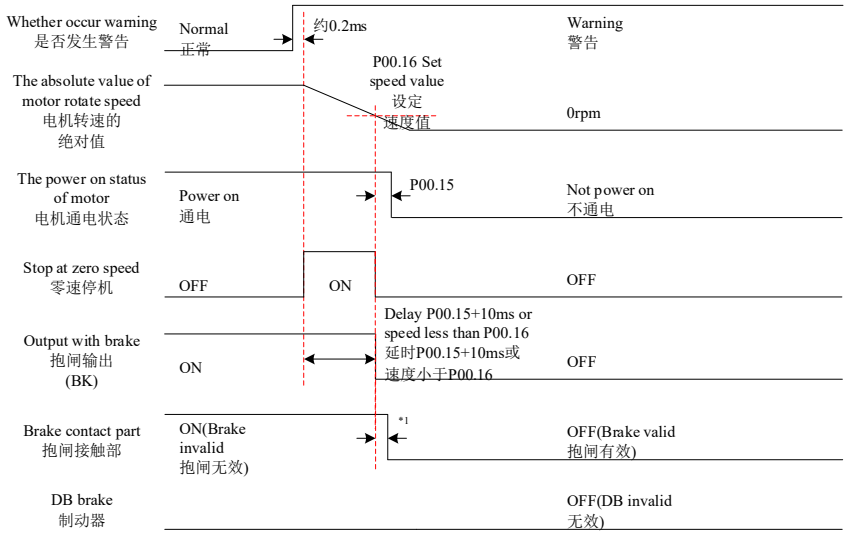

**p）Overtravel shutdown warning non-holding brake: Stop at zero speed, keep free running state (P00.13=2)**

**超程停机警告非抱闸：零速停机，保持自由运行状态(P00.13=2)**




**q）Overtravel shutdown warning non-holding brake: Stop at zero speed, keep free running state (P00.13=0 or P00.13=2)**

**超程停机警告带抱闸：零速停机，保持自由运行状态(P00.13=0 或 P00.13=2)**



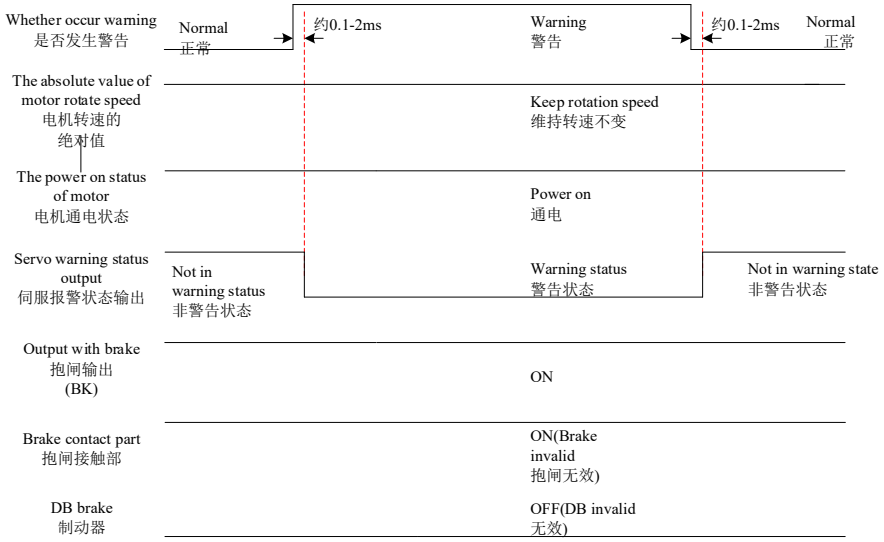

**Note注：**

*1：The delay time of brake contact part motion please refer to the relevant specifications of the motor.

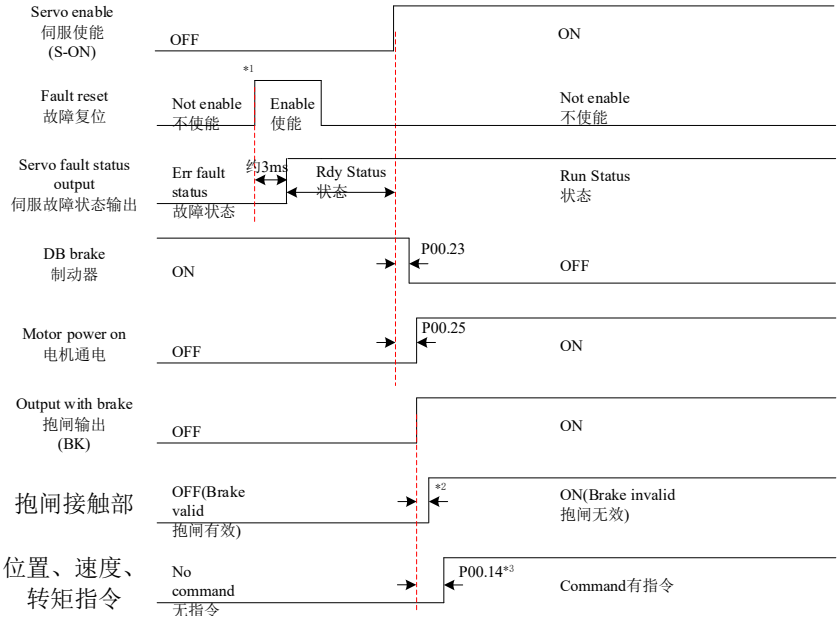
抱闸接触部动作的延迟时间请参考电机相关规格；

**r）非停机警告：**

除紧急刹车、正向超程警告、反向超程警告，其他警告对伺服当前状态无影响，如下所示。




**s）Fault reset 故障复位：**




**Note注：**

*1：DI fault reset signal(FunIN.2：ALM-RST) is valid for edge changes.

DI故障复位信号(FunIN.2：ALM-RST) 为沿变化有效；

*2：For the delay time of the brake contact action, please refer to the relevant specifications of the motor;

抱闸接触部动作的延迟时间请参考电机相关规格；

*3：When DO function 11 (FunOUT.11: BK) is not assigned, P00.14 has no effect.

未分配DO功能11(FunOUT.11：BK) 时，P00.14无作用。

### 5.1.9 Servo stops 伺服停止

According to different stop modes, it can be divided into free stop, DB stop and zero speed stop; according to the stop state, it can be divided into free running state, DB state and position lock. details as follows:

根据停机方式不同，可分为自由停机、DB停机与零速停机；根据停机状态，可分为自由运行状态、DB状态与位置保持锁定。具体如下：

Table 5-4 Comparison of three shutdown methods

表5-4 三种停机方式比较

| Shutdown methods<br>停机方式 | Free shutdown<br>自由停机 | DB shutdown<br>DB停机 | Shutdown at zero speed<br>零速停机 |
|---|---|---|---|
| Shutdown description<br>停机描述 | When the servo motor is not powered on, it decelerates to 0 freely. The deceleration time is affected by mechanical inertia, mechanical friction, etc.<br>伺服电机不通电，自由减速到0，减速时间受机械惯量、机械摩擦等影响。 | When the servo motor is not powered, short-circuit the three phases U, V, and W, and the motor will quickly decelerate to 0.<br>伺服电机不通电，短接U、V、W三相，电机迅速减速到0。 | The servo drive outputs reverse braking torque, and the motor quickly decelerates to 0.<br>伺服驱动器输出反向制动转矩，电机迅速减速到0。 |
| Shutdown characteristics<br>停机特点 | Smooth deceleration, small mechanical impact, but slow deceleration process.<br>平滑减速，机械冲击小，但减速过程慢。 | Rapid deceleration, small mechanical impact, but fast deceleration process.<br>快速减速，机械冲击小，但减速过程快。 | Rapid deceleration, large mechanical impact, but fast deceleration process.<br>快速减速，机械冲击大，但减速过程快。 |

Table 5-5 Comparison of three shutdown status
表5-5 三种停机状态比较

| Free running state<br>自由运行状态 | DB state<br>DB状态 | Keep position locked<br>位置保持锁定 |
|---|---|---|
| After the motor stops rotating, the motor is not powered and the motor shaft can rotate freely.<br>电机停止旋转后，电机不通电，电机轴可自由旋转。 | After the motor stops rotating, the motor is not energized; there is resistance when rotating the motor shaft, and the faster the rotation speed, the greater the resistance.<br>电机停止旋转后，电机不通电；转动电机轴有阻力，转动速度越快阻力越大。 | After the motor stops rotating, the motor shaft is locked and cannot rotate freely.<br>电机停止旋转后，电机轴被锁定，不可自由旋转。 |

Servo shutdown situations can be divided into the following categories:
伺服停机情况可分为以下几类：

**1） Servo enable(S-ON) OFF shutdown:**
**伺服使能(S-ON)OFF 停机：**

Set servo enable DI terminal to make it invalid.
设置伺服使能DI 端子，使其置为无效。

☆Associated function code:
关联功能码：

| Function code<br>功能码 | Name<br>名称 | Setting range<br>设定范围 | Function<br>功能 | Setting methods<br>设定方式 | Effective time<br>生效时间 | Factory setting<br>出厂设定 |
|---|---|---|---|---|---|---|
| P00.10 | Servo OFF shutdown method selection<br>伺服OFF停机方式选择 | 0- Free shutdown, maintain free sunning state<br>自由停机，保持自由运行状态<br>1- Stop at zero speed (decelerate time is controlled by P05.06), maintain free running state | Set servo enable to OFF, the motor shutdown method<br>设置伺服使能设为OFF 时，电机停机方式<br>◆Note注意：<br>When the enable is braking, drive internal of drive is forced to shutdown at zero speed (decelerate time is controlled by P00.15), maintain free state.<br>在使能抱闸时，驱动器内部强制为零速停机(减速时间由P00.15控制)，保持自由状态。 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 零速停机(减速时间由P05.06控制)，保持自由运行状态<br>2- Shutdown at zero speed (decelerate time is controlled by P05.06), maintain DB status<br>零速停机(减速时间由P05.06控制)，保持DB状态 | | | | |
| P00.15 | If NO.2 fault occurs or the servo enable is turned off in the rotating state, the brake output will be OFF delayed; In static state, delay from brake output OFF to motor de-energization<br>旋转状态下发生NO.2 故障或伺服使能OFF，抱闸输出OFF延时；静止状态，抱闸输出OFF至电机不通电延时 | 10ms～10000ms | Set the delay time when the brake output (BK) is set to OFF when the NO.2 fault occurs or the servo enable is OFF when the motor is in the rotating state; and the delay time when the brake output is OFF until the motor is de-energized in the stationary state.<br>设置电机处于旋转状态时，发生NO.2 故障或伺服使能OFF，将抱闸输出(BK) 置为OFF，的延迟时间；以及静止状态，抱闸输出OFF至电机不通电延时。 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 200 |
| P05.06 | Speed command decelerate time<br>速度指令减速时间 | 0ms～10000ms | The time for the speed command to decelerate from 1000rpm to 0<br>速度指令从1000rpm 减速到0 的时间 | Running setting<br>运行设定 | Effective immediately<br>立即生效 | 50 |

**2）Shutdown due to fault: 故障停机：**

According to different fault type, the servo shutdown method is also different.
根据故障类型不同，伺服停机方式也不同。

☆Associated function code:关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|
| P00.11 | Fault NO.1 shutdown method select 故障NO.1 停机方式选择 | 0- Free shutdown, maintain free running state 自由停机，保持自由运行状态<br>1- DB shutdown, maintain DB state DB停机，保持DB状态<br>2- DB shutdown, maintain free running state DB停机，保持自由运行状态 | Set the motor shutdown mode when a type 1 fault occurs 设置发生第1 类故障时，电机停机方式 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P00.12 | 故障NO.2 停机方式选择 | 0- Shutdown freely, maintain free running state 自由停机，保持自由运行状态<br>1- Shutdown at zero speed (decelerate time is controlled by P05.06), maintain free running status 零速停机(减速时间由P05.06控制)，保持自由运行状态<br>2- Shutdown at zero speed (decelerate time is controlled by P05.06), maintain DB status 零速停机(减速时间由P05.06控制)，保持DB状态<br>3- DB shutdown, maintain DB state DB停机，保持DB状态<br>4- DB shutdown, maintain free running state DB停机，保持自由运行状态 | Set the motor shutdown mode when a type 2 fault occurs 设置发生第2 类故障时，电机停机方式<br>◆Note 注意：<br>When the enable is braking, drive internal of drive is forced to shutdown at zero speed (decelerate time is controlled by P00.15), maintain free state. 在使能抱闸时，驱动器内部强制为零速停机(减速时间由P00.15控制)，保持自由运行状态。 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

**3）Overtravel shutdown 超程停机：**

“Overtravel”: Means that the mechanical movement exceeds the designed safe movement range.

“超程”：是指机械运动超出所设计的安全移动范围。

“Overtravel shutdown”: Means that when the mechanical movement exceeds the designed safe movement range, the safe functions of limit-bit switch output electric level changes, servo drive forced servo motor stopped.

“超程停机”：是指当机械的运动部分超出安全移动范围时，限位开关输出电平变化，伺服驱动器使伺服电机强制停止的安全功能。

☆Associated function code 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|
| P00.13 | Overtravel shutdown method selection 超程停机方式选择 | 0- Free shutdown, maintain free running state 自由停机，保持自由运行状态<br>1- Shutdown at zero speed (decelerate time is | Set motor shutdown method when overtravel occurs 设置发生超程时，电机停机方式<br>◆Note注意： | Shutdown setting 停机设定 | Effective immediately 立即生效 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | controlled by P05.06), keeps position locked status<br>零速停机(减速时间由P05.06控制)，保持位置锁定状态<br>2- Shutdown at zero speed (decelerate time is controlled by P05.06), maintain free running state<br>零速停机(减速时间由P05.06控制)，保持自由运行状态 | When set to 0 or 2, if the brake is enabled, the driver will be forced to stop at zero speed internally (the deceleration time is controlled by P00.15) and maintain free running status.<br>设置为0或2时，若使能抱闸，驱动器内部强制为零速停机(减速时间由P00.15控制)，保持自由运行状态。 | | | |

When the servo motor drives the vertical axis, if it is in an overtravel state, the workpiece may fall. To prevent the workpiece from falling, be sure to set the overtravel stop mode selection (P00.13) to "1-zero speed stop, position locked state". In situations such as linear motion of the workpiece, be sure to connect the limit switch to prevent mechanical damage. In the overtravel state, the motor (workpiece) can move in the reverse direction by inputting a reverse command.

伺服电机驱动垂直轴时，如果处于超程状态，工件可能会掉落。为防止工件掉落，请务必将超程停机方式选择(P00.13) 设为“1-零速停机，位置锁定状态”。在工件直线运动等情况下，请务必连接限位开关，以防止机械损坏。在超程状态下，可通过输入反向指令使电机(工件) 反向运动。

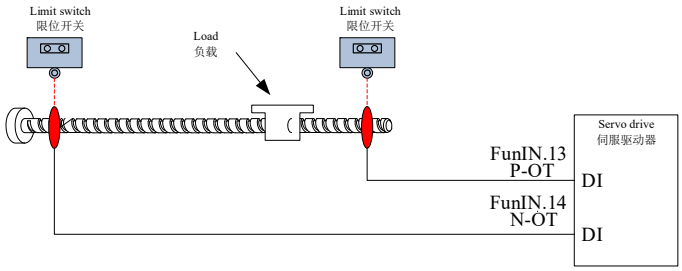



Figure 5-6 The install diagram of limit switch
图5-6限位开关的安装示意图

When using the overtravel stop function, the two DI terminals of the servo drive should be configured as function 13 (FunIN.13: P-OT, forward overtravel switch) and function 14 (FunIN.14: N-OT, reverse Overtravel switch) to receive the limit switch input level signal and set the valid logic of the DI terminal. Depending on whether the DI terminal level is valid, the driver will enable or disable the overtravel stop state.

使用超程停机功能时，应将伺服驱动器的2个DI 端子分别配置为功能13 (FunIN.13：P-OT，正向超程开关)和功能14(FunIN.14：N-OT，反向超程开关)，以接收限位开关输入电平信号，并设置DI 端子有效逻辑。根据DI 端子电平是否有效，驱动器将使能或解除超程停机状态。

☆Associated function code 关联功能编码：

| NO.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunIN.13 | P-OT | Forward overtravel switch<br>正向超程开关 | When mechanical action exceeds the movable range, enter the overtravel prevention function<br>当机械运动超出可移动范围，进入超程防止功能<br>Invalid, allowed forward drives 无效，允许正向驱动<br>Valid, forbit forward drives 有效，禁止正向驱动 |
| FunIN.14 | N-OT | Reverse overtravel switch<br>反向超程开关 | When mechanical action exceeds the movable range, enter the overtravel prevention function<br>当机械运动超出可移动范围，进入超程防止功能<br>Invalid, allowed reverse drives无效，允许反向驱动<br>Valid, forbit reverse drives有效，禁止反向驱动 |

**4）Emergency shutdown 紧急停机：**

Here are two emergency shutdown methods of servo 伺服有2 种紧急停机方式：

● Using DI function 34: FunIN.34: Emergency Stop, brake.
使用 DI 功能 34：FunIN.34：Emergency Stop，刹车；

● Using auxiliary function: Emergency stop (P11.08).
使用辅助功能：紧急停机 (P11.08)。

☆Associated function code: 关联功能编码：

| No.<br>编码 | Name<br>名称 | Function code<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunIN.34 | Emergency Stop | Brake<br>刹车 | Invalid, servo drive maintains current running state;<br>无效，伺服驱动器保持当前运行状态；<br>Valid, stop at zero speed, maintain position locked status, servo occurs warning Err.94 (DI emergency brake).<br>有效，零速停机，保持位置锁定状态，伺服发生警告Err.94(DI 紧急刹车)。 |

☆Associated function code 关联功能码：

| Function code<br>功能码 | Name<br>名称 | Setting range<br>设定范围 | Function<br>功能 | Setting method<br>设定方式 | Effective time<br>生效时间 | Factory setting<br>出厂设定 |
|---|---|---|---|---|---|---|
| P11.08 | Emergency stop<br>紧急停机 | 0- Servo drive maintains current running status<br>伺服驱动器保持当前运行状态<br>1- Enable emergency stop, the stop method is controlled by P00.10<br>使能紧急停机，停机方式由P00.10决定 | Enable emergency stop function, the method of shutdown is same as servo enable OFF.<br>使能紧急停机功能，停机方式与伺服使能OFF 时相同。<br>◆Note注意：<br>This parameter is not saved after power off<br>该参数掉电不保存 | Running setting<br>运行设定 | Effective immediately<br>立即生效 | 0 |

## 5.2 Position control mode 位置控制模式

### 5.2.1 Position control function block diagram 位置控制功能框图

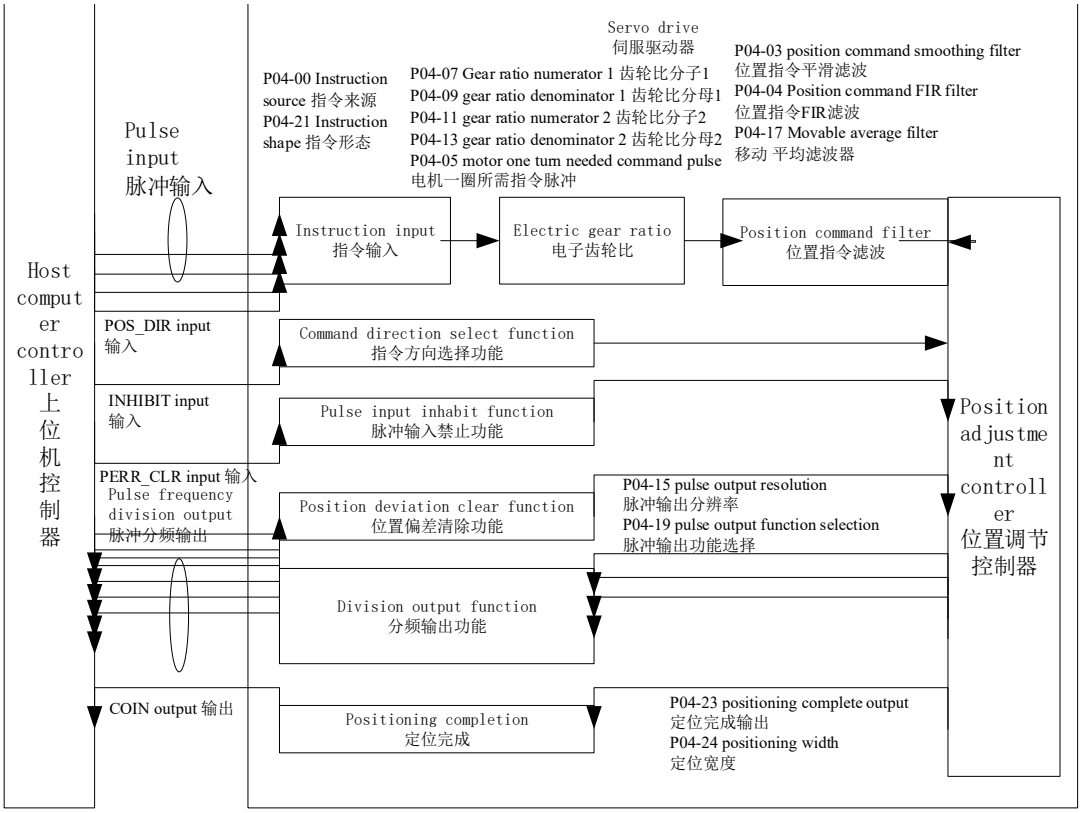



Figure 5-7 Position control block diagram
图5-7 位置控制框图

Position mode is the common working mode of servo drive, the main use steps are as follows:
位置模式是伺服驱动器的常见工作模式，其主要使用步骤如下：

1. Connect correctly the servo main circuit and power supply of control circuit, and motor power cables and encoder cables. The “rdy” displayed on servo panel is indicates correct wiring of servo power supply after power on, the motor encoder wiring is correct.
   正确连接伺服主电路和控制电路的电源，以及电机动力线和编码器线，上电后伺服面板显示“rdy”即表示伺服电源接线正确，电机编码器接线正确。
2. Disconnect the motor and load, perform a servo JOG test run by pressing the button to confirm whether the motor can operate normally.
   电机与负载断开连接，通过按键进行伺服 JOG 试运行，确认电机能否正常运行。
3. Refer to the wiring instructions to connect the pulse direction input and pulse command input in the CN1 terminal as well as the necessary DI/DO signals, such as servo enable, positioning complete, etc.
   参考配线说明连接 CN1 端子中的脉冲方向输入和脉冲指令输入以及必要的 DI/DO 信号，如伺服使能，定位完成等。
4. Make settings related to position mode. Set the DI/DO used according to the actual situation, and refer to the P02 group for the function code. In addition, functions such as origin return and frequency division output are sometimes set as needed.
   进行位置模式的相关设定。根据实际情况设置所用到的 DI/DO，功能码参照 P02 组。此外根据需要有时还要设置原点复归、分频输出等功能。
5. Enable the servo and send position commands through the host computer to control the rotation of the servo motor. First, make the motor rotate at low speed, and confirm whether the rotation direction and electronic gear ratio are normal, and then adjust the gain.
   使能伺服，通过上位机发出位置指令控制伺服电机旋转。首先使电机低速旋转，并确认旋转方向及电子齿轮比是否正常，然后进行增益调节。

## 5.2.2Position mode wiring 位置模式配线

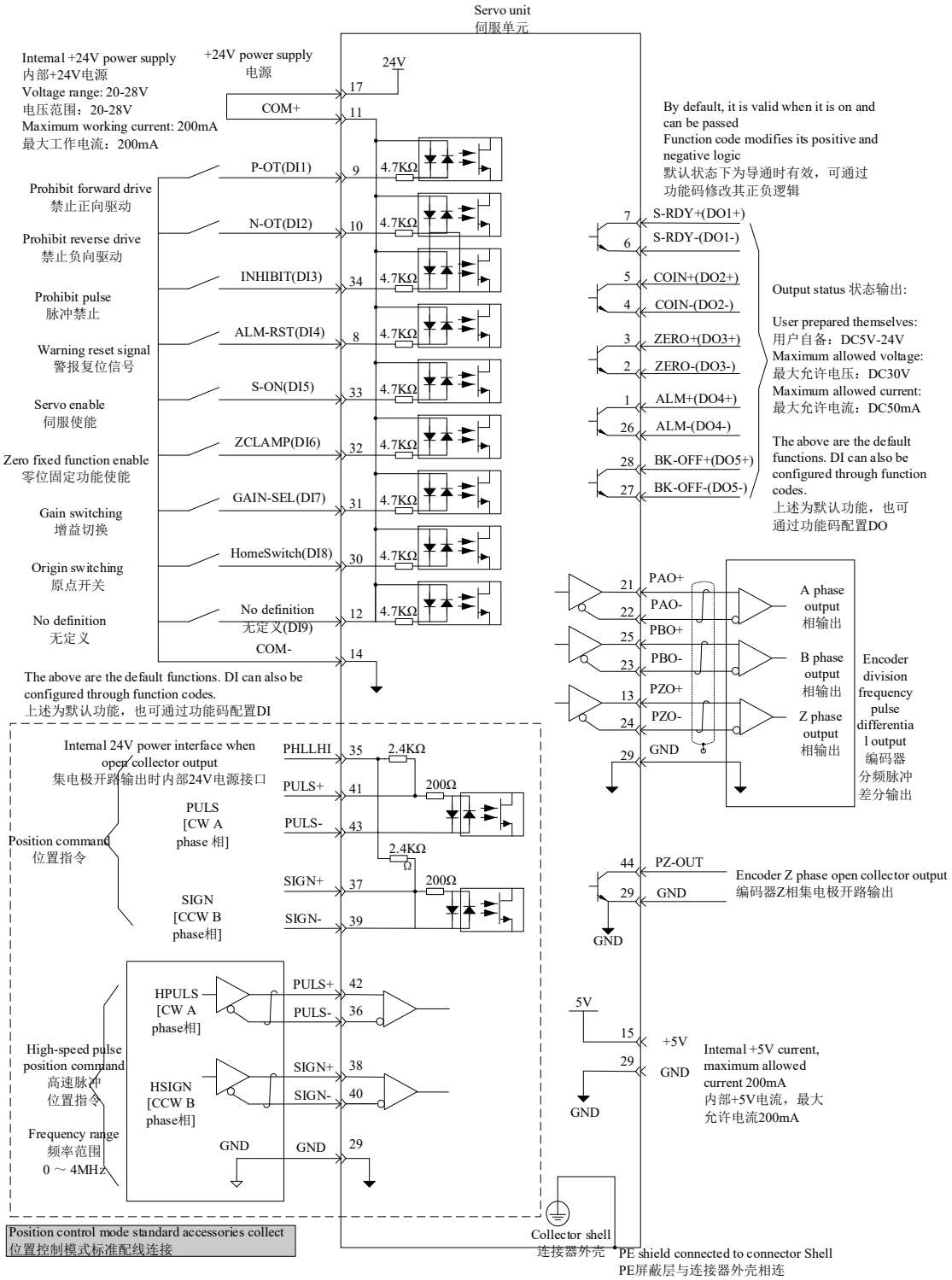



Figure 5-8 Position control wiring figure
图5-8 位置控制接线图

**Note 注：**

1、Signal cables and power cables must be routed separately, with a distance of at least 30cm.
信号线缆与动力线缆一定要分开走线，间隔至少 30cm 以上；

2、When connecting signal cables due to insufficient length, the shielding layer must be reliably connected to ensure reliable shielding and grounding.
信号线缆因为长度不够进行续接电缆时，一定将屏蔽层可靠连接以保证屏蔽及接地可靠；

3、 +5V is referenced to GND, +24V is referenced to COM-. Do not exceed the maximum allowable current, otherwise the driver will not work properly
+5V 以 GND 为参考，+24V 以 COM-为参考。请勿超过最大允许电流，否则驱动器无法正常工作。

### 5.2.3 Position control mode related function code setting 位置控制模式相关功能码设定

Parameter settings in position control mode, including mode selection, command pulse form, electronic gear ratio, DI/DO, etc.

位置控制模式下参数设置，包括模式选择、指令脉冲形式、电子齿轮比、DI/DO 等。

#### 5.2.3.1 Position instruction input setting 位置指令输入设置

**a) Position instruction source 位置指令来源**

Set function code P04-00=0, position instruction comes from the low-speed pulse command, and can also be set to other values according to the actual situation.

设置功能码 P04-00=0，位置指令来源于低速脉冲指令，也可根据实际情况设为其它值。

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Related mode 相关模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 00 | Main position instruction source 主位置指令来源 | 0- Low-speed pulse instruction 低速脉冲指令<br>1- High-speed pulse instruction 高速脉冲指令<br>2- Stepper amount given 步进量给定<br>3- Multi-segment instruction given 多段位置指令给定<br>4- Communication given 通信给定<br>5- Analog speed mode 模拟速度模式（专用参数） | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |

**b) Position instruction direction switch 位置指令方向切换**

By setting the DI function FunIN.24, DI can be used to control the direction switching of position instruction to meet the situation where the direction needs to be switched.

通过设置 DI 功能 FunIN.24，可使用 DI 控制位置指令的方向切换，满足需要切换方向的情况。

| No. 编码 | Name 名称 | Function name 功能名 | Setting range 设定范围 | Remark 备注 |
|---|---|---|---|---|
| FunIN.24 | POS_DIR | Position instruction direction 位置指令方向 | Invalid: Not change direction 无效：不换向<br>Valid: change direction 有效：换向 | Relate terminal logic selection is recommend to set to: edge valid 相关端子的逻辑选择建议设置为：边沿有效 |

**c) Pulse instruction shape select 脉冲指令形态选择**

Set function code P04-21, select external instruction form, which includes "Direction+pulse(positive and negative logic)、 "Quadrature pulse" 、 "CW+CW" three forms.

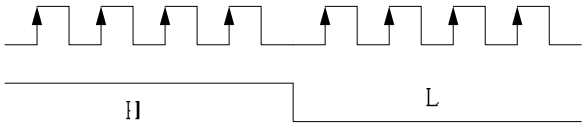
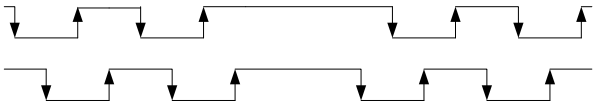
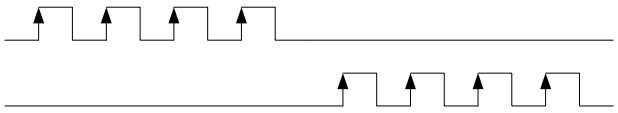
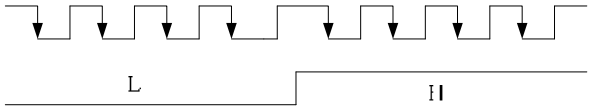
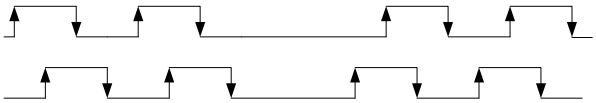
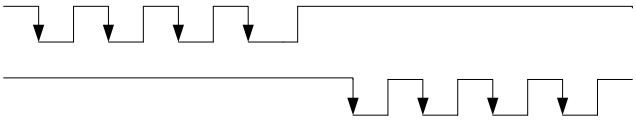
设置功能码 P04-21，选择外部脉冲指令的形式，包括"方向+脉冲(正负逻辑)"、"正交脉冲"、"CW+CCW"三种形式。

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Related mode 相关模式 |
|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| P04 | 21 | Pulse form<br>脉冲串形态 | 0- Direction+pulse, positive logic. (Default)<br>方向+脉冲，正逻辑。(默认值)<br>1- Direction +pulse, negative logic<br>方向+脉冲，负逻辑<br>2- A phase +B phase quadrature pulse, positive logic<br>A 相+B 相正交脉冲，正逻辑<br>3- A phase +B phase quadrature pulse, negative logic<br>A 相+B 相正交脉冲，负逻辑<br>4- CCW+CW, positive logic<br>CCW+CW, 正逻辑<br>5- CCW+CW, negative logic<br>CCW+CW, 负逻辑 | 1 | 0 | Power on again<br>再次通电 | Shutdown setting<br>停机设定 | P |

The principle of three pulse instructions are as follows.
三种脉冲指令形式的原理如下。

Table 5-6 Pulse instruction form principle
表 5-6 脉冲指令形式原理

| P04-21 | Polarity<br>极性 | Pulse instruction form<br>脉冲指令形式 | Positive rotate<br>正转 | Negative rotate<br>反转 |
|---|---|---|---|---|
| 0 | Positive logic<br>正逻辑 | Direction +pulse<br>方向+脉冲 |  | |
| 2 | Positive logic<br>正逻辑 | AB phases quadrature pulse<br>相正交脉冲 |  | |
| 4 | Positive logic<br>正逻辑 | CCW+CW |  | |
| 1 | Negative logic<br>负逻辑 | Direction +pulse<br>方向+脉冲 |  | |
| 3 | Negative logic<br>负逻辑 | AB phases quadrature pulse<br>相正交脉冲 |  | |
| 5 | Negative logic<br>负逻辑 | CCW+CW |  | |

**c) Pulse is prohibit input 脉冲禁止输入**

By setting DI function FunIN.12 to prohibit pulse instruction input.
通过设置 DI 功能 FunIN.12，禁止脉冲指令输入。

| No.<br>编码 | Name<br>名称 | Function name<br>功能名 | Setting range<br>设定范围 | Remark<br>备注 |
|---|---|---|---|---|
| FunIN.12 | INHIBIT | Pulse prohibit<br>脉冲禁止 | Invalid: Allow instruction pulse input<br>无效：允许指令脉冲输入<br>Valid: Prohibit instruction pulse input<br>有效：禁止指令脉冲输入 | Position commands are prohibited, including internal and external position commands. The logic selection of the corresponding terminal must be set to: level effective.<br>位置指令禁止，含内部和外部位置指令。相应端子的逻辑选择，必须设置 |

| | | | | |
|---|---|---|---|---|
| | | | | 为：电平有效。 |

### 5.2.3.2 Electronic gear ratio setting 电子齿轮比设置

Set the electronic gear ratio according to the actual conditions of the machine and host computer.
根据机械以及上位机实际情况设置电子齿轮比。

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Related mode 相关模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 05 | 电机一圈所需指令脉冲数 | 0 ~1048576 | 1P/Rev | 0 | Power on again 再次通电 | Shutdown setting 停机设定 | P |
| P04 | 07 | Electronic gear 1 numerator 电子齿轮 1 分子 | 1~1073741824 | 1 | 4 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P04 | 09 | Electronic gear 1 denominator 电子齿轮 1 分母 | 1~1073741824 | 1 | 1 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P04 | 11 | Electronic gear 2 molecule 电子齿轮 2 分子 | 1~1073741824 | 1 | 4 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P04 | 13 | Electronic gear 2 denominator 电子齿轮 2 分母 | 1~1073741824 | 1 | 1 | Effective immediately 立即生效 | Running setting 运行设定 | P |

The principle diagram of the electronic gear ratio is as follows:电子齿轮比的原理图如下：

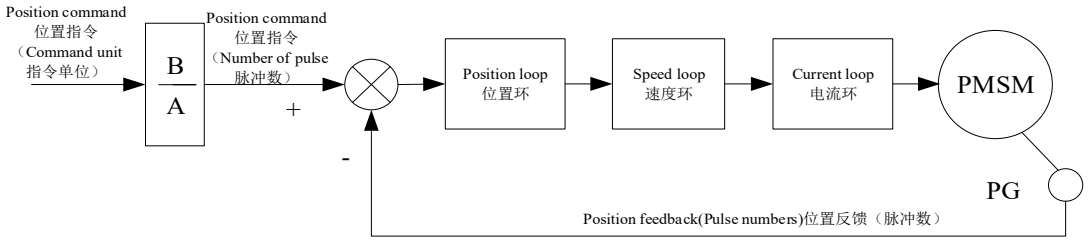



Figure 5-9 The principle of electronic gear ratio
图5-9 电子齿轮比的原理

a） When P04-05=0, the motor and the load are connected through a reduction gear. Assuming that the reduction ratio between the motor shaft and the mechanical side of the load is n/m (the motor shaft rotates m times and the load shaft rotates n times), the electronic gear ratio is calculated as follows:
P04-05=0 时，电机与负载通过减速齿轮连接，假设电机轴与负载机械侧的减速比为 n/m（电机轴旋转 m 圈，负载轴旋转 n 圈），则电子齿轮比的计算如下：

$$\text{Electronic gear ratio } \frac{B}{A} = \frac{P04-07}{P04-09} = \frac{Encoder\ resolution}{\text{Displacement amount of one rotation of the load axis (command unit)}} \times \frac{m}{n}$$

$$\text{电子齿轮比} \frac{B}{A} = \frac{P04-07}{P04-09} = \frac{\text{编码器分辨率}}{\text{负载轴旋转一圈的位移量（指令单位）}} \times \frac{m}{n}$$

This model of driver supports up to 2 sets of electronic gear ratios. You can use the electronic gear ratio switching function FunIN.23 to complete gear ratio selection.

本型号驱动器最多支持 2 组电子齿轮比，可使用电子齿轮比切换功能 FunIN.23 完成齿轮比选择。

b) When P04-05≠0, Electronic gear ratio $\frac{B}{A}=\frac{\text{Encoder resolution}}{P04-05}$

P04-05≠0 时：

$$\text{电子齿轮比}\frac{B}{A}=\frac{\text{编码器分辨率}}{P04-05}$$

At this time, the 2 sets of electronic gear ratios and electronic gear switching functions are invalid.

此时 2 组电子齿轮比及电子齿轮切换功能无效。

c)Electronic gear ratio setting range：

$\frac{0.001\times\text{Encoder resolution}}{10000}<\frac{B}{A}<\frac{4000\times\text{Encoder resolution}}{10000}$, otherwise, fault Er.49 (electronic gear ratio setting fault) will occur.

电子齿轮比设定范围为：$\frac{0.001\times\text{编码器分辨率}}{10000}<\frac{B}{A}<\frac{4000\times\text{编码器分辨率}}{10000}$，否则将发生故障 Er.49（电子齿轮比设置故障）

### 5.2.3.3 Position deviation clearing function 位置偏差清除功能

Position deviation = (position command - position feedback) (encoder unit)

位置偏差 = ( 位置指令- 位置反馈 )( 编码器单位)

The position deviation clearing function means that the driver can clear the position deviation when certain conditions are met (P04.22).

位置偏差清除功能是指驱动器在满足一定条件时(P04.22)，可将位置偏差清零。

☆Related function code 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P04.22 | Clear action selection 清除动作选择 | 0- The position deviation is cleared when the servo enable is OFF or a type 1 fault occurs. 伺服使能OFF或发生1类故障时清除位置偏差<br>1- Position deviation pulses are cleared only when a fault occurs 只在发生故障时清除位置偏差脉冲<br>2- Clear the position deviation through the ClrPosErr signal input by DI 通过DI输入的ClrPosErr 信号清除位置偏差 | - | Set conditions for clearing position deviations 设置清除位置偏差的条件。 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

When P04.22=2, one DI terminal of the servo drive should be configured as function 5 (FunIN.5: PERR_CLR, clear position deviation), and the valid logic of the DI terminal should be determined.

P04.22=2 时，应将伺服驱动器的1个DI 端子配置为功能5(FunIN.5：PERR_CLR，清除位置偏差)，并确定DI 端子有效逻辑。

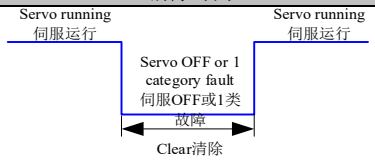
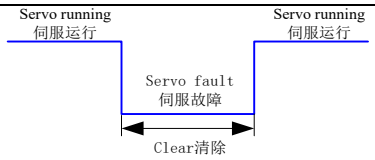
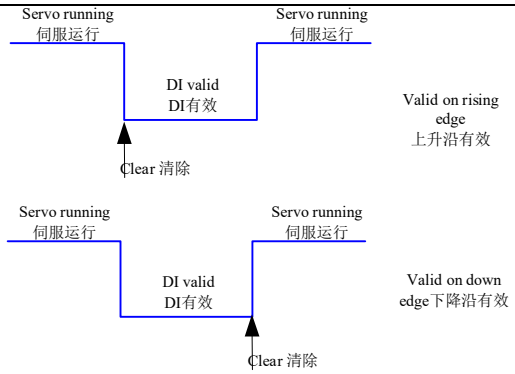
☆Related function code 关联功能编号：

| NO.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunIN.5 | PERR_CLR | Clear position deviation<br>清除位置偏差 | Valid, clear position deviation;<br>有效，清零位置偏差；<br>Invalid, no clearing operation is performed.<br>无效，不进行清除操作。 |

Setting methods are as follows: 设定方法如下：

Table 5-7 Position deviation clear setting

表 5-7 位置偏差清除设定

| Set value<br>设定值 | Clear condition<br>清除条件 | Clear time<br>清除时间 |
|---|---|---|
| P04.22=0 | The position deviation is cleared when the servo enable is OFF or a type 1 fault occurs.<br>伺服使能OFF 或发生1类故障时清除位置偏差 |  |
| P04.22=1 | Position deviation pulses are cleared only when a fault occurs<br>只在发生故障时清除位置偏差脉冲 |  |
| P04.22=2 | Clear the position deviation through the ClrPosErr signal input by DI<br>通过DI输入的ClrPosErr 信号清除位置偏差 |  |

### 5.2.3.4 Positioning completion/proximity function 定位完成/ 接近功能

The positioning completion function means that the position deviation meets the conditions set by the user (P04.24), and it can be considered that positioning in position control mode is completed. At this time, the servo driver can output the positioning completion (COIN) signal. When the host computer receives this signal, it can confirm that the servo driver's positioning is completed.

定位完成功能是指位置偏差满足用户设定的条件(P04.24)，可认为位置控制模式下定位结束。此时，伺服驱动器可输出定位完成(COIN) 信号，上位机接收到该信号可确认伺服驱动器定位完成。

Its functional principle is shown in the figure below:

其功能原理如下图所示：

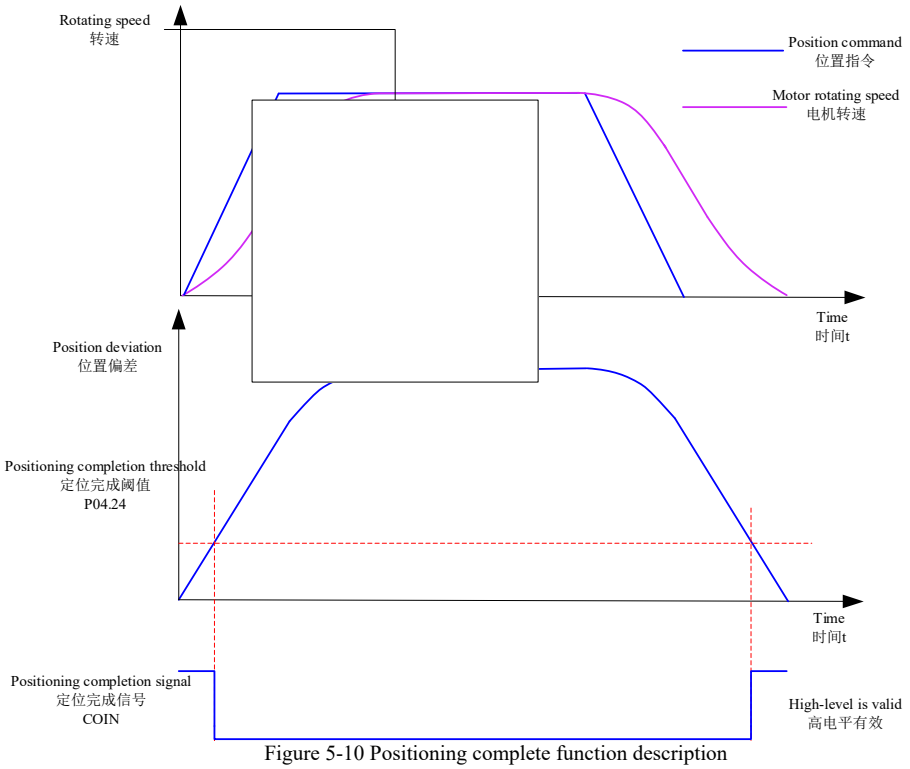



Figure 5-10 Positioning complete function description
图5-10 定位完成功能说明

When the position deviation meets the conditions (P04.23), the servo drive can also output the positioning approach (NEAR) signal. Usually, the host computer can receive the positioning approach signal before confirming that the positioning is completed to prepare for the positioning completion operation.

当位置偏差满足条件(P04.23)时，伺服驱动器也可输出定位接近(NEAR) 信号，通常上位机在确认定位完成前，可先接收到定位接近信号，为定位完成操作做准备。

Before using the positioning complete/approach function, the output conditions and thresholds of positioning complete/approach should be set.

使用定位完成/ 接近功能前，应对定位完成/ 接近的输出条件、阈值进行设置。

☆Related function code 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P04.23 | Positioning completed/approaching output conditions 定位完成/ 接近输出条件 | 0- Output when the absolute value of the position deviation is less than the positioning completion/approaching threshold 位置偏差绝对值小于定位完成/ 接近阈值时输出<br>1- Output when the absolute value of the position deviation is less than the positioning completion/approaching threshold and the position command filtered command is 0 位置偏差绝对值小于定位完成/ 接近阈值、且位置指令滤波后的指令为0 时输出<br>2- Output when the absolute value of the | - | Set the conditions for positioning completion (COIN)/nearness (NEAR) to be effective 设置定位完成(COIN)/ 接近(NEAR) 有效的条件 | Running setting 运行设定 | Effective immediately 立即生效 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | position deviation is less than the positioning completion/approach threshold and the position command is 0<br>位置偏差绝对值小于定位完成/ 接近阈值，且位置指令为0时输出 | | | | | |
| P04.24 | Positioning completion threshold<br>定位完成阈值 | 1~65535 | Encoder unit<br>编码器单位 | Set the threshold for the absolute value of position deviation when positioning completed (COIN) is valid<br>设置定位完成(COIN) 有效时位置偏差绝对值的阈值 | Running setting<br>运行设定 | Effective immediately<br>立即生效 | Varies by encoder<br>依编码器变化 |
| P04.25 | Positioning close to threshold<br>定位接近阈值 | 1~65535 | Encoder unit<br>编码器单位 | Set the threshold for the absolute value of the position deviation when positioning proximity (NEAR) is valid<br>设置定位接近(NEAR) 有效时位置偏差绝对值的阈值 | Running setting<br>运行设定 | Effective immediately<br>立即生效 | 65535 |

**Note 注：**

• The positioning approach threshold (P04.25) generally needs to be greater than the positioning completion threshold (P04.24).

定位接近阈值(P04.25) 一般需大于定位完成阈值(P04.24)。

• The positioning completion threshold (P04.24) only reflects the threshold of the absolute value of the position deviation when positioning completion is valid, and has nothing to do with positioning accuracy.

定位完成阈值(P04.24) 只反映，定位完成有效时位置偏差绝对值的阈值，与定位精度无关。

• Speed feedforward gain (P07.20) If the setting value is too large or when running at low speed, the absolute value of the position deviation will be small. If the setting value of P04.24 is too large, the positioning completion will always be valid. Therefore, in order to improve the positioning to ensure the effectiveness of the operation, please reduce the setting value of P04.24.

速度前馈增益(P07.20) 设定值过大或低速运行时，将引起位置偏差绝对值较小，若P04.24设定值过大，会导致定位完成一直有效，因此，为提高定位完成的有效性，请减小P04.24设定值。

• When the positioning completion threshold (P04.24) is small and the position deviation is also small, the output conditions of the positioning completion/approach signal can be changed by setting P04.23.

在定位完成阈值(P04.24) 小，位置偏差也较小情况下，可通过设置P04.23变更定位完成/ 接近信号的输出条件。

• When the servo enable (S-ON) is invalid, the positioning completion signal (COIN) and positioning approach signal (NEAR) outputs are invalid.

伺服使能(S-ON) 无效时，定位完成信号(COIN) 与定位接近信号(NEAR) 输出无效。

When using the positioning completion and positioning approach functions, the two DO terminals of the servo drive should be configured as DO function 7 (FunOUT.7: COIN, positioning completion) and DO function 8 (FunOUT.8: NEAR, positioning approach) respectively, and determine the valid logic of the corresponding DO terminal.

使用定位完成和定位接近功能时，应将伺服驱动器的 2 个 DO 端子分别配置为 DO 功能 7(FunOUT.7：COIN，定位完成) 和 DO 功能 8(FunOUT.8：NEAR，定位接近)，并确定对应 DO 端子有效逻辑。

☆Related function code 关联功能编号：

| No.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunOut.7 | COIN | Positioning completed<br>定位完成 | Valid. In position control mode, the absolute value of the position deviation meets the setting conditions of P04.24, indicating that the servo positioning is completed.<br>有效，位置控制模式下，位置偏差绝对值满足P04.24设定条件，表明伺服定位完成。<br>Invalid, in position control mode, the servo is in the process of positioning completion.<br>无效，位置控制模式下，伺服正处于定位完成过程中。 |
| FunOut.8 | NEAR | Positioning close to<br>定位接近 | Valid. In position control mode, the absolute value of the position deviation meets the setting conditions of P04.25, indicating that the servo positioning is close. |

| | | | |
|---|---|---|---|
| | | | 有效，位置控制模式下，位置偏差绝对值满足P04.25设定条件，表明伺服定位接近。<br>Invalid. In position control mode, the servo is in the process of positioning approach.<br>无效，位置控制模式下，伺服正处于定位接近过程中。 |

### 5.2.3.5 Interrupt fixed length function 中断定长功能

**1）Function introduction 功能介绍**

The interrupt fixed-length function means that in the position control mode, the current running state of the servo is interrupted and the preset fixed-length instruction is executed. That is, in the position control mode, when the servo enable is ON, after the interrupt fixed-length function is triggered, the servo motor will run the position command set by the interrupt fixed-length function according to the motor rotation direction before triggering.

中断定长功能是指位置控制模式下，中断伺服当前运行状态，执行预先设置的定长指令。即位置控制模式下，伺服使能为 ON 时，触发中断定长功能后，伺服电机将按照触发前的电机旋转方向，运行中断定长功能设置的位置指令。

During the interrupt fixed-length operation, the driver blocks any other internal and external position commands (including the interrupt fixed-length position command triggered again), and the input position command counter P18.15 only counts the interrupt fixed-length position commands; after the interrupt fixed-length operation is completed , according to the user settings (P16.06), the driver will maintain the position command shielding state, or resume responding to the position command, but the position command input during the interrupted fixed-length operation will be discarded.

中断定长运行期间，驱动器屏蔽其他任何内、外部位置指令(包括再次触发的中断定长位置指令)，输入位置指令计数器 P18.15 仅对中断定长位置指令进行计数；中断定长运行完成后，根据用户设置(P16.06)，驱动器将保持位置指令屏蔽状态，或恢复响应位置指令，但中断定长运行过程中输入的位置指令将被抛弃。

After the interrupt fixed length is completed, the servo driver outputs the interrupt fixed length completion signal (FunOUT.18: Long done. Among them, the output of the interrupt fixed-length completion signal has nothing to do with servo enable (S-ON) and whether the DI8 terminal logic is valid.

中断定长完成后，伺服驱动器同时输出中断定长完成信号(FunOUT.18：XINT_DONE) 与定位完成信号(FunOUT.7：COIN，定位完成)，上位机接收到中断定长完成信号可确认中断定长完成。其中，中断定长完成信号的输出与伺服使能(S-ON)、DI8 端子逻辑是否有效均无关。

Valid conditions for interrupt fixed-length function:

中断定长功能有效条件：

●Before triggering the interrupt fixed length, the current speed of the motor is greater than or equal to 10rpm, or P16.03 is not 0;

触发中断定长之前，电机当前速度大于或等于 10rpm，或者 P16.03 不为 0；

●Interrupt fixed-length displacement P16.01 is not zero; 中断定长位移 P16.01 不为零；

●DI function FunIN.31 (interrupt fixed length disabled) is not used or the corresponding port logic is invalid.

DI 功能 FunIN.31( 中断定长禁止 ) 未使用或对应端口逻辑无效。

**Note 注：**

When using the interrupt fixed-length function, the mean filter function is invalid.

使用中断定长功能时，均值滤波功能无效。

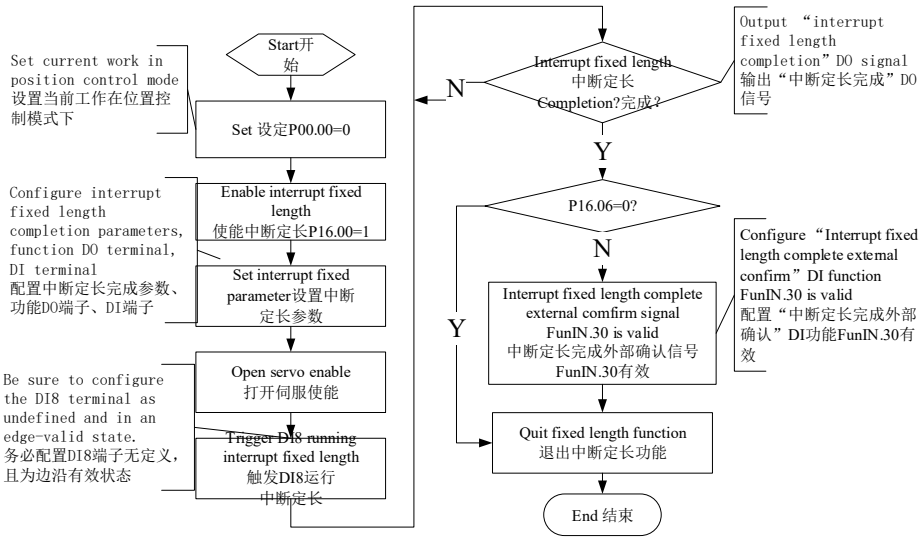



Figure 5-11 Interrupt fixed-length function signal flow chart
图5-11中断定长功能信号流程图

**2）Parameters set 参数设置**

☆Related function code 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P16.00 | Interrupt fixed length enable 中断定长使能 | 0- Prohibit 禁止<br>1- using 使用 | - | Set whether to enable the interrupt fixed-length function 设置是否使能中断定长功能 | Shutdown setting 停机设定 | Power on again 再次通电 | 0 |
| P16.01 | Interrupt fixed length displacement 中断定长位移 | 0~1073741824 | Command unit 指令单位 | Set interrupt fixed length displacement 设置中断定长位移 | Running setting 运行设定 | Effective immediately 立即生效 | 10000 |
| P16.03 | Interrupt fixed length constant speed running speed 中断定长恒速运行速度 | 0~6000 | rpm | Set the maximum speed of the motor during interrupted fixed-length operation, regardless of the electronic gear ratio. 设置中断定长运行时电机最大速度，与电子齿轮比无关。 | Running setting 运行设定 | Effective immediately 立即生效 | 200 |
| P16.04 | Interrupt fixed length acceleration time 中断定长加速时间 | 0~1000 | ms | Set the time for the motor speed to change evenly from 0 to 1000rpm 设置电机速度由 0 均匀变速到 1000rpm 的时间 | Running setting 运行设定 | Effective immediately 立即生效 | 10 |
| P16.05 | Interrupt fixed-length deceleration time 中断定长减速时间 | 0~1000 | ms | Set the time for the motor speed to change evenly from 0 to 1000rpm 设置电机速度由 0 均匀变速到 1000rpm 的时间 | Running setting 运行设定 | Effective immediately 立即生效 | 10 |
| P16.06 | Fixed length lock release signal enables 定长锁定解除信号使能 | 0- Not enable 不使能<br>1- Enable 使能 | - | Set the conditions for responding to other position commands after the interrupt fixed-length operation is completed. When P16.06=1, the DI function FunIN.30 (interrupt fixed-length completion external confirmation signal) | Running setting 运行设定 | Effective immediately 立即生效 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | must be used to unlock the lock state.设置中断定长运行完毕后，响应其他位置指令的条件，P16.06=1 时必须使用 DI 功能 FunIN.30(中断定长完成外部确认信号) 来解除锁定状态 | | | |

☆Related function code:关联功能编号：

| No.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunIN.30 | XINT_FINISH | Interrupt fixed length completion external confirmation<br>中断定长完成外部确认 | Valid, the interrupted fixed-length locking state is released, and the servo can respond to other position commands;有效，解除中断定长锁定状态，伺服可响应其他位置指令；<br>Invalid, the interrupt fixed-length locking state is maintained, and the servo does not respond to other position commands.无效，保持中断定长锁定状态，伺服不响应其他位置指令。 |
| FunIN.31 | XINT_DISABLE | Prohibit interrupt fixed length<br>中断定长禁止 | Valid, it is forbidden to interrupt the fixed-length function;<br>有效，禁止中断定长功能；<br>Invalid, allowing interruption of the fixed-length function.<br>无效，允许中断定长功能。 |
| FunOut.18 | XINT_DONE | Interrupt fixed length completion signal<br>中断定长完成信号 | Valid, during position control, the fixed-length displacement operation is interrupted and completed.<br>有效，位置控制时，中断定长位移运行完成。<br>Invalid, during position control, the fixed-length displacement is interrupted but not completed.<br>无效，位置控制时，中断定长位移未运行完成。 |

Note 注：

When using the interrupt fixed-length function, the driver is forced to use DI terminal DI8 as the interrupt fixed-length function trigger terminal, and other DI terminals are invalid. At this time, the function corresponding to the DI8 terminal (P02.08) is prohibited from being assigned to other DI functions, and the terminal logic (P02.18) should be set to edge change valid, otherwise the driver will force its logic to edge change valid.

使用中断定长功能时，驱动器强制使用 DI 端子 DI8 作为中断定长功能触发端子，其他 DI 端子均无效，此时 DI8 端子对应的功能(P02.08) 禁止分配为其他 DI 功能，且端子逻辑(P02.18) 应设置为沿变化有效，否则驱动器将其逻辑强制转换为沿变化有效。

Table 5-8 Interrupt fixed length, DI8 valid logic
表5-8 中断定长功能时，DI8有效逻辑

| P02.18 | D18 valid logic<br>DI8有效逻辑 | Corresponding waveform<br>对应波形 |
|---|---|---|
| 0 / 3 | Down edge<br>下降沿 |  |
| 1 / 2 | Rising edge<br>上升沿 |  |
| 4 | Rising edge and down edge<br>上升沿和下降沿 |  |

Interrupt fixed length constant speed running speed
中断定长恒速运行速度：

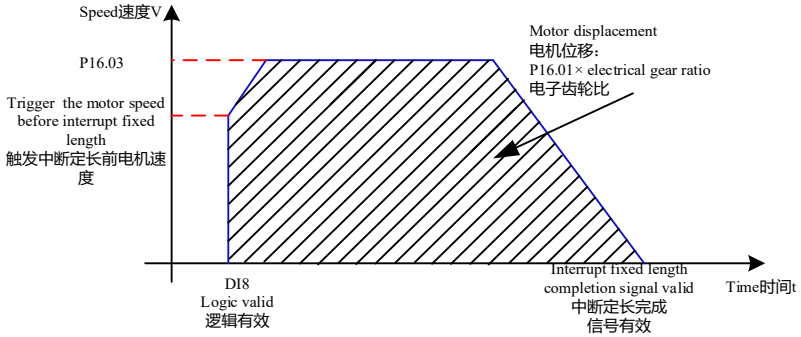



Figure 5-12 Motor running curve of interrupt fixed length function
图5-12 中断定长功能电机运行曲线

Table 5-9 Rotate speed description of interrupt fixed length motor
表5-9中断定长电机转速说明

| P16.03 | Motor speed before triggering interrupt fixed length<br>触发中断定长前电机速度 | Interrupt fixed length function<br>中断定长功能 | Interrupt fixed length constant running speed<br>中断定长恒速运行速度 |
|---|---|---|---|
| 0 | <10 | Invalid 无效 | - |
| | ≥10 | Valid 有效 | Motor speed before triggering interrupt fixed length<br>触发中断定长前电机速度 |
| 1~6000 | - | Valid 有效 | P16.03 |

### 5.2.3.6 Return to origin function 原点复归功能

Note注意：

Interrupt fixed length or multi-segment position function, the trigger signal of return to origin is shielded.
中断定长功能或多段位置功能正在运行时，原点复归触发信号被屏蔽。

**1）Function introduction 功能介绍**

Origin: The mechanical origin, which can represent the position of the origin switch or motor Z signal, and is selected and set by function code P16-09.

原点：即机械原点，可表示原点开关或电机 Z 信号位置，由功能码 P16-09 选择设定。

Zero point: The positioning target point, which can be expressed as the origin +offset (P16-14 setting). P16-14 is set to 0, the zero point is coincided with the origin.

零点：即定位目标点，可表示为原点+偏移量(P16-14 设定)。当 P16-14 设为 0 时，零点与原点重合。

The origin return function refers to in the position control mode, when servo enable is ON, after triggering the origin return function, servo motor will actively search for the zero point and complete positioning function. During the return-to-origin operation, other position commands (including the re-triggered return-to-origin enable signal) are shielded; after the return-to-origin operation is completed, the servo drive can respond to other position commands.

原点复归功能是指位置控制模式下，伺服使能为 ON 时，触发原点复归功能后，伺服电机将主动查找零点，完成定位的功能。原点复归运行期间，其他位置指令(包括再次触发的原点复归使能信号) 均被屏蔽；原点复归运行完成后，伺服驱动器可响应其他位置指令。

The origin returns to zero: After the servo drive receive the signal triggered by the origin return, actively positioning relative position between the motor shaft and mechanical origin according to the pre-set mechanical origin. Firstly, search for the origin, then move the offset based on the origin to zero-point position. The origin returns to zero, usually used when searching for zero point for the first time.

原点回零：伺服驱动器在接收到原点复归触发信号后，根据预先设置的机械原点，主动定位电机轴与机械原点的相对位置，首先查找原点，然后在原点基础上移动偏置量到达零点位置。原点回零，通常应用于首次寻找零点场合。

After the origin return to zero complete, the current absolute position(P18-07) is consistent with mechanical origin offset(P16-14).

原点复归完成后，电机当前绝对位置(P18-07)与机械原点偏移量(P16-14)一致。

After the origin return to zero, servo drive output the origin return to zero complete signal(FunOUT.19：HomeAttain) , when the host computer receives this signal, it can confirm that the return to origin is completed. The origin return to zero complete signal is nothing to do with servo mode and servo running state.

原点回零完成后，伺服驱动器输出原点回零完成信号(FunOUT.19：HomeAttain)，上位机接收到该信号可确认原点复归完成。原点回零完成信号与伺服模式和伺服运行状态无关。

Table 5-10 The origin return to zero enable control
表5-10原点回零使能控制

| regression category<br>复归类别 | Origin returns to zero enable control<br>原点回零使能控制<br>(P16-08) | Origin direction、decelerate point、origin<br>回零方向、减速点、原点 | Trigger signal<br>触发信号 | Motor total displacement<br>电机总位移 |
|---|---|---|---|---|
| The origin<br>原点 | 0- Close the return to origin function<br>关闭原点复位功能 | - | - | - |

| | | | | |
|---|---|---|---|---|
| Return to zero<br>回零 | 1- Enable the origin return function through DI input Homing Start signal<br>通过DI输入Homing Start信号使能原点复归功能 | P16-09 determined<br>决定 | Homing Start Signal<br>信号 | Determined by the mechanical origin coordinates and offset displacement<br>由机械原点坐标、偏移位移决定 |
| | 2- Start return-to-origin immediately after power-on<br>上电后立即启动原点复归 | | Servo enables<br>伺服使能 | |
| | 3- Start return-to-origin immediately<br>立即启动原点复归 | | Servo enables<br>伺服使能 | |
| | 4- Take the current position as the origin以当前位置为原点 | - | Servo enables<br>伺服使能 | |

**Note 注意：**

When use the return to origin function, the electronic gear, mean filter and low-pass filter functions are invalid.
使用原点复归功能时，电子齿轮、均值滤波与低通滤波功能无效。

**2）The origin return to zero 原点回零**

**Note 注意：**

• To use the return-to-origin function, the mechanical limit switch needs to be set in advance to ensure that the machine will not be damaged at high speed during the return-to-origin process!
使用原点复归功能，需提前设置机械限位开关，以保证原点复归过程中不会高速撞坏机械！

• After encountering the limit switch during the origin return process, the servo drive generates Er.86 (forward overtravel warning) or Er.87 (reverse overtravel warning), and then automatically returns to continue searching for the origin.
原点复归过程中遇到限位开关后，伺服驱动器发生 Er.86(正向超程警告) 或 Er.87 (反向超程警告)，然后自动返回，继续寻找原点。

Take the following situation as an example to illustrate the origin return to zero.
以下列情况为例，说明原点回零：

●Return to zero in the forward direction, the deceleration point and origin are the origin switches;
正向回零，减速点、原点为原点开关 (P16-09=0)；

●Return to zero in the forward direction, the deceleration point and origin are the Z signal((P16-09=2)) of motor;
正向回零，减速点、原点为电机 Z 信号 (P16-09=2)；

●Return to zero in the forward direction, the deceleration point is the origin switch、origin is the motor Z signal (P16-09=4);
正向回零，减速点为原点开关、原点为电机 Z 信号 (P16-09=4)；

●Return to zero in the forward direction, the deceleration point and origin are the forward overtravel switch(P16-09=6);
正向回零，减速点、原点为正向超程开关 (P16-09=6)；

●Return to zero in the forward direction, the deceleration point is forward overtravel switch, the origin is motor Z signal (P16-09=8);
正向回零，减速点为正向超程开关，原点为电机 Z 信号 (P16-09=8)；

●Return to zero in the forward direction, no deceleration point, the origin is the origin switch(P16-09=10);
正向回零，无减速点、原点为原点开关(P16-09=10)；

●Return to zero in the forward direction, no deceleration point, the origin is motor Z signal(P16-09=12);
正向回零，无减速点、原点为电机 Z 信号(P16-09=12)；

●Return to zero in the forward direction, no deceleration point, the origin is forward overtravel switch(P16-09=14);
正向回零，无减速点、原点为正向超程开关 (P16-09=14)。

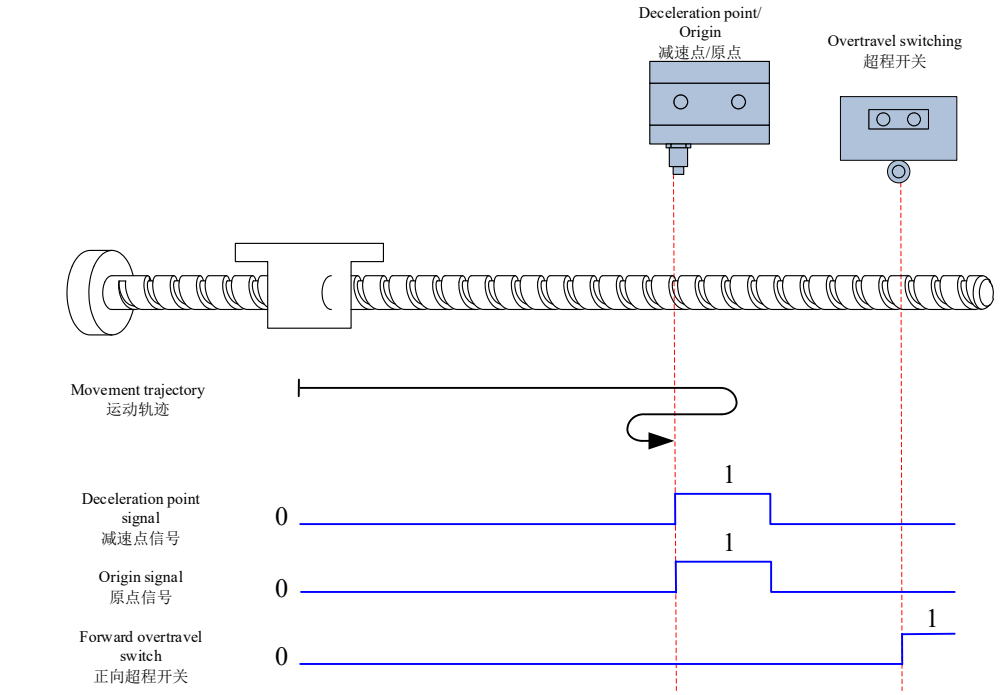
For other zero return methods, only the initial zero return method is opposite to the above.其余回零方式，仅初始回零方式与上述相反。

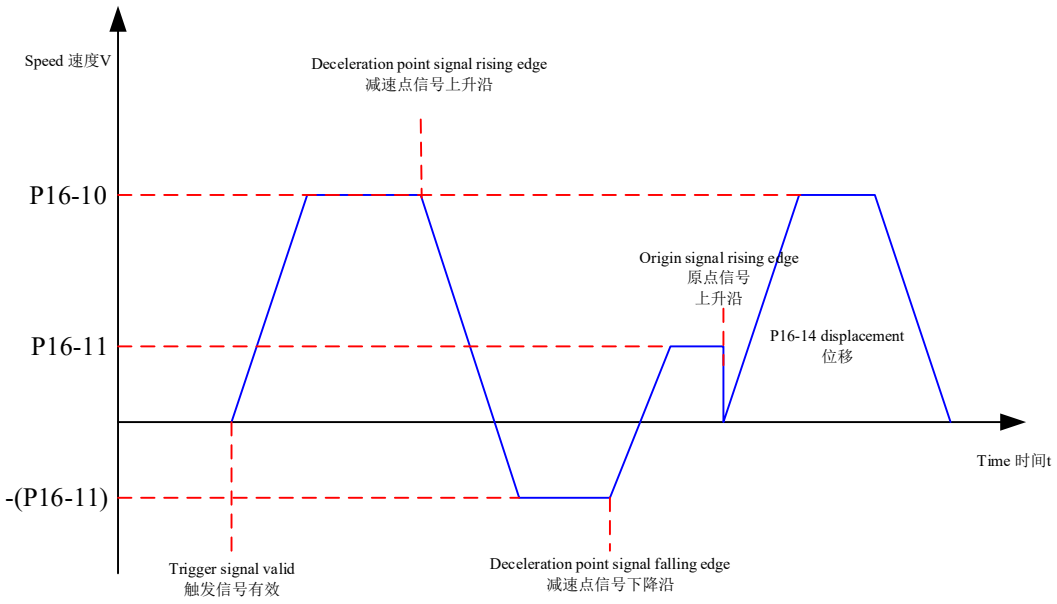
**a） Origin returns to zero: Forward return to zero, deceleration point and origin are the origin switches(P16-09=0).**
**原点回零：正向回零，减速点、原点为原点开关(P16-09=0)**

① When the motor starts to move, the origin switch (deceleration point) signal is invalid (0-invalid, 1-valid), and the forward overtravel switch is not triggered during the whole process.
电机开始运动时原点开关( 减速点) 信号无效(0- 无效，1- 有效)，全过程未触发正向超程开关。

The servo motor first searches for the deceleration point signal in the forward direction at high speed with the value set by P16-10 until it encounters the rising edge of the deceleration point signal. After gradually decelerating to - (P16-11) according to the setting of P16-12, the servo motor starts with - (P16-11) Set the low-speed reverse search for the falling edge of the deceleration point signal. When encountering the falling edge of the deceleration point signal, the reverse direction will be reversed, and P16-11 will be used to continue the low-speed search for the rising edge of the origin signal, forward acceleration or forward constant speed running process, it will stop immediately when encountering the rising edge of the origin signal. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以 P16-10 设定值高速正向搜索减速点信号，直至遇到减速点信号的上升沿，按照 P16-12 设定逐渐减速至-（P16-11）后，伺服电机以-（P16-11）设定的低速反向搜索减速点信号下降沿，遇到减速点信号下降沿则反向，并以 P16-11 继续低速搜索原点信号上升沿，正向加速或正向匀速运行过程中，遇到原点信号上升沿立即停机。然后以 P16-10 设定速度移动 P16-14 设定的相对偏移量。



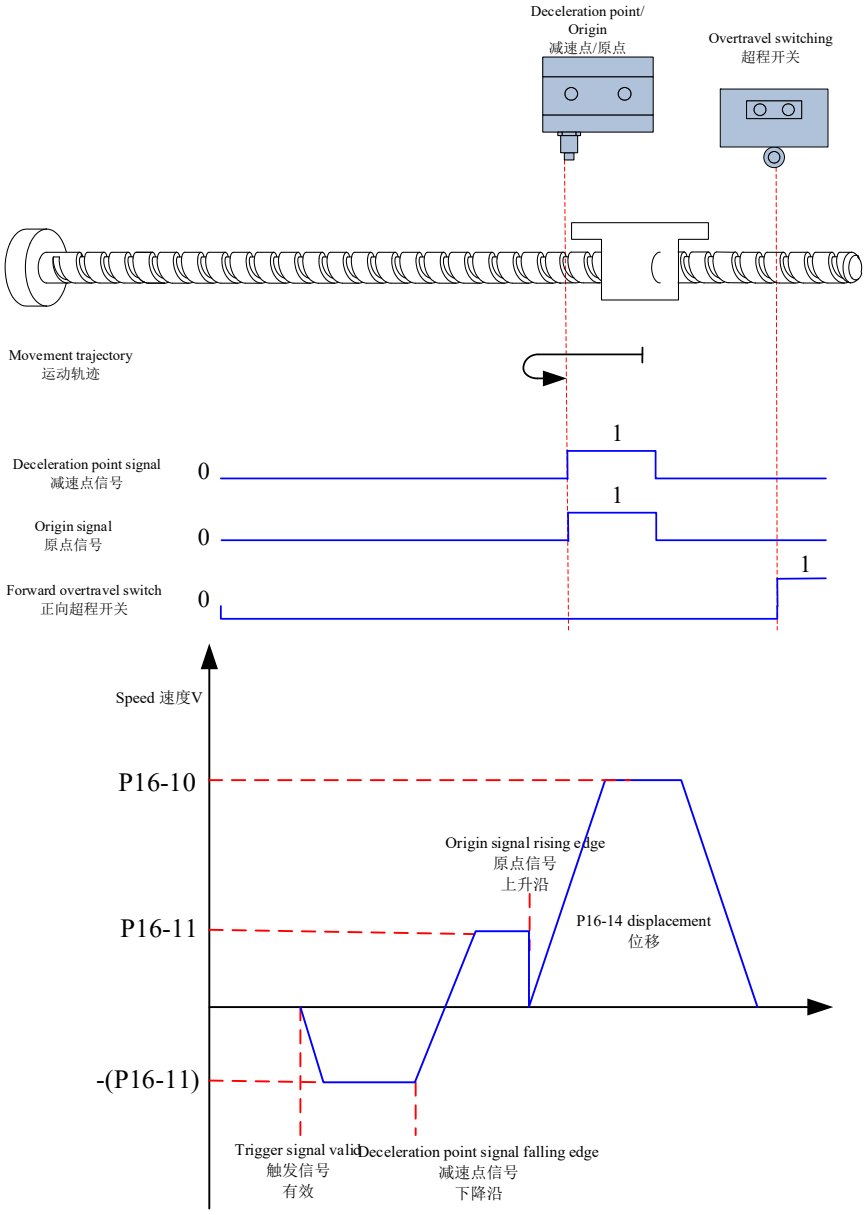




② When the motor starts to move, the origin switch (deceleration point) signal is valid, and the forward overtravel switch is not triggered during the whole process.

电机开始运动时原点开关(减速点) 信号有效，全过程未触发正向超程开关

The servo motor directly searches for the falling edge of the deceleration point signal in the low-speed reverse direction at the setting value of - (P16-11). When encountering the falling edge of the deceleration point signal, it reverses direction (i.e., forward), and continues to search for the rising origin signal at low speed using P16-11. edge, during forward acceleration or forward constant speed operation, it will stop immediately when encountering the rising edge of the origin signal. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机直接以-(P16-11) 设定值低速反向搜索减速点信号下降沿，遇到减速点信号下降沿则反向( 即正向)，并以P16-11 继续低速搜索原点信号上升沿，正向加速或正向匀速运行过程中，遇到原点信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。

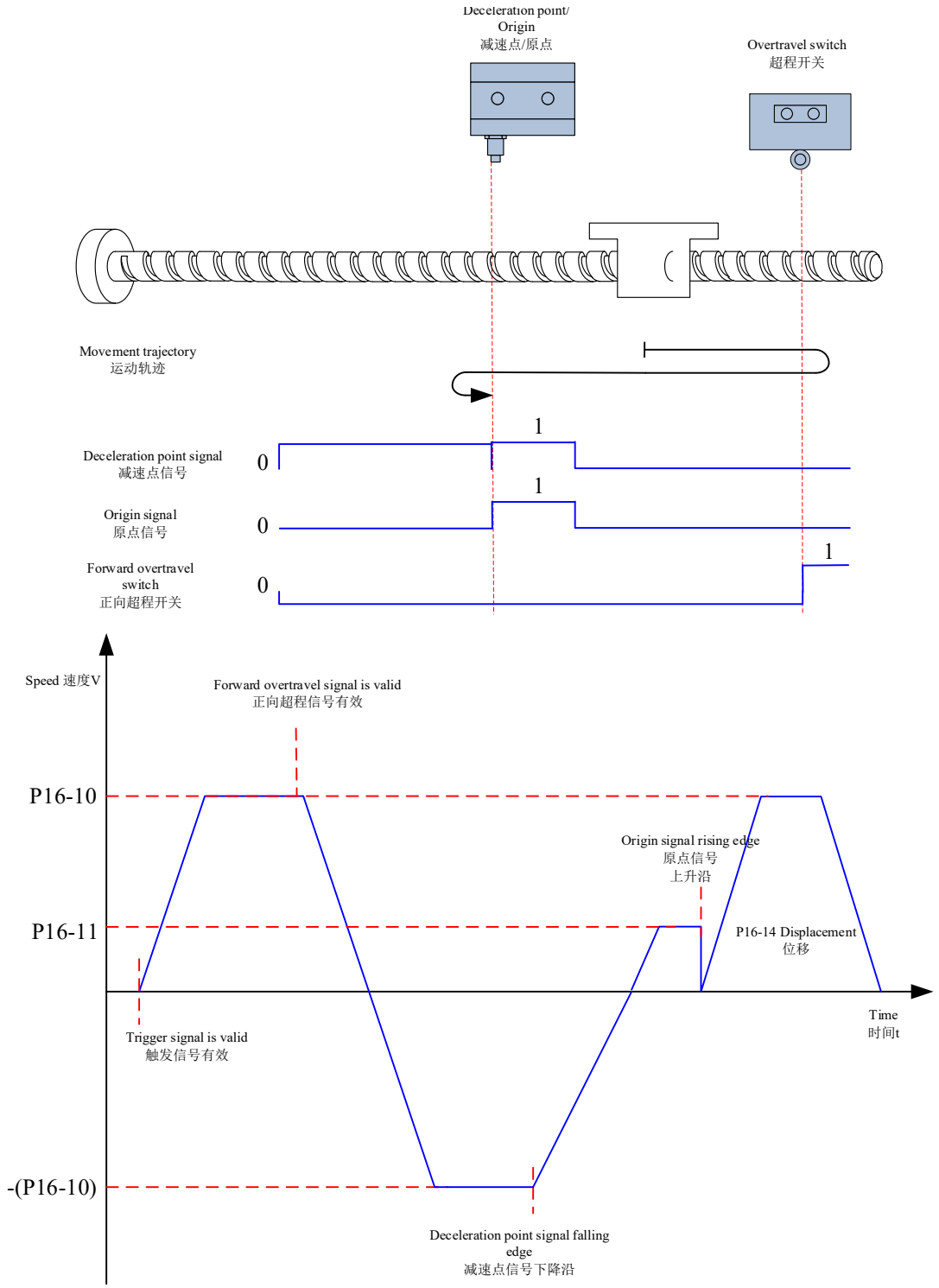



③ When the motor starts to move, the origin switch (deceleration point) signal is invalid, and the forward overtravel switch is valid when triggered during the process.

电机开始运动时原点开关(减速点)信号无效，过程中触发正向超程开关有效

Servo motor first searches for deceleration point signal in high speed forward direction at setting value of P16-10, after encountering the forward overtravel switch, it returns to zero in reverse direction, the drive searches for deceleration point signal falling edge in high speed reverse direction at -(P16-10), after encountering the deceleration point signal falling edge, decelerate in reverse direction at setting value P16-11(That is, return to forward direction), servo motor searches for deceleration point falling edge in low speed forward direction at P16-11, forward accelerate or during forward uniform running process, stop immediately when encountering the rising edge of origin signal. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-10设定值高速正向搜索减速点信号，遇到正向超程开关后反向回零，驱动器以-(P16-10)反向高速搜索减速点信号下降沿，遇到减速点信号下降沿后，按照P16-11设定值减速反向(即恢复正向)，伺服电机以P16-11正向低速搜索原点信号上升沿，正向加速或正向匀速运行过程中，遇到原点信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。




**b）Origin return to zero: Forward return to zero, deceleration points and origin are the motor Z signal(P16-09=2).**

**原点回零：正向回零，减速点、原点为电机 Z 信号 (P16-09=2)**

**Note 注意：**

In the origin return method (P16-09=2 or 3) using the Z signal as the deceleration point and origin, after returning to zero, the actual stop position of the motor may not be on the rising edge of the same side of the Z signal, and there is ±1 pulse (encoder unit) deviation.

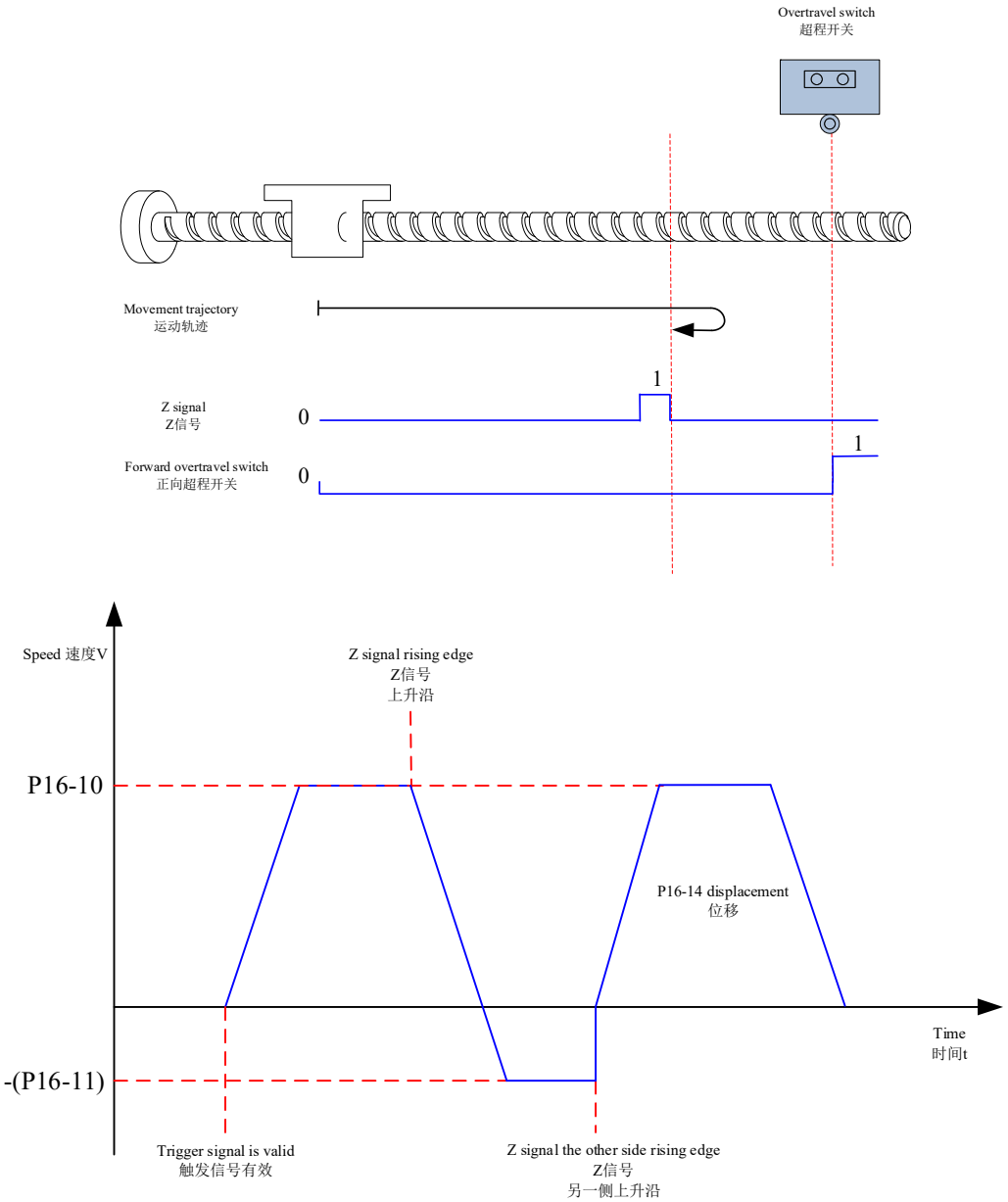
以 Z 信号为减速点和原点的原点回零方式(P16-09=2 或 3) 中，回零后，电机实际停止位置可能不在 Z 信号同一侧的上升沿，停止位置存在±1 个脉冲(编码器单位)的偏差。

① When the motor starts to move, the Z signal is invalid (0- invalid, 1- valid), and the forward overtravel switch is not triggered during the whole process.

电机开始运动时 Z 信号无效(0- 无效，1- 有效)，全过程未触发正向超程开关

The servo motor searches for Z signal in high speed forward direction at setting value P16-10, until encountering the rising edge of Z signal, gradually decelerate speed to –(P16-11) at setting value P16-12. During the process of accelerate in reverse direction or does uniform motion in reverse direction, stop immediately when encountering the rising edge of the Z signal on the other side of the motor. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-10设定值高速正向搜索Z信号，直至遇到Z信号的上升沿，按照P16-12设定逐渐减速至-（P16-11），反向加速或反向匀速运行过程中，遇到电机Z 信号另一侧上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。

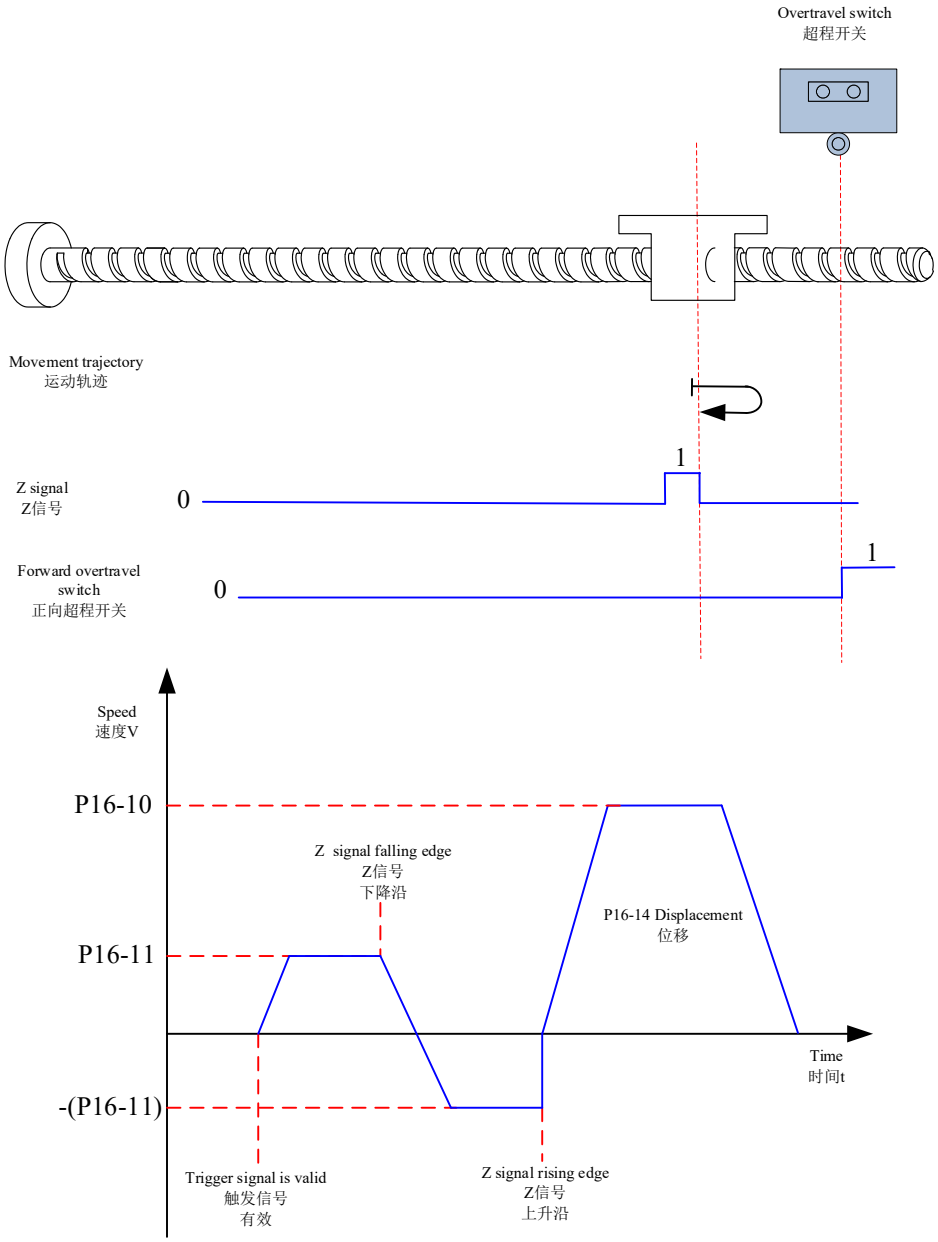



② When the motor starts to move, the Z signal is valid, and the forward overtravel switch is not triggered during the whole process.

电机开始运动时 Z 信号有效，全过程未触发正向超程开关

The servo motor searches for Z signal falling edge in low-speed forward direction at setting value P16-10, when encountering the falling edge of Z signal, it reverses direction (i.e., Negative). And continues and continues to search for the rising edge at low speed using –(P16-11) edge, during negative acceleration or negative constant speed operation, it will stop immediately when encountering the rising edge of Z signal. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机直接以P16-11设定值低速正向搜索Z信号下降沿，遇到Z信号下降沿则反向(即负向)，并以-（P16-11）继续低速搜索Z信号上升沿，反向加速或反向匀速运行过程中，遇到Z信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。

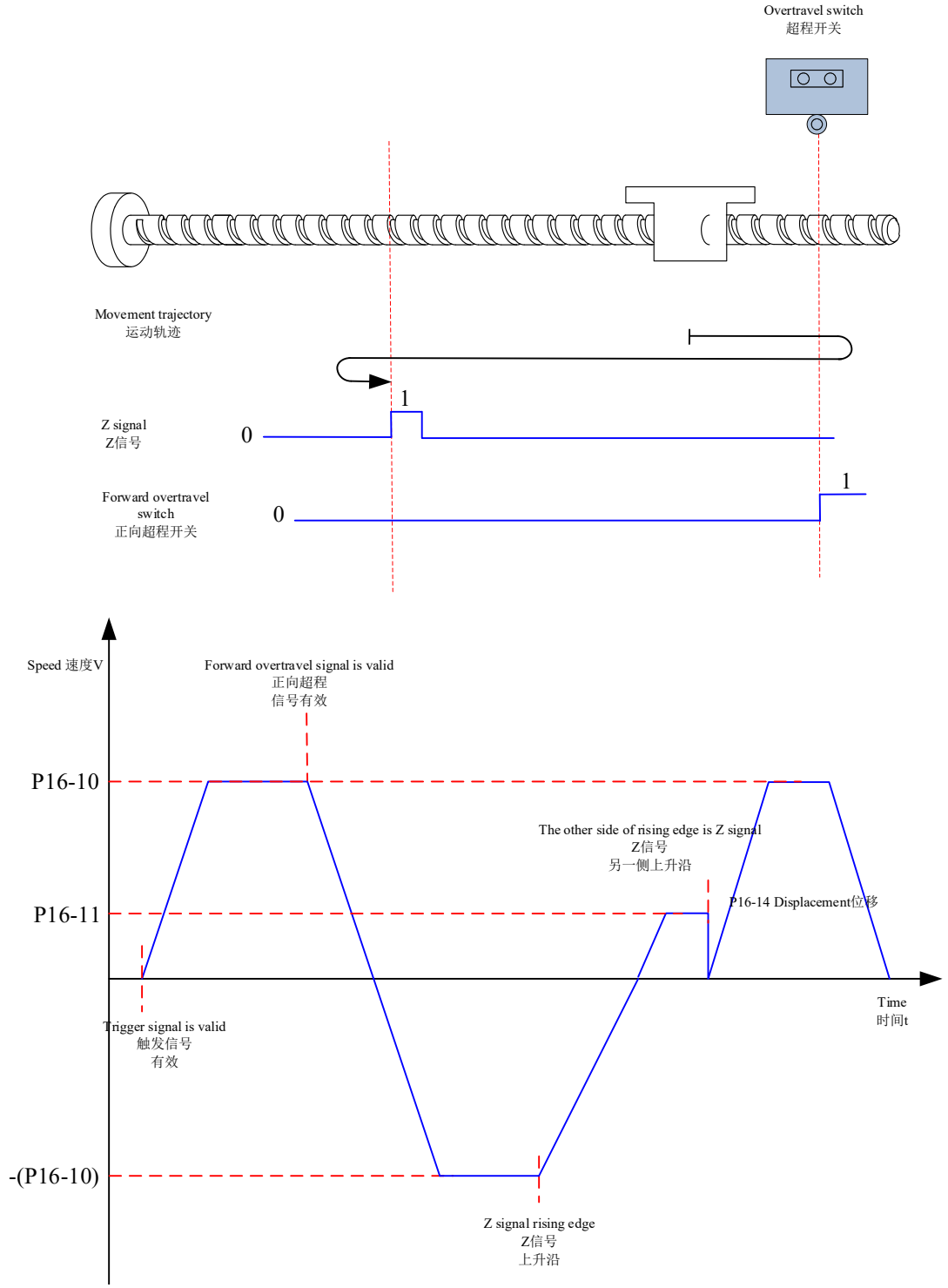



③ When the motor starts to move, the Z signal is invalid, and the forward overtravel switch is valid when triggered during the whole process

电机开始运动时 Z 信号无效，过程中触发正向超程开关有效

The servo motor first searches for Z signal in high-speed forward direction at setting value P16-10, after encountering the forward overtravel switch, it returns to zero in reverse direction at once. The drive searches for Z signal rising edge in reverse direction at high-speed using -(P16-10), after encountering Z signal rising edge, it decelerates and reverses according to setting value P16-11(That is, returns to the forward direction), servo motor searches for Z signal on the other side of rising edge in forward direction at low-speed using P16-11, during the process of forward accelerate or forward constant operation, it will stop immediately when encountering Z signal rising edge. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-10设定值高速正向搜索Z信号，遇到正向超程开关后，立刻反向回零，驱动器以-(P16-10)反向高速搜索Z信号上升沿，遇到Z信号上升沿后，按照P16-11设定值减速反向(即恢复正向)，伺服电机以P16-11正向低速搜索Z信号另一侧上升沿，正向加速或正向匀速运行过程中，遇到Z信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。




**b） Origin returns to zero: Forward return to zero, deceleration point is origin switch and origin is motor Z signal(P16-09=4)**

**原点回零：正向回零，减速点为原点开关,原点为电机 Z 信号(P16-09=4)**

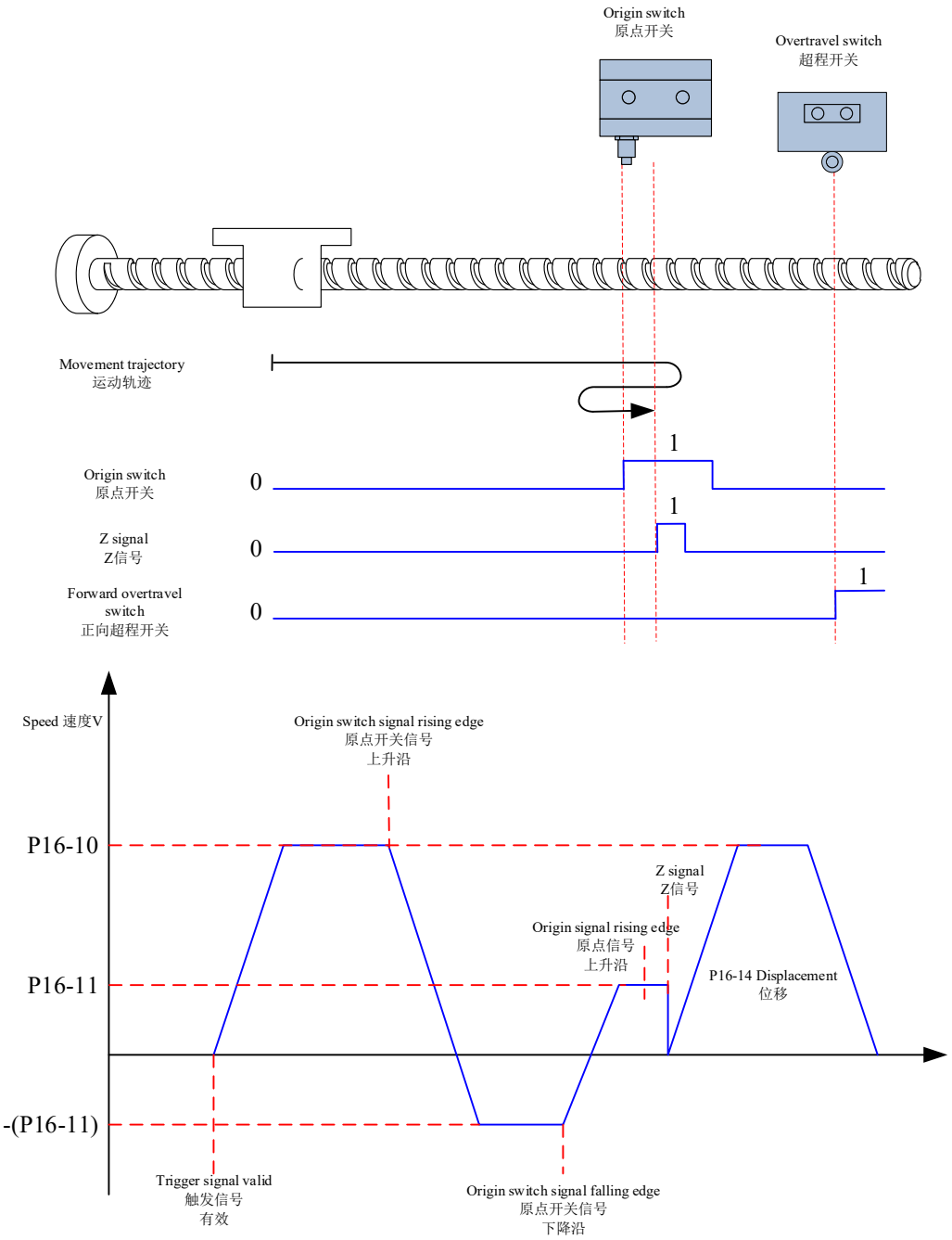
①When the motor starts to move, the origin switch signal is invalid (0- invalid, 1- valid), and the forward overtravel switch is not triggered during the whole process.

电机开始运动时原点开关信号无效(0- 无效，1- 有效)，全过程未触发正向超程开关

The servo motor first searches for the origin switch signal in the high-speed forward direction at the setting value of P16-10. After encountering the rising edge of the origin switch signal, it decelerates

and reverses according to the setting value of P16-12. The servo motor reverses at a low speed of -(P16-11). Search for the falling edge of the origin switch. When encountering the falling edge of the origin switch, decelerate and reverse direction (i.e., return to the forward direction), and search for the rising edge of the origin switch at low speed in the forward direction (P16-11). After encountering the rising edge of the origin switch, continue running, then the motor will stop immediately when encountering the Z signal for the first time. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-10设定值高速正向搜索原点开关信号，遇到原点开关信号的上升沿后，按照P16-12设定值减速反向，伺服电机以-(P16-11)低速反向搜索原点开关下降沿，遇到原点开关下降沿减速反向（即恢复正向），并以(P16-11)正向低速搜索原点开关的上升沿，遇到原点开关上升沿后，继续运行，之后第一次遇到电机Z信号立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。

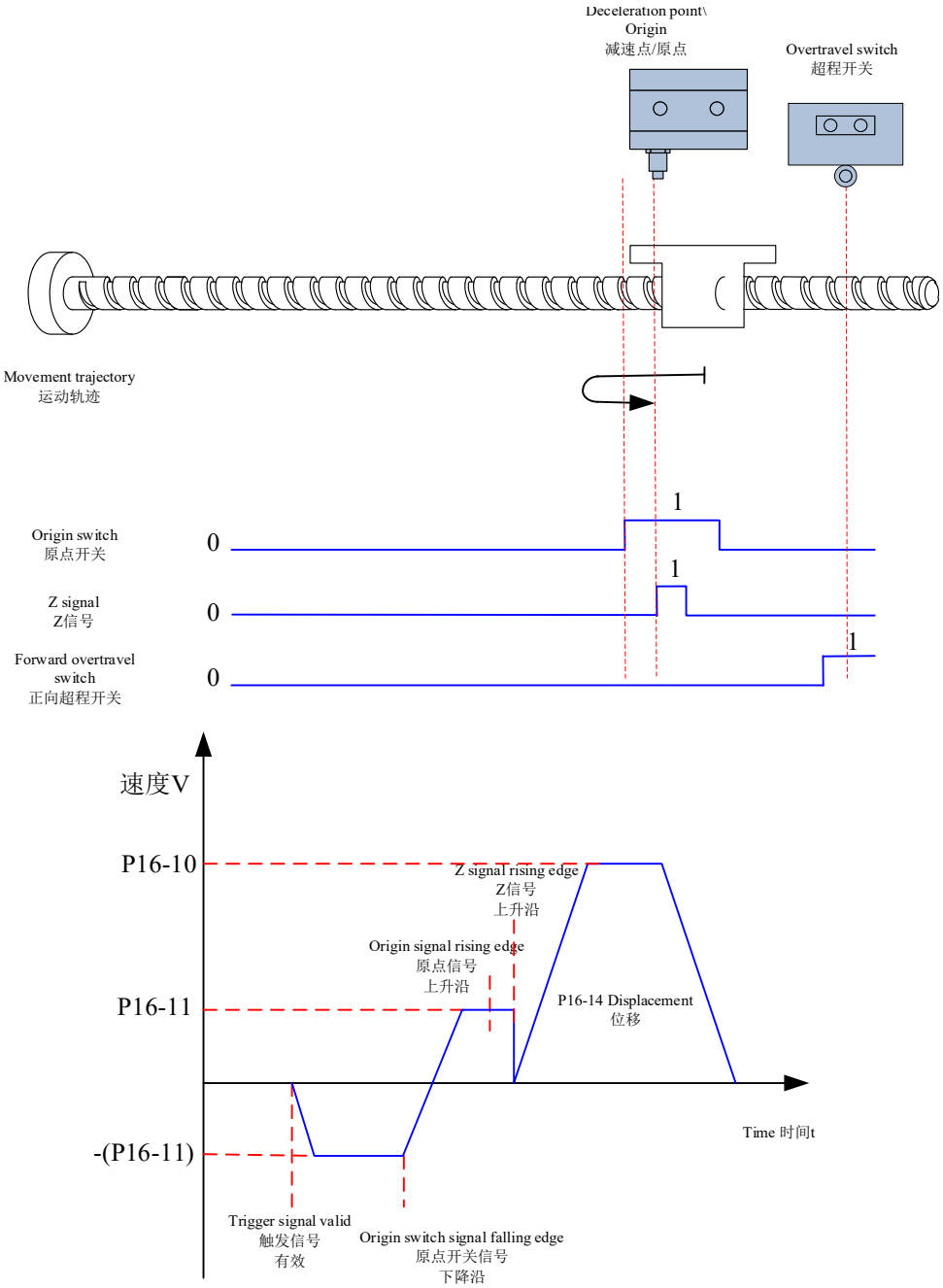



②When the motor starts to move, the origin switch signal is valid, and the forward overtravel switch is not triggered during the whole process.

电机开始运动时原点开关信号有效，全过程未触发正向超程开关

The servo motor directly searches for the falling edge of the origin switch signal at low speed at the set value of - (P16-11). When encountering the falling edge of the origin switch signal, it decelerates and reverses (i.e., forward), and searches in the forward direction with (P16-11). The rising edge of the origin signal, after encountering the rising edge of the origin switch signal, continues to run at low speed, and then stops immediately when encountering the rising edge of the Z signal for the first time. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机直接以-（P16-11）设定值低速反向搜索原点开关信号下降沿，遇到原点开关信号下降沿则减速反向（即正向），并以(P16-11)正向搜索原点信号上升沿，遇到原点开关信号上升后，继续低速运行，之后第一次遇到Z信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。

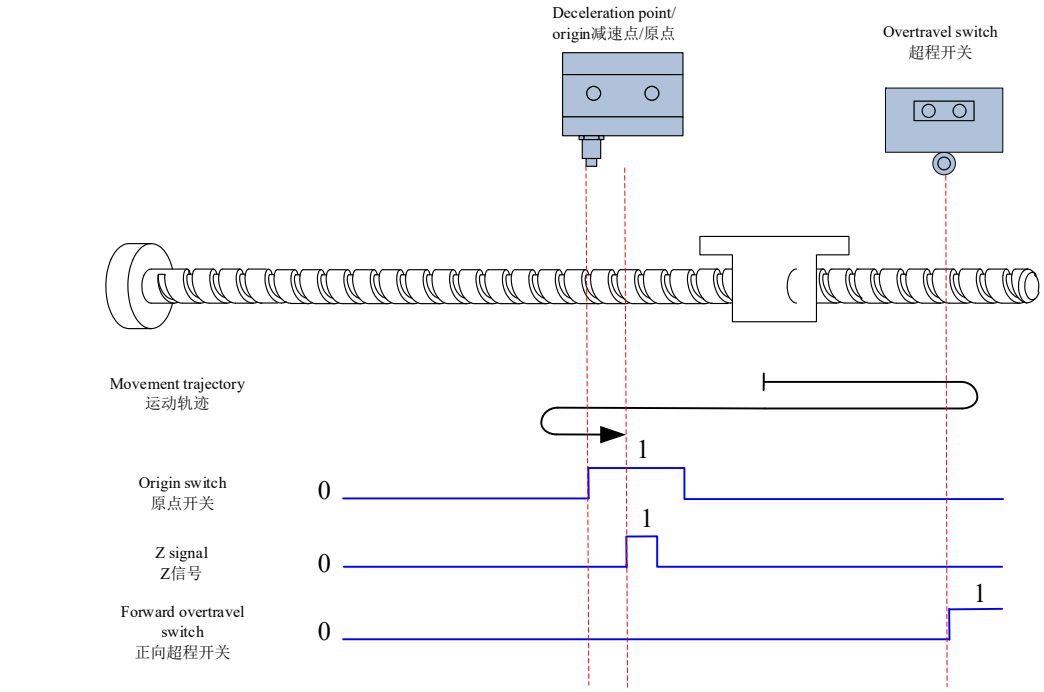


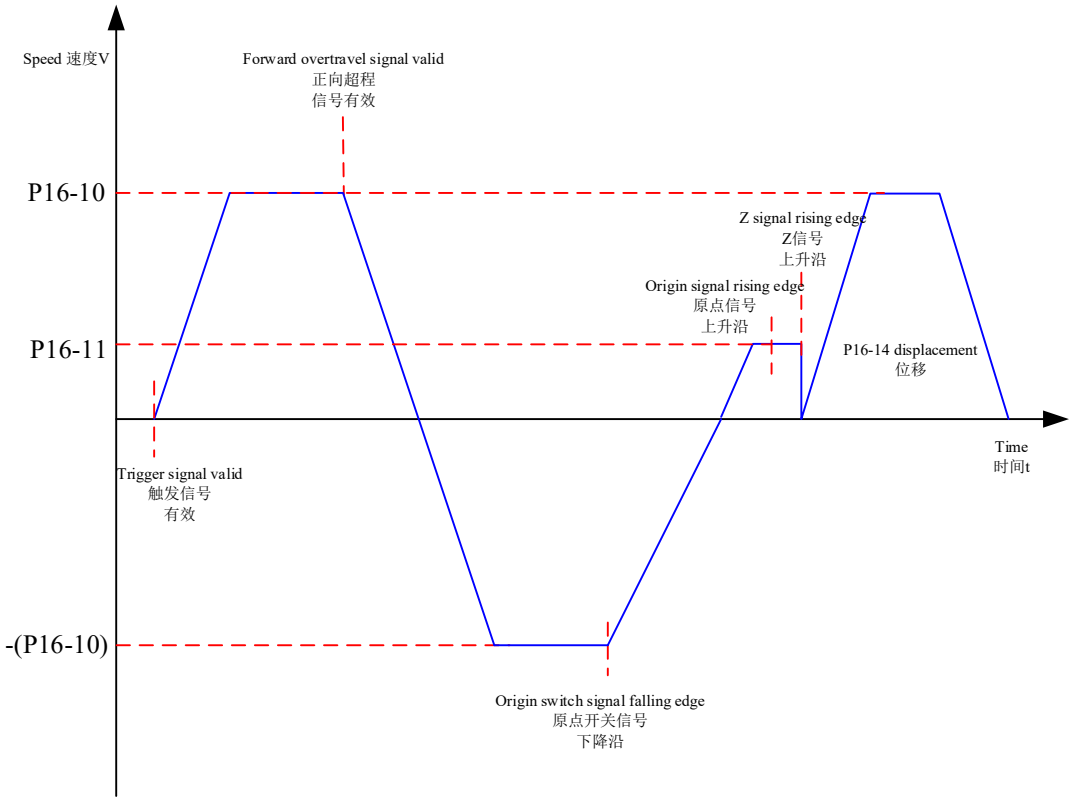

④ When the motor starts to move, the origin switch signal is invalid, and the forward overtravel switch is valid when triggered during the whole process.
电机开始运动时原点开关信号无效，过程中触发正向超程开关有效

The servo motor first searches for the origin switch signal in the forward direction at high speed with the setting value of P16-10. After encountering the forward overtravel switch, it immediately returns to zero in the reverse direction. The driver searches for the origin switch signal in the reverse direction at -(P16-10) at high speed. After reaching the falling edge of the origin switch signal, it

decelerates in the reverse direction (i.e., returns to the forward direction) according to the setting value of P16-11. The servo motor searches for the rising edge of the origin switch signal at a low speed in the forward direction of P16-11, and continues to run after encountering the rising edge of the origin switch, and then stop immediately when encountering the rising edge of the motor Z signal for the first time. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-10设定值高速正向搜索原点开关信号，遇到正向超程开关后，立刻反向回零，驱动器以-(P16-10)反向高速搜索原点开关信号，遇到原点开关信号下降沿后，按照P16-11设定值减速反向(即恢复正向)，伺服电机以P16-11正向低速搜索原点开关信号上升沿，遇到原点开关上升沿后继续运行，之后第一次遇到电机Z信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。



**d）Return to origin: forward return to zero, deceleration point and origin are forward overtravel switches (P16-09=6)**

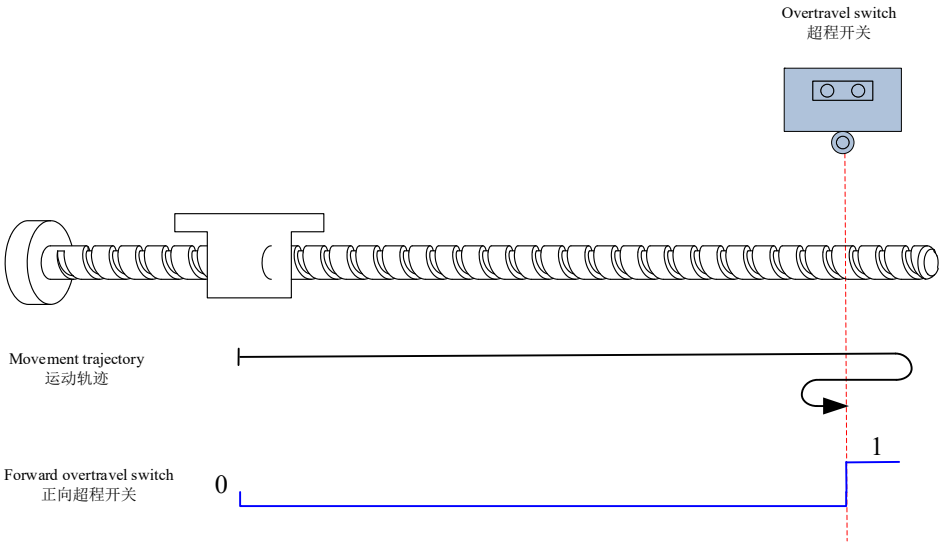
**原点回零：正向回零，减速点、原点为正向超程开关(P16-09=6)**

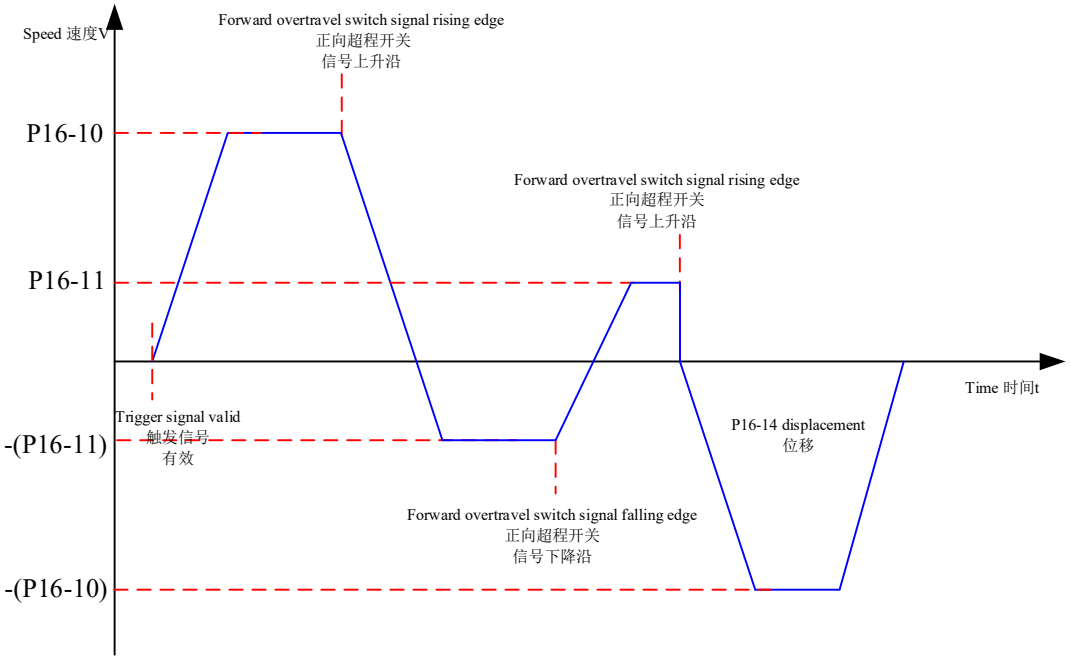
① When the motor starts to move, the forward overtravel switch signal is invalid (0- invalid, 1- valid)

电机开始运动时正向超程开关信号无效(0- 无效，1- 有效)

The servo motor first searches for the forward overtravel switch at high speed in the forward direction at the setting value of P16-10. After encountering the rising edge of the forward overtravel switch signal, it gradually decelerates and reverses according to the setting of P16-12. The servo motor starts with -(P16 -11) The set low speed reverse direction searches for the falling edge of the forward overtravel switch signal. When encountering the falling edge of the forward overtravel switch signal, it decelerates and reverses (i.e., returns to the forward direction), and searches the forward direction at low speed using P16-11. The rising edge of the overtravel switch signal. During forward acceleration or forward constant speed operation, the machine will stop immediately when encountering the rising edge of the forward overtravel switch signal. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-10设定值正向高速搜索正向超程开关，遇到正向超程开关信号的上升沿后，按照P16-12设定逐渐减速反向，伺服电机以-(P16-11) 设定的低速反向搜索正向超程开关信号下降沿，遇到正向超程开关信号下降沿减速反向( 即恢复正向)，并以P16-11 正向低速搜索正向超程开关信号上升沿，正向加速或正向匀速运行过程中，遇到正向超程开关信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。

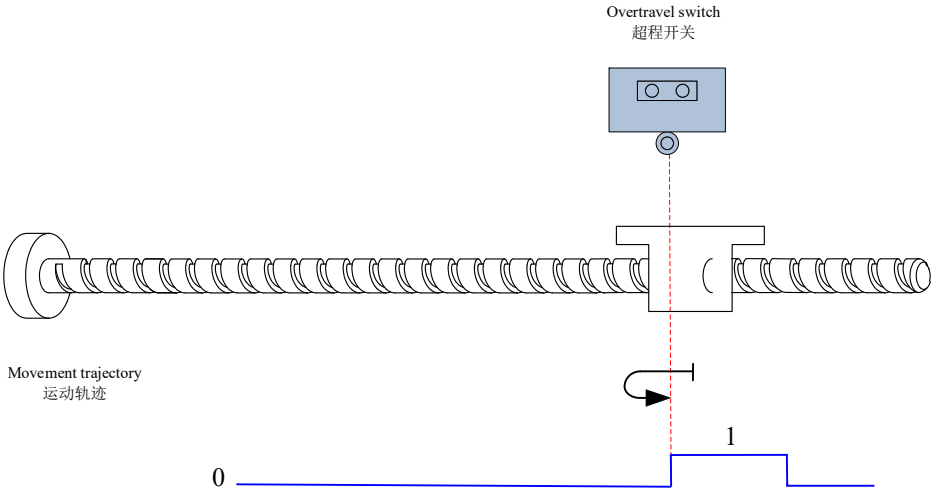


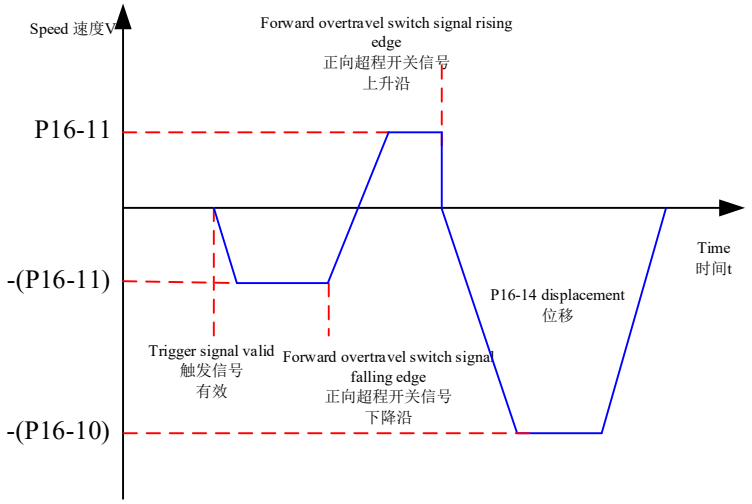



② When the motor starts to move, the forward overtravel switch signal is valid.
电机开始运动时正向超程开关信号有效

The servo motor directly searches for the falling edge of the forward overtravel switch signal at a low speed in the reverse direction at the setting value of - (P16-11). After encountering the falling edge of the forward overtravel switch signal, it decelerates in the reverse direction (i.e., forward) and starts with P16- 11 Low-speed forward search for the rising edge of the forward overtravel switch signal. During forward acceleration or forward constant speed operation, if it encounters the rising edge of the forward overtravel switch signal, it will stop immediately, and then move P16-14 at the speed set by P16-10. Set the relative offset.

伺服电机直接以-(P16-11) 设定值反向低速搜索正向超程开关信号下降沿，遇到正向超程开关信号下降沿后，减速反向( 即正向)，以P16-11低速正向搜索正向超程开关信号上升沿，正向加速或正向匀速运行过程中，遇到正向超程开关信号上升沿立即停机, 然后以P16-10设定速度移动P16-14设定的相对偏移量。





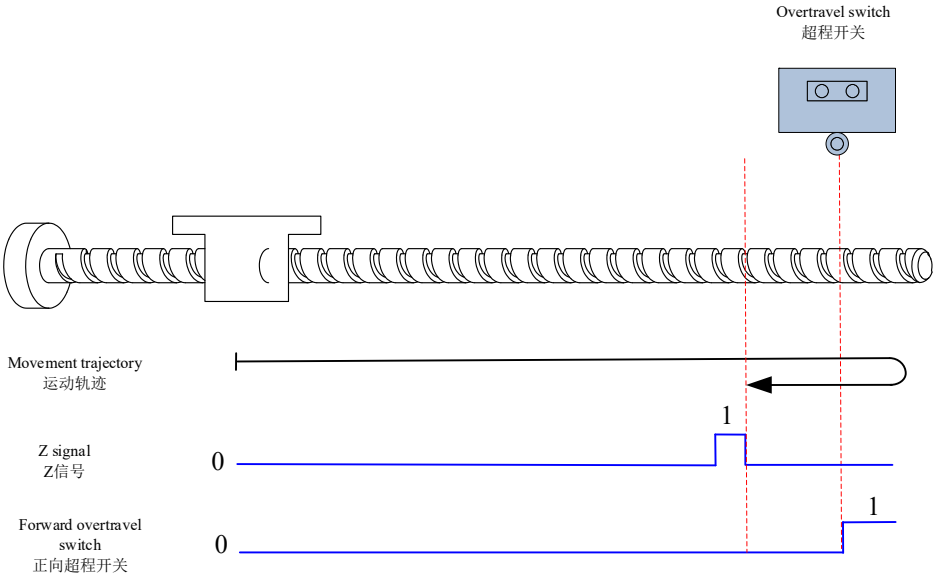

**e） Origin return: forward zero return, the deceleration point is the forward overtravel switch, and the origin is the Z signal (P16-09=8)**
**原点回零：正向回零，减速点为正向超程开关，原点为 Z 信号(P16-09=8)**

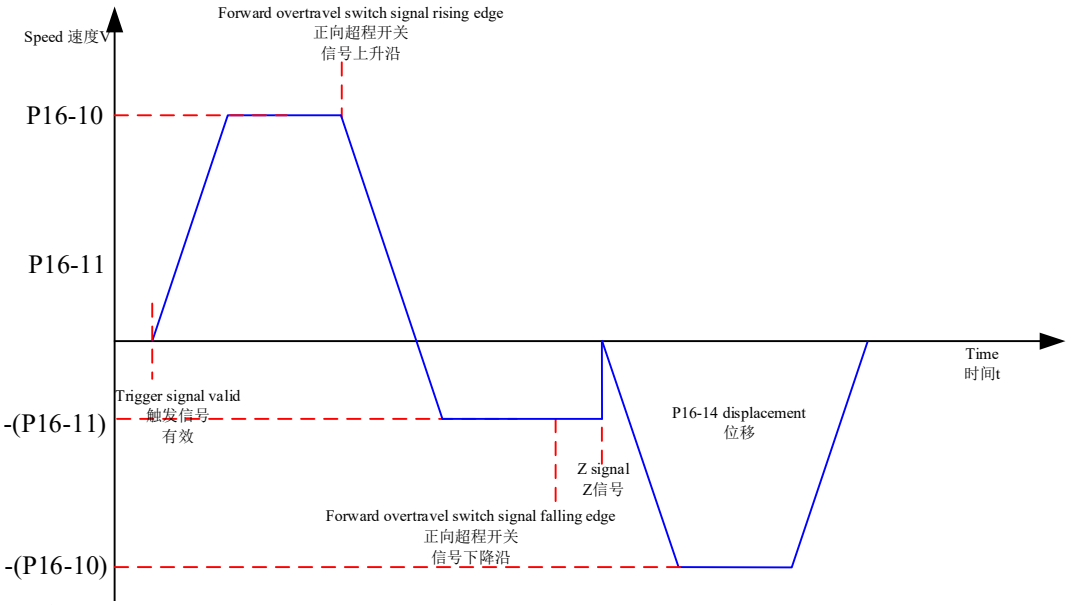
① When the motor starts to move, the forward overtravel switch signal is invalid (0- invalid, 1- valid)

电机开始运动时正向超程开关信号无效(0- 无效，1- 有效)

The servo motor first searches for the forward overtravel switch at high speed in the forward direction with the setting value of P16-10. After encountering the rising edge of the forward overtravel switch signal, it gradually decelerates and reverses according to the setting of P16-12. The servo motor starts with -(p16 -11) The set low speed reversely searches for the falling edge of the forward overtravel switch signal. It continues to run after encountering the falling edge of the forward overtravel switch signal. After that, it stops immediately when it encounters the motor Z signal for the first time. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-10设定值正向高速搜索正向超程开关，遇到正向超程开关信号的上升沿后，按照P16-12设定逐渐减速反向，伺服电机以-(p16-11) 设定的低速反向搜索正向超程开关信号下降沿，遇到正向超程开关信号下降沿后继续运行，之后第一次遇到电机Z信号立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。

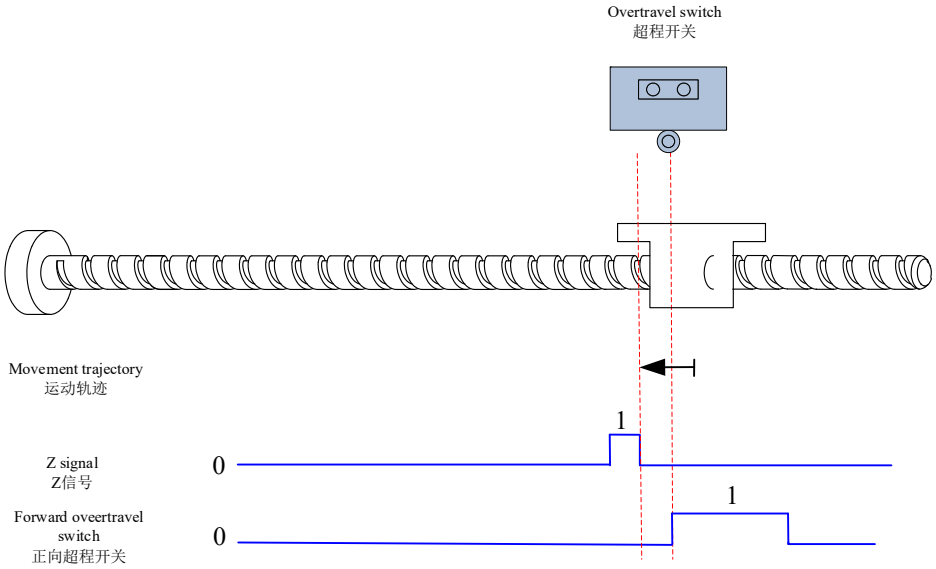


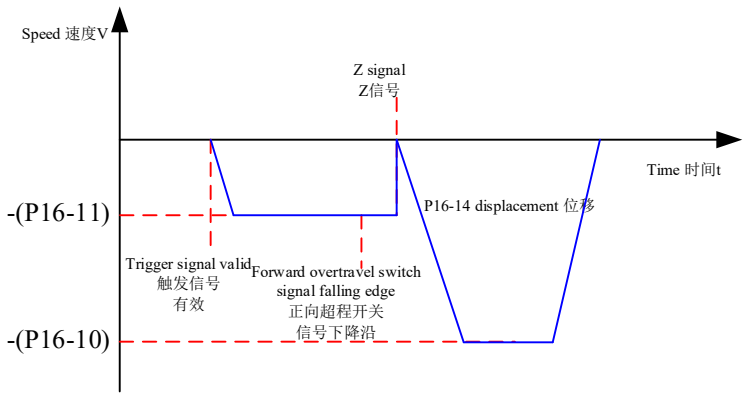



② When the motor starts to move, the forward overtravel switch signal is valid.
电机开始运动时正向超程开关信号有效

The servo motor directly searches for the falling edge of the forward overtravel switch signal at the set value of -(P16-11) in reverse at low speed. After encountering the falling edge of the forward overtravel switch signal, it continues to run at -(P16-11) in reverse at low speed. After encountering the rising edge of Z signal for the first time, it will stop immediately. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机直接以-(P16-11)设定值反向低速搜索正向超程开关信号下降沿，遇到正向超程开关信号下降沿后继续以-(P16-11)反向低速运行，之后第一次遇到Z 信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。






**f）Origin return: forward zero return, no deceleration point, the origin is origin switch (P16-09=10)**

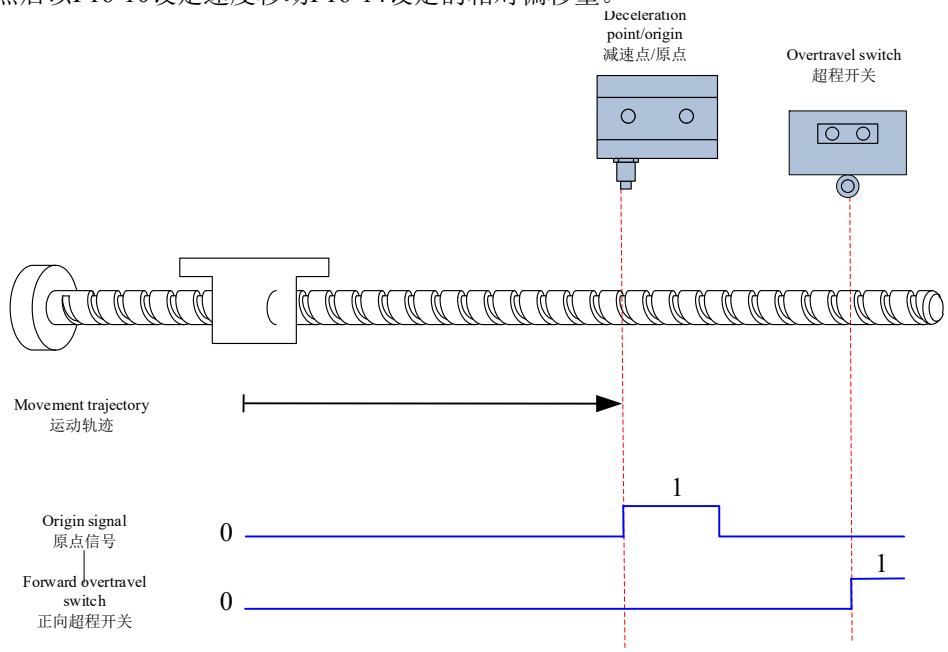
**原点回零：正向回零，无减速点、原点为原点开关(P16-09=10)**

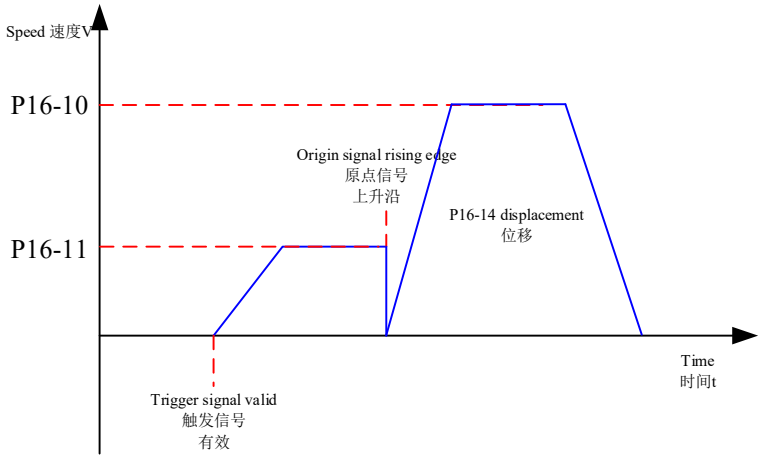
① When the motor starts to move, the origin switch signal is invalid (0- invalid, 1- valid), and the forward overtravel switch is not triggered during the whole process.

电机开始运动时原点开关信号无效(0- 无效，1- 有效)，全过程未触发正向超程开关

The servo motor first searches for the origin signal in the low-speed forward direction at the setting value of P16-11 until it encounters the rising edge of the origin signal and stops immediately. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-11设定值低速正向搜索原点信号，直至遇到原点信号的上升沿，立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。



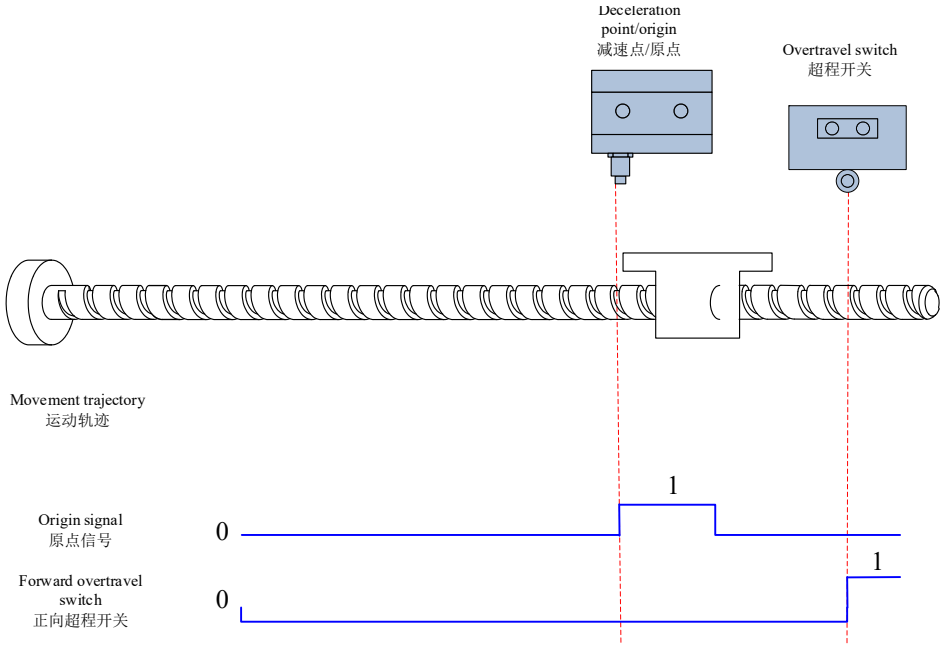


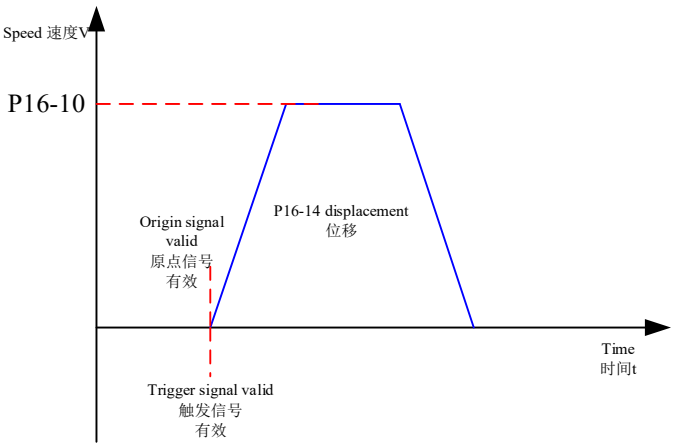

② When the motor starts to move, the origin switch signal is valid, and the forward overtravel switch is not triggered during the whole process.

电机开始运动时原点开关信号有效，全过程未触发正向超程开关

The servo motor directly moves the relative offset set by P16-14 at the speed set by P16-10.

伺服电机以P16-10设定速度直接移动P16-14设定的相对偏移量。



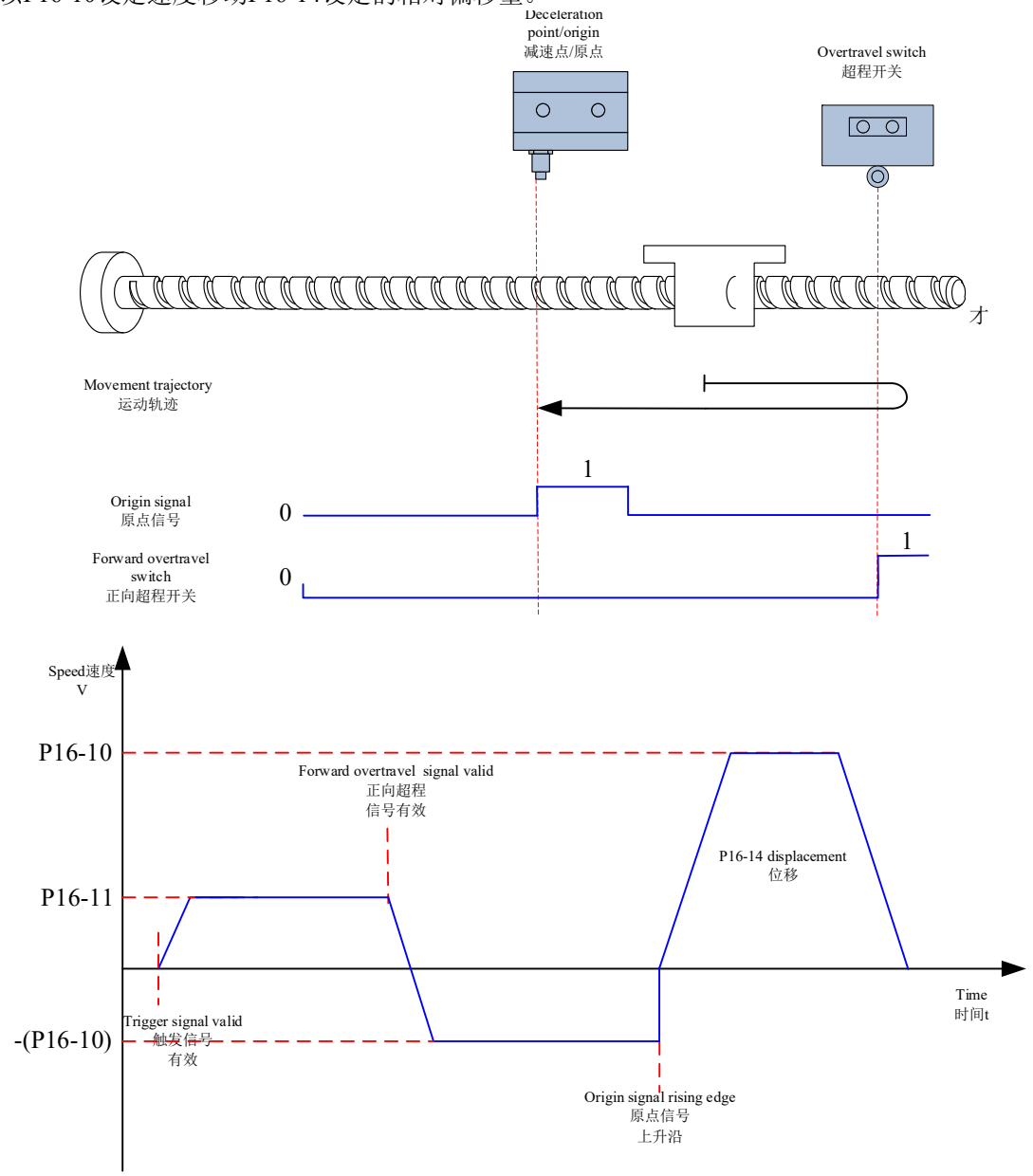




③ When the motor starts to move, the origin switch signal is invalid, and the forward overtravel switch is valid when triggered during the whole process

电机开始运动时原点开关信号无效，过程中触发正向超程开关有效

The servo motor first searches for the origin signal in the forward direction at low speed at the setting value of P16-11. After encountering the forward overtravel switch, it immediately returns to zero in the reverse direction. The driver searches for the rising edge of the origin signal at low speed in the reverse direction at -(P16-11). Stop immediately after reaching the rising edge of the origin signal. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-11设定值低速正向搜索原点信号，遇到正向超程开关后，立刻反向回零，驱动器以-(P16-11)反向低速搜索原点信号上升沿，遇到原点信号上升沿后立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。




**g）Return to origin: forward return to zero, no deceleration point, origin is motor Z signal (P16-09=12)**

**原点回零：正向回零，无减速点、原点为电机 Z 信号(P16-09=12)**

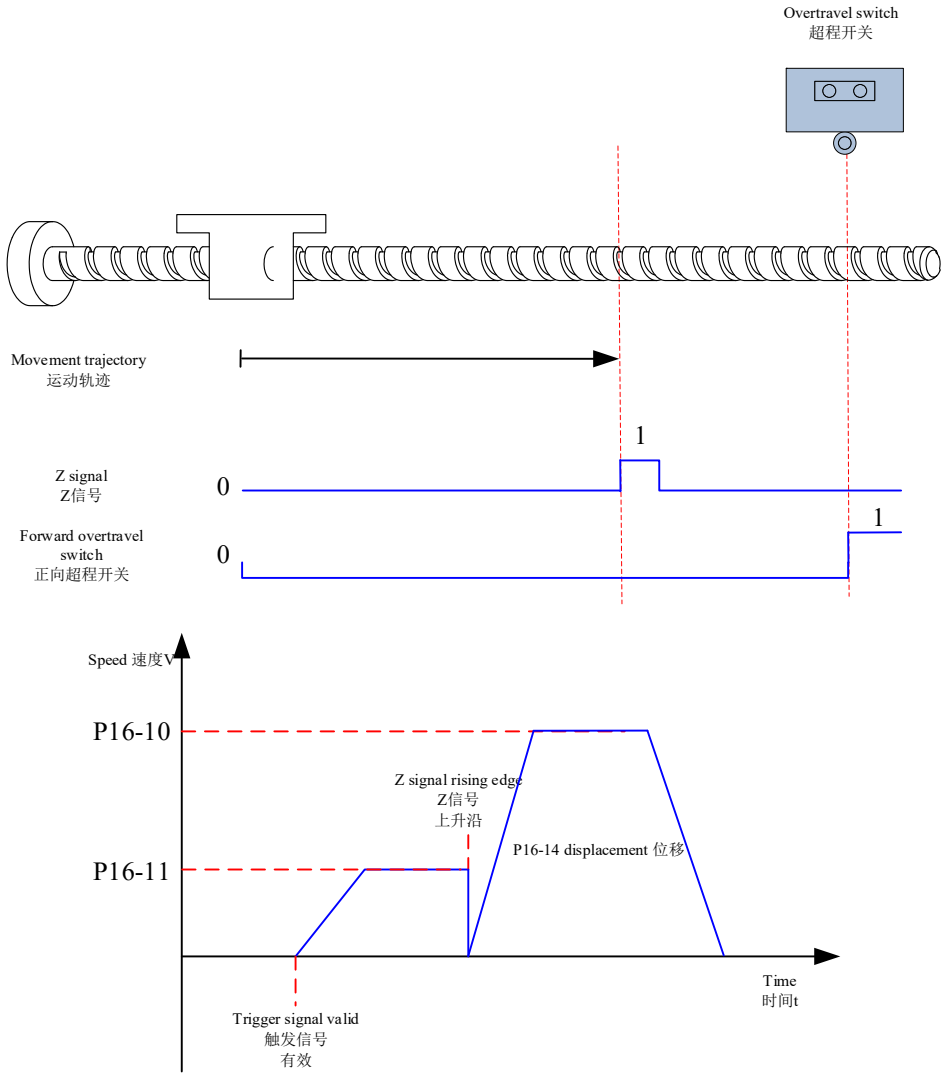
**Note 注意：**

In the origin return method (P16-09=2 or 3) using the Z signal as the deceleration point and origin, after returning to zero, the actual stop position of the motor may not be on the rising edge of the same side of the Z signal, and there is ±1 pulse (encoder unit) deviation.

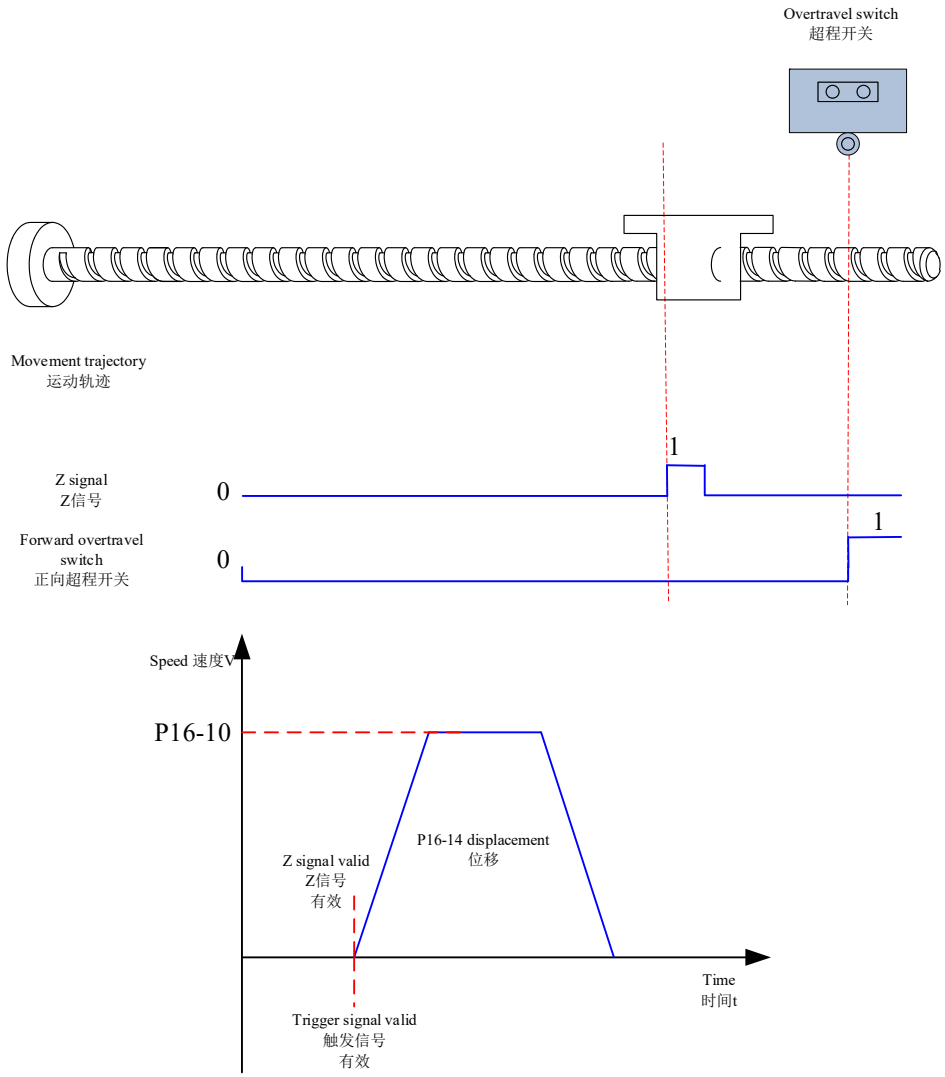
以 Z 信号为减速点和原点的原点回零方式(P16-09=2 或 3) 中，回零后，电机实际停止位置可能不在 Z 信号同一侧的上升沿，停止位置存在±1 个脉冲(编码器单位)的偏差。

① When the motor starts to move, the Z signal is invalid (0-invalid, 1-valid), and the forward overtravel switch is not triggered during the whole process.
电机开始运动时 Z 信号无效(0- 无效，1- 有效)，全过程未触发正向超程开关

The servo motor first searches for Z signal in forward direction at low speed using setting value P16-11, stop immediately until encountering the rising edge of Z signal. Then move the relative offset set by P16-14 at setting speed P16-10.
伺服电机首先以P16-11设定值低速正向搜索Z信号，直至遇到Z信号的上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。



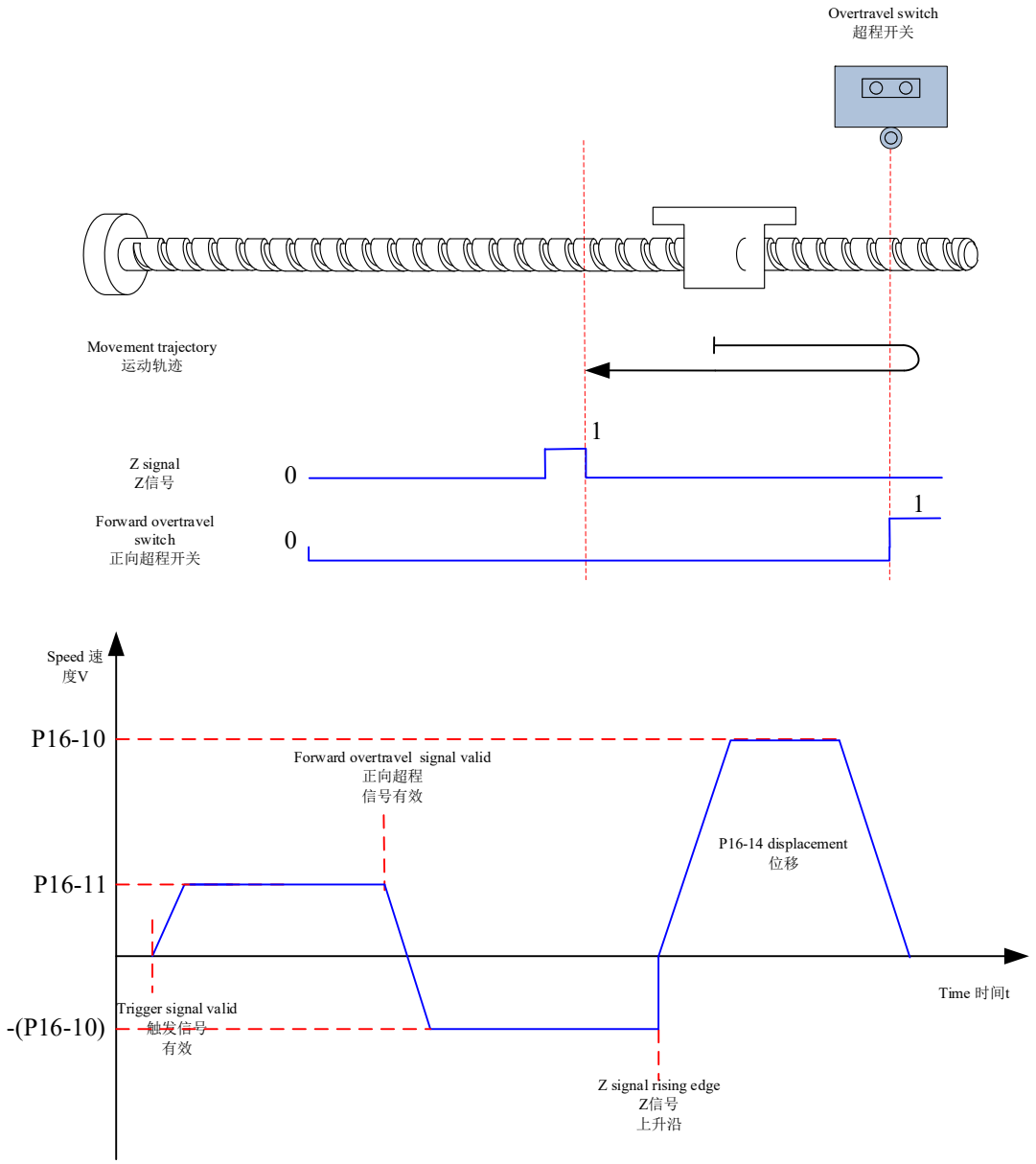

② When the motor starts to move, the Z signal is valid, and the forward overtravel switch is not triggered during the whole process.
电机开始运动时 Z 信号有效，全过程未触发正向超程开关
Servo motor directly move relative offset set by P16-14 at setting speed P16-10.
伺服电机以P16-10设定速度直接移动P16-14设定的相对偏移量。




③ The Z signal is invalid when the motor starts to move, and the forward overtravel switch is valid when triggered during the process.
电机开始运动时 Z 信号无效，过程中触发正向超程开关有效

The servo motor first searches for the Z signal in the forward direction at a low speed at the setting value of P16-11. After encountering the forward overtravel switch, it immediately returns to zero in the reverse direction. The driver searches for the rising edge of the Z signal at a low speed in the reverse direction at -(P16-11). Stop immediately when the Z signal rises. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-11设定值低速正向搜索Z信号，遇到正向超程开关后，立刻反向回零，驱动器以-(P16-11)反向低速搜索Z信号上升沿，遇到Z信号上升沿立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。



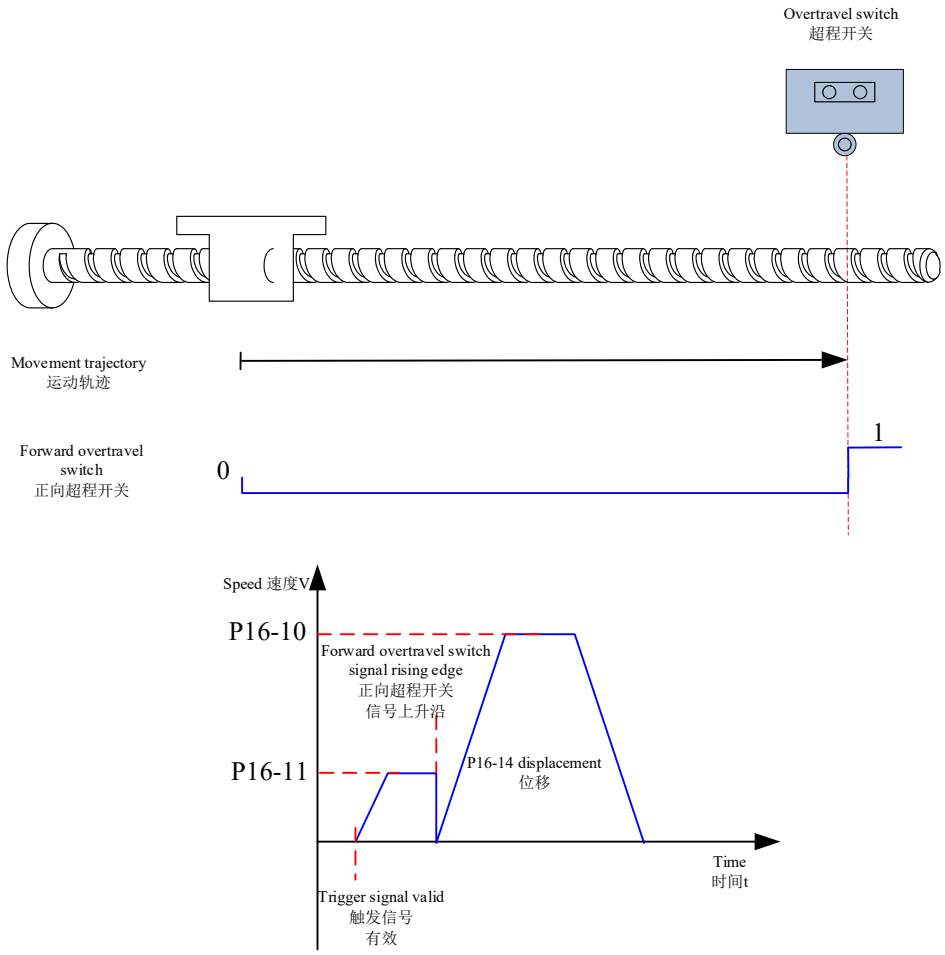

**h）Return to origin: forward return to zero, no deceleration point, origin is forward overtravel switch (P16-09=14)原点回零：正向回零，无减速点、原点为正向超程开关 (P16-09=14)**

① When the motor starts to move, the forward overtravel switch signal is invalid (0- invalid, 1- valid).

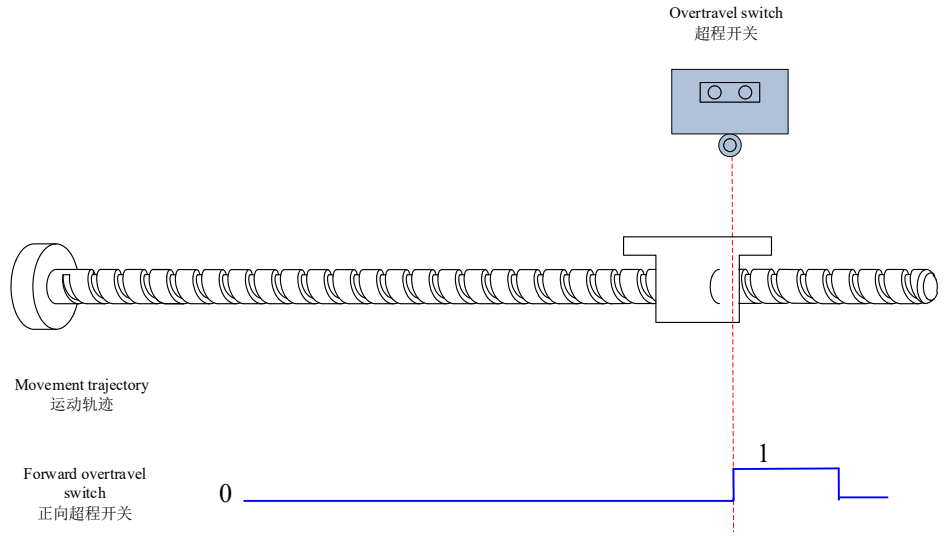
电机开始运动时正向超程开关信号无效(0- 无效，1- 有效)

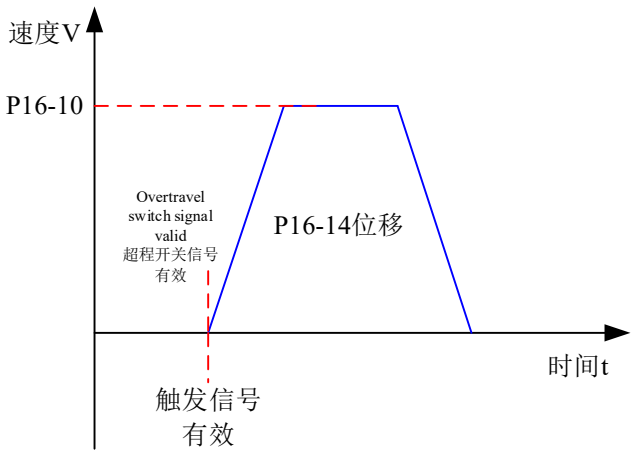
The servo motor first searches for the forward overtravel switch at a low speed in the forward direction at the setting value of P16-11. After encountering the forward overtravel switch signal, it stops immediately. Then move the relative offset set by P16-14 at the speed set by P16-10.

伺服电机首先以P16-11设定值正向低速搜索正向超程开关，遇到正向超程开关信号后，立即停机。然后以P16-10设定速度移动P16-14设定的相对偏移量。




② When the motor starts to move, the forward overtravel switch signal is valid.
电机开始运动时正向超程开关信号有效
The servo motor directly moves the relative offset set by P16-14 at the speed set by P16-10.
伺服电机以P16-10设定速度直接移动P16-14设定的相对偏移量。






**3) Related parameters setting 相关参数设置**

**a) Origin return mode setting 原点复归模式设置**

☆Related function code 关联功能码：

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂Setting 设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| 16 | 08 | Return to origin 原点复位 Enable control 使能控制 | 0- Turn off the origin return function 关闭原点复位功能；<br>1- Enable the origin return function through DI input Homing Start signal 通过DI输入Homing Start信号使能原点复归功能；<br>2- Start return-to-origin immediately after power-on; 上电后立即启动原点复归；<br>3- Start return-to-origin immediately 立即启动原点复归；<br>4- Take the current position as the origin; 以当前位置为原点； | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| 16 | 09 | Return to origin mode 原点复位模式 | 0- Forward return to zero, the deceleration points and origin are the origin switches; 正向回零，减速点、原点为原点开关；<br>1- Reverse return to zero, the deceleration points and origin are the origin switches; 反向回零，减速点、原点为原点开关；<br>2- Forward return to zero, the deceleration points and origin are motor Z signal; 正向回零，减速点、原点为电机Z 信号；<br>3- Reverse return to zero, the deceleration points and origin are motor Z signal; 反向回零，减速点、原点为电机Z 信号；<br>4- Forward return to zero, the deceleration points is origin switch, and origin is motor Z signal; 正向回零，减速点为原点开关，原点为电机Z 信号；<br>5- Reverse return to zero, the deceleration points is origin switch, and origin is motor Z signal; 反向回零，减速点为原点开关，原点为电机Z 信号；<br>6- Forward return to zero, deceleration points and origin are forward overtravel switches; 正向回零，减速点、原点为正向超程开关；<br>7- Reverse zero return, deceleration points and origin are reverse overtravel switches; 反向回零，减速点、原点为反向超程开关；<br>8- Forward return to zero, the deceleration points is the forward overtravel switch, and the origin is the motor Z signal; 正向回零，减速点为正向超程开关，原点为电 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 机Z信号；<br>9- Reverse zero return, the deceleration points are the reverse overtravel switch, and the origin is the motor Z signal;<br>反向回零，减速点为反向超程开关，原点为电机Z信号；<br>10- Positive return to zero, no deceleration points, the origin is the origin switch;<br>正向回零，无减速点、原点为原点开关；<br>11- Reverse zero return, no deceleration points, the origin is the origin switch;<br>反向回零，无减速点、原点为原点开关；<br>12- Positive return to zero, no deceleration points, the origin is the motor Z signal;<br>正向回零，无减速点、原点为电机Z信号；<br>13- Reverse zero return, no deceleration points, the origin is the motor Z signal;<br>反向回零，无减速点、原点为电机Z信号；<br>14- Positive return to zero, no deceleration points, the origin is the forward overtravel switch;<br>正向回零，无减速点、原点为正向超程开关；<br>15- Reverse zero return, no deceleration points, the origin is the reverse overtravel switch;<br>反向回零，无减速点、原点为反向超程开关； | | | | | |

**b）Origin return operation curve setting 原点复归运行曲线设置**

If the deceleration point signal is valid and the origin signal is valid without sufficient deceleration, the final positioning may be unstable. The displacement required for deceleration should be fully considered before setting the deceleration point and origin signal input position. The acceleration and deceleration time (P16.12) when searching for the origin will also affect the positioning stability, so it should be considered when setting.

若减速点信号有效后，在未充分减速情况下使得原点信号有效，则有可能导致最终定位不稳。应充分考虑减速所需的位移，再设置减速点和原点信号输入位置。搜索原点时的加减速时间(P16.12) 也会对定位稳定度造成影响，因此设置时应予以考虑。

☆Related function code 关联功能码：

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| 16 | 10 | Search for origin switch signal at high speed 高速搜索原点开关信号速度 | 10～3000 | rpm | 100 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| 16 | 11 | Search for origin switch signal at low speed低速搜索原点开关信号速度 | 10~1000 | rpm | 10 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| 16 | 12 | Limit the accelerate and decelerate time of search for origin switch signal限定搜索原点开关信号的加减速时间 | 0~1000 | ms | 1000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| 16 | 13 | Limit the time of search for origin限定查找原点的时间 | 0~65535 | ms | 10000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| 16 | 14 | Mechanical origin offset | -1073741824~1073741824 | unit | 0 | Effective | Shutdown | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| | | 机械原点偏移量 | | | | immediately 立即生效 | setting 停机设定 | |

☆Related function code 关联功能编号：

| NO. 编码 | Name 名称 | Function name 功能名 | Function 功能 |
|---|---|---|---|
| FunIN.32 | Home Switch | Origin switch 原点开关 | Valid, the current position is the origin;有效，当前位置为原点；<br>Home Switch Set DI terminal logic 设置的 DI 端子逻辑 / actual effective level 实际有效电平<br>0( Low level 低电平) / Low level 低电平<br>1( High level 高电平) / High level 高电平<br>3( Rising edge 上升沿) / High level 高电平<br>4( Falling edge 下降沿) / Low level 低电平<br>5( Edge change 沿变化) / Low level 低电平<br>The DI terminal logic corresponding to the origin switch should be set to high/low level based on the output of the host computer.<br>应根据上位机输出，将原点开关对应的DI 端子逻辑设置为高/ 低电平有效。 |
| FunIN.33 | Homing Start | Origin return function 原点复归使能 | Valid, the origin return function is enabled. During the origin return operation, repeated enabling is invalid;<br>有效，使能原点复归功能，原点复归运行过程中，反复使能无效；<br>Invalid, the origin return function is prohibited.<br>无效，禁止原点复归功能。 |
| FunOut.19 | Home Attain | Origin returns to zero completed 原点回零完成 | Valid, during position control, the origin return is completed.<br>有效，位置控制时，原点回零完成。<br>Invalid, origin return is not completed.<br>无效，原点回零未完成。 |

**4)Return to origin fault 回原点故障**

**a) timeout fault 超时故障（Er.96）**

Mechanism: When using the origin return function (P16.08=1~4), the origin is not found within the time set by P16.13.

产生机理：使用原点复归功能时 (P16.08=1~4)，在 P16.13 设定的时间内，未找到原点。

| Reason 原因 | Confirm method 确认方法 | Handle measures 处理措施 |
|---|---|---|
| 1. Origin switch fault 原点开关故障 | ■When returning to the origin, it is always searching at high speed and there is no low-speed search process.原点复归时一直在高速搜索而没有低速搜索过程。<br>■After the origin return high-speed search, it has been in the reverse low-speed search process.原点复归高速搜索后，一直处在反向低速搜索过程。 | Confirm that the P02 group has been set to DI function 32, and then check the DI terminal wiring. When the DI terminal logic changes manually, monitor whether the driver receives the corresponding DI level change through P18.21. If not, it means that the DI switch wiring is wrong; if so, indicating that there is an error in the origin return operation. Please refer to the "Origin Return Function Description" to operate this function correctly.确认P02组已设置DI功能32，然后检查DI 端子接线情况，手动使DI端子逻辑变化时，通过P18.21监控驱动器是否接收到对应的DI电平变化，若否，说明DI开关接线错误；若是，说明原点回归操作存在错误，请参考“原点复归功能描述”，正确操作该功能。 |
| 2. The time limit for finding the origin is too short限定查找原点的时间过短 | ■Check whether the time set in P16.13 is too small<br>查看P16.13所设定时间是否过小 | Increase 增大P16.13 |
| 3. The speed of high-speed search for origin | ■Check the distance between origin and 查看回零起始位置距离原点开关的距离， | Increase 增大P16.10 |

| | | |
|---|---|---|
| switch signal is too small高速搜索原点开关信号的速度过小 | 判断P16.10所设定速度值是否过小，导致寻找原点开关的时间过长 | |

**b) Offset setting error 偏移量设置错误（Er.97）**

In P16-09=6/ P16-09=8/ P16-09=14 mode, if P16-14 is greater than 0, the driver reports error No. 97, reminding the user to modify the P16-14 parameter to be less than or equal to 0; in P16- In 09=7/ P16-09=9/ P16-09=15 mode, if P16-14 is less than 0, the driver will report error No. 97 and remind the user to modify the P16-14 parameter to be greater than or equal to 0.

在 P16-09=6/ P16-09=8/ P16-09=14 模式下，若 P16-14 大于 0，则驱动器报 97 号错误，提醒用户修改 P16-14 参数为小于等于 0；在 P16-09=7/ P16-09=9/ P16-09=15 模式下，若 P16-14 小于 0，则驱动器报 97 号错误，提醒用户修改 P16-14 参数为大于等于 0。

**5) Working sequence 工作时序**

**a) P16.08 = 1---Input the Homing Start signal through DI to enable the origin return function;**

**P16.08 = 1---通过 DI 输入 Homing Start 信号使能原点复归功能；**

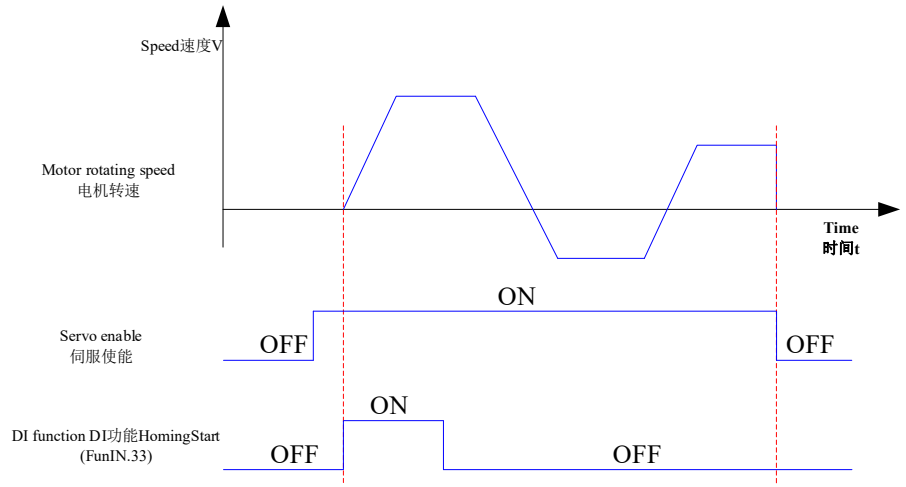



Figure 5-13 Timing diagram example
图5-13 时序图举例

●The servo enable signal must be turned on first, and then the Homing Start signal;
必须先打开伺服使能信号，再打开 Homing Start 信号；

●While the origin return is in progress, the servo enable signal remains valid and the Homing Start signal changes are blocked;
原点复归正在进行期间，伺服使能信号保持有效，Homing Start 信号变化被屏蔽；

●While the return to origin is in progress, the servo enable signal is deactivated and the servo motor stops rotating. To restart the return to origin, please turn on the servo enable signal first and then the Homing Start signal;
原点复归正在进行期间，伺服使能信号置为无效，伺服电机停止转动，重新启动原点复归，请先打开伺服使能信号，再打开 Homing Start 信号；

●When a return-to-origin timeout (Er.96) occurs, the servo motor stops rotating, keeping the servo enable signal valid, and re-triggering the Homing Start signal to be valid will reset Er.96 and perform return-to-origin again;
发生原点复归超时(Er.96)，伺服电机停止转动，保持伺服使能信号有效，重新触发 Homing Start 信号有效，即可复位 Er.96，并重新执行原点复归；

●Can trigger origin return repeatedly;
可反复触发原点复归；

**c) P16.08 = 2--- Start return-to-origin immediately after power-on;**
**上电后立即启动原点复归；**

●Only after power-on, when the servo enable signal is set to valid for the first time, the origin return is executed;
只在上电后，第 1 次将伺服使能信号置为有效时，执行原点复归；

●When the origin return timeout (Er.96) occurs, the servo motor stops rotating. Er.96 can be reset after deactivating the servo enable signal;

发生原点复归超时 (Er.96)，伺服电机停止转动，将伺服使能信号置为无效后可复位 Er.96；

●Do not trigger return-to-origin repeatedly before powering on again;

重新上电前，不可反复触发原点复归；

**c)P16.08 = 3--- Start return to origin immediately; 立即启动原点复归；**

●After powering on, set the servo enable signal to be valid and immediately return to the origin;

上电后将伺服使能信号置为有效，立即进行原点复归；

●While the return to origin is in progress, the servo enable signal is set to invalid and the servo motor stops rotating. Set the servo enable signal to valid again to trigger the return to origin again;

原点复归正在进行期间，伺服使能信号置为无效，伺服电机停止转动，重新将伺服使能信号置为有效，可重新触发原点复归；

●When the origin return timeout(Er.96) occurs, P16.08 is set to 0, the servo motor stops rotating and set the servo enable signal to invalid resettable Er.96, if need to perform origin return again, the P16.08 must to be reset; After finishing the origin return, P16.08=0, if need to perform origin return again, the P16.08 must to be reset;

发生原点复归超时 (Er.96)，P16.08 被置为 0，伺服电机停止转动，将伺服使能信号置为无效可复位 Er.96，若要重新进行原点复归，必须重新设定 P16.08；原点复归完成后，P16.08=0，若要重新进行原点复归，必须重新设定 P16.08；

**d)P16.08 = 4---Take current position as origin; 以当前位置为原点；**

●Use "**Take current position as origin**" function and need to achieve origin offset(P16.14 ≠ 0), must preset P16.14, at last set P16.08 =4, or P18.07 is the previous value of P16.14, rather than the modified value of P16.14;

使用"以当前位置为原点"功能且需要实现原点偏移 (P16.14 ≠ 0) 时，必须先设置 P16.14，最后再设置 P16.08 =4，否则 P18.07 是之前 P16.14 的值，而不是修改后的 P16.14 的值；

●After the origin return completed, P16.08=0, if need to return origin again, must to rewrite P16.14, and set P16.08=4;

原点复归完成后 P16.08=0，若要重新进行原点复归，必须重新写 P16.14，并置 P16.08=4；

### 5.2.3.7 Internal multi-segment position function 内部多段位置功能

The multi-segment position operation function means that the servo driver stores 16-segment position instructions internally, and the displacement, maximum operating speed, and acceleration and deceleration time of each segment can be set separately. The waiting time and connection method between each section can also be selected according to actual needs. The setting process is as follows:

多段位置运行功能是指伺服驱动器内部存储了 16 段位置指令，每段的位移、最大运行速度、加减速时间可分别设置。各段之间的等待时间、衔接方式也可根据实际需要进行选择。其设定流程如下：

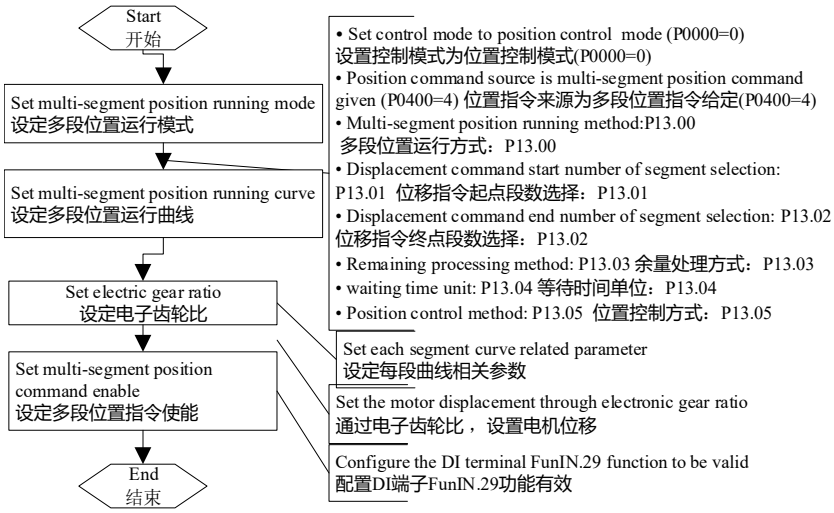



Figure 5-14 Multi-segment position source setting process
图5-14 多段位置指令来源设置流程

**1) Set multi-segment position running mode 设定多段位置运行模式**

☆Related function code: 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|
| P13.00 | Multi-segment position running method 多段位置运行方式 | 0- Single running finish shutdown 单次运行结束停机<br>1- Loop operation 循环运行<br>2-DI switching running DI 切换运行 | Set the connection method between segment and segment 设置段与段之间的衔接方式 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 1 |
| P13.01 | Specify starting segment 指定起点段 | 1～16 | Set the start segment of multi-segment position command 设置多段位置指令的起点段 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 1 |
| P13.02 | Specify ending segment 指定终点段 | 1～16 | Set end segment of multi-segment position command 设置多段位置指令的终点段 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 16 |
| P13.03 | Remaining processing method 余量处理方式 | 0- Continue running the unfinished segment 继续运行没走完的段<br>1- Restart operation from segment 1 从第 1 段重新开始运行 | Set servo enable ON, the starting segment number when the multi-segment position operation is interrupted and resumes operation. 设置伺服使能ON，多段位置运行从被中断到恢复运行时的起始段号 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P13.04 | Waiting time unit 等待时间单位 | 0-ms<br>1-s | Set waiting time unit 设置等待时间单位 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P13.05 | Position control method 位置控制方式 | 0- Relative position command 相对位置指令<br>1- Absolute position command 绝对位置指令 | Set displacement command category 设置位移指令类型 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

**a) Stop at the end of a single run 单次运行结束停机 (P13.00=0)**

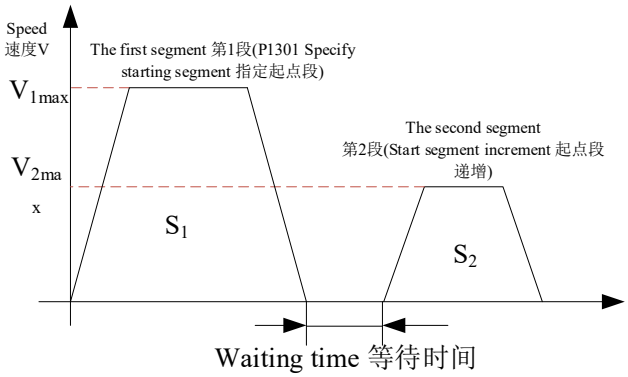



Figure 5-15 Operation curve of shutdown at the end of a single operation
图5-15 单次运行结束停机的运行曲线

$V_{1max}$、$V_{2max}$：the maximum operating speed of the first section (the starting section specified by P1301), the maximum operating speed of the second segment (the starting segment and the incremental segment).

$V_{1max}$、$V_{2max}$：第 1 段(P1301 指定起点段) 最大运行速度、第 2 段(起点段递增段)最大运行速度。

S1、S2：The first segment (P1301 specified start segment) displacement, the second segment (Start segment incremental segment) displacement.

S1、S2：第 1 段(P1301 指定起点段) 位移、第 2 段(起点段递增段)位移。

Model description: 模式描述：

◆Operation the first segment is P1301 specified start segment, the last segment of operation is P1302 specified segment.

运行第 1 段为 P1301 指定起点段，运行的最后一段为 P1302 指定终点段。

◆The number of segment is automatically switching incremental.段号自动递增切换；

◆Waiting time can be set between each segment; 每段之间可设置等待时间；

◆Internal multi-segment position enable (FunIN.29：PSEC_EN) signal is valid.

内部多段位置使能 (FunIN.29：PSEC_EN) 信号为电平有效。

◆After each segment completed, the positioning signal are all valid;

每段运行完成，定位完成信号均有效；

◆During operation, when the internal multi-segment position enable is OFF, the servo gives up the unfinished displacement of this segment and stops. After the shutdown is completed, the positioning completion signal becomes valid;

运行过程中内部多段位置使能 OFF，伺服放弃本段未完成位移并停机，停机完成后定位完成信号有效；

◆Re-enable the internal multi-segment position to ON, and the servo selects the corresponding segment to run according to the P13.03 setting;

重新将内部多段位置使能 ON，伺服按 P13.03 设置选择对应段运行；

◆If the servo enable OFF occurs during a certain period of operation, the motor will stop according to the servo OFF stop method. After the stop is completed, the positioning completion will be invalid;

某段运行时发生伺服使能 OFF，电机按照伺服 OFF 停机方式停机，停机完成后，定位完成无效；

◆During the operation of a certain section, the position command reverse DI (FunIN.24: POS_DIR) logic switching has no effect on the running direction of this section.

某段运行过程中，位置指令反向 DI(FunIN.24：POS_DIR) 逻辑切换对本段运行方向无影响。

**b) Loop running 循环运行 (P13.00=1)**

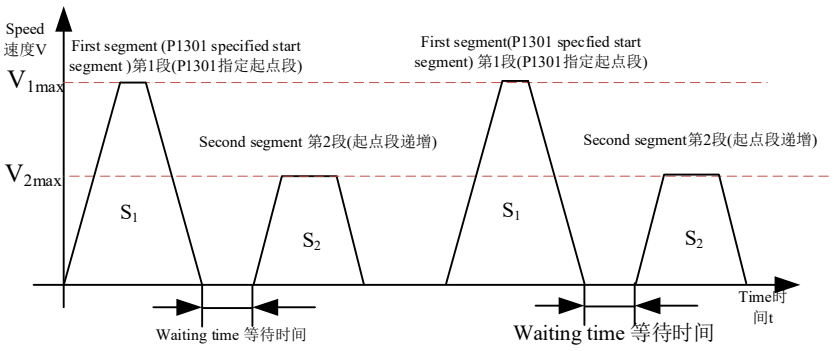



Figure 5-16 Loop operation curve
图5-16 循环运行的运行曲线

$V_{1max}$、$V_{2max}$：the maximum operating speed of the first segment (the starting section specified by P1301), the maximum operating speed of the second segment (the starting segment and the incremental segment).

V1max、V2max：第 1 段(P1301 指定起点段) 最大运行速度、第 2 段(起点段递增段)最大运行速度。

S1、S2：The first segment (P1301 specified start segment) displacement, the second segment (Start segment incremental segment) displacement.

S1、S2：第 1 段(P1301 指定起点段) 位移、第 2 段(起点段递增段)位移。

Model description: 模式描述：

◆Loop operation, every round start segment number is set by P1301 parameter;

循环运行，每轮起始段号由 P1301 参数设定；

◆Segment number automatically increases and switches;

段号自动递增切换；

◆Waiting time can be set between each segment;

每段之间可设置等待时间；

◆Internal multi-segment position enable(FunIN.29：PSEC_EN)signal is level valid; If it is valid, keep loop operation state.

内部多段位置使能 (FunIN.29：PSEC_EN) 信号为电平有效；若有效，保持循环运行状态。

◆After each segment completed, the positioning signal are all valid;

每段运行完成，定位完成信号均有效；

◆During operation, when the multi-segment position command is enabled, the servo discards the unfinished displacement of this segment and stops. After the shutdown is completed, the positioning completion signal becomes valid;

运行过程中将多段位置指令使能 OFF，伺服抛弃本段未完成位移并停机，停机完成后定位完成信号有效；

◆Re-enable the multi-segment position command to ON, and the servo selects the corresponding segment to run according to the setting of P13.03;

重新将多段位置指令使能 ON，伺服按 P13.03 设置选择对应段运行；

◆If the servo enable OFF occurs during a certain period of operation, the motor will stop according to the servo OFF stop method. After the stop is completed, the positioning completion will be invalid;

某段运行时发生伺服使能 OFF，电机按照伺服 OFF 停机方式停机，停机完成后，定位完成无效；

◆During the operation of a certain section, the position command reverse DI (FunIN.24: POS_DIR) logic switching has no effect on the running direction of this section.

某段运行过程中，位置指令反向 DI(FunIN.24：POS_DIR) 逻辑切换对本段运行方向无影响。

**c) DI switching operation (H11-00=2)**

**DI 切换运行 (H11-00=2)**

When the multi-segment position operation mode is set to DI switching operation, please configure the 4 DI terminals of the servo drive as functions 6~9 (FunIN.6: CMD1~FunIN.9: CMD4, multi-segment operation command switching), and make sure the DI terminal is valid logic.

多段位置运行方式设置为 DI 切换运行时，请将伺服驱动器的 4 个 DI 端子配置为功能 6~9(FunIN.6：CMD1~FunIN.9：CMD4，多段运行指令切换)，并确定 DI 端子有效逻辑。

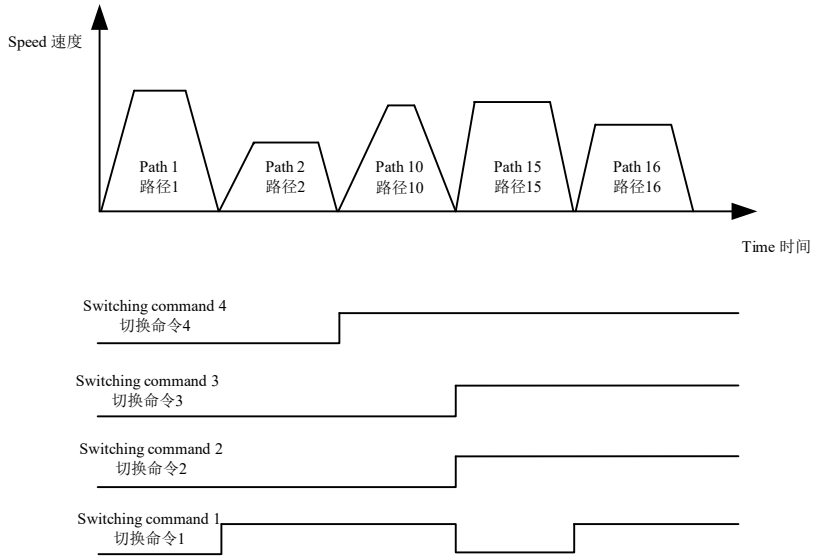



Figure 5-17 Multi-segment position timing diagram
图5-17 多段位置时序图

☆Related function code: 关联功能编码：

<table>
<tr><th>NO.<br>编码</th><th>Name<br>名称</th><th>Function name<br>功能名</th><th>Function<br>功能</th></tr>
<tr><td>FunIN.6</td><td>CMD1</td><td>Multi-segment running command switching 1<br>多段运行指令切换1</td><td rowspan="4">The multi-segment segment number is a 4-digit binary number. The corresponding relationship between CMD1~CMD4 and the segment number is as follows: (DI terminal logic is level valid. When the input level is valid, the CMD value is 1, otherwise it is 0)<br>多段段号为4 位二进制数，CMD1~CMD4 与段号的对应关系如下表：（DI 端子逻辑为电平有效，输入电平有效时CMD 值为1，否则为0）<br><table><tr><th>CMD4</th><th>CMD3</th><th>CMD2</th><th>CMD1</th><th>段号</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>2</td></tr><tr><td colspan="5">……</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>15</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>16</td></tr></table></td></tr>
<tr><td>FunIN.7</td><td>CMD2</td><td>Multi-segment running command switching 2<br>多段运行指令切换2</td></tr>
<tr><td>FunIN.8</td><td>CMD3</td><td>Multi-segment running command switching 3<br>多段运行指令切换3</td></tr>
<tr><td>FunIN.9</td><td>CMD4</td><td>Multi-segment running command switching 4<br>多段运行指令切换4</td></tr>
</table>

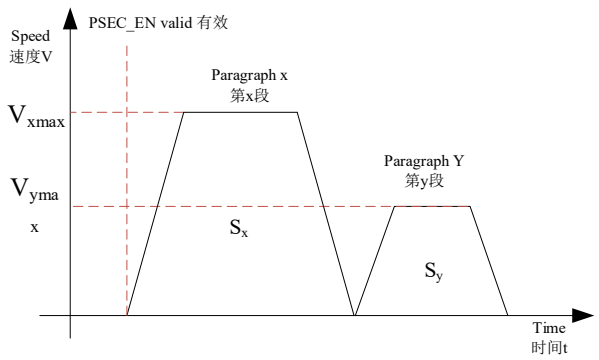



图5-18 DI 切换运行的运行曲线

$V_{1max}$、$V_{2max}$：the maximum operating speed of the x segment, the maximum operating speed of the y segment.

Vxmax、Vymax：第 x 段、第 y 段最大运行速度；

S1、S2：The x segment displacement, the y segment displacement.

Sx、Sy：第 x 段、第 y 段位移；

Model description: 模式描述：

◆When operating the current segment number, you can set the next running segment number. After completing the position command set by current segment number, the motor stops; then run the next running segment number immediately;

运行当前段号时可设置下次运行段号，完成当前段号设置的位置指令后电机停机；然后立即运行下次运行段号；

◆The segment number is determined by DI terminal logic;

段号由 DI 端子逻辑决定；

◆There is no waiting time between each segment, the interval is determined by host computer instruction delay.

每段之间无等待时间，间隔时间由上位机指令延时决定；

◆Internal multi-segment position enable(FunIN.29：PSEC_EN) signal is level valid; If it is valid, keep loop running state.

内部多段位置使能 (FunIN.29：PSEC_EN) 信号为电平有效；若有效，保持循环运行状态。

◆After each operation is completed, the positioning completion signal is valid

每段运行完成，定位完成信号均有效

◆During operation, when the multi-segment position command is enabled OFF, the servo discards the unfinished displacement of this segment and stops. After the shutdown is completed, the positioning completion signal becomes valid;

运行过程中将多段位置指令使能 OFF，伺服抛弃本段未完成位移并停机，停机完成后定位完成信号有效；

◆If the servo enable OFF occurs during a certain period of operation, the motor will stop according to the servo OFF shutdown method. After the shutdown is completed, the positioning completion will be invalid;

某段运行时发生伺服使能 OFF，电机按照伺服 OFF 停机方式停机，停机完成后，定位完成无效；

◆During the operation of a certain section, the position command reverse DI (FunIN.24: POS_DIR) logic switching has no effect on the running direction of this section.

某段运行过程中，位置指令反向 DI(FunIN.24：POS_DIR) 逻辑切换对本段运行方向无影响。

**2) Position control method 位置控制方式**

**a) Incremental position control 增量位置控制**

The relative displacement executed each time in the incremental position control mode is the position increment of the target position relative to the current position of the motor.

增量位置控制方式每次执行的相对位移是目标位置相对电机当前位置的位置增量。

**b) Absolute position control 绝对位置控制**

The absolute position control mode is performed based on the successful return of the motor to zero. If the motor zeroing is unsuccessful, that is, the motor origin is not reset before running the absolute position function, then the motor's multi-segment position function will not be executed, and the motor will enter the shaft lock waiting state.

绝对位置控制模式是在电机归零成功的基础上进行的。如果电机归零不成功，即在运行绝对位置功能之前没有先进行电机原点归零，那么电机的多段位置功能不会执行，此时电机进入锁轴等待状态。

Absolute displacement is the position increment of the target position relative to the motor origin. For example, the mechanical origin offset (P1614) after the motor returns to zero is set to 1000, then the absolute position counter (P1807) when the motor stops after the zero return is successful is also 1000. After the absolute position offset is executed, the value of the motor absolute position counter (P1807) is the motor mechanical origin offset (P1614) plus the absolute displacement increment of the corresponding segment (for example, the first segment P1308 is 20000), then the motor executes the absolute position of the end is 20000+1000.

绝对位移是目标位置相对于电机原点的位置增量，比如电机回零完成后的机械原点偏移量(P1614)设置为 1000，那么归零成功之后电机停止时的绝对位置计数器(P1807)也为 1000，绝对

位置偏移执行完之后电机绝对位置计数器(P1807)的值为电机机械原点偏移量(P1614)加上对应段的绝对位移增量(比如第一段 P1308 为 20000)，那么电机执行完的绝对位置为 20000+1000。

**3) Multi-segment position running curve setting 多段位置运行曲线设定**

The multi-segment position operation function can set 16 different position instructions. The displacement, maximum operating speed, acceleration and deceleration time of each segment and the waiting time between each segment can be set separately. Take paragraph 1 as an example:

多段位置运行功能可设定 16 段不同的位置指令，每段的位移、最大运行速度、加减速时间及各段之间的等待时间可分别设置。以第 1 段为例：

☆Related function code: 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P13.09 | Movement displacement of segment 1 第1 段移动位移 | -1073741824 ~1073741824 | Command unit 指令单位 | Set the total position command of the first segment 设置第1段位置指令总和 | Running setting 运行设定 | Effective immediately 立即生效 | 10000 |
| P13.10 | Maximum running speed of the first stage displacement 第1 段位移最大运行速度 | 1~6000 | rpm | Set the maximum running speed of segment 1 设置第1段最大运行速度 | Running setting 运行设定 | Effective immediately 立即生效 | 200 |
| P13.11 | First segment displacement acceleration and deceleration time 第1 段位移加减速时间 | 0~65535 | ms (s) | Set the time for the motor in the first stage of the multi-position position to change speed uniformly from 0rpm to 1000rpm. 设置多段位置第1 段电机由 0rpm 匀变速到 1000rpm 的时间。 | Running setting 运行设定 | Effective immediately 立即生效 | 10 |
| P13.12 | Waiting time after the first displacement is completed 第1 段位移完成后等待时间 | 0~10000 | ms (s) | Set the waiting time after the first positioning is completed 设置第1 段定位完成后的等待时间 | Running setting 运行设定 | Effective immediately 立即生效 | 10 |

Based on the above settings, the actual operating curve of the motor is as shown below:

根据以上设置，电机实际运行曲线如下图所示：

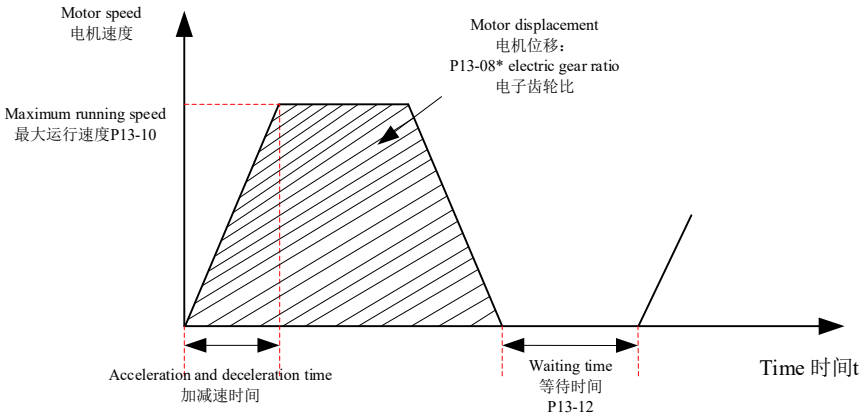



Figure 5-19 The first segment motor running curve
图5-19 第1段电机运行曲线

Therefore, the actual acceleration time to P13.10 (maximum operating speed of the first stage displacement):

因此，实际加速到 P13.10( 第 1 段位移最大运行速度) 的时间 t：

$$t = \frac{(P13.10)}{1000} \times (P13.11)$$

**4) Internal multi-segment position command enable 内部多段位置指令使能**

When selecting the internal multi-segment position command as the position command source, please configure one DI terminal of the servo drive as function 29 (FunIN.29: Internal multi-segment position enable), and determine the valid logic of the DI terminal.

选用内部多段位置指令作为位置指令来源时，请将伺服驱动器的 1 个 DI 端子配置为功能 29(FunIN.29：内部多段位置使能)，并确定 DI 端子有效逻辑。

☆Related function code: 关联功能编号：

| No.编码 | Name 名称 | Function code 功能名 | Function 功能 |
|---|---|---|---|
| FunIN.29 | PSEC_EN | Internal multi-segment position enables<br>内部多段位置使能 | Valid, servo motor running multi-segment position command; 有效，伺服电机运行多段位置指令；<br>Invalid, servo motor is in locked status;<br>无效，伺服电机处于锁定状态； |

## 5.3 Speed control model 速度控制模式

### 5.3.1 Speed control function block diagram 速度控制功能框图

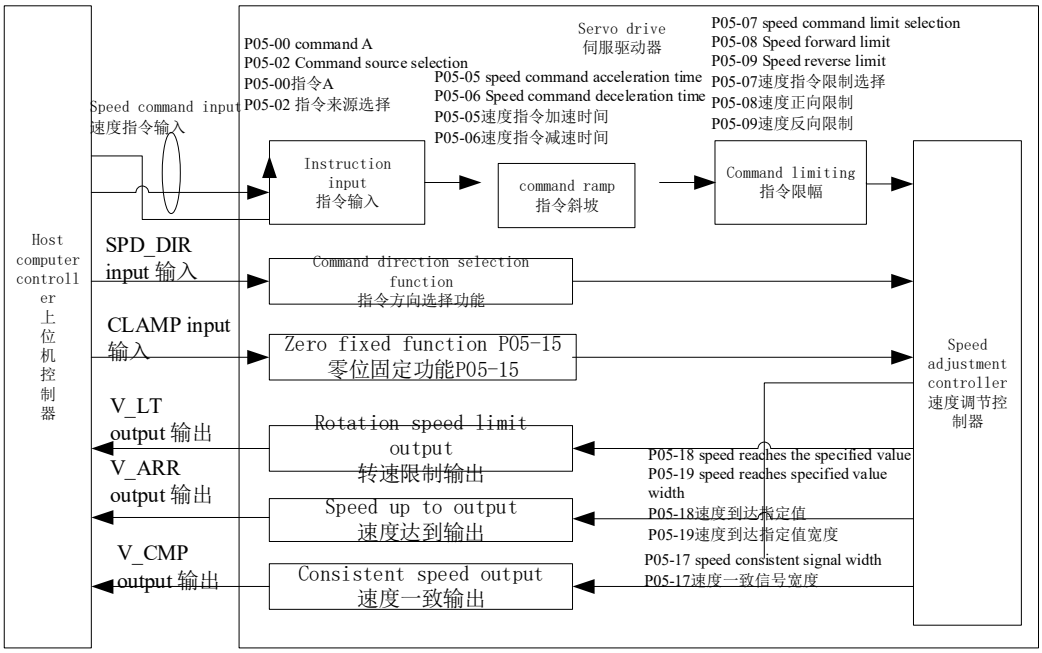



Figure 5-20 Speed control block diagram
5-20 速度控制框图

The main steps to use the speed control mode are as follows:
速度控制模式主要使用步骤如下：

1. Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and encoder line. After powering on, the servo panel displays "rdy", which means that the servo power supply is wired correctly and the motor encoder is wired correctly.
   正确连接伺服主电路和控制电路的电源，以及电机动力线和编码器线，上电后伺服面板显示“rdy”即表示伺服电源接线正确，电机编码器接线正确。
2. Disconnect the motor from the load and perform a servo JOG test run by pressing the button to confirm whether the motor can operate normally.
   电机与负载断开连接，通过按键进行伺服 JOG 试运行，确认电机能否正常运行。
3. Refer to the speed mode wiring instructions to connect the necessary DI/DO signals and analog speed commands in the CN1 terminal.
   参考速度模式配线说明连接 CN1 端子中必要的 DI/DO 信号及模拟量速度指令。
4. Make settings related to speed mode.
   进行速度模式的相关设定。
5. Enable the servo, first make the motor rotate at low speed, determine whether the motor's rotation direction is normal, and then adjust the gain
   使能伺服，首先使电机低速旋转，判断电机的旋转方向是否正常，然后进行增益调节

### 5.3.2 Speed mode wiring diagram 速度模式配线图

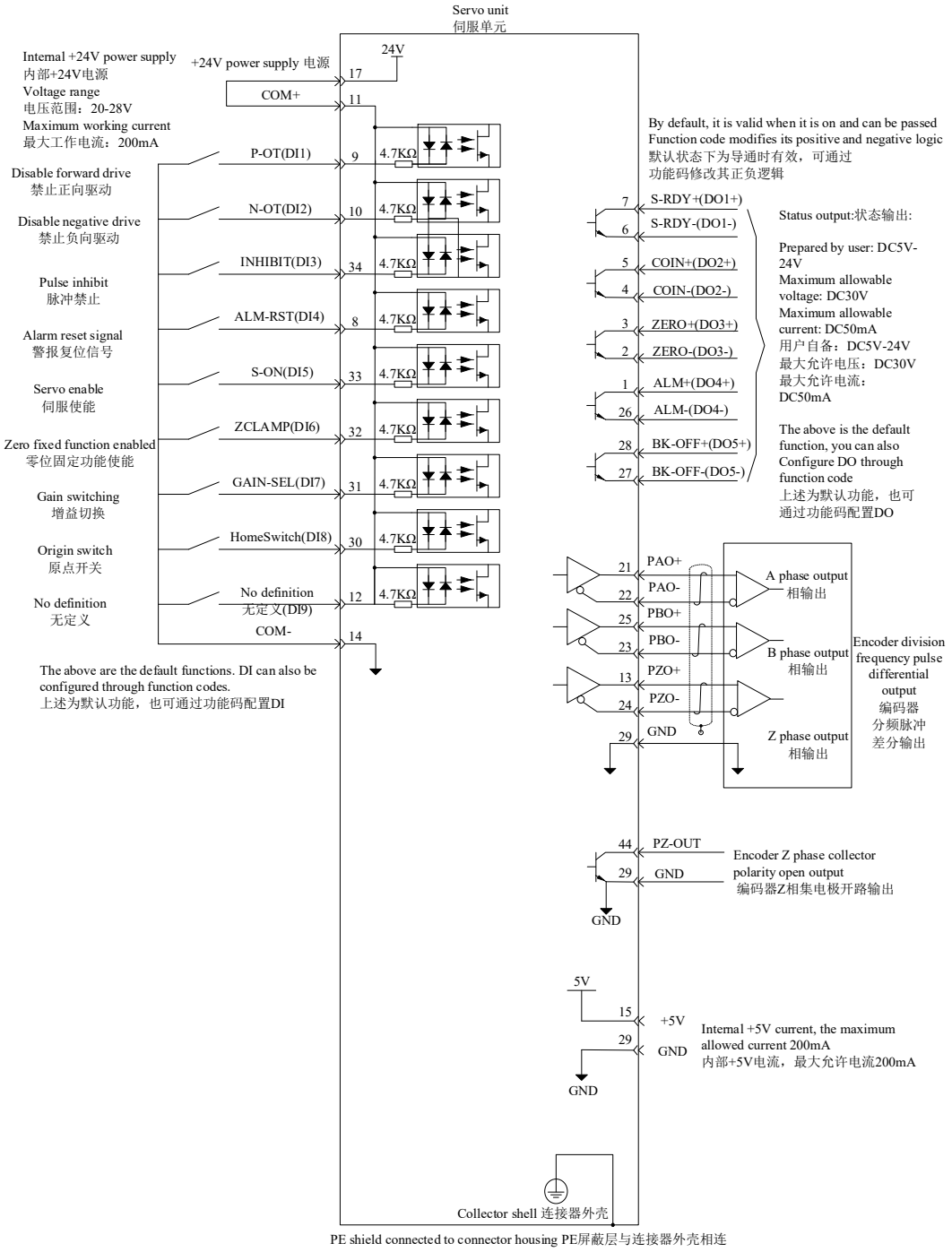



Figure 5-21 Sped control wiring diagram
图5-21 速度控制接线图

**Note 注：**

■Signal cables and power cables must be 信号线缆与动力线缆一定要分开走线，间隔至少 30cm 以上；

■When the signal cable is extended due to insufficient length, the shielding layer must be reliably connected to ensure reliable shielding and grounding;

信号线缆因为长度不够进行续接电缆时，一定将屏蔽层可靠连接以保证屏蔽及接地可靠；

■ +5V is referenced to GND, +24V is referenced to COM-. Do not exceed the maximum allowable current, otherwise the driver will not work properly.

+5V 以 GND 为参考，+24V 以 COM-为参考。请勿超过最大允许电流，否则驱动器无法正常工作。

### 5.3.3 Internal multi-segment speed function 内部多段速度功能

Servo drive has multi-segment speed running function. It is referred to the servo drive internal storage 16 segments speed command, the maximum running speed and running time of each segment can be set separately. And equipped with 4 sets of acceleration and deceleration times to choose from. The setting process is as follows:

伺服驱动器具有多段速度运行功能。它是指伺服驱动器内部存储了16段速度指令，每段的最大运行速度、运行时间可分别设置。并配有4组加减速时间可供选择。其设定流程如下：

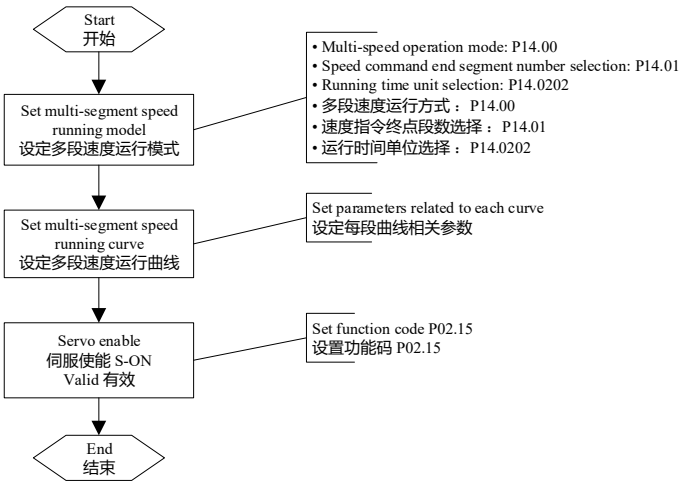



Figure 5-22 Multi-segment speed set process diagram
图5-22 多段速度设置流程图

**①Set multi-segment speed running mode 设定多段速度运行模式**

☆Related function code: 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P14.00 | Multi-segment speed running method 多段速度运行方式 | 0- Stop at the end of a single run 单次运行结束停机 (P14.01 number of segment selection 段数选择)<br>1- Loop running 循环运行 (P14.01 segment selection 段数选择)<br>2- Switching through external DI 通过外部DI 进行切换 | - | Set multi-segment speed command method 设定多段速度指令运行方式 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 1 |
| P14.01 | Speed command end segment number selection 速度指令终点段数选择 | 1~16 | - | Set the number of steps required for multi-step speed command 设定多段速指令所需段数 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 1 |
| P14.02 | Running time unit selection 运行时间单位选择 | 0-Sec<br>1-Min | - | Select the unit of multi-speed command running time 选择多段速度指令运行时间的单位 | Running setting 运行设定 | Effective immediately 立即生效 | 1 |

Take P14.01=2 as an example to illustrate each mode.

以P14.01=2 为例说明各模式。

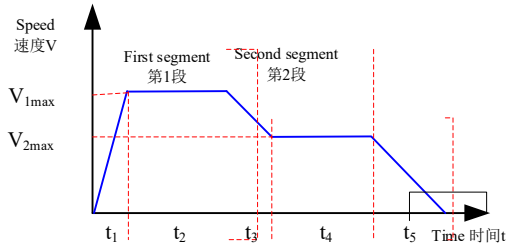
**●Stop at the end of a single run单次运行结束停机 (P14.00=0)**

Function code P14.00 is set to 0, select single running shutdown method. After setting function codes P14.01 and P14.02 respectively according to the total number of execution segments and the execution time unit, and setting the command value, running time and acceleration and deceleration time and other parameter of corresponding segment according to requirements. The driver will start

from the first segment according to the segment code. Run to the Nth section until the machine stops after running the last section.

功能码P14.00设定为0，选择单次运行停机方式。根据执行总段数和执行时间单位分别设定功能码P14.01、P14.02 后，并根据需求设置相应段的指令值，运行时间和加减速时间等参数，驱动器将按照段码从第1段到第N 段的方式运行，直到运行完最后一段后停机。

Table 5-11 Instructions for shutdown at the end of a single run
表5-11单次运行结束停机说明

| Mode description 模式描述 | Running curve 运行曲线 |
|---|---|
| ◆Run 1 round; 运行1 轮；<br>◆The segment number is automatically incremented and switched.<br>段号自动递增切换。 |  <br>◆V1max、V2max：The command speed of the 1st and 2nd stages;<br>第1段、第2段指令速度；<br>◆t1：The actual acceleration and deceleration time of the first segment;<br>第1段实际加减速时间；<br>◆t3、t5：The second period of acceleration and deceleration time;<br>第 2 段时间加、减速时间；<br>The running time of a certain section: the speed change time when the speed command of the previous section switches to the speed command of this section + the constant speed running time of this section (for example: the first section of the running time in the figure is t1+t2, the second section of running time is t3+t4, so and so on);<br>某段运行时间：上一段速度指令切换到该段速度指令的变速时间+该段匀速运行时间( 如：图中第一段运行时间为t1+t2，第二段运行时间为t3+t4，以此类推)；<br>Do not set the running time of a certain section to 0. The driver will skip the speed command of this section and execute the next section;<br>When the actual speed of the motor reaches the maximum operating speed set in this section, the speed arrival signal is valid.<br>某段运行时间勿设为0，驱动器将跳过该段速度指令，执行下一段；<br>电机实际转速达到该段设定的最大运行速度，速度到达信号有效。 |

★Glossary: 名词解释：

The drive runs completely once and the total number of multi-segment speed command steps set by P14.01 is called completing one round of operation.

驱动器完整地运行 1 次 P14.01 设定的多段速度指令总段数称为完成 1 轮运行。

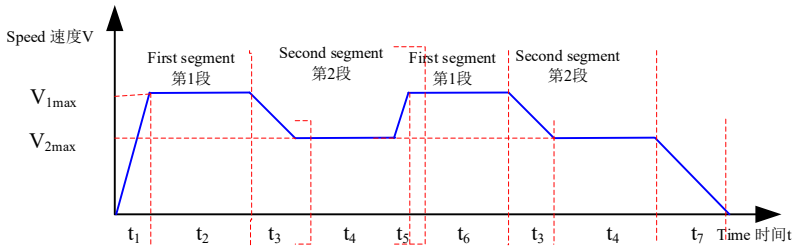
**●Loop operation 循环运行(P14.00=1)**

Set function code P14.00 to 1 to select the cycle operation mode. After setting the function codes P14.01 and P14.02 respectively according to the total number of execution segments and the execution time unit, and setting the command value, running time, acceleration and deceleration time and other parameters of the corresponding segment according to the requirements, the module will run according to the command running time and According to the setting of acceleration and deceleration time, the driver will run according to the segment code from the 1st segment to the Nth segment. After running the last segment, it will automatically jump to the 1st segment for cyclic operation.

功能码P14.00 设定为1，选择循环运行方式。根据执行总段数和执行时间单位分别设定功能码P14.01、P14.02 后，并根据需求设置相应段的指令值，运行时间和加减速时间等参数，模块将根据各段指令运行时间和加减速时间的设置，驱动器将按照段码从第1 段到第N 段的方式运行，运行完最后一段后自动跳转到第1段循环运行。

Table 5-12 Loop operation description
表5-12 循环运行说明

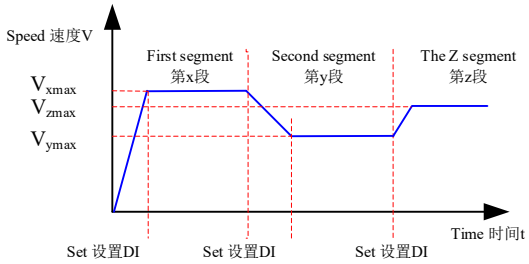
| Mode description<br>模式描述 | Running curve<br>运行曲线 |
|---|---|

| | |
|---|---|
| ◆Running in a loop, the starting segment number of each round is 1;<br>循环运行，每轮起始段号均为1；<br>◆Segment number automatically increases and switches;<br>段号自动递增切换；<br>◆If the servo enable is valid, the cycle operation state will always be maintained.<br>伺服使能有效，则一直保持循环运行状态。 |  <br>◆ V1max、V2max：Maximum operating speed of segments 1 and 2;<br>第1段、第2段最大运行速度；<br>◆The running time of a certain section: the speed change time when the speed command of the previous section switches to the speed command of this section + the constant speed running time of this section (for example: the first section of running time in the figure is t1+t2, the second section of running time is t3+t4, so and so on);<br>某段运行时间：上一段速度指令切换到该段速度指令的变速时间 + 该段匀速运行时间(比如：图中第一段运行时间为t1+t2，第二段运行时间为t3+t4，以此类推)；<br>◆Do not set the running time of a certain section to 0. The driver will skip the speed command of this section and execute the next section;<br>某段运行时间勿设为 0，驱动器将跳过该段速度指令，执行下一段；<br>◆When the actual speed of the motor reaches the maximum operating speed set in this section, the speed arrival signal is valid;<br>电机实际转速达到该段设定的最大运行速度，速度到达信号有效； |

**●DI switching operation DI 切换运行 (P14.00=2)**

Function code P14.00 set to 2, and select external DI switching method. According to requirements to set corresponding segment command value, operation time and acceleration and deceleration time and other parameter.功能码P14.00 设定为2，选择外部DI 切换方式。根据需求设置相应段的指令值，运行时间和加减速时间等参数，驱动器将根据外部DI(CMDx)的ON/OFF 组合来选择运行对应段号的速度指令。

Table 5-12 DI switch running description
表5-12 DI 切换运行说明

| Mode description 模式描述 | Running curve 运行曲线 |
|---|---|
| ◆As long as the segment number updated, it can continuous running<br>段号有更新即可持续运行<br>◆ The segment number is decided by DI terminal logic;<br>段号由 DI 端子逻辑决定；<br>◆ The interval between segments is determined by the host computer instruction delay time;<br>段与段之间间隔时间由上位机指令延时时间决定；<br>◆Multi-position enable is valid for edge change.<br>多段位置使能为沿变化有效。 |  <br>x，y：Segment number, the logical relationship between segment number and DI terminal is as described below;<br>段号，段号与DI 端子逻辑关系如下文所述；<br>The running time of a certain section is not affected by the function code setting value. During the speed command operation of a certain section, if the section number changes, it will immediately switch to the new section number to run;<br>某段运行时间不受功能码设定值影响，某段速度指令运行期间，若段号发生变化，则立刻切换到新的段号运行；<br>When the actual speed of the motor reaches the maximum operating speed set in this section, the speed arrival signal is valid.<br>电机实际转速达到该段设定的最大运行速度，速度到达信号有效。 |

When the multi-stage speed operation mode is set to DI switching operation, the 4 DI terminals of the servo drive must be configured as functions 6~9 (FunIN.6 ~FunIN.9 multi-stage operation command switching), and the valid logic of the DI terminals must be determined.

多段速度运行方式设置为 DI 切换运行时，必须将伺服驱动器的 4 个 DI 端子配置为功能 6~9(FunIN.6 ~FunIN.9 多段运行指令切换)，并确定 DI 端子有效逻辑。

☆Related function code: 关联功能编码：

| No.<br>编码 | Name<br>名称 | Function name<br>功能名 | Function<br>功能 |
|---|---|---|---|
| FunIN.6 | CMD1 | Multi-segment running command switching 1<br>多段运行指令切换1 | The multi-segment segment number is a 4-digit binary number. The corresponding relationship between CMD1~CMD4 and the segment number is shown in the following table.<br>多段段号为4 位二进制数，CMD1~CMD4 与段号的对应关系如下表所 |

| | | | |
|---|---|---|---|
| FunIN.7 | CMD2 | Multi-segment running command switching 2<br>多段运行指令切换2 | 示。 |
| FunIN.8 | CMD3 | Multi-segment running command switching 3<br>多段运行指令切换3 | |
| FunIN.9 | CMD4 | Multi-segment running command switching 4<br>多段运行指令切换4 | |

| CMD4 | CMD3 | CMD2 | CMD1 | 段号 |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 2 |
| …… | | | | |
| 1 | 1 | 1 | 1 | 16 |

When the DI terminal input level is valid, the CMD value is 1, otherwise it is 0
DI 端子输入电平有效时CMD 值为1，否则为0

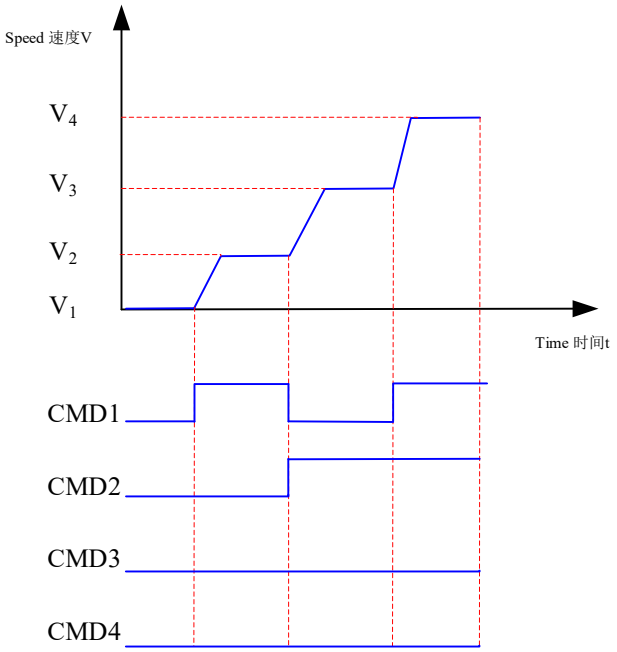



Figure 5-3 Multi-segment speed curve example
图 5-23 多段速度曲线举例

**③ Multi-segment speed curve setting 多段速度运行曲线设定**

Taking the first segment speed command as an example, the relevant function codes are as follows:

以第1段速度指令为例，相关功能码如下：

☆Related function code: 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P14.03 | Acceleration and deceleration time 1 加减速时间1 | 0~65535 | ms | Set acceleration and deceleration time 设定加减速时间 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P14.04 | Acceleration and deceleration time 2 加减速时间2 | 0~65535 | ms | | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P14.05 | Acceleration and deceleration time 3 加减速时间3 | 0~65535 | ms | | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P14.06 | Acceleration and deceleration time 4 加减速时间4 | 0~65535 | ms | | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P14.07 | The first segment speed command | -6000~6000 | rpm | Setting the first segment speed command value 设定第1段速度指令值 | Shutdown setting | Effective immediately 立即 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 第1段速度指令 | | | | 停机设定 | 生效 | |
| P14.08 | The first segment command running time 第1 段指令运行时间 | 0~65535 | 0.1s (min) | Setting the first segment command running time 设定第1 段指令运行时间 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 50 |
| P14.09 | The first segment acceleration and deceleration time 第1 段加减速时间 | 0- Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间1<br>2- Acceleration and deceleration time 2 加减速时间2<br>3- Acceleration and deceleration time 3 加减速时间3<br>4- Acceleration and deceleration time 4 加减速时间4 | - | Select the first segment acceleration and deceleration mode 选择第1 段加减速方式 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

In addition to the 1~16-segment command value and command running time, there are 4 sets of acceleration and deceleration times to choose from among the multi-segment speed command parameters. The default mode is no acceleration and deceleration time. Taking the end of a single run as P14.01=1 in multi-stage speed as an example, the actual acceleration and deceleration time and running time are explained:

多段速度指令参数中除1~16 段指令值和指令运行时间外，有4组加减速时间可供选择，默认方式为没有加减速时间。以多段速度中P14.01=1 单次运行结束为例，对实际加减速时间以及运行时间说明：

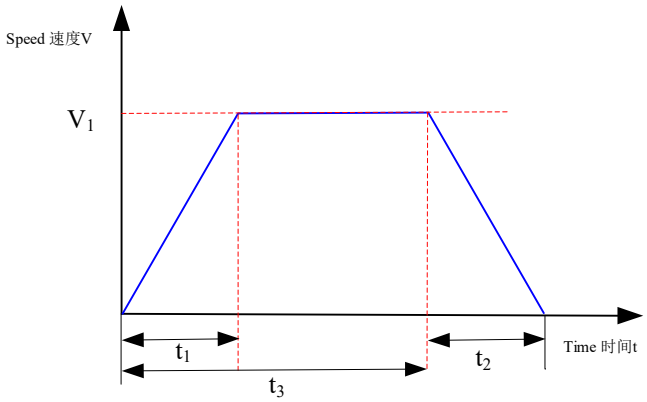



Figure 5-24 Multi-segment speed curve example
图5-24 多段速度曲线举例

As shown in the figure above, the speed command of this section is V1, and the actual acceleration time $t_1$ is:

如上图所示，该段速度指令为 V1，实际加速时间 $t_1$ 为：

$t_1=\frac{V_1}{1000}$ ×The acceleration time of this speed setting

$$t_1 = \frac{V_1}{1000} \times \text{该段速度设置的加速时间}$$

Actual deceleration time$t_2$: 实际减速时间$t_2$：

$t_2 = \frac{V_1}{1000} \times$The deceleration time of this speed setting

$$t_2 = \frac{V_1}{1000} \times \text{该段速度设置的减速时间}$$

Running time: the speed change time from the speed command of the previous section to the speed command of this section + the constant speed running time of this section, as shown in t3 in the figure.

运行时间：上一段速度指令切换到该段速度指令的变速时间+ 该段匀速运行时间，如图中 t3 所示。

## 5.4 Torque control mode 转矩控制模式

### 5.4.1 Torque control function diagram 转矩控制功能框图

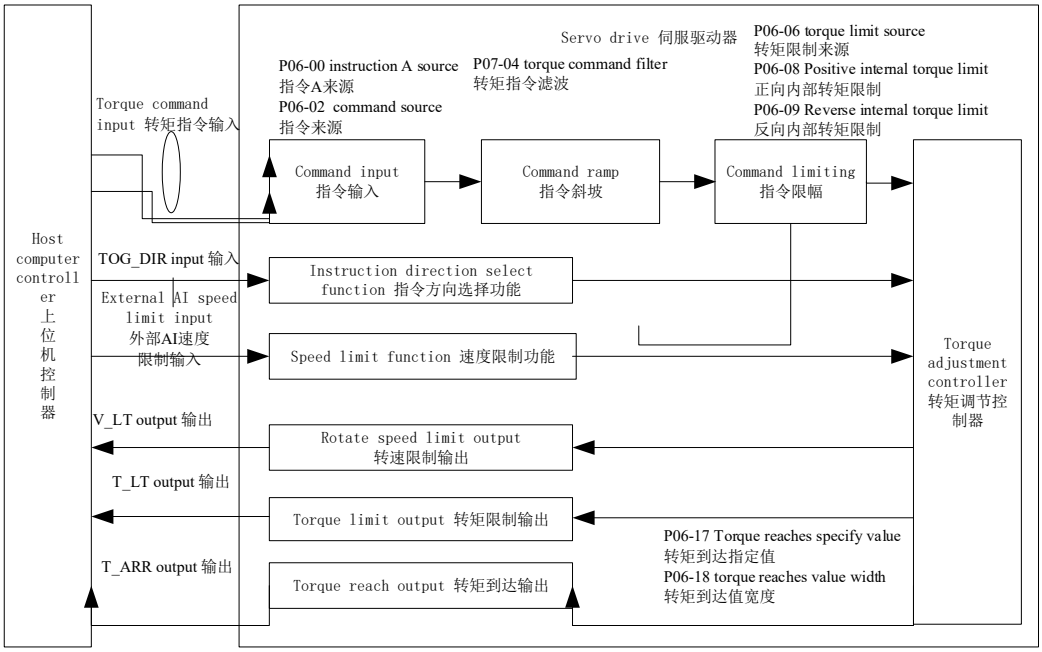



Figure 5-25 Torque control diagram
图5-25 转矩控制框图

The main steps of torque control mode are as follows:
转矩控制模式主要使用步骤如下：

1. Correctly connect servo main circuit and power supply of control circuit, and motor power cables and encoder cables, after power on, the servo panel displays “rdy” is represent the servo power wiring is correct, and the motor encoder wiring is correct.
   正确连接伺服主电路和控制电路的电源，以及电机动力线和编码器线，上电后伺服面板显示“rdy”即表示伺服电源接线正确，电机编码器接线正确。
2. Disconnect motor and load, perform a JOG testing by pressing the button to confirm whether the motor can operate normally.
   电机与负载断开连接，通过按键进行伺服 JOG 试运行，确认电机能否正常运行。
3. Refer to the wiring instructions to connect the necessary DI/DO, torque command source, speed limit, etc. in the CN1 terminal.
   参考配线说明连接 CN1 端子中必要的 DI/DO 及转矩指令来源、速度限制等。
4. Make settings related to torque mode.
   进行转矩模式的相关设定。
5. Enable the servo, set a lower speed limit value, apply a forward or reverse torque command to the servo, confirm whether the motor rotation direction is correct and whether the speed is correctly limited. If it is normal, you can start using it.
   使能伺服，设置一个较低的速度限制值，给伺服施加一个正向或反向转矩指令，确认电机旋转方向是否正确，转速是否被正确限制，若正常则可以开始使用。

### 5.4.2 Torque mode wiring diagram 转矩模式配线图

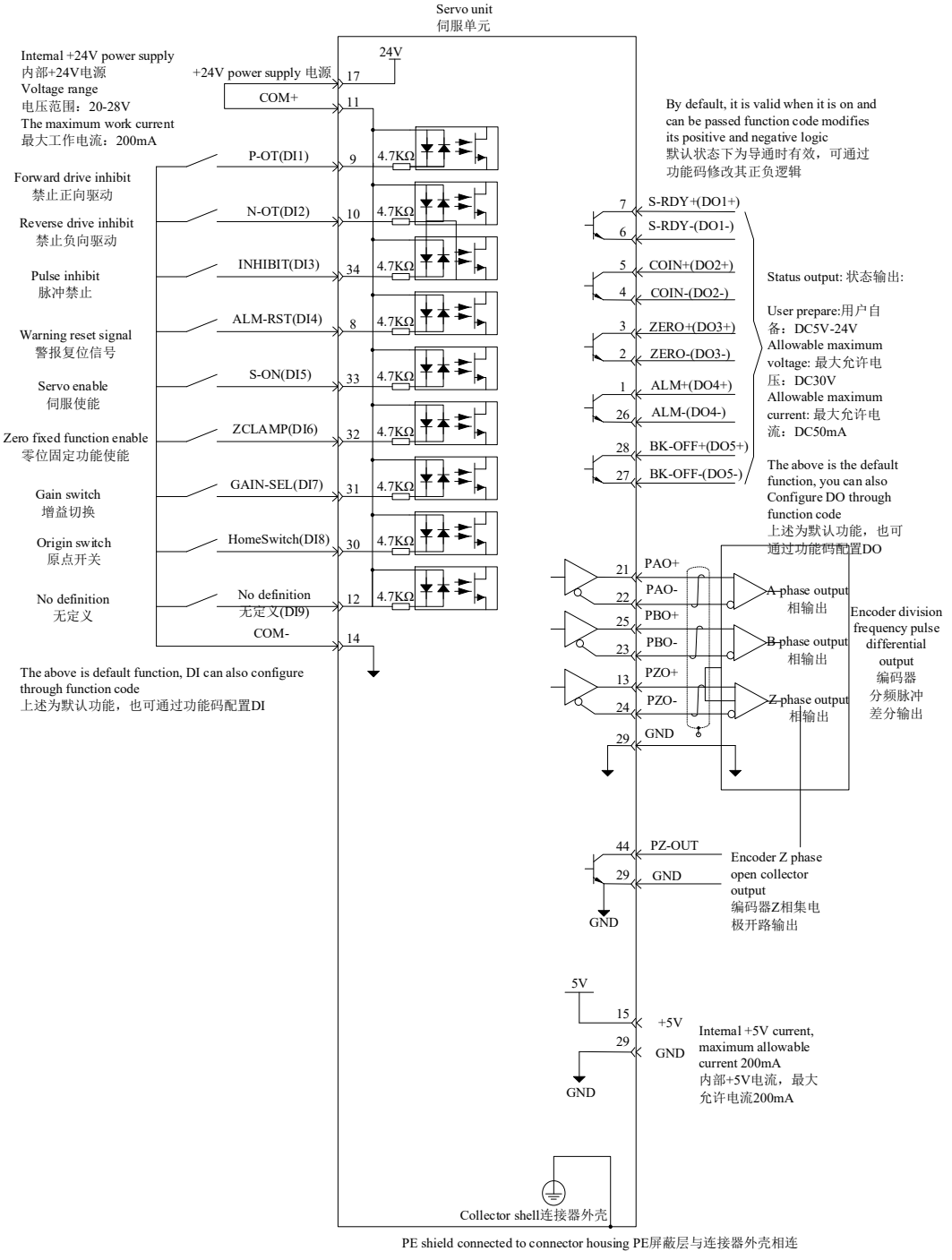



Figure 5-26 Torque control wiring diagram
图5-26 转矩控制接线图

**Note 注：**

■The signal cables and power cables must be routed separately; the interval is at least 30cm;
信号线缆与动力线缆一定要分开走线，间隔至少 30cm 以上；

■When the signal cable is extended due to insufficient length, the shielding layer must be reliably connected to ensure reliable shielding and grounding;
信号线缆因为长度不够进行续接电缆时，一定将屏蔽层可靠连接以保证屏蔽及接地可靠；

■+5V is referenced to GND, and +24V is referenced to COM-. Do not exceed the maximum allowable current, otherwise the driver will not work normally.
+5V 以 GND 为参考，+24V 以 COM-为参考。请勿超过最大允许电流，否则驱动器无法正常工作。

## 5.5 Mixed mode switch 混合模式切换

The mixed control mode means that when the servo enable is ON and the servo status is "run", the working mode of the servo driver can be switched between different control modes.

混合控制模式指，在伺服使能为ON，伺服状态为“run”时，伺服驱动器的工作模式可在不同控制模式之间切换。

There are three types of hybrid control modes. 混合控制模式有以下3种。

●Torque mode↔speed mode 转矩模式↔速度模式

●Speed mode↔ position mode 速度模式↔位置模式

●Torque mode↔ Position mode 转矩模式↔位置模式

By setting the function code P00.00 on the panel or host computer, the servo drive will work in the mixed control mode.

通过面板或上位机设定功能码P00.00，伺服驱动器将工作于混合控制模式。

☆Related function code: 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|
| P00.00 | Control mode selection 控制模式选择 | 0- Position mode 位置模式<br>1- Speed mode 速度模式<br>2- Torque mode 转矩模式<br>3- Torque mode↔ Speed mode 转矩模式↔ 速度模式<br>4- Speed mode ↔Position mode 速度模式↔ 位置模式<br>5- Torque mode ↔ position mode<br>转矩模式↔ 位置模式 | Set the control mode of the servo drive<br>设置伺服驱动器的控制模式 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

Please set the servo drive parameters in different control modes according to the mechanical structure and indicators.

请按照机械结构和指标分别设定不同控制模式下伺服驱动器参数。

When P00.00=3/4/5, please configure one DI terminal of the servo drive as function 10 (FunIN.10: MODE_SWITCH, mode switching), and determine the valid logic of the DI terminal.

P00.00=3/4/5 时，请将伺服驱动器的1个DI 端子配置为功能10(FunIN.10：MODE_SWITCH，模式切换)，并确定DI端子有效逻辑。

☆Related function code: 关联功能编码：

<table>
<tr><th>NO.<br>编码</th><th>Name<br>名称</th><th>Function name<br>功能名</th><th>Function<br>功能</th></tr>
<tr><td>FunIN.10</td><td>MODE_SWITCH</td><td>Mode switch<br>模式切换</td><td>Used to set the current control mode of the drive when the servo status is "run" in mixed control mode.<br>用于在混合控制模式下，伺服状态为“run”时，设置驱动器当前控制模式
<table>
<tr><th>P00.00</th><th>Terminal logic<br>端子逻辑</th><th>Control mode<br>控制模式</th></tr>
<tr><td rowspan="2">3</td><td>Invalid 无效</td><td>Torque mode<br>转矩模式</td></tr>
<tr><td>Valid 有效</td><td>Speed mode<br>速度模式</td></tr>
<tr><td rowspan="2">4</td><td>Invalid 无效</td><td>Speed mode<br>速度模式</td></tr>
<tr><td>Valid 有效</td><td>Position mode<br>位置模式</td></tr>
<tr><td rowspan="2">5</td><td>Invalid 无效</td><td>Torque mode<br>转矩模式</td></tr>
<tr><td>Valid 有效</td><td>Position mode<br>位置模式</td></tr>
</table>
</td></tr>
</table>

## 5.6 Absolute value system usage instructions 绝对值系统使用说明

### 5.6.1 Overview 概述

**1）The definition of absolute value motor 绝对值电机的定义**

The absolute value servo motor is equipped with an absolute value encoder, and the definition of "absolute value" inside the absolute value encoder refers to all the position values inside the encoder.

After the encoder is produced and shipped from the factory, all the position values within its range are "absolutely" determined in the encoder. After initializing the origin, each position is independent and unique. Each internal and external data refresh reading does not depend on the previous data reading, regardless of Whether inside the encoder or outside the encoder, there is no accumulation calculation of "count" and previous readings.

绝对值伺服电机配备的是绝对值编码器，而对于绝对值编码器的内部的“绝对值”的定义，是指编码器内部的所有位置值，在编码器生产出厂后，其量程内所有的位置已经“绝对”地确定在编码器内，在初始化原点后，每一个位置独立并具有唯一性，它的内部及外部每一次数据刷新读取，都不依赖于前次的数据读取，无论是编码器内部还是编码器外部，都不存在“计数”与前次读数的累加计算。

**2）Absolute value servo motor advantages 绝对值伺服电机优点**

a) Cost saving: two limit switches and one origin switch can be eliminated.
节省成本：可省去两个限位开关及一个原点开关。

b) Reduce the failure rate: It saves costs while reducing the probability of mechanical failure. It is suitable for occasions where the on-site environment is harsh and the installation of limit and origin switches is cumbersome.
降低故障率：在节省成本的同时减小了机械故障概率，适用于使用现场环境恶劣、限位及原点开关安装繁琐的场合。

c) High-precision zero return: Using the absolute value origin inside the driver, the origin accuracy does not depend on the accuracy of the external sensor, and the servo motor can find the origin very accurately.
高精度回零：使用驱动器内部绝对值原点，原点精度不依赖于外部传感器的精度，伺服电机就能非常精确的找到原点。

d) The zero point, positive and negative limit points can be flexibly set according to process requirements: the driver has built-in soft limit and absolute position return to origin modes, and the limit points and origin can be flexibly set.
零点、正负限位点根据工艺需求可灵活设置：驱动器内置软限位及绝对位置回原点模式，限位点及原点可灵活设置。

e) Accurately set the zero point: The origin position can be fine-tuned through the mechanical offset to achieve precise zero adjustment.
精确设置零点：原点位置可通过机械偏移量进行原点微调，实现精确调零。

f) Automatically plan the return-to-origin trajectory: When the absolute value returns to the origin, the running trajectory is planned internally, which can avoid mechanical impact during the rapid return-to-origin process and effectively reduce overshoot.
自动规划回原点轨迹：绝对值回原点时，内部规划运行轨迹，在快速回原点过程中可避免机械冲击，有效减小过冲。

g) Multi-axis return-to-origin sequence can be set: In the case of multi-axis linkage, the order of each axis returning to origin can be set by setting the return-to-origin delay time to meet the requirements of different mechanical equipment for the return-to-origin sequence (when multi-axis linkage is set according to the timing requirements P16.27 absolute value return to origin delay time and P16.13 limited search origin time.
多轴回零顺序可设置：多轴联动场合，通过设置回原点延时时间可设置各个轴回原点先后顺序，满足不同机械设备对回原点先后顺序要求(多轴联动时根据时序要求设置P16.27绝对值回原点延时时间及P16.13限定查找原点时间。

The absolute encoder not only detects the position of the motor within 1 rotation, but also counts the number of revolutions of the motor. The single-turn resolution RE of the encoder is 131072 (217) or 8388608 (223), and can store 16-bit multi-turn data. The absolute value system composed of absolute value encoders is divided into absolute position linear mode and absolute position rotation mode, which can be used in position, speed and torque control modes. When the driver is powered off, the encoder backs up data through the battery. The driver calculates the mechanical absolute position through the encoder absolute position, eliminating the need to repeat the mechanical origin return operation.

绝对值编码器既检测电机在旋转1周内的位置，又对电机旋转圈数进行计数，编码器单圈分辨率$R_E$为131072($2^{17}$)或8388608($2^{23}$)，可记忆16位多圈数据。使用绝对值编码器构成的绝对值系统分为绝对位置线性模式和绝对位置旋转模式，在位置、速度和转矩控制模式下均可使用，驱动器断电时编码器通过电池备份数据，上电后驱动器通过编码器绝对位置计算机械绝对位置，无需重复进行机械原点复归操作。

The absolute value system requires the servo driver to match the absolute value encoder motor, and set P00.06 (absolute value system selection) according to the actual application. Err.51 (encoder battery failure) will occur when the battery is connected for the first time. You need to set P11.06=2 to reset the encoder failure before performing the mechanical origin setting operation. The mechanical origin information is stored in the driver EEPROM.

绝对值系统需要伺服驱动器匹配绝对值编码器电机，根据实际应用情况设置P00.06（绝对值系统选择）。初次接通电池时会发生Err.51（编码器电池故障），需设置P11.06=2复位编码器故障后再进行机械原点设置操作，机械原点信息存储在驱动器EEPROM中。

**Note 注：**

When modifying P00.01 (rotation direction selection) or P11.06 (absolute encoder reset enable) operation, the encoder absolute position will mutate, causing the mechanical absolute position reference to change, so the mechanical origin needs to be reset.

修改P00.01(旋转方向选择) 或P11.06（绝对编码器复位使能）操作时，编码器绝对位置会发生突变，导致机械绝对位置基准发生变化，因此需要重新设置机械原点。

### 5.6.2 Related function code setting 相关功能码设定

#### 1）Absolute value system setting 绝对值系统设置

Servo drive match with absolute encoder motor, selects absolute position mode through P00.06

伺服驱动器匹配绝对值编码器电机，通过 P00.06 选择绝对位置模式。

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|
| P00.06 | Absolute value system selects 绝对值系统选择 | 0- Gain position mode 增量位置模式<br>1- Absolute position linear mode 绝对位置线性模式<br>2- Absolute position rotation mode 绝对位置旋转模式 | Select absolute position mode 选择绝对位置模式 | Shutdown setting 停机设定 | Power on again 再次通电 | 0 |

**Note 注：**

• In absolute position mode, the system automatically detects whether the motor number is an absolute encoder motor. If the setting is wrong, "Err.06 Absolute position mode product matching failure" occurs.

绝对位置模式下，系统自动检测电机编号是否为绝对值编码器电机，如果设置错误，发生“Err.06绝对位置模式产品匹配故障”。r

#### 2）Absolute position linear mode 绝对值位置线性模式

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|
| P18.07 | Absolute position counter 绝对位置计数器 | - | In position mode, display current motor absolute position (command unit). 位置模式下，显示电机当前绝对位置（指令单位）。 | Display 显示 | - | 0 |
| P18.32 | Absolute value encoder motor single count value 绝对值编码器电机单圈计数值 | - | Absolute encoder feedback absolute position. 绝对值编码器反馈的绝对位置。 | Display 显示 | - | 0 |
| P18.34 | Absolute value encoder motor rotates number of turns 绝对值编码器电机旋转圈数 | - | | Display 显示 | - | 0 |
| P18.56 | Mechanical absolute position convert to motor single count value 机械绝对位置折算为电机单圈计数值 | - | In absolute position linear mode or absolute position rotation mode, the load position is converted to the motor end position PM. 绝对位置线性模式或绝对位置旋转模式下，负载位置换算至电机端的位置$P_M$。 $P_M = P18.58 \times R_E + P18.56$ | Display 显示 | - | 0 |
| P18.58 | Mechanical absolute position convert to motor rotate number of turns 机械绝对位置折算为电机旋转圈数 | - | | Display 显示 | - | 0 |

This mode is mainly used when the load stroke range of the equipment is fixed and the encoder multi-turn data will not overflow, as shown in the ball screw transmission mechanism as shown below.

此模式主要用于设备负载行程范围固定，编码器多圈数据不会溢出的场合，如下图滚珠丝杠传动机构。

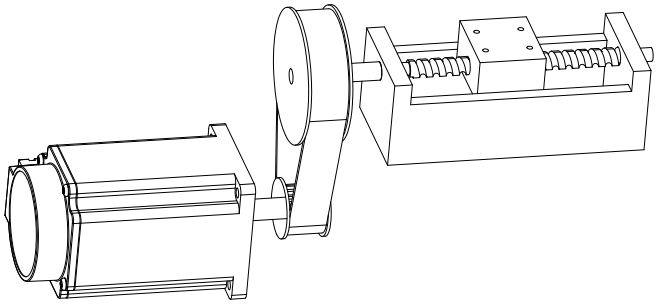


Figure 5-27 Schematic diagram of ball screw transmission mechanism
图5-27 滚珠丝杠传动机构示意图

Assume that the mechanical absolute position (P18.56 and P18.58) is PM, the encoder absolute position is PE [PE range is -238~ (238-1)], and the absolute position linear mode origin position (P16.19 and P16.21) is PO, then the relationship between the three is PM = PE - PO.

假设机械绝对位置(P18.56 和 P18.58)为 $P_M$，编码器绝对位置为 $P_E$【$P_E$ 范围为-$2^{38}$~($2^{38}$-1)】，绝对位置线性模式原点位置(P16.19 和 P16.21)为 $P_O$，则三者关系为 $P_M = P_E - P_O$。

Assuming the electronic gear ratio is B/A, the absolute position counter (P18.07) represents the current absolute position of the machine (command unit), P18.07 = PM*A/B.

假设电子齿轮比为 B/A，绝对位置计数器（P18.07）表示机械当前绝对位置（指令单位），$P18.07 = P_M*A/B$。

In absolute position linear mode, the mechanical origin position P16.19 and P16.21 default to 0. After rotating the motor to the desired mechanical origin position, by operating the drive origin return function, the drive automatically records the encoder information at the origin and assigns it to P16.19 and P16.19. P16.21 and stored in EEPROM.

绝对位置线性模式机械原点位置 P16.19 和 P16.21 默认为 0，将电机旋转至期望的机械原点位置后，通过操作驱动器原点复归功能，驱动器自动记录原点处编码器信息赋值给 P16.19 和 P16.21，并保存在 EEPROM 中。

The multi-turn data range of the absolute position linear mode encoder is -32768~32767. If the number of forward rotation turns is greater than 32767 or the number of reverse rotation turns is less than -32768, the Err.53 encoder multi-turn count overflow fault will occur. You can set P09.03 Shield this fault.

绝对位置线性模式编码器多圈数据范围是-32768~32767，如果正转圈数大于 32767 或反转圈数小于-32768，会发生 Err.53 编码器多圈计数溢出故障，可通过设置 P09.03 屏蔽该故障。

**3）Absolute value position rotate mode 绝对值位置旋转模式**

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P04.11 | Absolute position rotation mode mechanical gear ratio (numerator) 绝对位置旋转模式机械齿轮比（分子） | 1-1073741824 | 1 | The mechanical transmission gear ratio between load and motor in absolute position rotation mode, valid when P04.26=0 and P04.28=0. 绝对位置旋转模式下负载与电机的机械传动齿轮比，P04.26=0 且 P04.28=0 时有效。 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 4 |
| P04.13 | Absolute position rotation mode mechanical gear ratio (denominator) 绝对位置旋转模式机械齿轮比（分母） | 1-1073741824 | 1 | | Shutdown setting 停机设定 | Effective immediately 立即生效 | 1 |
| P04.26 | The number of pulses for one revolution of the load in absolute position rotation mode (lower 32 bits of the encoder unit) 绝对位置旋转模 | 0~4294967295 | Encoder unit 编码器单位 | In the absolute position rotation mode, the number of pulses RM of the motor end when the load rotates for one revolution. RM = P04.28×232 + P04.26 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 式负载旋转一圈的脉冲数（编码器单位低32位） | | | 绝对位置旋转模式下负载旋转一圈电机端转动的脉冲数 $R_M$。<br>$R_M$ = P04.28×$2^{32}$ + P04.26 | | | |
| P04.28 | The number of pulses for one revolution of the load in absolute position rotation mode (high 32 bits of the encoder unit)<br>绝对位置旋转模式负载旋转一圈的脉冲数（编码器单位高32位） | 0~ 127 | Encoder unit<br>编码器单位 | | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |
| P18.32 | Absolute encoder motor single-turn count value<br>绝对值编码器电机单圈计数值 | - | Encoder unit<br>编码器单位 | Absolute encoder feedback absolute position.<br>绝对值编码器反馈的绝对位置。 | Display<br>显示 | - | 0 |
| P18.34 | Absolute encoder motor rotation number<br>绝对值编码器电机旋转圈数 | - | Turns 圈 | | Display<br>显示 | - | 0 |
| P18.50 | Rotating load single-turn position (lower 32 bits)<br>旋转负载单圈位置（低32 位） | - | Encoder unit<br>编码器单位 | In the absolute position rotation mode, the position of the rotating load within one revolution is converted to the motor position at the motor end.<br>绝对位置旋转模式下，旋转负载1 圈内位置换算至电机端的电机位置。 | Display<br>显示 | - | 0 |
| P18.52 | Rotating load single-turn position (high 32 bits)<br>旋转负载单圈位置（高32 位） | - | Encoder unit<br>编码器单位 | | Display<br>显示 | - | 0 |
| P18.54 | Rotating load single turn position<br>旋转负载单圈位置 | - | Command unit<br>指令单位 | In the absolute position rotation mode, the position of the rotating load is within 1 circle.<br>绝对位置旋转模式下，旋转负载1 圈内位置。 | Display<br>显示 | - | 0 |
| P18.56 | The mechanical absolute position is converted into the motor single-turn count value<br>机械绝对位置折算为电机单圈计数值 | - | Encoder unit<br>编码器单位 | In absolute position linear mode or absolute position rotation mode, the load position is converted to the position of the motor end.<br>绝对位置线性模式或绝对位置旋转模式下，负载位置换算至电机端的位置。 | Display<br>显示 | - | 0 |
| P18.58 | The mechanical absolute position is converted into the number of motor rotations<br>机械绝对位置折算为电机旋转圈数 | - | Turns 圈 | | Display<br>显示 | - | 0 |

This mode is mainly used when the load stroke range of the equipment is not limited. When the power is off, the number of rotations of the motor in one direction is less than 32767, as shown in the figure below to rotate the load.

此模式主要用于设备负载行程范围不受限制，掉电时电机单方向旋转圈数小于 32767，如下图旋转负载。

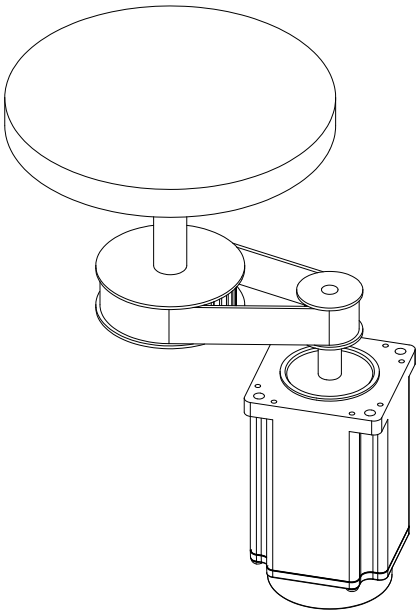


Figure 5-28 Rotation load schematic diagram
图5-28 旋转负载示意图

The drive internally calculates the mechanical absolute position upper limit using P04.26 and P04.28 first. When P04.26 and P04.28 are both 0, the mechanical gear ratio P04.11 and P04.13 are used for calculation. Assume that the number of encoder pulses corresponding to one revolution of the load is RM. When P04.26 or P04.28 is not equal to 0, RM=P04.28×232+P04.26; when P04.26 and P04.28 are both 0, RM =RE×P04.11/ P04.13.

驱动器内部计算机械绝对位置上限值优先使用P04.26、P04.28，当P04.26、P04.28均为0的情况下再使用机械齿轮比P04.11、P04.13计算。假设负载旋转一圈对应的编码器脉冲数为$R_M$，P04.26或P04.28不等于0 时，$R_M$=P04.28×$2^{32}$+ P04.26；P04.26、P04.28 均为0 时$R_M$=$R_E$×P04.11/ P04.13。

The corresponding relationship between the single-turn position of the rotating load and the position of the turntable is shown in the figure below.

旋转负载单圈位置与转台位置对应关系如下图所示。

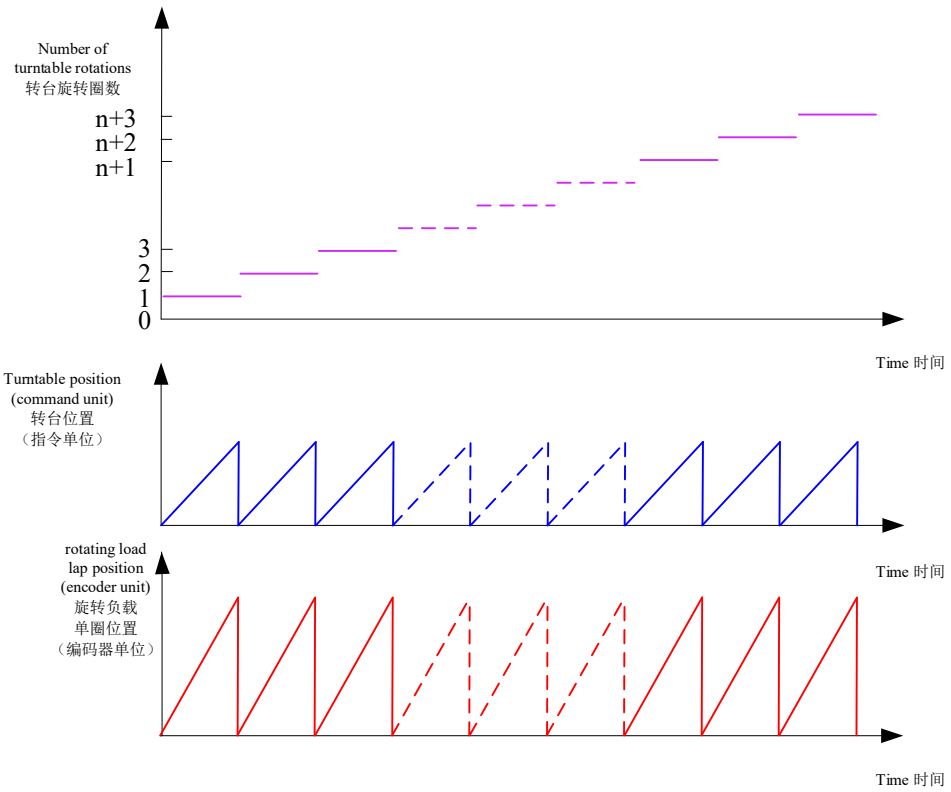



Figure 5-29 Corresponding relationship diagram of rotation load single position and turntable position
图5-29 旋转负载单圈位置与转台位置对应关系示意图

The multi-turn data range in absolute position rotation mode is unlimited, and the Err.53 encoder multi-turn count overflow fault is shielded.

绝对位置旋转模式多圈数据范围无限制，屏蔽 Err.53 编码器多圈计数溢出故障。

**4）Encoder multi-turns overflow fault selection 编码器多圈溢出故障选择**

In absolute position linear mode, set P09.03 to shield the encoder multi-turn overflow fault.

绝对位置线性模式下通过设置 P09.03 屏蔽编码器多圈溢出故障。

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P09.03 | Encoder multi-turn overflow fault selection 编码器多圈溢出故障选择 | 0- Not blocked 不屏蔽<br>8- Shield 屏蔽 | - | In absolute position linear mode, set P09.03 to shield the encoder multi-turn overflow fault.<br>绝对位置线性模式下通过设置P09.03屏蔽编码器多圈溢出故障。 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

**5）Absolute encoder reset operation 绝对编码器复位操作**

Reset the encoder internal fault or reset the encoder feedback multi-turn data by setting P11.06.

通过设置 P11.06 复位编码器内部故障或复位编码器反馈多圈数据。

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P11.06 | Absolute encoder reset enable 绝对编码器复位使能 | 0- No operation 无操作<br>1- Reset fault 复位故障 | - | Reset the encoder internal fault or reset the encoder feedback multi-turn data by setting P11.06.<br>通过设置P11.06复位编码器内部故障或复位编码器反馈多圈数据。 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2- Reset fault and multi-turns data<br>复位故障和多圈数据 | | | | | |

**Note 注：**

• After performing the operation of resetting the encoder feedback multi-turn data, the absolute position of the encoder suddenly changes, and a mechanical origin return operation is required.

执行复位编码器反馈多圈数据操作后，编码器绝对位置发生突变，需要进行机械原点复归操作。

### 5.6.3 Precautions for using the Absolute System Battery Box 绝对值系统电池盒使用注意事项

Err.51 (encoder battery failure) will occur when the battery is connected for the first time. You need to set P11.06=2 to reset the encoder failure before operating the absolute position system.

初次接通电池时会发生Err.51（编码器电池故障），需设置P11.06=2复位编码器故障，再进行绝对位置系统操作。

When the detected battery voltage is less than 3.2V, Err.95 (encoder battery warning) will occur. Please replace the battery. The replacement method is as follows:

当检测电池电压小于3.2V 时，会发生Err.95（编码器电池警告），请更换电池，更换方法如下：

●Step 1: The driver is powered on and in non-running state;

第一步：驱动器上电，处于非运行状态下；

●Step 2: Replace the battery;

第二步：更换电池；

●Step 3: After the driver automatically clears Err.95 (encoder battery warning), there will be no other abnormal warnings and it can run normally.

第三步：驱动器自动解除 Err.95（编码器电池警告）后，无其它异常警告，可正常运行。

**Note 注：**

• When the servo is powered off, Err.51 (encoder battery failure) will occur when the battery is replaced and the power is turned on again, and the multi-turn data mutates. Please set P11.06=2 to reset the encoder failure and perform the origin return function operation again.

在伺服掉电情况下，更换电池再次上电会发生Err.51（编码器电池故障），多圈数据发生突变，请设置P11.06=2复位编码器故障，重新进行原点复归功能操作；

• When the driver is powered off, please ensure that the maximum motor speed does not exceed 6000rpm to ensure that the encoder position information is accurately recorded;

驱动器掉电状态下，请确保电机最高转速不超过6000rpm，以保证编码器位置信息被准确记录；

• During storage, please store according to the specified ambient temperature, and ensure that the battery contact is reliable and the power is sufficient, otherwise the encoder position information may be lost.

存储期间请按规定环境温度存储，并保证电池接触可靠、电量足够，否则可能导致编码器位置信息丢失。

### 5.6.4 Absolute value origin function 绝对值原点功能

The absolute encoder not only detects the position of the motor within one revolution, but also counts the number of revolutions of the motor. It can memorize up to 16-bit multi-turn data. The absolute value mode can be used in position, speed and torque modes. When the drive is powered off, the absolute value encoder is powered by the battery and backs up data.

绝对值编码器既检测电机旋转 1 周内的位置，又对电机旋转圈数进行计数，最多可以记忆 16 位多圈数据。绝对值模式在位置，速度和转矩模式下均可以使用，驱动器断电时，绝对值编码器通过电池供电，备份数据。

**1)Function introduction 功能介绍**

Origin: In absolute value origin mode, the origin position is determined by P16.19 and 16.21.

Zero point: that is, the positioning target point, which can be expressed as the origin + offset (set by P16.14). When P16.14 is set to 0, the zero point coincides with the origin.

原点：绝对值原点模式下原点位置由 P16.19 以及 16.21 共同决定。

零点：即定位目标点，可表示为原点+ 偏移量(P16.14 设定)。当 P16.14 设为 0 时，零点与原点重合。

The origin return function refers to the function that in the position control mode, when the servo enable is ON, after the origin reset function is triggered, the servo motor will actively search for the zero point to complete positioning.

During the origin return operation, other position commands (including the re-triggered origin damper enable signal) are blocked; after the origin return operation is completed, the servo drive can respond to other position commands.

原点复位功能是指位置控制模式下，伺服使能为 ON 时，触发原点复位功能后，伺服电机将主动查找零点完成定位的功能。

原点复位运行期间，其他位置指令(包括再次触发的原点挡板使能信号) 均被屏蔽；原点复位运行完成后，伺服驱动器可响应其他位置指令。

**Absolute value origin operation 绝对值原点操作：**

④ Configure the origin-related DI/DO terminals, set P16.08 origin reset enable mode, origin reset mode P16.09=16 absolute value origin mode, P16.10 and P16.12 configure the return to origin speed and acceleration and deceleration time.
配置原点相关 DI/DO 端子、设置 P16.08 原点复位使能方式、原点复位模式 P16.09=16 绝对值原点模式、P16.10 及 P16.12 配置回原点速度及加减速时间；

⑤ Manually reset the motor position to the origin position, set P11.08=1 to update the current position to the origin position, and confirm whether the P16.19 and P16.21 positions are updated, and the servo is enabled.
将电机位置手动复位至原点位置，设置 P11.08=1 更新当前位置为原点位置，并确认 P16.19 及 P16.21 位置是否更新，伺服使能；

⑥ When the return to origin is enabled, the servo enters the return to origin state. After waiting for the return to origin to be completed, set P16.14 to fine-tune the origin position according to the actual situation.
回原点使能，伺服进入回原点状态，等待回原点完成后，根据实际情况，设置 P16.14 进行原点位置微调；

⑦ Repeat step ③ repeatedly until the origin position is accurate
反复重复步骤③直至原点位置准确；

⑧ When multi-axis linkage is performed, set P16.27 absolute value return-to-origin delay time and P16.13 limit search-to-origin time according to timing requirements.
多轴联动时根据时序要求设置 P16.27 绝对值回原点延时时间及 P16.13 限定查找原点时间。

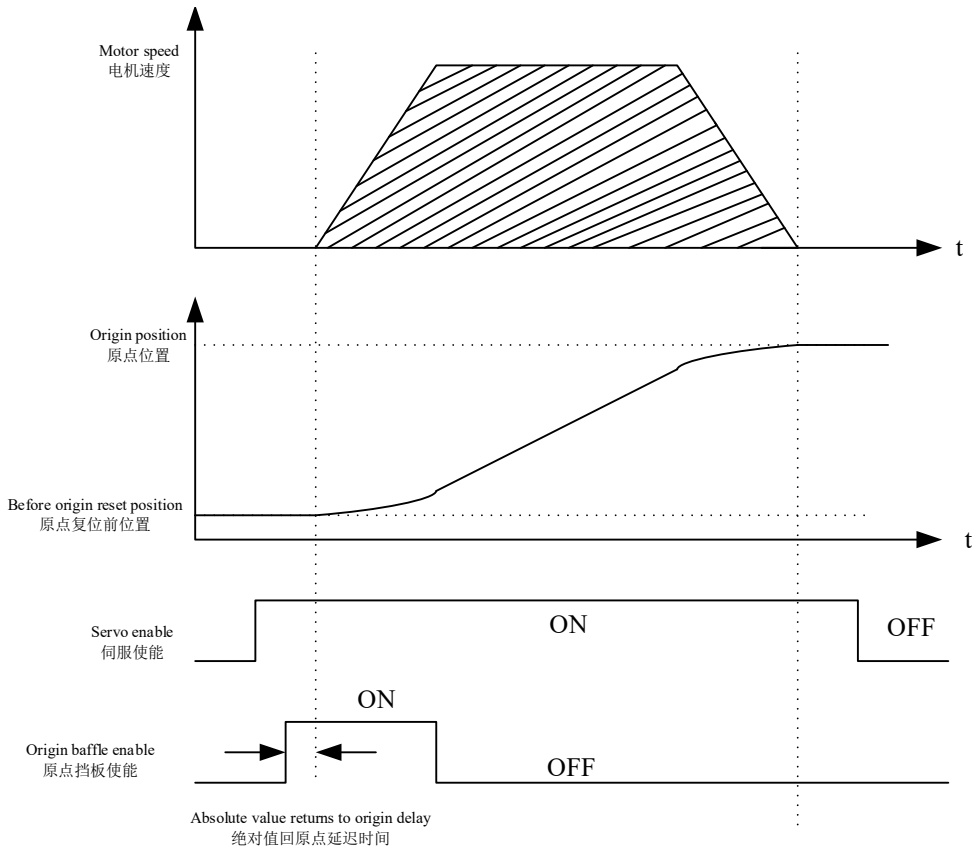



Figure 5-30 Absolute value origin return timing chart
图5-30 绝对值原点复位时序图

**2) Parameter settings 参数设置**

☆Related function code 关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Unit 单位 | Function 功能 | Setting method 设定方式 | Effective time 生效时间 | Factory setting 出厂设定 |
|---|---|---|---|---|---|---|---|
| P11.08 | Absolute value system origin setting 绝对值系统原点设置 | 0-无操作<br>1-设置当前位置为原点 | 1 | Update the origin position and set the update value to P16.19 and 16.21<br>更新原点位置并将更新值设定到 P16.19 及 16.21 | Running setting 运行设定 | Effective immediately 立即生效 | 0 |
| P16.08 | Origin return enable control 原点复位使能控制 | 0~6 | - | The setting is the origin return trigger mode.<br>设置是原点复位触发方式 | Shutdown setting 停机设定 | Power on again 再次通电 | 0 |
| P16.09 | Home return mode 原点复位模式 | 0~16 | - | 16：Absolute value return to origin mode<br>绝对值回原点模式 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 0 |
| P16.10 | High-speed search for original switch signal speed 高速搜索原电开关信号速度 | 0~3000 | rpm | Set the maximum speed of the motor when returning to the origin, regardless of the electronic gear ratio.<br>设置原点复位时电机最大速度，与电子齿轮比无关。 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 100 |
| P16.12 | Return to origin acceleration and deceleration time | 0~65535 | ms | Set the time for the motor speed to change uniformly from 0 to 1000rpm<br>设置电机速度由 0 匀变速到 1000rpm 的时间 | Shutdown setting 停机设定 | Effective immediately 立即生效 | 1000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 回原点加减速时间 | | | | | | |
| P16.13 | Limit the time to find the origin<br>限定查找原点的时间 | 0~65535 | ms | Set the specified time to complete the return to origin.<br>设置规定时间内完成原点复位 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 10000 |
| P16.14 | Mechanical origin offset<br>机械原点偏移量 | -1073741824~1073741824 | Unit | Set the absolute position value of the motor after return to origin<br>设置原点复位后电机绝对位置数值 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 10 |
| P16.19 | Absolute value origin single circle position<br>绝对值原点单圈位置 | 0~ Encoder resolution<br>编码器分辨率 | - | | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |
| P16.21 | Absolute value origin multi-turn data<br>绝对值原点多圈数据 | 0~65536 | - | | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |
| P16.27 | Absolute position return to origin delay time<br>绝对位置回原点延时时间 | 0~10000 | ms | After the return-to-origin function is enabled, wait for the time set by P16.27 before entering the origin reset.<br>回原点功能使能后，等待P16.27 设定时间后再进入原点复位 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |

☆Related function code 关联功能编号：

| No.编码 | Name 名称 | Function name 功能名 | Function 功能 |
|---|---|---|---|
| FunIN.33 | HOME_START | Origin baffle enable signal<br>原点挡板使能信号 | Valid, origin return starts<br>有效，原点复位开始 |
| FunOUT.19 | HOME_ATTAIN | Origin returns complete signal<br>原点回零完成信号 | Output after completion of origin return<br>原点回零完成后输出 |

### 5.6.5 Soft limit function 软限位功能

Traditional hardware limit function: In the traditional method, the limit position can only be given by an external signal, and the external sensor signal is connected to the CN1 interface of the servo driver.

传统硬件限位功能：传统方式中极限位只能通过外部信号给定，将外部传感器信号接入伺服驱动器 CN1 接口。

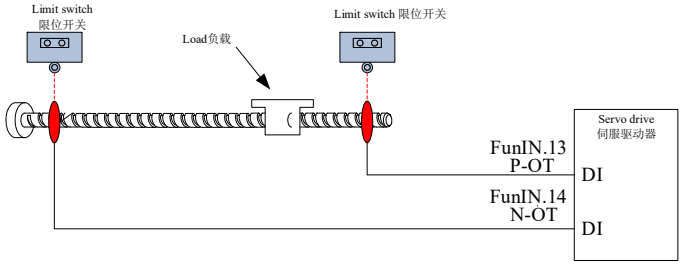



Figure 5-31 The installation diagram of limit switch
图5-31 限位开关的安装示意图

Soft limit function: refers to comparing the internal position feedback of the driver with the set limit value. When the limit value is exceeded, an alarm will be issued immediately and a shutdown operation will be executed.

软限位功能：指通过驱动器内部位置反馈与设置的限位值进行比较，当超出限位值后立即报警、执行停机操作。

**1）Comparison of the advantages and disadvantages of traditional hardware limit and software limit functions 传统硬件限位与软限位功能优劣势比较**

| Traditional hardware limit function 传统硬件限位功能 | | Soft limit function 软限位功能 | |
|---|---|---|---|
| 1 | Can only be limited to linear motion and single-turn rotation.<br>只能限定为线性运动、单圈旋转运动 | 1 | Can be used not only in linear motion, but also in rotation mode.<br>不仅可在线性运动中使用，在旋转模式下同样适用 |
| 2 | Requires external mechanical limit switch installation<br>需要外部具备安装机械限位开关 | 2 | No hardware wiring required to prevent malfunction caused by poor line contact.<br>无需硬件接线，防止线路接触不良导致误动作 |
| 3 | Unable to determine abnormal mechanical slippage<br>无法判断机械打滑异常 | 3 | Internal position comparison to prevent mechanical slippage and abnormal movement.<br>内部位置比较，防止机械打滑导致动作异常 |
| 4 | When the power is cut off, the machine moves out of the limit position and cannot judge or alarm. 当断电后，机械移出限位，无法判断、无法报警 | | |

**2）Soft limit related function codes 软限位相关功能码**

| Function code<br>功能码 | Name<br>名称 | Setting range<br>设定范围 | Unit<br>单位 | Function<br>功能 | Setting method<br>设定方式 | Effective time<br>生效时间 | Factory setting<br>出厂设定 |
|---|---|---|---|---|---|---|---|
| P11.07 | Absolute value system soft limit setting<br>绝对值系统软限位设置 | -1~1 | | 0：No operation 无操作<br>-1：The current position is the negative limit setting<br>当前位置为负限位设置<br>1：The current position is the positive limit setting<br>当前位置为正限位设置 | Running setting<br>运行设置 | Effective immediately<br>立即生效 | 0 |
| P16.30 | Soft limit setting<br>软限位设置 | 0- Disable soft limit 不使能软限位<br>1- Enable soft limit immediately after power on<br>上电后立即使能软限位 | 1 | Soft limit function selection.<br>软限位功能选择。 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |
| P16.31 | Positive soft limit encoder turns<br>正向软限位编码器圈数 | -32767~32767 | Turns 圈 | The soft limit function limits the absolute position in the positive direction.<br>软限位功能绝对位置正向限制。 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |
| P16.32 | Positive soft limit encoder single turn position<br>正向软限位编码器单圈位置 | 0~2147483647 | Encoder unit<br>编码器单位 | | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |
| P16.34 | Negative soft limit encoder turns<br>负向软限位编码器圈数 | -32767~32767 | Turns 圈 | The software limit function limits the absolute position in the negative direction.<br>软限位功能绝对位置负向限制。 | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |
| P16.35 | Negative soft limit encoder single-turn position<br>负向软限位编码器单圈位置 | 0~2147483647 | Encoder unit<br>编码器单位 | | Shutdown setting<br>停机设定 | Effective immediately<br>立即生效 | 0 |

● When P16.30=0, the software limit function is not enabled;

P16.30=0 时，不使能软限位功能；

● When P16.30=1, the software limit function is enabled immediately after the driver is powered on. When the absolute position of the motor P18.32 and 18.34 is greater than the positive limit value, an Err.86 warning occurs, and a positive overtravel stop is executed; when the absolute position of the motor P18.32, 18.34 is less than the negative limit value, an Err.87 warning occurs, and the execution Negative overtravel shutdown.

P16.30=1 时，驱动器上电后立即使能软限位功能。当电机绝对位置P18.32、18.34大于正向限制值时发生Err.86警告，执行正向超程停机；当电机绝对位置P18.32、18.34小于负向限制值时发生Err.87警告，执行负向超程停机。

# Chapter 6 Running performance adjustment
# 第六章运行性能调整

## 6.1 Overview 概述

Servo drive needs to drive the motor as quickly and accurately as possible to track the instructions from the host computer or internal settings. In order to meet this requirement, the servo gain must be reasonably adjusted.

伺服驱动器需要尽量快速、准确的驱动电机，以跟踪来自上位机或内部设定的指令。为达到这一要求，必须对伺服增益进行合理调整。

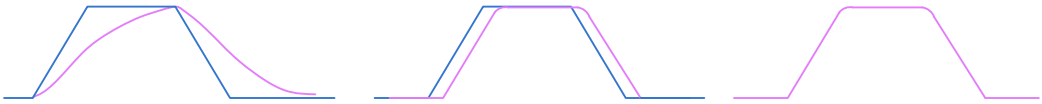


Figure 6-1 Gain setting example
图6-1 增益设定举例

| | | |
|---|---|---|
| Position loop gain<br>位置环增益：40.0Hz<br>Speed loop gain<br>速度环增益：200.0Hz<br>Speed loop integration time constant<br>速度环积分时间常数：100.00ms<br>Speed feed forward gain<br>速度前馈增益：0<br>Load to inertia ratio<br>负载惯量比：30 | Position loop gain<br>位置环增益：200.0Hz<br>Speed loop gain<br>速度环增益：25.0Hz<br>Speed loop integration time constant<br>速度环积分时间常数：50.00ms<br>Speed feed forward gain<br>速度前馈增益：0<br>Load to inertia ratio<br>负载惯量比：30 | Position loop gain<br>位置环增益：200.0Hz<br>Speed loop gain<br>速度环增益：25.0Hz<br>Speed loop integration time constant<br>速度环积分时间常数：50.00ms<br>Speed feed forward gain<br>速度前馈增益：50.0%<br>Load to inertia ratio<br>负载惯量比：30 |

The servo gain is set through a combination of multiple parameters (position loop, speed loop gain, filter, load inertia ratio, etc.), and they influence each other. Therefore, the servo gain setting must take into account the balance between each parameter setting value.

伺服增益通过多个参数(位置环、速度环增益，滤波器，负载转动惯量比等) 的组合进行设定，它们之间互相影响。因此，伺服增益的设定必须考虑到各个参数设定值之间的平衡。

**Note 注：**

Before performing gain adjustment, it is recommended to perform a jog test run first to confirm that the motor can operate normally!

在进行增益调整之前，建议先进行点动试运行，确认电机可以正常动作！

The general process of gain adjustment is shown in the figure below:

增益调整的一般流程如下图所示：

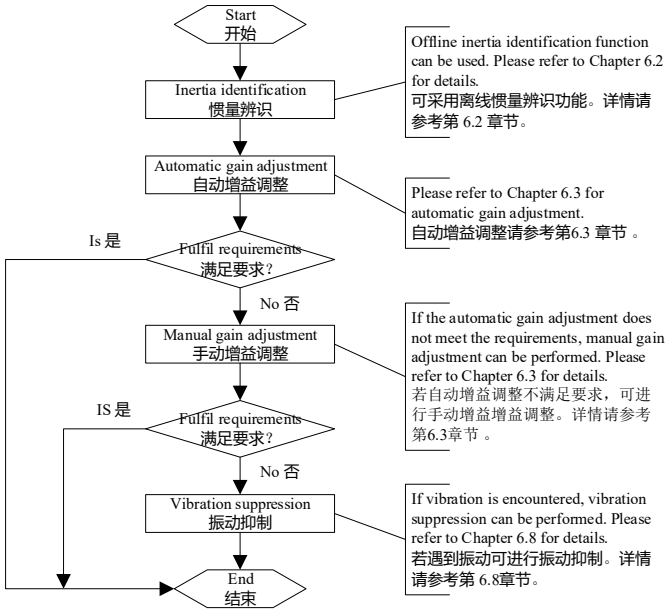



Figure 6-2 Gain adjustment process
图6-2 增益调整流程

## 6.2 Offline inertia identification 离线惯量辨识

$$\text{Load inertia ratio}=\frac{Total\ moment\ of\ inertia\ of\ mechanical\ load}{Motor's\ own\ moment\ of\ inertia}$$

$$\text{负载惯量比}=\frac{\text{机械负载总转动惯量}}{\text{电机自身转动惯量}}$$

The load inertia ratio is an important parameter of the servo system. Correctly setting the load inertia ratio helps to complete debugging quickly. The load inertia ratio can be set manually or automatically identified through the inertia identification function of the servo drive.

负载惯量比是伺服系统的重要参数，正确的设置负载惯量比有助于快速完成调试。负载惯量比可以手动设置，也可以通过伺服驱动器的惯量辨识功能自动识别。

Use the "rotating inertia identification function (P11.03)" to realize inertia identification by operating the buttons on the servo drive panel to rotate the motor without the intervention of the host computer, which is offline inertia identification.

使用“转动惯量辨识功能(P11.03)，通过操作伺服驱动器面板上的按键使电机旋转，实现惯量辨识，无需上位机的介入，即为离线惯量辨识。

**Note 注：**

To use the inertia identification function, in order to accurately calculate the load inertia ratio, the following conditions must be met:

使用惯量辨识功能，为准确计算负载惯量比，需满足以下条件：

•The actual motor maximum rotation speed is more than 200rpm; 实际电机最高转速高于 200rpm；

•When the actual motor accelerates and decelerates, the acceleration is above 3000rpm/s; 实际电机加减速时，加速度在 3000rpm/s 以上；

• The load torque is relatively stable and cannot change drastically; 负载转矩比较稳定，不能剧烈变化；

• The actual load to inertia ratio does not exceed 120 times; 实际负载惯量比不超过 120 倍；

If the actual load inertia ratio is large and the driver gain is low, the motor will move slowly and cannot meet the motor's maximum speed and acceleration requirements. In this case, the speed loop gain (P07.01) can be increased and the inertia identification can be performed again.

若实际负载惯量比很大而驱动器增益较低，将导致电机动作迟缓，不能达到电机最高转速要求和加速度要求，此时可增大速度环增益(P07.01)后重新进行惯量辨识。

If vibration occurs during the identification process, the inertia identification should be stopped immediately and the gain should be reduced. In addition, when the backlash of the transmission mechanism is large, the inertia identification may fail. Before performing offline inertia identification, first confirm the following:

辨识过程中若发生振动，应立刻停止惯量辨识，降低增益。此外，传动机构背隙较大时可能导致惯量辨识失效。进行离线惯量辨识前，首先确认如下内容：

**1) The movable stroke of the motor should meet the following two requirements 电机可运动行程应满足以下 2 个要求**

a）There is a movable stroke of more than 1 turn in the forward and reverse directions between the mechanical limit switches: before performing offline inertia identification, please make sure that the limit switch has been installed on the machine, and ensure that the motor has a movable stroke of more than 1 turn in the forward and reverse directions. Prevent overtravel from occurring during inertia identification and causing accidents!

在机械限位开关间有正反各1圈以上的可运动行程：进行离线惯量辨识前，请务必确保机械上已安装限位开关，并保证电机有正反各1圈以上的可运动行程，防止惯量辨识过程中发生超程，造成事故！

b）Meet requirement P08.24(Complete single inertia identification need motor rotation turns): Check the maximum speed of current inertia identification (P08.20), the time for speed up to maximum speed when inertia identification (P08.21), and complete the rotation turns needs by inertia identification (P08.24), make sure the movable stroke of motor at this stop position is more than the displayed value P08.24, or should reduce the P08.20 or P08.21 setting value, until meet this requirement.

满足P08.24(完成单次惯量辨识需电机转动圈数)要求：查看当前惯量辨识最大速度(P08.20)，惯量辨识时加速至最大速度时间(P08.21)，以及完成惯量辨识所需电机转动圈数(P08.24)，确保电机在此停止位置处的可运行行程大于P08.24显示值，否则应适当减小P08.20或P08.21设置值，直至满足该要求。

**2) Estimated load inertia ratio P00.05 value 预估负载惯量比 P00.05 数值**

If P00.05 is the default value (1.00) and the actual load inertia ratio is greater than 30.00, the motor may move slowly causing identification failure. In this case, the following two measures can be taken:

如果P00.05为默认值(1.00)，而实际负载惯量比大于30.00，可能会发生电机动作迟缓导致辨识失败，此时可采取以下两种措施：

a) The preset P00.05 is a larger initial value: it is recommended to use 5.00 times as the starting value for the preset value, and gradually increase it until the panel display value is updated during the identification process.
预置P00.05为一较大的初始值：预置值建议以5.00倍为起始值，逐步递增至辨识过程中面板显示值会随之更新为止。

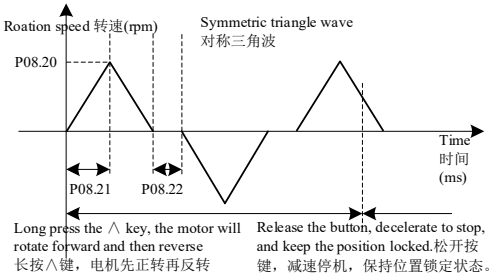
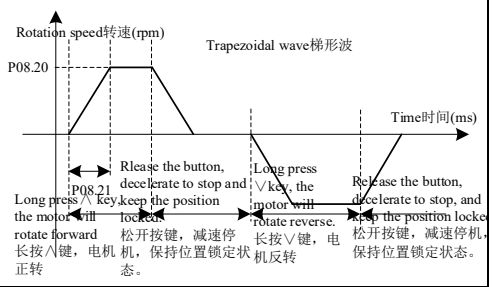
b) Appropriately increase the driver rigidity level (P00.04) so that the actual motor speed can reach the maximum speed of inertia identification (P08.20).

适当增大驱动器刚性等级(P00.04)以使电机实际转速能够达到惯量辨识最大速度(P08.20)。

Offline inertia identification is divided into two modes: positive and negative triangle wave mode and JOG jogging mode. The command forms of the two modes are different.

离线惯量辨识分为两种模式：正反三角波模式和 JOG 点动模式。两种模式的指令形式有所不同。

Table 6-1 Offline inertia identification method
表6-1 离线惯量辨识方法

| Project 项目 | Positive and negative triangle wave form 正反三角波形式(P08.23=0) | JOG jogging mode 点动模式(P08.23=1) |
|---|---|---|
| Command informs 指令形式 |  |  |
| Maximum speed 最大速度 | P08.20 | P08.20 |
| Acceleration and | P08.21 | P08.21 |

| Project<br>项目 | Positive and negative triangle wave form<br>正反三角波形式(P08.23=0) | JOG jogging mode 点动模式(P08.23=1) |
|---|---|---|
| deceleration time<br>加减速时间 | | |
| Intervals<br>间隔时间 | P08.22 | The time interval between two key operations before and after 前后两次按键操作时间间隔 |
| Number of motor rotations<br>电机旋转圈数 | Refer to 查看 P08.24 | Human control 人为控制 |
| Key Description<br>按键说明 | Long press the UP button: the motor first rotates forward and then reverses<br>Long press the DOWN key: the motor first rotates reversely and then rotates forward.<br>Release the button: stop at zero speed and keep the position locked state<br>长按UP 键：电机先正转后反转<br>长按DOWN 键：电机先反转后正转<br>松开按键：零速停机，保持位置锁定状态 | Press the UP key: the motor rotates forward<br>Press DOWN key: motor reverses<br>Release the button: stop at zero speed and keep the position locked state<br>按UP 键：电机正转<br>按DOWN 键：电机反转<br>松开按键：零速停机，保持位置锁定状态 |
| Applications<br>适用场合 | When the motor stroke is short<br>电机行程较短的场合 | The motor has a long stroke and can be controlled manually.<br>电机行程较长，可人为控制的场合 |

The general operation process of offline inertia identification is as follows:
离线惯量辨识的一般操作流程如下：

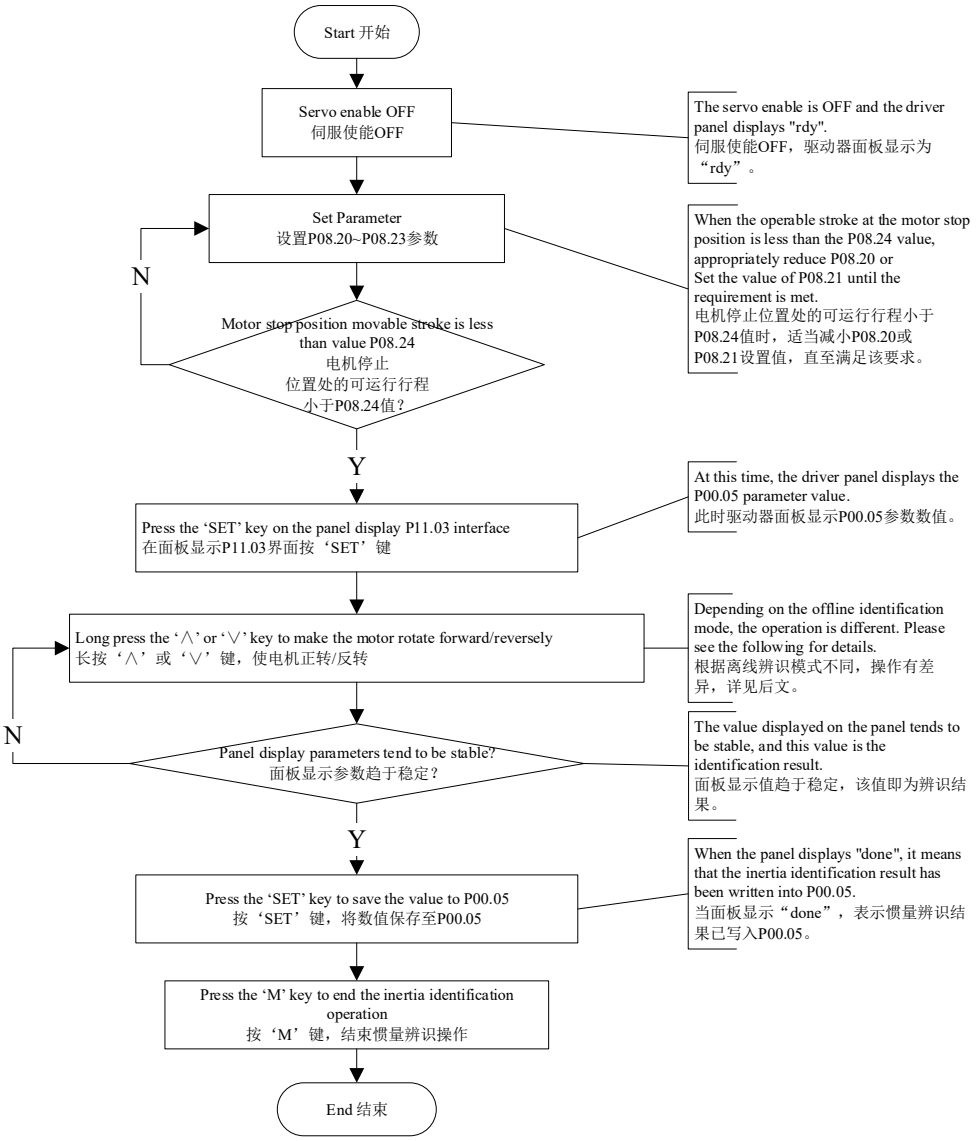



Figure 6-3 Offline inertia identification process
图6-3 离线惯量辨识流程

☆Related function code:关联功能码：

| Function code 功能码 | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Function 功能 | Factory setting 出厂设定 | Effective time 生效时间 | Setting method 设定方式 |
|---|---|---|---|---|---|---|---|
| P08.20 | Inertia identification maximum speed 惯量辨识最大速度 | 200~1000 | 1rpm | Set the maximum speed command of offline inertia identification设置离线惯量辨识的最大速度指令 | 500 | Effective immediately 立即生效 | Shutdown setting 停机设定 |
| P08.21 | Inertia identification accelerate and decelerate time 惯量辨识加减速时间 | 50~800 | 1 ms | Set the time for the motor to accelerate from 0rpm to the maximum speed of inertia identification (P08.20) under offline inertia identification. 设置离线惯量辨识下，电机从0rpm 加速至惯量辨识最大速度(P08.20) 的时间 | 100 | Effective immediately 立即生效 | Shutdown setting 停机设定 |
| P08.22 | Waiting time after single inertia identification | 100~10000 | 1ms | Set the time interval between two consecutive speed commands during offline inertia | 800 | Effective immediately 立即生效 | Shutdown setting 停机设定 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 单次惯量辨识完成后等待时间 | | | identification in positive and negative triangle wave mode.<br>设置正反三角波模式离线惯量辨识时连续两次速度指令间的时间间隔 | | | |
| P08.23 | Mode selection of inertia identification<br>惯量辨识模式选择 | 0- Positive and negative triangle wave pattern 正反三角波模式<br>1-JOG jogging mode 点动模式 | 1 | Set inertia identification mode<br>设置惯量辨识模式 | 0 | Effective immediately<br>立即生效 | Shutdown setting<br>停机设定 |
| P08.24 | Completed single inertia identification of motor revolutions<br>完成单次惯量辨识电机转动圈数 | 0-65535 | 0.01r | Display the number of turns required by the positive and negative triangle wave mode offline inertia identification motor<br>显示正反三角波模式离线惯量辨识电机所需转动的圈数 | 83 | - | - |

## 6.3 Gain adjustment 增益调整

### 6.3.1 PI parameter adjustment PI 参数调整

When the automatic gain adjustment cannot achieve the expected results, you can manually fine-tune the gain. Optimize the effect through more detailed adjustments. The servo system consists of three control loops, from outside to inside, the position loop, speed loop and current loop. The basic control block diagram is shown in the figure below.

在自动增益调整达不到预期效果时，可以手动微调增益。通过更细致的调整，优化效果。伺服系统由三个控制环路构成，从外向内依次是位置环、速度环和电流环，基本控制框图如下图所示。

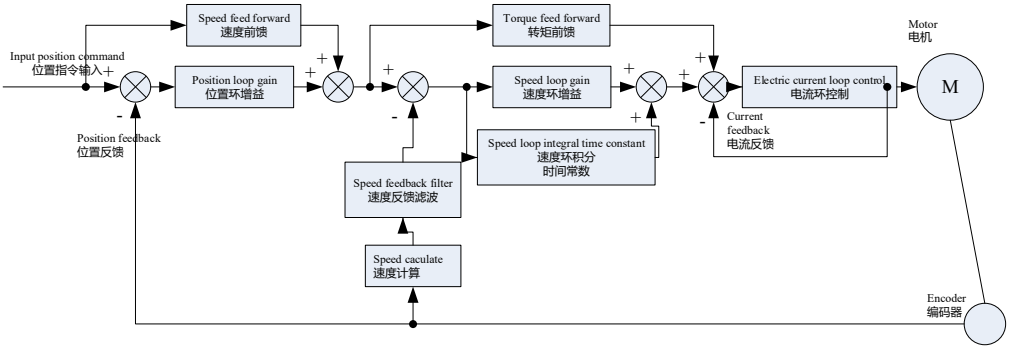
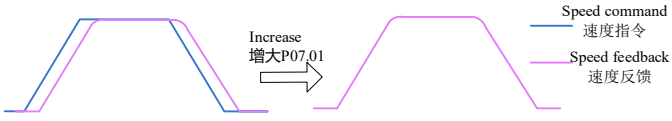


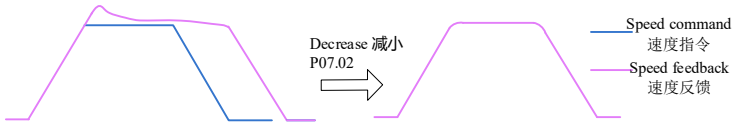
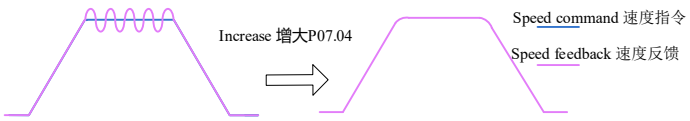

Figure Manual gain basic description diagram
图6-4手动增益基本说明框图

The default current loop gain of the servo driver has ensured sufficient responsiveness and generally does not need to be adjusted. Only the position loop gain, speed loop gains and other auxiliary gains need to be adjusted. Therefore, when performing gain adjustment in position control mode, in order to ensure system stability, while increasing the position loop gain, it is necessary to increase the speed loop gain and ensure that the response of the position loop is lower than the response of the speed loop. The basic gain parameter adjustment method is as follows.

伺服驱动器默认的电流环增益已确保了充分的响应性，一般无需调整，需要调整的只有位置环增益、速度环增益及其他辅助增益。因此，位置控制模式下进行增益调整时，为保证系统稳定，提高位置环增益的同时，需提高速度环增益，并确保位置环的响应低于速度环的响应，基本增益参数调整方法如下。

Table 6-2 Gain adjustment method
表6-2 增益调整方法

| Steps<br>步骤 | Function code<br>功能码 | Name<br>名称 | Adjustment description<br>调整说明 |
|---|---|---|---|
| 1 | P07.01 | Speed loop gain<br>速度环增益 | ◆Parameter function: 参数作用：<br>Determines the maximum frequency of changing speed commands that the speed loop can follow. 决定速度环能够跟随的，变化的速度指令最高频率。<br>Under the premise that the load inertia ratio (P00.05) is set correctly, it can be considered as:<br>在负载惯量比(P00.05) 设置正确的前提下，可认为：<br>Speed loop maximum following frequency =P07.01<br>速度环最高跟随频率=P07.01<br>  <br><br>◆ Adjustment method:调整方法：<br>In the range of not noise, vibration, increase this parameter, it can accelerate positioning time, bring more better speed stability and following ability;<br>在不发生噪声、振动的范围内，增大此参数，可加快定位时间，带来更好的速度稳定性和跟随性；<br>If noise occurs, reduce the parameter setting value.<br>发生噪音，则降低参数设定值。 |
| 2 | P07.02 | Speed loop integral time | ◆Parameter function 参数作用：<br>Eliminate speed loop deviation. 消除速度环偏差。 |

| | | | |
|---|---|---|---|
| | | constant 速度环积分时间常数 |  <br>◆Adjustment method:调整方法：<br>It is recommended to set the value according to the following relationship:<br>建议按以下关系取值：<br>500 ≤P07.01×P07.02 ≤ 1000<br>For example, speed loop gain, speed loop integral time constant should be meet: 例如，速度环增益P07.01=40.0Hz时，速度环积分时间常数应满足：<br>12.50ms ≤P07.02 ≤ 25.00ms。<br>Decreasing the set value can strengthen the integral effect and speed up the positioning time, but a set value that is too small can easily cause mechanical vibration. If the setting value is too high, the speed loop deviation will never be returned to zero.<br>减小设定值可加强积分作用，加快定位时间，但设定值过小易引起机械振动。设定值过高，将导致速度环偏差总不能归零。<br>When P07.02=512.00ms, the integral is invalid.<br>当 P07.02=512.00ms 时，积分无效。 |
| 3 | P07.00 | Position loop gain 位置环增益 | ◆Parameter function:参数作用：<br>Determines the highest frequency of position commands that the position loop can follow.<br>Position loop maximum following frequency =P07.00<br>决定位置环能够跟随的位置指令最高频率。<br>位置环最高跟随频率=P07.00<br>  <br>◆Adjustment method: 调整方法：<br>In order to ensure the stability of the system, it should be ensured that the maximum following frequency of the speed loop is 3~5 times the maximum following frequency of the position loop, therefore:<br>为保证系统稳定，应保证速度环最高跟随频率是位置环最高跟随频率的 3~5 倍，因此：<br>$$3 \le \frac{2\pi \cdot P07.01}{P07.00} \le 5$$<br>For example, when the speed loop gains P 07.01=40.Hz, the position loop gains should satisfy:<br>例如，速度环增益P07.01=40.Hz 时，位置环增益应满足：<br>50.2Hz ≤ P07.00≤ 83.7Hz。<br>Adjust according to positioning time. Increasing this parameter can speed up the positioning time and improve the ability of the motor to resist external disturbances when it is stationary.<br>根据定位时间进行调整。加大此参数，可加快定位时间，并提高电机静止时抵抗外界扰动的能力。<br>Setting the value too high may cause system instability and oscillation.<br>设定值过高可能导致系统不稳定，发生振荡。 |
| 4 | P07.04 | Torque command filter time constant 转矩指令滤波时间 | ◆Parameter function:参数作用：<br>Eliminate high-frequency noise and suppress mechanical resonance.<br>消除高频噪声，抑制机械共振。<br>  <br>◆Adjustment method:调整方法：<br>It should be ensured that the cutoff frequency of the torque command low-pass filter is higher than 4 times the highest following frequency of the speed loop, therefore:<br>应保证转矩指令低通滤波器的截止频率高于速度环最高跟随频率的 4 倍，因此：<br>$$\frac{1000}{2\pi \cdot P07.04} \ge (P07.01) \cdot 4$$<br>For example, when the speed loop gains P07.01=40.0Hz, the torque command filter time constant should satisfy:<br>例如，速度环增益P07.01=40.0Hz 时，转矩指令滤波时间常数应满足：<br>P07.04 ≤ 1.00ms。<br>When vibration occurs when P07.01 is increased, the vibration can be suppressed by adjusting P07.04;<br>If the setting value is too large, the response of the current loop will be reduced; |

| | | | |
|---|---|---|---|
| | | 常数 | 增大P07.01发生振动时，可通过调整P07.04抑制振动；<br>设定值过大，将导致电流环的响应降低；<br>To suppress vibration during shutdown, try increasing P07.01 and decreasing P07.04;<br>If the motor vibrates too much when it is stopped, try reducing the setting value of P07.04.<br>需抑制停机时的振动，可尝试加大P07.01，减小P07.04；<br>电机停止状态振动过大，可尝试减小 P07.04 设定值。 |

### 6.3.2 Feedforward gain adjustment 前馈增益调整

#### 6.3.2.1 Speed feed forward 速度前馈

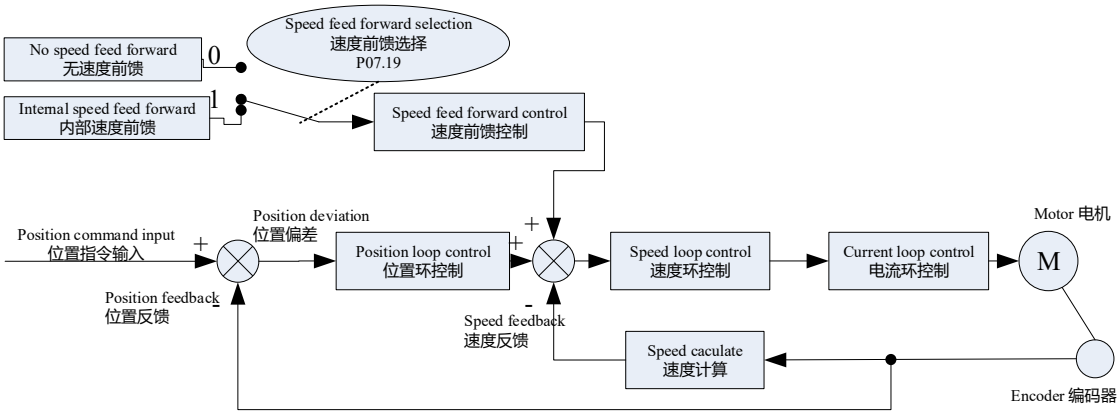



Figure 6-5 Speed feed forward control operation diagram
图6-5速度前馈控制操作图

**Speed feedforward is only available in position control mode.** Using the speed feedforward function can improve the speed command response and reduce the position deviation at a fixed speed.

**速度前馈仅适用于位置控制模式。**使用速度前馈功能，可以提高速度指令响应，减小固定速度时的位置偏差。

Speed feedforward function operation steps:

速度前馈功能操作步骤：

**a）Set the speed feedforward signal source 设置速度前馈信号来源**

Set P07.19 (speed feedforward control selection) to a non-0 value, the speed feedforward function takes effect, and the corresponding signal source is selected.

将 P07.19(速度前馈控制选择)置为非 0 值，速度前馈功能生效，且相应的信号来源被选中。

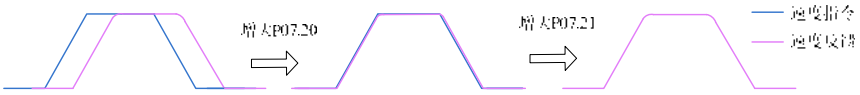
| Function code 功能码 | Name 名称 | Setting value 设定值 | Remarks 备注 |
|---|---|---|---|
| P07.19 | Speed feed forward 速度前馈 Control selection 控制选择 | 0- No speed feed forward 无速度前馈 | - |
| | | 1- Internal speed feedforward 内部速度前馈 | Use the speed information corresponding to the position command (encoder unit) as the source of the speed feedforward signal. 将位置指令(编码器单位)对应的速度信息作为速度前馈信号来源。 |
| | | 2- Use AI1 as velocity feedforward input 将 AI1 用作速度前馈输入 | Use the speed value corresponding to the analog input from analog channel AI1 as the speed feedforward signal source.将模拟通道AI1输入的模拟量对应的速度值作为速度前馈信号来源。<br>Please refer to AI1 parameter settings: P0304, P0305, P0306, P0314<br>AI1参数设置请参考：P0304、P0305、P0306、P0314 |
| | | 3- Use AI2 as velocity feed forward input 将 AI2 用作速度前馈输入 | Use the speed value corresponding to the analog input from analog channel AI2 as the speed feedforward signal source. 将模拟通道AI2输入的模拟量对应的速度值作为速度前馈信号来源。<br>Please refer to AI2 parameter settings: P0311, P0312, P0313, P0314<br>AI2参数设置请参考：P0311、P0312、P0313、P0314 |

**b）Set speed feed forward parameter 设置速度前馈参数**

Including speed feedforward gain (P07.20) and speed feedforward filter time constant (P07.21).

包括速度前馈增益(P07.20)和速度前馈滤波时间常数(P07.21)。

Table 6-3 Speed feed forward adjustment
表6-3 速度前馈调节

| Function code 功能码 | Name 名称 | Adjustment description 调整说明 |
|---|---|---|
| P07.20 | Speed feed forward gain 速度前馈增益 |  <br>◆Parameter function 参数作用：<br>Increasing P07.20 can improve the response, but speed overshoot may occur during acceleration and deceleration;<br>增大P07.20，可提高响应，但加减速时可能产生速度过冲；<br>Decreasing P07.21 can suppress the speed overshoot during acceleration and deceleration; increasing P07.21 can suppress the noise when the position command update cycle is longer than the drive control cycle and the pulse frequency of the position command is uneven. Jitter of positioning completion signal;<br>减小P07.21，可抑制加减速时的速度过冲；增大P07.21，可抑制位置指令更新周期与驱动器控制周期相比较长、位置指令的脉冲频率不均匀等情况下的噪音，抑制定位完成信号的抖动；<br>◆Adjustment method:调整方法：<br>First, set P07.21 to a fixed value; then gradually increase the value of P07.20 from 0 until the speed feedforward takes effect at a certain set value. When adjusting, you should repeatedly adjust P07.20 and P07.21 to find a setting with good balance.<br>首先，设定P07.21为一固定数值；然后将P07.20设定值由0逐渐增大，直至某一设定值下，速度前馈取得效果。调整时，应反复调整P07.20和P07.21，寻找平衡性好的设定 |
| P07.21 | Speed feed forward filter time constant 速度前馈滤波时间常数 | |

### 6.3.2.2 Torque feed forward: 转矩前馈：

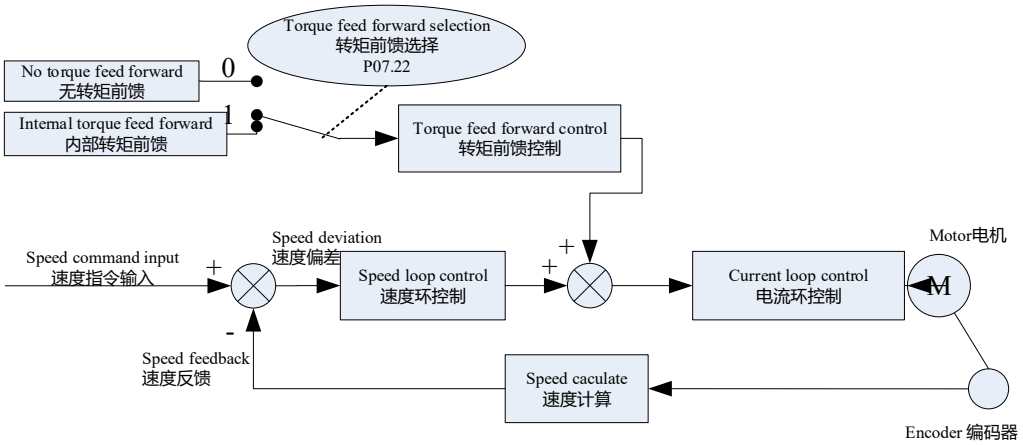



Figure 6-6 Torque feed forward control operation diagram
图6-6转矩前馈控制操作图

**Only applicable to non-torque control mode situations.** The position control mode uses torque feedforward, which can improve the torque command response and reduce the position deviation at fixed acceleration and deceleration. The speed control mode uses torque feedforward, which can improve the torque command response and reduce the position deviation at fixed speed. Speed deviation.

**仅适用于非转矩控制模式场合。**位置控制模式，采用转矩前馈，可以提高转矩指令响应，减小固定加减速时的位置偏差；速度控制模式，采用转矩前馈，可以提高转矩指令响应，减小固定速度时的速度偏差。

Speed feedforward function operation steps:
转矩前馈功能操作步骤：

**a）Set the source of torque feedforward signal 设置转矩前馈信号来源**

Set P07.22 (torque feedforward control selection) to a non-0 value, the torque feedforward function takes effect, and the corresponding signal source is selected.

将 P07.22(转矩前馈控制选择) 置为非 0 值，转矩前馈功能生效，且相应的信号来源被选中。

| Function code 功能码 | Name 名称 | Setting value 设定值 | Remarks 备注 |
|---|---|---|---|
| P07.22 | Control selection | 0- No torque feed forward 无转矩前馈 | - |

| | | | |
|---|---|---|---|
| | before torque feed forward 转矩前馈控制选择 | 1- Internal torque feed forward 内部转矩前馈 | The acceleration information corresponding to the speed command is used as the source of the torque feedforward signal.<br>将速度指令对应加速度信息作为转矩前馈信号来源。<br>In position control mode, the speed command comes from the output of the position controller.<br>位置控制模式下，速度指令来源于位置控制器的输出。 |

**b）Set torque feed forward parameter 设置转矩前馈参数**

| Function code 功能码 | Name 名称 | Adjustment description 调整说明 |
|---|---|---|
| P07.23 | Torque feed forward gain 转矩前馈增益 | ◆Parameter function参数作用：<br>Increasing P07.23 can improve the response, but overshoot may occur during acceleration and deceleration;<br>Decreasing P07.24 can suppress overshoot during acceleration and deceleration; increasing P07.24 can suppress noise;<br>增大P07.23，可提高响应，但加减速时可能产生过冲；<br>减小P07.24，可抑制加减速时的过冲；增大P07.24，可抑制噪音；<br>◆Adjustment method 调整方法：<br>When adjusting, first keep P07.24 as the default value; then gradually increase the setting value of P07.23 from 0 until the torque feedforward takes effect at a certain setting value.<br>When adjusting, P07.23 and P07.24 should be adjusted repeatedly to find a setting with good balance.<br>调整时，首先保持P07.24为默认值；然后将P07.23设定值由0逐渐增大，直至某一设定值下，转矩前馈取得效果。<br>调整时，应反复调整 P07.23 和 P07.24，寻找平衡性好的设定 |
| P07.24 | Torque feed forward filter time constant 转矩前馈滤波时间常数 | |

## 6.4 Command filter adjustment 指令滤波调整

### 6.4.1 Position command smoothing filter 位置指令平滑滤波器

Set the time constant of the primary delay filter for the position command.
设定针对位置指令的一次延迟滤波器的时间常数。

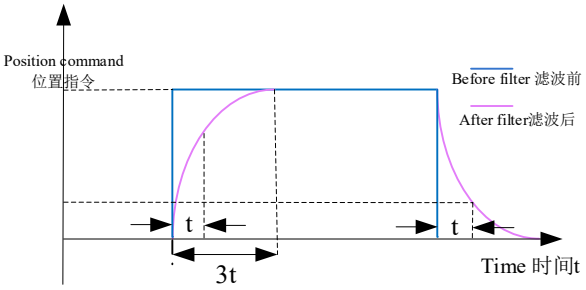



Figure 6-7 Schematic diagram of position command smoothing filter
图6-7 位置指令平滑滤波器示意图

☆Related function code 关联功能码：

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 03 | Position command smoothing filter 位置指令平滑滤波 | 0～65535 | 0.1ms | 0 | Effective immediatel y 立即生效 | Shutdown setting 停机设定 | P |

### 6.4.2 Position command FIR filter 位置指令 FIR 滤波器

Set the time constant of the FIR filter for the position command.
设定针对位置指令的 FIR 滤波器的时间常数。

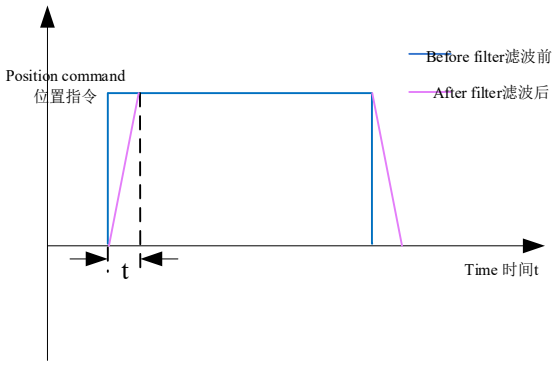



Figure Position command FIR filter diagram
图6-8 位置指令FIR滤波器示意图

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 04 | Position command FIR filter 位置指令 FIR 滤波 | 0.～1280 | 0.1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |

### 6.4.3 Position command long-term moving average filter 位置指令长时移动平均滤波器

Function: Filter the position command to make the machine run smoother and start and stop more smoothly. Its function is roughly similar to P04.04.

与此原文有关的更多信息要查看其他翻译信息，您必须输入相应原文作用：对位置指令进行滤波，使机械运行更平滑，起停更平稳，其作用大致与 P04.04 相类。

Parameters involved: 涉及到的参数：

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 17 | Moving average filter time constant filtering 移动平均滤波器时间常数滤波 | 0～10000 | 0.1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |

**Similar to P04.04: 与 P04.04 的相同点：**

1、The units are the same, both are 0.1ms; 单位相同，均为 0.1ms；

2、When the input position is given as trapezoidal acceleration and deceleration, the filter outputs S-shaped acceleration and deceleration. 当输入的位置给定为梯形加减速时，滤波器输出的 S 形加减速。

**Differences from P04.04: 与 P04.04 的不同点：**

1、The maximum effective duration that can be set for the filter time is different. The maximum effective duration of P04.17 is 1 second, and the maximum effective duration of P04.04 is much lower than this value; 滤波时间可以设置的有效最大时长不同，P04.17 最大有效时长为 1 秒，P04.04 的最大有效时长要远低于此值；

2、When the input position reference does not have acceleration or deceleration, the output of P04.17 filter is S-shaped acceleration and deceleration, and the output of P04.04 filter is trapezoidal acceleration and deceleration. 当输入的位置给定没有加减速时， P04.17 滤波器输出的为 S 形加减速，P04.04 滤波器输出的为梯形加减速。

**Disadvantage: It will cause position given lag, and the lag time is determined by the value of P04.17 and the input position command form.**

**缺点：**会造成位置给定滞后，滞后时长由 P04.17 的值以及输入的位置指令形态决定。

### 6.4.4 Vibration filter 减震滤波器

Function: Suppress low-frequency vibration within 0-200Hz

作用：抑制 0-200Hz 以内的低频震动

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 15 | Damping filter switch 减震滤波器开关 | 0：Turn off 关闭<br>1：Turn on 开启 | | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P08 | 16 | Damping filter frequency 减震滤波器频率 | 10~2000 | 0.1Hz | 2000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P08 | 17 | Damping filter selection 减震滤波器选择 | 0：Damping filter A 减震滤波器 A<br>1：Damping filter B 减震滤波器 B | | 1 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P08 | 18 | Damping filter A width 减震滤波器 A 宽度 | 0~200 | 1 | 4 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P08 | 19 | Damping filter B gain 减震滤波器 B 增益 | 0~100 | 1 | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |

Usage occasions: The equipment shakes during positioning movements.

使用场合：定位运动时设备产生晃动。

Debugging method: When encountering large shaking of the equipment, set P08.15 to turn on the vibration reduction filter switch, measure the vibration frequency through speed feedback, and set P08.16. Select different filters through P08.17. The smaller the width of the A-type filter, the more obvious the damping effect will be, and the longer the command delay will be. The greater the gain of type B filter, the more obvious the damping effect will be, and the longer the command delay will be.

调试方法：遇到设备产生较大晃动时，设置 P08.15 打开减震滤波器开关，通过速度反馈测量震动频率，设置 P08.16。通过 P08.17 选择不同滤波器，A 型滤波器宽度越小减震效果越明显，指令延时越长。B 型滤波器增益越大减震效果越明显，指令延时越长。

## 6.5 Instantaneous speed observer 瞬时速度观测器

**Function:** Help improve system response (rigidity)

**作用：**帮助提高系统响应（刚性）

Parameters involved: 涉及到的参数：

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P07 | 04 | Torque command filter 转矩指令滤波 1 | 0～10000 | 0.01ms | 126 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 39 | Instantaneous speed compensation switch 瞬时速度补偿开关 | 0-Turn off 关闭<br>1-Turn on 开启 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 40 | Instantaneous speed compensation gain 瞬时速度补偿增益 | 0~1000 | 1Hz | 300 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 41 | Instantaneous speed compensation gain compensation 瞬时速度补偿增益补偿 | 0~1000 | 0.01 | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PS |

Usage occasions: In structures with strong mechanical stiffness of the screw or rack, the belt structure is not suitable.

使用场合：在丝杆或齿条机械刚度较强的结构，皮带结构不适用。

Debugging method: In AS2, when the stiffness is increased and whistling occurs, set P08.39 to turn on the instantaneous speed observer. You can adjust and increase P08.40 appropriately to eliminate whistling and improve the rigidity level. You can increase it in conjunction with P07.04. minus adjustment.

调试方法：在 AS2 中，遇到提高刚性产生啸叫时，设置 P08.39 打开瞬时速度观测器，可适当调整增大 P08.40，可消除啸叫，提高刚性等级，可配合 P07.04 增减调整。

When encountering vibration that cannot be resolved, try turning off this instantaneous speed compensation.

当遇到无法解决的振动时，可尝试关闭此瞬时速度补偿。

## 6.6 Model compensation control 模型补偿控制

**Function:** Suppress positioning jitter and shorten positioning time.

**作用：**抑制定位抖动，缩短定位时间。

Parameters involved: 涉及到的参数：

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 45 | Model compensation switch 模型补偿开关 | 0-Turn off model compensation 关掉模型补偿<br>1-Rigidity model 刚性模型<br>3- Second-order vector model 二阶矢量模型 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 46 | Model compensation gain 模型补偿增益 | 10~20000 | 0.1/s | 300 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 50 | Model compensation vibration suppression frequency A 模型补偿抑振频率 A | 10~2500 | 0.1Hz | 500 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 51 | Model compensation vibration suppression frequency R 模型补偿抑振频率 R | 10~2500 | 0.1Hz | 500 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 52 | Model compensation speed compensation coefficient 模型补偿速度补偿系数 | 0-1000 | 0.1% | 1000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |

Model selection: 模型选择：

Turn on the model compensation function through P08.45 and select the model type.

通过 P08.45 打开模型补偿功能，并选择模型类型。

When P08.45 = 0, the model compensation function is turned off;

When P08.45 = 1, the model compensation function is turned on, and the model type is a rigid body model;

When P08.45 = 3, the model compensation function is turned on, and the model type is machine.

P08.45 = 0 时，关闭模型补偿功能；

P08.45 = 1 时，打开模型补偿功能，模型类型为刚体模型；

P08.45 = 3 时，打开模型补偿功能，模型类型为机台。

When using the model compensation function, please set P07.19 speed feedforward control selection and P07.22 torque feedforward selection to 0.

使用模型补偿功能时，请将 P07.19 速度前馈控制选择，P07.22 转矩前馈选择都设为 0。

**Model 1: Rigid body model**

**模型一：刚体模型**

Rigid body model: There is no elastic element connecting the motor shaft and the load. The most typical one is the motor shaft directly connected to the inertia plate (ideal rigid body does not exist).

刚体模型：电机轴与负载间没有任何弹性元件相联接，最典型的就是电机轴直联惯量盘（理想刚体不存在）。

An ideal rigid body will not have long-term positioning jitter. Positioning jitter can be effectively suppressed by adjusting the rigidity, the PID parameters of each loop, and adding filtering to the position command. If you want to achieve better results, you can set P08.45 to 1, turn on the model compensation function, and select the rigid body model.

理想刚体不会有长时的定位抖动。可通过调整刚性，各环路的 PID 参数，增加对位置指令的滤波等方式比较有效的抑制定位抖动。如想取得更好的效果，可将 P08.45 设为 1，打开模型补偿功能，并选择刚体模型。

Parameter adjustment under rigid body model: 刚体模型下的参数调整：

1、 Under the rigid body model, the parameters that often need to be adjusted are P08.46 and P08.52. In this mode, P08.50 and P08.51 are invalid.
刚体模型下，常需调整的参数为 P08.46 与 P08.52，在此模式下 P08.50 与 P08.51 无效。

2、 When you need to shorten the positioning time and speed up the response, please increase P08.46 and set P08.52 to 1000;
当需要缩短定位时间，加快响应时，请增大 P08.46，并将 P08.52 设为 1000；

3、 When it is necessary to emphasize jitter suppression, please reduce P08.46; when emphasis is placed on overshoot, please set P08.52 to a value less than 1000, and a more appropriate value is 900;
当需要强调抖动抑制时，请减小 P08.46；当注重超调时，请将 P08.52 设为小于 1000 的值，比较合适的为 900；

4、 When the forward and reverse responses are inconsistent, please adjust P08.48 and P08.49.

当正反转响应不一致时，请调整 P08.48 与 P08.49。

**Model 2: Machine model 模型二：机台模型**

Machine model: In most cases, it is a machine model, especially with a long swing arm, or a flexible system such as a belt.

机台模型：大多数场合都为机台模型，尤其是带有长的摆臂，或者皮带等柔性系统。

The most extreme case of positioning vibration in this situation is peripheral vibration, that is, long-term low-frequency vibration that occurs during the positioning process. By adjusting the rigidity, the PID parameters of each loop do not have a good effect. At this time, it is necessary to use the model compensation function and damping filter of the machine model to improve this problem.

这种情况的定位振动比较极端的情况就是末梢振动，即定位的过程中发生的长时的低频振动，通过调整刚性，各环路的 PID 参数没有很好的效果。此时，就需要使用机台模型的模型补偿功能与减震滤波器来改善此问题。

Parameter adjustment under the machine model (tip vibration suppression):

机台模型下的参数调整（末梢振动抑制）：

1、 Under the machine model, the parameters that often need to be adjusted are P08.46, P08.52, P08.50 and P08.51.
机台模型下，常需调整的参数为 P08.46，P08.52，P08.50 与 P08.51。

2、 When paying attention to overshoot, please set P08.52 to a value less than 1000, a more appropriate value is 900;
当注重超调时，请将 P08.52 设为小于 1000 的值，比较合适的为 900；

3、 When the forward and reverse responses are inconsistent, please adjust P08.48 and P08.49.
当正反转响应不一致时，请调整 P08.48 与 P08.49。

**Debugging process:**
**调试过程：**

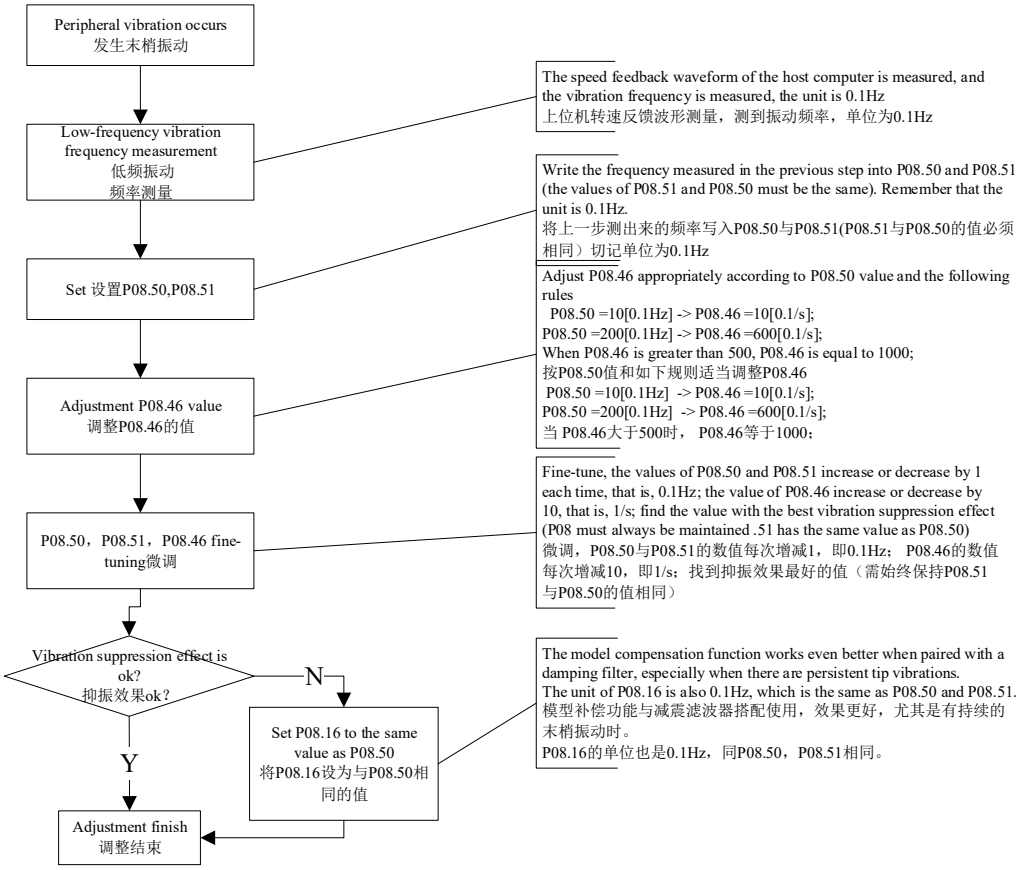



Figure 6-9 Model compensation debugging process
图6-9 模型补偿调试流程

**Note 注：**

If necessary, a vibration reduction filter must be used to suppress peripheral vibration.
末梢振动抑制必要时需搭配减震滤波器使用。

## 6.7 Adjustment parameters in different modes 不同模式下的调整参数

Parameter adjustments in different control modes must follow the sequence of "Inertia Identification" ==> "Automatic Gain Adjustment" ==> "Manual Gain Adjustment".

不同控制模式下的参数调整均需按照“惯量辨识”==>“自动增益调整”==>“手动增益调整”的顺序。

### 6.7.1 Parameter adjustment in position mode 位置模式下的参数调整

1）Through inertia identification, obtain the load inertia ratio P00.05:
通过惯量辨识，获取负载惯量比 P00.05：

2） Gain parameters in position mode:
位置模式下的增益参数：

① First gain:第一增益：

| Function code 功能码 | Name 名称 | Function 功能 | Default 默认值 |
|---|---|---|---|
| P07.00 | Position loop gain 位置环增益 | Set position loop proportional gain 设置位置环比例增益 | 48.0Hz |
| P07.01 | Speed loop gain 速度环增益 | Set speed loop proportional gain 设置速度环比例增益 | 50.0Hz |
| P07.02 | Speed loop integral time constant 速度环积分时间常数 | Set speed loop integral time constant 设置速度环的积分时间常数 | 12.00ms |
| P07.04 | Torque command filter time constant 转矩指令滤波时间常数 | Set torque command filter time constant 设置转矩指令滤波时间常数 | 1.26ms |

② Second gain:第二增益：

| Function code 功能码 | Name 名称 | Function 功能 | Default 默认值 |
|---|---|---|---|
| P07.05 | Second position loop gain 第二位置环增益 | Set position loop proportional gain 设置位置环比例增益 | 38.0Hz |
| P07.06 | Second speed loop gain 第二速度环增益 | Set speed loop proportional gain 设置速度环比例增益 | 18.0Hz |
| P07.07 | Second speed loop integral time constant 第二速度环积分时间常数 | Set speed loop integral time constant 设置速度环的积分时间常数 | 512.00ms |
| P07.09 | Second torque command filter time constant 第二转矩指令滤波时间常数 | Set torque command filter time constant 设置转矩指令滤波时间常数 | 1.26ms |
| P07.10 | DI function GAIN-SWITCH Switching action selection DI 功能 GAIN-SWITCH 切换动作选择 | Set GAIN-SWITCH switching action selection 设置 GAIN-SWITCH 切换动作选择 | 0 |
| P07.11 | Gain switching mode 增益切换模式 | Set the conditions for gain switching 设置增益切换的条件 | 0 |
| P07.12 | Gain switching delay 增益切换延时 | Set delay time for gain switching 设置增益切换的延迟时间 | 5.0ms |
| P07.13 | Gain switching level 增益切换水平 | Set gain switching level 设置增益切换的水平 | 50 |
| P07.14 | Gain switching hysteresis 增益切换回滞 | Set gain switch hysteresis 设置增益切换的回滞 | 33 |
| P07.15 | Position gain switching time 位置增益切换时间 | Set position loop gain switching time 设置位置环增益的切换时间 | 3.3ms |

Public gain:公共增益：

| Function code 功能码 | Name 名称 | Function 功能 | Default 默认值 |
|---|---|---|---|
| P07.03 | Speed feedback filter 速度反馈滤波 | Set speed feed forward filter time 设置速度反馈滤波时间 | 0.00ms |
| P07.16 | Pseudo-differential feedforward control coefficient 伪微分前馈控制系数 | Set PDFF control coefficient 设置 PDFF 控制器的系数 | 70.0% |
| P07.20 | Speed feed forward gain 速度前馈增益 | Set speed feed forward gain 设置速度前馈增益 | 0.0% |
| P07.21 | Speed feed forward filter time constant 速度前馈滤波时间常数 | Set speed feed forward signal filter time constant 设置速度前馈信号的滤波时间常数 | 0.50ms |
| P07.23 | Torque feed forward gain 转矩前馈增益 | Set torque feed forward gain | 0.0% |

| | | | |
|---|---|---|---|
| | | 设置转矩前馈增益 | |
| P07.24 | Torque feed forward filter time constant<br>转矩前馈滤波时间常数 | Set torque feed forward signal filter time constant<br>设置转矩前馈信号的滤波时间常数 | 0.50ms |

3) By setting the P00.04 rigidity level, automatic gain adjustment is performed to obtain the first gain (or second gain). If the rigid connection equipment of the screw and rack encounters whistling when the rigidity level is increased, the instantaneous speed observer (P08 .39) to increase the rigidity level.

通过设置 P00.04 刚性等级，自动增益调整，获得第一增益( 或第二增益) ，如在丝杆、齿条刚性连接设备遇到提升刚性等级产生啸叫，可开启瞬时速度观测器（P08.39），以提升刚性等级。

4）Manually fine-tune the following gains. If there are problems such as mechanical whistling, mechanical shaking, and tip jitter, you can use notch and model compensation control to optimize:

手动微调下述增益，如有机械啸叫或机械晃动及末梢抖动等问题，可使用陷波、模型补偿控制优化：

| Function code<br>功能码 | Name<br>名称 | Function<br>功能 |
|---|---|---|
| P07.00 | Position loop gain 位置环增益 | Set position loop proportional gain<br>设置位置环比例增益 |
| P07.01 | Speed loop gain 速度环增益 | Set speed loop proportional gain<br>设置速度环比例增益 |
| P07.02 | Speed loop integral time constant<br>速度环积分时间常数 | Set speed loop integral time constant<br>设置速度环的积分时间常数 |
| P07.04 | Torque command filter time constant<br>转矩指令滤波时间常数 | Set torque command filter time constant<br>设置转矩指令滤波时间常数 |
| P07.20 | Speed feed forward gain 速度前馈增益 | Set speed feed forward gain<br>设置速度前馈增益 |
| P07.21 | Speed feed forward filter time<br>速度前馈滤波时间 | Set speed feed forward command filter<br>设置速度前馈指令滤波 |

### 6.7.2 Parameter adjustment in speed mode 速度模式下的参数调整

Parameter adjustment in speed control mode is the same as that in position control mode. Except for the position loop gain (P07.00, P07.05), please adjust according to 6.7.1 "Parameter Adjustment in Position Mode".

速度控制模式下的参数调整与位置控制模式下相同,除位置环增益(P07.00、P07.05)外，请按6.7.1 “位置模式下的参数调整”调整。

### 6.7.3 Parameter adjustment in torque mode 转矩模式下的参数调整

Parameter adjustment in torque control mode needs to be distinguished according to the following situations:

转矩控制模式下的参数调整需要按以下情况进行区分：

When the actual speed reaches the speed limit value, the adjustment method is the same as 6.7.2 "Parameter adjustment in speed mode";

The actual speed has not reached the speed limit value. Except for the speed loop gain (P07.01, P07.06) and the speed loop integral time constant (P07.02, P07.07), the adjustment method is the same as the parameters in 6.7.2 "Speed mode" Adjustment".

实际速度达到速度限制值，调整方法同6.7.2“速度模式下的参数调整”；

实际速度未达到速度限制值，除速度环增益(P07.01、P07.06)与速度环积分时间常数(P07.02、P07.07)外，调整方法同 6.7.2“速度模式下的参数调整”。

## 6.8 Mechanical resonance suppression 机械共振抑制

The mechanical system has a certain resonance frequency. When the servo gain is increased, resonance may occur near the mechanical resonance frequency, causing the gain to be unable to continue to increase. There are two ways to suppress mechanical resonance:

机械系统具有一定的共振频率，伺服增益提高时，可能在机械共振频率附近产生共振，导

致增益无法继续提高。抑制机械共振有2种途径：

**1）Torque command filter 转矩指令滤波(P07.04，P07.09)**

By setting the filter time constant, the torque command is attenuated in the high-frequency band above the cutoff frequency to achieve the purpose of suppressing mechanical resonance.

通过设定滤波时间常数，使转矩指令在截止频率以上的高频段衰减，达到抑制机械共振的目的。

**2）Notch filter: 陷波器：**

The notch filter can suppress mechanical resonance by reducing the gain at specific frequencies. After correctly setting the notch filter, the vibration can be effectively suppressed, and you can try to continue to increase the servo gain. The principle of the trap is as shown below.

陷波器通过降低特定频率处的增益，可达到抑制机械共振的目的。正确设置陷波器后，振动可以得到有效抑制，可尝试继续增大伺服增益。陷波器的原理如下图。

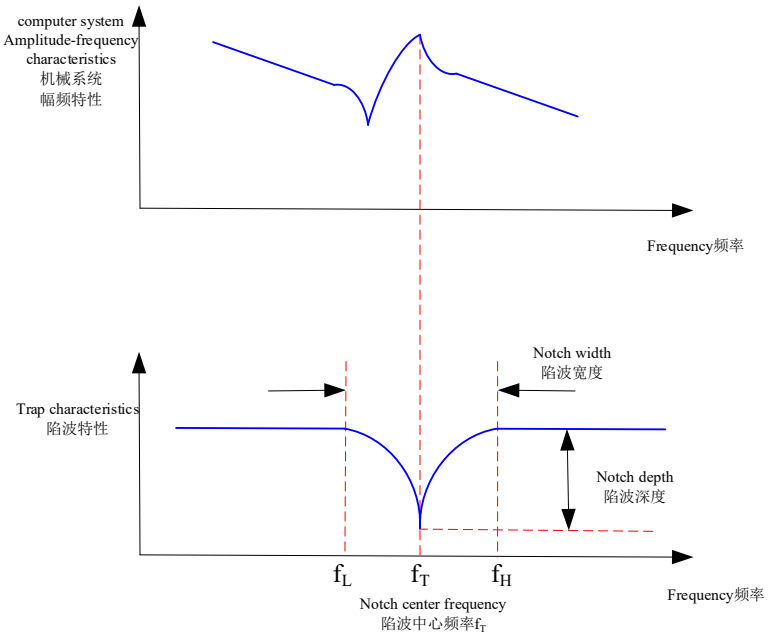



Figure 6-10 Principle of trap

图6-10 陷波器原理

The servo drive has a total of 2 sets of notches, and each set of notches has 3 parameters, namely notch frequency, width level and depth level. This notch is a manual notch, and each parameter is set manually by the user.

伺服驱动器共有 2 组陷波器，每组陷波器有 3 个参数，分别为陷波器频率，宽度等级和深度等级。此陷波器为手动陷波器，各参数由用户手动设置。

**Notch Width and Depth 陷波器宽度与深度**

The notch width is used to express the ratio of the notch frequency bandwidth to the notch center frequency:

陷波器宽度用于表示陷波器频率带宽和陷波器中心频率的比值：

$$\text{Notch width}=\frac{f_H-f_L}{f_T}$$

$$\text{陷波器宽度}=\frac{f_H-f_L}{f_T}$$

Among: 其中：

$f_T$：The center frequency of the trap, which is the mechanical resonance frequency. 陷波器中心频率，即机械共振频率

$f_H$-$f_L$：The notch frequency bandwidth represents the frequency bandwidth with an amplitude attenuation rate of -3dB relative to the notch center frequency. 陷波器频率带宽，表示相对于陷波器中心频率，幅值衰减率为-3dB 的频率带宽。

The notch depth rating represents the ratio of the output to the input at the center frequency. When the notch depth level is 0, the input is completely suppressed at the center frequency; when the notch depth level is 100, the input is completely passable at the center frequency. Therefore, the smaller the

notch depth level setting, the deeper the notch depth and the stronger the suppression of mechanical resonance. However, it may cause system instability, so you should pay attention when using it.

陷波器深度等级表示在中心频率处输出与输入之间的比值关系。陷波器深度等级为 0 时，在中心频率处，输入完全被抑制；陷波器深度等级为 100 时，在中心频率处，输入完全可通过。因此，陷波器深度等级设置越小，陷波深度越深，对机械共振的抑制也越强，但可能导致系统不稳定，使用时应注意。

Table 6-4 Notch filter parameter settings
表6-4 陷波器参数设置

| Notch width level<br>陷波宽度等级 | Bandwidth/center frequency<br>带宽/中心频率 |
|---|---|
| 0 | 0.5 |
| 1 | 0.59 |
| 2 | 0.71 |
| 3 | 0.84 |
| 4 | 1 |
| 5 | 1.19 |
| 6 | 1.41 |
| 7 | 1.68 |
| 8 | 2 |

| Notch Depth Level<br>陷波深度等级 | Output to input ratio<br>输出输入比 | [dB] represent<br>表示 |
|---|---|---|
| 0 | 0 | -∞ |
| 1 | 0.01 | -40 |
| 2 | 0.02 | -34 |
| 3 | 0.03 | -30.5 |
| 4 | 0.04 | -28 |
| 5 | 0.05 | -26 |
| 6 | 0.06 | -24.4 |
| 7 | 0.07 | -23.1 |
| 8 | 0.08 | -21.9 |
| 9 | 0.09 | -20.9 |
| 10 | 0.1 | -20 |
| 15 | 0.15 | -16.5 |
| 20 | 0.2 | -14 |
| 25 | 0.25 | -12 |
| 30 | 0.3 | -10.5 |
| 35 | 0.35 | -9.1 |
| 40 | 0.4 | -8 |
| 45 | 0.45 | -6.9 |
| 50 | 0.5 | -6 |
| 60 | 0.6 | -4.4 |
| 70 | 0.7 | -3.1 |
| 80 | 0.8 | -1.9 |
| 90 | 0.9 | -0.9 |
| 100 | 1 | 0 |

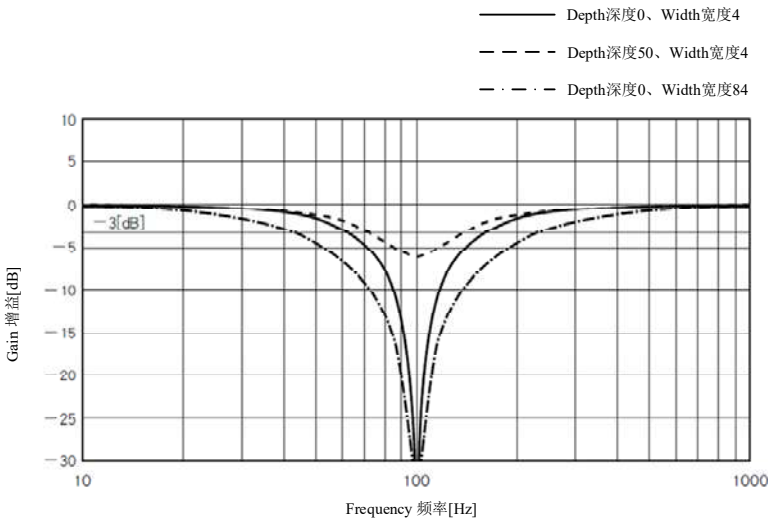



Figure 6-11 Notch filter frequency characteristics
图6-11 陷波器频率特性

**Steps to use the trap 陷波器使用步骤**

① Analyze resonant frequencies;分析共振频率；

When using a manual notch, the frequency of the notch needs to be set to the actual resonant frequency that occurs. How to obtain the resonant frequency: By setting P08.00=3, the resonant frequency is automatically tested when the servo is running, and the test results are saved in P08.01. After the test is completed, be sure to set P08.00 to 0.

使用手动陷波器时，需要将陷波器的频率设置为实际发生的共振频率。共振频率的获得方法：通过将 P08.00=3，伺服运行时，自动测试共振频率，并将测试结果保存在 P08.01 中，测试完成后务必将 P08.00 设置成 0。

② Input the resonant frequency obtained in step ① into the notch parameters of the selected group, and at the same time enter the width level and depth level of the notch group;
将第①步获取的共振频率输入选用组的陷波器参数，同时输入该组陷波器的宽度等级和深度等级；

③ If the resonance is suppressed, it means that the notch filter is effective. You can continue to adjust the gain. After the gain increases, if new resonance occurs, repeat steps ① ~ ②;
若共振得到抑制，说明陷波器取得效果，可继续调整增益，待增益增大后，若出现新的共振，重复步骤①～②；

④ If the vibration cannot be eliminated for a long time, please turn off the servo enable in time.
若振动长时间不能消除请及时关闭伺服使能。

☆Related function code 关联功能码

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 00 | Adaptive filter mode<br>自适应滤波器模式 | 0~5 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 01 | Resonance frequency<br>共振频率 | - | 1Hz | 0 | N/A | Display Param para 显示参数 | PST |
| P08 | 02 | 1st Notch Frequency (Manual)<br>第 1 陷波器频率（手动） | 10~4000 | 1Hz | 4000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 03 | 1st notch width<br>第 1 陷波器宽度 | 0~8 | 1 | 2 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 04 | 1st notch depth<br>第 1 陷波器深度 | 0~100 | 1 | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 05 | 2nd notch frequency (manual)<br>第 2 陷波器频率（手动） | 10~4000 | 1Hz | 4000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 06 | 2nd notch width<br>第 2 陷波器宽度 | 0~8 | 1 | 2 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 07 | 2nd notch depth<br>第 2 陷波器深度 | 0~100 | 1 | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

# Chapter 7 Auxiliary function
# 第七章辅助功能

## 7.1.JOG running 运行

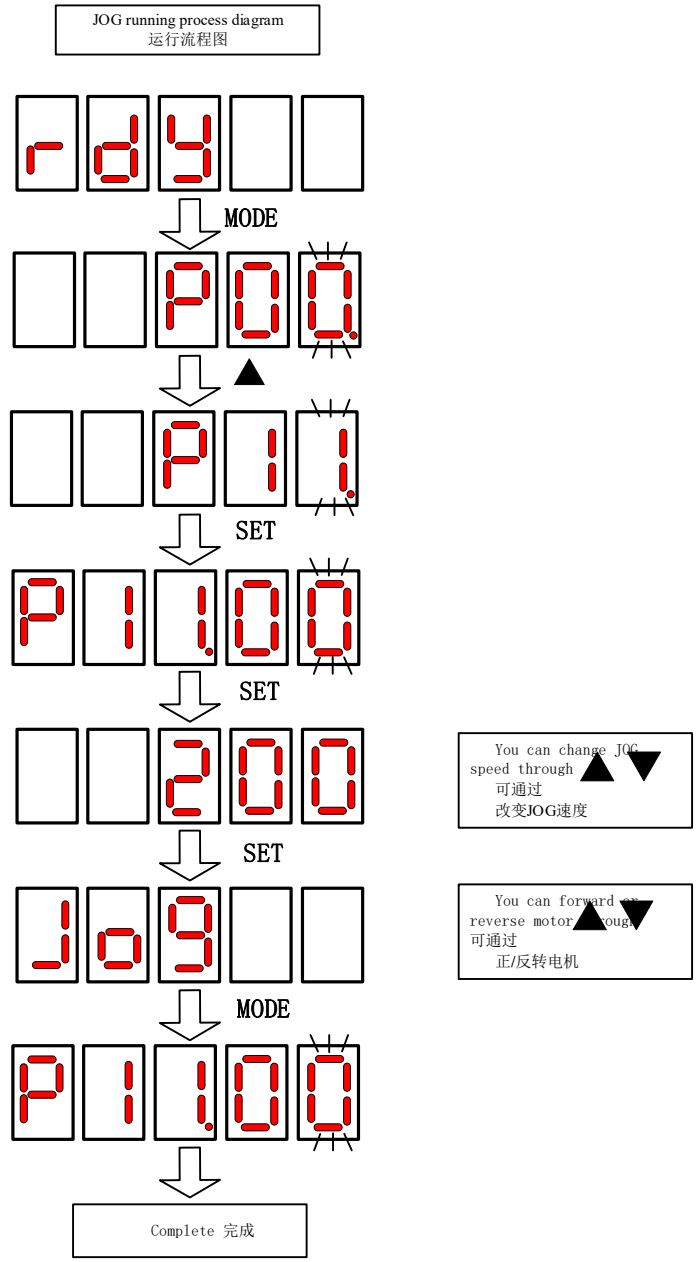



Diagram 7-1 JOG operation process
图7-1 Jog运行操作流程

## 7.2 Warning reset 报警复位

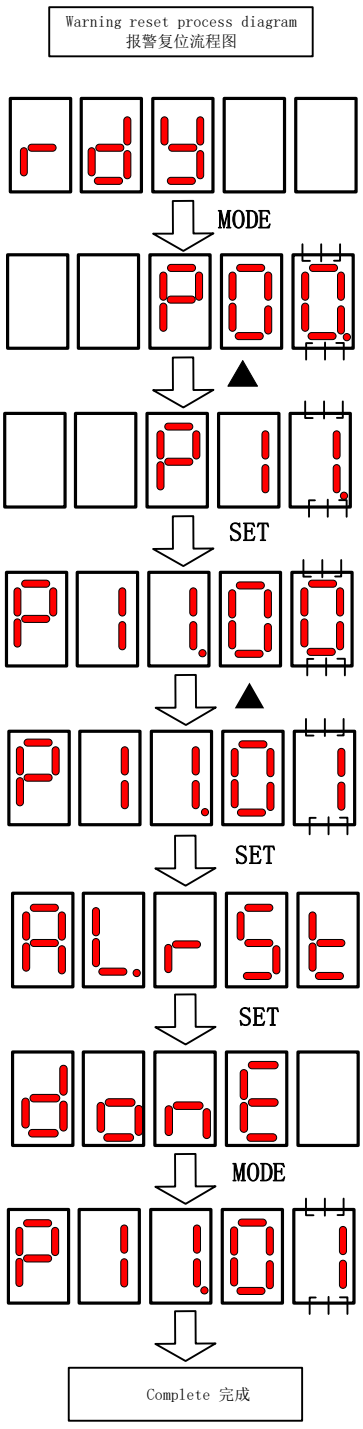



Figure 7-2 Warning reset running operation process
图7-2 报警复位运行操作流程

**Note 注：**

When an alarm occurs, please eliminate the cause of the alarm first, and then reset the alarm.
当发生报警时，请先排除报警原因，然后再进行报警复位操作。

## 7.3 Parameter initialization 参数初始化

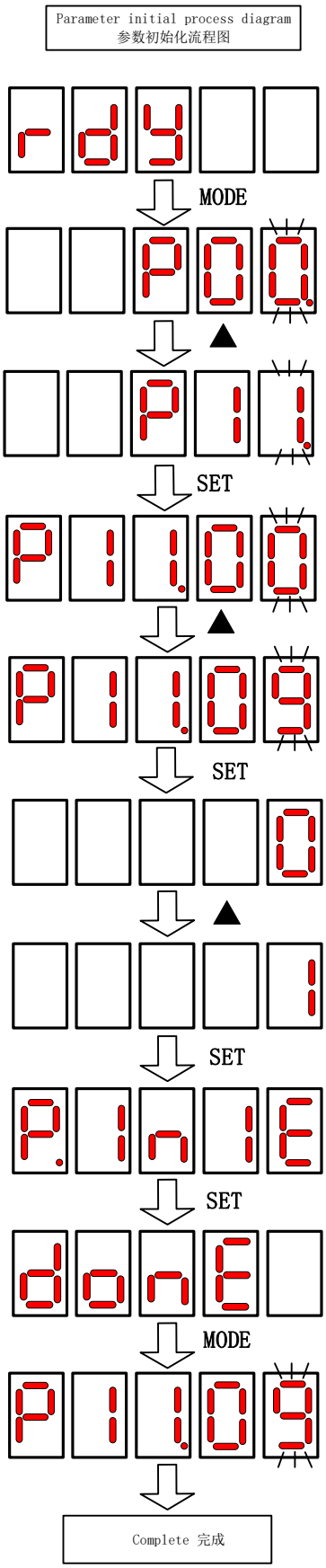



Figure 7-3 Parameter initialization operation process
图7-3 参数初始化操作流程

## 7.4 Digital signal forced input and output function 数字信号强制输入输出功能

The servo drive has a DI/DO forced input and output function. The forced DI input can be used to test the DI function of the drive, and the forced DO output can be used to check the DO signal connection between the host computer and the drive. When using the digital signal forced input and output function, the logic of physical DI and virtual DI is given by the forced input.

伺服驱动器具有DI/DO强制输入输出功能，其中，强制DI输入可用于测试驱动器DI功能，强制DO输出可用于检查上位机和驱动器间DO信号连接。使用数字信号强制输入输出功能时，物理DI与虚拟DI的逻辑均由强制输入给定。

### 7.4.1 DI signal forced input DI 信号强制输入

After this function is turned on, the level of each DI signal is only controlled by the setting of the forced input (P11-11) and has nothing to do with the status of the external DI signal.

此功能开启后，各 DI 信号电平仅受控于强制输入(P11-11) 的设置，与外界 DI 信号状态无关。

**1)Operation method 操作方法**

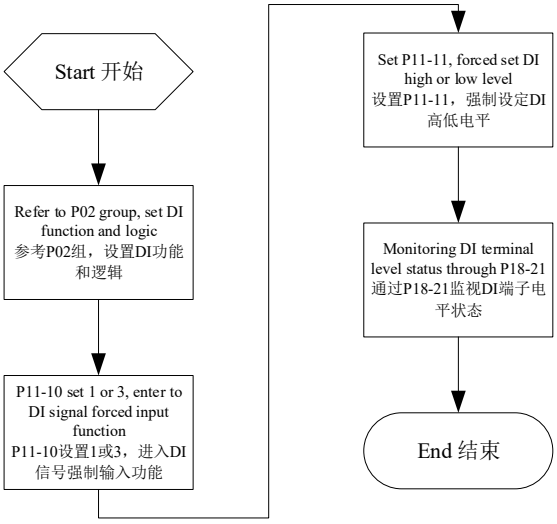



Figure 7-5 DI signal forced input set steps diagram
图7-5 DI 信号强制输入设定步骤示意图

Related function code 关联功能码

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Related mode 相关模式 |
|---|---|---|---|---|---|---|---|---|
| P11 | 10 | DIDO forced input output enable 强制输入输出使能 | 0- No operation 无操作<br>2- Forced DI enable 强制 DI 使能<br>3- Forced DO enable 强制 DO 使能<br>4- Forced DIDO enable 强制 DIDO 都使能 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P11 | 11 | DI forced input given 强制输入给定 | 0-0x01FF | 1 | 0x1FF | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P11 | 12 | DO forced output given 强制输出给定 | 0-0x001F | 1 | 0x00 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

Among them, P11-11 is used to forcefully set the DI level. It is displayed in hexadecimal on the panel. After converting to binary, "1" represents high level and "0" represents low level.

其中，P11-11 用于强制设定 DI 电平，面板上为十六进制显示，转化成二进制后，“1”表示高电平，“0”表示低电平。

Set the DI terminal logic selection through the P02 group parameters. P18-21 is used to monitor the level status of the DI terminal. The level is displayed on the panel. P18-21 read by the background software is a decimal number.

通过 P02 组参数设置 DI 端子逻辑选择。P18-21 用于监控 DI 端子电平状态，面板上为电平显示，后台软件读取的 P18-21 为十进制数。

For example:

The setting method of "the DI function corresponding to the DI1 terminal is valid, but the DI functions corresponding to the DI2~DI9 terminals are invalid" is as follows (the logic of the 9 DI terminals is "low level active"):

举例说明：

“DI1 端子对应的 DI 功能有效，而 DI2~DI9 端子对应的 DI 功能均无效”的设置方法如下(9 个 DI 端子逻辑均为“低电平有效”)：

Since "1" represents high level and "0" represents low level, the corresponding binary number is "111111110" and the corresponding hexadecimal number "1FE", so the "P11-11" parameter value can be set to " 1FE".

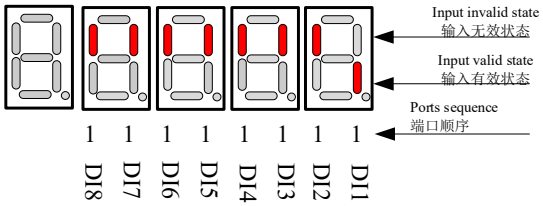
因“1”表示高电平，“0”表示低电平，则对应二进制为“111111110”，对应十六进制数“1FE”，因此可通过面板将“P11-11”参数值设为“1FE”。

P18-21 monitors DI level status:

If there is no fault in the DI function, the displayed value of P11-11 is always consistent with P18-21. Therefore, at this time, the panel shows that the DI1 terminal is in the input valid state, and the DI2~DI9 terminals are in the input inactive state.

P18-21 监控 DI 电平状态：

若 DI 功能无故障，P11-11 的显示值总是与 P18-21 一致。故此时面板上显示 DI1 端子为输入有效状态，DI2~DI9 端子为输入无效状态。




Displayed as follows:显示如下：

Figure 7-6 P18-21 corresponding DI valid status description
图7-6P18-21对应DI有效状态说明

**2) Exit function 退出功能**

The DI signal forced input function will not be remembered after a power outage. Normal DI can be restored when the power is turned on again, or it can be switched back to the normal DI mode by setting P11-10=0.

DI 信号强制输入功能在断电后不记忆，重新上电即可恢复正常 DI，或设定 P11-10=0 亦可切回正常 DI 模式。

### 7.4.2 DO signal forced output DO 信号强制输出

After this function is turned on, the level of each DO signal is only controlled by the setting of forced output (P11-12) and has nothing to do with the internal DO function status of the driver.

此功能开启后，各 DO 信号电平仅受控于强制输出(P11-12)的设置，与驱动器内部 DO 功能状态无关。

**1)Operation method 操作方法**

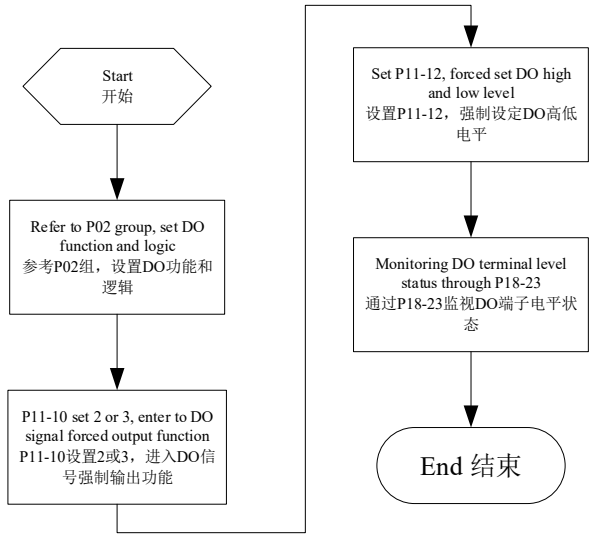



Figure 7-7 DO signal forced output setting steps diagram
图7-7DO信号强制输出设定步骤示意图

Among them, P11-12 is used to forcefully set whether the DO function is valid. It is displayed in hexadecimal on the panel. After converting to binary, "0" means that the DO function is invalid, "1" means that the DO function is valid, P18-23 Used to monitor DO level status, the level is displayed on the panel, and P18-23 is a decimal number.

其中，P11-12 用于强制设定 DO 功能是否有效，面板上为十六进制显示，转化成二进制后，“0”表示该 DO 功能无效，“1”表示该 DO 功能有效，P18-23 用于监控 DO 电平状态，面板上为电平显示，P18-23 为十进制数。

For example: The setting method of "the DO function corresponding to the DO1 terminal is invalid, and the DO functions corresponding to the DO2~DO5 terminals are all valid" is as follows:

举例说明：“DO1 端子对应的 DO 功能无效， DO2~DO5 端子对应的 DO 功能均有效”的设置方法如下：

Since "1" indicates that the DO function is valid and "0" indicates that the DO function is invalid, the corresponding binary number is "11110" and the corresponding hexadecimal number "1E", so the "P11-12" parameter value can be set through the panel. is "1E". Set the "P11-12" parameter value to "1E" through the panel.

因“1”表示该 DO 功能有效，“0”表示该 DO 功能无效，则对应二进制为“11110”，对应十六进制数“1E”，因此可通过面板将“P11-12”参数值设为“1E”。通过面板将“P11-12”参数值设为“1E”。

P11-23 monitors DO level status:

P11-23 监控 DO 电平状态：

Figure 7-8. DO terminal level display corresponding to P18-23

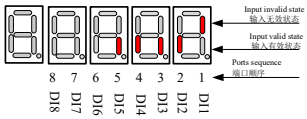



图7-8. P18-23对应的DO 端子电平显示

**2) Exit function 退出功能**

The DO signal forced input function will not be remembered after power off. Normal DO can be restored after power is turned on again, or it can be switched back to normal DO mode by setting P11-10=0.

DO 信号强制输入功能在断电后不记忆，重新上电即可恢复正常 DO，或设定 P11-10=0 亦可切回正常 DO 模式。

# Chapter 8 Fault and handle
# 第八章故障及处理

Servo drive alarm is divided into two levels 伺服驱动器警报等级分两个级别

Table 8-1 Alarm level
表8-1 报警级别

| Alarm level<br>报警级别 | Name<br>名称 | Meaning<br>代表含义 |
|---|---|---|
| Level 1 级别一 | Fault<br>故障 | The servo drive has a serious alarm and cannot work normally and needs to be shut down for processing. 伺服驱动器发生严重警报，不能正常工作，需停机处理。<br>DO terminal output ALM signal.<br>DO 端子输出 ALM 信号。 |
| Level 2 级别二 | Warn<br>警告 | Servo drive has a warn and not damage the device temporarily, but if not handled in time, it may cause a high-level fault output.伺服驱动器发生警告，暂时不会损坏设备，但如果不及时处理可能引起高级别的故障输出。<br>DO terminal output WARN signal.<br>DO 端子输出 WARN 信号。 |

## 8.1 Fault diagnosis and treatment measures 故障诊断及处理措施

The fault is divided into: 故障可分为：

a) Non-resettable NO.1 fault; 不可复位 NO.1 故障；
b) Resettable NO.1 fault; 可复位 NO.1 故障；
c) Resettable NO.2 fault; 可复位 NO.2 故障。

Among them, resettable means that after the fault is handled, you can set P11-01 to 1 or configure the DI function FunIN.2: ALM-RST alarm reset to clear the servo fault status.

其中，可复位表示故障处理后，此时可通过 P11-01 置 1 或配置 DI 功能 FunIN.2：ALM-RST 报警复位，清除伺服故障状态。

Non-resettable means that after the fault is handled, it is need to power on again.

不可复位表示故障处理后，需重新上电。

The shutdown method of fault NO.1、NO.2, NO.1 fault is free stop, maintain free running state, NO.2 fault is set by P00-12 function code.

NO.1、NO.2 故障的停机方式不同，NO.1 故障自由停车，保持自由运行状态，NO.2 故障由 P00-12 功能码设置。

Reset method for NO.1 and NO.2 resettable faults: first turn off the servo enable signal (S-ON is set to OFF), then set P11-01=1 or use DI function 2.

NO.1、NO.2 可复位故障的复位方法：先关闭伺服使能信号(S-ON 置为 OFF)，然后置 P11-01=1 或使用 DI 功能 2。

When the servo drive fails, the fault display "Er.xxx" will appear on the digital operator.

伺服驱动器发生故障时，数字操作器上会出现故障显示“Er.xxx”。

### 8.1.1 Non-resettable NO.1 fault 不可复位 NO.1 故障

Table 8-2 Non-resettable NO.1 fault
表8-2 不可复位NO.1故障

| **Fault NO. Er<br>故障编号 Er_** | **Fault name<br>故障名称** | **Fault reason<br>故障原因** | **Stopping method in case of fault<br>故障时的停止方法** | **Fault reset<br>故障复位<br>Is or No<br>可否** |
|---|---|---|---|---|
| 1 | Abnormal system parameters<br>系统参数异常 | The data of the internal parameters of the servo unit is abnormal.<br>伺服单元内部参数的数据异常 | No.1 | No 否 |
| 2 | Product model selection failure<br>产品型号选择故障 | Invalid drive model set<br>设置了无效的驱动器型号 | No.1 | No 否 |

| | | | | |
|---|---|---|---|---|
| 3 | Motor model selection failure<br>电机型号选择故障 | P01.00 function code sets an invalid motor code<br>P01.00 功能码设置了无效的电机代码 | No.1 | No 否 |
| 4 | Parameter storage fault<br>参数存储故障 | 1 Parameter storage device fault<br>参数存储设备故障<br>2 Parameters are read and written too frequently 参数读写过于频繁<br>3 Control power supply is unstable 控制电源不稳定<br>4 Drive fault 驱动器故障 | No.1 | No 否 |
| 5 | FPGA fault 故障 | 1 FPGA Initial abnormal 初始化异常<br>2 FPGA logic version abnormal 逻辑版本异常<br>3 FPGA detected abnormally 检测到异常 | No.1 | No 否 |
| 6 | Encoder matching fault<br>编码器匹配故障 | In absolute system mode (P00.06 function code is not equal to 0), use incremental or single-turn absolute encoder motors<br>在绝对值系统模式下（P00.06 功能码不等于 0），使用增量型或单圈绝对值编码器电机 | No.1 | No 否 |
| 7 | Control voltage undervoltage 控制电欠压 | Control power supply voltage is too low<br>控制电源电压过低 | No.1 | No 否 |
| 8 | Short circuit to ground detection fault<br>对地短路检测故障 | 1 Drive or motor parameter is incorrect;<br>驱动器或电机参数不正确；<br>2 UVW phase short circuit<br>UVW 相间短路；<br>3 The motor is burned out;<br>电机烧坏；<br>4 Motor short circuit to ground;<br>电机对地短路；<br>5 Drive fault;<br>驱动器故障； | NO.1 | No 否 |
| 9 | Overcurrent fault A<br>过流故障 A | 1 Drive or motor parameter is incorrect;<br>驱动器或电机参数不正确；<br>2 UVW phase short circuit;<br>UVW 相间短路；<br>3 Motor is burned out;<br>电机烧坏；<br>4 Motor short circuit to ground;<br>电机对地短路；<br>5 Drive fault;<br>驱动器故障； | NO.1 | No 否 |
| 10 | Overcurrent fault B<br>过流故障 B | 1 The servo motor wiring is abnormal;<br>伺服电机接线不正常；<br>2 The software detects overcurrent in the power transistor;<br>软件检测出功率晶体管过电流；<br>3 The servo motor wiring is abnormal;<br>伺服电机接线不正常； | No.1 | No 否 |
| 11 | Encoder disconnection fault 编码器断线故障 | Incremental encoder A/B/Z three-phase disconnection<br>增量型编码器 A/B/Z 三相存在断线 | No.1 | No 否 |
| 12 | Encoder AB signal abnormality<br>编码器 AB 信号异常 | Bus type encoder AB signal abnormality<br>总线型编码器 AB 信号异常 | No.1 | No 否 |
| 13 | Encoder verification exception<br>编码器校验异常 | 1 Bus type encoder data verification abnormality 总线型编码器数据校验异常<br>2 Incremental encoder zero point calibration abnormality 增量型编码器零点校验异常 | No.1 | No 否 |
| 14 | Motor initial angle detection abnormality<br>电机初始角检测异常 | There is interference in the encoder signal when the incremental encoder is powered on.<br>增量型编码器上电时编码器信号存在干扰 | No.1 | No 否 |
| 15 | Speeding problem<br>飞车故障 | 1 Motor UVW phase sequence setting error 电机 UVW 相序设置错误<br>2 UVW wiring is wrong 接线错误<br>3 Initial position or encoder parameter setting error<br>初始位置或编码器参数设置错误 | No.1 | No 否 |
| 16 | Current sampling fault | Current A/D sampling circuit failure | No.1 | No 否 |

| | | | | |
|---|---|---|---|---|
| | 电流采样故障 | 电流 A/D 采样电路故障 | | |
| 18 | Motor data verification fault<br>电机数据校验故障 | 1 Motor parameters are not written in the encoder EEPROM<br>编码器 EEPROM 中未写入电机参数<br>2 Motor parameter verification error<br>电机参数校验错误 | No.1 | No 否 |

### 8.1.2 Resettable NO.1 fault 可复位 NO.1 故障

Table 8-3 Resettable NO.1 fault
表8-3 可复位NO.1故障

| Fault NO. Er<br>故障编号 Er_ | Fault name<br>故障名称 | Fault reason<br>故障原因 | Stopping method in case of fault<br>故障时的停止方法 | Fault reset<br>故障复位<br>Is or No<br>可否 |
|---|---|---|---|---|
| 20 | Overvoltage 过电压 | 1 Main circuit DC voltage is abnormally high<br>主回路 DC 电压异常高 | No.1 | Is 可 |
| 21 | Undervoltage 欠电压 | 1 Main circuit DC voltage insufficient fault<br>主回路 DC 电压不足故障 | No.1 | Is 可 |
| 22 | Over speed 过速 | 1 The speed command exceeds the maximum speed setting value<br>速度指令超过了最高转速设定值<br>2 UVW phase sequence error<br>UVW 相序错误<br>3 Severe overshoot in speed response<br>速度响应严重超调<br>4 Drive fault<br>驱动器故障 | No.1 | Is 可 |
| 27 | DI terminal parameter setting fault<br>DI 端子参数设置故障 | Different DIs are assigned the same function repeatedly;<br>不同的 DI 重复分配了同一功能； | No.1 | Is 可 |
| 28 | DO terminal parameter setting fault<br>DO 端子参数设置故障 | Different DOs are assigned the same output repeatedly;<br>不同的 DO 重复分配了同一输出 | No.1 | Is 可 |
| 30 | Reference position fault<br>参考位置故障 | When use PTP function, not set P04.00=5<br>使用 PTP 功能时，未设置 P04.00=5 | No.1 | Is 可 |

### 8.1.3 Resettable NO.2 fault 可复位 NO.2 故障

Table 8-4 Resettable NO.2 fault
表8-4 可复位NO.2故障

| Fault NO. Er<br>故障编号 Er_ | Fault name<br>故障名称 | Fault reason<br>故障原因 | Stopping method in case of fault<br>故障时的停止方法 | Fault reset<br>故障复位<br>Is or No<br>可否 |
|---|---|---|---|---|
| 43 | Excessive position deviation fault<br>位置偏差过大故障 | In the servo ON state, the position deviation exceeds the excessive position deviation fault value (P09.09).<br>在伺服 ON 状态,位置偏差超出位置偏差过大故障值(P09.09) | No.2 | Is 可 |
| 44 | Main circuit input phase loss 主回路输入缺相 | When the power supply input is out of phase protection select parameter P09-00=0(Enable fault、inhabit warn) or P09-00=1(Enable fault and warn):<br>电源输入缺相保护选择参数 P09-00=0（使能故障、禁止警告）或 P09-00=1（使能故障和警告）时：<br>1 Three-phase input wiring is not good.<br>三相输入线接线不良<br>2 Three-phase drives operate on single-phase power<br>三相规格的驱动器运行在单相电源下 | No.2 | Is 可 |

| Fault NO. Er<br>故障编号 Er_ | Fault name<br>故障名称 | Fault reason<br>故障原因 | Stopping method in case of fault<br>故障时的停止方法 | Fault reset<br>故障复位<br>Is or No<br>可否 |
|---|---|---|---|---|
| 46 | Drive overload<br>驱动器过载 | The load operation exceeds the inverse time limit curve of the drive;<br>带载运行超过驱动器反时限曲线；<br>The UVW output may be out of phase or connected in wrong phase sequence;<br>UVW 输出可能缺相或相序接错； | No.2 | Is 可 |
| 47 | Motor overload<br>电机过载 | The load operation exceeds the reverse time limit curve of the drive;<br>带载运行超过电机反时限曲线；<br>The UVW output may be out of phase or connected in wrong phase sequence;<br>UVW 输出可能缺相或相序接错； | N0.2 | Is 可 |
| 48 | Motor stalled<br>电机堵转 | 1 Mechanical position is stuck, causing the motor current to continue to increase abnormally.<br>机械位置卡死导致电机电流持续异常升高<br>2 Dual-drive motors with gantry structure respond inconsistently<br>龙门结构双驱电机响应不一致 | N0.2 | Is 可 |
| 49 | Electronic gear setting error<br>电子齿轮设定错误 | Electric 电子齿轮比超过规格范围 | No.2 | Is 可 |
| 50 | Radiator overheated<br>散热器过热 | The servo unit radiator exceeds the set fault value 伺服单元散热器超过设定故障值 | No.2 | Is 可 |
| 51 | Encoder battery failure<br>编码器电池失效 | No battery is connected or the battery voltage is lower than 2.6V<br>没接电池或电池电压低于 2.6V | No.2 | Is 可 |
| 52 | Encoder multiturn count error<br>编码器多圈计数错误 | Absolute encoder multi-turn counting error<br>绝对值编码器多圈计数错误 | No.2 | Is 可 |
| 53 | Encoder multi-turn count overflow<br>编码器多圈计数溢出 | Absolute encoder multi-turn count overflow<br>绝对值编码器多圈计数溢出 | No.2 | Is 可 |
| 54 | Software limit setting error 软限位设置错误 | 1 The position between the positive/negative limits is too short 正/负限位间位置过短<br>2 When the motor runs in the positive direction counterclockwise, the positive limit value is smaller than the negative limit value.<br>当电机以逆时针方向为正方向运行时，正限位数值比负限位数值小<br>3 When the motor runs in the clockwise direction as the positive direction, the negative limit value is smaller than the positive limit value.<br>当电机以顺时针方向为正方向运行时，负限位数值比正限位数值小 | No.2 | Is 可 |
| 55 | Absolute value system setting error<br>绝对值系统设置错误 | Drive is not set to absolute system mode when absolute function is enabled<br>启用绝对值功能时未将驱动器设置为绝对值系统模式 | No.2 | Is 可 |

## 8.2 Reasons for warnings and handling measures 警告的原因及处理措施

Table 8-5 Reasons for warnings and handling measures
表8-5 警告原因及处理措施

| Warning NO. EE<br>警告编码 EE_ | Warning name<br>警告名称 | Warning reason<br>警告原因 |
|---|---|---|
| 81 | Drive overload warning<br>驱动器过载警告 | Fault when reaching 80% of the drive overload fault value<br>达到驱动器过载故障值的 80%时的故障 |
| 82 | Motor overload warning<br>电机过载警告 | Warning before motor failure, the warning value is determined by P09_05 电机即将故障前的警告，警告值由 P09_05 决定 |

| Warning NO.<br>EE<br>警告编码<br>EE_ | Warning name<br>警告名称 | Warning reason<br>警告原因 |
|---|---|---|
| 83 | Parameter changes need to be powered on again to take effect.变更参数需要重新接通电源生效 | Parameters that require power cycle have been changed<br>变更了需要重新接通电源的参数 |
| 84 | Reset encoder warning prompt<br>复位编码器警告提示 | Perform encoder reset operation in enabled state<br>使能状态下进行编码器复位操作 |
| 86 | Forward overtravel warning prompt 正向超程警告提示 | The forward overtravel switch POT terminal is valid<br>正向超程开关 POT 端子有效 |
| 87 | Negative overtravel warning prompt 负向超程警告提示 | The NOT terminal of the negative overtravel switch is valid<br>负向超程开关 NOT 端子有效 |
| 88 | Frequency division pulse output setting failure<br>分频脉冲输出设定故障 | The number of encoder frequency division pulses does not meet the set conditions or range.<br>编码器分频脉冲数不符合设定条件或范围 |
| 89 | AI1\ AI2 Zero drift is too large 零漂过大 | AI1\ AI2 Zero drift is too large 零漂过大 |
| 90 | Braking resistor overload<br>制动电阻过载 | The power of the external regeneration bleeder resistor is too small.<br>外接再生泄放电阻功率过小 |
| 91 | The external regeneration bleeder resistor is too small<br>外接再生泄放电阻过小 | The external regenerative bleeder resistor is smaller than the minimum value required by the driver or the parameter setting is wrong.<br>外接再生泄放电阻小于驱动器要求的最小值或参数设置错误 |
| 92 | RS485 communication error<br>通讯错误 | RS485 communication fault 通讯故障 |
| 93 | Prohibit in enable status<br>使能状态下禁止操作 | 1 Operate JOG test run in enabled state 使能状态下操作 JOG 试运行<br>2 Operational moment of inertia identification in enabled state<br>使能状态下操作转动惯量辨识 |
| 94 | DI stop emergency<br>紧急刹车 | External emergency brake E_STOP terminal triggers<br>外部紧急刹车 E_STOP 端子触发 |
| 95 | Absolute encoder battery low<br>绝对值编码器电池电量低 | Battery voltage is lower than 3.2V<br>电池电压低于 3.2V |
| 96 | Return to origin timeout<br>回原点超时 | 1 Origin switch fault 原点开关故障<br>2 The time limit for finding the origin is too short<br>限定查找原点的时间过短<br>3 The speed of high-speed search for origin switch signal is too small<br>高速搜索原点开关信号的速度过小 |
| 97 | Mechanical origin offset error 机械原点偏移量错误 | 1 When the origin returns mode parameter P16-09=6 or P16-09=8 or P16-09=14, the setting value of the mechanical origin offset parameter P16-14 is greater than 0<br>原点复位模式参数 P16-09=6 或 P16-09=8 或 P16-09=14 时，机械原点偏移量参数 P16-14 设置值大于 0<br>2 When the origin returns mode parameter P16-09=7 or P16-09=9 or P16-09=15, the setting value of the mechanical origin offset parameter P16-14 is less than 0<br>原点复位模式参数 P16-09=7 或 P16-09=9 或 P16-09=15 时，机械原点偏移量参数 P16-14 设置值小于 0 |
| 98 | Main circuit input phase loss<br>主回路输入缺相 | When the power input phase loss protection selection parameter P09-00=1 (enable fault and warning), for drives with rated power of 0.8kW, 1.0kW, 1.5kW, and 3.0kW, a warning will be reported when the main circuit input voltage is single-phase specifications.<br>电源输入缺相保护选择参数 P09-00=1（使能故障和警告）时，额定功率 0.8kW、1.0kW、1.5kW、3.0kW 的驱动器，主回路输入电压为单相规格时，会报警告。 |
| 99 | Multi-segment position reference position fault<br>多段位置参考位置故障 | 1 In multi-position absolute position operation mode, the system does not perform zero return operation or the drive is not set to an absolute value system.<br>多段位置绝对位置运行模式下，系统未进行回零操作或未将驱动器设置为绝对值系统<br>2 In the multi-segment position incremental position operation mode, when the P13.07 function code is set to 1, the system does not perform the zero-return operation.<br>多段位置增量位置运行模式下，当 P13.07 功能码设置为 1 时系统未进行回零操作 |

Note 注：

Warning reset method: Set P11-01=1 or use DI function 2.

警告的复位方法：置 P11-01=1 或使用 DI 功能 2。

# Chapter 9 Parameter List
# 第九章参数一览

## 9.1Parameter group number 参数组号

Table 9-1 Parameter group number
表9-1 参数组号

| Parameter group number<br>参数组号 | Parameter group function<br>参数组功能 |
|---|---|
| P00 | Basic control parameters 基本控制参数 |
| P01 | Servo motor parameter 伺服电机参数 |
| P02 | Digital input output parameter 数字输入输出参数 |
| P04 | Position control parameter 位置控制参数 |
| P05 | Speed control parameter 速度控制参数 |
| P06 | Torque control parameter 转矩控制参数 |
| P07 | Gain parameter 增益参数 |
| P08 | Advanced adjust parameter 高级调整参数 |
| P09 | Fault and protect parameter 故障与保护参数 |
| P10 | Communication parameters 通信参数 |
| P11 | Auxiliary function parameter 辅助功能参数 |
| P12 | Keyboard display parameters 键盘显示参数 |
| P13 | Multi-segment position function parameter 多段位置功能参数 |
| P14 | Multi-segment speed function parameter 多段速度功能参数 |
| P16 | Special function parameters 特殊功能参数 |
| P17 | Drive parameters 驱动器参数 |
| P18 | Display parameter 显示参数 |

**Note 注：**

The above parameters are not completely listed, please refer to the detailed instructions for more parameters.
以上参数并未不完全列出，更多参数请参考详细说明书。

## 9.2 Each group of parameters 各组参数

### P00 Group basic control parameters P00 组基本控制参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 00 | Control mode selection 控制模式选择 | 0- Position mode 位置模式<br>1-Speed mode 速度模式<br>2-Torque mode 转矩模式<br>3-Speed /torque mixed mode 速度模式/转矩混合模式<br>4-Position mode/speed mixed mode 位置模式/速度混合模式<br>5-Position mode/torque mixed mode 位置模式/转矩混合模式 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 01 | Rotate direction select 旋转方向选择 | 0-CCW is forward direction(Counterclockwise is positive)向为正转方向(逆时针为正)<br>1-CW is forward direction()方向为正转方向（Clockwise is positive 顺时针为正） | 1 | 0 | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P00 | 02 | Pulse output forward direction definition 脉冲输出正方向定义 | 0-CCW is forward direction 方向为正转方向<br>(When the pulse output OA leads OB, the corresponding motor rotation direction 脉冲输出 OA 超前 OB 时,对应的电机旋转方向)<br>1- CW is forward direction 方向为正转方向<br>（Inversion mode, OA lags OB 反转模式，OA 滞后 OB） | 1 | 0 | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P00 | 03 | Reserve parameter 保留参数 | 0~65535 | 1 | 0 | N/A | Reserve Parameter 保留参数 | PST |
| P00 | 04 | Rigidity level setting 刚性等级设定 | 0~31 | 1 | 11 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P00 | 05 | Inertia ratio 惯量比 | 0~3000 | 0.01 | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P00 | 06 | Absolute value system selection 绝对值系统选择 | 0- Incremental position mode 增量位置模式<br>1- Absolute position linear mode 绝对值位置线性模式<br>2- Absolute position rotation mode 绝对值位置旋转模式 | 1 | 0 | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P00 | 07 | System maximum speed 系统最大速度 | 0~10000 | 1rpm | 6000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 08 | Reserve parameter 保留参数 | 0~65535 | 1 | 0 | N/A | Reserve Parameter 保留参数 | PST |
| P00 | 10 | Servo OFF shutdown mode 伺服 OFF 停机方式 | 0- Free stop and maintain free running status 自由停机，保持自由运行状态<br>1- Stop at zero speed (deceleration time is controlled by P05.06) and maintain free running state 零速停机(减速时间由 P05.06 控制)，保持自由运行状态<br>2- Stop at zero speed (deceleration time is controlled by P05.06), maintain DB status 零速停机(减速时间由 P05.06 控制)，保持 DB 状态 | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 11 | Fault No.1 shutdown mode selection 故障 No.1 停机方式选择 | 0- Free stop and maintain free running status 自由停机，保持自由运行状态<br>1- DB shuts down and maintains DB status DB 停机，保持 DB 状态<br>2- DB shuts down and remains free-running DB 停机，保持自由运行状态 | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 12 | Fault No.2 shutdown mode selection 故障 No.2 停机方式选择 | 0- Free stop and maintain free running status 自由停机，保持自由运行状态<br>1- Stop at zero speed (deceleration time is controlled by P05.06) and maintain free running state 零速停机(减速时间由 P05.06 控制)，保持自由运行状态<br>2- Stop at zero speed (deceleration time is controlled by P05.06), maintain DB status 零速停机(减速时间由 P05.06 控制)，保持 DB 状态<br>3- 3- DB shuts down and maintains DB status DB 停机，保持 DB 状态<br>4- 4- DB shuts down and remains free-running DB 停机，保持自由运行状态 | 1 | 3 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 13 | Stop method when overtravel 超程时的停止方式 | 0- free run stop自由运行停止<br>1- Use the set torque of the emergency stop torque as the maximum value to decelerate and stop the motor, and then enter the servo lock state.将紧急停止转矩的设定转矩作为最大值来减速停止电机，然后进入伺服锁定状态<br>2- Use the set torque of the emergency stop torque as the maximum value to decelerate and stop the motor, and then enter the free running state.将紧急停止转矩的设定转矩作为最大值来减速停止电机，然后进入自由运行状态 | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 14 | Delay from brake output ON to command reception 抱闸输出 ON 至指令接收延时 | 0～10000 | 1ms | 200 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P00 | 15 | If NO.2 fault occurs or the servo enable is turned off in the rotating state, the brake output will be turned off with delay; In static state, delay from brake output OFF to motor de-energization. 旋转状态下发生 NO.2 故障或伺服使能 OFF，抱闸输出 OFF 延时；静止状态，抱闸输出 OFF 至电机不通电延时 | 10～10000 | 1ms | 200 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P00 | 16 | Rotating state, speed threshold when brake output is OFF. 旋转状态，抱闸输出 OFF 时转速阈值 | 0～1000 | 1rpm | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P00 | 17 | When NO.1 fault occurs in the rotating state, there is a delay from servo enable OFF to brake output OFF. 旋转状态下发生 NO.1 故障，伺服使能 OFF 至抱闸输出 OFF 延时 | 0～10000 | 1ms | 500 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 18 | Energy consumption resistor setting 能耗电阻设置 | 0- Use built-in energy dissipation resistor. 使用内置能耗电阻<br>1- Use external energy dissipation resistor and natural cooling. 使用外置能耗电阻并且自然冷却<br>2- Use external energy dissipation resistor and forced air cooling. 使用外置能耗电阻并且强迫风冷<br>3- No energy-consuming resistors are needed; all is absorbed by capacitors. 不用能耗电阻，全靠电容吸收 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 19 | External resistor power capacity 外置电阻功率容量 | 1～65535 | 1W | 机型参数 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 20 | External resistor value 外置电阻阻值 | 1～1000 | 1Ω | 机型参数 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 21 | External resistor heating time constant 外置电阻发热时间常数 | 1000~65535 | 1ms | 机型参数 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 22 | Energy consumption braking starting voltage 能耗制动开始电压 | 0~410 | 1V | 机型参数 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P00 | 23 | S_ON to dynamic brake release waiting time S_ON 至动态制动解除等待时间 | 0～10 | 1ms | 5 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 24 | Waiting time from when the motor is de-energized until dynamic braking becomes effective 电机不通电至动态制动有效等待时间 | 0～10 | 1ms | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 25 | Waiting time from S_ON to motor power on S_ON 至电机通电等待时间 | 25～100 | 1ms | 25 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P00 | 37 | Pulse delta threshold 脉冲增量阈值 | 0～200 | 1 | 1 | Effective immediately 立即生效 | Running setting 运行设定 | PS |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P00 | 38 | Number of consecutive pulse-free reception cycles 连续无脉冲接收周期数 | 1～200 | 1 | 3 | Effective immediately 立即生效 | Running setting 运行设定 | PS |

## P01 Group servo motor parameter 组伺服电机参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P01 | 00 | Motor model code 电机型号编码 | 0~65535 | 1 | 18000 | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 03 | Rated power 额定功率 | 0~65535 | 0.01Kw | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 04 | Rated current 额定电流 | 1～10000 | 0.01A | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 05 | Rated torque 额定转矩 | 0~65535 | 0.01Nm | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 08 | Maximum rotate speed 最大转速 | 0~9000 | 1rpm | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 09 | Rotate inertia 转动惯量 | 0~10000 | 0.01 $kgcm^2$ | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 10 | Number of pole pairs of permanent magnet synchronous motor 永磁同步电机极对数 | 1~50 | 1 对极 | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 14 | Counter electromotive force 反电动势 | 1~65535 | 0.01mV/rpm | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 15 | Torque coefficient 转矩系数 | 1~65535 | 0.001 Nm/A | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 18 | Encoder selects 编码器选择 | 0-2500 line encoder 线编码器<br>1- 17bit incremental encoder 增量式编码器<br>3- 17bit absolute encoder 绝对值编码器<br>4- 23bit increment encoder 增量式编码器<br>3- 23bit absolute value encoder 绝对值编码器 | | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 20 | Encoder resolution 编码器分辨率 | 1~1073741824 | | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P01 | 22 | Z corresponds to the electrical angle Z 对应电角度 | 0~3600 | 0.1° | | Power on again 再次通电 | Shutdown setting 停机设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P01 | 23 | The rising edge of U corresponds to the electrical angle<br>U 上升沿对应电角度 | 0~3600 | 0.1° | | Power on again<br>再次通电 | Shutdown setting<br>停机设定 | PST |
| P01 | 24 | FPGA uploads motor model<br>FPGA 上传电机型号 | 0～65535 | | | Effective immediately 立即生效 | Read-only parameters 只读参数 | PST |

## P02 group digital terminal input and output parameter 组数字量端子输入输出参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P02 | 00 | FunINL signal unassigned status<br>信号未分配的状态（HEX） | 0～0xFFFF<br>Bit0- correspond 对应 FunIN.1；<br>Bit1- correspond 对应 FunIN.2；<br>Bit15- correspond 对应 FunIN.16 | 1 | 0 | Power on again<br>再次上电 | Running setting<br>运行设定 | PST |
| P02 | 01 | DI1Terminal function select<br>端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition 无定义<br>1～45：FunIN.1～45（Refer to DIDO basic function code table 参考 DIDO 基本功能编码表） | 1 | 13 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P02 | 02 | DI2 terminal function selection<br>端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition 无定义<br>1～45：FunIN.1～45（Refer to DIDO basic function code table 参考 DIDO 基本功能编码表） | 1 | 14 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P02 | 03 | DI3 terminal function selection 端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition 无定义<br>1～45：FunIN.1～45（Refer to DIDO basic function code table 参考 DIDO 基本功能编码表） | 1 | 12 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P02 | 04 | DI4 terminal function selection 端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition<br>无定义<br>1～45：FunIN.1～45（Refer to DIDI basic function code table 参考 DIDO 基本功能编码表） | 1 | 2 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P02 | 05 | DI5 terminal function selection 端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition 无定义<br>1～45：FunIN.1～45（Refer to DIDI basic function code table 参考 DIDO 基本功能编码表） | 1 | 1 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P02 | 06 | DI6 terminal function selection 端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition 无定义<br>1～45：FunIN.1～45（Refer to DIDI basic function code table 参考 DIDO 基本功能编码表） | 1 | 11 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 07 | DI7 terminal function selection 端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition 无定义<br>1～45：FunIN.1～45（Refer to DIDI basic function code table 参考 DIDO 基本功能编码表） | 1 | 3 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 08 | DI8 terminal function selection 端子功能选择 | Input function code 输入功能编码：0，1-45<br>0：No definition 无定义<br>1～45：FunIN.1～45（Refer to DIDI basic function code table 参考 DIDO 基本功能编码表） | 1 | 32 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 09 | External input terminal filter time 外部输入端子滤波时间 1(FPGA) | 0~65535 | 12.5ns | 800 | Power on again 再次通电 | 停机设定 | PST |
| P02 | 10 | FunINH Signal unassigned status 信号未分配的状态（HEX） | 0～0xFFFF<br>Bit0-correspond 对应FunIN.17；<br>Bit1-correspond 对应FunIN.18；<br>Bit15-correspond 对应FunIN.32 | 1 | 0 | Power on again 再次上电 | Running setting 运行设定 | PST |
| P02 | 11 | DI1 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0-Low level valid 低电平有效<br>1-High level valid 高电平有效<br>2-Rising edge valid 上升沿有效<br>3-Falling edge valid 下降沿有效<br>4-Rising and falling edge are both valid上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 12 | DI2 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0-Low level valid 低电平有效<br>1-High level valid 高电平有效<br>2-Rising edge valid 上升沿有效<br>3-Falling edge valid 下降沿有效<br>4-Rising and falling edge are both valid 上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 13 | DI3 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0- Low level valid 低电平有效<br>1- High level valid 高电平有效<br>2- Rising edge valid 上升沿有效<br>3- Falling edge valid 下降沿有效<br>4-上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 14 | DI4 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0- Low level valid 低电平有效<br>1- High level valid 高电平有效<br>2- Rising edge valid 上升沿有效<br>3- Falling edge valid 下降沿有效<br>4- Rising and falling edge are both valid上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 15 | DI5 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0- Low level valid 低电平有效<br>1- High level valid 高电平有效<br>2- Rising edge valid 上升沿有效<br>3- Falling edge valid 下降沿有效<br>4- Rising and falling edge are both valid上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P02 | 16 | DI6 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0- Low level valid 低电平有效<br>1- High level valid 高电平有效<br>2- Rising edge valid 上升沿有效<br>3- Falling edge valid 下降沿有效<br>4- Rising and falling edge are both valid上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 17 | DI7 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0- Low level valid 低电平有效<br>1- High level valid 高电平有效<br>2- Rising edge valid 上升沿有效<br>3- Falling edge valid 下降沿有效<br>4- Rising and falling edge are both valid上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 18 | DI8 terminal function selection 端子逻辑选择 | Input polarity 输入极性：0-4<br>0- Low level valid 低电平有效<br>1- High level valid 高电平有效<br>2- Rising edge valid 上升沿有效<br>3- Falling edge valid 下降沿有效<br>4- Rising and falling edge are both valid上升下降沿均有效 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 20 | 外部输入端子滤波时间2(MCU) | 0~65535 | 1ms | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P02 | 21 | DO1 terminal function selection 端子功能选择 | Output encoding 输出编码：1～25<br>0：No definition 无定义<br>1～25：FunOUT.1～25 Refer to the DIDO function selection code definition 参考DIDO功能选择码定义 | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 22 | DO2 terminal function selection 端子功能选择 | Output encoding 输出编码：1～25<br>0：No definition 无定义<br>1～25：FunOUT.1～25 Refer to the DIDO function selection code definition 参考DIDO功能选择码定义 | 1 | 7 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 23 | DO3 terminal function selection 端子功能选择 | Output encoding 输出编码：1～25<br>0：No definition 无定义<br>1～25：FunOUT.1～25 Refer to the DIDO function selection code definition 参考DIDO功能选择码定义 | 1 | 5 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 24 | DO4 terminal function selection 端子功能选择 | Output encoding 输出编码：1～25<br>0：No definition 无定义<br>1～25：FunOUT.1～25 Refer to the DIDO function selection code definition 参考DIDO功能选择码定义 | 1 | 2 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 25 | DO5 terminal function selection 端子功能选择 | Output encoding 输出编码：1～25<br>0：No definition 无定义<br>1～25：FunOUT.1～25 Refer to the DIDO function selection code definition 参考DIDO功能选择码定义 | 1 | 11 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P02 | 31 | DO1 terminal logic level selection 端子逻辑电平选择 | Output polarity inversion setting 输出极性反转设定：0-1<br>0- Conductive when valid (normally open contact) 有效时导通（常开触点）<br>1- No conduction when valid (normally closed contact) 有效时不导通（常闭触点） | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 32 | DO2 terminal logic level selection 端子逻辑电平选择 | Output polarity inversion setting 输出极性反转设定：0-1<br>0- Conductive when valid (normally open contact) 有效时导通（常开触点）<br>1- No conduction when valid (normally closed contact) 有效时不导通（常闭触点） | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 33 | DO3 terminal logic level selection 端子逻辑电平选择 | Output polarity inversion setting 输出极性反转设定：0-1<br>0- Conductive when valid (normally open contact) 有效时导通（常开触点）<br>1- No conduction when valid (normally closed contact) 有效时不导通（常闭触点） | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 34 | DO4 terminal logic level selection 端子逻辑电平选择 | Output polarity inversion setting 输出极性反转设定：0-1<br>0- Conductive when valid (normally open contact) 有效时导通（常开触点）<br>1- No conduction when valid (normally closed contact) 有效时不导通（常闭触点） | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P02 | 35 | DO5 terminal logic level selection 端子逻辑电平选择 | Output polarity inversion setting 输出极性反转设定：0-1<br>0- Conductive when valid (normally open contact) 有效时导通（常开触点）<br>1- No conduction when valid (normally closed contact) 有效时不导通（常闭触点） | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |

## P04 Group position control parameter 组位置控制参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 00 | Main position command A source 主位置指令 A 来源 | 0-Low speed pulse instruction 低速脉冲指令<br>1-High speed pulse instruction 高速脉冲指令<br>2- Step amount given 步进量给定<br>4- Multi-segment position command given 多段位置指令给定<br>5- communication given 通信给定<br>6- Analog speed mode (reserved) 模拟速度模式（保留） | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 01 | Reserve parameter 保留参数 | 0 ～65535 | 1 | 4 | N/A | Reserve parameter 保留参数 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 02 | step amount 步进量 | -9999～9999 | 1Unit | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 03 | Position command smoothing filter 位置指令平滑滤波 | 0 ～65535 | 0.1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 04 | Position command FIR filter 位置指令 FIR 滤波 | 0～1280 | 0.1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 05 | The number of unit instructions required for one revolution of the motor (32 bits) 电机一圈所需单位指令数（32位） | 0～1073741824 | 1Unit/Turn | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P04 | 07 | Electronic gear 1 molecule (32 bits) 电子齿轮 1 分子(32 位） | 1～1073741824 | 1 | 电机分辨率 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P04 | 09 | Electronic gear 1 denominator (32 bits) 电子齿轮 1 分母(32 位） | 1～1073741824 | 1 | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P04 | 11 | Electronic gear 2 molecules (32 bits) 电子齿轮 2 分子(32 位） | 1～1073741824 | 1 | 电机分辨率*** | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P04 | 13 | Electronic gear 2 denominator (32 bits) 电子齿轮 2 分母(32 位） | 1～1073741824 | 1 | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P04 | 15 | Pulse output resolution (32 bits) 脉冲输出分辨率(32 位） | 16 ～ 1073741824 （Calculate the number of corresponding lines according to the incremental photoelectric encoder*4 按增量光电编码器计算对应线数*4) | 1PPR | 10000 | Power on again 再次上电 | Shutdown setting 停机设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 17 | Moving average filter time constant filtering 移动平均滤波器时间常数滤波 | 0ms ～10000 | 0.1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 18 | Pulse output Z polarity 脉冲输出 Z 极性 | 0-Z When the pulse rush arrives, it is high level 脉冲到来时为高电平<br>1-Z When the pulse rush arrives, it is low level 脉冲到来时为低电平 | 1 | 0 | N/A | Reserve parameter 保留参数 | P |
| P04 | 19 | Pulse output function selection 脉冲输出功能选择 | 0- Encoder frequency division output 编码器分频输出<br>1- Pulse command synchronous output 脉冲指令同步输出 | 1 | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P04 | 20 | Frequency division output pulse form 分频输出脉冲形式 | 0-AB Orthogonal signals 正交信号<br>1- pulse+direction 脉冲+方向 | 1 | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P04 | 21 | Pulse command form 脉冲指令形态 | 0- pulse+direction, Positive logic (default) 脉冲+方向，正逻辑(默认值)<br>1- direction + pulse, negative logic 方向+脉冲，负逻辑<br>2- A phase + B phase quadrature pulse, positive logic A 相+B 相正交脉冲，正逻辑<br>3- A phase + B phase quadrature pulse, negative logic A 相+B 相正交脉冲，负逻辑<br>4- CCW+CW, positive logic CCW+CW, 正逻辑<br>5- CCW+CW, negative logic CCW+CW, 负逻辑 | 1 | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P04 | 22 | Position deviation clearing function 位置偏差清除功能 | 0- Cleared when the servo is turned off and a type 1 fault occurs. Remove position deviation pulse 伺服 OFF 及发生 1 类故障时清除位置偏差脉冲<br>2- Position deviation is only cleared in the event of a fault 只在发生故障时清除位置偏差<br>3- Cleared by DI input function (PERR-CLR) 通过 DI 输入功能（PERR-CLR）清除 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P04 | 23 | Positioning completed (COIN) output<br>定位完成（COIN）输出 | 0- Output when the absolute value of the position deviation is smaller than the positioning completion range<br>位置偏差绝对值小于定位完成范围时输出<br>1- Output when the absolute value of the position deviation is less than the positioning completion range and the position command filtered command is 0<br>位置偏差绝对值小于定位完成范围且位置指令滤波后的指令为 0 时输出<br>2- Output when the absolute value of the position deviation is less than the positioning completion range and the position command is 0<br>位置偏差绝对值小于定位完成范围且位置指令为 0 时输出 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 24 | Positioning completion range<br>定位完成范围 | 1～65535 | 1P | 2500 线电机：717 位电机：10023 位电机：1000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 25 | Positioning proximity range<br>定位接近范围 | 1～65535 | 1P | 65535 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P04 | 26 | Number of pulses required for one revolution of the load (lower 32 bits)<br>负载旋转一圈所需脉冲数（低 32 位） | 0～4294967295 | 1Unit | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |
| P04 | 28 | Number of pulses required for one revolution of the load (high 32 bits)<br>负载旋转一圈所需脉冲数（高 32 位） | 0～4294967295 | 1Unit | 0 | Power on again 再次上电 | Shutdown setting 停机设定 | P |

## P05 Group speed control parameter 组速度控制参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P05 | 00 | Main speed command A source<br>主速度指令 A 来源 | 0-Digital give 数字给定（P0503）<br>1-AI1（Reserve 保留）<br>2-AI2（Reserve 保留）<br>3-Multi-segment instruction 多段速度指令<br>4-Communication given 通信给定 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P05 | 01 | Auxiliary speed command B source<br>辅助速度指令 B 来源 | 0-Digital give 数字给定（P0503）<br>1-AI1（Reserve 保留）<br>2-AI2（Reserve 保留）<br>3-Multi-segment instruction 多段速度指令<br>4- Communication given 通信给定 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P05 | 02 | Speed command selection<br>速度指令选择 | 0- Main speed command A source 主速度指令 A 来源<br>1- Auxiliary speed command B source<br>辅助速度指令 B 来源<br>2-A+B<br>3-A/B switch 切换 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P05 | 03 | Speed command keyboard setting value<br>速度指令键盘设定值 | -9000～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | S |
| P05 | 04 | Jog speed setting value<br>点动速度设定值 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | S |
| P05 | 05 | Speed command acceleration time<br>速度指令加速时间 | 0～10000 | 1ms | 50 | Effective immediately 立即生效 | Reserve parameter 保留参数 | S |
| P05 | 06 | Speed command deceleration time<br>速度指令减速时间 | 0～10000 | 1ms | 50 | Effective immediately 立即生效 | Reserve parameter 保留参数 | S |
| P05 | 07 | Speed command limit selection<br>速度指令限制选择 | 0 forward 正 P05.08、reverse 反 P05.09 internal limit 内部限制（Default 默认）<br>1-AI1（Reserve 保留）<br>2-AI2（Reserve 保留）<br>（ Limited by system maximum speed 受系统最大速度的限制） | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | S |
| P05 | 08 | Forward speed limit<br>速度正向限制 | 0～9000 | 1rpm | 9000 | Effective immediately 立即生效 | Running setting 运行设定 | S |
| P05 | 09 | 速度反向限制 | 0～9000 | 1rpm | 9000 | Effective immediately 立即生效 | Running setting 运行设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P05 | 14 | Speed direction selection 速度方向选择 | 0- Direction remains unchanged 方向不变<br>1- reverse direction 方向取反<br>2- Direction is determined by DI function 25 方向由 DI 功能 25 决定<br>3- Direction is determined by DI function 40/41 方向由 DI 功能 40/41 决定 | 1 | 2 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P05 | 15 | Zero position fixed speed setting 零位固定转速定值 | 0～6000 | 1rpm | 10 | Effective immediately 立即生效 | Running setting 运行设定 | S |
| P05 | 16 | Motor rotation signal speed threshold 电机旋转信号速度门限值 | 0～1000 | 1rpm | 20 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P05 | 17 | Speed consistent signal width 速度一致信号宽度 | 0～100 | 1rpm | 10 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P05 | 18 | The speed reaches the specified value 速度到达指定值 | 0～6000 | 1rpm | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P05 | 20 | Zero speed judgment threshold 零速判断阀值 | 0～6000 | 1rpm | 10 | N/A | Running setting 运行设定 | PST |

## P06 Group torque control parameter 组转矩控制参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P06 | 00 | Main torque command A source 主转矩指令 A 来源 | 0-Digital given 数字给定（P06-05）<br>3- Multi-segment torque command 多段转矩指令 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | T |
| P06 | 02 | Torque command selection 转矩指令选择 | 0- Main torque command A source 主转矩指令 A 来源 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | T |
| P06 | 03 | Torque limit signal delay output time 转矩限制信号延时输出时间 | 0～65535 | 1ms | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P06 | 04 | Torque command filter time in torque mode 转矩模式下转矩指令滤波时间 | 0～65535 | 0.01ms | 0 | Effective immediately 立即生效 | Running setting 运行设定 | T |
| P06 | 05 | Torque command keyboard setting value 转矩指令键盘设定值 | -3000～3000(Based on motor rated torque 基于电机额定转矩) | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | T |
| P06 | 06 | Torque limit source 转矩限制来源 | 0- Positive and negative internal torque limits (default) 正反内部转矩限制（默认）<br>1-Positive and negative external torque limit(Use P-CL,N-CL selection) 正反外部转矩限制（利用 P_CL，N_CL 选择）<br>2-Take T-LMT as external torque limit input 将 T-LMT 用作外部转矩限制输入<br>3- The minimum value of the positive and negative external torque and the external T-LMT is the torque limit (selected using P_CL, N_CL) 以正反外部转矩和外部 T-LMT 的最小值为转矩限制（利用 P_CL，N_CL 选择）<br>4- Positive and negative internal torque limit and external T-LMT torque limit (selected using P_CL, N_CL) 正反内部转矩限制和外部 T-LMT 转矩限制（利用 P_CL，N_CL 选择） | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 07 | T-LMT selection 选择 | 1-AI1（Reserve 保留）<br>2-AI2（Reserve 保留） | 1 | 2 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 08 | Forward rotation internal torque limit 正转内部转矩限制 | 0~5000(Based on motor rated torque 基于电机额定转矩) | 0.1% | 3000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 09 | Reverse internal torque limit 反转内部转矩限制 | 0~5000 (Based on motor rated torque 基于电机额定转矩) | 0.1% | 3000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 10 | Forward side external torque limit 正转侧外部转矩限制 | 0~5000 (Based on motor rated torque 基于电机额定转矩) | 0.1% | 3000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P06 | 11 | Reverse side external torque limit<br>反转侧外部转矩限制 | 0~5000 (Based on motor rated torque 基于电机额定转矩） | 0.1% | 3000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 13 | Speed limit source selection during torque control<br>转矩控制时速度限制来源选择 | 0-Internal speed limit 内部速度限制（P06.15、P06.16 setting value 设定值）<br>1- Using V-LMT as external speed limit input<br>将 V-LMT 用作外部速度限制输入 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | T |
| P06 | 15 | Positive speed limit during torque control<br>转矩控制时正速度限制 | 0～9000 | 1 | 3000 | Effective immediately 立即生效 | Running setting 运行设定 | T |
| P06 | 16 | Negative speed limit during torque control<br>转矩控制时负速度限制 | 0～9000 | 1 | 3000 | Effective immediately 立即生效 | Running setting 运行设定 | T |
| P06 | 17 | Torque reaches command reference value.<br>转矩到达指令基准值 | 0～5000（1000 Corresponding motor rated torque 对应电机额定转矩） | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 18 | Torque reaches valid offset threshold<br>转矩到达有效偏移阈值 | 0～5000（1000 Corresponding motor rated torque 对应电机额定转矩） | 0.1% | 200 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 19 | Torque reaches invalid offset threshold<br>转矩到达无效偏移阈值 | 0～5000（1000 Corresponding motor rated torque 对应电机额定转矩） | 0.1% | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 20 | Speed limited window in torque mode 转矩模式下速度受限窗 | 1~900 | 1ms | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P06 | 21 | Multi-stage torque command 1<br>多段转矩指令 1 | -3000～3000 (Based on motor rated torque 基于电机额定转矩） | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | T |
| P06 | 22 | Multi-stage torque command 2<br>多段转矩指令 2 | -3000～3000 (Based on motor rated torque 基于电机额定转矩） | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | T |
| P06 | 23 | Multi-stage torque command 3<br>多段转矩指令 3 | -3000～3000 (Based on motor rated torque 基于电机额定转矩） | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | T |

## P07 Group gain parameter 组增益参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P07 | 00 | Position loop gain 1<br>位置环增益 1 | 10～20000 | 0.1HZ | 320 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | P |
| P07 | 01 | Position loop gain 1<br>速度环增益 1 | 10～20000 | 0.1HZ | 180 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 02 | Speed loop integration time 1<br>速度环积分时间 1 | 15～51200 | 0.01ms | 3100 | Effective immediately<br>立即生效 | 运 Running setting<br>行设定 | PS |
| P07 | 03 | Speed detection filter 1<br>速度检测滤波 1 | 0～200 | 0.01ms | 20 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P07 | 04 | Torque command filter 1 转矩指令滤波 1 | 0～10000 | 0.01ms | 126 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P07 | 05 | Position loop gain 2<br>位置环增益 2 | 10～20000 | 0.1HZ | 380 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | P |
| P07 | 06 | Speed loop gain 2<br>速度环增益 2 | 10～20000 | 0.1HZ | 180 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 07 | Speed loop integration time 2<br>速度环积分时间 2 | 15～51200 | 0.01ms | 51200 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 08 | Speed detection filter 2<br>速度检测滤波 2 | 0～200 | 0.01ms | 0 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P07 | 09 | Torque command filter 2<br>转矩指令滤波 2 | 0～10000 | 0.01ms | 126 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PST |
| P07 | 10 | DI function GAIN-SWITCH switching action selection<br>DI 功能 GAIN-SWITCH 切换动作选择 | 0- Speed loop regulator P(1)/PI(0) switching, the gain is fixed to the first group 速度环调节器 P(1)/PI(0)切换,增益固定为第一组<br>1- Switching between first gain (0) and second gain (1) 第一增益（0)、第二增益(1)切换 | 1 | 0 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P07 | 11 | Gain switch mode<br>增益切换模式 | 0- First gain fixed 第一增益固定<br>1- Second gain fixed 第二增益固定<br>2- Using DI input (GAIN-SWITCH)<br>利用 DI 输入（GAIN-SWITCH）<br>3- Torque command is large 转矩指令大<br>4- The speed command changes greatly 速度指令变化大<br>5- Large speed command 速度指令大<br>6- Large position deviation 位置偏差大（P)<br>7- There is a position command 有位置指令（P)<br>8- Positioning not completed 定位未完成（P)<br>9- Actual speed is high 实际速度大（P)<br>10- There is position command plus actual speed 有位置指令加实际速度（P)<br>11- The speed loop controller adopts PDFF control 速度环控制器采用 PDFF 控制（PS)<br>12-Reserve 保留<br>13- The speed loop controller adopts improved PI control (PS)<br>速度环控制器采用改进 PI 控制（PS) | 1 | 0 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 12 | Gain switching delay<br>增益切换延时 | 0~10000 | 0.1ms | 50 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 13 | Gain switching level<br>增益切换水平 | 0~20000（Unit 单位：According to the gain switching mode instructions 根据增益切换模式说明） | 1 | 50 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 14 | Hysteresis during gain switching<br>增益切换时回滞 | 0~20000（Unit: According to the gain switching mode description 单位：根据增益切换模式说明） | 1 | 33 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 15 | Position gain switching time<br>位置增益切换时间 | 0~10000 | 0.1ms | 33 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 16 | Speed regulator PDFF coefficient<br>速度调节器 PDFF 系数 | 0~1000 | 0.1% | 700 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |
| P07 | 17 | Improved speed PI control level<br>改进速度 PI 控制等级 | 2~9 | 1 | 5 | Effective immediately<br>立即生效 | Running setting<br>运行设定 | PS |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P07 | 18 | Anti-integral saturation coefficient 抗积分饱和系数 | 0~1000 | 0.001 | 820 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P07 | 19 | Speed feed forward control selection 速度前馈控制选择 | 0-No speed feedforward 无速度前馈<br>1-Internal speed feedforward 内部速度前馈<br>2- Use AI1 as velocity feed forward input 将 AI1 用作速度前馈输入<br>3- Use AI2 as velocity feedforward input 将 AI2 用作速度前馈输入<br>4- communication given 通信给定 | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P07 | 20 | Speed feed forward gain 速度前馈增益 | 0～1000 | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P07 | 21 | Speed feedforward filter time parameter 速度前馈滤波时间参数 | 0～6400 | 0.01ms | 50 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P07 | 22 | Torque feed forward selection 转矩前馈选择 | 0-No speed feedforward 无转矩前馈<br>5- Internal speed feedforward 内部转矩前馈<br>2- Use AI1 as velocity feed forward input 将 AI1 用作速度前馈输入<br>3- Use AI2 as velocity feedforward input 将 AI2 用作速度前馈输入<br>4-communication given 通信给定 | 1 | 1 | Effective immediately 即时生效 | Shutdown setting 停机设定 | PS |
| P07 | 23 | Torque feed forward selection 转矩前馈增益 | 0～1000 | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P07 | 24 | Torque feedforward filter time parameter 转矩前馈滤波时间参数 | 0～6400 | 0.01ms | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P07 | 25 | Velocity offset overlay threshold 速度偏移叠加阈值 | 0～100 | 1P | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P07 | 26 | velocity offset 速度偏移量 | 0～1000 | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P07 | 27 | Voltage feedforward gain 电压前馈增益 | 0～1000 | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P07 | 28 | Reserved parameters 保留参数 | 0 ～65535 | 1 | 0 | N/A | Reserved parameters 保留参数 | PST |

**P08 Group advanced adjustment parameter 组高级调整参数**

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 00 | Adaptive filter mode 自适应滤波器模式 | 0~5 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 01 | Resonance frequency 共振频率 | 0~65535 | 1Hz | 0 | N/A | Display parameter 显示参数 | PST |
| P08 | 02 | 1st Notch Frequency (Manual) 第 1 陷波器频率（手动） | 10~4000 | 1Hz | 4000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 03 | 1st notch width 第 1 陷波器宽度 | 0~8 | 1 | 8 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 04 | 1st notch depth 第 1 陷波器深度 | 0~100 | 1 | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 05 | 2nd notch frequency (manual) 第 2 陷波器频率（手动） | 10~4000 | 1Hz | 4000 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 06 | 2nd notch width 第 2 陷波器宽度 | 0~8 | 1 | 8 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P08 | 07 | 2nd notch depth 第 2 陷波器深度 | 0~100 | 1 | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 15 | Damping filter switch<br>减震滤波器开关 | 0-Turn off 关闭<br>1- Turn on 开启 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 16 | Damping filter frequency<br>减震滤波器频率 | 10~2000 | 0.1Hz | 2000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 17 | Damping filter selection<br>减震滤波器选择 | 0-Vibration filter A 减震滤波器 A<br>1-Vibration filter B 减震滤波器 B | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 18 | Filter A width<br>滤波器 A 宽度 | 0~200 | 1 | 4 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 19 | Filter B gain<br>滤波器 B 增益 | 0~100 | 1 | 100 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 20 | Offline inertia identification maximum speed<br>离线惯量辨识最大速度 | 200 ~1000 | 1rpm | 500 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P08 | 21 | Offline inertia identification acceleration and deceleration time<br>离线惯量辨识加减速时间 | 50~800 | 1ms | 100 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P08 | 22 | Waiting time after completion of single offline inertia identification<br>单次离线惯量辨识完成后等待时间 | 100~10000 | 1ms | 800 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P08 | 23 | Inertia identification mode selection<br>惯量辨识模式选择 | 0- Offline inertia identification: the speed command is in the form of positive and negative triangle waves 离线惯量辨识：速度指令为正反三角波形式<br>1- Offline inertia identification: speed command is JOG mode 离线惯量辨识：速度指令为 JOG 点动模式 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P08 | 24 | Completed a single offline inertia identification of the number of motor rotations<br>完成单次离线惯量辨识电机转动圈数 | 0~65535 | 0.01 turn 圈 | 83 | N/A | Display parameter 显示参数 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 26 | Completed a single offline inertia identification of the number of motor rotations 高频抑振控制开关 | 0-Turn off 关闭<br>1-Turn on 开启 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 27 | High frequency vibration suppression frequency 高频抑振频率 | 10~4000 | 1 Hz | 4000 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 28 | High frequency vibration suppression gain compensation 高频抑振增益补偿 | 0~1000 | 0.01 | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 29 | High frequency vibration suppression damping coefficient 1 高频抑振阻尼系数 1 | 0~1000 | 0.01 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 30 | High frequency vibration suppression frequency compensation 1 高频抑振频率补偿 1 | -1000~1000 | 1 Hz | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 31 | High frequency vibration suppression frequency compensation 2 高频抑振频率补偿 2 | -1000~1000 | 1 Hz | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 32 | High frequency vibration suppression damping coefficient 2 高频抑振阻尼系数 2 | 0~1000 | 0.01 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 33 | Anti-disturbance compensation switch 抗扰动补偿开关 | 0-Close 关闭<br>1-Open 开启 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 36 | Disturbance compensation coefficient 扰动补偿系数 | 0~10000 | 0.1% | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 39 | Instantaneous speed compensation switch 瞬时速度补偿开关 | 0-Close 关闭<br>1-Open 开启 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P08 | 40 | Instantaneous speed compensation gain 瞬时速度补偿增益 | 0~1000 | 1 Hz | 300 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 41 | Instantaneous speed compensation gain compensation 瞬时速度补偿增益补偿 | 0~1000 | 0.01 | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P08 | 45 | Model compensation switch 模型补偿开关 | 0- Turn off model compensation 关掉模型补偿<br>1- rigid model 刚性模型<br>3- second-order vector model 二阶矢量模型 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 46 | Model compensation gain 模型补偿增益 | 10~20000 | 0.1/s | 300 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 48 | Model compensation forward compensation coefficient 模型补偿正转补偿系数 | 0~10000 | 0.1% | 1000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 49 | Model compensation inversion compensation coefficient 模型补偿反转补偿系数 | 0~10000 | 0.1% | 1000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 50 | Model compensation vibration suppression frequency A 模型补偿抑振频率 A | 0~2500 | 0.1Hz | 500 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 51 | Model compensation vibration suppression frequency R 模型补偿抑振频率 R | 0~2500 | 0.1Hz | 500 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PS |
| P08 | 52 | Model compensation speed compensation coefficient 模型补偿速度补偿系数 | 0~10000 | 0.1% | 1000 | Effective immediately 立即生效 | Shutdown setting Shutdown setting 停机设定 | PS |

## P09 Group fault and protection 组故障与保护

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P09 | 00 | Power input phase loss protection selection 电源输入缺相保护选择 | 0- Enable faults and disable warnings 使能故障、禁止警告<br>1- Enable faults and warnings 使能故障和警告<br>2- Disable faults and warnings 禁止故障和警告 | 1 | 2 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 01 | Reserved parameters 保留参数 | - | 1 | 0 | N/A | Reserve parameter 保留参数 | PST |
| P09 | 02 | Undervoltage detection delay 欠压检测延时 | 100 ~20000 | 0.1ms | 700 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 03 | Encoder error mask bit 编码器错误屏蔽位 | Bit7- Encoder battery failure 编码器电池失效<br>Bit6- Encoder battery low warning 编码器电池电量低警告<br>Bit5- Encoder multiturn count error 编码器多圈计数错误*<br>Bit3- Encoder multi-turn count overflow*编码器多圈计数溢出* | 1 | 255 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 04 | Speed protection function 飞车保护功能 | 0- Turn on protection 开启保护<br>1- Turn off protection 关闭保护 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 05 | Overload warning value 过载警告值 | 1～100 | 1% | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 06 | Motor overload protection coefficient 电机过载保护系数 | 10 ～300 | 1% | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 07 | Undervoltage protection point 欠压保护点 | 50 ～ 100 （ 100 Corresponds to the default undervoltage point 对应默认的欠压点） | 1% | 100 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 08 | Overspeed fault point 过速故障点 | 50 ～ 120 （ 100 Corresponding to the maximum speed of the motor 对应电机最大转速） | 1% | 120 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P09 | 09 | Excessive position deviation threshold 位置偏差过大阀值(32 位） | 1~1073741824 | 1P | 2500 线电机：32767 17 位电机：39321623 位电机：25165824 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 11 | High-speed command pulse input pin filter time 高速指令脉冲输入管脚滤波时间 | 0-50 | 20ns | 2 | Power on again 再次通电 | Shutdown setting 停机设定 | P |
| P09 | 12 | Low speed command pulse input pin filter time 低速指令脉冲输入管脚滤波时间 | 0-255 | 20ns | 45 | Power on again 再次通电 | Shutdown setting 停机设定 | P |
| P09 | 13 | Reserved parameters 保留参数 | 0 ～65535 | 1 | 80 | N/A | Display parameter 保留参数 | PST |
| P09 | 14 | Encoder Z signal output width 编码器 Z 信号输出宽度 | 0～60000 | 200ns | 10000 | Power on again 再次通电 | Shutdown setting 停机设定 | PST |
| P09 | 15 | The number of consecutive errors in bus encoder communication verification reports a fault. 总线编码器通信校验连续错误次数报故障 | 1～16 | 1 | 5 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 16 | Average load rate overload threshold 平均负载率过载阈值 | 100~3000 | 0.1% | 1100 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P09 | 17 | Multi-segment position/speed DI input delay detection time 多段位置/速度 DI 输入延迟检测时间 | 0~1000 | 1ms | 3 | Effective immediately 立即生效 | Running setting 运行设定 | PS |
| P09 | 23 | Locked rotor over-temperature protection time 堵转过温保护时间 | 10~65535 | 1ms | 200 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P09 | 24 | Locked rotor over-temperature protection enable 堵转过温保护使能 | 0- Shielded stalled rotor over-temperature protection monitoring 屏蔽堵转过温保护监检测<br>1- Turn on motor stall and over-temperature protection monitoring 开启电机堵转过温保护监检测 | 1 | 1 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P09 | 25 | Motor overload protection enabled 电机过载保护使能 | 0- Open motor overload and average load rate overload detection 开放电机过载及平均负载率过载检测<br>1- Open motor overload, shielded average load rate overload detection 开放电机过载、屏蔽平均负载率过载检测<br>2- Shielded motor overload, open average load rate overload detection 屏蔽电机过载、开放平均负载率过载检测<br>3- Shielded motor overload and average load rate overload detection 屏蔽电机过载及平均负载率过载检测 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P09 | 29 | Average load rate protection time 平均负载率保护时间 | 10~65535 | 160ms | 300 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |

## P10 Group communication parameter 组通信参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P10 | 00 | contact address 通信地址 | 0~247，0 is the broadcast address 为广播地址 | 1 | 1 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P10 | 01 | Communication network selection 通信组网选择 | 0-Modbus | 1 | 0 | Power on again 再次上电 | Running setting 运行设定 | PST |
| P10 | 02 | Modbus Baud rate setting 波特率设置 | 0-2400<br>1-4800<br>2-9600<br>3-19200<br>4-38400<br>5-57600<br>6-115200 | 1 | 6 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P10 | 03 | Modbus Data Format 数据格式 | 0- No parity, 2 stop bits 无校验,2 个停止位<br>1- Even parity, 1 stop bit 偶校验，1 个停止位<br>2- Odd parity, 1 stop bit 奇校验，1 个停止位<br>3- No parity, 1 stop bit 无校验，1 个停止位 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P10 | 04 | Whether the communication writing function code is updated to EEPROM 通信写入功能码是否更新到 EEPROM | 0- Not updating EEPROM 不更新 EEPROM<br>1- Except P11 group and P18 group, update to EEPROM 除 P11 组和 P18 组外，更新到 EEPROM | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P10 | 05 | RS232 communication baud rate setting RS232 通信波特率设置 | 0-2400<br>1-4800<br>2-9600<br>3-19200<br>4-38400<br>5-57600<br>6-115200 | 1 | 6 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

## P11 Group auxiliary function parameter 组辅助功能参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P11 | 00 | JOG mode 模式 | Effective upon entry 进入即生效 | | | | | |
| P11 | 01 | Fault reset 故障复位 | 0-No operation 无操作<br>1-Fault reset 故障复位 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P11 | 03 | Rotate inertia identification function 转动惯量辨识功能 | Effective upon entry 进入即生效 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P11 | 05 | Analog input automatic adjustment 模拟输入自动校正 | 0-No operation 无操作<br>1~2- AI1~AI2 adjustment 调整 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P11 | 06 | Absolute value encoder reset 绝对值编码器复位 | 0- No operation 无操作<br>1- Absolute value encoder related warning and fault clearing 绝对值编码器相关的警告和错误清除<br>2- Absolute value encoder multi-turn data reset 绝对值编码器多圈数据复位。 | 1 | 0 | 再次上电 | Shutdown setting 停机设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P11 | 07 | Absolute value system soft limit setting 绝对值系统软限位设置 | -1 The current position is set to the negative limit 当前位置设置为负限位<br>0-No operation 无操作<br>1- The current position is set to the positive limit 当前位置设置为正限位 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P11 | 08 | Absolute value system origin setting 绝对值系统原点设置 | 0-No operation 无操作<br>1- Set the current position as the origin 设置当前位置为原点 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P11 | 09 | System initialization function 系统初始化功能 | 0-No operation 无操作<br>1- Restore factory settings(Except P1 and P17 group parameters)恢复出厂设定值（除 P1 和 P17 组参数）<br>2- Clear fault record 清除故障记录 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P11 | 10 | DIDO forces input and output enable DIDO 强制输入输出使能 | 0-No operation 无操作<br>1- Force DI enable 强制 DI 使能<br>2- Force DO enable 强制 DO 使能<br>3- Force DIDO to be enabled 强制 DIDO 都使能 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P11 | 11 | DI forced input given DI 强制输入给定 | 0-0x01FF | 1 | 511 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P11 | 12 | DO forces output given DO 强制输出给定 | 0-0x001F | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P11 | 13 | Emergency shutdown settings 紧急停机设置 | 0-No operation 无操作<br>1-Shutdown emergency 紧急停机 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

## P12 Group keyboard display parameter 组键盘显示参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P12 | 00 | LED warning display select 警告显示选择 | 0-LEDOutput warning message immediately 立即输出警告信息<br>1-LED No warning message is output 不输出警告信息 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P12 | 01 | Default display setting 默认显示设置 | 0~100 | 1 | 1 | Effective immediately 立即生效 | Running setting 运行设定 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P12 | 03 | Speed display filter time 速度显示滤波时间 | 0~10000 | 0.1ms | 50 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P12 | 11 | Non-standard version number 非标版本号 | VV.B.DD | 1 | 0 | N/A | Display parameter 显示参数 | |
| P12 | 12 | Main control software version number 主控软件版本号 | VV.B.DD | 1 | 0 | N/A | Display parameter 显示参数 | |
| P12 | 13 | FPGA version No. 版本号 | VV.B.DD | 1 | 0 | N/A | Display parameter 显示参数 | |
| P12 | 14 | Product series code 产品系列代号 | PP.XXX | 1 | 3000 | N/A | Display parameter 显示参数 | |

## P13 Group multi-segment position 组多段位置

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 00 | Multi-position operation mode 多段位置运行方式 | 0- Shut down after a single operation (P1301 is carried out) Segment selection)单次运行结束停机（P1301 进行段数选择）<br>1- Cycle operation (P1301 selects the number of segments)循环运行（P1301 进行段数选择）<br>2- DI switching operation (selected via DI)<br>DI 切换运行(通过 DI 来选择) | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P13 | 01 | Specify starting segment 指定起点段 | 1～16 | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P13 | 02 | Specify end segment 指定终点段 | 1～16 | 1 | 16 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 03 | Remaining processing method 余量处理方式 | Valid in the other three modes except DI mode<br>DI 模式外其他三种模式下有效<br>0：Continue running the unfinished segment 继续运行没走完的段<br>1：Restart from step 1<br>从第 1 段重新开始运行 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P13 | 04 | Waiting time unit 等待时间单位 | 0-ms<br>1-s | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P13 | 05 | Position control method 位置控制方式 | 0- Incremental position control 增量位置控制<br>1- Absolute position control 绝对位置控制 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P13 | 07 | Incremental position control mode zero return restriction conditions 增量位置控制方式回零限制条件 | 0- Can be run before zero return is completed 回零完成前可以运行<br>1- It cannot be run before zero return is completed.回零完成前不能运行 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P13 | 08 | First segment movement displacement (32 bits) 第 1 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 10 | The maximum running speed of the first stage displacement 第 1 段位移最大运行速度 | 0～9000 | 1rpm | 200 | 立 Effective immediately 即生效 | Running setting 运行设定 | P |
| P13 | 11 | The first displacement acceleration and deceleration time 第 1 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 12 | Waiting time after the first displacement is completed 第 1 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 13 | 2nd segment movement displacement (32 bits) 第 2 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 15 | The maximum running speed of the second stage displacement 第 2 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 16 | 2nd segment displacement acceleration and deceleration time 第 2 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 17 | Waiting time after completion of the second segment of displacement 第 2 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 18 | The third segment movement displacement (32 bits) 第 3 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 20 | The maximum running speed of the third stage displacement 第 3 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 21 | The third segment displacement acceleration and deceleration time 第 3 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 22 | Waiting time after completion of the third segment of displacement 第 3 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 23 | The 4th segment movement displacement (32 bits) 第 4 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 25 | The maximum running speed of the 4th stage displacement 第 4 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 26 | The 4th segment displacement acceleration and deceleration time 第 4 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 27 | Waiting time after the 4th segment of displacement is completed 第 4 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 28 | The 5th segment movement displacement (32 bits) 第 5 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 30 | The maximum running speed of the 5th stage displacement 第 5 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 31 | The 5th segment displacement acceleration and deceleration time 第 5 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 32 | Waiting time after the 5th segment of displacement is completed 第 5 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 33 | The 6th segment movement displacement (32 bits) 第 6 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 35 | The maximum running speed of the 6th stage displacement 第 6 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 36 | The 6th segment displacement acceleration and deceleration time 第 6 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 37 | Waiting time after the 6th segment of displacement is completed 第 6 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 38 | Segment 7 movement displacement (32 bits) 第 7 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 40 | The maximum running speed of the 7th stage displacement 第 7 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 41 | The 7th segment displacement acceleration and deceleration time 第 7 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 42 | Waiting time after the 7th segment of displacement is completed 第 7 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 43 | The 8th segment movement displacement (32 bits) 第 8 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 45 | The maximum running speed of the 8th stage displacement 第 8 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 46 | The 8th segment displacement acceleration and deceleration time 第 8 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 47 | Waiting time after the 8th segment of displacement is completed 第 8 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 48 | 9th segment movement displacement (32 bits) 第 9 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 50 | The maximum running speed of the 9th stage displacement 第 9 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 51 | The 9th segment displacement acceleration and deceleration time 第 9 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 52 | Waiting time after completion of the 9th segment displacement 第 9 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 53 | The 10th segment movement displacement (32 bits) 第 10 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 55 | The maximum running speed of the 10th stage displacement 第 10 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 56 | The 10th segment displacement acceleration and deceleration time 第 10 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 57 | Waiting time after completion of the 10th segment of displacement 第 10 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 58 | The 11th segment movement displacement (32 bits) 第 11 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 60 | The maximum running speed of the 10th stage displacement 第 10 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 61 | The 11th segment displacement acceleration and deceleration time 第 11 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 62 | Waiting time after the 11th segment of displacement is completed 第 11 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 63 | 12th segment movement displacement (32 bits) 第 12 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 65 | Maximum running speed of the 12th stage displacement 第 12 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 66 | The 12th segment displacement acceleration and deceleration time 第 12 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 67 | Waiting time after completion of the 12th segment of displacement 第 12 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 68 | The 13th segment movement displacement (32 bits) 第 13 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 70 | The maximum running speed of the 13th segment displacement 第 13 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 71 | The 13th segment displacement acceleration and deceleration time 第 13 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 72 | Waiting time after completion of 第 13 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 73 | The 14th segment movement displacement (32 bits) 第 14 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 75 | The maximum running speed of the 14th stage displacement 第 14 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 76 | The 14th segment displacement acceleration and deceleration time 第 14 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 77 | Waiting time after the 14th segment of displacement is completed 第 14 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 78 | Movement displacement of segment 15 (32 bits) 第 15 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 80 | The maximum running speed of the 15th stage displacement 第 15 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 81 | The 15th segment displacement acceleration and deceleration time 第 15 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P13 | 82 | Waiting time after completion of the 15th segment of displacement 第 15 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 83 | The 16th segment movement displacement(32 bits) 第 16 段移动位移(32 位) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 85 | The maximum running speed of the 16th segment displacement 第 16 段位移最大运行速度 | 0～9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 86 | The 16th segment displacement acceleration and deceleration time 第 16 段位移加减速时间 | 0~65535 | 1ms | 100 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P13 | 87 | Waiting time after the16th segment displacement completed 第 16 段位移完成后等待时间 | 0～10000 | 1ms(s) | 1000 | Effective immediately 立即生效 | Running setting 运行设定 | P |

## P14 Group multi-segment speed command 组多段速度指令

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 00 | Multi-segment speed command running method 多段速度指令运行方式 | 0- Single running finish shutdown (P1401 selects the number of segments) 单次运行结束停机（P1401 进行段数选择）<br>1-Cycle running(P1401 selects the number of segments) 循环运行（P1401 进行段数选择）<br>2-Switching by external DI 通过外部 DI 进行切换 | 1 | 1 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 01 | Speed command end selection of segments number 速度指令终点段数选择 | 1～16 | 1 | 16 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 02 | Selects running time unit 运行时间单位选择 | 0-s<br>1-min | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 03 | Acceleration and deceleration time 1 加减速时间 1 | 0-10000 | 1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 04 | Acceleration and deceleration time 2 加减速时间 2 | 0-10000 | 1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 05 | Acceleration and deceleration time 3 加减速时间 3 | 0-10000 | 1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 06 | Acceleration and deceleration time 4 加减速时间 4 | 0-10000 | 1ms | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 07 | The first segment command 第 1 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 08 | The first segment command running time 第 1 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 09 | The first segment of speed up and down time 第 1 段升降速时间 | 0- Zero acceleration and deceleration time 零加减速时间<br>1-Acceleration and deceleration time1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 10 | The second segment command 第 2 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 11 | The second segment command running time 第 2 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 12 | The second segment speed up and speed down time 第 2 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 13 | The third segment command 第 3 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 14 | The third segment command running time 第 3 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 15 | The third segment speed up and speed down time 第 3 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 16 | The fourth segment command 第 4 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 17 | The fourth segment command running time 第 4 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 18 | The fourth segment speed up and down time 第 4 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 19 | The fifth segment command 第 5 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 20 | The fifth segment command running time 第 5 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 21 | The fifth segment speed up and down time 第 5 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 22 | The sixth segment command 第 6 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 23 | The sixth segment command running time 第 6 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 24 | The sixth segment speed up and down time 第 6 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 25 | The seventh segment command 第 7 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 26 | The seventh segment command running time 第 7 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 27 | The seventh segment speed up and down time 第 7 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 28 | The eighth segment command 第 8 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 29 | The eighth segment command running time 第 8 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 30 | The eighth segment speed up and down time 第 8 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 31 | The ninth segment command 第 9 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 32 | The ninth segment running time 第 9 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 33 | The ninth segment speed up and down time 第 9 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 34 | The tenth segment command 第 10 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 35 | The tenth segment command running time 第 10 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 36 | The tenth segment speed up and down time 第 10 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 37 | The eleventh segment command 第 11 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 38 | The eleventh segment command running time 第 11 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 39 | The eleventh segment speed up and down time 第 11 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 40 | The twelfth segment command 第 12 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 41 | The twelfth segment command running time 第 12 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 42 | The twelfth segment speed up and down time 第 12 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 43 | The thirteenth segment command 第 13 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 44 | The thirteenth segment command running time 第 13 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 45 | The thirteenth segment speed up and down time 第 13 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 46 | The fourteenth segment command 第 14 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 47 | The fourteenth segment command running time 第 14 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 48 | The fourteenth segment speed up and down time 第 14 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 49 | The fifteenth segment command 第 15 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 50 | The fifteenth segment command running time 第 15 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 51 | The fifteenth segment speed up and down time 第 15 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P14 | 52 | The sixteenth segment command 第 16 段指令 | -9000～+9000 | 1rpm | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 53 | The sixteenth segment command running time 第 16 段指令运行时间 | 0～65535 | 0.1s(min) | 50 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |
| P14 | 54 | The sixteenth segment speed up and down time 第 16 段升降速时间 | 0-Zero acceleration and deceleration time 零加减速时间<br>1- Acceleration and deceleration time 1 加减速时间 1<br>2- Acceleration and deceleration time 2 加减速时间 2<br>3- Acceleration and deceleration time 3 加减速时间 3<br>4- Acceleration and deceleration time 4 加减速时间 4 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | S |

## P16 Group special function parameter 组特殊功能参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P16 | 00 | Interrupt fixed length enable 中断定长使能 | 0- Disable interruption of fixed-length function 禁止中断定长功能<br>1- Use the interrupt fixed-length function 使用中断定长功能 | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P16 | 01 | Interrupt fixed length 1 displacement 中断定长 1 位移 | 0~1073741824 | 1 Unit | 10000 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 03 | Interrupt fixed length 1 constant speed running speed 中断定长 1 恒速运行速度 | 0~9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 04 | Interrupt fixed length acceleration time 中断定长加速时间 | 0~1000 | 1ms | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 05 | Interrupt fixed length deceleration time 中断定长减速时间 | 0~1000 | 1ms | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 06 | Fixed length lock release signal enables 定长锁定解除信号使能 | 0~1 | 1 | 1 | Effective immediately 立即生效 | Running setting 运行设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P16 | 08 | Origin return enable control 原点复位使能控制 | 0-Close origin reset function 关闭原点复位功能；<br>1- Enable the origin return function through the DI input Homing Start signal; 通过 DI 输入 Homing Start 信号使能原点复归功能；<br>2- Start return-to-origin immediately after power-on 上电后立即启动原点复归；<br>3- Start return-to-origin immediately 立即启动原点复归；<br>4- Take the current position as the origin 以当前位置为原点；<br>5- Set origin via DI trigger 通过 DI 触发设置原点； | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| P16 | 09 | Home return mode<br>原点复位模式 | 0- Return to zero in the forward direction, the deceleration point and origin are the origin switches 正向回零，减速点、原点为原点开关；<br>1- Return to zero in the reverse direction, the deceleration point and origin are the origin switches 反向回零，减速点、原点为原点开关；<br>2- Return to zero in the forward direction, the deceleration point and origin are the Z signal of the motor 正向回零，减速点、原点为电机 Z 信号；<br>3- Return to zero in the reverse direction, the deceleration point and origin are the Z signal of the motor 反向回零，减速点、原点为电机 Z 信号；<br>4- Return to zero in the forward direction, the deceleration point is the origin switch, and the origin is the motor Z signal 正向回零，减速点为原点开关，原点为电机Z信号；<br>5-Return to zero in the reverse direction, and the origin is the motor Z signal;反向回零，减速点为原点开关，原点为电机 Z 信号；<br>6-Return to zero in the forward direction, the deceleration point and origin are the forward overtravel switches; 正向回零，减速点、原点为正向超程开关；<br>7-Return to zero in the reverse direction, deceleration point and origin are the reverse overtravel switches.反向回零，减速点、原点为反向超程开关；<br>8- Forward return to zero, the deceleration point is the forward overtravel switch, and the origin is the motor Z signal;正向回零，减速点为正向超程开关，原点为电机 Z 信号；<br>9- Reverse zero return, the deceleration point is the reverse overtravel switch, and the origin is the motor Z signal 反向回零，减速点为反向超程开关，原点为电机 Z 信号；<br>10- Positive return to zero, no deceleration point, the origin is the origin switch;正向回零，无减速点、原点为原点开关；<br>11- Reverse zero return, no deceleration point, the origin is the origin switch;反向回零，无减速点、原点为原点开关；<br>12- Positive return to zero, no deceleration point, the origin is the motor Z signal 正向回零，无减速点、原点为电机 Z 信号；<br>13- Reverse zero return, no deceleration point, the origin is the motor Z signal;反向回零，无减速点、原点为电机 Z 信号；<br>14- Positive return to zero, no deceleration point, the origin is the forward overtravel switch 正向回 | 1 | 0 | Effective immediately<br>立即生效 | Shutdown setting<br>停机设定 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| | | | 零，无减速点、原点为正向超程开关；<br>15- Reverse zero return, no deceleration point, origin is reverse overtravel switch 反向回零，无减速点、原点为反向超程开关；<br>16- Absolute value returns to origin 绝对值回原点；<br>17- Indexing absolute value returns to origin 分度绝对值回原点； | | | | | |
| P16 | 10 | High-speed search speed for origin switch signal 高速搜索原点开关信号的速度 | 10-3000 | 1rpm | 100 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P16 | 11 | Low-speed search speed for origin switch signal 低速搜索原点开关信号的速度 | 10 -1000 | 1rpm | 10 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P16 | 12 | Limit the acceleration and deceleration time when searching for the origin 限定搜索原点时的加减速时间 | 0-65535 | 1ms | 1000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P16 | 13 | Limit the time to find the origin 限定查找原点的时间 | 0-65535 | 1ms | 60000 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P16 | 14 | Mechanical origin offset (32 bits) 机械原点偏移量（32 位） | -1073741824 ~ 1073741824 | 1Unit | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | P |
| P16 | 18 | Reserved parameters 保留参数 | 0 ～65535 | 1P | 0 | N/A | Reserved parameters 保留参数 | P |
| P16 | 19 | Absolute value origin single circle absolute position 绝对值原点单圈绝对位置 | 0~1073741824 | 1Unit | 0 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 21 | Absolute value origin multi-turn data 绝对值原点多圈数据 | -32767~32767 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 22 | Reserved parameter 保留参数 | 0 ～65535 | 1 | 0 | N/A | Reserved parameters 保留参数 | P |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P16 | 23 | Reserved parameters 保留参数 | 0 ～65535 | 1 | 0 | N/A | Reserved parameters 保留参数 | P |
| P16 | 25 | Reserved parameters 保留参数 | 0 ～65535 | 1 | 0 | N/A | Reserved parameters 保留参数 | P |
| P16 | 27 | Absolute position return to origin delay time 绝对位置回原点延迟时间 | 0~10000 | 1ms | 0 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 28 | Single turn indexing 单圈分度数 | 1~200 | 1 | 50 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 30 | Limit condition setting 限位条件设置 | 0-使用硬限位；<br>1-使用软限位； | 1 | 0 | Effective immediately 立即生效 | Shutdown setting 停机设定 | PST |
| P16 | 31 | Positive soft limit encoder turns 正向软限位编码器圈数 | -32767~32767 | 1 圈 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P16 | 32 | Positive soft limit encoder single turn position 正向软限位编码器单圈位置 | 0~1073741824 | 1 P | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P16 | 34 | Negative soft limit encoder turns 负向软限位编码器圈数 | -32767~32767 | 1 圈 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P16 | 35 | Negative soft limit encoder single-turn position 负向软限位编码器单圈位置 | 0~1073741824 | 1 P | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P16 | 37 | Interrupt fixed length 2 displacement 中断定长 2 位移 | 0~1073741824 | 1 Unit | 0 | Effective immediately 立即生效 | Running setting 运行设定 | P |
| P16 | 39 | Interrupt fixed length 2 constant speed running speed 中断定长 2 恒速运行速度 | 0~9000 | 1rpm | 200 | Effective immediately 立即生效 | Running setting 运行设定 | P |

## P18 Group display parameter 组显示参数

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P18 | 00 | Servo status<br>伺服状态 | rdy、run、Err.00~99（Fault 故障）,AL.00~10( Warning 警告） | 1 | - | N/A | Display parameters 显示参数 | PST |
| P18 | 01 | Motor speed feedback (32 bits)<br>电机转速反馈（32 位) | -9000~9000 | 1rpm | - | N/A | Display parameters 显示参数 | PST |
| P18 | 02 | average load rate<br>平均负载率 | 0~3000 | 0.1% | - | N/A | Display parameters 显示参数 | PST |
| P18 | 03 | Speed command<br>速度指令 | -9000~9000 | 1rpm | - | N/A | Display parameters 显示参数 | PST |
| P18 | 04 | Internal torque command (relative to rated torque)<br>内部转矩指令（相对于额定转矩） | -5000~5000 | 0.1% | - | N/A | Display parameters 显示参数 | PST |
| P18 | 05 | Phase current effective value 相电流有效值 | 0~10000 | 0.01A | - | N/A | Display parameters 显示参数 | PST |
| P18 | 06 | Bus voltage value<br>母线电压值 | 0~10000 | 0.1V | - | N/A | Display parameters 显示参数 | PST |
| P18 | 07 | Absolute position counter<br>绝对位置计数器（32 位) | -1073741824 ~ 1073741824 | 1Unit | - | N/A | Display parameters 显示参数 | PST |
| P18 | 09 | electrical angle<br>电气角度 | 0~3600 | 0.1 度 | - | N/A | Display parameters 显示参数 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P18 | 10 | Mechanical angle (relative to encoder zero point) 机械角度（相对于编码器零点） | 0~3600 | 0.1 度 | - | N/A | Display parameters 显示参数 | PST |
| P18 | 11 | Number of bus encoder communication verification errors 总线编码器通信校验错误次数 | - | 1 | - | N/A | Display parameters 显示参数 | PST |
| P18 | 12 | Input position command corresponding speed information 输入位置指令对应速度信息 | -9000~9000 | 1rpm | - | N/A | Display parameters 显示参数 | PST |
| P18 | 13 | Position deviation counter (32 bits) 位置偏差计数器（32 位） | -1073741824 ~ 1073741824 | 1P | - | N/A | Display parameters 显示参数 | PST |
| P18 | 15 | Input command pulse counter(32 bits) 输入指令脉冲计数器（32 位） | -1073741824 ~ 1073741824 | 1Unit | - | N/A | Display parameters 显示参数 | PST |
| P18 | 17 | Feedback pulse counter (32 bits) 反馈脉冲计数器（32 位） | -1073741824 ~ 1073741824 | 1P | - | N/A | Display parameters 显示参数 | PST |
| P18 | 19 | Position deviation counter command unit (32 bits) 位置偏差计数器指令单位（32 位） | -1073741824 ~ 1073741824 | 1Unit | - | N/A | Display parameters 显示参数 | PST |
| P18 | 21 | Digital input signal monitoring 数字输入信号监视 | - | - | - | N/A | Display parameters 显示参数 | PST |
| P18 | 23 | Digital output signal monitoring 数字输出信号监视 | - | - | - | N/A | Display parameters 显示参数 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P18 | 25 | Total power-on time (32-bit) 总上电时间（32 位） | 0-4294967295 | 0.1s | - | N/A | Display parameters 显示参数 | PST |
| P18 | 27 | AI1 sampling voltage value AI1 采样电压值 | - | 1mV | - | N/A | Display parameters 显示参数 | PST |
| P18 | 28 | AI2 sampling voltage value AI2 采样电压值 | - | 1mV | - | N/A | Display parameters 显示参数 | PST |
| P18 | 29 | AI1 original voltage value AI1 原始电压值 | - | 1mV | - | N/A | Display parameters 显示参数 | PST |
| P18 | 30 | AI2 original voltage value 原始电压值 | - | 1mV | - | N/A | Display parameters 显示参数 | PST |
| P18 | 31 | Module temperature value 模块温度值 | - | 1°C | - | N/A | Display parameters 显示参数 | PST |
| P18 | 32 | Absolute encoder single turn data 绝对值编码器单圈数据 | - | pulse | - | N/A | Display parameters 显示参数 | PST |
| P18 | 34 | Absolute encoder multi-turn data 绝对值编码器多圈数据 | - | turn | - | N/A | Display parameters 显示参数 | PST |
| P18 | 35 | Maximum load rate 最大负载率 | 0~3000 | 0.1% | - | N/A | Display parameters 显示参数 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P18 | 40 | Display of fault records<br>故障记录的显示 | 0-Current fault 当前故障<br>1- Last failure 上 1 次故障<br>2- Last 2 failures 上 2 次故障<br>……<br>9-Last 9 failures 上 9 次故障 | 1 | 0 | Effective immediately 立即生效 | Running setting 运行设定 | PST |
| P18 | 41 | Error code<br>故障码 | - | - | - | N/A | Display parameters 显示参数 | PST |
| P18 | 42 | Selected failure timestamp (32 bits)<br>所选故障时间戳（32 位） | - | 0.1s | - | N/A | Display parameters 显示参数 | PST |
| P18 | 44 | Current speed at selected fault<br>所选故障时当前转速 | - | 1rpm | - | N/A | Display parameters 显示参数 | PST |
| P18 | 45 | Current U at selected fault<br>所选故障时当前电流 U | - | 0.01A | - | N/A | Display parameters 显示参数 | PST |
| P18 | 46 | Current at selected fault<br>所选故障时当前电流 V | - | 0.01A | | N/A | Display parameters 显示参数 | PST |
| P18 | 47 | Bus voltage at selected fault<br>所选故障时母线电压 | - | 0.1V | - | N/A | Display parameters 显示参数 | PST |
| P18 | 48 | Input terminal status during fault<br>故障时输入端子状态 | - | - | - | N/A | Display parameters 显示参数 | PST |
| P18 | 49 | Output terminal status at selected fault<br>所选故障时输出端子状态 | - | - | - | N/A | Display parameters 显示参数 | PST |

| Function code 功能码 | | Name 名称 | Setting range 设定范围 | Minimum unit 最小单位 | Factory setting 出厂设定 | Effective time 生效时间 | Category 类别 | Mode 模式 |
|---|---|---|---|---|---|---|---|---|
| P18 | 50 | Rotating load single turn position (lower 32 bits) 旋转负载单圈位置（低 32 位） | 0~ 4294967295 | 1P | - | N/A | Display parameters 显示参数 | PST |
| P18 | 52 | Rotating load single turn position (lower 32 bits) 旋转负载单圈位置（高 32 位） | 0~ 4294967295 | 1P | - | N/A | Display parameters 显示参数 | PST |
| P18 | 54 | Rotating load single turn position 旋转负载单圈位置 | 0~ 4294967295 | 1Unit | - | N/A | Display parameters 显示参数 | PST |
| P18 | 56 | Mechanical absolute position motor single-turn counter value 机械绝对位置电机单圈计数值 | -2147483647~ 2147483647 | 1 P | - | N/A | Display parameters 显示参数 | PST |
| P18 | 58 | Mechanical absolute position motor turns 机械绝对位置电机圈数 | -32767~32767 | 1 turn 圈 | - | N/A | Display parameters 显示参数 | PST |

## DIDO Assign basic function definitions 分配基本功能定义

| Input signal function description 输入信号功能说明 | | | | |
|---|---|---|---|---|
| No. 编码 | Name 名称 | Function code 功能名 | Description 说明 | Status 状态 |
| FunIN.1 | S_ON | Servo enables 伺服使能 | Invalid-Servo motor enable prohibit is valid-Servo motor power on enables 无效-伺服电机使能禁止有效-伺服电机上电使能 | distribute 分配 |
| FunIN.2 | ALM_RST | Warning reset signal (Edge valid function) 报警复位信号（沿有效功能） | 按照报警类型，有些报警复位后伺服是可以继续工作的。此功能是沿有效电平，当设端子为电平有效时，也仅检测到沿变化时有效。 | distribute 分配 |
| FunIN.3 | GAIN_SWITCH | Proportional action switching/gain switching 比例动作切换/增益切换 | P07.10=0 时：<br>无效-速度控制环为 PI 控制<br>有效-速度控制环为 P 控制<br>P07.10=1 时：<br>无效-使用第一组增益<br>有效-使用第二组增益 | distribute 分配 |
| FunIN.4 | CMD_SWITCH | Switching of main and auxiliary running instructions 主辅运行指令切换 | 无效-当前运行指令为 A<br>有效-当前运行指令为 B | distribute 分配 |
| FunIN.5 | PERR_CLR | Pulse deviation clear 脉冲偏差清除 | 建议设置成上升沿或下降沿有效<br>无效-不动作<br>有效-清除脉冲偏差 | distribute 分配 |

| Input signal function description 输入信号功能说明 | | | | |
|---|---|---|---|---|
| No.<br>编码 | Name<br>名称 | Function code<br>功能名 | Description<br>说明 | Status<br>状态 |
| FunIN.6 | CMD1 | Multi-segment running instructions switching CMD1<br>多段运行指令切换 CMD1 | 16-segment instruction selection<br>16 段指令选择 | Distribute<br>分配 |
| FunIN.7 | CMD2 | Multi-segment running instructions switching CMD2<br>多段运行指令切换 CMD2 | 16-segment instruction selection<br>16 段指令选择 | distribute<br>分配 |
| FunIN.8 | CMD3 | Multi-segment running instructions switching CMD3<br>多段运行指令切换 CMD3 | 16-segment instruction selection<br>16 段指令选择 | distribute<br>分配 |
| FunIN.9 | CMD4 | Multi-segment running instructions switching CMD4<br>多段运行指令切换 CMD4 | 16-segment instruction selection<br>16 段指令选择 | distribute<br>分配 |
| FunIN.10 | MODE_SWITCH | Model switching<br>模式切换 M1-SEL | Switch between speed, position and torque according to the selected control mode (3, 4, 5)根据选择的控制模式（3、4、5），进行速度、位置、转矩之间的切换 | distribute<br>分配 |
| FunIN.11 | ZERO_CLAMP | Zero fixed function enable signal<br>零位固定功能使能信号 | Valid-Enable zero fixed function<br>有效-使能零位固定功能<br>Invalid-Prohibit zero fixed function<br>无效-禁止零位固定功能 | distribute<br>分配 |
| FunIN.12 | INHIBIT | Pulse prohibits<br>脉冲禁止 | Valid-prohibit instruction pulse input<br>有效-禁止指令脉冲输入<br>Invalid- Allow command pulse input 无效-允许指令脉冲输入 | distribute<br>分配 |
| FunIN.13 | P_OT | Overtravel in forward direction<br>正向超程 | When mechanical motion exceeds the movable range limit switch, enter to overtravel protection function.<br>当机械运动超过可移动范围限位开关动作，进入超程保护功能。<br>Valid-Overtravel in forward direction, prohibit forward drives.<br>有效-正向超程，禁止正向驱动<br>Invalid-normal range, allow drives in forward direction<br>无效-正常范围，允许正向驱动 | distribute<br>分配 |
| FunIN.14 | N_OT | Overtravel in reverse direction<br>负向超程 | When mechanical motion exceeds the movable range limit switch, enter to overtravel protection function.<br>当机械运动超过可移动范围限位开关动作，进入超程保护功能。<br>Valid-Overtravel in reverse direction, prohibit forward drives.<br>有效-负向超程，禁止反向驱动<br>Invalid- normal range, allow drives in forward direction<br>无效-正常范围，允许正向驱动 | distribute<br>分配 |
| FunIN.15 | P_CL | Forward rotation external torque limit<br>正转外部转矩限制 ON | B | distribute<br>分配 |

| Input signal function description 输入信号功能说明 | | | | |
|---|---|---|---|---|
| No.<br>编码 | Name<br>名称 | Function code<br>功能名 | Description<br>说明 | Status<br>状态 |
| FunIN.16 | N_CL | Reverse external torque limit ON<br>反转外部转矩限制 ON | According to the selection of P06-06, the torque limit source is switched.P06-06 的选择，进行转矩限制源的切换。<br>P06-06=1 时：<br>Valid 有效- Valid - Reverse external torque limit is valid 反转外部转矩限制有效<br>Invalid-reverse interna; torque limit is valid<br>无效-反转内部转矩限制有效<br>P06-06=3 And when the AI limit value is less than the inversion external limit value:<br>且 AI 限制值小于反转外部限制值时：<br>Valid-reverse external torque limit is valid<br>有效-反转外部转矩限制有效<br>Invalid-AI torque limit is valid<br>无效-AI 转矩限制有效<br>P06-06=4：<br>Valid-AI torque limit is valid<br>有效- AI 转矩限制有效<br>Invalid-Reverse internal torque limit is valid<br>无效- 反转内部转矩限制有效 | distribute<br>分配 |
| FunIN.17 | P_JOG | Forward jog<br>正向点动 | Valid-According to the given command input<br>有效-按照给定指令输入<br>Invalid-Stop input the running command<br>无效-运行指令停止输入 | distribute<br>分配 |
| FunIN.18 | N_JOG | Negative jog<br>负向点动 | Valid- Input in reverse direction according to given command<br>有效-按照给定指令反向输入<br>Invalid-Stop input the running command<br>无效-运行指令停止输入 | distribute<br>分配 |
| FunIN.19 | STEP | Position step input enable<br>位置步进量输入使能 | Valid- According to the given step amount run<br>有效-按照给定步进量运行<br>Invalid- Stop input the running command<br>无效-运行指令停止输入 | distribute<br>分配 |
| FunIN.23 | GEAR_SWITCH | Electronic gear selection<br>电子齿轮选择 | Invalid- electronic gear ratio 1<br>无效-电子齿轮比 1<br>Valid- electronic gear ratio 2<br>有效-电子齿轮比 2 | distribute<br>分配 |
| FunIN.24 | POS_DIR | Position command reverse<br>位置指令反向 | Invalid- Not change direction; Invalid-Change direction<br>无效-不换向;有效-换向 | distribute<br>分配 |
| FunIN.25 | SPD_DIR | Speed command reverse<br>速度指令反向 | Invalid-Not change direction; Valid-Change direction<br>无效-不换向;有效-换向 | distribute<br>分配 |
| FunIN.26 | TOG_DIR | Torque command reverse<br>转矩指令反向 | Invalid-Not change direction; Valid- Change direction<br>无效-不换向;有效-换向 | distribute<br>分配 |
| FunIN.29 | PSEC_EN | Internal multi-segment position enable signal<br>内部多段位置使能信号 | Edge is valid 沿有效<br>Invalid- Ignore internal multi-segment command; Valid-Start internal multi-segment<br>无效-忽略内部多段指令;<br>有效-启动内部多段 | distribute<br>分配 |
| FunIN.30 | XINT_FINISH | Interrupt fixed length completion external confirmation signal<br>中断定长完成外部确认信号 | Edge is valid 沿有效<br>Invalid- Not response; Valid-trigger interrupt<br>无效-不响应;有效-触发中断 | distribute<br>分配 |
| FunIN.31 | XINT_DISABLE | Interrupt fixed length prohibit<br>中断定长禁止 | Level is valid<br>电平有效<br>Invalid- Not response; Valid-trigger interrupt<br>无效-不响应;有效-触发中断 | distribute<br>分配 |
| FunIN.32 | HOME_SWITCH | Origin switch signal<br>原点开关信号 | Mechanical origin switch<br>机械原点开关 | distribute<br>分配 |
| FunIN.33 | HOME_START | Origin baffle enable signal<br>原点挡板使能信号 | Start origin reset 原点复位开始 | distribute<br>分配 |
| FunIN.34 | ESTOP | Stop emergency<br>紧急停车 | Motor quickly stop and maintain servo locked<br>电机快速停止并保持伺服锁定 | distribute<br>分配 |

| Input signal function description 输入信号功能说明 | | | | |
|---|---|---|---|---|
| No.<br>编码 | Name<br>名称 | Function code<br>功能名 | Description<br>说明 | Status<br>状态 |
| FunIN.35 | POS_RUN | Position loop running at constant speed<br>位置环恒速运行 | The motor runs continuously at constant speed in position control mode<br>电机在位置控制模式以恒定速度持续运行 | distribute<br>分配 |
| FunIN.36 | XINT_RST | Interrupt fixed length reset<br>中断定长复位 | Force exits from fixed length state<br>强制退出定长状态 | distribute<br>分配 |
| FunIN.37 | RUN_SUSPEND | Interrupt fixed length running pause 中断定长运行暂停 | Interrupt fixed-length running pause<br>中断定长运行暂停 | distribute<br>分配 |
| FunIN.38 | TCMD1 | Multi-segment torque command 1<br>多段转矩指令 1 | 3-stage torque command selection<br>3 段转矩指令选择 | distribute<br>分配 |
| FunIN.39 | TCMD2 | Multi-segment torque command 2<br>多段转矩指令 2 | 3-stage torque command selection<br>3 段转矩指令选择 | distribute<br>分配 |
| FunIN.40 | SPD_AI_DIRCMD1 | Speed mode command switching CMD1<br>速度模式指令方向切换 CMD1 | Switch motor forward/reverse/stop operation<br>切换电机正转/反转/停止运行 | distribute<br>分配 |
| FunIN.41 | SPD_AI_DIRCMD2 | Speed mode command switching CMD2<br>速度模式指令方向切换 CMD2 | Switch motor forward/reverse/stop operation<br>切换电机正转/反转/停止运行 | distribute<br>分配 |
| FunIN.42 | ABS_HOME_SET | Absolute position encoder origin position renews<br>绝对位置编码器原点位置更新 | Trigger the drive to record the current position as the origin<br>触发驱动器将当前位置记录为原点 | distribute<br>分配 |

| Output signal function description<br>输出信号功能说明 | | | | |
|---|---|---|---|---|
| No.<br>编码 | Name<br>名称 | Function code<br>功能名 | Description<br>说明 | Status<br>状态 |
| FunOUT.1 | S_RDY | Servo ready<br>伺服准备好 | Servo status is ready, it can receive S-ON signal.<br>伺服状态准备好，可以接收 S-ON 有效信号。<br>Valid- Servo ready<br>有效-伺服准备好<br>Invalid- Servo is not ready<br>无效-伺服未准备好 | distribute<br>分配 |
| FunOUT.2 | ALM | Fault output signal<br>故障输出信号 | Status is valid when a fault is detected<br>检测出故障时状态有效 | distribute<br>分配 |
| FunOUT.3 | WARN | Warning output signal<br>警告输出信号 | The warning output signal is valid (conducted)<br>警告输出信号有效(导通) | distribute<br>分配 |
| FunOUT.4 | TGON | Motor rotation output signal<br>电机旋转输出信号 | When the rotation speed of servo motor is higher than speed threshold<br>伺服电机的转速高于速度门限值(P05-16)时<br>Valid-motor rotation signal is valid<br>有效-电机旋转信号有效<br>Invalid- motor rotation signal is invalid<br>无效-电机旋转信号无效 | distribute<br>分配 |
| FunOUT.5 | V_ZERO | Zero speed signal<br>零速信号 | Servo motor stops rotate and output signal.<br>伺服电机停止转动时输出的信号。<br>Valid-the motor rotation speed is at zero<br>有效电机转速为零<br>Invalid-the motor rotation speed is not at zero<br>无效电机转速不为零 | distribute<br>分配 |
| FunOUT.6 | V_CMP | consistent speed<br>速度一致 | Speed control, it is valid when the absolute value for difference of servo motor speed and speed command is less than P05-17 speed deviation 速度控制时，伺服电机速度与速度指令之差的绝对值小于 P05-17 速度偏差设定值时有效。 | distribute<br>分配 |

| Output signal function description<br>输出信号功能说明 | | | | |
|---|---|---|---|---|
| No.<br>编码 | Name<br>名称 | Function code<br>功能名 | Description<br>说明 | Status<br>状态 |
| FunOUT.7 | COIN | Position completion<br>位置完成 | During position control, the position deviation pulse is valid when it reaches the positioning completion range P04-24.<br>位置控制时，位置偏差脉冲到达定位完成幅度 P04-24 内时有效 | distribute<br>分配 |
| FunOUT.8 | NEAR | Location proximity signal<br>定位接近信号 | During position control, the position deviation pulse is effective when it reaches the positioning proximity signal amplitude P04-25 setting value.<br>位置控制时，位置偏差脉冲到达定位接近信号幅度 P04-25 设定值时有效 | distribute<br>分配 |
| FunOUT.9 | T_LT | Torque limit signal<br>转矩限制信号 | Torque limit confirmation signal<br>转矩限制的确认信号<br>Valid - motor torque limited<br>有效-电机转矩受限<br>Invalid - motor torque is not limited<br>无效-电机转矩不受限 | distribute<br>分配 |
| FunOUT.10 | V_LT | Rotation speed limit signal<br>转速限制信号 | Confirmation signal for speed limitation during torque control<br>转矩控制时速度受限的确认信号<br>Valid - motor speed limited<br>有效-电机转速受限<br>Invalid-Motor rotation speed is not limited<br>无效-电机转速不受限 | distribute<br>分配 |
| FunOUT.11 | BKOFF | Brake release signal output:<br>抱闸解除信号输出 | Brake release signal output:<br>抱闸解除信号输出：<br>Valid - the brake is released and the motor shaft is free<br>有效-抱闸器松开，电机轴自由<br>Invalid - the brake is restored and the motor shaft is locked<br>无效-抱闸器恢复，电机轴锁住 | distribute<br>分配 |
| FunOUT.12 | T_ARR | Torque feedback reaches the specified range 转矩反馈到达指定范围 | Valid - the absolute value of torque reaches the set value 有效-转矩绝对值到达设定值<br>Invalid - the absolute value of torque is less than the set value 无效-转矩绝对值小于设定值 | distribute<br>分配 |
| FunOUT.13 | V_ARR | Speed feedback reaches the specified range 速度反馈到达指定范围 | Valid - speed feedback reaches the set value<br>有效-速度反馈达到设定值<br>Invalid - the speed range does not reach the set value 无效-速度范围未达到设定值 | distribute<br>分配 |
| FunOUT.18 | XINT_DONE | Interrupt fixed-length completion signal<br>中断定长完成信号 | Output after interrupt fixed length is completed<br>中断定长完成后输出 | distribute<br>分配 |
| FunOUT.19 | HOME_ATTAIN | Origin returns complete signal<br>原点回零完成信号 | Output after completion of origin return<br>原点回零完成后输出 | distribute<br>分配 |
| FunOUT.20 | XINT2_DONE | Interrupt fixed length 2 completion signal 中断定长 2 完成信号 | The second stage interrupts the fixed-length displacement operation completion signal output<br>第二段中断定长位移量运行完成信号输出 | distribute<br>分配 |
| FunOUT.21 | STEP1_OUT | Multi-segment position command 1 completes output<br>多段位置指令 1 完成输出 | 16-segment position complete output<br>16 段位置完成输出 | distribute<br>分配 |
| FunOUT.22 | STEP2_OUT | Multi-segment position command 2 completes output<br>多段位置指令 2 完成输出 | 16-segment position complete output<br>16 段位置完成输出 | distribute<br>分配 |
| FunOUT.23 | STEP3_OUT | Multi-segment position command 3 completes output<br>多段位置指令 3 完成输出 | 16-segment position complete output<br>16 段位置完成输出 | distribute<br>分配 |

| Output signal function description<br>输出信号功能说明 | | | | |
|---|---|---|---|---|
| No.<br>编码 | Name<br>名称 | Function code<br>功能名 | Description<br>说明 | Status<br>状态 |
| FunOUT.24 | STEP4_OUT | Multi-segment position command 4 completes output<br>多段位置指令 4 完成输出 | 16-segment position complete output<br>16 段位置完成输出 | distribute<br>分配 |
| FunOUT.25 | DBKOFF | Dynamic brake control signal output<br>动态制动控制信号输出 | Dynamic brake control signal output:<br>动态制动控制信号输出：<br>Active - the dynamic brake internal relay is open and the motor shaft is free 有效- 动态制动器内部继电器打开，电机轴自由<br>Invalid - the internal relay of the dynamic brake is closed, and the motor shaft is subject to resistance 无效-动态制动器内部继电器吸合，电机轴受阻力 | distribute<br>分配 |

# Appendix A: Version Change Record
# 附录 A：版本变更记录

| Date<br>日期 | Version after change<br>变更后版本 | Change content<br>变更内容 |
|---|---|---|
| 2021.04.29 | V 1.0 | Initial Release 首次发布 |
| 2021.06.30 | V 1.1 | Modify some known errors 修改一些已知错误 |
| 2022.08.22 | V 1.2 | Added comparison diagram of correct and incorrect wiring of pulse port 新增脉冲端口正确与错误接线的对比图 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

# AS3-BAI Series

## AC Servo Drive

**User manual V1.2**


**2022-03-09**

**SHENZHEN YAKO AUTOMATION TECHNOLOGY CO., LTD.**
**www.yakotec.com**

# Content

# Chapter 1 Selection of Servo System

## 1.1 Drive specifications

Table 1-1 AS3 Series Servo Drive Basic Specifications

| | | | | | |
|---|---|---|---|---|---|
| Basic Specifications | Model | AS3-02BAI | AS3-04BAI | AS3-08BAI | AS3-10BAI |
| | Continuous Output Current Arms | 1.6 | 2.8 | 5.0 | 6 |
| | Maximum Output Current Arms | 5.8 | 10 | 13.5 | 17 |
| | Power Supply Input | Single Phase,AC200~240V,50/60HZ | | | |
| | Use Environment | Temperature | Operation Temperature：0℃～55℃<br>Storage Temperature：：-20℃～+70℃ | | |
| | | Humidity | 0～90% RH（No dew environment） | | |
| | | Using Height | Elevation ≤1000m | | |
| | | Vibration/Strike | Vibration <0.5G/ Strike <2G | | |
| | | IP Grade / Contamination | IP20/ Contamination Rating 2 | | |
| | Control Method | | IGBT PWM Space Vector Control | | |
| | Encoder | | 17bit Serial Incremental Type/ 17bit Serial absolute value Type/ 23bit Serial Incremental Type/ 23bit Serial absolute value Type | | |
| | I/O Ports | IO Signal | Input | 8 pcs (General) | |
| | | | Output | 5 pcs (General) | |
| | | Pulse Signal | Input | 4 pcs (Low Speed Pulse, High Speed Pulse) | |
| | | | Output | 4 pcs (3 Frequency Output, 1 Open Collector Output) | |
| | Communication | RS-232 | Communication | | |
| | | RS-485 | Multi-group parallel，485 communication with the host computer | | |
| | Panel Operator | | LED Display | | |
| | Regeneration Function | | Over 400W built-in braking resistor | | |
| | Protection Function | | Overcurrent, Overload, Overvoltage, Low Voltage, Over speed, Overheat, Encoder error, Communication error, Position deviation | | |
| | Control Mode | | Position Control Mode; Speed Control Mode; Torque Control Mode; Mixed-mode Switching | | |
| Function Specifications | Position Control Mode | Location Command Format | PULSE/DIR;<br>CW/CCW;<br>A,B Phase Cross Pulse | | |
| | | Position Input Circuit | Line Driver；Open Collector | | |
| | | Maximum Input Frequency | Line Driver Low Speed 500Kpps<br>Line Driver High Speed 3Mpps<br>Open Collector 200Kpps | | |
| | | Smoothing Filter | Smoothing treatment for position command, ensuring motor running more stable | | |
| | | Electronic Gear | Two sets of electronic gear ratios available | | |
| | | Vibration Suppression Filter | Effectively inhibit external signal interference and the system resonant frequency, to ensure stable operation | | |
| | Speed Control Mode | Command Form | Internal speed command | | |
| | | Speed Change Fate | Voltage Fluctuation | Rated voltage ±10%：0.5%（Rated speed） | |
| | | | Load Fluctuation | 0-100% load：- 0.5%(Rated speed) | |
| | | | Temperature Fluctuation | 25±25℃：≤0.5%(Rated speed) | |
| | | Acceleration/Deceleration Setting Range | 0-10S | | |
| | Torque Control Mode | Command Form | Internal torque command | | |
| | Common Spec | Self-tuning Function | Identifying inertia, rigidity tuning | | |
| | | Encoder Feedback Electronic Gear | Free set | | |
| | | Error Record | 9 sets of historical information records | | |
| | | Dynamic braking | Built-in dynamic braking unit to prevent running out of power | | |

## 1.2 Servo motors and drives model description

### 1.2.1 Drive Model Description

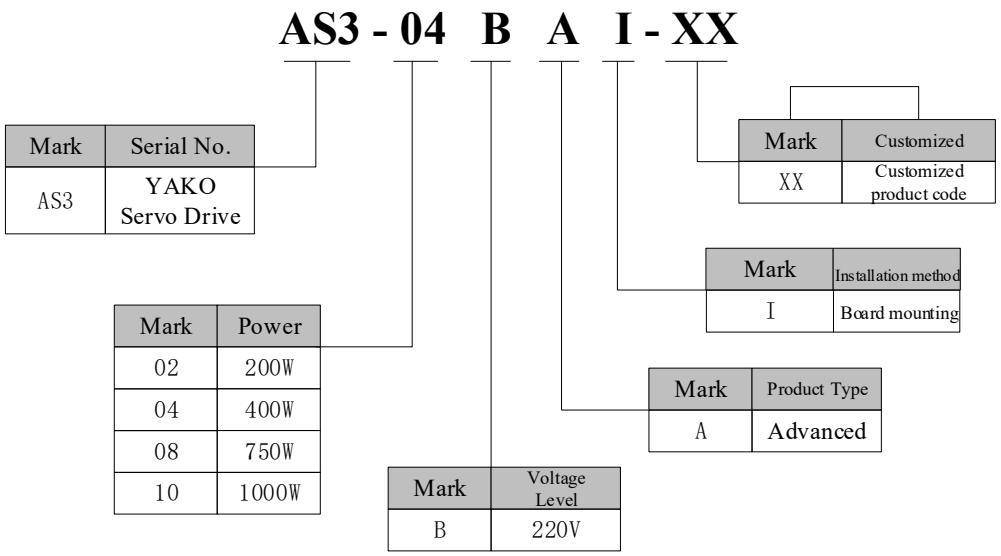



Chart 1-1 Drive naming rules

### 1.2.2 Servo motor model description

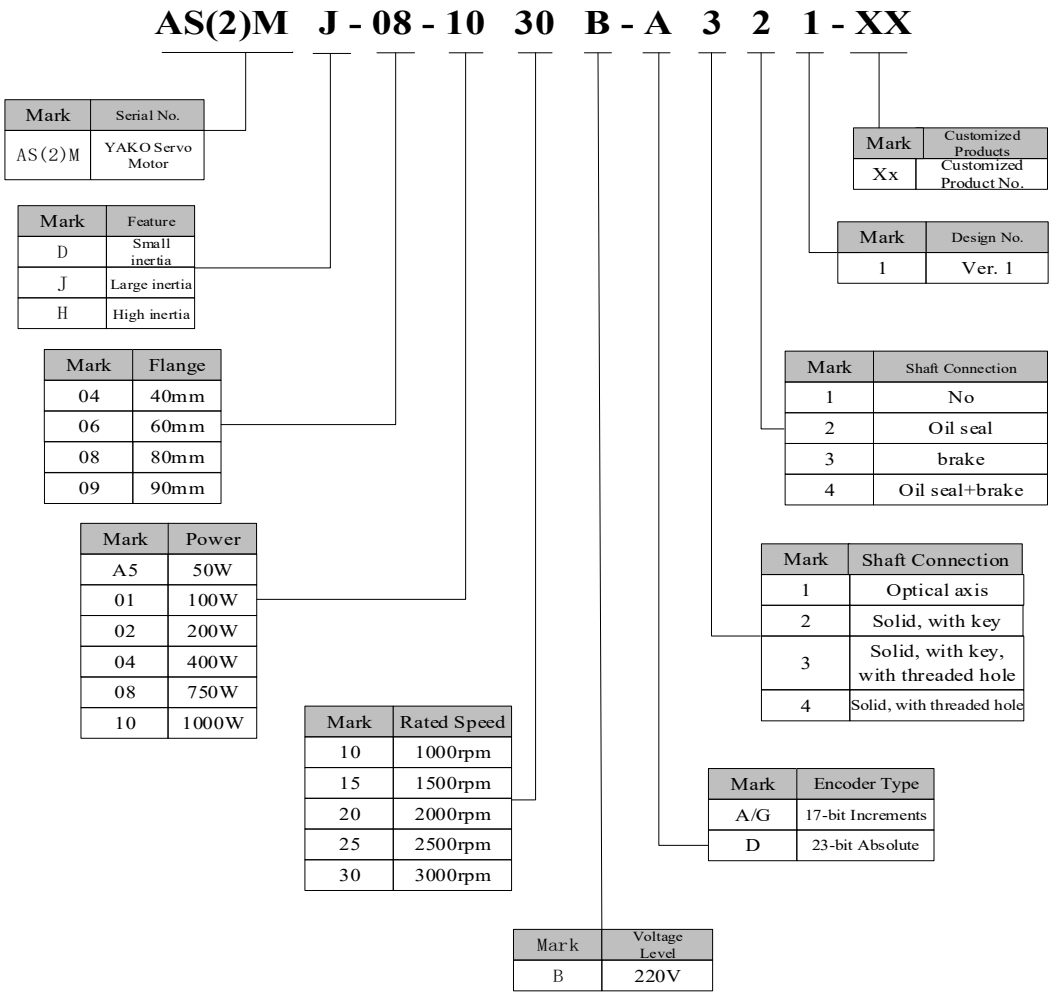



Figure 1-2 Motor naming rules

## 1.3 Servo drive and servo motor matching list

Table 1-2 Servo drive and motor matching table

| Servo Motor Models | | Flange | Capacity | Drive Model | Drive | Matching cable |
|---|---|---|---|---|---|---|
| | | | | AS3-□□BAI | SIZE | |
| Small inertia | ASMD-04-A530B | 40 | 50W | 02 | B | P1-AS3 E1-AS3 |
| | ASMD-04-0130B | 40 | 100W | 02 | B | |
| | AS2MD-04-A530B-G*** | 40 | 50W | 02 | B | |
| | AS2MD-04-0130B-G*** | 40 | 100W | 02 | B | |
| | ASMD-04-0130B-G***-SA | 40 | 100W | 02 | B | |
| Large inertia | ASMJ-06-0230B | 60 | 200W | 02 | B | |
| | ASMJ-06-0430B | 60 | 400W | 04 | B | |
| | ASMJ-08-0830B | 80 | 750W | 10 | B | |
| | ASMJ-09-1030B | 90 | 1KW | 10 | B | |
| | AS2MJ-06-0230B-G*** | 60 | 200W | 02 | B | |
| | AS2MJ-06-0430B-G*** | 60 | 400W | 04 | B | |
| | AS2MJ-08-0830B-G*** | 80 | 750W | 10 | B | |
| | AS2MJ-08-1030B-G*** | 80 | 1.0KW | 10 | B | |
| | ASMJ-06-0230B-G***-SA | 60 | 200W | 02 | B | |
| | ASMJ-06-0430B-G***-SA | 60 | 400W | 04 | B | |
| | ASMJ-08-0830B-G***-SA | 80 | 750W | 10 | B | |
| | ASMJ-08-1030B-G***-SA | 80 | 1.0KW | 10 | B | |

## 1.4 Matching motor parameters

Table 1-3 Motor parameter table

| Motor specifications | Rated output (KW) | Rated torque (Nm) | Maximum torque (Nm) | Rated current (Arms) | Maximum current (Arms) | Rated speed ($min^{-1}$) | Maximum speed ($min^{-1}$) | Rotor inertia ($10^{-4}$ $Kgm^2$) |
|---|---|---|---|---|---|---|---|---|
| ASMD-04-A530B | 0.05 | 0.159 | 0.477 | 0.69 | 2.07 | 3000 | 5000 | 0.025 |
| ASMD-04-0130B | 0.1 | 0.318 | 0.954 | 1.27 | 3.81 | 3000 | 5000 | 0.046 |
| ASMJ-06-0230B | 0.2 | 0.64 | 1.92 | 1.7 | 5.1 | 3000 | 5000 | 0.42 |
| ASMJ-06-0430B | 0.4 | 1.27 | 3.81 | 2.8 | 8.4 | 3000 | 5000 | 0.68 |
| ASMJ-08-0830B | 0.75 | 2.39 | 7.17 | 4.5 | 13.5 | 3000 | 4500 | 1.53 |
| ASMJ-09-1030B | 1 | 3.18 | 9.54 | 4.5 | 13.5 | 3000 | 4000 | 2.38 |
| AS2MD-04-A530B-G*** | 0.05 | 0.16 | 0.48 | 0.67 | 2.01 | 3000 | 5000 | 0.025 |
| AS2MD-04-0130B-G*** | 0.1 | 0.31 | 0.95 | 1.27 | 3.81 | 3000 | 5000 | 0.05 |
| ASMD-04-0130B-G***-SA | 0.1 | 0.32 | 0.95 | 1.1 | 3.3 | 3000 | 6000 | 0.05 |
| AS2MJ-06-0230B-G*** | 0.2 | 0.64 | 1.92 | 1.7 | 5.1 | 3000 | 5000 | 0.42 |
| AS2MJ-06-0430B-G*** | 0.4 | 1.27 | 3.81 | 2.7 | 8.1 | 3000 | 5000 | 0.68 |
| AS2MJ-08-0830B-G*** | 0.75 | 2.39 | 7.17 | 4.5 | 13.5 | 3000 | 4500 | 1.50 |
| AS2MJ-08-1030B-G*** | 1 | 3.18 | 9.52 | 6.5 | 19.5 | 3000 | 4500 | 1.70 |
| ASMJ-06-0230B-G***-SA | 0.2 | 0.64 | 1.92 | 1.70 | 5.10 | 3000 | 6000 | 0.20 |
| ASMJ-06-0430B-G***-SA | 0.4 | 1.27 | 3.81 | 2.80 | 8.40 | 3000 | 6000 | 0.44 |
| ASMJ-08-0830B-G***-SA | 0.75 | 2.39 | 7.17 | 4.90 | 14.7 | 3000 | 5000 | 1.43 |
| ASMJ-08-1030B-G***-SA | 1 | 3.18 | 9.52 | 5.70 | 17.1 | 3000 | 4500 | 1.10 |

## 1.5 Matching cable

The naming rules for motor power lines are as follows.

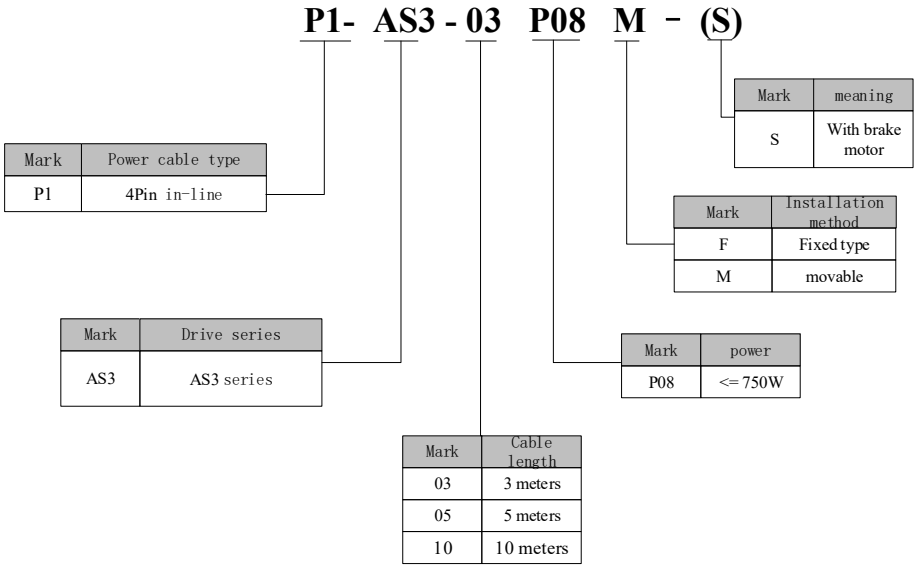
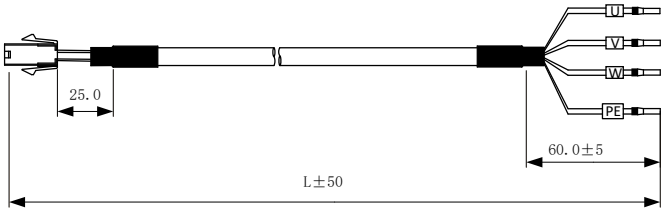
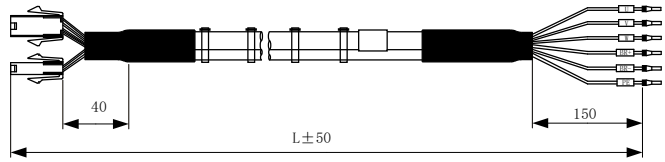



Figure 1-3 Power line naming rules

The structure diagram of the motor power cable is shown in the table below.

Table 1-4 Power cable structure diagram

| Cable model | Cable length L(mm) | SIZE-C |
|---|---|---|
| P1-AS3-1A5P08M | 1500 |  |
| P1-AS3-03P08M | 3000 | |
| P1-AS3-05P08M | 5000 | |
| P1-AS3-08P08M | 8000 | |
| P1-AS3-10P08M | 10000 | |
| P1-AS3-1A5P08M-S | 1500 |  |
| P1-AS3-03P08M-S | 3000 | |
| P1-AS3-05P08M-S | 5000 | |
| P1-AS3-08P08M-S | 8000 | |
| P1-AS3-10P08M-S | 10000 | |

The naming rules for motor encoder lines are as follows.

**E1 - AS3 - 03 A M**

| Mark | Encoder line type |
|---|---|
| E1 | 9Pin in-line |

| Mark | Installation method |
|---|---|
| F | Fixed type |
| M | movable |

| Mark | Drive series |
|---|---|
| AS3 | AS3 series |

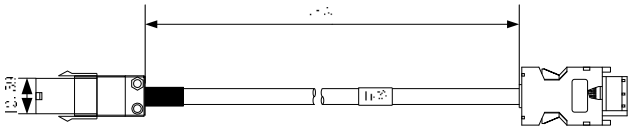
| Mark | power |
|---|---|
| A | Increment encoder |
| B | Absolute encoder |

| Mark | Cable length |
|---|---|
| 03 | 3 meters |
| 05 | 5 meters |
| 10 | 10 meters |

Figure 1-4 Encoder line naming rules

The structure diagram of the encoder cable is shown in the table below.

Table 1-5 Encoder cable structure diagram

| Cable model | Cable length L(mm) | SIZE-C |
|---|---|---|
| E1-AS3-1A5AM | 1500 | |
| E1-AS3-03AM*1 | 3000 |  |
| E1-AS3-05AM | 5000 | |
| E1-AS3-08AM | 8000 | |
| E1-AS3-10AM | 10000 | |

**Note:**

*1: A indicates increment encoder, B indicates absolute encoder

## 1.6 Accessories

Table 1-6 Line Accessories

| Name | Accessories model | Quantity | Picture | Accessories name | matched cable model | matched motor type (flange) |
|---|---|---|---|---|---|---|
| SA-C5 | DB plug plastic case | 1 |  | Alignment fitting between encoder cable and driver | E1-AS3-03AM | 40、60、80、90 |
| | DB head-6P | 1 | | | | |
| | AMP-172161-1 | 1 |  | 9P connector plastic case metal terminal<br>9P connector tail clip kit | | |
| | AMP-170361-1 | 10 | | | | |
| | AMP-316454-1 | 2 | | | | |
| | AMP-172159-1 | 1 |  | 4P connector plastic case metal terminal<br>2P connector molded | P1-AS3-03P08M<br>P5-AS3-03P08M | |
| | AMP-170362-1 | 8 | | | | |
| | AMP-172157-1 | 1 | | | | |

# Chapter 2 Dimensions and Product Installation

## 2.1 Servo drive dimensions

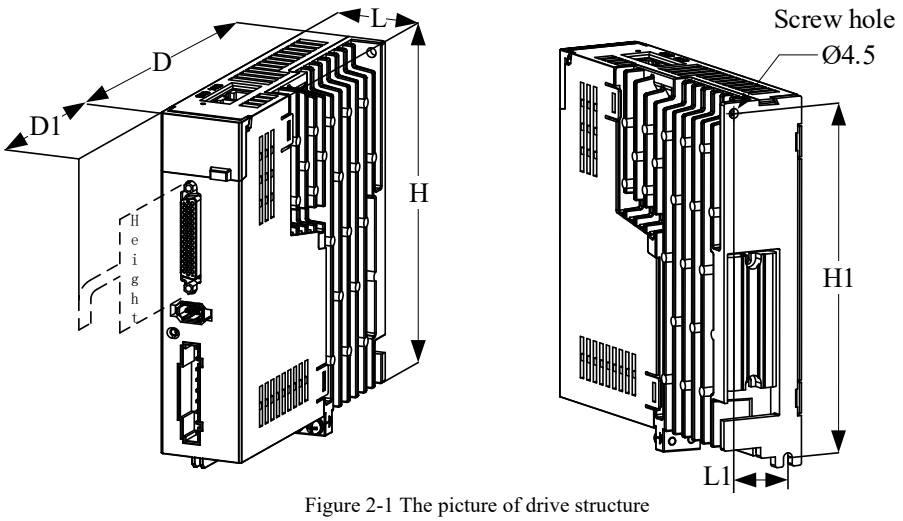



Figure 2-1 The picture of drive structure

**Note：**

Frame B:AS3-02B/AS3-04B

Frame C: AS3-08B/AS3-10B

Table 2-1The dimension of drive

| model | L(mm) | H(mm) | D(mm) | L1(mm) | H1(mm) | D1(mm) | Screw hole |
|---|---|---|---|---|---|---|---|
| Frame B | 40 | 170 | 153 | 28 | 161 | 75 | 2-M4 |
| Frame C | 50 | 170 | 173 | 37 | 161 | 75 | 2-M4 |

## 2.2 Servo drive installation

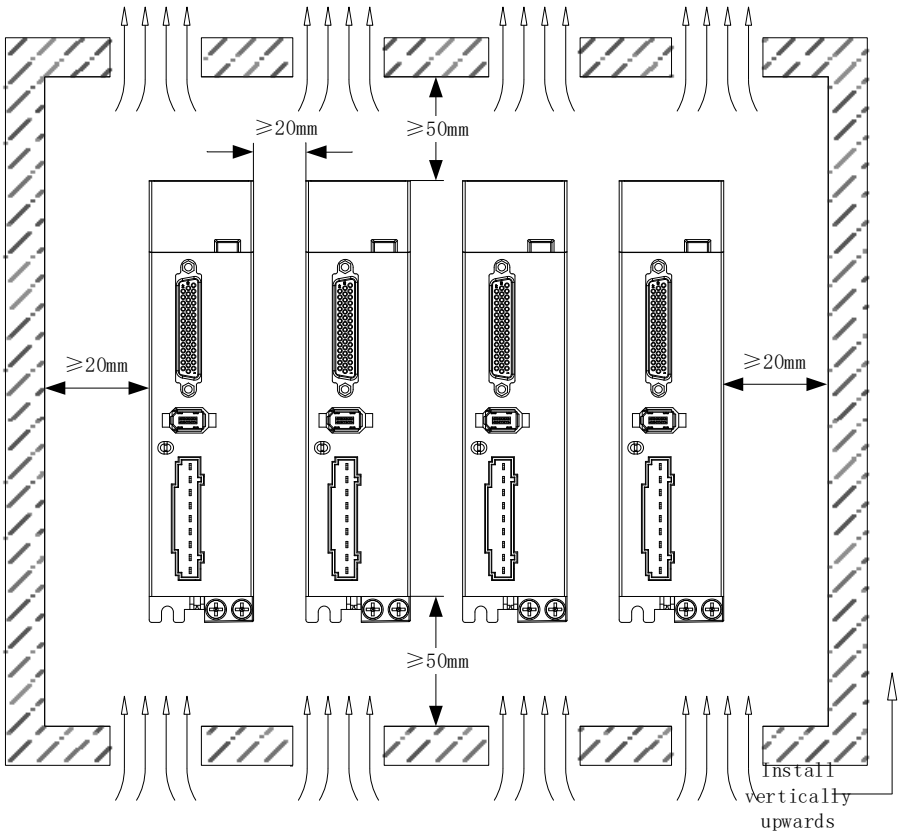



Figure 2-2 Servo drive installation

# Chapter 3 Servo Drive and Motor Connection

## 3.1 System structure diagram


Figure 3-1 System structure diagram

The names, functions and specifications of each part of the drive are as follows.

Table 3-1 Servo drive main circuit terminal name and function

| No. | Name | Description |
|---|---|---|
| 1 | L1、L2<br>AC power terminal | Input control circuit power according to specifications |
| 2 | P、C、D、N<br>Regenerative resistor terminal | 1Kw models default P, D short connection, and it has been connected to the built-in resistance. When the braking capacity is insufficient, connect P and C with an external brake resistor (to use the external resistor, remove the short wiring and keep P and D open).<br><br>400W models P and C have been connected with their own external brake resistance<br><br>P, N DC bus terminal, when multiple machines in parallel can be connected to a common bus |
| 3 | U、V、W、PE<br>Motor power cable | Connect servo motor three-phase and ground wire |
| 4 | Communication control CN3,CN4 | Connected to RS485 command device or RS232 command device |
| 5 | Control port CN1 | Connect to host controller for IO signal control |
| 6 | Encoder feedback port CN2 | Connected to the motor encoder cable |

## 3.2 Main circuit

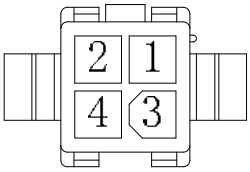
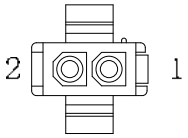
The functions, names and specifications of each part of the main circuit are as follows:

Table 3-2 Servo drive main circuit terminal function specifications

| Name | Terminal mark | Function, specification |
|---|---|---|
| power input terminal | L1、L2 | Single-phase AC220V power input |
| regenerative resistor connection terminal | P、C、D | 1Kw models default P, D short connection, and it has been connected to the built-in resistance. When the braking capacity is insufficient, connect P and C with an external brake resistor (to use the external resistor, remove the short wiring and keep P and D open).<br><br>400W models P and C have been connected with their own external brake resistance |
| Common DC terminal | P、N | Servo DC bus terminal for common bus connection when multiple units are connected in parallel |
| Servo motor Power cable connection terminal | U、V、W | Connected to the U, V, W of the motor. |
| Ground terminal | PE | Two grounding terminals are connected to the power grounding terminal and the motor grounding terminal.<br><br>Be sure to ground the entire system. |

## 3.3 Power cable and brake connector

Table 3-3 Power cable and brake connector

<table>
<tr><th colspan="2">Terminal pin</th><th>Matched motor</th><th>Connector picture</th></tr>
<tr><td colspan="2">4Pin connector</td><td>40、60、80、90</td><td rowspan="6"> 
</td></tr>
<tr><td>Pin NO.</td><td>Signal name</td><td rowspan="5">Plastic shell：AMP 172159-1<br>Terminal：AMP 170362-1</td></tr>
<tr><td>1</td><td>U</td></tr>
<tr><td>2</td><td>V</td></tr>
<tr><td>3</td><td>W</td></tr>
<tr><td>4</td><td>PE</td></tr>
<tr><td colspan="2">2Pin connector</td><td rowspan="4">Plastic shell：AMP 172157-1<br>Terminal：AMP 170362-1</td><td rowspan="4"> 
</td></tr>
<tr><td>Pin NO.</td><td>Signal name</td></tr>
<tr><td>1</td><td>BK+</td></tr>
<tr><td>2</td><td>BK-</td></tr>
</table>

## 3.4 Encoder connector

The encoder cable drive connector PIN distribution diagram is as follows:

Table 3-4 The encoder cable drive connector PIN distribution

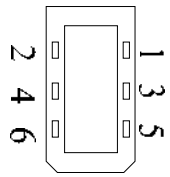
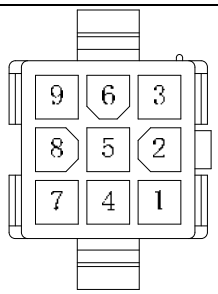
<table>
<tr><th>Pin</th><th>Encoder signal</th><th>Function description</th><th>picture</th></tr>
<tr><td>1</td><td>+5V</td><td>+5V power output</td><td rowspan="5"> 
</td></tr>
<tr><td>2</td><td>GND</td><td>Power GND output</td></tr>
<tr><td>5</td><td>SD+</td><td rowspan="2">Encoder signal</td></tr>
<tr><td>6</td><td>SD-</td></tr>
<tr><td>Shell</td><td>PE</td><td></td></tr>
</table>

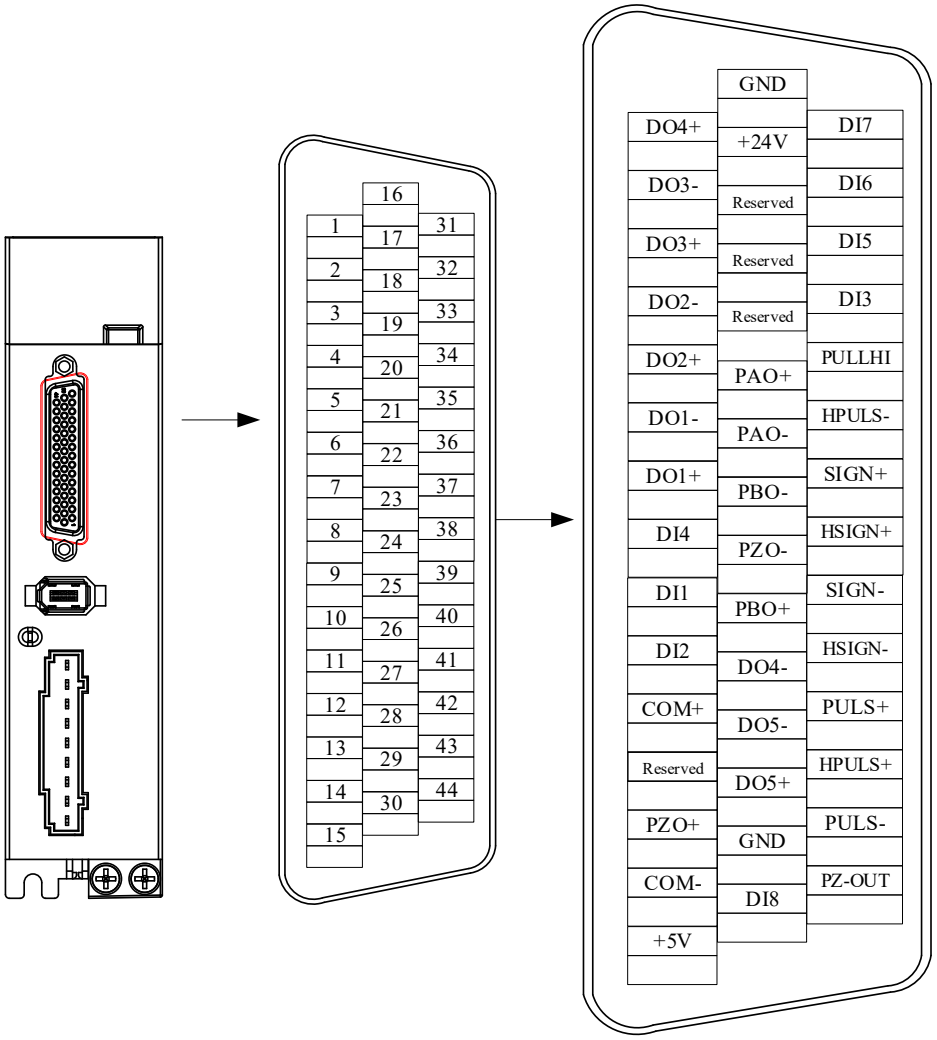
Table 3-5 Servo motor connector

<table>
<tr><th colspan="3">Terminal PIN distribution</th><th>Matched motor</th><th>Connector picture</th></tr>
<tr><td colspan="3">9Pin connector</td><td>40、60、80、90</td><td rowspan="3"></td></tr>
<tr><td>Pin NO.</td><td>2500 lines signal</td><td>17/23-bit signal</td><td rowspan="2">Plastic shell：AMP 172161-1<br>Terminal：AMP</td></tr>
<tr><td>3</td><td>A+</td><td>-</td></tr>
</table>

| | | | | |
|---|---|---|---|---|
| 6 | A- | - | 170361-1 |  |
| 2 | B+ | SD+ | | |
| 5 | B- | SD- | | |
| 1 | Z+ | BAT+ | | |
| 4 | Z- | BAT- | | |
| 9 | +5V | +5V | | |
| 8 | GND | GND | | |
| 7 | PE | PE | | |



### 3.5 Control signal CN1




Pic. 3-2 CN1 connector diagram

**Note：**

Control terminal PIN definition is as follows

Table 3-5 Control terminal PIN definition

| Definition | | PIN | Function | |
|---|---|---|---|---|
| Position command | PULS+ | 41 | Low speed pulse command (differential or single ended) | Differential drive input or open collector input |
| | PULS- | 43 | | |
| | SIGN+ | 37 | Low speed pulse command (differential or single ended) | |
| | SIGN- | 39 | | |
| | HPULS+ | 42 | High speed pulse command input, differential input required | |
| | HPULS- | 36 | | |
| | HSIGN+ | 38 | High speed pulse command input, differential input required | |
| | HSIGN- | 40 | | |
| | PULLHI | 35 | COM+，power input port , internal connected with current limiting resistor | |
| | GND | 29 | Differential signal ground | |
| Encoder output | PAO+ | 21 | Encoder pulse divider output | |
| | PAO- | 22 | | |
| | PBO+ | 25 | | |
| | PBO- | 23 | | |
| | PZO+ | 13 | | |
| | PZO- | 24 | | |
| | PZ-OUT | 44 | Z-phase pulse collector open output | |
| | GND | 29 | Z-phase pulse collector open circuit output signal ground; differential signal ground | |
| | +5V | 15 | Internal 5 V supply with a maximum output current 200 mA | |
| | GND | 16 | | |
| | PE | Shell | | |
| Analog signal input | | | Default function | Functional description |
| | DI1 | 9 | P-OT | Prohibit forward drive |
| | DI2 | 10 | N-OT | Prohibit backward drive |
| | DI3 | 34 | INHIBIT | Pulse inhibit |
| | DI4 | 8 | ALM-RST | Alarm reset |
| | DI5 | 33 | S-ON | Servo enable |
| | DI6 | 32 | ZCLAMP | Zero fixed |
| | DI7 | 31 | GAIN-SEL | Gain switching |
| | DI8 | 30 | Home Switch | Home switching |
| | +24V | 17 | | Internal 24 power supply , voltage range 24V±10%，maximum output current 200 mA |
| | COM- | 14 | | Internal 24V ground; open collector pulse input ground; |
| | COM+ | 11 | | DI connector Power input termianl，24V |

| | | | | |
|---|---|---|---|---|
| | DO1+ | 7 | S-RDY+ | Servo ready |
| | DO1- | 6 | S-RDY- | |
| | DO2+ | 5 | COIN+ | Position arrival |
| | DO2- | 4 | COIN- | |
| | DO3+ | 3 | ZERO+ | Zero speed |
| | DO3- | 2 | ZERO- | |
| | DO4+ | 1 | ALM+ | Error output |
| | DO4- | 26 | ALM- | |
| | DO5+ | 28 | Reserved | Reserved |
| | DO5- | 27 | Reserved | |

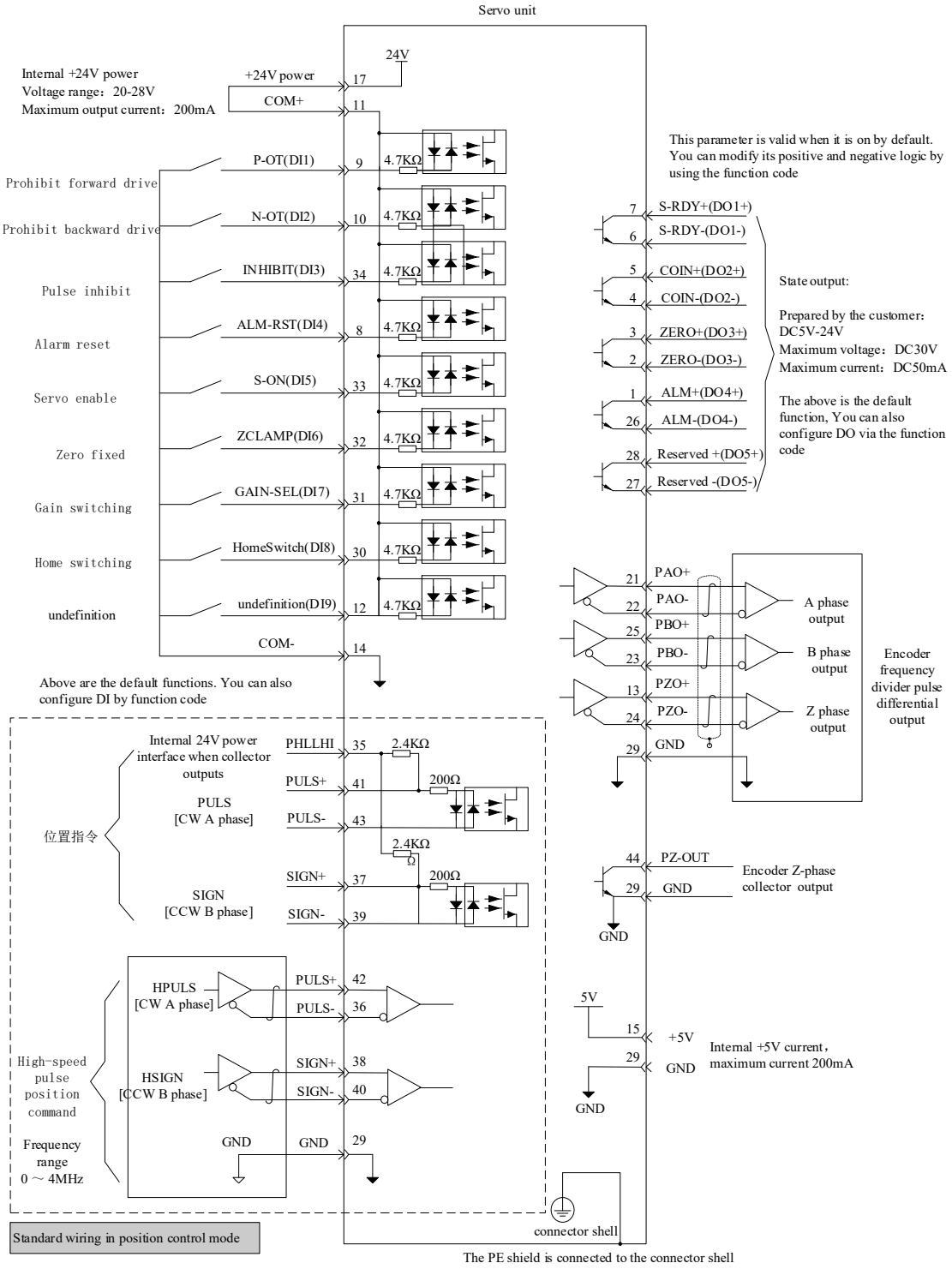



Figure 3-3 Contral mode diagram

### 3.5.1 Digital input and output signal

#### 3.5.1.1 Digital input circuit

Take DI1 as an example, DI1~DI8 is the same

**a) When the host computer is relay output：**

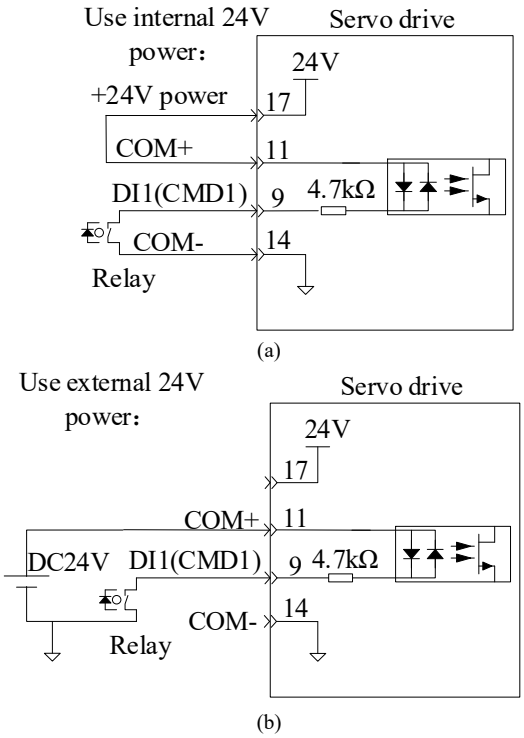
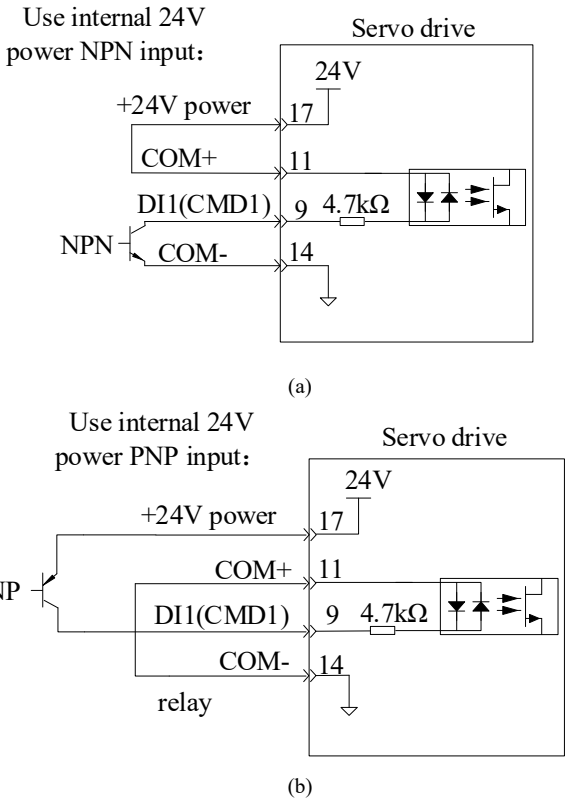



Figure 3-4 DI wiring When the host computer is relay output

**b) When the host computer is open collector output：**



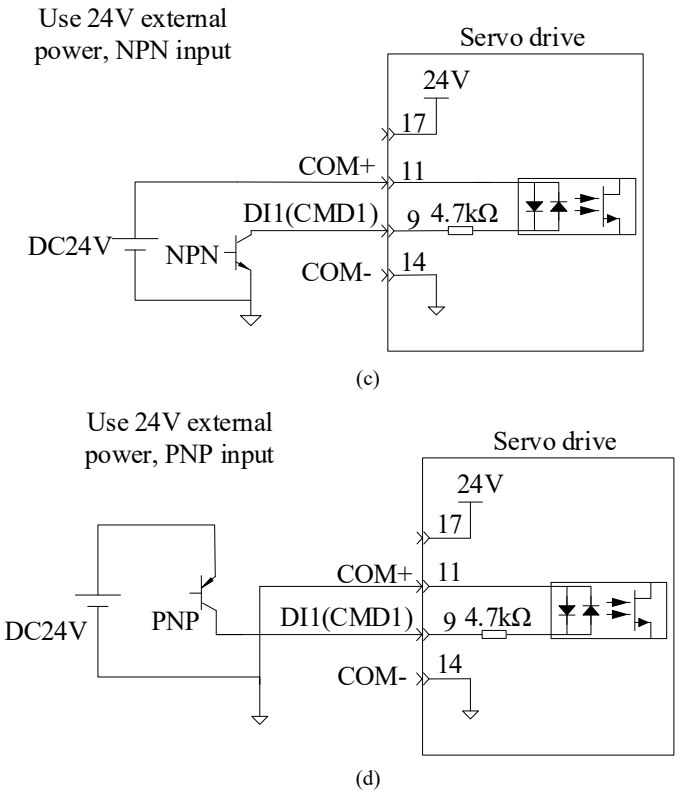



Figure 3-5 DI wiring When the host computer is open collector output

**Note：**

The mixing of NPN and PNP inputs is not supported.

### 3.5.1.2 Digital output circuit

Take DO1 as an example, DO1~DO5 circuit is the same.

**a) When the host computer is a relay input**

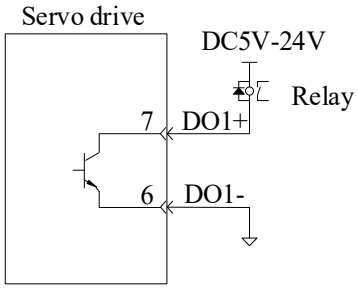



Figure 3-6 DO wiring When the host computer is relay input

**Note：**

When the host computer is relay input, be sure to connect the freewheeling diode in the correct direction, otherwise the DO port may be damaged.

**b) When the host computer is optocoupler input**

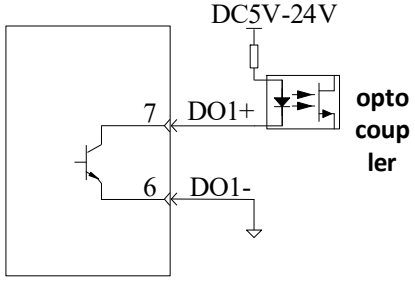



Figure 3-7 DO wiring When the host computer is optocoupler input

**Note：**

1. Be sure to connect a current limiting resistor;
2. The maximum allowable voltage and current of the internal optocoupler circuit of the servo driver are as follows:
Voltage: DC30V (maximum)
Current: DC50mA (maximum)

### 3.5.3 Position command input signal

Table 3-8 The relation between pulse input frequency and pulse width

| Pulse method | | Maximum frequency（HZ） | Minimum width（us） |
|---|---|---|---|
| Low speed | differential | 500K | 1 |
| | Open collector | 200K | 2.5 |
| High-speed differential | | 3M | 0.166 |

**Note：**

The pulse width of host computer should not be less than the minimum pulse width, otherwise the driver may receive pulse error

#### 3.5.3.1 Common pulse command input

**a) Differential mode**

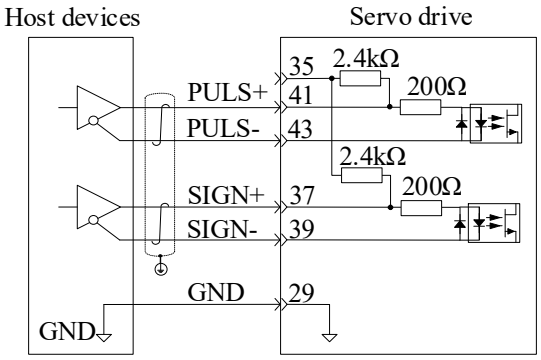



Figure 3-9 Wiring diagram in defferential mode

**b) Open collector mode**

**Use the internal 24V power supply of the drive**

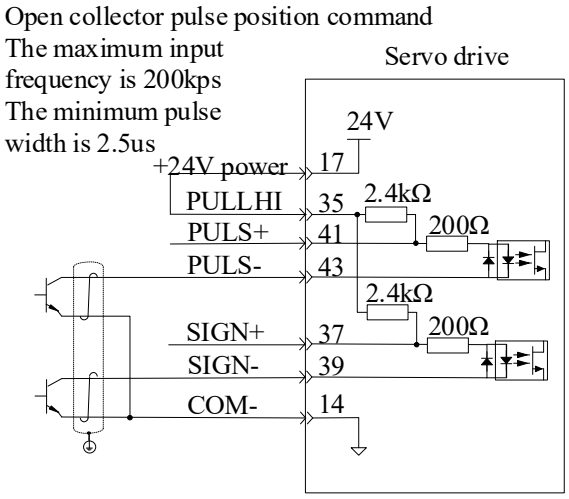



Figure 3-10 Wiring diagram when use the internal 24V power

**Use an external power supply**

Option 1: Use the internal resistance of the drive (recommended)

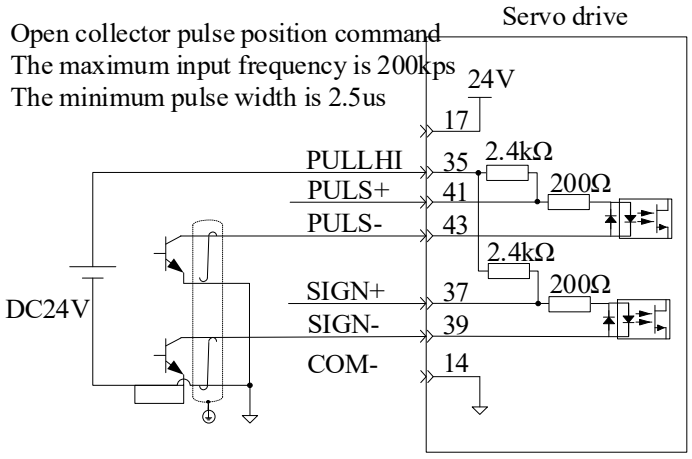



Figure 3-11 Wiring diagram when use the external power and internal resistance

Option 2: Use external resistors and NPN type

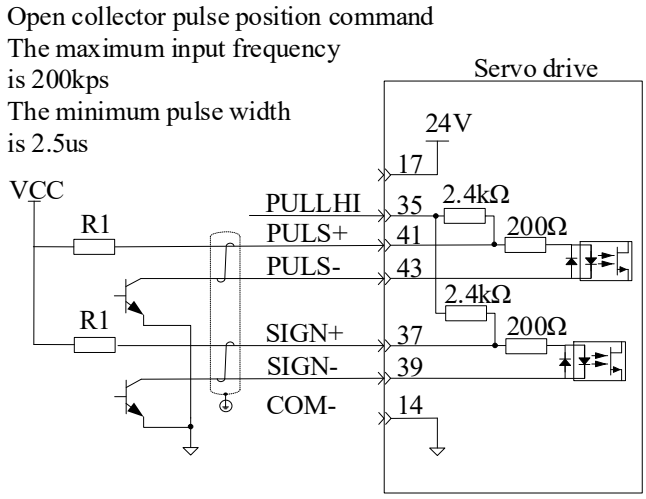



Figure 3-12 Wiring diagram when use the external power and external resistance in NPN input mode

Option 3: Use external resistors and PNP type

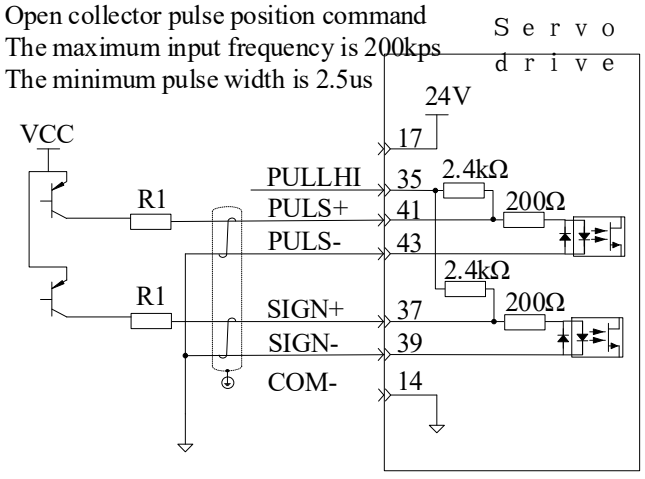



Figure 3-13 Wiring diagram when use the external power and external resistance in PNP input mode

Resistance R1 select formula：$\frac{V_{CC}-1.5}{R1+200}=10mA$

R1 recommended values

表 3-9 R1 推荐值

| VCC voltage | R1 resistance | R1 power |
|---|---|---|
| 24V | 2.4KΩ | 0.5W |
| 12V | 1.5KΩ | 0.5W |
| 5V | 200Ω | 0.5W |

#### 3.5.3.2 High speed pulse command input

High-speed pulse command only supports differential input.

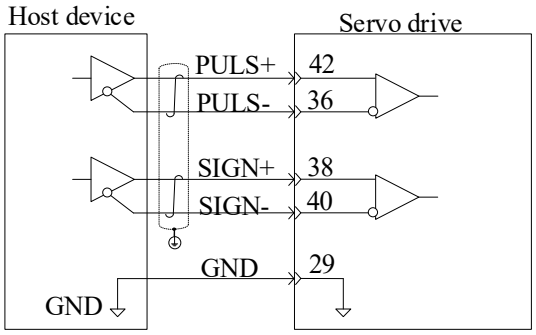



Figure 3-14 Wiring diagram high-speed pulse command differential input mode

**Note：**

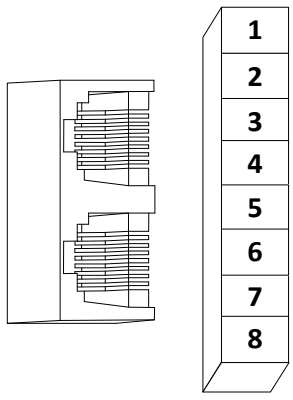
1. Ensure that the differential input is 5V, otherwise the servo drive input pulse will be unstable. It will cause the following problems:
   a) When a command pulse is input, pulse loss occurs;
   b) When direction command is input, it is reversed.
2. Be sure to connect the 5V ground of the host device to the GND of the driver to reduce noise interference.

### 3.6 Communication signals

### 3.6.1 Industrial bus port CN3/CN4

CN3 and CN4 are used as industrial bus communication ports and host computer communication interfaces.

Table 3-10 Communication cable connector PIN definitions

| PIN | Definition | Function | Pin distribution |
|---|---|---|---|
| 1 | -- | |  |
| 2 | -- | | |
| 3 | GND(RS485) | RS485 communication port | |
| 4 | RS485+ | | |
| 5 | RS485- | | |
| 6 | RS232-TXD | RS232 communication port | |
| 7 | RX232-RXD | | |
| 8 | GND(RS232) | | |
| shell | PE | Shield | |

# Chapter 4 Panel Display

## 4.1 Panel operator description

### 4.1.1 Interface introduction

The servo driver's operation interface consists 5-digit 7-segment LED digital tube and 5 buttons, which is used for the interface display and parameter setting of the servo driver. The interface is as follows:

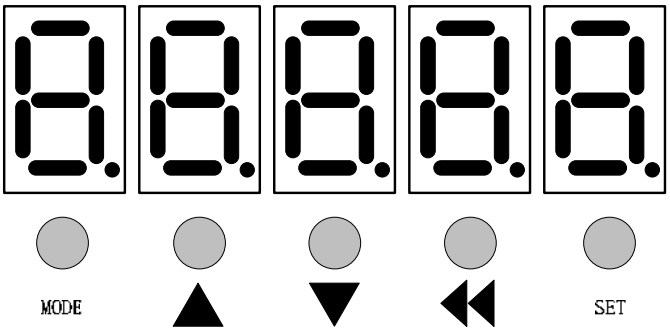
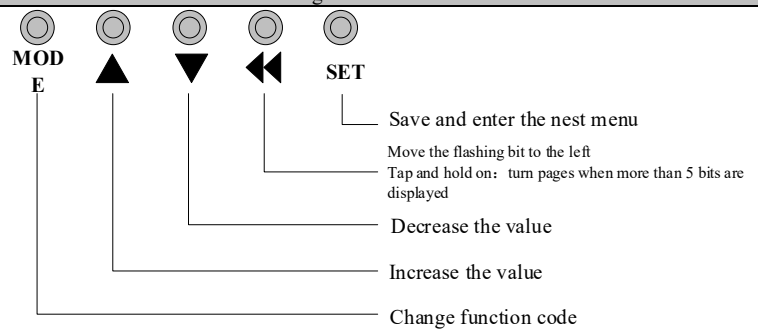



Figure 4-1 Interface of operation and display

**1、Button name and function operation**

Table 4-1 Function of button

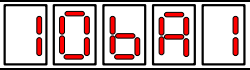
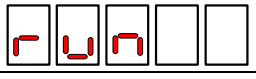
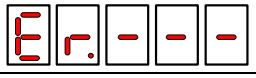
| Digital tube | 5-digit 7-segment LED digital tube and 5 buttons to display the state and parameter setting of the servo driver |
|---|---|
| Button |  |



**2、 Servo drive status display**

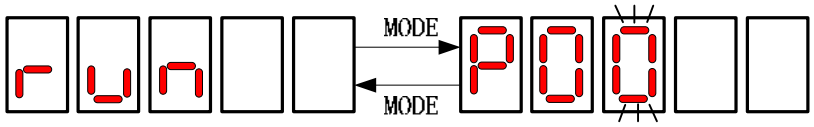
The running status of the servo drive is displayed by the display characters of 5 digit LED tubes, which are shown in the following table:

Table 4-2 Digital tube display status description

| Symbol | LED display | Status and Character description |
|---|---|---|
| “AS3” |  | Displays this character when the drive is powered-on for initialization, indicating the serial number of the drive. |
| “10bA1” (example) |  | Displays this character when the drive is powered-on for initialization, indicating the model of the drive. |
| “nrd” |  | Not ready: after it starts or resets, the servo is not ready, for example, the main circuit is not powered. |
| “rdy” |  | Ready: the servo system passed self-test, waiting for host control device to give a servo enable signal. |
| “run” |  | Run: servo is in normal running state. At this time, the servo running status and each variable can be viewed through the P18 group function code. |
| “Er.xxx” |  | Error: servo system has an error. The three digits of “xxx” represent error code. For the error code, please refer to Chapter 8. |

**3、How to browse and modify the parameters of the servo drive**

**To view the status of the servo parameters, you need to press the MODE button to switch to theP** group of the function code to select the corresponding function code:**




Running status display mode Parameter browsing or setting mode

Figure 4-2 "Level 0 menu"diagram

When switching to the parameter display mode, the parameter group number is displayed first in three digits of "Pxx.", also called "level 0 menu". One of the displayed bits is flashing. At this time, press the up or down button, the number of the flashing digit will increase or decrease by 1; if the left button is pressed, the flashing digit will move, which is convenient to set to the desired group number:

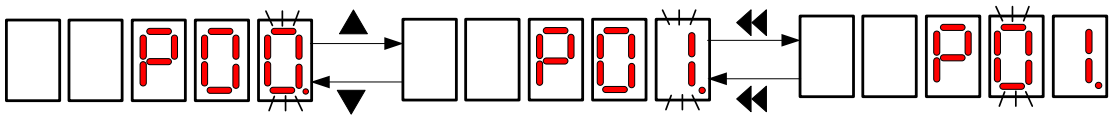


Figure 4-3 "Level 1 menu"diagram

When the desired group number is set, press the SET button to enter the setting status of the parameter number in the group. "Pxx.xx" also called "level 1 menu", is displayed at this time,. After the function code number is confirmed, press the SET button to enter the parameter setting state, also called "Level 2 menu". If the parameter can be modified, the lowest bit will flash, then press ◀◀、▲、▼ to modify, as shown below:

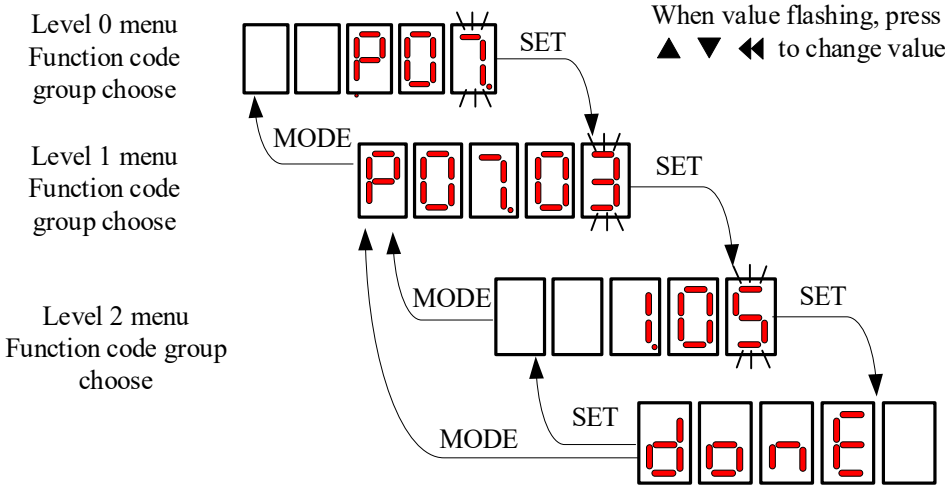



Figure 4-4 Operation panel diagram

When the SET button is pressed after modification, the word "done" will be displayed. If the modified value is not changed, the word "done" will not be displayed. Press the MODE button to exitstatus monitoring mode and enter parameter mode for parameter viewing and modification.

### 4.1.2 Parameter setting and display

**1、Modify properties and display features of parameters**

Some parameters can only be viewed and cannot be modified. For example, after entering the Level 2 menu for running parameter, the display parameters does not flash. At this time, the ◀◀、▲、▼ and SET button will not respond.

Some parameters can only be set in the stop state. Before modifying these parameters, the servo motor needs to be stopped.

**2、Five bits parameters set**

When setting the parameter is between -9999 to 99999, 5 digit display screen can be displayed or edited at once.

**3、Six and more bits parameters set**

When the setting parameter range exceeds the range of [-9999~99999], it exceeds the display range of five digital tubes, so six digits and more digital tube characters are required for display. In YAKO servo system, the display is performed by a method of displaying 4 digits by 3 pages. At this time, there is a flashing "—" segment in the leftmost character of each screen, which is used to indicate the screen number of the current character. For example, if the parameter value to be displayed is -10501080.10, it will be divided into three pages as [-10] [5010] [80.10] to show in the screen. And change pages by press ◀◀. As shown below:

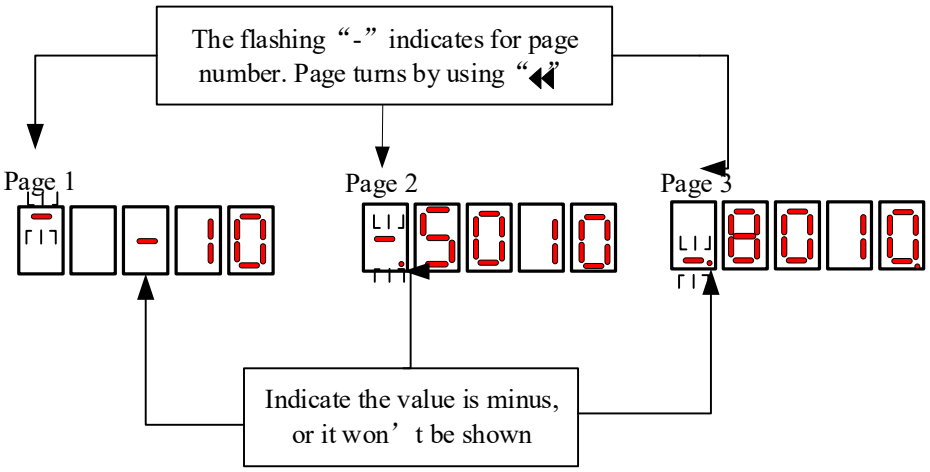



Figure 4-5 Parameters display

When using the SHIFT button to shift, it will automatically switch to the corresponding display segment. For example, suppose the current flashing bit is thousand. When using SHIFT, it will automatically switch to the middle four digit display, and the 10,000 digit (that is, the rightmost digit of this segment) will flash. Press ▲、▼, at this time, the increase or decrease is 10000. For the parameters that can be modified, the corresponding modifications can be made by ◀◀ shifting. If it is a read-only parameter, you can only use the long press ◀◀ key to scroll through the page.

### 4.1.3 Monitorable parameter list

The monitor display is a function for displaying the command value set in the servo driver, the state of the input/output signal, and the internal state of the servo driver. The parameters to display are shown in "Chapter 9 group P18 parameters."

**Note:**

**DI/DO terminal status display method**

1. A digital tube displays two DI/DO, the short "|" in high position indicates invalid status and low position "|" indicates valid status.

2. The status of DIDO is represented by 8 status bits. Currently, the standard DI is 8 channels and DO is 5 channels. The figure below shows the status of the DI input terminal.

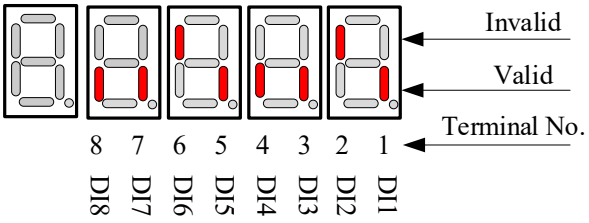
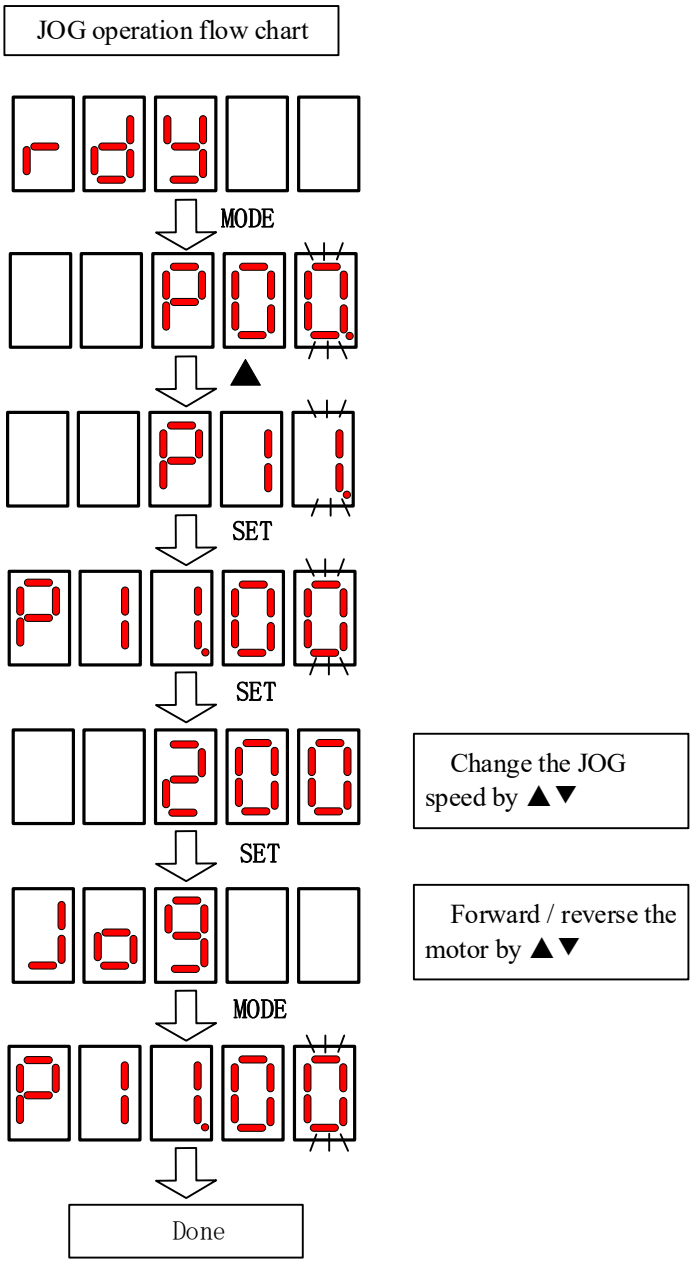



Figure 4-6 The status of DI

The meaning of the above figure are as follows: DI1=1; DI2=0; DI3=1; DI4=1; DI5=1; DI6=0; DI7=1; DI8=1.

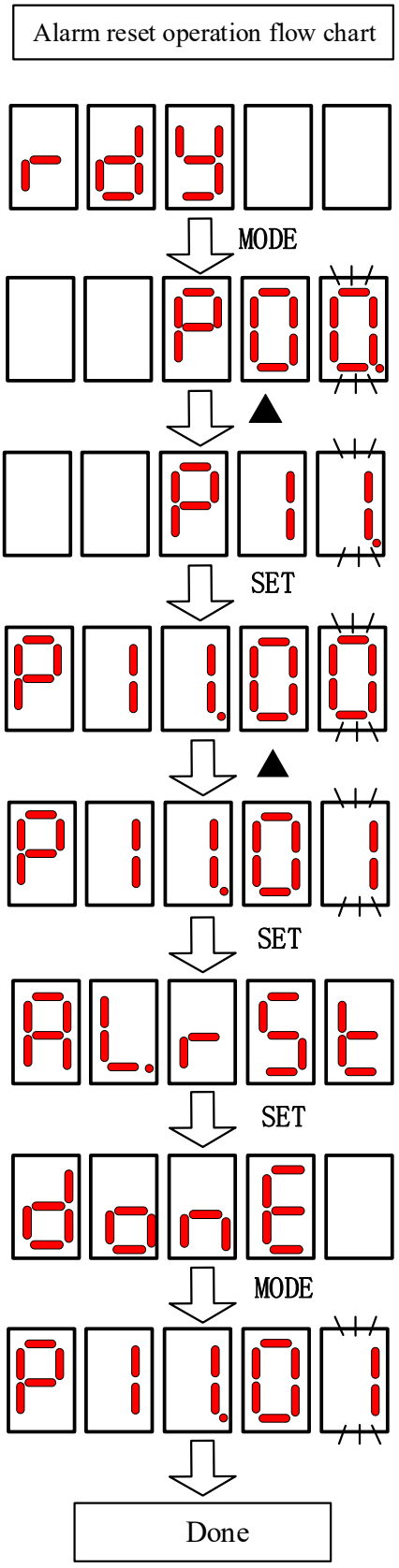
# Chapter 5 Accessibility

## 5.1. JOG operation




Picture 5-1 Jog operation flow chart

## 5.2 Alarm reset

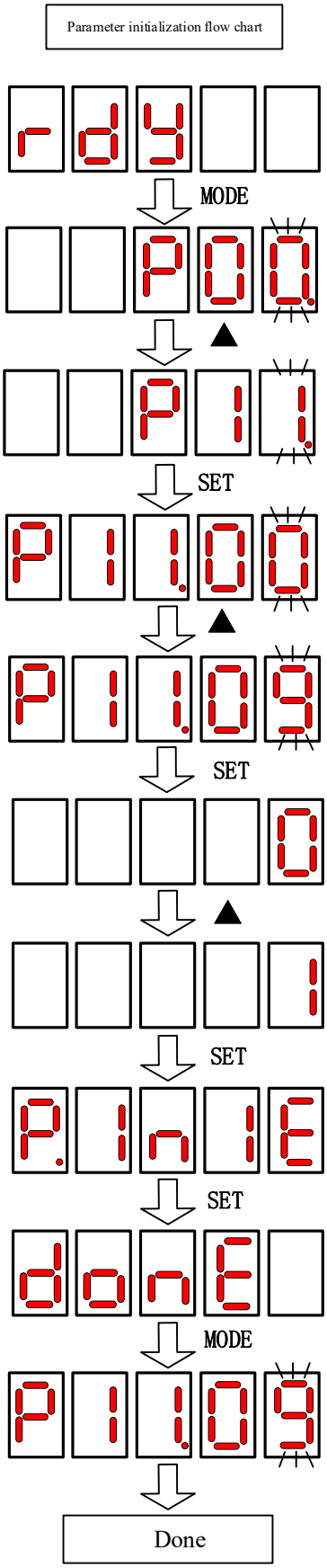



Picture 5-2 alarm reset operation flow chart

**Note:**

When an alarm occurs, please check the cause of the alarm first, and then perform the alarm reset operation.

## 5.3 Parameter initialization




Picture 5-3 parameter initialization operation flow chart

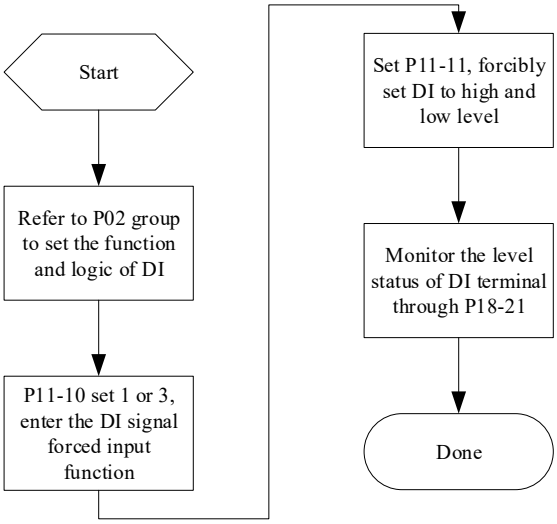
## 5.4 Digital signal forced input and output function

Servo driver has DI/DO forced input and output function. Among them, the forced DI input can be used to test the DI function of the driver, and the forced DO output can be used to check the DO signal connection between the host computer and the driver. When using digital signal forced input and output function, the logic of physical DI and virtual DI is given by forced input.

### 5.4.1 DI signal forced input

After this function is enabled, the level of each DI signal is only controlled by the setting of the forced input (P11-11), and is unrelated to the state of the external DI signal.

**1) Operation**




Picture 5-5 DI signal forced input setting steps schematic diagram

Associated function code

| Function code | | Name | setting range | Minimum unit | Factory setting | Effective time | Type | Relevant mode |
|---|---|---|---|---|---|---|---|---|
| P11 | 10 | DI DO forced input and output enable | 0 - no operation<br>1-Force DI enable<br>2-Force DO enable<br>3- Force DI & DO enabled | 1 | 0 | Effective immediately | operation settings | PST |
| P11 | 11 | DI force input given | 0-0x01FF | 1 | 0x1FF | Effective immediately | operation settings | PST |
| P11 | 12 | DO force output given | 0-0x001F | 1 | 0x00 | Effective immediately | operation settings | PST |

Among them, P11-11 is used to forcibly set the DI level, which is displayed in hexadecimal on the panel. After being converted into binary, "1" means high level, and "0" means low level.

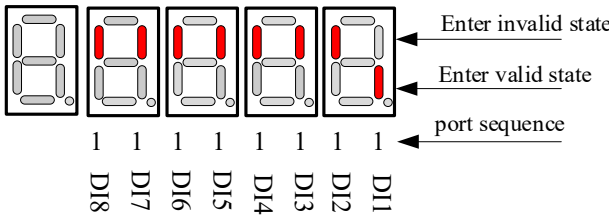
Set the DI terminal logic selection through the P02 group parameters. P18-21 is used to monitor the level status of the DI terminal, the level is displayed on the panel, and the P18-21 read by the background software is a decimal number.

**For example：** The setting method of "The DI function corresponding to the DI1 terminal is valid, and the DI function corresponding to the DI2~DI9 terminal is invalid" is as follows (the logic of the 9 DI terminals is "active low"):

Because "1" means high level and "0" means low level, the corresponding binary is "111111110", and the corresponding hexadecimal number is "1FE", so the "P11-11" parameter value can be set to " 1FE".

P18-21 Monitor DI level status: If the DI function is not faulty, the displayed value of P11-11 is always the same as that of P18-21. Therefore, the panel shows that the DI1 terminal is in the input valid state, and the DI2~DI9 terminals are in the input invalid state.

The display is as follows:




Picture 5-6 P18-21 corresponding to DI valid state description

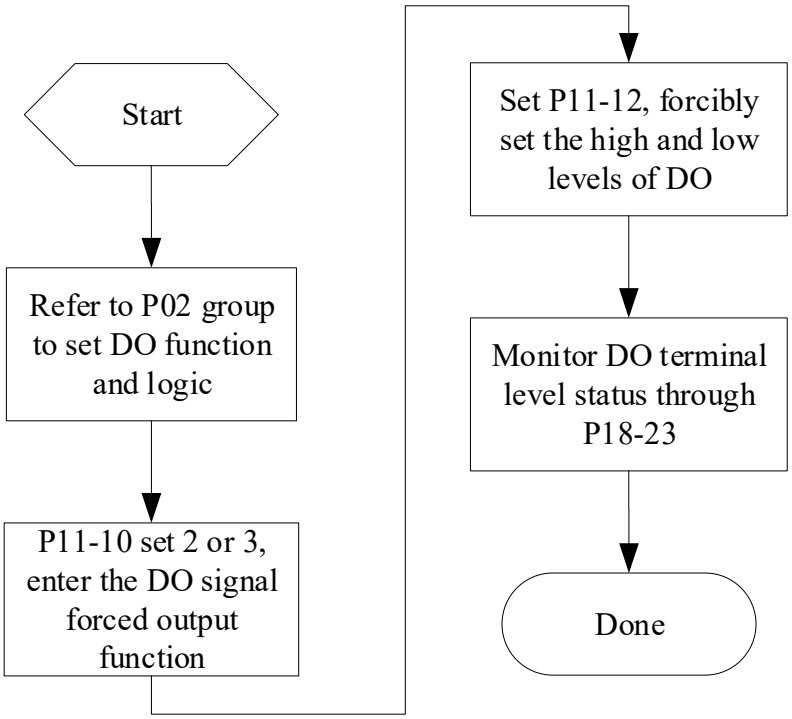
**2) Exit function**

The DI signal forced input function will not be memorized after power off. It can be restored to normal DI after power on again, or it can be switched back to normal DI mode by setting P11-10=0.

### 5.4.2 DO signal forced output

After this function is turned on, each DO signal level is only controlled by the setting of forced output (P11-12), and is unrelated to the internal DO function status of the driver.

**1) Operation**



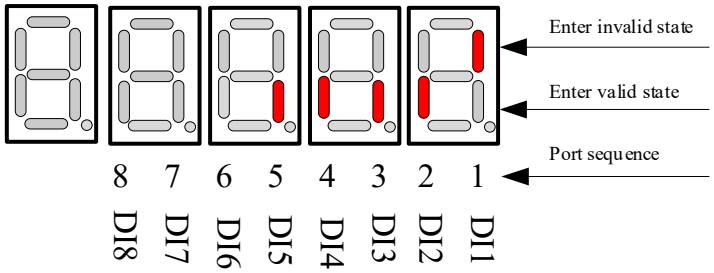

Picture 5-7 DO signal forced output setting steps schematic diagram

Among them, P11-12 is used to forcefully set whether the DO function is valid or not. It is displayed in hexadecimal on the panel. After converting into binary, "0" means the DO function is invalid, "1" means the DO function is valid, and P18-23 It is used to monitor the DO level status, the level is displayed on the panel, and P18-23 are decimal numbers.

For example: The setting method of "DO function corresponding to DO1 terminal is invalid, and DO function corresponding to DO2~DO5 terminal is valid" is as follows:

Because "1" indicates that the DO function is valid, and "0" indicates that the DO function is invalid, the corresponding binary value is "11110", and the corresponding hexadecimal number is "1E". Therefore, the parameter value of "P11-12" can be set to “1E” through the panel.

P11-23 Monitor DO level status:




Picture 5-8. DO level display corresponding to P18-23

**2) Exit function**

The DO signal forced input function will not be memorized after power off, and the normal DO mode can be restored after power on again, or switch back to the normal DO mode by setting P11-10=0.

# Chapter 6 Troubleshooting and Handling

Servo drive alarm level is divided into two levels

Table 6-1 Alarm level

| Alarm level | Name | Decription |
|---|---|---|
| Level 1 | Fault | The servo drive has a serious alarm and cannot work normally. It needs to be shut down to check. DO terminal outputs ALM signal. |
| Level 2 | Warning | The servo drive warns that the device will not be damaged for the time being, but if it is not handled correctly in time, it may cause a high level fault output. DO terminal outputs WARN signal |

## 6.1 Fault diagnosis and treatment

Faults can be divided into:

a) Non-resettable NO.1 failure;
b) Resettable NO.1 fault;
c) Resettable NO.2 fault.

Among them, “Resettable” means that after troubleshooting, P11-01 can be set to 1 or the DI function can be configured FunIN.2: ALM-RST alarm reset to clear the servo fault state.

“Non-resettable” means that after the fault is handled, drive needs to be re-powered.

The NO.1 and NO.2 faults have different stop modes. The NO.1 fault is free to stop and keeps running freely. The NO.2 fault stop mode is set by P00-12.

The reset method of NO.1, NO.2 resettable fault: first turn off the servo enable signal (S-ON is set to OFF), then set P11-01=1 or use DI function 2.

When the servo drive is faulty, the digital operator will display the fault "Er.xxx".

### 6.1.1 Non-resettable NO.1 fault

Table 6-2 Non-resettable NO.1 fault

| Fault number Er_ | Fault name | Cause of fault | Stop method when fault occurs | Whether the fault can be reset |
|---|---|---|---|---|
| 1 | System parameter exception | Abnormal data of servo internal parameters | No.1 | NO |
| 2 | Product model selection failure | Invalid motor or drive model | No.1 | NO |
| 3 | Motor data verification failure | Motor ROM data check error or no data | No.1 | NO |
| 4 | Fault in parameter storage | 1. parameter storage device failure<br>2. parameters read and write too frequently<br>3. control power supply instability<br>4. drive failure | No.1 | NO |
| 5 | FPGA fault | 1 FPGA initialization exception<br>2 FPGA logic version is abnormal<br>3 FPGA detected an exception | No.1 | NO |
| 6 | Program exception | 1. system parameter abnormal<br>2. drive internal failure | No.1 | NO |

| | | | | |
|---|---|---|---|---|
| 7 | Control power supply undervoltage | Control circuit power supply undervoltage | No.1 | NO |
| 8 | Short circuit to ground failure detected | 1. drive or motor parameters are incorrect;<br>2. UVW phase-to-phase short circuit;<br>3. motor burned out;<br>4. motor is shorted to ground;<br>5. drive failure; | No.1 | NO |
| 9 | Overcurrent fault A | 1 The drive or motor parameters are incorrect;<br>2 UVW phase-to-phase short circuit;<br>3 the motor burned out;<br>4 The motor is shorted to ground;<br>5 drive failure; | No.1 | NO |
| 10 | Overcurrent fault B | 1 servo motor wiring is not normal;<br>2 software detects the overcurrent of power transistor;<br>3 servo motor wiring is not normal; | No.1 | NO |
| 11 | Encoder disconnection | Encoder disconnection | No.1 | NO |
| 12 | Encoder AB signal abnormal | Encoder AB signal is abnormal | No.1 | NO |
| 13 | Encoder check exception | Encoder zero point check exception | No.1 | NO |
| 14 | Motor initial angle detection abnormal | Motor initial angle detection is abnormal | No.1 | NO |
| 15 | Motor out of control | 1 Motor UVW phase sequence setting error<br>2 UVW wiring error<br>3 Initial position or encoder parameter setting error | No.1 | NO |
| 16 | Current sampling fault | Current sampling fault | No.1 | NO |
| 18 | Motor data verification failure | 1. The motor parameters are not written in the motor encoder EEPROM. You need to manually set the P01.00 parameter to write the motor code.<br>2. Motor parameter verification error | No.1 | NO |

### 6.1.2 Resettable NO.1 fault

Table 6-3 Resettable NO.1 fault

| Fault number Er_ | Fault name | Cause of fault | Stop method when fault occurs | Whether the fault can be reset |
|---|---|---|---|---|
| 20 | Overvoltage | The main circuit DC voltage abnormally high | No.1 | Yes |
| 21 | Undervoltage | Main circuit DC voltage low | No.1 | Yes |
| 22 | Overspeed | 1. Speed command exceeds the maximum speed value<br>2. UVW phase sequence error<br>3. Speed response too high, severely exceed adjustment range<br>4. Drive failure | No.1 | Yes |
| 27 | DI terminal parameter setting fault | Different DI are assigned with same function repeatedly; | No.1 | Yes |
| 28 | DO terminal parameter setting fault | Different DO are assigned with same output | No.1 | Yes |

| Fault number Er_ | Fault name | Cause of fault | Stop method when fault occurs | Whether the fault can be reset |
|---|---|---|---|---|
| 30 | Reference position failure | When using the PTP function, P04.00=5 is not set | No.1 | Yes |

### 6.1.3 Resettable NO.2 fault

Table 6-4 Resettable NO.2 fault

| Fault number Er_ | Fault name | Cause of fault | Stop method when fault occurs | Whether the fault can be reset |
|---|---|---|---|---|
| 43 | Position deviation is too large | In the servo ON state, the position deviation exceeds the position deviation value (P09.09) | No.2 | Yes |
| 44 | Main circuit input phase lack | When lack power input phase, the protection selects parameter P09-00=0 (enable fault, disable warning) or P09-00=1 (enable fault and warning):<br>1. Three-phase input line is poorly connected<br>2. Three-phase drive operates under single-phase power | No.2 | Yes |
| 46 | Drive overload | The load operation exceeds the inverse time curve of the drive;<br>The UVW output may be lack of phase or phase sequence connected incorrectly; | No.2 | Yes |
| 47 | Motor overload | The load operation exceeds the inverse time curve of the motor;<br>The UVW output may be lack of phase or phase sequence connected incorrectly; | No.2 | Yes |
| 48 | Motor stall | 1. The mechanical position is stuck, causing the motor current to continuously increase abnormally<br>2. Inconsistent response of dual-drive motors with gantry structure | N0.2 | Yes |
| 49 | Electronic gear setting error | Electronic gear ratio exceeds specification range [0.001, 4000] | No.2 | Yes |
| 50 | Heat sink (fan) overheating | Servo unit heat sink (fan) exceeds the set fault value | No.2 | Yes |
| 51 | Encoder battery failure | No battery or battery voltage below 2.6V | No.2 | Yes |
| 52 | Encoder multi-turn count error | Absolute encoder multi-turn count error | No.2 | Yes |
| 53 | Encoder multi-turn count overflow | Absolute encoder multi-turn count overflow | No.2 | Yes |
| 54 | Soft limit setting error | 1. The position between positive/negative limit is too short<br>2. When the motor runs in the counterclockwise direction as the positive direction, the positive limit value is smaller than the negative limit value<br>3. When the motor runs in the clockwise direction as the positive direction, the negative limit value is smaller than the positive limit value | No.2 | Yes |
| 55 | Absolute value system setting error | Drive is not set to absolute system mode when absolute function is enabled | No.2 | Yes |

## 6.2 Reasons for warning and treatment

Table 6-5 Reasons for warning and treatment

| Fault number Er_ | Warning name | Cause of fault |
|---|---|---|
| 81 | Drive overload warning | Warning when 80% of the drive overload limit value is reached |
| 82 | Motor overload warning | The warning before the motor is about to fail, the warning value is determined by P09_05 |
| 83 | Changed parameters need to be re-powered to take effect | Changed parameters that need to be re-powered |
| 84 | Reset encoder warning | In enabled state, resets encoder when host computer sending commands. |
| 86 | Forward overtravel warning | Positive overtravel switch Pot terminal is valid |
| 87 | Negative overtravel warning | Negative overtravel switch Not terminal is valid |
| 88 | Divided pulse output setting fault | The number of encoder divided pulses does not meet set condition or range |
| 89 | AI1\ AI2 zero drift too large | AI1\ AI2 zero drift too large |
| 90 | External regenerative resistor overload | External regenerative resistor power is too small |
| 91 | External regenerative resistor is too small | The external regenerative resistor is less than the minimum requirement by the driver;<br>Or parameter setting error |
| 92 | RS485 communication error | RS485 communication error |
| 93 | Disable operation in enabled state | 1 Operate JOG test run in enabled state<br>2 Operatel inertia identification in the enabled state |
| 94 | DI emergency brake | External emergency brake E_STOP terminal trigger |
| 95 | Absolute encoder battery low | Battery voltage is lower than 3.2V |
| 96 | Homing timeout | 1. Home switch failure<br>2. Time limit to find home is too short<br>3. The high speed for searching home signal is too small |
| 97 | Mechanical home point offset error | 1 When the home return mode parameter P16-09=6 or P16-09=8 or P16-09=14, the mechanical home offset parameter P16-14 is set to a value greater than 0.<br>2 When the home return mode parameter P16-09=7 or P16-09=9 or P16-09=15, the mechanical home offset parameter P16-14 is set to less than 0. |
| 98 | Main circuit input lack phase | When the power input lack phase protection selects parameter P09-00=1 (enable fault and warning), the driver with rated power of 0.8kW, 1.0kW, 1.5kW, 3.0kW will report a warning when the main circuit input voltage is single-phase. . |
| 99 | Multi-segment position reference position fault | 1. In the multi-segment absolute position operation mode, the system does not perform the zero return operation or the drive is not set to the absolute value system<br>2. In the multi-segment incremental position operation mode, when the function code of P13.07 is set to 1, the system does not perform the zero return operation |

**Note:** The reset method of warning: set P11-01=1 or use DI function 2.

# Chapter 7 Parameter List

## 7.1 Parameter group number

Table 7-1 Parameter group number

| Parameter group number | Parameter group description |
|---|---|
| P00 | Basic control parameters |
| P01 | Servo motor parameters |
| P02 | Digital input and output parameters |
| P04 | Position control parameters |
| P05 | Speed control parameters |
| P06 | Torque control parameters |
| P07 | Gain parameters |
| P08 | Advanced adjustment parameters |
| P09 | Fault and protection parameters |
| P10 | Communication parameter |
| P11 | Auxiliary function parameters |
| P12 | Keyboard display parameters |
| P13 | Multi-segment position function parameters |
| P14 | Multi-speed function parameters |
| P16 | Special function parameters |
| P17 | Drive parameters |
| P18 | Display parameters |

**Note:** The above parameters are not completely listed. For more parameters, please refer to the detailed manual

## 7.2 Each group of parameters

### P00 group: basic control parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P00 | 00 | Control mode selection | 0-position mode<br>1-speed mode<br>2-torque mode<br>3-speed / torque mixing mode<br>4-position / speed mixing mode<br>5-position / torque mixing mode<br>6-reserved<br>7-pulse/speed mixing mode | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P00 | 01 | Direction of rotation | 0-CCW direction is the forward direction (counterclockwise)<br>1-CW direction is the forward direction (clockwise) | 1 | 0 | Re-power | Setting after motor stop | PST |
| P00 | 02 | Pulse output positive direction definition | 0-CCW direction is forward direction (the corresponding motor rotation direction when the pulse output OA leads the OB)<br>1- CW direction is forward direction (reverse mode, OA lag OB) | 1 | 0 | Re-power | Setting after motor stop | PST |
| P00 | 03 | reserved parameters | 0~65535 | 1 | 0 | N/A | reserved parameters | PST |
| P00 | 04 | Rigidity level setting | 0~31 | 1 | 11 | Effective immediately | Set when running | PST |
| P00 | 05 | Inertia ratio | 0~3000 | 0.01 | 1.00 | Effective immediately | Set when running | PST |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P00 | 06 | Absolute value system selection | 0-incremental position mode<br>1- Absolute position linear mode<br>2- Absolute value position rotation mode | 1 | 0 | Re-power | Setting after motor stop | PST |
| P00 | 07 | system maximum speed | 0~10000 | 1rpm | 6000 | Effective immediately | Setting after motor stop | PST |
| P00 | 08 | Reserved parameter | 0~65535 | 1 | 0 | N/A | Reserved parameter | PST |
| P00 | 10 | Servo OFF stop mode | 0- Freewheel stop, keep free running state<br>1- Stop at zero speed (deceleration time is controlled by P05.06), keep free running state<br>2- Stop at zero speed (deceleration time is controlled by P05.06), keep DB state | 1 | 1 | Effective immediately | Setting after motor stop | PST |
| P00 | 11 | Fault No.1 stop mode selection | 0- Freewheel stop, keep free running state<br>1- DB shutdown, keep DB status<br>2- DB down, keep free running | 1 | 1 | Effective immediately | Setting after motor stop | PST |
| P00 | 12 | Fault No.2 stop mode selection | 0- Freewheel stop, keep free running state<br>1- Stop at zero speed (deceleration time is controlled by P05.06), keep free running state<br>2- Stop at zero speed (deceleration time is controlled by P05.06), keep DB state<br>3- DB down, keep DB status<br>4- DB stop, keep free running | 1 | 3 | Effective immediately | Setting after motor stop | PST |
| P00 | 13 | Stop mode when overtravel | 0-free running stop<br>1- Decelerate the motor with the set torque of the emergency stop torque as the maximum value, and then enter the servo lock state.<br>2- Decelerate the motor with the set torque of the emergency stop torque as the maximum value, and then enter free running state. | 1 | 1 | Effective immediately | Setting after motor stop | PST |
| P00 | 14 | Brake output ON to command receiving delay | 0～10000 | 1ms | 200 | Effective immediately | Setting after motor stop | PST |
| P00 | 15 | In the rotation state, No.2 fault occurs, or the servo enable is OFF, the brake output OFF delay;<br>In the static state, brake output OFF to the motor not energized delay. | 10～10000 | 1ms | 200 | Effective immediately | Set when running | PST |
| P00 | 16 | Rotating state, the speed threshold when the brake output is OFF | 0～1000 | 1rpm | 50 | Effective immediately | Set when running | PST |
| P00 | 17 | NO.1 fault occurs in rotating state , delay between servo enable OFF and brake output OFF | 0～10000 | 1ms | 500 | Effective immediately | Set when running | PST |
| P00 | 18 | Energy consumption resistance setting | 0-Use built-in power consumption resistor<br>1-Use external power-consuming resistors and cool naturally<br>2-Use external power-consuming resistors and force air-cooled<br>3- No energy consumption resistor, relying on capacitance absorption | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P00 | 19 | External resistor power capacity | 1～65535 | 1W | Model parameters | Effective immediately | Setting after motor stop | PST |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P00 | 20 | External resistance value | 1～1000 | 1Ω | Model parameters | Effective immediately | Setting after motor stop | PST |
| P00 | 21 | External resistance heating time constant | 1000~65535 | 1ms | Model parameters | Effective immediately | Setting after motor stop | PST |
| P00 | 22 | Energy consumption braking start voltage | 0~410 | 1V | Model parameters | Effective immediately | Set when running | PST |
| P00 | 23 | Waiting time from S_ON to dynamic brake release | 0～10 | 1ms | 5 | Effective immediately | Setting after motor stop | PST |
| P00 | 24 | Waiting time from the motor not power-on to the dynamic brake valid | 0～10 | 1ms | 1 | Effective immediately | Setting after motor stop | PST |
| P00 | 25 | Waiting time from S_ON to motor power-on | 25～100 | 1ms | 25 | Effective immediately | Setting after motor stop | PST |
| P00 | 37 | Pulse increment threshold | 0～200 | 1 | 1 | Effective immediately | Set when running | PS |
| P00 | 38 | Continuous pulseless reception cycle number | 1～200 | 1 | 3 | Effective immediately | Set when running | PS |

## P01 group: Servo motor parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P01 | 00 | Motor model code | 0~65535 | 1 | 18000 | Re-power | Setting after motor stop | PST |
| P01 | 03 | Rated power | 0~65535 | 0.01Kw | | Re-power | Setting after motor stop | PST |
| P01 | 04 | Rated current | 1～10000 | 0.01A | | Re-power | Setting after motor stop | PST |
| P01 | 05 | Rated torque | 0~65535 | 0.01Nm | | Re-power | Setting after motor stop | PST |
| P01 | 08 | Max speed | 0~9000 | 1rpm | | Re-power | Setting after motor stop | PST |
| P01 | 09 | Rotor inertia | 0~10000 | 0.01 $kgcm^2$ | | Re-power | Setting after motor stop | PST |
| P01 | 10 | Number of pole pairs of permanent magnet synchronous motor | 1~50 | 1 对极 | | Re-power | Setting after motor stop | PST |
| P01 | 14 | Back EMF | 1~65535 | 0.01 mV/rpm | | Re-power | Setting after motor stop | PST |
| P01 | 15 | torque factor | 1~65535 | 0.001 Nm/A | | Re-power | Setting after motor stop | PST |
| P01 | 18 | Encoder selection | 0: 2500 lines encoder<br>1: 17bit incremental encoder<br>2: 17bit absolute encoder<br>3: 23bit incremental encoder<br>4: 23bit absolute encoder | | | Re-power | Setting after motor stop | PST |
| P01 | 20 | Encoder resolution | 1~1073741824 | | | Re-power | Setting after motor stop | PST |
| P01 | 22 | Z corresponding electrical angle | 0~3600 | 0.1° | | Re-power | Setting after motor stop | PST |
| P01 | 23 | U rising edge corresponding electrical angle | 0~3600 | 0.1° | | Re-power | Setting after motor stop | PST |
| P01 | 24 | FPGA upload motor model | 0～65535 | | | Effective immediately | Only read parameter | PST |

## P02 group: digital terminal input and output parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P02 | 00 | FunINL signal unassigned state (HEX) | 0~0xFFFF<br>Bit0- corresponds to FunIN.1;<br>Bit1- corresponds to FunIN.2;<br>.....<br>Bit15-corresponds to FunIN.16 | 1 | 0 | Re-power | Set when running | PST |
| P02 | 01 | DI1 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 13 | Effective immediately | Set when running | PST |
| P02 | 02 | DI2 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 14 | Effective immediately | Set when running | PST |
| P02 | 03 | DI3 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 12 | Effective immediately | Set when running | PST |
| P02 | 04 | DI4 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 2 | Effective immediately | Set when running | PST |
| P02 | 05 | DI5 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 1 | Effective immediately | Set when running | PST |
| P02 | 06 | DI6 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 11 | Effective immediately | Set when running | PST |
| P02 | 07 | DI7 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 3 | Effective immediately | Set when running | PST |
| P02 | 08 | DI8 terminal function selection | Input function code: 0, 1-45<br>0: no definition<br>1~45: FunIN.1 to 45 (refer to the DIDO basic function coding table) | 1 | 32 | Effective immediately | Set when running | PST |
| P02 | 09 | External input terminal filter time 1(FPGA) | 0~65535 | 12.5ns | 25000 | Re-power | Setting after motor stop | PST |
| P02 | 10 | FunINH signal unassigned state (HEX) | 0~0xFFFF<br>Bit0- corresponds to FunIN.17;<br>Bit1- corresponds to FunIN.18;<br>.....<br>Bit15-corresponds to FunIN.32 | 1 | 0 | Re-power | Set when running | PST |
| P02 | 11 | DI1 terminal logic selection | Input polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |
| P02 | 12 | DI2 terminal logic selection | Input polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |
| P02 | 13 | DI3 terminal logic selection | Input polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P02 | 14 | DI4 terminal logic selection | nput polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |
| P02 | 15 | DI5 terminal logic selection | Input polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |
| P02 | 16 | DI6 terminal logic selection | Input polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |
| P02 | 17 | DI7 terminal logic selection | Input polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |
| P02 | 18 | DI8terminal logic selection | Input polarity: 0-4<br>0-low level effective<br>1-high level effective<br>2-rising edge is valid<br>3-falling edge is valid<br>4- rising and falling edges are valid | 1 | 0 | Effective immediately | Set when running | PST |
| P02 | 20 | External input terminal filter time 2(MCU) | 0~65535 | 1ms | 0 | Effective immediately | Set when running | PST |
| P02 | 21 | DO1 terminal function selection | Output code：1～25<br>0：no definition<br>1～25：FunOUT.1～25 refer to DIDO function selection code definition | 1 | 1 | Effective immediately | Setting after motor stop | PST |
| P02 | 22 | DO2 terminal function selection | Output code：1～25<br>0：no definition<br>1～25：FunOUT.1～25 refer to DIDO function selection code definition | 1 | 7 | Effective immediately | Setting after motor stop | PST |
| P02 | 23 | DO3 terminal function selection | Output code：1～25<br>0：no definition<br>1～25：FunOUT.1～25 refer to DIDO function selection code definition | 1 | 5 | Effective immediately | Setting after motor stop | PST |
| P02 | 24 | DO4 terminal function selection | Output code：1～25<br>0：no definition<br>1～25：FunOUT.1～25 refer to DIDO function selection code definition | 1 | 2 | Effective immediately | Setting after motor stop | PST |
| P02 | 25 | DO5 terminal function selection | Output code：1～25<br>0：no definition<br>1～25：FunOUT.1～25 refer to DIDO function selection code definition | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P02 | 31 | DO1 terminal logic level selection | Output polarity inversion setting: 0-1<br>0: conduct when active (normally open)<br>1: not conduct when active (normally closed) | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P02 | 32 | DO2 terminal logic level selection | Output polarity inversion setting: 0-1<br>0: conduct when active (normally open)<br>1: not conduct when active (normally closed) | 1 | 0 | Effective immediately | Setting after motor stop | PST |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P02 | 33 | DO3 terminal logic level selection | Output polarity inversion setting: 0-1<br>0: conduct when active (normally open)<br>1: not conduct when active (normally closed) | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P02 | 34 | DO4 terminal logic level selection | Output polarity inversion setting: 0-1<br>0: conduct when active (normally open)<br>1: not conduct when active (normally closed) | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P02 | 35 | DO5 terminal logic level selection | Output polarity inversion setting: 0-1<br>0: conduct when active (normally open)<br>1: not conduct when active (normally closed) | 1 | 0 | Effective immediately | Setting after motor stop | PST |

## P04 group: position control parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P04 | 00 | Main position command A source | 0-low speed pulse command<br>1- high speed pulse command<br>2-step amount given<br>4-multi-segment position command given<br>5-given through communication<br>6-Analog speed mode (reserved) | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P04 | 01 | Reserved parameter | 0 ～65535 | 1 | 4 | N/A | Reserved parameter | P |
| P04 | 02 | Step amount | -9999～9999 | 1Unit | 50 | Effective immediately | Setting after motor stop | P |
| P04 | 03 | Position command smoothing filter | 0 ～65535 | 0.1ms | 0 | Effective immediately | Setting after motor stop | P |
| P04 | 04 | Position command FIR filter | 0～1280 | 0.1ms | 0 | Effective immediately | Setting after motor stop | P |
| P04 | 05 | Number of instruction unit required for one round (32-bit) | 16～1073741824 | 1Unit/Turn | 0 | Re-power | Setting after motor stop | P |
| P04 | 07 | Electronic gear 1 numerator (32 bit) | 1～1073741824 | 1 | Motor resolution | Effective immediately | Setting after motor stop | P |
| P04 | 09 | Electronic gear 1 denominator (32 bit) | 1～1073741824 | 1 | 10000 | Effective immediately | Setting after motor stop | P |
| P04 | 11 | Electronic gear 2 numerator (32 bit) | 1～1073741824 | 1 | Motor resolution | Effective immediately | Setting after motor stop | P |
| P04 | 13 | Electronic gear 2 denominator (32 bit) | 1～1073741824 | 1 | 10000 | Effective immediately | Setting after motor stop | P |
| P04 | 15 | Pulse output resolution (32 bit) | 16PPR ～ 1073741824PPR (calculate: lines of incremental photoelectric encoder*4) | 1PPR | 10000 | Re-power | Setting after motor stop | P |
| P04 | 17 | Moving Average Filter Time Constant Filtering | 0ms ～10000 | 0.1ms | 0 | Effective immediately | Setting after motor stop | P |
| P04 | 18 | Pulse output Z polarity | 0-Z pulse is high when it arrives<br>1-Z pulse is low when it arrives | 1 | 0 | N/A | Reserved | P |
| P04 | 19 | Pulse output function selection | 0-encoder crossover output<br>1-pulse command synchronous output | 1 | 0 | Re-power | Setting after motor stop | P |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P04 | 20 | Frequency division output pulse form | 0-AB quadrature signal<br>1-pulse + direction | 1 | 0 | Re-power | Setting after motor stop | P |
| P04 | 21 | Pulse shape | 0-pulse + direction, positive logic. (Defaults)<br>1-direction + pulse, negative logic<br>2-A phase + B phase orthogonal pulse, positive logic<br>3-A phase + B phase orthogonal pulse, negative logic<br>4- CCW+CW, positive logic<br>5- CCW+CW, negative logic | 1 | 0 | Re-power | Setting after motor stop | P |
| P04 | 22 | Position deviation clear function | 0- Clear position deviation pulse when fault occurs or servo OFF<br>1- Clear the position deviation pulse only when a fault occurs<br>2- Cleared by DI input function (PERR-CLR) | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P04 | 23 | Positioning complete (COIN) output | 0-Output when the absolute position deviation value is smaller than positioning completion range<br>1- Output when the absolute position deviation value is smaller than positioning completion range and the filtered position command is 0<br>2- Output when the absolute position deviation value is smaller than positioning completion range and position command is 0 | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P04 | 24 | Positioning completion range | 1～65535 | 1P | 2500 line motor: 7P<br>17-bit motor: 100P<br>23-bit motor: 1000P | Effective immediately | Setting after motor stop | P |
| P04 | 25 | Positioning close range | 1～65535 | 1P | 65535 | Effective immediately | Setting after motor stop | P |
| P04 | 26 | The number of pulses required for one rotation of the load (lower 32 bits) | 0～4294967295 | 1Unit | 0 | Re-power | Setting after motor stop | P |
| P04 | 28 | The number of pulses required for one rotation of the load (upper 32 bits) | 0～4294967295 | 1Unit | 0 | Re-power | Setting after motor stop | P |

## P05 group: speed control parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P05 | 00 | Main speed command A source | 0-digit value(P0503)<br>1-AI1<br>2-AI2<br>3-multi-speed command<br>4-communication command given | Setting after motor stop | 0 | Effective immediately | Setting after motor stop | S |
| P05 | 01 | Auxiliary speed command B source | 0-digit value(P0503)<br>1-AI1<br>2-AI2<br>3-multi-speed command<br>4-communication command given | 1 | 3 | Effective immediately | Setting after motor stop | S |
| P05 | 02 | Speed command selection | 0-main speed command A source<br>1-auxiliary speed command B source<br>2-A+B<br>3-A/B switching | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P05 | 03 | Speed command keyboard setting | -9000～9000 | 1rpm | 200 | Effective immediately | Set when running | S |
| P05 | 04 | Jog speed setting | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | S |
| P05 | 05 | Speed command acceleration time | 0～10000 | 1ms | 50 | Effective immediately | Reserved | S |
| P05 | 06 | Speed command deceleration time | 0～10000 | 1ms | 50 | Effective immediately | Reserved | S |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P05 | 07 | Speed command limit selection | 0-forward P05.08, reverse P05.09, internal limit (default)<br>1-AI1<br>2-AI2<br>(limited by system max. speed) | 1 | 0 | Effective immediately | Set when running | S |
| P05 | 08 | Forward speed limit | 0～9000 | 1rpm | 9000 | Effective immediately | Set when running | S |
| P05 | 09 | Backward speed limit | 0～9000 | 1rpm | 9000 | Effective immediately | Set when running | S |
| P05 | 14 | Speed direction selection | 0-direction unchanged<br>1-direction reversal<br>2-direction is determined by DI function 25<br>3-direction is determined by DI function 40/41 | 1 | 2 | Effective immediately | Setting after motor stop | S |
| P05 | 15 | Zero fixed speed fixed value | 0～6000 | 1rpm | 10 | Effective immediately | Set when running | S |
| P05 | 16 | Speed threshold of motor running signal output | 0～1000 | 1rpm | 20 | Effective immediately | Set when running | PS |
| P05 | 17 | Speed uniform signal width | 0～100 | 1rpm | 10 | Effective immediately | Set when running | PS |
| P05 | 18 | Speed reaches the specified value | 0～6000 | 1rpm | 1000 | Effective immediately | Set when running | PST |
| P05 | 20 | Zero speed judgment threshold | 0～6000 | 1rpm | 10 | N/A | Set when running | PST |

## P06 group: torque control parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P06 | 00 | Main torque command A source | 0-digit given (P06-05)<br>4- Multi-segment torque command | 1 | 0 | Effective immediately | Setting after motor stop | T |
| P06 | 02 | Torque command selection | 0-Main torque command A source | 1 | 0 | Effective immediately | Setting after motor stop | T |
| P06 | 03 | Torque limit signal delay output time | 0～65535 | 1ms | 0 | Effective immediately | Set when running | PST |
| P06 | 04 | Torque command filter time in torque mode | 0～65535 | 0.01 ms | 0 | Effective immediately | Set when running | T |
| P06 | 05 | Torque command keyboard setting | -3000～3000(based on rated motor torque) | 0.1% | 0 | Effective immediately | Set when running | T |
| P06 | 06 | Torque limit source | 0-positive and negative internal torque limit (default)<br>1-positive and reverse external torque limit (selected with P_CL, N_CL)<br>2-use T-LMT as external torque limit input<br>3- torque limit is the lower value between positive and negative external torque and external T-LMT (selected by P_CL, N_CL)<br>4-positive and negative internal torque limit and external T-LMT torque limit (selected with P_CL, N_CL) | 1 | 0 | Effective immediately | Set when running | PST |
| P06 | 07 | T-LMT select | 1-AI1<br>2-AI2 | 1 | 2 | Effective immediately | Set when running | PST |
| P06 | 08 | Forward internal torque limit | 0~5000(based on rated motor torque） | 0.1% | 3000 | Effective immediately | Set when running | PST |
| P06 | 09 | Backward internal torque limit | 0~5000 (based on rated motor torque） | 0.1% | 3000 | Effective immediately | Set when running | PST |
| P06 | 10 | Forward side external torque limit | 0~5000 (based on rated motor torque） | 0.1% | 3000 | Effective immediately | Set when running | PST |
| P06 | 11 | Backward side external torque limit | 0~5000 (based on rated motor torque） | 0.1% | 3000 | Effective immediately | Set when running | PST |
| P06 | 13 | Speed limit source selection for torque control | 0-internal speed limit (P06.15, P06.16 setting)<br>1-use V-LMT as external speed limit input | 1 | 0 | Effective immediately | Set when running | T |
| P06 | 15 | Positive speed limit during torque control | 0～9000 | 1 | 3000 | Effective immediately | Set when running | T |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P06 | 16 | Negetive speed limit during torque control | 0～9000 | 1 | 3000 | Effective immediately | Set when running | T |
| P06 | 17 | Torque arrival command reference value | 0～5000<br>(1000 corresponds to the rated torque of the motor) | 0.1% | 0 | Effective immediately | Set when running | PST |
| P06 | 18 | Torque arrival effective offset threshold | 0～5000<br>(1000 corresponds to the rated torque of the motor) | 0.1% | 200 | Effective immediately | Set when running | PST |
| P06 | 19 | Torque arrival ineffective offset threshold | 0～5000<br>(1000 corresponds to the rated torque of the motor) | 0.1% | 100 | Effective immediately | Set when running | PST |
| P06 | 20 | Speed limit window in torque mode | 1~900 | 1ms | 50 | Effective immediately | Set when running | PST |
| P06 | 21 | Multi-segment torque command 1 | -3000～3000 (based on motor rated torque） | 0.1% | 0 | Effective immediately | Set when running | T |
| P06 | 22 | Multi-segment torque command 2 | -3000～3000(based on motor rated torque） | 0.1% | 0 | Effective immediately | Set when running | T |
| P06 | 23 | Multi-segment torque command 3 | -3000～3000 (based on motor rated torque） | 0.1% | 0 | Effective immediately | Set when running | T |

## P07 group: gain parameter

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P07 | 00 | Position loop gain 1 | 10～20000 | 0.1HZ | 480 | Effective immediately | Set when running | P |
| P07 | 01 | Speed loop gain 1 | 10～20000 | 0.1HZ | 500 | Effective immediately | Set when running | PS |
| P07 | 02 | Speed loop integral time 1 | 15～512 | 0.01ms | 1200 | Effective immediately | Set when running | PS |
| P07 | 03 | Speed detection filter 1 | 0～200 | 0.01ms | 0 | Effective immediately | Set when running | PST |
| P07 | 04 | Torque command filtering 1 | 0～10000 | 0.01ms | 126 | Effective immediately | Set when running | PST |
| P07 | 05 | Position loop gain 2 | 10～20000 | 0.1HZ | 380 | Effective immediately | Set when running | P |
| P07 | 06 | Speed loop gain 2 | 10～20000 | 0.1HZ | 180 | Effective immediately | Set when running | PS |
| P07 | 07 | Speed loop integral time 2 | 15～51200 | 0.01ms | 51200 | Effective immediately | Set when running | PS |
| P07 | 08 | Speed detection filter 2 | 0～200 | 0.01ms | 0 | Effective immediately | Set when running | PST |
| P07 | 09 | Torque command filtering 2 | 0～10000 | 0.01ms | 126 | Effective immediately | Set when running | PST |
| P07 | 10 | DI function GAIN-SWITCH switching action selection | 0-speed loop regulator P (1) / PI (0) switch, gain is fixed to first group<br>1-first gain (0), second gain (1) switching | 1 | 0 | Effective immediately | Set when running | PS |
| P07 | 11 | Gain switching mode | 0-first gain fixed<br>1-second gain fixed<br>2-using DI input (GAIN-SWITCH)<br>3-torque command greater<br>4-speed command change greater<br>5-speed command greater<br>6-position deviation greater (P)<br>7-receive position command (P)<br>8-positioning is not completed (P)<br>9-actual speed is greater (P)<br>10-receive position command and actual speed (P)<br>11-speed loop controller with PDFF control (PS)<br>12-reserved<br>13-speed loop controller with improved PI control (PS) | 1 | 0 | Effective immediately | Set when running | PS |
| P07 | 12 | Gain switching delay | 0~10000 | 0.1ms | 50 | Effective immediately | Set when running | PS |
| P07 | 13 | Gain switching level | 0~20000（unit: according to the gain switching mode description） | 1 | 50 | Effective immediately | Set when running | PS |
| P07 | 14 | Hysteresis time of gain switching | 0~20000（unit: according to the gain switching mode description） | 1 | 33 | Effective immediately | Set when running | PS |
| P07 | 15 | Position gain switching time | 0~10000 | 0.1ms | 33 | Effective immediately | Set when running | PS |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P07 | 16 | Speed regulator PDFF coefficient | 0~1000 | 0.1% | 700 | Effective immediately | Set when running | PS |
| P07 | 17 | Improved speed PI control level | 2~9 | 1 | 5 | Effective immediately | Set when running | PS |
| P07 | 18 | Anti-integration saturation coefficient | 0~1000 | 0.001 | 820 | Effective immediately | Set when running | PS |
| P07 | 19 | Speed feedforward control selection | 0-no speed feedforward<br>1-internal speed feedforward<br>2-use AI1 as speed feedforward input<br>3-use AI2 as speed feedforward input<br>4-given through communication | 1 | 1 | Effective immediately | Set when running | P |
| P07 | 20 | Speed feedforward gain | 0～1000 | 0.1% | 0 | Effective immediately | Set when running | P |
| P07 | 21 | Speed feedforward filter time parameter | 0～6400 | 0.01ms | 50 | Effective immediately | Set when running | P |
| P07 | 22 | Torque feedforward selection | 0-no torque feedforward<br>1-internal torque feedforward<br>2-use AI1 as speed feedforward input<br>3-use AI2 as speed feedforward input<br>4-given through communication | 1 | 1 | Effective immediately | Setting after motor stop | PS |
| P07 | 23 | Torque feedforward gain | 0～1000 | 0.1% | 0 | Effective immediately | Set when running | PS |
| P07 | 24 | Torque feedforward filter time parameter | 0～6400 | 0.01ms | 50 | Effective immediately | Set when running | PS |
| P07 | 25 | Speed offset superimposed threshold | 0～100 | 1P | 7 | Effective immediately | Setting after motor stop | P |
| P07 | 26 | Speed offset | 0～1000 | 0.1% | 0 | Effective immediately | Set when running | P |
| P07 | 27 | Voltage feedforward gain | 0～1000 | 0.1% | 0 | Effective immediately | Set when running | PST |
| P07 | 28 | Reserved parameter | 0 ～65535 | 1 | 0 | N/A | Reserved | PST |

## P08 group: advanced adjustment parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P08 | 00 | Adaptive filter mode | 0~5 | 1 | 0 | Effective immediately | Set when running | PST |
| P08 | 01 | Resonance frequency | 0~65535 | 1Hz | 0 | N/A | Display parameters | PST |
| P08 | 02 | The 1st notch filter frequency (manual) | 10~4000 | 1Hz | 4000 | Effective immediately | Set when running | PST |
| P08 | 03 | The 1st notch filter width | 0~8 | 1 | 8 | Effective immediately | Set when running | PST |
| P08 | 04 | The 1st notch filter depth | 0~100 | 1 | 50 | Effective immediately | Set when running | PST |
| P08 | 05 | The 2nd notch filter frequency (manual) | 10~4000 | 1Hz | 4000 | Effective immediately | Set when running | PST |
| P08 | 06 | The 2nd notch filter width | 0~8 | 1 | 8 | Effective immediately | Set when running | PST |
| P08 | 07 | The 2nd notch filter depth | 0~100 | 1 | 50 | Effective immediately | Set when running | PST |
| P08 | 15 | Damping filter switch | 0-OFF<br>1-ON | 1 | 0 | Effective immediately | Setting after motor stop | PS |
| P08 | 16 | Damping filter frequency | 10~2000 | 0.1Hz | 2000 | Effective immediately | Setting after motor stop | PS |
| P08 | 17 | Damping filter selection | 0- Damping filter A<br>1- Damping filter B | 1 | 1 | Effective immediately | Setting after motor stop | PS |
| P08 | 18 | Filter A width | 0~200 | 1 | 4 | Effective immediately | Setting after motor stop | PS |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P08 | 19 | Filter B gain | 0~100 | 1 | 100 | Effective immediately | Setting after motor stop | PS |
| P08 | 20 | Offline inertia identification maximum speed | 200 ~1000 | 1rpm | 500 | Effective immediately | Setting after motor stop | PST |
| P08 | 21 | Offline inertia identification acceleration and deceleration time | 50~800 | 1ms | 100 | Effective immediately | Setting after motor stop | PST |
| P08 | 22 | Waiting time after a single offline inertia identification is completed | 100~10000 | 1ms | 800 | Effective immediately | Setting after motor stop | PST |
| P08 | 23 | Inertia identification mode selection | 0-offline inertia identification: speed command is positive and negative triangle wave<br>1-offline inertia identification: Speed command is JOG mode | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P08 | 24 | Motor rotation round for complete single offline inertia identificatio | 0~65535 | 0.01 圈 | 83 | N/A | Display parameter | PST |
| P08 | 26 | High frequency vibration suppression control switch | 0-OFF<br>1-ON | 1 | 0 | Effective immediately | Setting after motor stop | PS |
| P08 | 27 | High frequency vibration suppression frequency | 10~4000 | 1 Hz | 4000 | Effective immediately | Set when running | PS |
| P08 | 28 | High frequency vibration suppression gain compensation | 0~1000 | 0.01 | 100 | Effective immediately | Set when running | PS |
| P08 | 29 | High frequency vibration suppression damping coefficient 1 | 0~1000 | 0.01 | 0 | Effective immediately | Set when running | PS |
| P08 | 30 | High frequency vibration suppression frequency compensation 1 | -1000~1000 | 1 Hz | 0 | Effective immediately | Set when running | PS |
| P08 | 31 | High frequency vibration suppression frequency compensation 2 | -1000~1000 | 1 Hz | 0 | Effective immediately | Set when running | PS |
| P08 | 32 | High frequency vibration suppression damping coefficient 2 | 0~1000 | 0.01 | 0 | Effective immediately | Set when running | PS |
| P08 | 33 | Anti-disturbance compensation switch | 0-OFF<br>1-ON | 1 | 0 | Effective immediately | Setting after motor stop | PS |
| P08 | 36 | Disturbance compensation factor | 0~10000 | 0.1% | 0 | Effective immediately | Set when running | PS |
| P08 | 39 | Momentary speed compensation switch | 0-OFF<br>1-ON | 1 | 0 | Effective immediately | Setting after motor stop | PS |
| P08 | 40 | Instantaneous speed compensation gain | 0~1000 | 1 Hz | 300 | Effective immediately | Set when running | PS |
| P08 | 41 | Instantaneous speed compensation gain compensation | 0 ~1000 | 0.01 | 100 | Effective immediately | Set when running | PS |
| P08 | 45 | Model compensation switch | 0 - Turn off model compensation<br>1 - Rigid model<br>2-Second order vector model | 1 | 0 | Effective immediately | Setting after motor stop | PS |
| P08 | 46 | Model compensation gain | 10~20000 | 0.1/s | 300 | Effective immediately | Setting after motor stop | PS |
| P08 | 48 | Model Compensation Forward Compensation Coefficient | 0~10000 | 0.1% | 1000 | Effective immediately | Setting after motor stop | PS |
| P08 | 49 | Model Compensation Reverse Compensation Coefficient | 0~10000 | 0.1% | 1000 | Effective immediately | Setting after motor stop | PS |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P08 | 50 | Model compensation vibration suppression frequency A | 0~2500 | 0.1Hz | 500 | Effective immediately | Setting after motor stop | PS |
| P08 | 51 | Model compensation vibration suppression frequency R | 0~2500 | 0.1Hz | 500 | Effective immediately | Setting after motor stop | PS |
| P08 | 52 | Model Compensation Speed Compensation Coefficient | 0~10000 | 0.1% | 1000 | Effective immediately | Setting after motor stop | PS |

## P09 group: failure and protection

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P09 | 00 | Power input lack phase protection option | 0-Enable fault, disable warning<br>1-Enable faults and warnings<br>2- Prohibited faults and warnings | 1 | 2 | Effective immediately | Set when running | PST |
| P09 | 01 | Reserved parameter | - | 1 | 0 | N/A | Reserved | PST |
| P09 | 02 | Undervoltage detection delay | 100 ~20000 | 0.1ms | 700 | Effective immediately | Set when running | PST |
| P09 | 03 | Encoder error shield bit | Bit7-encoder battery failure<br>Bit6-encoder battery low warning<br>Bit5-encoder multi-round count error*<br>Bit3-encoder multi-round count overflow* | 1 | 255 | Effective immediately | Set when running | PST |
| P09 | 04 | Motor out of control protection | 0- protection open<br>1- protection off | 1 | 0 | Effective immediately | Set when running | PST |
| P09 | 05 | Overload warning value | 1～100 | 1% | 100 | Effective immediately | Set when running | PST |
| P09 | 06 | Motor overload protection factor | 10 ～300 | 1% | 100 | Effective immediately | Set when running | PST |
| P09 | 07 | Undervoltage protection point | 50 ～100（100 corresponds to the default undervoltage point） | 1% | 100 | Effective immediately | Set when running | PST |
| P09 | 08 | Overspeed fault point | 50 ～120（100 corresponds to maximum motor speed） | 1% | 120 | Effective immediately | Set when running | PST |
| P09 | 09 | Position deviation excessive threshold (32 bit) | 1~1073741824 | 1P | 2500 line motor: 32767P<br>17-bit motor: 393216<br>23-bit motor: 25165824 | Effective immediately | Set when running | PST |
| P09 | 11 | High-speed command pulse input pin filter time | 0-100 | 12.5ns | 8 | Re-power | Setting after motor stop | P |
| P09 | 12 | Low-speed command pulse input pin filter time | 0-500 | 12.5ns | 50 | Re-power | Setting after motor stop | P |
| P09 | 13 | Quadrature encoder filter time | 0 ～65535 | 1 | 80 | N/A | Reserved | PST |
| P09 | 14 | Encoder Z signal output width | 0～60000 | 200ns | 10000 | Re-power | Setting after motor stop | PST |
| P09 | 15 | Bus encoder communication verification continuous error count report failure | 1～16 | 1 | 3 | Effective immediately | Set when running | PST |
| P09 | 16 | Average Load Rate Overload Threshold | 100~3000 | 0.1% | 1100 | Effective immediately | Setting after motor stop | PST |
| P09 | 17 | Multi-segment position/speed DI input delay detection time | 0~1000 | 1ms | 3 | Effective immediately | Set when running | PS |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P09 | 23 | Motor stall over temperature protection time | 10~65535 | 1ms | 200 | Effective immediately | Setting after motor stop | PST |
| P09 | 24 | Motor stall over temperature protection enable | 0 - Shield locked rotor over temperature protection monitoring detection<br>1- Turn on the motor stall and over-temperature protection monitoring and detection | 1 | 1 | Effective immediately | Set when running | PST |
| P09 | 25 | Motor overload protection enable | 0- Open motor overload and average load rate overload detection<br>1- Open motor overload, shield the average load rate overload detection<br>2- Shield motor overload, open average load rate overload detection<br>3- Shield motor overload and average load rate overload detection | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P09 | 29 | Average load rate protection time | 10~65535 | 160ms | 300 | Effective immediately | Setting after motor stop | PST |

## P10 group: communication parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P10 | 00 | Communication address | 0~247，0 is broadcast address | 1 | 1 | Effective immediately | Set when running | PST |
| P10 | 01 | Communication network selection | 0-Modbus | 1 | 0 | Re-power | Set when running | PST |
| P10 | 02 | Modbus baud rate setting | 0-2400<br>1-4800<br>2-9600<br>3-19200<br>4-38400<br>5-57600<br>6-115200 | 1 | 6 | Effective immediately | Set when running | PST |
| P10 | 03 | Modbus data format | 0 - no parity, 2 stop bits<br>1-even parity, 1 stop bit<br>2-odd parity, 1 stop bit<br>3- no parity, 1 stop bit | 1 | 0 | Effective immediately | Set when running | PST |
| P10 | 04 | Update writed communication function code to EEPROM? | 0-Do not update EEPROM<br>1- Update to EEPROM except P11 group and P18 group | 1 | 0 | Effective immediately | Set when running | PST |
| P10 | 05 | RS232 communication baud rate setting | 0-2400<br>1-4800<br>2-9600<br>3-19200<br>4-38400<br>5-57600<br>6-115200 | 1 | 6 | Effective immediately | Set when running | PST |

## P11 group: auxiliary function parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P11 | 00 | JOG mode | Effective upon enter | | | | | |
| P11 | 01 | Fault reset | 0-no operation<br>1-fault reset | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P11 | 03 | Inertia recognition function | Effective upon enter | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P11 | 05 | Analog input automatic correction | 0- no operation<br>1~2- AI1~AI2 adjustmen | 1 | 0 | Effective immediately | Setting after motor stop | PST |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P11 | 06 | Absolute encoder reset | 0-no operation<br>1-Absolute encoder related warning and error clearing<br>2- Absolute encoder multi-turn data reset. | 1 | 0 | Re-power | Setting after motor stop | PST |
| P11 | 07 | Absolute value system soft limit setting | -1 The current position is set to the negative limit<br>0 - no operation<br>1- The current position is set as the positive limit | 1 | 0 | Effective immediately | Set when running | PST |
| P11 | 08 | Absolute value system origin setting | 0 - no operation<br>1- Set the current position as the origin | 1 | 0 | Effective immediately | Set when running | PST |
| P11 | 09 | System initialization function | 0-no operation<br>1-Restore factory setting (except P1 and P17 parameters)<br>2- Clear the fault record | 1 | 0 | Effective immediately | Setting after motor stop | PST |
| P11 | 10 | DIDO forced input and output enable | 0-no operation<br>1- forced DI enable<br>2-forced DO enable<br>3-forced DIDO enabled | 1 | 0 | Effective immediately | Set when running | PST |
| P11 | 11 | Set DI forced input | 0-0x01FF | 1 | 511 | Effective immediately | Set when running | PST |
| P11 | 12 | Set DO forced output | 0-0x001F | 1 | 0 | Effective immediately | Set when running | PST |
| P11 | 13 | Emergency stop settings | 0 - no operation<br>1- Emergency stop | 1 | 0 | Effective immediately | Set when running | PST |

## P12 group: keyboard display parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P12 | 00 | LED warning display selection | 0-LED immediately outputs warning message<br>1-LED does not output warning message | 1 | 0 | Effective immediately | Set when running | PST |
| P12 | 01 | Default display settings | 0-100 | 1 | 1 | Effective immediately | Set when running | PST |
| P12 | 03 | Speed display filter time | 0~10000 | 0.1ms | 50 | Effective immediately | Set when running | PST |
| P12 | 11 | Non-standard version number | VV.B.DD | 1 | 0 | N/A | Display parameter | |
| P12 | 12 | Software version number | VV.B.DD | 1 | 0 | N/A | Display parameter | |
| P12 | 13 | FPGA version number | VV.B.DD | 1 | 0 | N/A | Display parameter | |
| P12 | 14 | Product series code | PP.XXX | 1 | 3000 | N/A | Display parameter | |

## P13 group: multi-segment position

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P13 | 00 | Multi-segment position operation mode | 0- stop after the end of single operation (P1301 for segment number selection)<br>1-cycle operation (P1301 for segment number selection)<br>2-DI switching operation (selected by DI) | 1 | 1 | Effective immediately | Setting after motor stop | P |
| P13 | 01 | Specify starting segment | 1～16 | 1 | 1 | Effective immediately | Setting after motor stop | P |
| P13 | 02 | Specify end segment | 1～16 | 1 | 16 | Effective immediately | Setting after motor stop | P |
| P13 | 03 | Interrupted position handle setting | Valid in the other three modes except DI mode<br>0: continue to run the segment that has not finished<br>1: restart from the first segment | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P13 | 04 | Waiting time unit | 0-ms<br>1-s | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P13 | 05 | Position control method | 0-incremental position control<br>1-absolute position control | 1 | 0 | Effective immediately | Setting after motor stop | P |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P13 | 07 | Incremental position control method zero return limit condition | 0- available to run before zero return completed ;<br>1- unavailable to run before zero return completed | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P13 | 08 | Segment 1: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 10 | Segment 1: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 11 | Segment 1: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 12 | Segment 1: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 13 | Segment 2: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 15 | Segment 2: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 16 | Segment 2: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 17 | Segment 2: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 18 | Segment 3: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 20 | Segment 3: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 21 | Segment 3: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 22 | Segment 3: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 23 | Segment 4: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 25 | Segment 4: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 26 | Segment 4: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 27 | Segment 4: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 28 | Segment 5: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 30 | Segment 5: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 31 | Segment 5: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 32 | Segment 5: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 33 | Segment 6: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 35 | Segment 6: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 36 | Segment 6: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P13 | 37 | Segment 6: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 38 | Segment 7: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 40 | Segment 7: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 41 | Segment 7: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 42 | Segment 7: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 43 | Segment 8: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 45 | Segment 8: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 46 | Segment 8: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 47 | Segment 8: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 48 | Segment 9: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 50 | Segment 9: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 51 | Segment 9: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 52 | Segment 9: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 53 | Segment 10: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 55 | Segment 10: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 56 | Segment 10: acceleration/deceleration time | 0~65535 | 1ms | 1 | 立即生效 | Set when running | P |
| P13 | 57 | Segment 10: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 58 | Segment 11: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 60 | Segment 11: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 61 | Segment 11: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 62 | Segment 11: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 63 | Segment 12: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 65 | Segment 12: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 66 | Segment 12: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P13 | 67 | Segment 12: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 68 | Segment 13: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 70 | Segment 13: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 71 | Segment 13: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 72 | Segment 13: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 73 | Segment 14: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 75 | Segment 14: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 76 | Segment 14: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 77 | Segment 14: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 78 | Segment 15: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 80 | Segment 15: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 81 | Segment 15: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 82 | Segment 15: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |
| P13 | 83 | Segment 16: movement displacement (32 bits) | -1073741824～1073741824 | 1Unit | 10000 | Effective immediately | Set when running | P |
| P13 | 85 | Segment 16: maximum running speed | 0～9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P13 | 86 | Segment 16: acceleration/deceleration time | 0~65535 | 1ms | 1 | Effective immediately | Set when running | P |
| P13 | 87 | Segment 16: waiting time after completion | 0～10000 | 1ms(s) | 1000 | Effective immediately | Set when running | P |

## P14 group Multi-speed command

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P14 | 00 | Multi-speed command operation mode | 0- stop after the end of single operation (P1401 for segment number selection)<br>1-cycle operation (P1401 for segment number selection)<br>2-DI switching operation | 1 | 1 | Effective immediately | Setting after motor stop | S |
| P14 | 01 | Speed command end segment selection | 1～16 | 1 | 16 | Effective immediately | Setting after motor stop | S |
| P14 | 02 | Running time unit selection | 0-s<br>1-min | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 03 | Acceleration/deceleration time 1 | 0-10000 | 1ms | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 04 | Acceleration/deceleration time 2 | 0-10000 | 1ms | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 05 | Acceleration/deceleration time 3 | 0-10000 | 1ms | 0 | Effective immediately | Setting after motor stop | S |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P14 | 06 | Acceleration/deceleration time 4 | 0-10000 | 1ms | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 07 | Speed segment 1 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 08 | Running time of speed segment 1 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 09 | Speed up and down time of speed segment 1 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 10 | Speed segment 2 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 11 | Running time of speed segment 2 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 12 | Speed up and down time of speed segment 2 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 13 | Speed segment 3 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 14 | Running time of speed segment 3 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 15 | Speed up and down time of speed segment 3 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 16 | Speed segment 4 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 17 | Running time of speed segment 4 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 18 | Speed up and down time of speed segment 4 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 19 | Speed segment 5 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 20 | Running time of speed segment 5 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 21 | Speed up and down time of speed segment 5 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 22 | Speed segment 6 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 23 | Running time of speed segment 6 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 24 | Speed up and down time of speed segment 6 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 25 | Speed segment 7 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 26 | Running time of speed segment 7 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 27 | Speed up and down time of speed segment 7 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 28 | Speed segment 8 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 29 | Running time of speed segment 8 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 30 | Speed up and down time of speed segment 8 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 31 | Speed segment 9 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 32 | Running time of speed segment 9 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P14 | 33 | Speed up and down time of speed segment 9 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 34 | Speed segment 10 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 35 | Running time of speed segment 10 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 36 | Speed up and down time of speed segment 10 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 37 | Speed segment 11 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 38 | Running time of speed segment 11 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 39 | Speed up and down time of speed segment 11 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 40 | Speed segment 12 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 41 | Running time of speed segment 12 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 42 | Speed up and down time of speed segment 12 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 43 | Speed segment 13 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 44 | Running time of speed segment 13 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 45 | Speed up and down time of speed segment 13 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 46 | Speed segment 14 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 47 | Running time of speed segment 14 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 48 | Speed up and down time of speed segment 14 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 49 | Speed segment 15 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 50 | Running time of speed segment 15 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 51 | Speed up and down time of speed segment 15 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 52 | Speed segment 16 | -9000～+9000 | 1rpm | 0 | Effective immediately | Setting after motor stop | S |
| P14 | 53 | Running time of speed segment 16 | 0～65535 | 0.1s(min) | 50 | Effective immediately | Setting after motor stop | S |
| P14 | 54 | Speed up and down time of speed segment 16 | 0-zero acc./dec. time<br>1- acc./dec. time 1<br>2- acc./dec. time 2<br>3- acc./dec. time 3<br>4- acc./dec. time 4 | 1 | 0 | Effective immediately | Setting after motor stop | S |

## P16 group: special function parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P16 | 00 | Interrupt fixed length enable | 0-Disable<br>1-Enable | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P16 | 01 | Interrupt fixed length 1 displacement | 0~1073741824 | 1 Unit | 10000 | Effective immediately | Set when running | P |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P16 | 03 | Interrupt fixed length 1 constant running speed | 0~9000 | 1rpm | 200 | Effective immediately | Set when running | P |
| P16 | 04 | Interrupt fixed length acceleration time | 0~1000 | 1ms | 200 | Effective immediately | Set when running | P |
| P16 | 05 | Interrupt fixed length deceleration time | 0~1000 | 1ms | 200 | Effective immediately | Set when running | P |
| P16 | 06 | Fixed length lock release signal enable | 0~1 | 1 | 1 | Effective immediately | Set when running | P |
| P16 | 08 | Homing enable control | 0 - turn off the origin return function;<br>1- Enable the origin return function by inputting the HomingStart signal through DI;<br>2-Start return to origin immediately after power-on;<br>3-Start return to origin immediately;<br>4- Take the current position as the origin;<br>5- Set the origin through DI trigger; | 1 | 0 | Effective immediately | Setting after motor stop | P |
| P16 | 09 | Homing mode | 0-forward homing, deceleration and home points are home switch;<br>1- backward homing, deceleration and home points are home switch;<br>2- forward homing, deceleration and home points are motor Z signal;<br>3- backward homing, deceleration and home points are motor Z signal;<br>4- forward homing, deceleration point is origin switch, home is motor Z signal;<br>5- backward homing, deceleration point is origin switch, home is motor Z signal;<br>6- forward homing, deceleration and home points are forward overtravel switch;<br>7- backward homing, deceleration and home points are backward overtravel switch;<br>8- forward homing, deceleration point is forward overtravel switch, home is motor Z signal;<br>9- backward homing, deceleration point is backward overtravel switch, home is motor Z signal;<br>10- forward homing, no deceleration point, home is home switch;<br>11- backward homing, no deceleration point, home is home switch;<br>12- forward homing, no deceleration point, home is motor Z signal;<br>13- backward homing, no deceleration point, home is motor Z signal;<br>14- forward homing, no deceleration point, home is forward overtravel switch;<br>15- backward homing, no deceleration point, home is backward overtravel switch;<br>16-absolute value homing;<br>17- indexing absolute value homing; | 1 | 0 | Effective immediately | Setting after motor stop | P |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P16 | 10 | High-speed for searching home switch signal | 10-3000 | 1rpm | 100 | Effective immediately | Setting after motor stop | P |
| P16 | 11 | Low-speed for searching home switch signal | 10 -1000 | 1rpm | 10 | Effective immediately | Setting after motor stop | P |
| P16 | 12 | Limit the accel. / decel. time for searching home | 0-65535 | 1ms | 1000 | Effective immediately | Setting after motor stop | P |
| P16 | 13 | Limit time for finding home | 0-65535 | 1ms | 10000 | Effective immediately | Setting after motor stop | P |
| P16 | 14 | Mechanical home offset (32 bits) | -1073741824 ~ 1073741824 | 1Unit | 0 | Effective immediately | Setting after motor stop | P |
| P16 | 18 | Reserved parameter | 0 ～65535 | 1P | 0 | N/A | Reserved | P |
| P16 | 19 | Absolute value home single-round absolute position | 0~1073741824 | 1Unit | 0 | Effective immediately | Set when running | P |
| P16 | 21 | Absolute value home multi-round data | -32767~32767 | 1 | 0 | Effective immediately | Set when running | P |
| P16 | 22 | Reserved parameter | 0 ～65535 | 1 | 0 | N/A | Reserved | P |
| P16 | 23 | Reserved parameter | 0 ～65535 | 1 | 0 | N/A | Reserved | P |
| P16 | 25 | Reserved parameter | 0 ～65535 | 1 | 0 | N/A | Reserved | P |
| P16 | 27 | Absolute position homing delay time | 0~10000 | 1ms | 0 | Effective immediately | Set when running | P |
| P16 | 28 | Single round indexing number | 1~200 | 1 | 50 | Effective immediately | Set when running | P |
| P16 | 30 | Limit condition setting | 0 - Use hard limit;<br>1- Use soft limit; | 1 | 0 | Effective immediately | Setting after the motor stop | PST |
| P16 | 31 | Positive soft limit encoder turns | -32767~32767 | 1turn | 0 | Effective immediately | Set when running | PST |
| P16 | 32 | Positive soft limit encoder single-turn position | 0~1073741824 | 1 P | 0 | Effective immediately | Set when running | PST |
| P16 | 34 | Negative soft limit encoder turns | -32767~32767 | 1turn | 0 | Effective immediately | Set when running | PST |
| P16 | 35 | Negative soft limit encoder single-turn position | 0~1073741824 | 1 P | 0 | Effective immediately | Set when running | PST |
| P16 | 37 | Interrupt fixed length 2 displacement | -1073741824~1073741824 | 1 Unit | 0 | Effective immediately | Set when running | P |
| P16 | 39 | Interrupt fixed length 2 constant running speed | 0~9000 | 1rpm | 200 | Effective immediately | Set when running | P |

## P18 group: display parameters

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P18 | 00 | Servo status | rdy 、 run 、 Err.00~99（error）,AL.00~10(warning) | 1 | - | N/A | Display parameter | PST |
| P18 | 01 | Motor speed feedback (32 bit) | -9000~9000 | 1rpm | - | N/A | Display parameter | PST |
| P18 | 02 | average load rate | 0~3000 | 0.1% | - | N/A | Display parameter | PST |
| P18 | 03 | Speed command | -9000~9000 | 1rpm | - | N/A | Display parameter | PST |
| P18 | 04 | Internal torque command (relative to rated torque) | -5000~5000 | 0.1% | - | N/A | Display parameter | PST |
| P18 | 05 | Phase current RMS | 0~10000 | 0.01 A | - | N/A | Display parameter | PST |
| P18 | 06 | Bus voltage value | 0~10000 | 0.1V | - | N/A | Display parameter | PST |
| P18 | 07 | Absolute position counter (32 bit) | -1073741824 ~ 1073741824 | 1Unit | - | N/A | Display parameter | PST |
| P18 | 09 | Electrical angle | 0~3600 | 0.1° | - | N/A | Display parameter | PST |
| P18 | 10 | Mechanical angle (relative to encoder zero) | 0~3600 | 0.1° | - | N/A | Display parameter | PST |
| P18 | 11 | Bus encoder communication check error counter | - | 1 | - | N/A | Display parameter | PST |

| Function code | | Name | Setting range | Min. unit | Default setting | Effective time | Type | Mode |
|---|---|---|---|---|---|---|---|---|
| P18 | 12 | Corresponding speed information of input position command | -9000~9000 | 1rpm | - | N/A | Display parameter | PST |
| P18 | 13 | Position deviation counter (32 bit) | -1073741824 ~ 1073741824 | 1P | - | N/A | Display parameter | PST |
| P18 | 15 | Input command pulse counter (32 bit) | -1073741824 ~ 1073741824 | 1Unit | - | N/A | Display parameter | PST |
| P18 | 17 | Feedback pulse counter (32 bit) | -1073741824 ~ 1073741824 | 1P | - | N/A | Display parameter | PST |
| P18 | 19 | Position deviation counter command unit (32 bit) | -1073741824 ~ 1073741824 | 1Unit | - | N/A | Display parameter | PST |
| P18 | 21 | Digital input signal monitoring | - | - | - | N/A | Display parameter | PST |
| P18 | 23 | Digital output signal monitoring | - | - | - | N/A | Display parameter | PST |
| P18 | 25 | Total power-on time (32-bit) | 0-4294967295 | 0.1s | - | N/A | Display parameter | PST |
| P18 | 27 | AI1 sampling voltage value | - | 1mV | - | N/A | Display parameter | PST |
| P18 | 28 | AI2 sampling voltage value | - | 1mV | - | N/A | Display parameter | PST |
| P18 | 29 | AI1 original voltage value | - | 1mV | - | N/A | Display parameter | PST |
| P18 | 30 | AI2 original voltage value | - | 1mV | - | N/A | Display parameter | PST |
| P18 | 31 | Module temperature value | - | 1°C | - | N/A | Display parameter | PST |
| P18 | 32 | Absolute encoder single-round data | - | pulse | - | N/A | Display parameter | PST |
| P18 | 34 | Absolute encoder multi-round data | - | turn | - | N/A | Display parameter | PST |
| P18 | 35 | Maximum load rate | 0~3000 | 0.1% | - | N/A | Display parameter | PST |
| P18 | 40 | Display of fault record | 0-current fault<br>1- the first fault before current fault<br>2- the second fault before current fault<br>.....<br>9- the 9th fault before current fault | 1 | 0 | Effective immediately | Set when running | PST |
| P18 | 41 | error code | - | - | - | N/A | Display parameter | PST |
| P18 | 42 | Selected fault timestamp (32 bit) | - | 0.1s | - | N/A | Display parameter | PST |
| P18 | 44 | In-time speed at selected fault | - | 1rpm | - | N/A | Display parameter | PST |
| P18 | 45 | In-time current U at selected fault | - | 0.01 A | - | N/A | Display parameter | PST |
| P18 | 46 | In-time current V at selected fault | - | 0.01 A | | N/A | Display parameter | PST |
| P18 | 47 | Bus voltage at selected fault | - | 0.1V | - | N/A | Display parameter | PST |
| P18 | 48 | Input terminal status at selected fault | - | - | - | N/A | Display parameter | PST |
| P18 | 49 | Output terminal status at selected fault | - | - | - | N/A | Display parameter | PST |
| P18 | 50 | Rotating load single-turn position (lower 32 bits) | 0~ 4294967295 | 1P | - | N/A | Display parameter | PST |
| P18 | 52 | Rotating load single-turn position (upper 32 bits） | 0~ 4294967295 | 1P | - | N/A | Display parameter | PST |
| P18 | 54 | Rotating load single-turn position | 0~ 4294967295 | 1Unit | - | N/A | Display parameter | PST |
| P18 | 56 | Mechanical absolute position motor single-turn count value | -2147483647~ 2147483647 | 1 P | - | N/A | Display parameter | PST |
| P18 | 58 | Mechanical absolute position motor turns | -32767~32767 | 1turn | - | N/A | Display parameter | PST |

## DIDO assignment basic function definition

| Input signal function description | | | | |
|---|---|---|---|---|
| Code | Name | Function Name | Description | Status |
| FunIN.1 | S_ON | Servo enable | Invalid - Servo motor enable disabled<br>Active - Servo motor power-on enable | Assign |
| FunIN.2 | ALM_RST | Alarm reset signal (edge valid function) | According to the type of alarm, the servo can continue to work after some alarms are reset. This function is edge effective. When the terminal is set to level effective, it is still only valid when edge change is detected. | Assign |
| FunIN.3 | GAIN_SWITCH | Proportional motion switching / gain switching | When P07.10=0:<br>Invalid - speed control loop is PI control<br>Valid -speed control loop is P control<br><br>When P07.10=1:<br>Invalid - use the first set of gains<br>Valid - use the second set of gains | Assign |
| FunIN.4 | CMD_SWITCH | Main and auxiliary running command switching | Invalid - the current run command is A<br>Valid - the current run command is B | Assign |
| FunIN.5 | PERR_CLR | Pulse deviation clear | Recommend to set rising or falling edge effective<br>Invalid - no action<br>Valid - clear pulse deviation | Assign |
| FunIN.6 | CMD1 | Multi-segment running command switching CMD1 | 16 segment command selection | Assign |
| FunIN.7 | CMD2 | Multi-segment running command switching CMD2 | 16 segment command selection | Assign |
| FunIN.8 | CMD3 | Multi-segment running command switching CMD3 | 16 segment command selection | Assign |
| FunIN.9 | CMD4 | Multi-segment running command switching CMD4 | 16 segment command selection | Assign |
| FunIN.10 | MODE_SWITCH | Mode switching M1-SEL | Switch between speed, position and torque according to the selected control mode (3, 4, 5) | Assign |
| FunIN.11 | ZERO_CLAMP | Zero postion fixed function enable signal | Valid -enable zero postion fixed function,<br>Invalid-disable zero postion fixed function | Assign |
| FunIN.12 | INHIBIT | Pulse inhibit | Valid - disable command pulse input<br>Invalid - allow command pulse input | Assign |
| FunIN.13 | P_OT | Forward overtravel | When the mechanical movement exceeds the movable range limit switch, the overtravel protection function is activated.<br>Active-forward overtravel, forward run disabled<br>Invalid - normal range, forward run enabled | Assign |
| FunIN.14 | N_OT | Backward overtravel | When the mechanical movement exceeds the movable range limit switch, the overtravel protection function is activated.<br>Active-backward overtravel, backward run disabled<br>Invalid - normal range, backward run enabled | Assign |
| FunIN.15 | P_CL | Forward external torque limit ON | According to the selection of P06-06, the torque limit source is switched.<br>When P06-06=1:<br>Valid - forward external torque limit is valid<br>Invalid - Forward internal torque limit is valid<br>When P06-06=3 and the AI limit value is greater than forward external limit value:<br>Valid - forward external torque limit is valid<br>Invalid - AI torque limit is valid<br>P06-06=4:<br>Valid - AI torque limit is valid<br>Invalid - Forward internal torque limit is valid | Assign |
| FunIN.16 | N_CL | Backward external torque limit ON | According to the selection of P06-06, the torque limit source is switched.<br>When P06-06=1:<br>Valid - backward external torque limit is valid<br>Invalid - backward internal torque limit is valid<br>When P06-06=3 and the AI limit value is greater than backward external limit value:<br>Valid - backward external torque limit is valid<br>Invalid - AI torque limit is valid<br>When P06-06=4:<br>Valid - AI torque limit is valid<br>Invalid - backward internal torque limit is valid | Assign |
| FunIN.17 | P_JOG | Forward JOG | Valid - input according to given command<br>Invalid - stop input run command | Assign |
| FunIN.18 | N_JOG | Backward JOG | Valid - input reversely according to given command<br>Invalid - stop input run command | Assign |

| Input signal function description | | | | |
|---|---|---|---|---|
| Code | Name | Function Name | Description | Status |
| FunIN.19 | STEP | Position step input enable | Active - run according to the given step amount<br>Invalid - run command stops input | Assign |
| FunIN.23 | GEAR_SWITCH | Electronic gear selection | Invalid - electronic gear ratio 1<br>Valid - electronic gear ratio 2 | Assign |
| FunIN.24 | POS_DIR | Position command reversal | Invalid - no reversal; effective - reversal | Assign |
| FunIN.25 | SPD_DIR | Speed command reversal | Invalid - no reversal; effective - reversal | Assign |
| FunIN.26 | TOG_DIR | Torque command reversal | Invalid - no reversal; effective - reversal | Assign |
| FunIN.29 | PSEC_EN | Internal multi-segment position enable signal | Edge effective:<br>Invalid - ignore internal multi-segment command;<br>Valid - start internal multi-segment | Assign |
| FunIN.30 | XINT_FINISH | External confirmation signal of interrupt fixed length completion | Edge valid<br>Invalid - no response; valid - trigger interrupt | Assign |
| FunIN.31 | XINT_DISABLE | Disable interrupt fixed length | Level effective<br>Invalid - no response; valid - trigger interrupt | Assign |
| FunIN.32 | HOME_SWITCH | Home switch signal | Mechanical home switch | Assign |
| FunIN.33 | HOME_START | Homing enable signal | Homing start | Assign |
| FunIN.34 | ESTOP | Emergency stop | Motor stops quickly and keeps servo locked | Assign |
| FunIN.35 | POS_RUN | Position loop constant speed running | Motor runs continuously at constant speed in position control mode | Assign |
| FunIN.36 | XINT_RST | Reset interrupt fixed length | Forced to exit the fixed length state | Assign |
| FunIN.37 | RUN_SUSPEND | Pause interrupt fixed length | Pause interrupt fixed length operation | Assign |
| FunIN.38 | TCMD1 | Multi-segment torque command 1 | 3 segmen torque command selection | Assign |
| FunIN.39 | TCMD2 | Multi-segment torque command 2 | 3 segmen torque command selection | Assign |
| FunIN.40 | SPD_AI_DIRCMD1 | Speed mode command direction switching CMD1 | Switch motor forward/reverse/stop | Assign |
| FunIN.41 | SPD_AI_DIRCMD2 | Speed mode command direction switching CMD12 | Switch motor forward/reverse/stop | Assign |
| FunIN.42 | ABS_HOME_SET | Absolute position encoder origin position update | Trigger the drive to record the current position as the origin | Assign |

| Output signal function description | | | | |
|---|---|---|---|---|
| Code | Name | Function Name | Description | Status |
| FunOUT.1 | S_RDY | Servo ready | The servo state is ready to receive the S-ON valid signal.<br>Valid - servo ready<br>Invalid - servo not ready | Assign |
| FunOUT.2 | ALM | Alarm output signal | Valid when alarm is detected. | Assign |
| FunOUT.3 | WARN | Warning output signal | Warning output signal is valid (conducting) | Assign |
| FunOUT.4 | TGON | Motor rotation output signal | When the servo motor speed is higher than the speed threshold (P05-16):<br>Valid - motor rotation signal is valid<br>Invalid - motor rotation signal is invalid | Assign |
| FunOUT.5 | V_ZERO | Zero speed signal | The signal output when the servo motor stops rotating.<br>Valid - motor speed is zero<br>Invalid - motor speed is not zero | Assign |
| FunOUT.6 | V_CMP | Speed arrival | In speed control mode, the absolute value of the difference between servo motor speed and speed command is less than P05-17 speed deviation setting value. | Assign |
| FunOUT.7 | COIN | Position arrival | In position control mode, it is valid when the position deviation pulse reaches the positioning completion amplitude P04-24. | Assign |
| FunOUT.8 | NEAR | Positioning proximity signal | In position control mode, it is valid when the position deviation pulse reaches the positioning proximity amplitude P04-25 | Assign |
| FunOUT.9 | T_LT | Torque limit signal | Torque limit confirmation signal<br>Valid - motor torque limited<br>Invalid - motor torque is not limited | Assign |

| Output signal function description | | | | |
|---|---|---|---|---|
| Code | Name | Function Name | Description | Status |
| FunOUT.10 | V_LT | Speed limit signal | Speed-limited signal for speed control<br>Valid - motor speed limited<br>Invalid - motor speed is not limited | Assign |
| FunOUT.11 | BKOFF | Brake release signal output | Brake release signal output:<br>Valid - brake is released, motor shaft is free<br>Invalid - brake is hold, motor shaft is locked | Assign |
| FunOUT.12 | T_ARR | Torque feedback reaches the specified range | Valid - Torque absolute value reaches set value<br>Invalid - Torque absolute value less than set value | Assign |
| FunOUT.13 | V_ARR | Speed feedback reaches the specified range | Valid-speed feedback reaches set value<br>Invalid - speed range does not reach set value | Assign |
| FunOUT.18 | XINT_DONE | Interrupt fixed length completion signal | Output after interrupt fixed length completion | Assign |
| FunOUT.19 | HOME_ATTAIN | Homing complete signal | Output after homing complete | Assign |
| FunOUT.20 | XINT2_DONE | Interrupt fixed length 2 completion signal | The second segment interrupts the fixed-length displacement running completion signal output | Assign |
| FunOUT.21 | STEP1_OUT | Multi-segment position command 1 completes output | 16-segment position completion output | Assign |
| FunOUT.22 | STEP2_OUT | Multi-segment position command 2 completes output | 16-segment position completion output | Assign |
| FunOUT.23 | STEP3_OUT | Multi-segment position command 3 completes output | 16-segment position completion output | Assign |
| FunOUT.24 | STEP4_OUT | Multi-segment position command 4 completes output | 16-segment position completion output | Assign |
| FunOUT.25 | DBKOFF | Dynamic brake control signal output | Dynamic brake control signal output:<br>Active - Dynamic Brake Internal Relay Open, Motor Shaft Free<br>Invalid - The internal relay of the dynamic brake is closed, and the motor shaft is resisted | Assign |