

## Preface

Thank you for purchasing the EURONORM DRIVE SYSTEMS JIE350 series AC drive.

The JI-350 series AC drive is a general-purpose high-performance current vector control AC drive. It can also control synchronous motor and permanent magnet synchronous motor (PMSM) with current vector control.

Perfect performance, multiple function parameters, and optional expansion cards (PG card, communication card, special apply card), that can meet lots of application requirement, such as crane, textile, paper-making, wiredrawing, machine tool, packing, food, fan and pump, etc.

This manual describes the correct use of the AC drive, including selection, parameter setting, commissioning, maintenance & inspection. Read and understand the manual before use and forward the manual to the end user.

### **Please take more attention for bellow items:**

1. Make sure disconnect power during wiring
2. Before indicator turn off of AC drive after power fail, stands for there are high voltage inside and forbidden to touch any inside components.
3. Never try to modify or change inside components of AC drive.
4. Please feel free to contact us if any question during using.

The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual.

## Introduction

improvements:

1) Multiple voltage classes

It provides coverage of single-phase 220 V, three-phase 220 V, three-phase 380 V, three-phase 480 V, three-phase 690 V and three-phase 1,140 V.

2) Control of asynchronous motor and PMSM (AD800S series)

It supports vector control of three-phase AC asynchronous motor and three-phase AC PMSM.

3) Diversified control modes: It supports three control modes, namely, sensorless flux vector control (SFVC), close loop vector control (CLVC) and V/F control.

4) Multiple communication protocols: It supports communication via Modbus-RTU, profibus, and can option.

5) Multiple encoder types: It supports various encoders such as differential encoder, open-collector encoder, resolver and UVW encoder.

6) All-new SFVC algorithm: It introduces an all-new sensorless flux vector control (SFVC) algorithm that gives better low-speed stability, enhanced low-frequency loading capacity, and supports torque control.

7) User programmable function: The EC-01 programmable card enables you to write programs in ladder diagram.

## Product Checking

Upon unpacking, check:

- Whether the nameplate model and AC drive ratings are consistent with your order. The box contains the AC drive, certificate of conformity, user manual and warranty card.
- Whether the AC drive is damaged during transportation. If you find any omission or damage, contact EURONORM DRIVE SYSTEMS or your supplier immediately.

## First-time Use

For the users who use this product for the first time, read the manual carefully. If in doubt concerning some functions or performances, contact the technical support personnel of EURONORM DRIVE SYSTEMS to ensure correct use.

## CE Mark

The CE mark on the AD series declares that the AC drive complies with the European low voltage directive (LVD) and EMC directive.

# Content

|   |    |
|---|----|
| Preface.....  | 1  |
| Introduction .....  | 2  |
| Chapter 1. Safety Information and Precautions .....                   | 1  |
| 1.1. Safety Information .....   | 1  |
| 1.2. General Precautions .....  | 5  |
| Chapter 2. Product Information Introduction.....                      | 8  |
| 2.1. Models .....   | 8  |
| 2.2. Name plate : (take example 7.5KW ) .....                         | 8  |
| 2.3. Production Technical .....                                       | 9  |
| 2.4. Outline overall and installing dimensions .....                  | 11 |
| 2.5. Dimension of standard built keypad and optional keypad (mm)..... | 15 |
| Chapter 3. Production installation.....                               | 18 |
| 3.1. Installation Environment Requirements .....                      | 18 |
| 3.2. Peripheral Electrical Devices and System Configuration.....      | 19 |
| 3.3. Peripheral Electrical Devices selection. ....                    | 20 |
| 3.4. Reactor description and selection. ....                          | 23 |
| 3.5. Main loop circuit terminals description .....                    | 24 |
| 3.6. Control loop circuit and connections .....                       | 24 |
| 3.6. Control terminal and wiring.....                                 | 26 |
| 3.7. Description of Wiring of control loop Signal Terminals .....     | 30 |
| 3.8. EMC (Electromagnetic Compatibility) .....                        | 34 |
| Chapter 4. Operation and display .....                                | 37 |
| 4.1. Operation display introduction.....                              | 37 |
| 4.2. Press function description .....                                 | 37 |
| 4.3. Monitor status list .....  | 39 |
| 4.4. Function code review and modify method .....                     | 42 |
| 4.5. Password setting.....  | 42 |
| 4.6. Motor trial running ( first time power on) .....                 | 43 |
| Chapter 5. Function parameters list .....                             | 44 |

|   |     |
|---|-----|
| Charter 6. Function parameters description .....                        | 75  |
| P0. Basic parameters: .....   | 75  |
| P1. Startup and stop group.....   | 88  |
| P2. Motor parameters group .....  | 91  |
| P3 .Motor Vector Control Parameters .....                               | 96  |
| P4. V/F Control Parameters .....  | 99  |
| P5. Input terminals group .....   | 103 |
| P6. Output terminals group .....  | 112 |
| P7. Keypad operation and Display .....                                  | 118 |
| P8. Auxiliary Functions .....   | 122 |
| P9. PID function group.....   | 136 |
| PA. Multi-Reference and Simple PLC Function .....                       | 143 |
| Pb. Swing Frequency, Fixed Length and Count Group .....                 | 148 |
| PC. Fault and Protection .....  | 151 |
| Pd. RS485 communication parameters group .....                          | 160 |
| H0: Torque Control and Restricting Parameters.....                      | 162 |
| H3 Group multiple points curve AI parameters setting . .....            | 165 |
| C0. Monitor parameters group.....                                       | 167 |
| Chapter 7. Fault diagnosis and trouble shooting.....                    | 168 |
| 7.1. Fault code description and solution .....                          | 168 |
| 7.2. Table below Troubleshooting to common faults of the AC drive ..... | 173 |
| Chapter 8. Maintenance and Troubleshooting .....                        | 176 |
| 8.1 Routine Maintenance .....   | 176 |
| 8.2. Routine cleaning involves .....                                    | 176 |
| 8.2. Periodic Inspection .....  | 176 |
| 8.3. Main circuit insulation test.....                                  | 176 |
| 8.4. Storage of the AC Drive .....                                      | 177 |
| Appendix A. Selection of Power of Braking Resistor.....                 | 178 |
| Appendix B. Communication protocol description .....                    | 181 |
| Appendix C PG card for encoder and expansion card .....                 | 187 |

## Chapter 1. Safety Information and Precautions



In this manual, the notices are graded based on the degree of danger:

- **DANGER** indicates that failure to comply with the notice will result in severe personal injury or even death.
- **WARNING** indicates that failure to comply with the notice will result in personal injury or property damage.



Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter Euronorm Drive Systems will assume no liability or responsibility for any injury or loss caused by improper operation.

### 1.1. Safety Information

#### 1. Before installation:

|  |
|--|
|  <b>DANGER</b>  |
| <ul style="list-style-type: none"> <li>• Do not install the equipment if you find water seepage, component missing or damage upon unpacking.</li> <li>• Do not install the equipment if the packing list does not conform to the product you received</li> </ul>   |
|  <b>Warning</b>   |
| <ul style="list-style-type: none"> <li>• Handle the equipment with care during transportation to prevent damage to the equipment.</li> <li>• Do not use the equipment if any component is damaged or missing. Failure to comply will result in personal injury.</li> <li>• Do not touch the components with your hands. Failure to comply will result in static electricity damage.</li> </ul> |

#### 2. During installation

|   |
|---|
|  <b>DANGER</b>   |
| <ul style="list-style-type: none"> <li>• Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire.</li> <li>• Do not loosen the fixed screws of the components, especially the screws with red mark</li> </ul> |
|  <b>Warning</b>  |
| <ul style="list-style-type: none"> <li>• Do not drop wire end or screw into the AC drive. Failure to comply will result</li> </ul>  |

in damage to the AC drive.

- Install the AC drive in places free of vibration and direct sunlight.
- When two AC drives are laid in the same cabinet, arrange the installation positions properly to ensure the cooling effect.

### 3. At wiring

#### **DANGER**

- Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents.
- A circuit breaker must be used to isolate the power supply and the AC drive. Failure to comply may result in a fire.
- Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock.
- Tie the AC drive to ground properly by standard. Failure to comply may result in electric shock

#### **Warning**

- Never connect the power cables to the output terminals (U, V, W) of the AC drive. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the AC drive.
- Never connect the braking resistor between the DC bus terminals (+) and (-). Failure to comply may result in a fire.
- Use wire sizes recommended in the manual. Failure to comply may result in accidents.
- Use a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded.

#### 4. Before power on

##### **DANGER**

- Check that the following requirements are met:
  - The voltage class of the power supply is consistent with the rated voltage class of the AC drive.
  - The input terminals (R, S, T) and output terminals (U, V, W) are properly connected.
  - No short-circuit exists in the peripheral circuit.
  - The wiring is secured.

Failure to comply will result in damage to the AC drive

- Do not perform the voltage resistance test on any part of the AC drive because such test has been done in the factory. Failure to comply will result in accidents.

##### **Warning**

- Cover the AC drive properly before power-on to prevent electric shock.
- All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply will result in accidents

#### 5. After power on

##### **DANGER**

- Do not open the AC drive's cover after power-on. Failure to comply may result in electric shock.
- Do not touch any I/O terminal of the AC drive. Failure to comply may result in electric shock

##### **Warning**

- Do not touch the rotating part of the motor during the motor auto-tuning or running. Failure to comply will result in accidents.
- Do not change the default settings of the AC drive. Failure to comply will result in damage to the AC drive

## 6 Running operation :

### **DANGER**

- Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt.
- Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the AC drive.

### **Warning**

- Avoid objects falling into the AC drive when it is running. Failure to comply will result in damage to the AC drive.
- Do not start/stop the AC drive by turning the contactor ON/OFF. Failure to comply will result in damage to the AC drive.

## 7 Running operation

### **DANGER**

- Repair or maintenance of the AC drive may be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the AC drive.
- Do not repair or maintain the AC drive at power-on. Failure to comply will result in electric shock.
- Repair or maintain the AC drive only ten minutes after the AC drive is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury.
- Ensure that the AC drive is disconnected from all power supplies before starting repair or maintenance on the AC drive.
- Set and check the parameters again after the AC drive is replaced.
- All the pluggable components must be plugged or removed only after power-off.
- The rotating motor generally feeds back power to the AC drive. As a result, the AC drive is still charged even if the motor stops, and the power supply is cut off. Thus ensure that the AC drive is disconnected from the motor before starting repair or maintenance on the AC drive.

### **Warning**

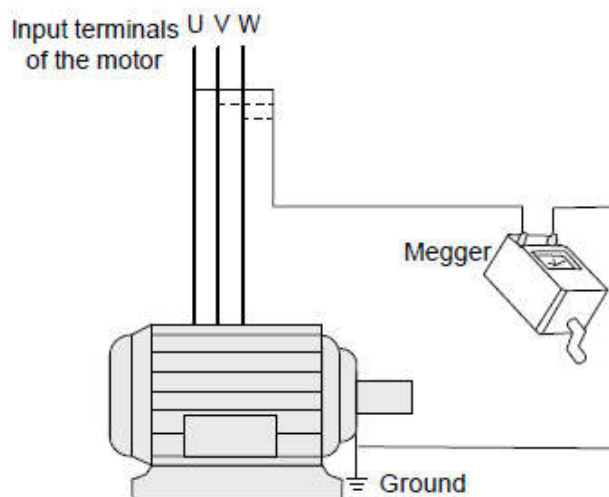
- During AC drive running to avoid any parts drop into it and cause equip damaged. Don't start and stop AC drive by contactors ON and OFF to void equip damaged.



## 1.2. General Precautions

### 1. Motor insulation test

Perform the insulation test when the motor is used for the first time, or when it is reused after being stored for a long time, or in a regular check-up, in order to prevent the poor insulation of motor windings from damaging the AC drive. The motor must be disconnected from the AC drive during the insulation test. A 500-V mega-Ohm meter is recommended for the test. The insulation resistance must not be less than 5 MΩ.



### 2. Thermal protection of motor

If the rated capacity of the motor selected does not match that of the AC drive, especially when the AC drive's rated power is greater than the motor's, adjust the motor protection parameters on the operation panel of the AC drive or install a thermal relay in the motor circuit for protection.

### 3. Running at over 50 Hz

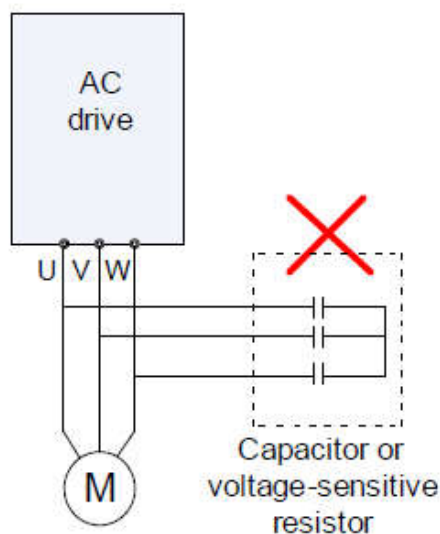
The AC drive provides frequency output of 0 to 3200 Hz (Up to 400 Hz is supported if the AC drive runs in CLVC and SFVC mode). If the AC drive is required to run at over 50 Hz, consider the capacity of the machine.

### 4. Motor heat and noise

The output of the AC drive is pulse width modulation (PWM) wave with certain harmonic frequencies, and therefore, the motor temperature, noise, and vibration are slightly greater than those when the AC drive runs at power frequency (50 Hz).

### 5. Voltage-sensitive device or capacitor on output side of the AC drive

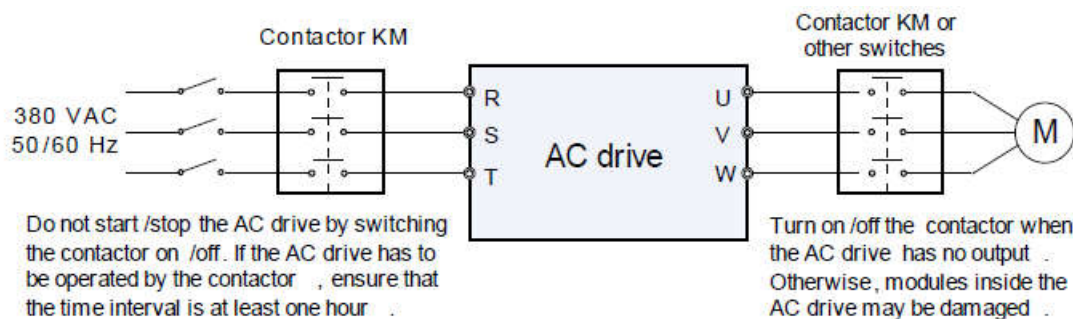
Do not install the capacitor for improving power factor or lightning protection voltagesensitive resistor on the output side of the AC drive because the output of the AC drive is PWM wave. Otherwise, the AC drive may suffer transient over current or even be damaged.



## 6. Contactor at the I/O terminal of the AC drive

When a contactor is installed between the input side of the AC drive and the power supply, the AC drive must not be started or stopped by switching the contactor on or off. If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour since frequent charge and discharge will shorten the service life of the capacitor inside the AC drive.

When a contactor is installed between the output side of the AC drive and the motor, do not turn off the contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.



## 7. When external voltage is out of rated voltage range

The AC drive must not be used outside the allowable voltage range specified in this manual.

Otherwise, the AC drive's components may be damaged. If required, use a corresponding voltage step-up or step-down device.

## 8. Prohibition of three-phase input changed into two-phase input

Do not change the three-phase input of the AC drive into two-phase input. Otherwise, a fault will result or the AC drive will be damaged

## 8. Surge suppressor

The AC drive has a built-in voltage dependent resistor (VDR) for suppressing the surge voltage generated when the inductive loads (electromagnetic contactor, electromagnetic relay, solenoid valve,

electromagnetic coil and electromagnetic brake) around the AC drive are switched on or off. If the inductive loads generate a very high surge voltage, use a surge suppressor for the inductive load or also use a diode **Note:** Do not connect the surge suppressor on the output side of the AC.

### **10. Altitude and de-rating**

In places where the altitude is above 1000 m and the cooling effect reduces due to thin air, it is necessary to de-rate the AC drive. Contact EURONORM DRIVE SYSTEMS for technical support.

### **11. Some special usages**

If wiring that is not described in this manual such as common DC bus is applied, contact the agent or EURONORM DRIVE SYSTEMS for technical support.

### **12. Disposal**

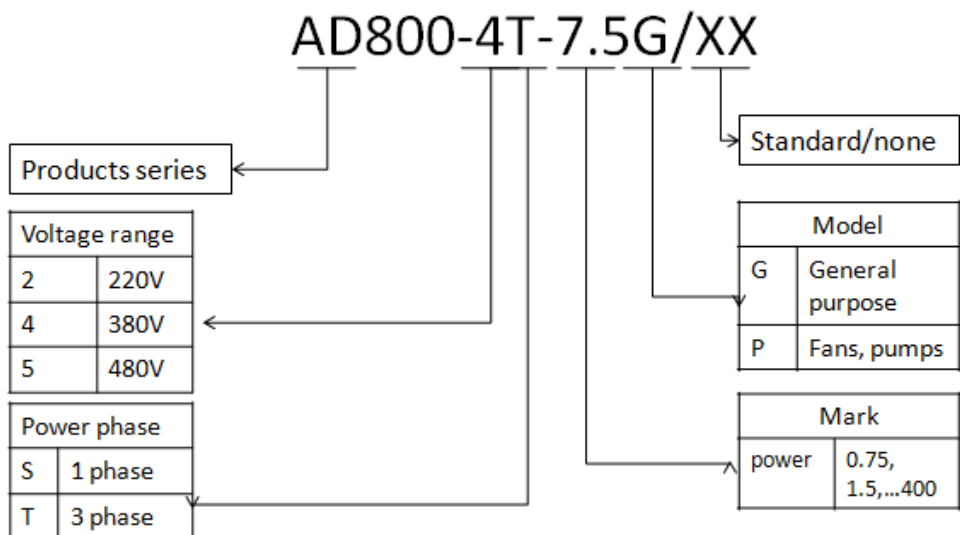
The electrolytic capacitors on the main circuits and PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste

#### **Adaptable Motor**

- The standard adaptable motor is adaptable four-pole squirrel-cage asynchronous induction motor or PMSM. For other types of motor, select a proper AC drive according to the rated motor current.
- The cooling fan and rotor shaft of non-variable-frequency motor are coaxial, which results in reduced cooling effect when the rotational speed declines. If variable speed is required, add a more powerful fan or replace it with variable-frequency motor in applications where the motor overheats easily.
- The standard parameters of the adaptable motor have been configured inside the AC drive. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions. Otherwise, the running result and protection performance will be affected.
- The AC drive may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the AC drive is disconnected from the tested parts.

# Chapter 2. Product Information Introduction

## 2.1. Models



## 2.2. Name plate : (take example 7.5KW)

|                      |         |                           |
|----------------------|---------|---------------------------|
| Product model        | MODEL:  | AD800—4T7.5GB             |
| Input specification  | INPUT:  | AC 3PH 380V±15% 50/60Hz   |
| Output specification | OUTPUT: | AC 3PH 0~380V 0~400Hz 17A |
| Series No.           | NO:     |                           |

## 2.3. Production Technical

| Items           |   | Specification  |             |                           |
|-----------------|---|--|-------------|---------------------------|
| Control mode    | Control mode                              | SVC in open loop   | V/F control | Close loop vector control |
|                 | Starting torque                           | 0.5Hz 180%   | 0.5Hz 150%  | 0.00Hz 180%               |
|                 | Speed adjust range                        | 1:100  | 1:100       | 1:1000                    |
|                 | Speed stabilizing precision               |  |             | ±0.02%                    |
|                 | Torque precision                          | NO   | NO          | ±5%                       |
|                 | Motor type                                | General induction motor , permanent magnet synchronous motor (PMSM )*  |             |                           |
| Function design | Highest frequency                         | General vector control :400Hz V/f control : 4000Hz   |             |                           |
|                 | frequency resolution                      | Digital setting: 0.01Hz analog setting:maximum×0.025%  |             |                           |
|                 | Carrier frequency                         | 0.5K ~ 16KHz, the carrier frequency can be adjusted by temperature automatically   |             |                           |
|                 | Frequency reference setting method        | Digital of Control panel, analog AI1, AI2, potentiometer of control panel, UP/DN control, communication, PLC pulse frequency                 |             |                           |
|                 | Acceleration./deceleration characteristic | Linear curve and S curve accel. /decel. mode, range of time: 0.0 to 65000S.  |             |                           |
|                 | V/F curve                                 | 3 mode: linear, multiple points, N Power   |             |                           |
|                 | V/F separation                            | 2 times separation: totally separation, half separation  |             |                           |
|                 | DC braking                                | DC braking frequency: 0.0 to 300Hz, DC braking current: 0.0% to 100%   |             |                           |
|                 | Braking unit                              | Standard built in for up to 4T15G (15kw), optional built it for 4T18.5G ~ 4T75G (18.5kw to 75kw), external built for above 4T93G (95kw).     |             |                           |
|                 | Jog function                              | Job frequency range: 0.0 to 50.0Hz, the acceleration and deceleration time of Jog  |             |                           |
|                 | Configured PID function                   | Easy to perform pressure, flow, temperature close loop control.  |             |                           |
|                 | PLC multiple speed                        | To achieve 16 segment speed running through built in PLC or terminal control   |             |                           |
|                 | Common Dc bus                             | Multiple drives use one DC bus for energy balance.   |             |                           |
|                 | Auto voltage regulation (AVR)             | Enable to keep output voltage constant when grid fluctuation   |             |                           |
|                 | Over load tolerance capability            | G type model: 150% rated current for 60s, 180% rated current for 3s,<br>P type Model: 120% rated current for 60s, 150% rated current for 3s. |             |                           |

| Items       |  | Specification   |
|-------------|--|---|
|             | Stall protection control when over current, over voltage | Carry out limiting automation for running current, voltage to prevent over current, over voltage frequently                                   |
|             | Rapid current limit function                             | Minimize the IGBT module broken to protect the AC Drive, maximum reduce the over current fault.   |
|             | Torque limit and torque control                          | "Excavator" characteristics , torque limit automatically during motor running. Torque control is available in close loop vector control mode. |
| Features    | Friendly interface                                       | Display Hello when power on.  |
|             | Multiple function key JOG button                         | It can set for Forward Jog, reverse Jog, forward/reverse switch   |
|             | Timing control function                                  | A total running time and total running time calculating   |
|             | 2 group motor parameters                                 | To achieve two motor switchover freely, control mode is selectable  |
|             | Motor over heat protection                               | Accepting motor temperature sensor signal input via AI1 terminals.  |
|             | Multiple kinds encoder *                                 | Compatible collector PG, differential PG, and rotary transformer Encoder( resolver).  |
|             | Command source   | Control panel, control terminals, series communication, switch freely.  |
|             | Frequency source   | Digital setting, analog current/voltage, pulse setting, serial communication, main and auxiliary combination.                                 |
|             | Protection function                                      | Short circuit detect when power on, input/output phase loss, over voltage, over current, under voltage, over heat, over load protection.      |
| Environment | Application site   | Indoor, free of exposure to sunlight, no dusty, no corrosive, no inflammable gas, no oil and water vapor, and water dipping                   |
|             | Altitude   | Lower 1000m   |
|             | environment temperature                                  | -10℃ ~ +40℃ , power derated for 40 ~ 50℃ , rated current derated 1% for 1℃ increasing.  |
|             | humidity   | Less than 95%, no water condense.   |
|             | storage  | -40 ~ +70℃  |
|             | Ip rating  | IP20  |

**\*:JI-350 does not have this function**

## 2.4. Outline overall and installing dimensions

### 2.4. 1. Outline overall and installing dimensions : JI-350 series

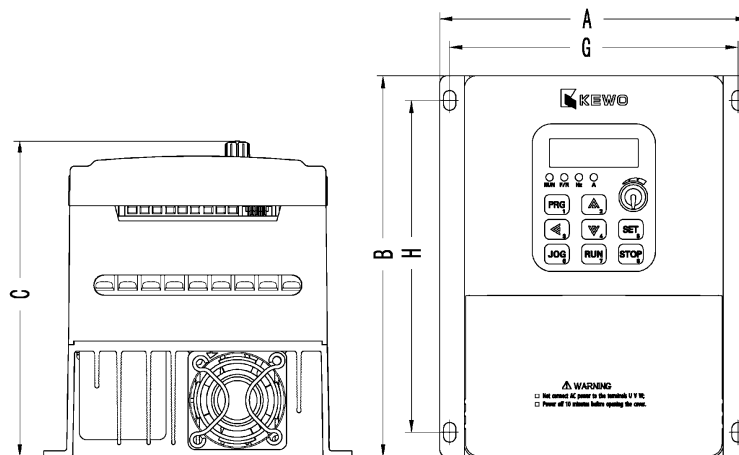


Fig 1 (Wall mounted)

### 2.4.2 . Outline overall and installing dimensions : AD800 series

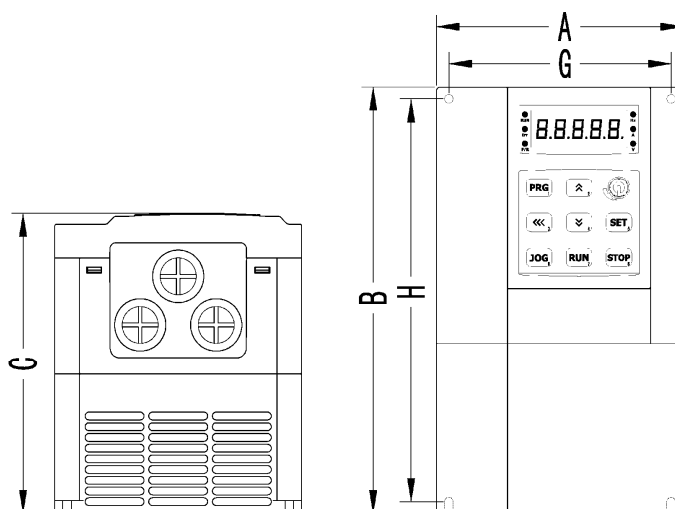


Fig. (Wall mounted)

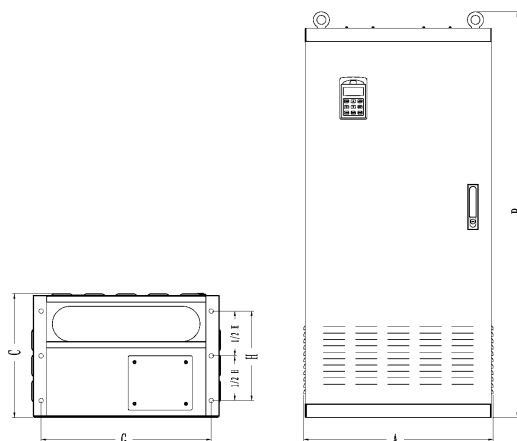


Fig. (Floor stand)

| AC drive model                      | Installation<br>hole site mm |     | Outline dimension<br>mm |     |     | Mounting<br>bolt<br>mm | Fig /<br>Dim. |
|-------------------------------------|------------------------------|-----|-------------------------|-----|-----|------------------------|---------------|
|                                     | G                            | H   | A                       | B   | C   |                        |               |
| JI-350 Series                       |                              |     |                         |     |     |                        |               |
| JI-350-2S0.4GBJI-<br>350-2S2.2GB    | 117                          | 135 | 125                     | 155 | 130 | M4                     | Fig 1         |
| JI-350-4T0.75GB<br>~ JI-350-4T3.7GB |                              |     |                         |     |     |                        |               |
| AD800 series 3 phase 220V           |                              |     |                         |     |     |                        |               |
| AD800-2T0.75GB                      | 117                          | 135 | 125                     | 155 | 130 | M4                     | Fig 2         |
| AD800-2T1.5GB                       |                              |     |                         |     |     |                        |               |
| AD800-2T2.2GB                       |                              |     |                         |     |     |                        |               |
| AD800-2T3.7GB                       | 140                          | 260 | 160                     | 270 | 165 | M5                     | Fig 1         |
| AD800-2T5.5GB                       |                              |     |                         |     |     |                        |               |
| AD800-2T7.5GB                       | 140                          | 350 | 210                     | 370 | 178 | M6                     | Fig. 2        |
| AD800-2T11G                         |                              |     |                         |     |     |                        |               |
| AD800-2T15G                         | 200                          | 410 | 270                     | 430 | 225 | M6                     | Fig. 2        |
| AD800-2T18.5G                       |                              |     |                         |     |     |                        |               |
| AD800-2T22G                         | 200                          | 500 | 290                     | 520 | 225 | M8                     | Fig. 2        |
| AD800-2T30G                         |                              |     |                         |     |     |                        |               |



| AC drive model   | Installation<br>hole site mm |     | Outline dimension<br>mm |     |      | Mounting<br>bolt<br>mm | Fig /<br>Dim. |
|--|------------------------------|-----|-------------------------|-----|------|------------------------|---------------|
|  | G                            | H   | A                       | B   | C    |                        |               |
| AD800-2T37G  | 250                          | 580 | 352                     | 600 | 285  | M8                     | Fig. 2        |
| AD800-2T45G  |                              |     |                         |     |      |                        |               |
| AD800-2T55G  | 300                          | 700 | 458                     | 720 | 310- | M8                     | Fig. 2        |
| AD800-2T75G  |                              |     |                         |     |      |                        |               |
| AD800 series    3 phase 380V   |                              |     |                         |     |      |                        |               |
| AD800-4T0.7GB  | 117                          | 210 | 130                     | 220 | 165  | M4                     | Fig. 2        |
| AD800-4T1.5GB  |                              |     |                         |     |      |                        |               |
| AD800-4T2.2GB  |                              |     |                         |     |      |                        |               |
| AD800-4T3.7GB<br>AD800-4T5.5PB   |                              |     |                         |     |      |                        |               |
| AD800-4T5.5GB<br>AD800-4T7.5PB<br>AD800-4T7.5GB<br>AD800-4T11PB                          | 140                          | 260 | 160                     | 270 | 190  | M5                     | Fig. 2        |
| AD800-4T11GB<br>AD800-4T15PB<br>AD800-4T15GB<br>AD800-4T18.5PB                           | 140                          | 355 | 210                     | 370 | 190  | M6                     | Fig. 2        |
| AD800-4T18.5G<br>AD800-4T22P<br>AD800-4T22G<br>AD800-4T30P<br>AD800-4T30G<br>AD800-4T37P | 200                          | 410 | 270                     | 430 | 235  | M6                     | Fig. 2        |
| AD800-4T37G<br>AD800-4T45P   | 200                          | 500 | 290                     | 520 | 265  | M8                     | Fig. 2        |
| AD800-4T45G<br>AD800-4T55P<br>AD800-4T55G<br>AD800-4T75P                                 | 250                          | 560 | 352                     | 580 | 295  | M8                     | Fig. 2        |

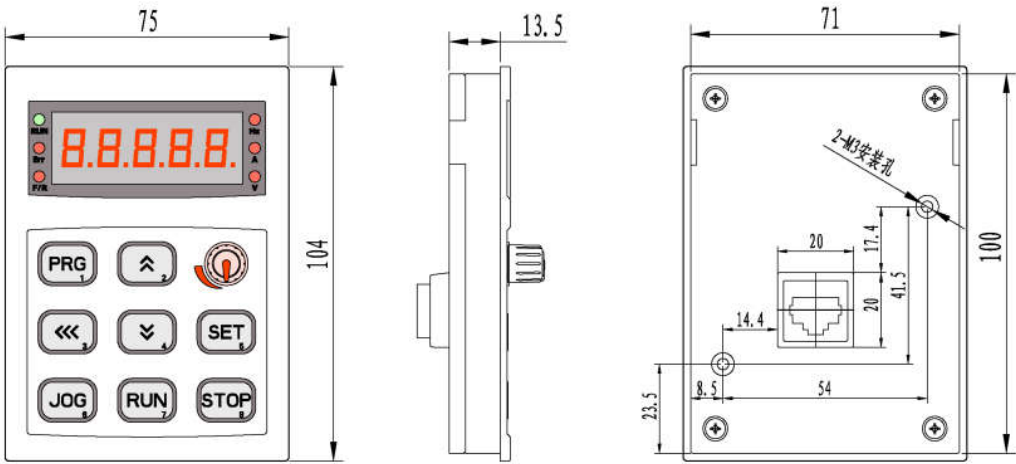
| AC drive model   | Installation hole site mm |     | Outline dimension mm |      |     | Mounting bolt mm | Fig / Dim. |
|--|---------------------------|-----|----------------------|------|-----|------------------|------------|
|  | G                         | H   | A                    | B    | C   |                  |            |
| AD800-4T75G<br>AD800-4T93P<br>AD800-4T93G<br>AD800-4T110P<br>AD800-4T110G<br>AD800-4T132P    | 300                       | 700 | 458                  | 720  | 320 | M8               | Fig. 2     |
| AD800-4T132G<br>AD800-4T160P   | 400                       | 700 | 508                  | 720  | 360 | M8               | Fig. 2     |
| AD800-4T160G-C<br>AD800-4T185P-C   |                           |     |                      |      |     |                  |            |
| AD800-4T160G<br>AD800-4T185P<br>AD800-4T185G<br>AD800-4T200P                                 | 490                       | --  | 550                  | 1160 | 370 | M12              | Fig. 2     |
| AD800-4T200G<br>AD800-4T220P<br>AD800-4T220G<br>AD800-4T250P                                 | 530                       | --  | 590                  | 1270 | 390 | M12              | Fig. 2     |
| AD800-4T250G<br>AD800-4T280P<br>AD800-4T280G<br>AD800-4T315P<br>AD800-4T315G<br>AD800-4T355P | 660                       | --  | 710                  | 1450 | 410 | M12              | Fig. 2     |
| AD800-4T355G<br>AD800-4T400P<br>AD800-4T400G<br>AD800-4T450P                                 | 770                       | --  | 832                  | 1850 | 410 | M16              | Fig. 2     |
| AD800N Series 3 phase 380V   |                           |     |                      |      |     |                  |            |
| AD800N-4T5.5GB<br>AD800N-4T7.5PB<br>AD800N-4T7.5GB<br>AD800N-4T11PB                          | 147                       | 245 | 160                  | 260  | 190 | M5               | Fig. 2     |

| AC drive model   | Installation hole site mm |     | Outline dimension mm |     |     | Mounting bolt mm | Fig / Dim. |
|--|---------------------------|-----|----------------------|-----|-----|------------------|------------|
|  | G                         | H   | A                    | B   | C   |                  |            |
| AD800N-4T11GB<br>AD800N-4T15PB<br>AD800N-4T15GB<br>AD800N-4T18.5PB | 185                       | 302 | 200                  | 320 | 200 | M6               | Fig. 2     |
| AD800N-4T18.5GB<br>AD800N-4T22PB<br>AD800N-4T22GB<br>AD800N-4T30PB | 170                       | 365 | 230                  | 380 | 210 | M6               | Fig. 2     |
| AD800N-4T30G<br>AD800N-4T37P                                       | 200                       | 410 | 270                  | 430 | 240 | M6               | Fig. 2     |
| AD800N-4T37G<br>AD800N-4T45P<br>AD800N-4T45G<br>AD800N-4T55P       | 220                       | 500 | 350                  | 580 | 275 | M8               | Fig. 2     |
| AD800N-4T55G<br>AD800N-4T75P<br>AD800N-4T75G<br>AD800N-4T93P       | 280                       | 560 | 350                  | 580 | 275 | M8               | Fig. 2     |
| AD800N-4T93G<br>AD800N-4T110P<br>AD800N-4T110G<br>AD800N-4T132P    | 300                       | 600 | 400                  | 620 | 300 | M8               | Fig. 2     |
| AD800N-4T132G<br>AD800N-4T160P<br>AD800N-4T160G<br>AD800N-4T185P   | 350                       | 680 | 460                  | 700 | 320 | M8               | Fig. 2     |

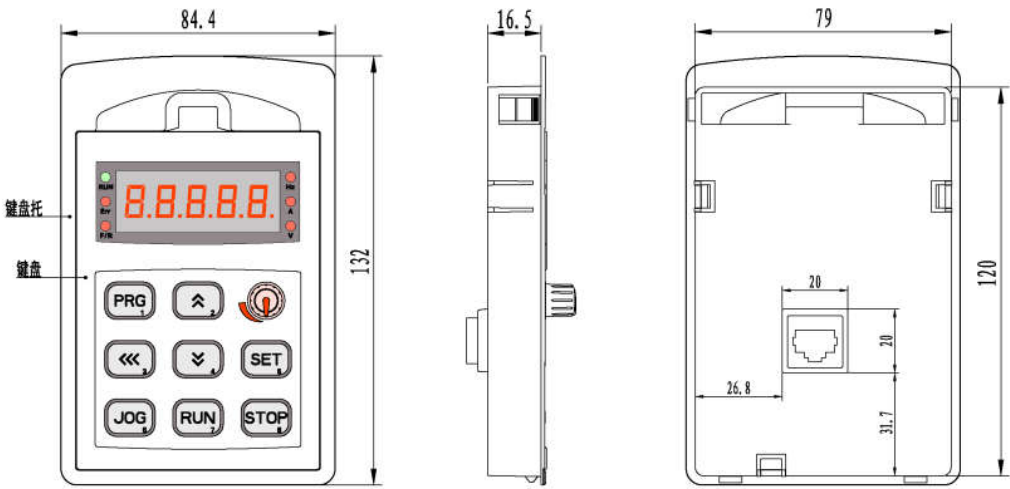
## 2.5. Dimension of standard built keypad and optional keypad (mm).

There are 3 models of AD series AC drive for using.

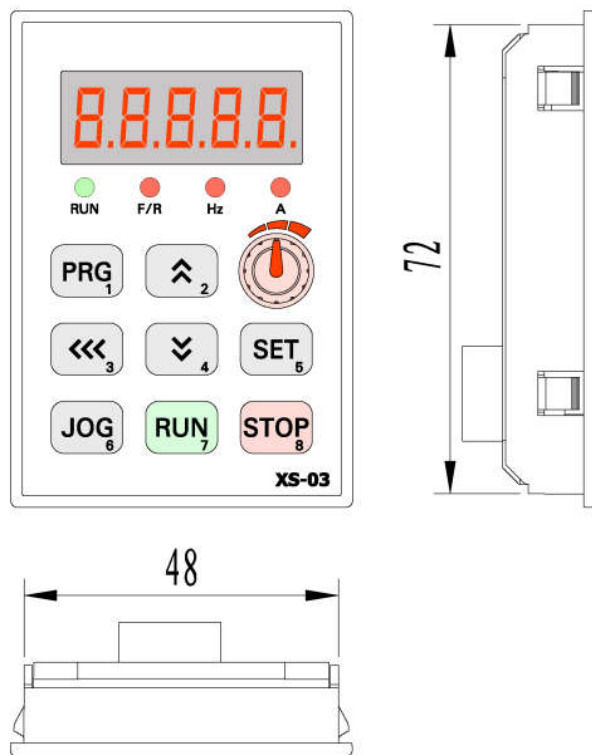
Note: JI-350 series keypad is not dismantle, the user can connect external keypad from external connecting. When connecting external keypad, the built in keypad has no display. vice versa



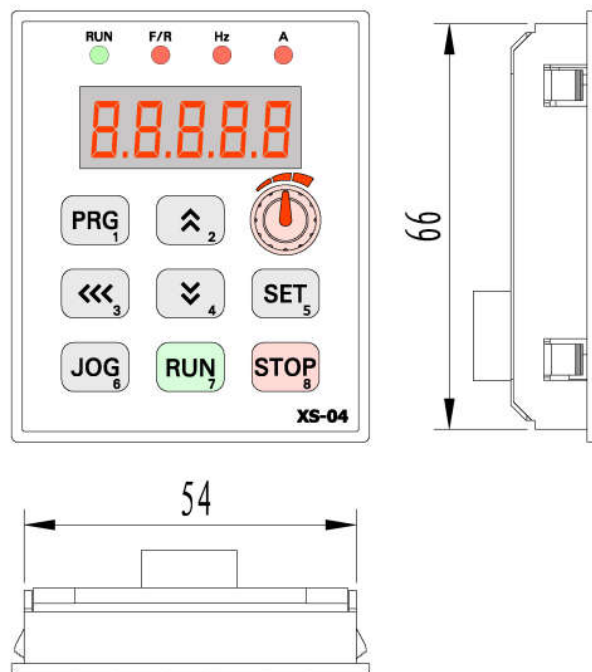
Standard built keypad model: XS-01



:Standard built keypad model: XS-01T



External optional keypad: :XS-03



External optional keypad: :X S-04

## Chapter 3. Production installation

### 3.1. Installation Environment Requirements

1. Ambient temperature, the surrounding environment temperature take great effect for service life span of AC drive, don't allow surrounding temperature over than allowable temperature above ( $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ )
2. Heat dissipation, Install the AC drive on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation. Install the AC drive vertically on the support using screws.
3. vibration, it should be less than 0.6G, far away from the punching machine or the like.
4. Free from direct sunlight, high humidity and condensation
5. Free from corrosive, explosive and combustible gas
6. Free from oil dirt, dust and metal powder

#### Installation position remind.

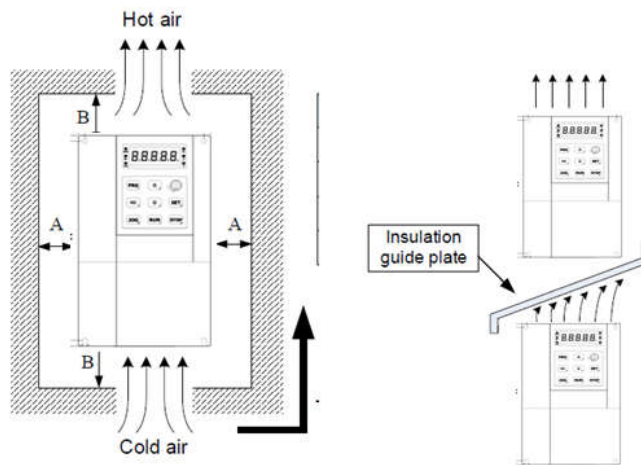


Fig 3-1 AD series AC drive installation

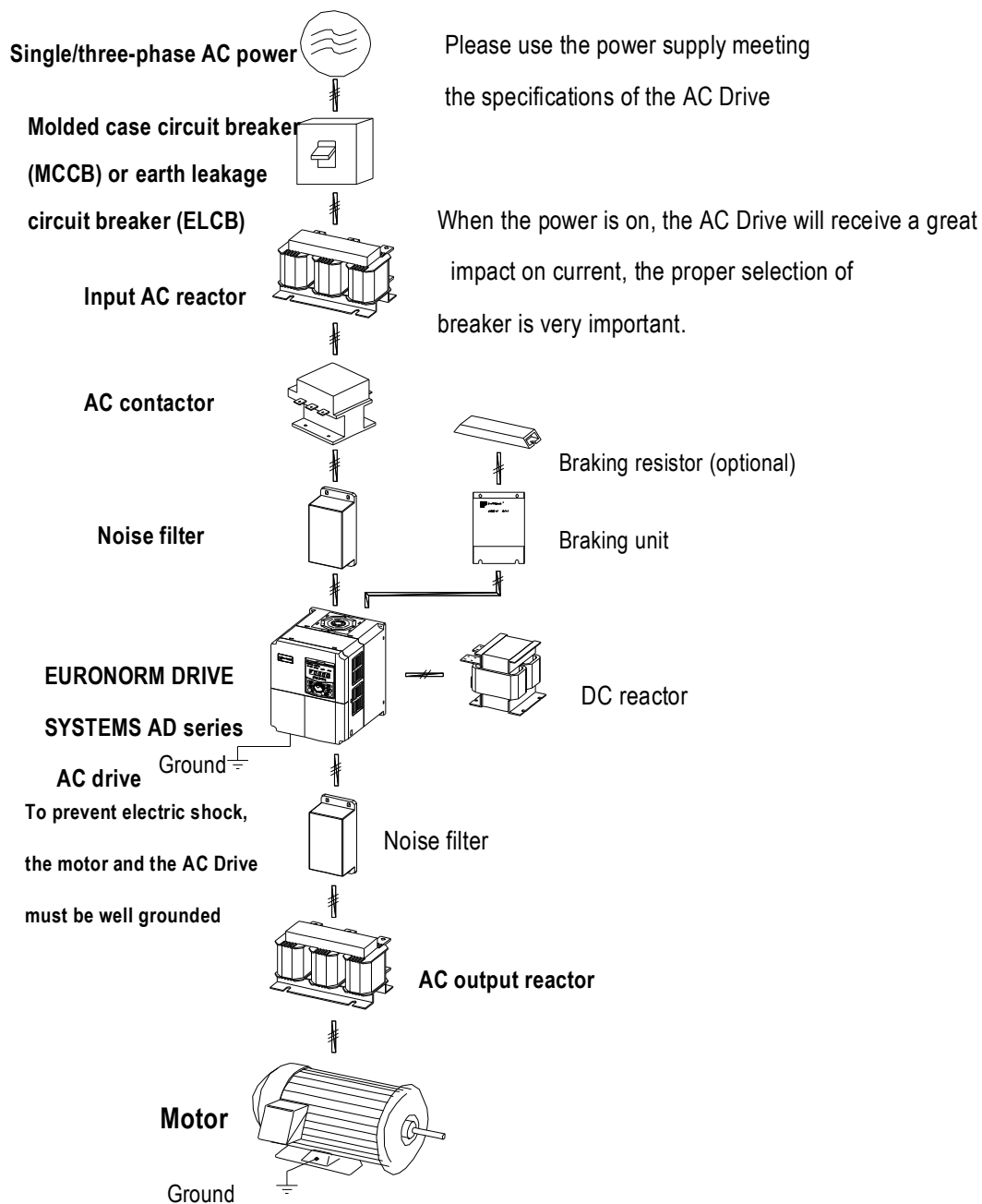
when AC drive installation in up and down, should install insulation guide plate to avoid upper AC drive heating.

**Note:** when the power of AC drive less than 22kw, no need consider the A dimension,  
When the power large than 22kw, A should large than 50mm.

#### Installation Precautions

- 1) Reserve the installation clearances as specified in Figure 3-1 to ensure sufficient space for heat dissipation. Take heat dissipation of other parts in the cabinet into consideration.
- 2) Install the AC drives upright to facilitate heat dissipation. If multiple AC drives are installed in the cabinet, install them side by side. If one row of AC drives need to be installed above another row, install an insulation guide plate, as shown in Figure 3-1.
- 3) Use incombustible hanging bracket.
- 4) In scenarios with heavy metal powder, install the heat sink outside the cabinet, and ensure that the room inside the fully-sealed cabinet is as large as possible.

## 3.2. Peripheral Electrical Devices and System Configuration



### 3.3. Peripheral Electrical Devices selection.

| AC drive model                     | MCCB)<br>A | Recomm<br>end<br>contactor | recommend<br>input side main<br>loop cable mm <sup>2</sup> | recommend output<br>side main loop<br>cable mm <sup>2</sup> | Recommend<br>Control circle<br>cable mm <sup>2</sup> |
|------------------------------------|------------|----------------------------|--|---|--|
| Single 220V                        |            |                            |  |   |  |
| JI-350-2S0.4GB/<br>AD800-2S0.4GB   | 16         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-2S0.7GB/<br>AD800-2S0.7GB   | 16         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-2S1.5GB/<br>AD800-2S1.5GB   | 20         | 16                         | 4.0  | 2.5   | 1.0  |
| JI-350-2S2.2GB/<br>AD800-2S2.2GB   | 32         | 20                         | 6.0  | 4.0   | 1.0  |
| 3 phase 220V                       |            |                            |  |   |  |
| JI-350-2T0.4GB/<br>AD800-2T0.4GB   | 10         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-2T0.75GB/<br>AD800-2T0.75GB | 16         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-2T1.5GB/<br>AD800-2T1.5GB   | 16         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-2T2.2GB/<br>AD800-2T2.2GB   | 25         | 16                         | 4.0  | 4.0   | 1.0  |
| AD800-2T3.7GB                      | 32         | 25                         | 4.0  | 4.0   | 1.0  |
| AD800-2T5.5GB                      | 63         | 40                         | 4.0  | 4.0   | 1.0  |
| AD800-2T7.5GB                      | 63         | 40                         | 6.0  | 6.0   | 1.0  |
| AD800-2T11G                        | 100        | 63                         | 10   | 10  | 1.5  |
| AD800-2T15G                        | 125        | 100                        | 16   | 10  | 1.5  |
| AD800-2T18.5G                      | 160        | 100                        | 16   | 16  | 1.5  |
| AD800-2T22G                        | 200        | 125                        | 25   | 25  | 1.5  |
| AD800-2T30G                        | 200        | 125                        | 35   | 25  | 1.5  |
| AD800-2T37G                        | 250        | 160                        | 50   | 35  | 1.5  |
| AD800-2T45G                        | 250        | 160                        | 50   | 50  | 1.5  |



| AC drive model                   | MCCB)<br>A | Recomm<br>end<br>contactor | recommend<br>input side main<br>loop cable mm <sup>2</sup> | recommend output<br>side main loop<br>cable mm <sup>2</sup> | Recommend<br>Control circle<br>cable mm <sup>2</sup> |
|----------------------------------|------------|----------------------------|--|---|--|
| AD800-2T55G                      | 350        | 350                        | 75   | 75  | 1.5  |
| AD800-2T75G                      | 500        | 400                        | 100  | 100   | 1.5  |
| 3 phase 380V                     |            |                            |  |   |  |
| JI-350-4T0.7GB/<br>AD800-4T0.7GB | 10         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-4T1.5GB/<br>AD800-4T1.5GB | 16         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-4T2.2GB/<br>AD800-4T2.2GB | 16         | 10                         | 2.5  | 2.5   | 1.0  |
| JI-350-4T3.7GB/<br>AD800-4T3.7GB | 25         | 16                         | 4.0  | 4.0   | 1.0  |
| AD800-4T5.5GB<br>AD800-4T7.5PB   | 32         | 25                         | 4.0  | 4.0   | 1.0  |
| AD800-4T7.5GB<br>AD800-4T11 PB   | 40         | 32                         | 4.0  | 4.0   | 1.0  |
| AD800-4T11GB<br>AD800-4T15PB     | 63         | 40                         | 4.0  | 4.0   | 1.0  |
| AD800-4T15GB<br>AD800-4T18.5PB   | 63         | 40                         | 6.0  | 6.0   | 1.0  |
| AD800-4T18.5GB<br>AD800-4T22P    | 100        | 63                         | 6.0  | 6.0   | 1.5  |
| AD800-4T22G<br>AD800-4T30P       | 100        | 63                         | 10   | 10  | 1.5  |
| AD800-4T30G<br>AD800-4T37P       | 125        | 100                        | 16   | 16  | 1.5  |
| AD800-4T37G<br>AD800-4T45P       | 160        | 100                        | 25   | 25  | 1.5  |
| AD800-4T45G<br>AD800-4T55P       | 200        | 125                        | 35   | 35  | 1.5  |
| AD800-4T55G<br>AD800-4T75P       | 200        | 125                        | 50   | 35  | 1.5  |
| AD800-4T75G                      | 250        | 160                        | 50   | 50  | 1.5  |

| AC drive model   | MCCB)<br>A | Recomm<br>end<br>contactor | recommend<br>input side main<br>loop cable mm <sup>2</sup> | recommend output<br>side main loop<br>cable mm <sup>2</sup> | Recommend<br>Control circle<br>cable mm <sup>2</sup> |
|--|------------|----------------------------|--|---|--|
| AD800-4T93P  |            |                            |  |   |  |
| AD800-4T93G<br>AD800-4T110P                                  | 250        | 160                        | 75   | 75  | 1.5  |
| AD800-4T110G<br>AD800-4T132P                                 | 350        | 350                        | 100  | 100   | 1.5  |
| AD800-4T132G<br>AD800-4T160P                                 | 400        | 400                        | 150  | 150   | 1.5  |
| AD800-4T160G<br>AD800-4T185P<br>AD800-4T185G<br>AD800-4T200P | 500        | 400                        | 185  | 185   | 1.5  |
| AD800-4T200G<br>AD800-4T220P                                 | 600        | 600                        | 150*2  | 150*2   | 1.5  |
| AD800-4T220G<br>AD800-4T250P                                 | 600        | 600                        | 150*2  | 150*2   | 1.5  |
| AD800-4T250G<br>AD800-4T280P                                 | 800        | 600                        | 185*2  | 185*2   | 1.5  |
| AD800-4T280G<br>AD800-4T315P                                 | 800        | 800                        | 185*2  | 185*2   | 1.5  |
| AD800-4T315G<br>AD800-4T355P                                 | 800        | 800                        | 250*2  | 250*2   | 1.5  |
| AD800-4T355G<br>AD800-4T400P                                 | 800        | 800                        | 325*2  | 325*2   | 1.5  |
| AD800-4T400G<br>AD800-4T450P                                 | 1000       | 1000                       | 325*2  | 325*2   | 1.5  |

### 3.4. Reactor description and selection.

An AC input reactor is installed to eliminate the harmonics of the input current. As an optional device, the reactor can be installed externally to meet strict requirements of an application environment for harmonics.

When the cable of motor connecting from AC drive longer than 50m, electrical resonance will be generated due to the impact of distributed capacitance. This will damage the motor insulation or generate higher leakage current, causing the AC drive to trip in over current protection. If the motor cable is greater than 100 m long, an AC output reactor must be installed close to the AC drive.

Built in external DC reactor for above 18.5kw AC drive is available, configuration DC reactor standard for above 160kw AC drive. The DC reactor can improve the power factor and avoid too big current rush to AC drive to cause rectifier damage, and also can avoid grid suddenly change.

#### AC input reactor, output reactor and DC reactor selection table.

| AC drive models | Input AC contactor |                 | Output AC contactor |                 | DC reactor     |                 |
|-----------------|--------------------|-----------------|---------------------|-----------------|----------------|-----------------|
|                 | current (A)        | inductance (mH) | Current (A)         | Inductance (mH) | current (A)    | inductance (mH) |
| AD-4T1.5G       | 5                  | 3.8             | 5                   | 1.5             | 6              | 11              |
| AD-4T2.2G       | 7                  | 2.5             | 7                   | 1               | 6              | 11              |
| AD-4T3.7G       | 10                 | 1.5             | 10                  | 0.6             | 12             | 6.3             |
| AD-4T5.5G       | 15                 | 1.0             | 15                  | 0.25            | 23             | 3.6             |
| AD-4T7.5G       | 20                 | 0.75            | 20                  | 0.13            | 23             | 3.6             |
| AD-4T11G        | 30                 | 0.60            | 30                  | 0.087           | 33             | 2               |
| AD-4T15G        | 40                 | 0.42            | 40                  | 0.066           | 33             | 2               |
| AD-4T18.5G      | 50                 | 0.35            | 50                  | 0.052           | 40             | 1.3             |
| AD-4T22G        | 60                 | 0.28            | 60                  | 0.045           | 50             | 1.08            |
| AD-4T30G        | 80                 | 0.19            | 80                  | 0.032           | 65             | 0.80            |
| AD-4T37G        | 90                 | 0.16            | 90                  | 0.030           | 78             | 0.70            |
| AD-4T45G        | 120                | 0.13            | 120                 | 0.023           | 95             | 0.54            |
| AD-4T55G        | 150                | 0.10            | 150                 | 0.019           | 115            | 0.45            |
| AD-4T75G        | 200                | 0.12            | 200                 | 0.014           | 160            | 0.36            |
| AD-4T93G        | 250                | 0.06            | 250                 | 0.011           | 180            | 0.33            |
| AD-4T110G       | 250                | 0.06            | 250                 | 0.011           | 250            | 0.26            |
| AD-4T132G       | 290                | 0.04            | 290                 | 0.008           | 250            | 0.26            |
| AD-4T160G       | 330                | 0.04            | 330                 | 0.008           | Standard built |                 |
| AD-4T185G       | 400                | 0.04            | 400                 | 0.005           |                |                 |
| AD-4T200G       | 490                | 0.03            | 490                 | 0.004           |                |                 |
| AD-4T220G       | 490                | 0.03            | 490                 | 0.004           |                |                 |
| AD-4T250G       | 530                | 0.03            | 530                 | 0.003           |                |                 |
| AD-4T280G       | 600                | 0.02            | 600                 | 0.003           |                |                 |
| AD-4T315G       | 660                | 0.02            | 660                 | 0.002           |                |                 |

|           |       |      |       |       |  |
|-----------|-------|------|-------|-------|--|
| AD-4T355G | 660   | 0.02 | 660   | 0.002 |  |
| AD-4T400G | 400*2 | 0.03 | 400*2 | 0.005 |  |

### 3.5. Main loop circuit terminals description

#### Main loop circuit terminals description 1 (JI-350 series)

|    |    |   |   |   |   |   |   |                    |
|----|----|---|---|---|---|---|---|--------------------|
| P+ | PB | R | S | T | U | V | W | $\frac{I}{\equiv}$ |
|----|----|---|---|---|---|---|---|--------------------|

Applicable to JI-350-2S0.4G ~ 2S2.2G/AD800-4T0.75G ~ 4T3.7G

#### Main loop terminals description 2 ( AD800 series)

|                    |    |    |   |   |   |   |   |   |    |
|--------------------|----|----|---|---|---|---|---|---|----|
| $\frac{I}{\equiv}$ | P+ | P- | R | S | T | U | V | W | PB |
|--------------------|----|----|---|---|---|---|---|---|----|

Applicable to AD800-2T0.4G ~ 2T7.5G/AD800-4T0.75G ~ 4T15G

|   |   |   |    |    |    |   |   |   |                    |
|---|---|---|----|----|----|---|---|---|--------------------|
| R | S | T | P- | P+ | P1 | U | V | W | $\frac{I}{\equiv}$ |
|---|---|---|----|----|----|---|---|---|--------------------|

Applicable to AD800-2T11G ~ 2T75G/AD800-4T18.5G ~ 4T132G

|   |   |   |    |    |   |   |   |                    |
|---|---|---|----|----|---|---|---|--------------------|
| R | S | T | P+ | P- | U | V | W | $\frac{I}{\equiv}$ |
|---|---|---|----|----|---|---|---|--------------------|

Applicable to AD800-4T160 and above


### 3.6. Control loop circuit and connections

#### 1. Single phase 220V input AC drive main loop terminal description

| Terminal mark             | Name                                 | Description                  |
|---------------------------|--------------------------------------|------------------------------|
| R T                       | Single phase power input terminal    | Connecting 220V power supply |
| U V W                     | AC drive output terminal             | Connecting 3 phase motor     |
| P+ P-                     | DC bus positive/negative terminal    | DC bus common input terminal |
| P+ PB                     | Braking resistor connecting terminal | Connecting braking resistor  |
| PE ( $\frac{I}{\equiv}$ ) | Grounding terminal                   | AC drive grounding terminal  |

#### 2. Three phase AC drive main loop terminal description

| Terminal mark | Name                         | Description     |
|---------------|------------------------------|-----------------|
| R S T         | 3 phase power input terminal | Connect 3 phase |

|  |                                      |   |
|--|--------------------------------------|---|
|  |                                      | power supply  |
| U V W  | AC drive output terminal             | Connect 3 phase motor   |
| P+ P1  | Short circuit after factory leaving  | Connect DC reactor dismantle                                  |
| P+ P-  | DC bus positive/negative terminal    | DC bus input terminal/ external braking unit connecting point |
| P+ PB  | Braking resistor connecting terminal | Connecting braking resistor                                   |
| PE (  ) | Grounding terminal                   | AC drive grounding terminal                                   |

### Wring precaution:

#### 1. Input R, T or R, ST

AC drive input power supply connection side, no phase order request.

2. DC bus P+ P- , Take attention there are still exist residual voltage between P+, P- after power off. If need touch must need wait LED off and measuring voltage less than 36V. Otherwise it will be shock.

3. The braking unit wiring can't over than 10m, and need to using twisted-pair and diplomema cable. Don't allow connect braking resistor to P+ and P-, otherwise it will cause AC drive damaged and fire.

4. Braking resistor should be connect to P+ and PB.

Built it braking unit up to 4T15 (15Kw) for standard, only connect braking resistor is OK.

Please select braking resistor according to recommend list and wring should less than 5M, otherwise it will cause AC drive damaged.

5. Connecting external DC reactor terminal. Built it DC reactor for above 4T160G. if need connect DC reactor for 4T18.5G ~ 4T132G range of AC drive, please remove P+ and P1 short circuit copper bar first, and connect to reactor.

6. AC drive output side U V W of terminals.

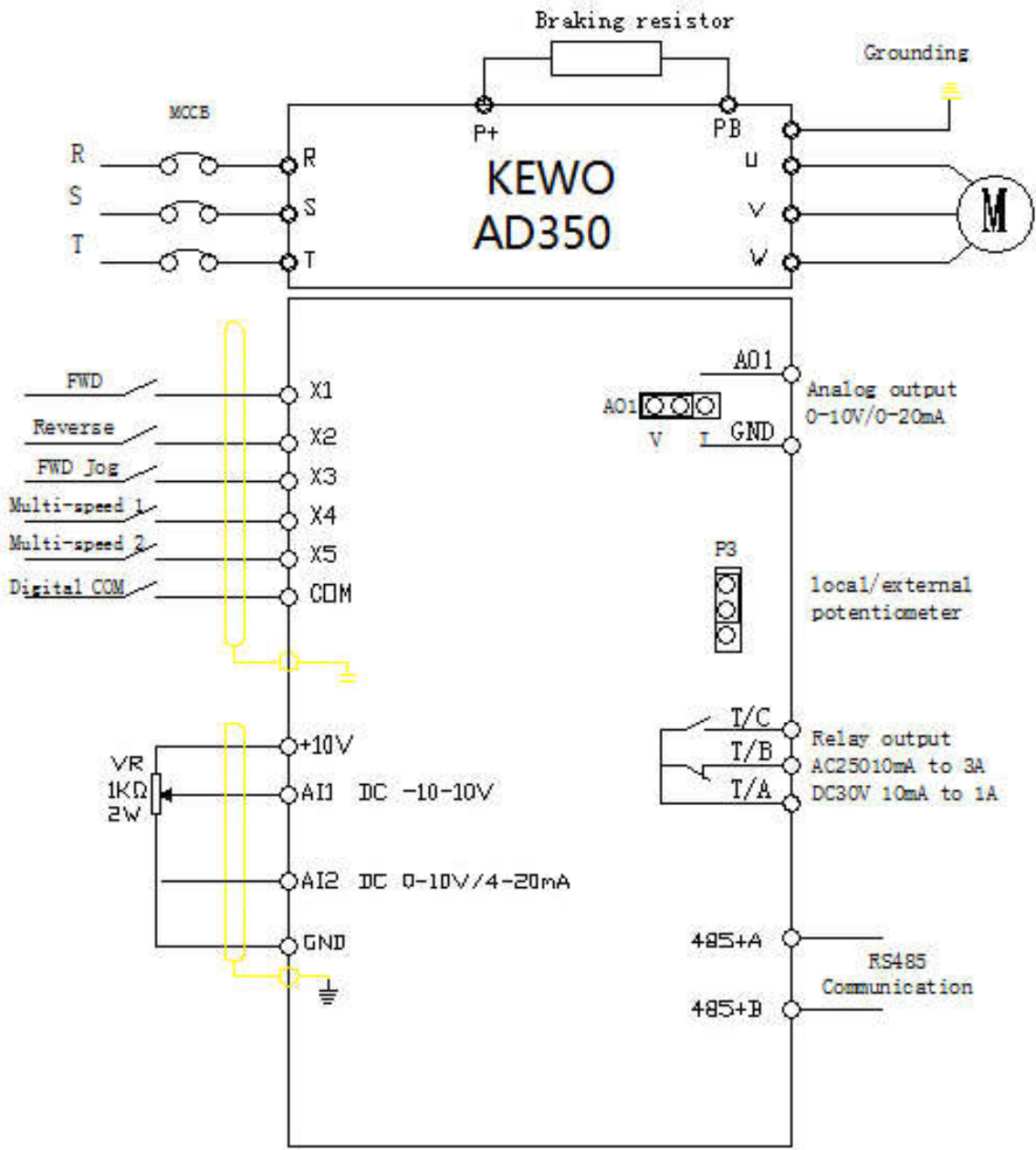
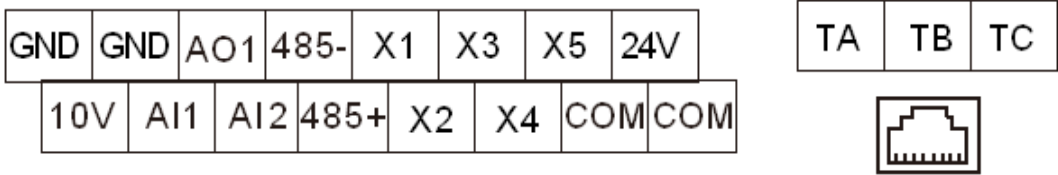
Don't allow connect capacitor and surge after there terminals, otherwise will cause AC drive damage. If the motor cable is too long, electrical resonance will be generated due to the impact of distributed capacitance. This will damage the motor insulation or generate higher leakage current, causing the AC drive to trip in over current protection. If the motor cable is greater than 100 m long, an AC output reactor must be installed close to the AC drive.

7. Ground PE

This terminal must be reliably connected to the main grounding conductor. Otherwise, it may cause electric shock, mal-function or even damage to the AC drive. And can't connect PE to null line.

3.6. Control terminal and wiring

3.6.1 Control terminal and wiring：JI-350 for example



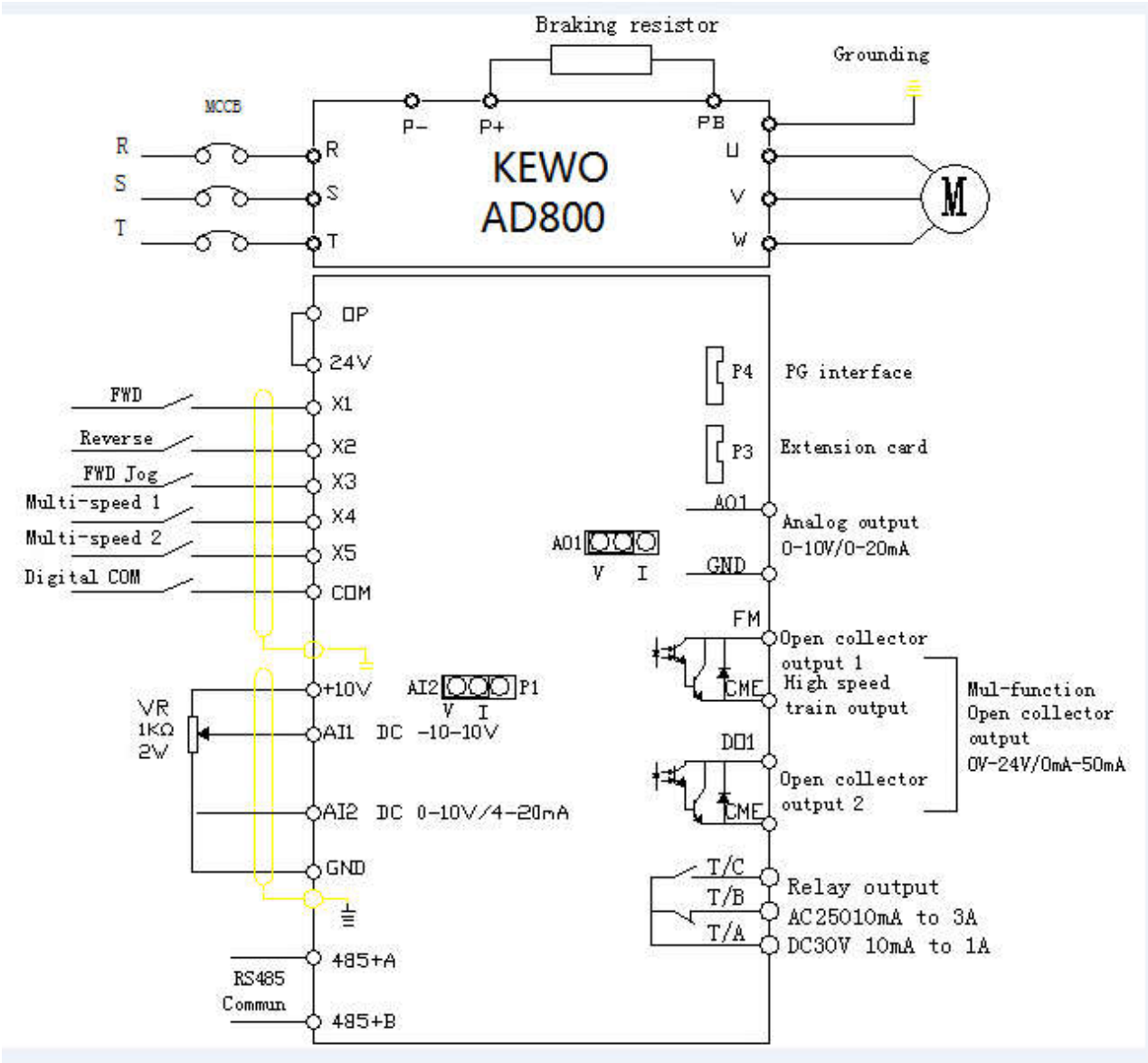
### 3.6.2 . JI-350 series, Control loop terminal function description

| Terminal label | Terminal name  | Function description   |
|----------------|--|--|
| X1 COM         | Multi-function input terminal 1  | 1: input specification: 24V DC, 5mA<br>2. Frequency range : 0 ~ 200Hz<br>3. Voltage range: 10V ~ 30V   |
| X2 COM         | multi-function input terminal 2  |  |
| X3 COM         | multi-function input terminal 3  |  |
| X4 COM         | Multi-function input terminal 4  |  |
| X5 COM         | Multi-function input terminal 5<br>High speed pulse train input terminal | Not only has the function as same as X1 to X4, but also can use for high speed pulse train receiving channel.<br>Pulse frequency: 0 to 100KHz. |
| 10V GND        | Supply 10V power supply  | Provides 10V power supply, maximum output current:10mA,<br>Connect potentiometer, the resistor of potentiometer is 1-5KΩ.                      |
| 24V COM        | 24 external power supply   | Provide 24V power supply, maximum current is 200mA.<br>Use for power on sensors or small relay   |
| AI1 GND        | analog input terminal 1  | 1. Input voltage range: DC 0—10V<br>2. Input impedance: 22KΩ   |
| AI2 GND        | Analogy input terminal 2   | 1. Input signal" DC 0-10V/4-20mA, select by jumper Pi of controller board.<br>2. Input impedance: Voltage signal 22KΩ, current signal 500Ω     |
| AO1 GND        | Analog output 1  | Output current or voltage signal selected by jumper P2 of controller board.<br>Voltage signal range: 0-10V, current signal range:0-20mA        |
| TA TB TC       | Relay output   | Multiple relay output: TA and TC is normal open, TA and TB is normal close.<br>Specification: AC250V,3A/DC30V, 1A                              |
| RS+ RS-        | 485 communication interface  | Built it RS485 communication interface   |

**Note: When connecting external potentiometer, the Jump P3 should place top position.**

3.6.3. Control terminal and wiring: AD800 example

|     |     |     |      |     |     |     |    |     |    |    |    |    |
|-----|-----|-----|------|-----|-----|-----|----|-----|----|----|----|----|
| GND | GND | AO1 | 485- | COM | X1  | X2  | X3 | X4  | X5 |    |    |    |
| 10V | AI1 | AI2 | 485+ | CME | COM | DO1 | FM | 24V | OP | TA | TB | TC |





**3.6.4 Control loop terminal function: AD800 series**

| Terminal mark |     | Terminal name   | Function description  |
|---------------|-----|---|---|
| X1            | COM | Multi-function input terminal 1                             | 1.Input specification: 24V DC, 5mA<br>2.frequency range: 0 ~ 200Hz<br>3.Voltage range: 10V ~ 30V  |
| X2            | COM | Multi-function input terminal 2                             |   |
| X3            | COM | Multi-function input terminal 3                             |   |
| X4            | COM | Multi-function input terminal 4                             |   |
| X5            | COM | Multi-function input terminal 5<br>Can for High pulse trans | It can used for high speed pulse train input terminals as well for receiving 0 ~ 100KHz, except equip X1-X4 functions.  |
| 10V           | GND | Provides 10V power source                                   | Provides 10V voltage power supply, maximum current: 10A, for connecting external potentiometer 2 side in general, resistor value 1-5KΩ  |
| 24V           | COM | Provides 24V power source                                   | Provides 24V power supply, the maximum current: 200mA, use for external sensor or micro relay power supply  |
| OP            |     | External power supply input terminal                        | Short circuit connected between 24V and OP terminals. When using external driving X1 ~ X5, OP for connecting external power supply, P9 disconnect.  |
| AI1           | GND | Analog input terminal 1                                     | 1. Input voltage range: DC 0—10V<br>2. Input impedance: 22KΩ  |
| AI2           | GND | Analog input terminal 2                                     | 1. Input signal" DC 0-10V/4-20mA, select by jumper Pi of controller board.<br>2. Input impedance: Voltage signal 22KΩ, current signal 500Ω  |
| AO1           | GND | Analog output 1   | Output current or voltage signal selected by jumper P2 of controller board.<br>Voltage signal range: 0-10V, current signal range: 0-20mA  |
| DO1<br>CME    |     | Collector output 1  | Opto-isolator, open collector output<br>Output voltage range: 0 ~ 24V<br>Output current range: 0 ~ 50mA<br>Note: the digital output grounding CME and digital input grounding is isolated. CME and COM is short circuit connected by jumper P8 before they leave to factory. When it need connect external power supply for DO1, the CME and COM should be disconnect. P8 jump off. |

| Terminal mark | Terminal name                                 | Function description   |
|---------------|---|--|
| FM<br>COM     | High speed pulse trains output/digital output | Take as high speed pulse trains output, the maximum frequency can up to 100KHz,<br>Takes as digital output, the function as same as DO1. |
| TA  TB<br>TC  | Relay output                                  | Multiple relay output: TA and TC is normal open, TA and TB is normal close. Specification: AC250V,3A/DC30V, 1A                           |
| RS+  RS-      | 485 communication card                        | Standard built rS485 communication port, P5 is terminal resistor, if place left means disable, if place to right, means enable.          |
| P3            | PG interface card                             | for external connecting PG card  |
| P4            | Expansion card                                | for external connecting expansion card   |

3.7. Description of Wiring of control loop Signal Terminals

3.7.1 Analog input terminals

1) Wiring of AI terminals

Weak analog voltage signals are easy to suffer external interference, and therefore the shielded cable must be used and the cable length must be less than 20 m, as shown in following figure.

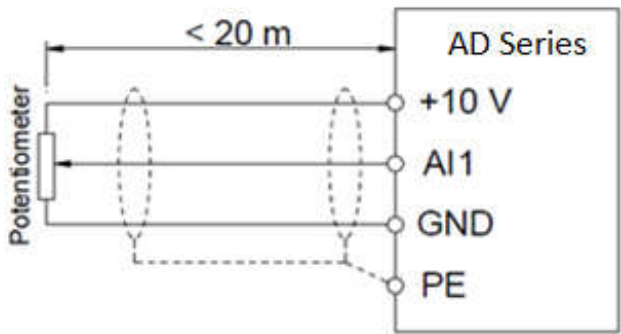


Figure 3-2 Wiring mode of AI terminals

In applications where the analog signal suffers severe interference, install filter capacitor or ferrite magnetic core at the analog signal source as below fig.

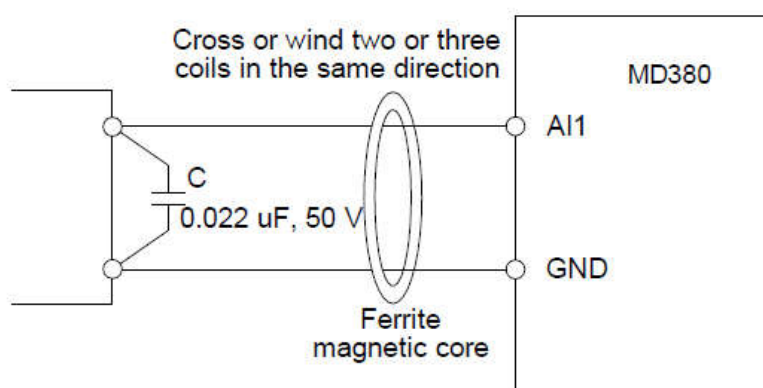


Figure 3-3 Install filter capacitor or ferrite magnetic core

### 3.7.2. Wiring of XI input terminals

Generally, select shielded cable no longer than 20 m. When active driving is adopted, necessary filtering measures shall be taken to prevent the interference to the power supply. It is recommended to use the contact control mode.

#### a. SINK wiring

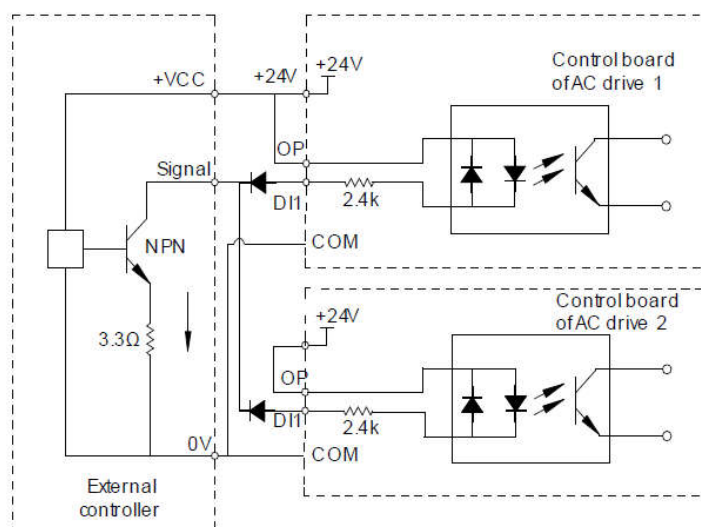


Fig 3-4 Using inner power supply connected mode, P9 terminal should short circuit.

This is the most commonly used wiring mode. To apply external power supply, remove jumpers between +24 V and OP and between COM and CME, and connect the positive pole of external power supply to OP and negative pole to CME. In such wiring mode, the XI terminals of different AC drives cannot be connected in parallel. Otherwise, DI malfunction may result. If parallel connection (different AC drives) is required, connect a diode in series at the DI and the diode needs to satisfy the requirement:  $I_F > 10 \text{ mA}$ ,  $U_F < 1 \text{ V}$ .

**b. SOURCE wiring**

In such wiring mode, remove the jumper between +24 V and OP. Connect +24 V to the common port of external controller and meanwhile connect OP to COM. If external power supply is applied, remove the jumper between CME and COM.

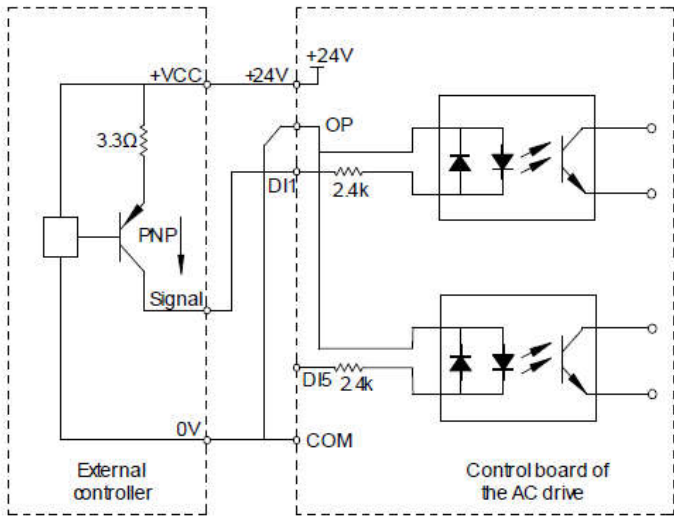


Fig 3-5 Using external power supply connected mode, remove 9 terminals short circuit bar.  
**Note:** when using the external power supply, it must remove short circuit bar between 24V and OP, otherwise it will cause Ac drive damage, the external power supply voltage range is DC20 to 30V, otherwise it can't make sure AC drive works well our cause AC drive damage.

**3.7.3. Wiring of DO terminal**

When the digital output terminal needs to drive the relay, an absorption diode shall be installed between two sides of the relay coil. Otherwise, it may cause damage to the 24 VDC power supply. The driving capacity is not more than 50 mA.

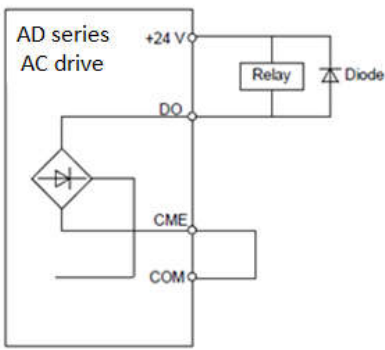


Fig 3-6 Using the inside power supply to drive external relay diagram, P8 terminals short circuit.

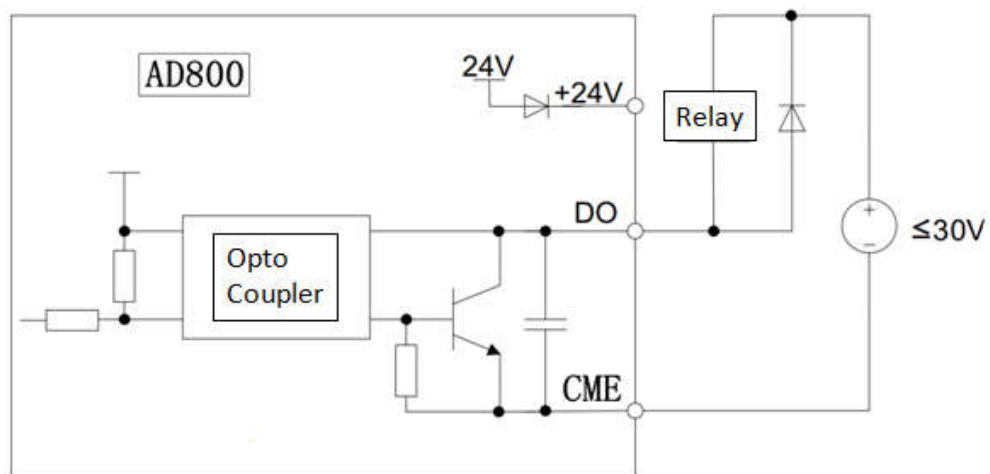


Fig 3-7, Using the external to drive relay diagram P8 terminal disconnect.

### 3.8. EMC (Electromagnetic Compatibility)

#### 3.8.1 Definition

Electromagnetic compatibility refers to the ability that the electric equipment runs in an electromagnetic interference environment and implements its function stably without interferences on the electromagnetic environment.

#### 3.8.2. EMC Standard

In accordance with the requirements of the Chinese national standard GB/T12668.3, the AC Drive must comply with the requirements of electromagnetic interference and anti- electromagnetic interference.

Our existing products adopt the latest international standards: IEC/EN61800-3: 2004), which is equivalent to the Chinese national standards GB/T12668.3. EC/EN61800-3 assesses the AC Drive in terms of electromagnetic interference and anti-electronic interference. Electromagnetic interference mainly tests the radiation interference, conduction interference and harmonics interference on the AC Drive (necessary for civil AC Drive)

Anti-electromagnetic interference mainly tests the conduction immunity, radiation immunity, surge immunity, EFTB(Electrical Fast Transient Burs) immunity, ESD immunity and power low frequency end immunity (the specific test items includes: 1. Immunity tests of input voltage sag, interrupt and change; 2. commutation notch immunity; 3. harmonic input immunity ; 4. input frequency change; 5. input voltage unbalance; 6. input voltage fluctuation). The tests shall be conducted strictly in accordance with the above requirements of IEC/EN61800-3, and our products are installed and used according to the guideline of the Section 7.3 and can provide good electromagnetic compatibility in general industry environment.

#### 3.8.2. Directive

##### 1. Harmonic Effect:

The higher harmonics of power supply may damage the AC Drive. Thus, at some places where the quality of power system is relatively poor, it is recommended to install AC input reactor.

##### 2. Electromagnetic Interference and Installation Precautions:

There are two kinds of electromagnetic interferences, one is the interference from electromagnetic noise in the surrounding environment to the AC Drive, and the other is the interference from the AC Drive to the surrounding equipments.

Installation Precautions:

- 1) The earth wires of the AC Drive and other electric products ca shall be well grounded;
- 2) The power cables of the AC Drive power input and output and the cable of weak current signal (e.g. control line) shall not be arranged in parallel but in vertical if possible.
- 3) It is recommended that the output power cables of the AC Drive shall use shield cables or steel pipe shielded cables and that the shielding layer shall be grounded reliably, the lead cables of the

equipment suffering interferences shall use twisted-pair shielded control cables, and the shielding layer shall be grounded reliably.

4) When the length of motor cable is longer than 100 meters, it needs to install output filter or reactor.

3. Remedies for the interferences from the surrounding electromagnetic equipments to the AC Drive: Generally the electromagnetic interference on the AC Drive is generated by plenty of relays, contactors and electromagnetic brakes installed near the AC Drive. When the AC Drive has error action due to the interferences, the following measures is recommended:

1) Install surge suppressor on the devices generating interference;

2) Install filter at the input end of the AC Drive, please refer to Section 7.3.6 for the specific operations.

3) The lead cables of the control signal cable of the AC Drive and the detection line shall use the shielded cable and the shielding layer shall be grounded reliably.

4. Remedies for the interferences from the AC Drive to the surrounding electromagnetic equipments: These noise interferences are classified into two types: one is the radiation interference of the AC Drive, and the other is the conduction interference of the AC Drive. These two types of interferences cause that the surrounding electric equipments suffer from the affect of electromagnetic or electrostatic induction. Further ,the surrounding equipment produces error action. For different interferences, please refer to the following remedies:

1) Generally the meters, receivers and sensors for measuring and testing have more weak signals. If they are placed nearby the AC Drive or together with the AC Drive in the same control cabinet, they easily suffer from interference and thus generate error actions. It is recommended to handle with the following methods: away from the interference source as far as possible; do not arrange the signal cables with the power cables in parallel and never bind them together; both the signal cables and power cables shall use shielded cables and shall be well grounded; install ferrite magnetic ring (with suppressing frequency of 30 to 1,000MHz) at the output side of the AC Drive and wind it 2 to 3 turns; install EMC output filter in more severe conditions.

2) When the interfered equipment and the AC Drive use the same power supply, it may cause conduction interference. If the above methods cannot remove the interference, it shall install EMC filter between the AC Drive and the power supply (refer to Section 7.3.6 for the selection operation);

3) The surrounding equipment shall be separately grounded, which can avoid the interference caused by the leakage current of the AC Drive's grounding wire when common grounding mode is adopted.

5. Remedies for leakage current

There are two forms of leakage current when using the AC Drive. One is leakage current to the earth, and the other is leakage current between the cables.

1) Factors of affecting leakage current to the earth and its solutions:

There are the distributed capacitance between the lead cables and the earth. The larger the distributed capacitance, the larger the leakage current; the distributed capacitance can be reduced by effectively reducing the distance

between the AC Drive and the motor. The higher the carrier frequency, the larger the leakage current. The leakage current can be reduced by reducing the carrier frequency. However, the carrier frequency reduced may result in the increase of motor noise. Please note that additional installation of reactor is also an effective method to solve leakage current problem.

The leakage current may increase with the increase of circuit current. Therefore, when the motor power is higher, the corresponding leakage current will be higher too.

## 2) Factors of producing leakage current between the cables and its solutions:

There is the distributed capacitance between the output cables of the AC Drive. If the current passing lines has higher harmonic, it may cause resonance and thus result in leakage current. If the thermal relay is used, it may generate error action.

The solution is to reduce the carrier frequency or install output reactor. It is recommended that the thermal relay shall not be installed in the front of the motor when using the AC Drive, and that electronic over current protection function of the AC Drive shall be used instead.

## 6. Precautions on Installing EMC input filter at the input end of power supply

1) Note: when using the AC Drive, please follow its rated values strictly. Since the filter belongs to Classification I electric appliances, the metal enclosure of the filter and the metal ground of the installing cabinet shall be well earthed in a large area, and have good conduction continuity, otherwise there may be danger of electric shock and the EMC effect may be greatly affected.

Through the EMC test, it is found that the filter ground end and the PE end of the AC Drive must be connected to the same public earth end, otherwise the EMC effect may be greatly affected.

2) The filter shall be installed at a place close to the input end of the power supply as much as possible.









## Chapter 4. Operation and display




### 4.1. Operation display introduction

User can modify the parameters, monitor the working status and start or stop the AD series AC drive by operating the operation panel, as shown in the following



### 4.2. Press function description

|   |                    |  |
|---|--------------------|--|
|  | Programming key    | Access to first level menu, or exit  |
|  | Up key             | Data and function code increase  |
|  | Shift              | To press this key to display parameters in stop or running status, also can select change bit during parameters modifying. |
|  | Down key           | Data and function code decrease  |
|  | Confirm key        | Enter to menu display step by step, confirm and save parameters  |
|  | Multi-function key | This function code determined by P7.04.  |


|   |               |   |
|---|---------------|---|
|  | Running key   | Start AC drive in keypad control mode   |
|  | Stop/ Rest    | Stop AC drive in keypad operation mode, reset fault when fault occurs and trouble clearing. |
|  | Potentiometer | When function code P0.03=4, the frequency adjust by potentiometer directly.                 |



Description of Indicators :













**RUN**: ON indicates that the AC drive is in the running state, and OFF indicates that the AC drive is in the stop state, flash slowly present AC drive in sleep mode.




**Err**: Parameters identify/torque /fault indicator, ON indicates in torque control mode, flash slowly means in motor auto tuning state, flash fast present fault state.

**F/R**: Forward running indicator, ON indicates in reverse running state.


 : Unit indictor, using to show currently data unit, it has several units as following show.

(  stand for OFF ;  stand for ON )

 Hz       Hz       Hz       Hz  
 A       A       A       A  
 v : Hz frequency indicator ;  v : A current indicator ;  v : voltage indicator ;  v : RMP speed

 Hz  
 A  
unit ;  v : % percentage ;

### 4.3. Monitor status list

Through the shit key “” of keypad can display kinds of state parameters in stop or running mode. Selecting parameters display by function binary bit of code P7.06 (running parameters 1) , P7.07 (running parameters 2. P7.08 (stop parameters)

In stop state, there are 11 stop state parameters can be selected to display, show as following respectively.

|       |                               |   |   |    |   |
|-------|-------------------------------|---|---|----|---|
| P7.08 | LED<br>Stop display parameter | Unit's digit :<br>Bit0: frequency reference<br>Bit1: DC bus voltage<br>Bit2: AI1 voltage<br>Bit3: AI2 voltage<br>Ten's digit :<br>Bit0: reserve | Bit1: counting value<br>Bit2: length value<br>Bit3: load speed<br>Hundred's unit :<br>Bit0:PID reference<br>Bit1 : X terminals status<br>Bit2 : D0 status | 33 | ☆ |
|-------|-------------------------------|---|---|----|---|

In running state, 4 running status parameters running frequency, frequency reference, DC bus voltage and output current are displayed by default, and you can set whether other parameters are displayed by setting

P7.06 and P7.07, as listed in the following table.

|       |                                     |  |   |    |   |
|-------|-------------------------------------|--|---|----|---|
| P7.06 | LED running display<br>parameters 1 | Unit's digit :<br>Bit0: running reference<br>Bit1: Output current<br>Bit2: Output voltage<br>Bit3: Machine speed<br>Ten 's digit :<br>Bit0: DC bus voltage<br>Bit1: frequency reference<br>Bit2: Count value<br>Bit3: length value | Hundred' digit :<br>Bit0 : X input terminals state<br>Bit1 : DO output terminals<br>state<br>Bit2 : AI1 voltage<br>Bit3 : AI2 voltage<br>Thousand's digit :<br>Bit0: Reserve<br>Bit1 : PID reference<br>Bit2: Output current<br>Bit3: Output torque | 33 | ☆ |
|-------|-------------------------------------|--|---|----|---|

|       |                                  |  |   |   |   |
|-------|----------------------------------|--|---|---|---|
| P7.07 | LED running display parameters 1 | Unit's digit:  | Hundred's unit:   | 0 | ☆ |
|       |                                  | Bit0: linear speed<br>Bit1: PID feedback<br>Bit2: PLC stage<br>Bit3: PLUSE input frequency<br>Ten's digit:<br>Bit0: current power on time<br>Bit1: current running time<br>Bit2: The rest running time<br>Bit3: main frequency display | Bit0: Auxiliary frequency Y<br>Bit1: encoder feedback<br>Bit2: actual feedback<br>Bit3: before AI1 revise voltage<br>Thousand 's unit:<br>Bit0: before AI2 revise voltage<br>Bit1: Torque reference<br>Bit2: PLUSE input frequency<br>Bit3: communication value |   |   |

When the AC drive is powered on again after power failure, the parameters that are selected before power failure are displayed.

Take P7.08 for example ( stop display parameters ), if you need to display frequency reference, DC bus voltage, machine speed, PID reference. Due to each parameter is independently, should be set unit's digit, then's digit, hundred's unit. Should set it with binary, and then translate into hexadecimal.

### Binary and hexadecimal transformed compare table

| Binary |      |      |      | hexadecimal<br>(LED bit display value) |
|--------|------|------|------|--|
| BIT3   | BIT2 | BIT1 | BIT0 |  |
| 0      | 0    | 0    | 0    | 0                                      |
| 0      | 0    | 0    | 1    | 1                                      |
| 0      | 0    | 1    | 0    | 2                                      |
| 0      | 0    | 1    | 1    | 3                                      |
| 0      | 1    | 0    | 0    | 4                                      |
| 0      | 1    | 0    | 1    | 5                                      |
| 0      | 1    | 1    | 0    | 6                                      |
| 0      | 1    | 1    | 1    | 7                                      |
| 1      | 0    | 0    | 0    | 8                                      |
| 1      | 0    | 0    | 1    | 9                                      |

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 0 | 1 | 0 | A |
| 1 | 0 | 1 | 1 | B |
| 1 | 1 | 0 | 0 | C |
| 1 | 1 | 0 | 1 | D |
| 1 | 1 | 1 | 0 | E |
| 1 | 1 | 1 | 1 | F |

Table 4.1: Binary and hexadecimal translation compare table

**Refer to below list**

**Unit' digit setting:** The frequency reference and DC bus voltage is determined by BIT0, BIT1 of P7.08 parameters. for example, if BIT0=1, means set for frequency reference, other bit set for 0 if no need display. So the unit digit is 0011, and the translate it for 3 of hexadecimal. So the unit's digit is 3.

**Unit' digit setting:** If need display machine speed, so the binary of ten' digit is 1000, and then translate 8 of hexadecimal, so the ten unit should set it for 8.

**Hundred's unit setting:** If need to display PID setting, so the binary of hundred digit is 00001, then translate it to 1 of hexadecimal.

In conclusion, the P7.08 should set for 0183.

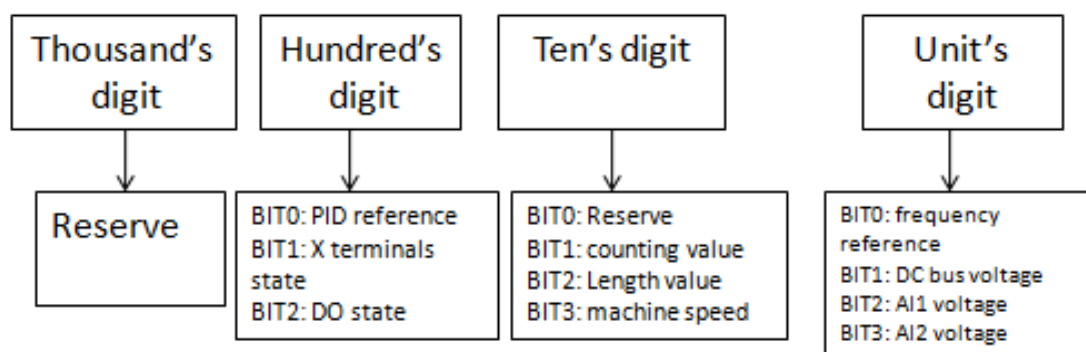
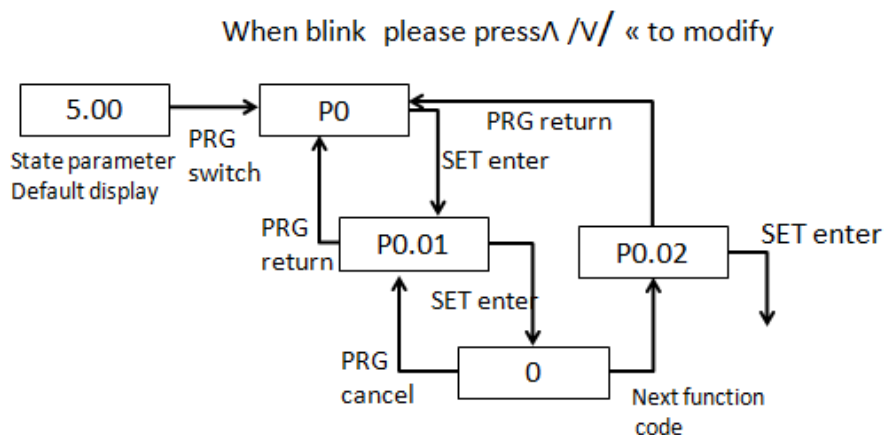


Table 4.2 Hexadecimal parameters setting chat

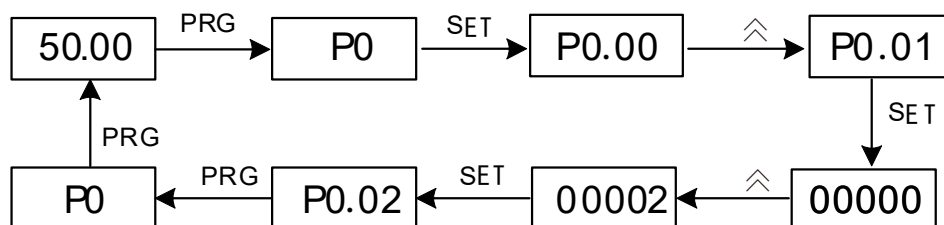
#### 4.4. Function code review and modify method

AD series AC drive keypad adopts 3 level menu design to operate parameters setting.



Note: During the third level menu operation, press PRG or SET key can return to second level menu. The difference is that, press SET key can save the set parameters and return to second menu, and automatically switch to next function code, and press PRG key means cancel the current parameters modifying and return to current function code of second menu directly.

**For example:** Change the 0 value to 2 of P0.01 function/



In the third menu state, if the parameters no blinking, means this function code can't modify. The possibility reason as following list:

1. This function code don't allow modify, such as AC drive type, actually detect parameters, running record parameters.
2. this function code can't be modified in running state. Only change in stop mode.

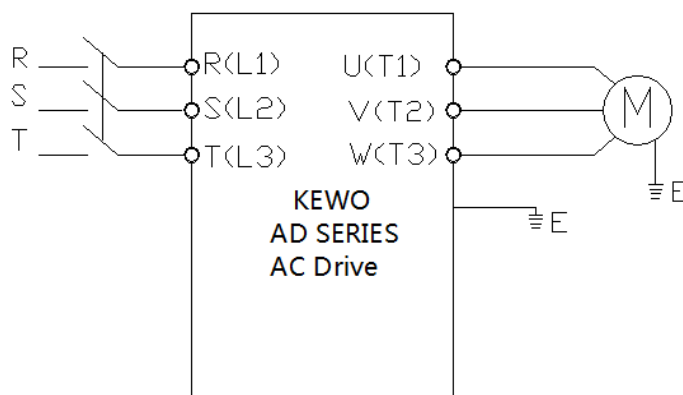
#### 4.5. Password setting

AD series AC drive provide user password protection. If the P7.00 is none 0 value, means it is user password. The password protection function is activated once exit function code edit mode. It will display "-----" if press the PRG key. Need input correct password to enter general menu. Otherwise it is forbidden enter.

If it need cancel the password, should enter to P7.00 with password first and then set it to 0.

#### 4.6. Motor trial running ( first time power on)

1. Correct wiring as following connection diagram.





Above Fig, Simple wiring connection for trail running.

2. Confirm the wiring is correct and power on, the AC drive will display HELLO first and then display 50.00.

3. Check the main frequency source (X) if by digit setting (P0.03=0/1).

4. Confirm the running command channel if by keypad control ( P0,01=0)

5. Press the RUN key tp start AC drive. RUN indicator is ON, and motor start to running.

6. Press ,  key to increase or reduce frequency to check motor if runs well in difference frequency range.

7. Press the STOP key to AC drive, and cut off power supply.

Note: It is forbidden to connect power supply to output terminals U, V, W of AC drive, otherwise it will damage AC drive seriously. Please disconnect motor from driving machine in the first time running to ensure safety.

Confirm the running direction of motor if correct. If not correct, please change the any two phase order of U, V, W.

Make sure the power (capability) of motor and AC drive if matching

## Chapter 5. Function parameters list

| Function code                       | Name   | Setting range   | Factory setting | modification |
|-------------------------------------|--|---|-----------------|--------------|
| <b>P0 Basic function parameters</b> |  |   |                 |              |
| P0.00                               | Control mode selection                                 | 0: Open loop sensor less vector control<br>1: V/F control<br>2: Close loop sensor vector control  | 1               | ★            |
| P0.01                               | Running command reference                              | 0: Keypad ( operation panel)<br>1: External terminal<br>2: RS485 communication  | 0               | ☆            |
| P0.02                               | Memory of digital setting frequency upon power failure | 0: Not memorize; 1: memorize  | 1               | ☆            |
| P0.03                               | Main frequency reference source X Selection            | 0: keypad digital frequency setting, not save after power failure<br>1: keypad digital frequency setting, memorized frequency after power failure.<br>2: Analog AI1 (-10v-10v)<br>3: Analog AI2 (0-10v/4-20mA)<br>4: Keypad potentiometer<br>5: PULSE trains frequency reference<br>6: Simple PLC<br>7: Multiple step command reference<br>8. Process-PID<br>9: RS485 communication | 1               | ★            |
| P0.04                               | Maximum frequency                                      | 50.00Hz ~ 4000.00Hz   | 50.00Hz         | ★            |
| P0.05                               | Upper limit frequency                                  | P0.06 ~ P0.04   | 50.00Hz         | ★            |
| P0.06                               | Lower limit frequency                                  | 0.00Hz ~ P0.05  | 0.00Hz          | ☆            |
| P0.07                               | Digital frequency reference                            | 0.00Hz ~ P0.04  | 50.00Hz         | ☆            |
| P0.08                               | Acceleration time 1                                    | 0.00s ~ 65000s  | Per model       | ☆            |
| P0.09                               | Deceleration time 1                                    | 0.00s ~ 65000s  | Per model       | ☆            |



| Function code | Name   | Setting range  | Factory setting | modification |
|---------------|--|--|-----------------|--------------|
| P0.10         | Rotation direction   | 0 forward; 1: reverse  | 0               | ☆            |
| P0.11         | Carrier frequency  | 0.5kHz ~ 16.0kHz   | Per model       | ☆            |
| P0.12         | Carrier frequency auto adjust select                           | 0: Not auto adjust; 1: Auto adjust   | 1               | ☆            |
| P0.13         | Parameters restore   | 0: No operation<br>1: Restore factory settings except motor parameters<br>2: Clear records   | 0               | ★            |
| P0.14         | Auxiliary frequency source Y selection                         | As same as P0.03 ( main frequency source reference)  | 0               | ★            |
| P0.15         | Auxiliary frequency source selection Y when operation          | 0: Relative to maximum frequency (P0.04)<br>1: Relative to main frequency X (P0.03)  | 0               | ☆            |
| P0.16         | Range of auxiliary frequency source Y selection when operation | 0% ~ 150%  | 100%            | ☆            |
| P0.17         | Frequency source operation (X, Y) selection                    | Unit's digit: frequency source selection<br>0: main frequency source<br>1: Arithmetic result of main and auxiliary operation (arithmetic relationship operation depends on ten's digit)<br>2: Switchover between main frequency X source and auxiliary source Y<br>3: Switchover between main source X and arithmetic operation between of main and auxiliary source.<br>4: Switchover between auxiliary source and arithmetic operation between of main X and auxiliary source Y<br>Ten's digit : The arithmetic operation relationship between main and auxiliary.<br>0: main + auxiliary<br>1: main – auxiliary<br>2: Biggest one among two | 00              | ☆            |

| Function code                       | Name                                 | Setting range  | Factory setting | modification |
|-------------------------------------|--------------------------------------|--|-----------------|--------------|
|                                     |                                      | 3: Smallest one among two  |                 |              |
| P0.18                               | Running terminals command mode       | 0: two lines 1<br>1: two lines 2<br>2: three lines 1<br>3: three lines 2               | 0               | ★            |
| <b>P1 Start/ stop control group</b> |                                      |  |                 |              |
| P1.00                               | Startup mode                         | 0: Start directly<br>1: DC brake first and start from starting frequency<br>2: Reserve | 0               | ☆            |
| P1.01                               | Starting frequency                   | 0.00Hz ~ 10.00Hz   | 0.00Hz          | ☆            |
| P1.02                               | Starting frequency holding time      | 0.0s ~ 100.0s  | 0.0s            | ★            |
| P1.03                               | Startup DC braking current           | 0% ~ 100%  | 0%              | ★            |
| P1.04                               | Startup DC braking time              | 0.0s ~ 100.0s  | 0.0s            | ★            |
| P1.05                               | Stop mode                            | 0":deceleration; 1: free stop  | 0               | ☆            |
| P1.06                               | Initial frequency of stop DC braking | 0.00Hz ~ maximum P0.04   | 0.00Hz          | ☆            |
| P1.07                               | Waiting time of stop DC braking      | 0.0s ~ 100.0s  | 0.0s            | ☆            |
| P1.08                               | Stop DC braking current              | 0% ~ 100%  | 0%              | ☆            |
| P1.09                               | Stop DC braking time                 | 0.0s ~ 100.0s  | 0.0s            | ☆            |
| P1.10                               | Brake use ratio                      | 0% ~ 100%  | 100%            | ☆            |
| P1.11                               | Reverse running control              | 0: allow run in reverse, 1: reverse is forbidden                                       | 0               | ★            |
| P1.12                               | Jog running frequency                | 0.00Hz ~ maximum frequency   | 5.00Hz          | ☆            |
| <b>P2 Motor parameters group</b>    |                                      |  |                 |              |
| P2.00                               | G/P type indicator                   | 0: G type 1: P type  | Per model       | ●            |
| P2.01                               | Motor type selection                 | 0: general asynchronous motor<br>1: frequency AC Drive motor                           | 0               | ★            |
| P2.02                               | Motor rated power                    | 0.1kW ~ 1000.0kW   | Per model       | ★            |
| P2.03                               | Motor rated frequency                | 0.00Hz ~ maximum frequency   | 50.00Hz         | ★            |
| P2.04                               | Motor rated speed                    | 0rpm ~ 65535rpm  | 1460rpm         | ★            |
| P2.05                               | Motor rated voltage                  | 0V ~ 2000V   | Per model       | ★            |
| P2.06                               | Motor rated current                  | 0.1A ~ 2000A   | Per model       | ★            |

| Function code                                   | Name   | Setting range   | Factory setting | modification |
|---|--|---|-----------------|--------------|
| P2.07   | Motor Stator resistance                                      | 0.001Ω ~ 65.535Ω  | Per model       | ★            |
| P2.08   | Motor rotor resistance                                       | 0.001Ω ~ 65.535Ω  | Per model       | ★            |
| P2.09   | Motor Motor leakage inductance                               | 0.01mH ~ 655.35mH   | Per model       | ★            |
| P2.10   | Motor mutual inductance                                      | 0.1mH ~ 6553.5mH  | Per model       | ★            |
| P2.11   | Motor no-load current  | 0.01A ~ P2.06   | Per model       | ★            |
| P2.18   | Encoder pulse number   | 1 ~ 65535   | 1024            | ★            |
| P2.19   | Encoder type   | 0: ABZ increase encoder<br>1: Rotary transformer resolver                                       | 0               | ★            |
| P2.21   | ABZ encoder phase order/<br>main director                    | 0: forward<br>1: reverse  | 0               | ★            |
| P2.25   | Poles of resolver  | 1 ~ 65535   | 1               | ★            |
| P2.27   | Motor auto tuning  | 1: static auto tuning<br>2: rotating tuning ( complete tuning)                                  | 0               | ★            |
| <b>P3 Motor vector control group parameters</b> |  |   |                 |              |
| P3.00   | Speed loop proportional gain 1                               | 1 ~ 100   | 30              | ☆            |
| P3.01   | Speed loop integral time 1                                   | 0.01s ~ 10.00s  | 0.50s           | ☆            |
| P3.02   | Switching frequency 1  | 0.00 ~ P3.05  | 5.00Hz          | ☆            |
| P3.03   | Speed loop proportional gain 2                               | 1 ~ 100   | 20              | ☆            |
| P3.04   | Speed loop integral time 2                                   | 0.01s ~ 10.00s  | 1.00s           | ☆            |
| P3.05   | Switching frequency 2  | P3.02 ~ P0.04   | 10.00Hz         | ☆            |
| P3.06   | Slip compensation coefficient                                | 50% ~ 200%  | 100%            | ☆            |
| P3.07   | Speed loop filter time constant                              | 0.000s ~ 0.100s   | 0.000s          | ☆            |
| P3.08   | Vector control over excitation gain                          | 0 ~ 200   | 64              | ☆            |
| P3.09   | Upper limit of torque source selection in speed control mode | 0: set by P3.10 function code<br>1: AI1 setting<br>2: AI2 setting<br>3: Potentiometer of keypad | 0               | ☆            |

| Function code                    | Name  | Setting range   | Factory setting | modification |
|----------------------------------|---|---|-----------------|--------------|
|                                  |   | 4: PULSE train setting<br>5: communication  |                 |              |
| P3.10                            | Upper limit of torque digital setting in speed control mode | 0.0% ~ 200.0%   | 150.0%          | ☆            |
| <b>P4 V/F Control parameters</b> |   |   |                 |              |
| P4.00                            | V/F curve setting   | 0: 0: Linear V / F curve<br>1: Multi-point V / F curve<br>2: Square V / F curve<br>3: V/F separation mode 1<br>4: V/F separation mode 2 | 0               | ★            |
| P4.01                            | Torque boost  | 0.0%: (auto torque boost )<br>0.1% ~ 30.0%  | 0.0%            | ☆            |
| P4.02                            | Torque boost cut-off frequency                              | 0.00Hz ~ maximum  | 50.00Hz         | ★            |
| P4.03                            | V/F Slip compensation gain coefficient                      | 0.0% ~ 200.0%   | 0.0%            | ☆            |
| P4.04                            | V/F over excitation gain                                    | 0 ~ 200   | 64              | ☆            |
| P4.05                            | V/F vertex point 1 output frequency                         | 0.00Hz ~ P4.07  | 0.00Hz          | ★            |
| P4.06                            | V/F vertex point 1 output voltage proportional              | 0.0% ~ 100.0%   | 0.0%            | ★            |
| P4.07                            | V/F vertex point 2 output frequency                         | P4.05 ~ P4.09   | 0.00Hz          | ★            |
| P4.08                            | V/F vertex point 2 output voltage proportional              | 0.0% ~ 100.0%   | 0.0%            | ★            |
| P4.09                            | V/F vertex point 3 output frequency                         | P4.07 ~ motor rated frequency   | 0.00Hz          | ★            |
| P4.10                            | V/F vertex point 3 output voltage proportional              | 0.0% ~ 100.0%   | 0.0%            | ★            |
| P4.11                            | The voltage source  | 0: digital reference (P4.13)<br>1: AI1 reference  | 0               | ☆            |

| Function code                     | Name  | Setting range  | Factory setting | modification |
|-----------------------------------|---|--|-----------------|--------------|
|                                   | selection when VF isolated                  | 2: AI2reference<br>3: keypad potentiometer reference<br>4: PULSE train reference (X5)  |                 |              |
| P4.12                             | The voltage source setting when VF isolated | 0V ~ motor rated voltage   | 0V              | ☆            |
| P4.13                             | The voltage ramp up time when VF isolated   | 0.0s ~ 1000.0s   | 0.0s            | ☆            |
| <b>P5 Input/ Output terminals</b> |   |  |                 |              |
| P5.00                             | X1 terminals function define                | 0: No operation<br>1: forward running (FWD)<br>2: Reverse running (REV)<br>3: 3 lines control mode<br>4: Jog forward (FJOG)<br>5: Reverse forward (RJOG)<br>6: Free stop<br>7: Fault reset (RESET)<br>8: Normal open input of external fault<br>9: Terminal UP<br>10: Terminal DOWN<br>11: UP/DOWN reset (Terminal, keypad)<br>12: Multiple step terminals 1<br>13: Multiple step terminals 2<br>14: Multiple step terminals 3<br>15: Multiple step terminals 4<br>16: Acceleration/ deceleration selection terminals 1<br>17: Acceleration/ deceleration selection terminals 2<br>18: Normal close input of external fault<br>19: Stop by external terminals ( only valid for running command by keypad )<br>20: Frequency reference source | 1               | ★            |
| P5.01                             | X2 terminals function define                |  | 2               | ★            |
| P5.02                             | X3 terminals function define                |  | 4               | ★            |
| P5.03                             | X4 terminals function define                |  | 12              | ★            |
| P5.04                             | X5 terminals function define                |  | 13              | ★            |
| P5.05                             | X6 terminals function define (extension)    |  | 0               | ★            |
| P5.06                             | X7 terminals function define (extension)    |  | 0               | ★            |
| P5.07                             | X 8 terminals function define (extension)   |  | 0               | ★            |
| P5.08                             | X 9 terminals function define (extension)   |  | 0               | ★            |
| P5.09                             | X 10 terminals function define (extension)  |  | 0               | ★            |

| Function code | Name | Setting range   | Factory setting | modification |
|---------------|------|---|-----------------|--------------|
|               |      | switch<br>21: X5 pulse trains input<br>22: Switch between main frequency and preset frequency reference<br>23: Switch between auxiliary frequency and preset frequency reference<br>24: Running command switch terminal<br>25: PID pause<br>26: PID action direction change for reverse<br>27: PID integral pause<br>28: PID parameters switch terminal.<br>29: Counter input<br>30: Counter reset<br>31: length counting input<br>32: length reset<br>33: Counter enable<br>34: Swing frequency pause<br>36: Accel/decel. forbidden<br>37: DC brake command<br>38: run command switch terminal 2<br>39: frequency reference activate terminal<br>40: Motor select terminal 1<br>41: speed/torque control<br>42: running pause<br>43: user fault define by terminal 1<br>44: user fault define by terminal 2<br>46: Torque control forbidden<br>47: emergency stop<br>48: stop by external terminal (by deceleration 4 reference)<br>49:DC braking in deceleration<br>50:Currently time reset |                 |              |

| Function code | Name   | Setting range     | Factory setting | modification |
|---------------|--|-------------------|-----------------|--------------|
| P5.10         | X terminal filter time   | 0.000s ~ 1.000s   | 0.010s          | ☆            |
| P5.11         | Line AI1 minimum setting   | -10.00V ~ P5.13   | 0.20V           | ☆            |
| P5.12         | Corresponding value of line AI1 minimum setting                        | -100.0% ~ +100.0% | 0.0%            | ☆            |
| P5.13         | Line AI1 maximum setting   | P5.11 ~ +10.00V   | 10.00V          | ☆            |
| P5.14         | Corresponding value of line AI1 maximum setting                        | -100.0% ~ +100.0% | 100.0%          | ☆            |
| P5.15         | AI1 filter time  | 0.00s ~ 10.00s    | 0.10s           | ☆            |
| P5.16         | Line AI2 minimum setting   | 0.00V ~ P5.18     | 0.20V           | ☆            |
| P5.17         | Corresponding value of line AI2 minimum setting                        | -100.0% ~ +100.0% | 0.0%            | ☆            |
| P5.18         | Line AI2 maximum setting   | P5.16 ~ +10.00V   | 10.00V          | ☆            |
| P5.19         | Corresponding value of line AI2 maximum setting                        | -100.0% ~ +100.0% | 100.0%          | ☆            |
| P5.20         | AI2 filter time  | 0.00s ~ 10.00s    | 0.10s           | ☆            |
| P5.21         | Minimum value reference of potentiometer keypad                        | 0.00V ~ P5.23     | 0.20V           | ☆            |
| P5.22         | Corresponding value of minimum value reference of potentiometer keypad | -100.0% ~ +100.0% | 0.0%            | ☆            |
| P5.23         | Maximum value reference of potentiometer keypad                        | P5.21 ~ +10.00V   | 10.00V          | ☆            |
| P5.24         | Corresponding value of maximum value reference of potentiometer keypad | -100.0% ~ +100.0% | 100.0%          | ☆            |
| P5.25         | Filter time of potentiometer   | 0.00s ~ 10.00s    | 0.10s           | ☆            |
| P5.26         | PULSE minimum input  | 0.00kHz ~ P5.28   | 0.00kHz         | ☆            |
| P5.27         | Corresponding value of PULSE minimum input                             | -100.0% ~ 100.0%  | 0.0%            | ☆            |
| P5.28         | PULSE maximum input  | P5.26 ~ 100.00kHz | 50.00kHz        | ☆            |
| P5.29         | P Corresponding value of PULSE maximum input                           | -100.0% ~ 100.0%  | 100.0%          | ☆            |
| P5.30         | PULSE filter time  | 0.00s ~ 10.00s    | 0.10s           | ☆            |
| P5.32         | AI less than minimum   | Unit's digit :    | 000             | ☆            |

| Function code                    | Name   | Setting range  | Factory setting | modification |
|----------------------------------|--|--|-----------------|--------------|
|                                  | input setting selection                          | AI1 less than minimum input setting selection<br>0: Corresponding setting for minimum input<br>1L 0.0%<br>Ten's digit:<br>AI2 less than minimum input setting selection, as same as above<br>Hundred's digit: potentiometer of keypad less than minimum input selection, as above. |                 |              |
| P5.33                            | X1 terminal response delay time                  | 0.0s ~ 3600.0s   | 0.0s            | ★            |
| P5.34                            | X2 terminal response delay time                  | 0.0s ~ 3600.0s   | 0.0s            | ★            |
| P5.35                            | X3 terminal response delay time                  | 0.0s ~ 3600.0s   | 0.0s            | ★            |
| P5.36                            | Input terminal positive/negative logic setting 1 | 0: Positive logic<br>1: Negative logic<br>Unit digit: X1<br>Ten digit: X2<br>Hundred 's digit: X3<br>Thousand digit: X4<br>Ten thousand digit: X5  | 00000           | ★            |
| <b>P6 Output terminals group</b> |  |  |                 |              |
| P6.00                            | FM terminal output selection                     | 0: Pulse train output<br>1: digital output   | 0               | ☆            |



| Function code | Name                                 | Setting range  | Factory setting | modification |
|---------------|--------------------------------------|--|-----------------|--------------|
| P6.01         | FM terminal digital output selection | 0: No output<br>1: Frequency running<br>2: frequency reach<br>3: Fault output (free stop fault )<br>4: Frequency level detect FDT 1 output<br>5: Frequency level detect FDT 2 output<br>6: 0 speed running ( no output when free stop )<br>7: 0 speed running 2 (stop with output)<br>8: upper limit frequency reach<br>9: lower limit frequency reach<br>10: frequency reach 1 output<br>11: frequency reach 2 output<br>12: power on time reach<br>13: Running time reach<br>14: preset timing reach<br>15: setting counter arrive<br>16: Programmed counter arrive<br>17: Length arrive | 0               | ☆            |
| P6.02         | Local relay output                   | 18: under voltage status output<br>19: motor overload pre-alarm<br>20: frequency overload pre-alarm  | 3               | ☆            |
| P6.03         | Expansion relay output               | 21: frequency under limit<br>22: torque under limit<br>23: standby for running<br>24: AI1>AI2  | 0               | ☆            |
| P6.04         | DO1 output selection                 | 25: AI1 input out of upper and lower limit<br>26: lower frequency arrive (stop with output)  | 1               | ☆            |
| P6.05         | Expansion output2                    | 27: this running time arrive<br>28: warning output (for all faults )<br>29: Fault output (free stop fault and  | 4               | ☆            |

| Function code | Name                                     | Setting range   | Factory setting | modification |
|---------------|--|---|-----------------|--------------|
|               |  | without output when under voltage)<br>30: current arrive 1 output<br>31: current arrive 2 output<br>32: load missing<br>34: module temperature reach<br>35: over current of software output<br>36: running direction<br>37: motor overheat pre-alarm<br>38: PLC circle running finish |                 |              |
| P6.06         | FM pulse train output selection          | 0: running frequency<br>1: setting frequency<br>2: current output<br>3: torque output<br>4: power output<br>5: Output voltage<br>6: PULSE trains input (100.% corresponding to 100.0kHz)<br>7: AI1<br>8: AI2<br>9: Reverse  | 0               | ☆            |
| P6.07         | AO1 output selection                     | 10: length<br>11: count value<br>12: communication setting<br>13: motor running speed   | 0               | ☆            |
| P6.08         | Expansion A02 output selection           | 14: output current (100.0% corresponding to 1000.0A)<br>15: Output voltage (100.0% corresponding to 1000.0V)<br>16: output torque (rated torque)  | 1               | ☆            |
| P6.09         | FM pulse trains output maximum frequency | 0.01kHz ~ 100.00kHz   | 50.00kHz        | ☆            |
| P6.10         | AO1 zero offset                          | -100.0% ~ 100.0%  | 0.0%            | ☆            |
| P6.11         | AO1 gain                                 | -10.00 ~ 10.00  | 1.00            | ☆            |
| P6.12         | Expansion A02 zero offset coefficient    | -100.0% ~ 100.0%  | 0.0%            | ☆            |
| P6.13         | Expansion card A02 gain                  | -10.00 ~ 10.00  | 1.00            | ☆            |

| Function code                                | Name                                      | Setting range   | Factory setting | modification |
|--|---|---|-----------------|--------------|
| P6.14  | FM digital output ON delay time           | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.15  | Local relay output ON delay time          | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.16  | Expansion relay output ON relay time      | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.17  | DO1 output ON delay time                  | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.18  | DO2 output ON delay time                  | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.19  | DO output terminal valid status selection | 0: positive logic; 1: negative logic<br>unit digit: FM terminal<br>Ten digit: local relay<br>Hundred digit: expansion relay<br>Thousand digit: DO1<br>Ten thousand digit: DO2 | 00000           | ☆            |
| P6.20  | FM digital output OFF delay time          | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.21  | Local relay output OFF delay time         | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.22  | Expansion relay output OFF relay time     | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.23  | DO1 output OFF delay time                 | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| P6.24  | DO2 output OFF delay time                 | 0.0s ~ 3600.0s  | 0.0s            | ☆            |
| <b>P7 Keypad and monitor parameter group</b> |   |   |                 |              |
| P7.00  | User password                             | 0 ~ 65535   | 0               | ☆            |
| P7.01  | Function code group display selection     | Digit: C group monitor display select<br>0: no display; 1: display<br>Ten digit: H function code display select<br>0: no display; 1: display                                  | 01              | ☆            |
| P7.03  | Parameters write                          | 0: parameters modify is allowable,  | 0               | ☆            |

| Function code | Name                                | Setting range  | Factory setting | modification |
|---------------|-------------------------------------|--|-----------------|--------------|
|               | protection                          | 1: parameters modify forbidden   |                 |              |
| P7.04         | JOG key function selection          | 0: JOG key invalid<br>1: switching between of keypad and remote communication ( between terminals and remote communication)<br>2: switch forward and reverse<br>3: forward jog<br>4: reverse jog   | 3               | ★            |
| P7.05         | STOP key function                   | 0: Stop key is valid only on keypad control mode<br>1 : Stop key is valid in any control mode  | 1               | ☆            |
| P7.06         | LED parameters display 1 on running | Unit Digit :<br>Bit0: Running frequency<br>Bit1: Output current<br>Bit2: Output voltage<br>Bit3: Machine speed<br>Ten digit :<br>Bit0: DC bus voltage<br>Bit1: Frequency reference<br>Bit2: Count value<br>Bit3: Length<br>Hundred digit:<br>Bit0: X terminals input status<br>Bit1: DO terminals output status<br>Bit2: AI1 voltage<br>Bit3: AI2 voltage<br>Thousand digit :<br>Bit0: Reserve<br>Bit1: PID reference<br>Bit2: Power output<br>Bit3: Torque output | 33              | ☆            |
| P7.07         | LED parameters display 2 on running | Unit digit :<br>Bit0: linear speed<br>Bit1: PID feedback   | 0               | ☆            |

| Function code | Name                              | Setting range  | Factory setting | modification |
|---------------|-----------------------------------|--|-----------------|--------------|
|               |                                   | Bit2: PLC circle running<br>Bit3: PLUSE trains input (KHz)<br>Ten digit:<br>Bit0: current power on time<br>Bit1: current running time<br>Bit2: The remaining run time<br>Bit3: main frequency<br>Hundred digit:<br>Bit0: auxiliary frequency<br>Bit1: Encoder feedback speed<br>Bit2: actual feedback speed<br>Bit3: AI1 voltage before correction<br>Hundred unit:<br>Bit0: AI2 voltage before correction<br>Bit1: torque reference value<br>Bit2: PLUSE input frequency<br>Bit3: communication reference |                 |              |
| P7.08         | LED display parameters at stop    | Unit digit:<br>Bit0: frequency reference<br>Bit1: DC bus voltage<br>Bit2: AI1 voltage<br>Bit3: AI2 voltage<br>Ten digit:<br>Bit0: Torque reference<br>Bit1: Counter value<br>Bit2: Length value<br>Bit3: machine speed<br>Hundred digit:<br>Bit0: PID reference<br>Bit1: X terminal status<br>Bit2: DO status  | 3               | ☆            |
| P7.09         | Machine load display coefficient  | 0.0001 ~ 6.5000  | 1.0000          | ●            |
| P7.10         | Heat sink of AC Drive temperature | 0.0℃ ~ 100℃  | -               | ●            |
| P7.12         | Accumulative total running        | 0h ~ 65535h  | -               | ●            |

| Function code                        | Name  | Setting range  | Factory setting | modification |
|--------------------------------------|---|--|-----------------|--------------|
|                                      | time  |  |                 |              |
| P7.15                                | Machine load speed display number of decimal point                | 0: 0 decimal point<br>1: 1 decimal point<br>2: 2 decimal point<br>3: 3 decimal point | 1               | ●            |
| P7.16                                | Cumulative time of power on time                                  | 00000 ~ 65535 hour   | -               | ●            |
| <b>P8 Auxiliary parameters group</b> |   |  |                 |              |
| P8.00                                | The unit of acceleration/deceleration time                        | 0: 1s<br>1: 0.1s<br>2: 0.01s   | 1               | ★            |
| P8.01                                | Jog acceleration time   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.02                                | Jog deceleration time   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.03                                | Acceleration time 2   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.04                                | Deceleration time 2   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.05                                | Acceleration time 3   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.06                                | Deceleration time 3   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.07                                | Acceleration time 4   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.08                                | Deceleration time 4   | 0.0s ~ 6500.0s   | 20.0s           | ☆            |
| P8.10                                | Reference frequency of acceleration/deceleration time             | 0: maximum frequency (P0.04)<br>1: frequency reference<br>2: 100Hz                   | 0               | ★            |
| P8.11                                | Jumping frequency 1   | 0.00Hz ~ maximum frequency   | 0.00Hz          | ☆            |
| P8.12                                | Jumping frequency 2   | 0.00Hz ~ maximum frequency   | 0.00Hz          | ☆            |
| P8.13                                | Jumping frequency range   | 0.00Hz ~ maximum frequency   | 0.01Hz          | ☆            |
| P8.14                                | Frequency selecting is forbidden during acceleration/deceleration | 0: invalid      1: valid   | 0               | ☆            |
| P8.15                                | 1/2 of acceleration time frequency switch point                   | 0.00Hz ~ maximum frequency   | 0.00Hz          | ☆            |
| P8.16                                | 1/2 of deceleration time frequency switch point                   | 0.00Hz ~ maximum frequency   | 0.00Hz          | ☆            |
| P8.17                                | Terminal jog function priority selection                          | 0: not priority ;    1: priority   | 0               | ☆            |

| Function code | Name  | Setting range   | Factory setting | modification |
|---------------|---|---|-----------------|--------------|
| P8.18         | Upper limit frequency source reference mode               | 0: P0.05 reference<br>1: AI1 reference<br>2: AI2 reference<br>3: potentiometer of keypad<br>4: PULSE trains setting<br>5: communication setting   | 0               | ★            |
| P8.19         | Upper limit frequency offset                              | 0.00Hz ~ maximum P0.04  | 0.00Hz          | ☆            |
| P8.20         | Auxiliary frequency source offset when superposition      | 0.00Hz ~ maximum P0.04  | 0.00Hz          | ☆            |
| P8.21         | Frequency standard of UP/DOWN during running              | 0: running frequency<br>1: frequency reference setting  | 0               | ★            |
| P8.22         | Command source, combination of frequency source selection | Unit digit: with keypad control, combination of frequency source selection<br>0: no combination<br>1: digital setting<br>2: AI1<br>3: AI2<br>4: potentiometer of keypad<br>5: PULSE trains (X5)<br>6: multiple step speed<br>7: Simple PLC<br>8: PID<br>9: communication<br>Ten digit: terminal command, combination frequency source selection<br>Hundred digit: RS485 communication command, combination frequency source selection.,<br>Thousand digit: auto running, combination frequency source selection | 0000            | ☆            |
| P8.23         | Terminals UP/DOWN   | 0.001Hz ~ 65.535Hz  | 1.00Hz          | ☆            |

| Function code | Name  | Setting range   | Factory setting | modification |
|---------------|---|---|-----------------|--------------|
|               | charge rate   |   |                 |              |
| P8.24         | accelerate/ decelerate mode   | 0: accelerate/ decelerate with straight line ;<br>1: S curve accelerate/ decelerate A | 0               | ★            |
| P8.25         | S curve time scale of starting step                                   | 0.0% ~ (100.0%-P8.26)   | 30.0%           | ★            |
| P8.26         | S curve time scale of close step                                      | 0.0% ~ (100.0%-P8.25)   | 30.0%           | ★            |
| P8.27         | Forward/ reverse dead zoon time                                       | 0.0s ~ 3000.0s  | 0.0s            | ☆            |
| P8.28         | Frequency less than lower limit frequency stop delay time             | 0.0 ~ 600.0S  | 0.0S            | ☆            |
| P8.29         | Running mode selection when frequency less than lower limit frequency | 0: running as lower limit frequency<br>1: stop<br>2: zero speed running               | 0               | ☆            |
| P8.30         | terminal start when power on protection select                        | 0: not protection; 1: protection  | 0               | ☆            |
| P8.31         | Drop control  | 0.00Hz ~ 10.00Hz  | 0.00Hz          | ☆            |
| P8.32         | FDT1 level  | 0.00Hz ~ maximum frequency  | 50.00Hz         | ☆            |
| P8.33         | FDT 1 lag value   | 0.0% ~ 100.0%   | 5.0%            | ☆            |
| P8.34         | Frequency arrival detecting range                                     | 0.0% ~ 100.0% (maximum)   | 0.0%            | ☆            |
| P8.35         | FDT2 level  | 0.00Hz ~ maximum frequency  | 50.00Hz         | ☆            |
| P8.36         | FDT2 lag value  | 0.0% ~ 100.0%   | 5.0%            | ☆            |
| P8.37         | Any arrival frequency detecting value 1                               | 0.00Hz ~ maximum frequency  | 50.00Hz         | ☆            |
| P8.38         | Any frequency arrival detecting range 1                               | 0.0% ~ 100.0% (maximum frequency)   | 0.0%            | ☆            |
| P8.39         | Any arrival frequency detecting value 2                               | 0.00Hz ~ maximum frequency  | 50.00Hz         | ☆            |
| P8.40         | Any frequency arrival detecting range 2                               | 0.0% ~ 100.0% (maximum frequency)   | 0.0%            | ☆            |
| P8.41         | Reverse   |   |                 |              |



| Function code | Name                                       | Setting range  | Factory setting | modification |
|---------------|--|--|-----------------|--------------|
| P8.42         | Time of timer setting method               | 0: P8.43 digital set<br>1: AI1 reference<br>2: AI2 reference<br>3: potentiometer of keypad<br>Range of analog input corresponding to P8.43 | 0               | ☆            |
| P8.43         | Time value of timer                        | 0.0min ~ 6500.0min   | 0.0min          | ☆            |
| P8.44         | Zero current detect level                  | 0.0% ~ 300.0%; ( 100.0% corresponding to motor rated current, stop without output)   | 5.0%            | ☆            |
| P8.45         | Zero current detect delay time             | 0.01s ~ 600.00s  | 0.10s           | ☆            |
| P8.46         | over current set point by software         | 0.0% (no detect)<br>0.1% ~ 300.0% (motor rated current)  | 200.0%          | ☆            |
| P8.47         | Over current detect delay time by software | 0.00s ~ 600.00s  | 0.00s           | ☆            |
| P8.48         | Any current arrival 1                      | 0.0% ~ 300.0%( motor rated current)  | 100.0%          | ☆            |
| P8.49         | Range of any current arrival 1             | 0.0% ~ 300.0%( motor rated current)  | 0.0%            | ☆            |
| P8.50         | Any current arrival 2                      | 0.0% ~ 300.0%( motor rated current)  | 100.0%          | ☆            |
| P8.51         | Range of any current arrival 2             | 0.0% ~ 300.0%( motor rated current)  | 0.0%            | ☆            |
| P8.52         | AI1 input voltage lower limit protection   | 0.00V ~ P8.53  | 3.00V           | ☆            |
| P8.53         | AI1 input voltage upper limit protection   | P8.52 ~ 11.00V   | 7.00V           | ☆            |
| P8.54         | Cooling fan control                        | 0: Fans working on run<br>1: Fans working once power on  | 0               | ☆            |
| P8.55         | Module temperature arrival                 | 0°C ~ 100°C  | 75°C            | ☆            |
| P8.56         | Current running arrival time               | 0.0min ~ 6500.0min   | 0.0min          | ☆            |
| P8.57         | Motor selection                            | 0: motor 1; 1: motor 2   | 0               | ★            |

| Function code                | Name                                       | Setting range   | Factory setting | modification |
|------------------------------|--|---|-----------------|--------------|
| <b>P9 PID function group</b> |  |   |                 |              |
| P9.00                        | PID reference                              | 0: digital set (P9.01)<br>1: AI1<br>2: AI2<br>3: potentiometer of keypad<br>4: PULSE trains (X5)<br>5: communication<br>6: multiple step speed                      | 0               | ☆            |
| P9.01                        | PID reference value set                    | 0.0% ~ 100.0%   | 50.0%           | ☆            |
| P9.02                        | PID feedback value                         | 0: analog AI1<br>1: analog AI2<br>2: reserve<br>3: AI1-AI2<br>4: PULSE train (X5)<br>5: communication<br>6: AI1+AI2<br>7: MAX( AI1 ,  AI2 )<br>8: MIN( AI1 ,  AI2 ) | 0               | ☆            |
| P9.03                        | PID adjust property                        | 0: positive; 1: negative  | 0               | ☆            |
| P9.04                        | PID reference feedback range               | 0 ~ 65535   | 1000            | ☆            |
| P9.05                        | proportional gain P1                       | 0.0 ~ 100.0   | 20.0            | ☆            |
| P9.06                        | integral time I1                           | 0.01s ~ 10.00s  | 2.00s           | ☆            |
| P9.07                        | derivative time D1                         | 0.000s ~ 10.000s  | 0.000s          | ☆            |
| P9.08                        | PID inversion cut of frequency for reverse | 0.00 ~ maximum frequency  | 2.00HZ          | ☆            |
| P9.09                        | PID limit deviation                        | 0.0% ~ 100.0%   | 0.0%            | ☆            |
| P9.10                        | PID differential amplitude limiting        | 0.00% ~ 100.00%   | 0.10%           | ☆            |
| P9.11                        | PID reference change time                  | 0.00 ~ 650.00s  | 0.00s           | ☆            |
| P9.12                        | PID feedback filter time                   | 0.00 ~ 60.00s   | 0.00s           | ☆            |
| P9.13                        | PID output filter time                     | 0.00 ~ 60.00s   | 0.00s           | ☆            |
| P9.15                        | proportional gain P2                       | 0.0 ~ 100.0   | 20.0            | ☆            |
| P9.16                        | integral time I2                           | 0.01s ~ 10.00s  | 2.00s           | ☆            |

| Function code | Name  | Setting range   | Factory setting | modification |
|---------------|---|---|-----------------|--------------|
| P9.17         | derivative time D2                              | 0.000s ~ 10.000s  | 0.000s          | ☆            |
| P9.18         | PID parameters switchover condition             | 0: no switch<br>1: terminals<br>2: Switchover according to deviation  | 0               | ☆            |
| P9.19         | PID parameters switchover deviation 1           | 0.0% ~ PA.20  | 20.0%           | ☆            |
| P9.20         | PID parameters switchover deviation 2           | PA.19 ~ 100.0%  | 80.0%           | ☆            |
| P9.21         | PID starting value                              | 0.0% ~ 100.0%   | 0.0%            | ☆            |
| P9.22         | PID starting value holding time                 | 0.00 ~ 650.00s  | 0.00s           | ☆            |
| P9.23         | Positive maximum between twice deviation output | 0.00% ~ 100.00%   | 1.00%           | ☆            |
| P9.24         | Negative maximum between twice deviation output | 0.00% ~ 100.00%   | 1.00%           | ☆            |
| P9.25         | PID integral property                           | Unit digit: integral separation<br>0: invalid; 1: valid<br>Ten digit: if stop integral calculating when output reach to limit<br>0: continue; 1: stop | 00              | ☆            |
| P9.26         | PID feedback loss detect value                  | 0.0%: no detect for loss<br>0.1% ~ 100.0%   | 0.0%            | ☆            |
| P9.27         | PID feedback loss detect time                   | 0.0s ~ 20.0s  | 0.0s            | ☆            |
| P9.28         | PID stop calculating                            | 0: stop without calculating, 1: stop and calculating  | 0               | ☆            |
| P9.29         | wake up frequency                               | Sleeping frequency (P9.31) ~ maximum (P0.10)  | 0.00Hz          | ☆            |
| P9.30         | Wake up delay time                              | 0.0s ~ 6500.0s  | 0.0s            | ☆            |
| P9.31         | sleeping frequency                              | 0.00Hz ~ wake frequency (P9.29)   | 0.00Hz          | ☆            |
| P9.32         | Sleeping delay time                             | 0.0s ~ 6500.0s  | 0.0s            | ☆            |
| P9.33         | Wake up function define                         | 0: as frequency (P9.29)<br>1: as percentage (P9.34)   | 0               | ☆            |
| P9.34         | Wake up value                                   | 0.0% ~ 100.0%   | 0.0%            | ☆            |

| Function code                                      | Name   | Setting range  | Factory setting | modification |
|--|--|--|-----------------|--------------|
| <b>PA Multiple step command, PLC running group</b> |  |  |                 |              |
| PA.00  | Multi-step speed 1   | -100.0% ~ 100.0%<br>(100.0% corresponding to P0.04)  | 5.0%            | ☆            |
| PA.01  | Multi-step speed 2   | -100.0% ~ 100.0%   | 10.0%           | ☆            |
| PA.02  | Multi-step speed 3   | -100.0% ~ 100.0%   | 15.0%           | ☆            |
| PA.03  | Multi-step speed 4   | -100.0% ~ 100.0%   | 20.0%           | ☆            |
| PA.04  | Multi-step speed 5   | -100.0% ~ 100.0%   | 25.0%           | ☆            |
| PA.05  | Multi-step speed 6   | -100.0% ~ 100.0%   | 30.0%           | ☆            |
| PA.06  | Multi-step speed 7   | -100.0% ~ 100.0%   | 35.0%           | ☆            |
| PA.07  | Multi-step speed 8   | -100.0% ~ 100.0%   | 40.0%           | ☆            |
| PA.08  | Multi-step speed 9   | -100.0% ~ 100.0%   | 45.0%           | ☆            |
| PA.09  | Multi-step speed 10  | -100.0% ~ 100.0%   | 50.0%           | ☆            |
| PA.10  | Multi-step speed 11  | -100.0% ~ 100.0%   | 55.0%           | ☆            |
| PA.11  | Multi-step speed 12  | -100.0% ~ 100.0%   | 60.0%           | ☆            |
| PA.12  | Multi-step speed 13  | -100.0% ~ 100.0%   | 65.0%           | ☆            |
| PA.13  | Multi-step speed 14  | -100.0% ~ 100.0%   | 70.0%           | ☆            |
| PA.14  | Multi-step speed 15  | -100.0% ~ 100.0%   | 75.0%           | ☆            |
| PA.15  | Multi-step speed 16  | -100.0% ~ 100.0%   | 80.0%           | ☆            |
| PA.16  | PLC running mode   | 0: Stop when single circle running finish<br>1: Keep final value when single circle running finish<br>2: continue circle running | 0               | ☆            |
| PA.17  | PLC running Power-off memory select                        | Unit digit:<br>0: no memory when power off;<br>1: power-off memory<br>Ten digit:<br>0: no memory when stop; 1: stop memory       | 00              | ☆            |
| PA.18  | PLC 1 <sup>st</sup> step running time                      | 0.0s(h) ~ 6500.0s(h)   | 0.0s(h)         | ☆            |
| PA.19  | PLC 1 <sup>st</sup> acceleration/ deceleration time select | 0 ~ 3  | 0               | ☆            |
| PA.20  | PLC 2 <sup>nd</sup> step running time                      | 0.0s(h) ~ 6500.0s(h)   | 0.0s(h)         | ☆            |
| PA.21  | PLC 2 <sup>nd</sup> acceleration/                          | 0 ~ 3  | 0               | ☆            |

| Function code | Name   | Setting range        | Factory setting | modification |
|---------------|--|----------------------|-----------------|--------------|
|               | deceleration time select                                   |                      |                 |              |
| PA.22         | PLC 3 <sup>rd</sup> step running time                      | 0.0s(h) ~ 6500.0s(h) | 0.0s(h)         | ☆            |
| PA.23         | PLC 3 <sup>rd</sup> acceleration/deceleration time select  | 0 ~ 3                | 0               | ☆            |
| PA.24         | PLC 4 <sup>th</sup> step running time                      | 0.0s(h) ~ 6500.0s(h) | 0.0s(h)         | ☆            |
| PA.25         | PLC 4 <sup>th</sup> acceleration/deceleration time select  | 0 ~ 3                | 0               | ☆            |
| PA.26         | PLC 5 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h) | 0.0s(h)         | ☆            |
| PA.27         | PLC 5 <sup>th</sup> acceleration/deceleration time select  | 0 ~ 3                | 0               | ☆            |
| PA.28         | PLC 6 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h) | 0.0s(h)         | ☆            |
| PA.29         | PLC 6 <sup>th</sup> acceleration/deceleration time select  | 0 ~ 3                | 0               | ☆            |
| PA.30         | PLC 7 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h) | 0.0s(h)         | ☆            |
| PA.31         | PLC 7 <sup>th</sup> acceleration/deceleration time select  | 0 ~ 3                | 0               | ☆            |
| PA.32         | PLC 8 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h) | 0.0s(h)         | ☆            |
| PA.33         | PLC 8 <sup>th</sup> acceleration/deceleration time select  | 0 ~ 3                | 0               | ☆            |
| PA.34         | PLC 9 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h) | 0.0s(h)         | ☆            |
| PA.35         | PLC 9 <sup>th</sup> acceleration/deceleration time select  | 0 ~ 3                | 0               | ☆            |
| PA.36         | PLC 10 <sup>th</sup> step running time                     | 0.0s(h) ~ 6553.5s(h) | 0.0s(h)         | ☆            |
| PA.37         | PLC 10 <sup>th</sup> acceleration/deceleration time select | 0 ~ 3                | 0               | ☆            |
| PA.38         | PLC 11 <sup>th</sup> step running time                     | 0.0s(h) ~ 6553.5s(h) | 0.0s(h)         | ☆            |
| PA.39         | PLC 11 <sup>th</sup> acceleration/deceleration time select | 0 ~ 3                | 0               | ☆            |

| Function code                                     | Name  | Setting range  | Factory setting | modification |
|---|---|--|-----------------|--------------|
| PA.40   | PLC 12 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h)   | 0.0s(h)         | ☆            |
| PA.41   | PLC 12 <sup>th</sup> acceleration/ deceleration time select | 0 ~ 3  | 0               | ☆            |
| PA.42   | PLC 13 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h)   | 0.0s(h)         | ☆            |
| PA.43   | PLC 13 <sup>th</sup> acceleration/ deceleration time select | 0 ~ 3  | 0               | ☆            |
| PA.44   | PLC 14 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h)   | 0.0s(h)         | ☆            |
| PA.45   | PLC 14 <sup>th</sup> acceleration/ deceleration time select | 0 ~ 3  | 0               | ☆            |
| PA.46   | PLC 15 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h)   | 0.0s(h)         | ☆            |
| PA.47   | PLC 15 <sup>th</sup> acceleration/ deceleration time select | 0 ~ 3  | 0               | ☆            |
| PA.48   | PLC 16 <sup>th</sup> step running time                      | 0.0s(h) ~ 6553.5s(h)   | 0.0s(h)         | ☆            |
| PA.49   | PLC 16 <sup>th</sup> acceleration/ deceleration time select | 0 ~ 3  | 0               | ☆            |
| PA.50   | PLC running time unit                                       | 0: s (second) ; 1: h (hour)  | 0               | ☆            |
| PA.51   | Multiple step command 1 frequency reference                 | 0: function code PA.00 reference<br>1: AI1<br>2: AI2<br>3: potentiometer keypad<br>4: PULSE trains<br>5: PID reference<br>6: digit reference , UP/DOWN is changeable | 0               | ☆            |
| <b>Pb swing frequency, fixed length , counter</b> |   |  |                 |              |
| Pb.00   | Swing frequency setting mode                                | 0: corresponding to center frequency<br>1: corresponding to maximum frequency  | 0               | ☆            |
| Pb.01   | Swing frequency range                                       | 0.0% ~ 100.0%  | 0.0%            | ☆            |

| Function code                        | Name  | Setting range             | Factory setting | modification |
|--------------------------------------|---|---------------------------|-----------------|--------------|
| Pb.02                                | Suddenly jump frequency range                               | 0.0% ~ 50.0%              | 0.0%            | ☆            |
| Pb.03                                | Swing frequency period                                      | 0.1s ~ 3000.0s            | 10.0s           | ☆            |
| Pb.04                                | Delta wave rise time of swing frequency                     | 0.1% ~ 100.0%             | 50.0%           | ☆            |
| Pb.05                                | length set  | 0m ~ 65535m               | 1000m           | ☆            |
| Pb.06                                | Actual length   | 0m ~ 65535m               | 0m              | ☆            |
| Pb.07                                | Pulse per meter, unit: 0.1                                  | 0.1 ~ 6553.5              | 100.0           | ☆            |
| Pb.08                                | count value setting   | 1 ~ 65535                 | 1000            | ☆            |
| Pb.09                                | Assign of count value                                       | 1 ~ 65535                 | 1000            | ☆            |
| <b>PC Fault and protection group</b> |   |                           |                 |              |
| PC.00                                | Motor overload protection                                   | 0: forbidden; 1: allow    | 1               | ☆            |
| PC.01                                | Motor overload protection gain                              | 0.20 ~ 10.00              | 1.00            | ☆            |
| PC.02                                | Motor overload pre-alarm coefficient                        | 50% ~ 100%                | 80%             | ☆            |
| PC.03                                | Over voltage gain   | 0 ~ 100                   | 0               | ☆            |
| PC.04                                | Overvoltage protection voltage                              | 120% ~ 150%               | 130%            | ☆            |
| PC.05                                | Over current stall gain                                     | 0 ~ 100                   | 20              | ☆            |
| PC.06                                | Over current stall protection current                       | 100% ~ 200%               | 150%            | ☆            |
| PC.08                                | Fault automatic reset times                                 | 0 ~ 20                    | 0               | ☆            |
| PC.09                                | Fault DO action selection when fault automatic reset period | 0: on action<br>1: action | 0               | ☆            |
| PC.10                                | Interval time of fault automatic reset                      | 0.1s ~ 100.0s             | 1.0s            | ☆            |
| PC.11                                | Input power phase missing protection                        | 0: disable 1: enable      | 1               | ★            |
| PC.12                                | Output power phase missing protection                       | 0: disable 1: enable      | 1               |              |

| Function code | Name   | Setting range  | Factory setting | modification |
|---------------|--|--|-----------------|--------------|
| PC.13         | The 1 <sup>st</sup> fault type               | 0: no fault<br>1: over current on acceleration (E001)<br>2: over current on deceleration (E002)<br>3: over current on fixed speed (E003)<br>4: over voltage on acceleration (E004)<br>5: over voltage on deceleration (E005)   | -               | •            |
| PC.14         | The 2 <sup>nd</sup> fault type               | 6: over voltage on fixed speed (E006)  | -               | •            |
| PC.15         | The 3 <sup>rd</sup> ( latest one) fault type | 7: control power fault (E007)<br>8: under voltage fault (E008)<br>9: AC Drive unit fault (E009)<br>10: input power phase missing (E010)<br>11: output power phase missing (E011)<br>12: motor to ground short circuit fault (E012)<br>13: reserve<br>14: AC Drive overload (E014)<br>15: motor overload (E015)<br>16: module overheat (E016)<br>17: parameters write/read abnormal (E017)<br>18: external fault (E018)<br>19: running time arrival (E019)<br>20: power on time arrival (E020)<br>21: current detect fault (E021)<br>22: motor over temperature (E022)<br>23: contactor abnormal (E023)<br>24: communication fault (E024) | -               | •            |



| Function code | Name  | Setting range   | Factory setting | modification |
|---------------|---|---|-----------------|--------------|
|               |   | 25: encoder /PG fault (E025)<br>26: motor auto tuning fault (E026)<br>27: initial position fault (E027)<br>28: hardware over current protection (E028)<br>29: motor over speed (E029)<br>30: speed deviation is big (E030)<br>31: reserve |                 |              |
| PC.16         | Running frequency on the 3 <sup>rd</sup> fault                | -   | -               | ●            |
| PC.17         | Current on the 3 <sup>rd</sup> fault                          | -   | -               | ●            |
| PC.18         | DC bus voltage on 3 <sup>rd</sup> fault                       | -   | -               | ●            |
| PC.19         | Input terminal status on 3 <sup>rd</sup> fault                | -   | -               | ●            |
| PC.20         | Output terminal status on 3 <sup>rd</sup> fault               | -   | -               | ●            |
| PC.21         | Frequency AC Drive status on 3 <sup>rd</sup> fault            | -   | -               | ●            |
| PC.22         | Time of the 3 <sup>rd</sup> fault (Timing from current time)  | -   | -               | ●            |
| PC.23         | Time of the 3 <sup>rd</sup> fault (timing from start running) | -   | -               | ●            |
| PC.24         | Running frequency on the 2 <sup>nd</sup> fault                | -   | -               | ●            |
| PC.25         | Current on the 2 <sup>nd</sup> fault                          | -   | -               | ●            |
| PC.26         | DC bus voltage on 2 <sup>nd</sup> fault                       | -   | -               | ●            |
| PC.27         | Input terminal status on 2 <sup>nd</sup> fault                | -   | -               | ●            |
| PC.28         | Output terminal status on 2 <sup>nd</sup> fault               | -   | -               | ●            |
| PC.29         | Frequency AC Drive status on 2 <sup>nd</sup> fault            | -   | -               | ●            |
| PC.30         | Time of the 2 <sup>nd</sup> fault                             | -   | -               | ●            |

| Function code | Name  | Setting range  | Factory setting | modification |
|---------------|---|--|-----------------|--------------|
|               | ( Timing from current time )                                      |  |                 |              |
| PC.31         | Time of the 2 <sup>nd</sup> fault<br>( timing from start running) | -  | -               | ●            |
| PC.32         | Running frequency on the 1 <sup>st</sup> fault                    | -  | -               | ●            |
| PC.33         | Current on the 1 <sup>st</sup> fault                              | -  | -               | ●            |
| PC.34         | DC bus voltage on 1 <sup>st</sup> fault                           | -  | -               | ●            |
| PC.35         | Input terminal status on 1 <sup>st</sup> fault                    | -  | -               | ●            |
| PC.36         | Output terminal status on 1 <sup>st</sup> fault                   | -  | -               | ●            |
| PC.37         | Frequency AC Drive status on 1 <sup>st</sup> fault                | -  | -               | ●            |
| PC.38         | Time of the 1 <sup>st</sup> fault<br>( Timing from current time ) | -  | -               | ●            |
| PC.39         | Time of the 1 <sup>st</sup> fault<br>( timing from start running) | -  | -               | ●            |
| PC.45         | Action selection at instantaneous power failure                   | 0: Invalid<br>1: Decelerate<br>2: Decelerate to stop |                 |              |
| PC.46         | Action pause judging voltage at instantaneous power failure       | PC.48 ~ 100.0%                                       |                 |              |
| PC.47         | Voltage rise again judging time at instantaneous power failure    | 0.0 ~ 100.0S   |                 |              |
| PC.48         | Action judging voltage at instantaneous power failure             | 60.0% ~ 100.0%                                       | 80.0%           | ☆            |
| PC.49         | Protection of load loss   | 0:Disable    1: Enable                               | 0               | ☆            |
| PC.50         | Detection level of load loss                                      | 0.0 ~ 100.0%   | 10.0%           | ☆            |

| Function code                            | Name   | Setting range  | Factory setting | modification |
|--|--|--|-----------------|--------------|
| PC.51                                    | Detection time of load Loss                  | 0.0 ~ 60.0S  | 0.0             | ☆            |
| PC.52                                    | Over-speed detection value                   | 0.0 ~ 50.0% (P0.04 value)  | 20.0%           | ☆            |
| PC.53                                    | Over-speed detection time                    | 0.0 ~ 60.0S  | 5.0S            | ☆            |
| PC.54                                    | Detection value of too large speed deviation | 0.0 ~ 50.0% (P0.04 value)  | 20.0%           | ☆            |
| PC.55                                    | Detection time of too large speed deviation  | 0.0 ~ 60.0S  | 0.0S            | ☆            |
| PC.56                                    | Reserve                                      |  |                 |              |
| PC.57                                    | Motor temperature sensor type                | 0: No temperature sensor 1: PT100 2:PT1000   | 0               | ☆            |
| PC.58                                    | Motor overheat protection value              | 0.0°C ~ 200°C  | 110°C           | ☆            |
| PC.59                                    | Motor overheat pre-alarm value               | 0.0°C ~ 200°C  | 90°C            | ☆            |
| PC.60                                    | Reserve                                      |  |                 |              |
| PC.61                                    | Quick current limit                          | 0: Disable 1: Enable   | 1               | ☆            |
| PC.62                                    | Under voltage voltage setting                | 60.0 ~ 140.0%  | 100.0%          | ☆            |
|  |  |  |                 |              |
| <b>Pd communication parameters group</b> |  |  |                 |              |
| Pd.01                                    | Selection of communication Baud rate         | 1: 600BPS<br>2: 1200BPS<br>3: 2400BPS<br>4: 4800BPS<br>5: 9600BPS<br>6: 19200BPS<br>7: 38400BPS<br>8: 57600BPS<br>9: 115200BPS | 5               | ☆            |
| Pd.02                                    | Format of data                               | 0: No parity (8.N-2)<br>1: Even parity (8.E-1)<br>2: Odd parity (8.O-1)  | 0               | ☆            |

| Function code                             | Name   | Setting range  | Factory setting | modification |
|---|--|--|-----------------|--------------|
|   |  | 3: No parity (8.N-1)   |                 |              |
| Pd.03                                     | Local address                                  | 1 ~ 247; 0 take as for Broadcast address   | 1               | ☆            |
| Pd.04                                     | Response delay                                 | 0ms ~ 20ms   | 2               | ☆            |
| Pd.05                                     | Communication timeout                          | 0.0 (invalid) ; 0.1s ~ 60.0s   | 0.0             | ☆            |
| Pd.06                                     | Data transfer format selection                 | 0: non standard MODBUS Protocol<br>1: standard MODBUS Protocol   | 1               | ☆            |
| <b>PE A Advanced parameters group</b>     |  |  |                 |              |
| PF.14                                     | Accumulative total power on time reach setting | 0.0 ~ 65535h   | 0               | ★            |
| PF.15                                     | Accumulative total running time reach setting  | 0.0 ~ 65535h   | 0               | ★            |
| PF.16                                     | Speed tracking function selection              | 0:Disable 1: Enable  | 0               | ★            |
| PF.17                                     | Speed tracking mode                            | 0: Start tracking with stop frequency tracking, 1: Zero speed, 2: maximum frequency  | 0               | ★            |
| PF.18                                     | Speed tracking speed ratio                     | 1 ~ 100  | 20              | ★            |
|   |  |  |                 |              |
| <b>H0 Torque control parameters group</b> |  |  |                 |              |
| H0.00                                     | Torque control mode                            | 0: disable ; 1: enable   | 0               | ★            |
| H0.01                                     | Torque reference selection                     | 0: digital of keypad reference (H0,03)<br>The maximum range corresponding torque upper limit ( H0.03)<br>1: analog AI1 reference<br>2: analog AI2 reference<br>3: potentiometer of keypad<br>4: PULSE trains reference<br>5: communication<br>6: minimum between of (AI1,AI2)<br>7: maximum between of (AI1,AI2) | 0               | ★            |
| H0.03                                     | torque reference by digital                    | -200.0% ~ 200.0%   | 150.0%          | ☆            |

| Function code  | Name   | Setting range              | Factory setting | modification |
|--|--|----------------------------|-----------------|--------------|
|  | set  |                            |                 |              |
| H0.05  | Maximum frequency in forward under torque control  | 0.00Hz ~ maximum frequency | 50.00Hz         | ☆            |
| H0.06  | Maximum frequency in reverse under torque control  | 0.00Hz ~ maximum frequency | 50.00Hz         | ☆            |
| H0.07  | Acceleration time of torque control                | 0.00s ~ 65000s             | 0.00s           | ☆            |
| H0.08  | Deceleration time of torque control                | 0.00s ~ 65000s             | 0.00s           | ☆            |
| <b>H3 Multiple points AI curve parameters group.</b> |  |                            |                 |              |
| H3.00  | AI curve 4 minimum input                           | -10.00V ~ H3.02            | 0.00V           | ☆            |
| H3.01  | AI curve 4 minimum input corresponding value       | -100.0% ~ +100.0%          | 0.0%            | ☆            |
| H3.02  | AI curve 4 break point 1 input                     | H3.00 ~ H3.04              | 3.00V           | ☆            |
| H3.03  | AI curve 4 break point 1 input corresponding value | -100.0% ~ +100.0%          | 30.00%          | ☆            |
| H3.04  | AI curve 4 break point 2 input                     | H3.02 ~ H3.06              | 6.00V           | ☆            |
| H3.05  | AI curve 4 break point 2 input corresponding value | -100.0% ~ +100.0%          | 60.00%          | ☆            |
| H3.06  | AI curve 4 maximum input                           | H3.04 ~ +10.00V            | 10.00V          | ☆            |
| H3.07  | AI curve 4 maximum input corresponding value       | -100.0% ~ +100.0%          | 100.0%          | ☆            |
| H3.08  | AI curve 5 minimum input                           | -10.00V ~ H3.10            | 0.00V           | ☆            |
| H3.09  | AI curve 5 minimum input corresponding value       | -100.0% ~ +100.0%          | 0.0%            | ☆            |
| H3.10  | AI curve 5 break point 1 input                     | H3.08 ~ H3.12              | 3.00V           | ☆            |

| Function code | Name   | Setting range     | Factory setting | modification |
|---------------|--|-------------------|-----------------|--------------|
| H3.11         | AI curve 5 break point 1 input corresponding value | -100.0% ~ +100.0% | 30.00%          | ☆            |
| H3.12         | AI curve 5 break point 2 input                     | H3.10 ~ H3.14     | 6.00V           | ☆            |
| H3.13         | AI curve 5 break point 2 input corresponding value | -100.0% ~ +100.0% | 60.00%          | ☆            |
| H3.14         | AI curve 5 maximum input                           | H3.12 ~ +10.00V   | 10.00V          | ☆            |
| H3.15         | AI curve 5 maximum input corresponding value       | -100.0% ~ +100.0% | 100.0%          | ☆            |

The function code describes as following:

“☆”: Stands for parameters can be modify during frequency running and stop status.

“★”: Stands for parameters can't be modify on running status.

“●”: Stands for parameters can't modify in any conditions, only for reference.

## Charter 6. Function parameters description

### P0. Basic parameters:

|       |  |   |   |   |
|-------|--|---|---|---|
| P0.00 | The 1 <sup>st</sup> motor control mode |   | Factory setting                               | 0 |
|       | Setting range                          | 0 | Open loop sensorless vector control           |   |
|       |  | 1 | V/F control                                   |   |
|       |  | 2 | Close loop sensor vector control with PG card |   |

#### 0: Open loop sensorless vector control:

Open loop sensorless vector control mode suits for high performance general purpose application without encoder, such as machine, centrifugal machine, drawbench, injection mold machine, etc. one AC drive only allow to service one motor.

#### 1: V/F control

No need install encoder, good compatibility and stable running. Suits for the applications, which no high request for loads, and one drive for more than one motors, and motor auto-tuning cannot be performed or the motor's parameters can be acquired through other methods, such as fans, pumps load.

#### 2: Close loop sensor vector control

That is vector control running mode with speed sensor, which is mainly used in the cases such as high accuracy speed control, torque control and simple servo control which have high requirements for control performance. When the control mode is selected, generally, PG should be installed on the motor's terminal, and the PG's parameters should be set up correctly. For the setup and adjustment of the PG's parameters, refer to the explanation of P2 parameters group.

Note:

1. Before running in the vector control mode for the first time, activate motor auto-tuning to get the correct motor parameters. After that, the motor parameters will be stored in the control panel for later use.
2. Correctly set the parameter of the speed regulator to ensure good static and dynamic control performance. See the description of P2 parameter group for related instructions.
3. When in the feedback vector control mode, one AC Drive can drive only one motor. Besides, the AC Drive and motor capacity should be close to each other. The AC Drive power can be two grades bigger or one grade smaller than the motor, otherwise its control performance may decrease, and the driving system may fail.

4. Using the vector control with PG requires the PG parameters in P2 group be set correctly.

|       |                           |   |                             |   |
|-------|---------------------------|---|-----------------------------|---|
| P0.01 | Running command reference |   | Factory setting             | 0 |
|       | Setting range             | 0 | 0: Keypad (operation panel) |   |
|       |                           | 1 | 1: External terminals       |   |
|       |                           | 2 | 2: RS485 communication      |   |

Selects AC Drive running command input channel,

The AC Drive control command includes starting, stop, forward, reverse, jog function.

**0: Keypad (operation panel);** the running command is controlled by RUN, STOP, JOG( through P7.04) by keypad.



**1: External terminals** The running command controlled by multiple function terminals. It can achieved to forward, reverse, Jog, reverse running with two lines or three lines control, see P0.18, P5.00 ~ 5.04 function code in detail.



#### **2: communication command**



The running command is given by communication, see the communication protocol Pd group description.

|       |  |   |                 |   |
|-------|--|---|-----------------|---|
| P0.02 | Memory of digital setting frequency upon power failure |   | Factory setting | 1 |
|       | Setting range  | 0 | Not memorize    |   |
|       |  | 1 | memorize        |   |

This function only valid for the frequency source is selected by digital control. That is P0.03 set for 0 or 1.

**No memorize means** that the digital frequency reference will be restore to the value of P0.07, and frequency modification value ,  of keypad are rested ( set to 0) after frequency stop power fail.

**Memorize means** that the digital frequency is kept on the setting of last time AC Drive on stop mode, and the frequency modification of ,  is keeping as well.

When using the external terminals to control frequency up and down, the terminals UP and DW function as same as ,  of keypad. ( When two terminals of P5.00-P5.04 is setting for 9 UP and 10 DW).



|       |                         |   |  |   |
|-------|-------------------------|---|--|---|
| P0.03 | Main frequency source X |   | Factory setting  | 1 |
|       | Setting range           | 0 | keypad digital frequency setting, not memorized after power failure        |   |
|       |                         | 1 | keypad digital frequency setting, memorized frequency after power failure. |   |







|  |  |   |                                  |
|--|--|---|----------------------------------|
|  |  | 2 | Analog AI1 (-10v-10v)            |
|  |  | 3 | Analog AI2 (0-10v/4-20mA )       |
|  |  | 4 | Keypad potentiometer             |
|  |  | 5 | PULSE trains frequency reference |
|  |  | 6 | simple PLC                       |
|  |  | 7 | multi- step reference            |
|  |  | 8 | Process-PID                      |
|  |  | 9 | communication                    |

There are 10 kinds of main frequency reference source channel.

0: keypad digital frequency setting, not memorized after power failure

The frequency set by P0.07, and can be changed by ,  keys of keypad ( or UP/DOWN of multi-function terminals.) But when the frequency setting will be restore to P0.07 preset frequency value after AC Drive stop power fail.

1: keypad digital frequency setting, memorized frequency after power failure.

The frequency set by P0.07, and can be changed by ,  keys of keypad ( or UP/DOWN of multi-function terminals. ) The frequency reference will be kept on the value of last time AC Drive stop mode, and it can be changed by ,  keys of keypad ( or UP/DOWN of multi-function terminals.)

Note: P0.02 is used for the parameters memorizing selecting of digital frequency setting in stop mode. The frequency changed value if memorized or reset for 0 when AC Drive on stop mode.

2: Analog AI1, -10V to 10V voltage input, the direction of motor will be place on reverse when signal is negative. The default setting is 0-10V.

3: Analog AI2, 0 ~ 10V/4 ~ 20mA, if voltage signal or current signal are decided by PI slide switch of controller board. The default setting is voltage signal.

4: potentiometer of keypad. Used it to adjust the frequency directly.

Note: Because the potentiometer of keypad is easy damage parts, it will be damaged easily when it rotated frequently. Advice user don't used this potentiometer for a long term.

When connecting external potentiometer, too long cable will cause big voltage drop and cause speed accurate.

J1-350's keypad can't dismantled, if need external connecting should buy independent, and also need change the position of P3.

5: Pulse trains frequency (X5)

Frequency reference set by X5 high speed pulse trains.

The specification of this signal as following: 9V ~ 30V of voltage, frequency range is 0KHz ~ 100KHz, and only valid when connecting from X5 multiple input terminal. And the same time P5.04 should be set for 21.

## 6: simple PLC

When the frequency source set as simple PLC, the AC Drive can runs with any frequency reference of 1-16 multi-step frequency, and the respective running time, acceleration, deceleration also can be set independently, see PA parameters group in detail.

## 7: Multi-step frequency

The difference corresponding frequency must be set by digital combination of X terminals when selecting multi-step frequency running. AD series AC Drive can set 16 multi-steps frequency through 4 digital

multi-step terminals. ( terminals function 12 ~ 15).

The P5 group parameters should be set accordingly when digital input set as for multi-step frequency terminals function. see the P5 group associative function parameters description in detail.

## 8: Process PID

Select process PID control output as running frequency. in general, it used in process close loop control on site, such as constant pressure, constant temperature, constant tension control, which need make feedback value to fit target value in basically.

## 9: communication

The frequency set by communication, This series configure with standard Modbus RTU communication.

See the appendix of communication protocol A in detail, or contact Euronorm Drive Systems directly.

|       |                   |                     |         |
|-------|-------------------|---------------------|---------|
| P0.04 | Maximum frequency | Factory setting     | 50.00Hz |
|       | Setting range     | 50.00Hz ~ 4000.00Hz |         |

Used to set frequency maximum output frequency. In general case, the value is set as rated of motor frequency. if this value is higher than rated motor frequency, please take consider to wearing of motor bearing, and mechanical vibration. For variable frequency motor, spindle motor case, the setting is set according to actual working conditions.

When analog input, pulse trains input, multi-step frequency is set for frequency source, the respective 100% is relative to P0.04.

In V/F control mode, the maximum frequency can be set up to 4000Hz.

|       |                       |   |         |
|-------|-----------------------|---|---------|
| P0.05 | Upper limit frequency | Factory setting                                     | 50.00Hz |
|       | Setting range         | Lower limit frequency P0.06 ~ upper limit frequency |         |

The upper limit frequency of output frequency of AC Drive. This value setting is less than or equal to maximum frequency. Setting range P0.06 ~ P0.04

|       |                       |                                      |        |
|-------|-----------------------|--------------------------------------|--------|
| P0.06 | Lower limit frequency | Factory setting                      | 0.00Hz |
|       | Setting range         | 0.00Hz ~ Upper limit frequency P0.05 |        |

The lower limit frequency of AC Drive output frequency.

AC Drive can be stop, runs with less frequency or 0 speed when the running frequency less than this value.

Which running mode will be apply depends on P8.29 ( running mode when frequency reference lower than lower limit frequency ) setting.

|       |                             |                                |         |
|-------|-----------------------------|--------------------------------|---------|
| P0.07 | Digital frequency reference | Factory setting                | 50.00Hz |
|       | Setting range               | 0.00 ~ maximum frequency P0.04 |         |

When the frequency source set as digital reference or terminals UP/DOWN, this function code can be set as initial frequency of AC Drive by digital setting.

|       |                     |                 |                  |
|-------|---------------------|-----------------|------------------|
| P0.08 | Acceleration time 1 | Factory setting | Per machine mode |
|       | Setting range       | 0.0s ~ 6500.0s  |                  |
| P0.09 | Deceleration time 1 | Factory setting | Per machine mode |
|       | Setting range       | 0.0s ~ 6500.0s  |                  |

The acc time means the time during which the AC Drive output from zero frequency to the maximum output frequency ( P0.04), shown in t1 of 6-1, the

Dec time means the time during which the AC Drive outputs from the lowest output frequency to zero frequency shown in Figure 6-1 as T2.

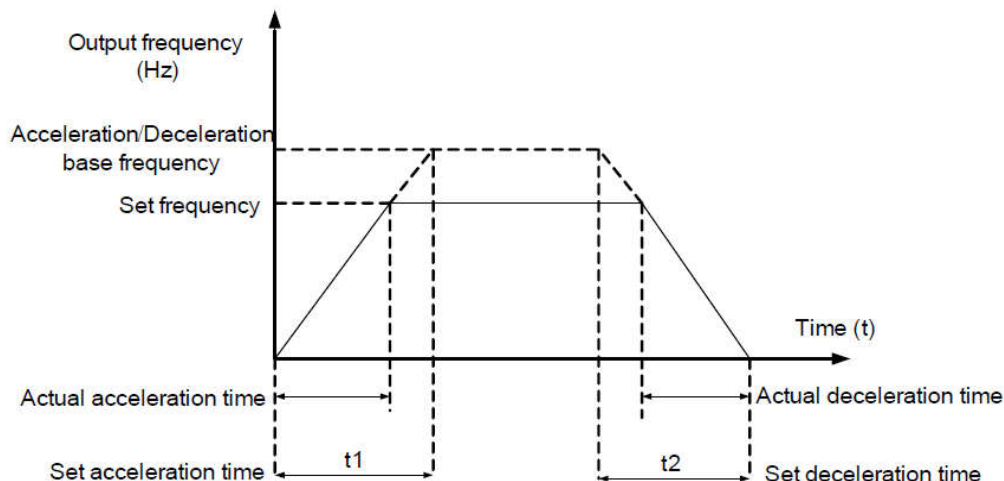


Figure 6-1 acceleration/ deceleration time

AD series provide 4 groups deceleration, acceleration time. user can use digit input terminals to select.

The 4 groups function code as following:

The first group: P0.08, P0.09;

The second group: P8.03, P8.04;

The third group: P8.05, P8.06;

The fourth group: P8.07, P8.08;

The difference acceleration, deceleration time if need, must set by multi-function terminals switching, to achieve 4 groups accel/ decel function, the default setting is the first decel./decel. time.

In some case

In some cases, the actual acceleration, deceleration time is much larger than setting of acceleration, deceleration time, possibility the effect of over current stall, and over voltage stall function cause by too heavy load or too big inertia.

|       |                    |                 |         |
|-------|--------------------|-----------------|---------|
| P0.10 | Rotation direction | Factory setting | 0       |
|       | Setting range      | 0               | forward |
|       |                    | 1               | Reverse |

Possible to change motor rotation direction via this parameters setting, no need change motor wiring. The function as same as changing the every two wires order of U, W, V to modify the director of motor.

But the director will be recover to the original status after AC Drive parameters initialization.

|       |                   |                  |           |
|-------|-------------------|------------------|-----------|
| P0.11 | Carrier frequency | Factory setting  | per model |
|       | Setting range     | 0.5kHz ~ 16.0kHz |           |

This function use to adjust carrier frequency. the motor noise can be adjust via carrier frequency changing, to avoid the point of resonance of mechanical system, and to reduce the interference generated by AC Drive, and reduce leakage current.

When the carrier frequency is low, the output ultraharmonics of current will be increase, and motor loss and temperature will be increase as well.

When the carrier frequency is high, the motor loss and temperature will be reduce, but the loss, temperature and interference of AC Drive will be increase.

It will generate following effect when carrier frequency adjusting.

|                                 |              |
|---------------------------------|--------------|
| carrier frequency value         | low→ high    |
| Motor noise                     | Large→ small |
| Output current waveform         | Bad→ Good    |
| Motor temperature rise          | High→ Low    |
| AC drive temperature rise       | Low→ high    |
| Leakage current                 | small→ large |
| External radiation interference | small→ large |

The factory setting of carrier frequency varies with the AC drive power. If you need to modify the carrier frequency, note that if the set carrier frequency is higher than factory setting, it will lead to an increase in temperature rise of the AC drive's heatsink. In this case, you need to de-rate the AC drive. Otherwise, the AC drive may overheat and alarm. When the setting is above the factory setting, the AC Drive should derated using for 20% when carrier frequency increasing 1KHz.

|       |   |                 |   |
|-------|---|-----------------|---|
| P0.12 | Carrier frequency adjust with temperature | Factory setting | 0 |
|       | Setting range                             | 0: no; 1: yes   |   |

It is used to set whether the carrier frequency is adjusted based on the temperature. The AC Drive automatically reduces the carrier frequency when detecting that the heat sink temperature is high. The AC drive resumes the carrier frequency to the set value when the heat sink temperature becomes normal. This function reduces the overheat alarms.

|       |                             |    |   |   |
|-------|-----------------------------|----|---|---|
| P0.13 | Parameters restore settings |    | Factory setting                                     | 0 |
|       | Setting range               | 0  | 0: No operation                                     |   |
|       |                             | 1  | 1: Restore factory settings except motor parameters |   |
|       |                             | 12 | 12: Clear records                                   |   |

1: Restore default settings except motor parameters



When P0.13 set for 1, most function codes are restored to the default settings except motor parameters, fault records.

12. Clear fault record If P0.13 set to 12, the fault records will be clear and then it will reset to 0 after setting.

|       |  |   |  |   |
|-------|--|---|--|---|
| P0.14 | Auxiliary frequency source Y selection |   | Factory setting  | 0 |
|       | Setting range                          | 0 | keypad digital frequency setting, not memorize after power failure         |   |
|       |  | 1 | keypad digital frequency setting, memorized frequency after power failure. |   |
|       |  | 2 | Analog AI1 (-10v-10v)  |   |
|       |  | 3 | Analog AI2 (0-10v/4-20mA)  |   |
|       |  | 4 | Keypad potentiometer   |   |
|       |  | 5 | PULSE trains frequency reference (X5)                                      |   |
|       |  | 6 | simple PLC   |   |
|       |  | 7 | multi- step reference  |   |
|       |  | 8 | Process-PID  |   |
|       |  | 9 | 9: communication   |   |

When used as an independent frequency input channel, the auxiliary frequency source is used in the same way as the main frequency source (refer to P-03). The using method refer to P0.03 description.

When the auxiliary frequency source as for frequency combination reference. ( it means frequency reference depend on combination of main and auxiliary frequency source).

Note: 1. When the auxiliary frequency source is selected by digital, the digital frequency (P0.07) is disable, the user can adjust frequency directly base on given frequency by UP  and  DOWN of keypad or UP and DOWN of multiple function terminals ).

2. When auxiliary frequency is selected by AI1, AI2, potentiometer of keypad or pulse trains, 100% of the input corresponds to the range of the auxiliary frequency can be set by P0.15 and P0.16.

3. If the auxiliary frequency source is pulse setting, it is similar to analog input

4. The main frequency source and auxiliary frequency source must not use the same channel.

That is, P0-03 and P0-14 cannot be set to the same value.

|       |   |   |  |   |
|-------|---|---|--|---|
| P0.15 | Range of auxiliary frequency source selection when superimposed |   | Factory setting                                    | 0 |
|       | Setting range   | 0 | 0: Respect to the maximum frequency (P0.04)        |   |
|       |   | 1 | Respect to main frequency source reference (P0.03) |   |
| P0.16 | Range of auxiliary frequency source selection when operation    |   | Factory setting                                    | 0 |
|       | Setting range   |   | 0% ~ 150%  |   |

When the frequency source is selected for frequency combination, both parameters used to define the range of auxiliary frequency source. P0.15 used to select the object of selection, it can be select maximum frequency or main frequency source. When select to main frequency, the range of auxiliary frequency will vary with main frequency changing.

|       |   |              |   |   |
|-------|---|--------------|---|---|
| P0.17 | frequency source selection when operation |              | Factory setting.  | 0 |
|       | Setting range                             | Unit's digit | Frequency source selection  |   |
|       |   | 0            | Main frequency source X   |   |
|       |   | 1            | 1: X and Y operation (operation relationship determined by ten's digit) |   |
|       |   | 2            | Switchover between X and Y  |   |
|       |   | 3            | Switchover between X and "X and Y operation"                            |   |
|       |   | 4            | 4: Switchover between Y and "X  |   |

|  |  |            |  |
|--|--|------------|--|
|  |  |            | and Y operation"                             |
|  |  | Ten digits | Ten's digit (X and Y operation relationship) |
|  |  | 0          | X+Y  |
|  |  | 1          | X-Y  |
|  |  | 2          | Maximum ( X, Y)                              |
|  |  | 3          | Min (X, Y)                                   |

Select the frequency reference source through parameters setting. The frequency reference select by operation between main frequency source X and auxiliary frequency source Y.

Unit digit: frequency source selection

0: Main frequency source X, take the main frequency source X for target frequency

1: Operation result of main X and auxiliary Y frequency source.

Take the operation result as target frequency, the operation relationship decide by ten unit setting.

2: Switchover between main frequency source X and auxiliary frequency source Y.

When input multi-function terminals function 20 ( frequency switchover) is disable, main frequency X will be take for target frequency.

When input multi-function terminals function 20 ( frequency switchover) is enable, the auxiliary frequency Y will be take for target frequency.

3. Switchover between main frequency source X and operation of main frequency source X and auxiliary frequency Y.

When input multi-function terminals function 20 ( frequency switchover) is disable, main frequency X will be take for target frequency.

When input multi-function terminals function 20 ( frequency switchover) is enable, the operation of X and Y will be take for target frequency.

4. Switchover between auxiliary frequency source Y and operation of main frequency source X and auxiliary frequency Y.

When input multi-function terminals function 20 ( frequency switchover) is disable, auxiliary frequency Y will be take for target frequency.

When input multi-function terminals function 20 ( frequency switchover) is enable, the operation of X and Y will be take for target frequency.

Ten digit: the relationship of frequency source operation of X and Y

0: Main frequency source X+ Auxiliary frequency source Y

The addition of X and Y serve as for the target frequency to realize frequency superposition reference.

1: main frequency source X – auxiliary frequency source Y

Main frequency X minus the auxiliary frequency Y as the target frequency

2: MAX (main frequency source X, auxiliary frequency source Y)

Take the maximum absolute value of main frequency X and auxiliary frequency Y as the target frequency.

3. MIN (main frequency source X, auxiliary frequency source Y)

Take the minimum absolute value of main frequency X and auxiliary frequency Y as the target frequency.

In addition, when set the operation of main X and auxiliary Y frequency as for frequency source reference, user can set the offset frequency through P8.20 parameter, do superposition base on result operation of main X and auxiliary to meet various of requirement.

|       |                                |   |                   |   |
|-------|--------------------------------|---|-------------------|---|
| P0.18 | Running terminals command mode |   | Factory setting   | 0 |
|       | Setting range                  | 0 | Two-line mode 1   |   |
|       |                                | 1 | Two-line mode 2   |   |
|       |                                | 2 | Three-line mode 1 |   |
|       |                                | 3 | Three-line mode 2 |   |

This parameter defines 4 kinds difference control mode of AC Drive by external terminals.

Note: For convenience of explanation, takes any 3 terminals function of X1、X2、X3 from X1 ~ X5 multi-function terminals for showing. Refer to P5.00 ~ P5.04 to get description in detail.

0: Two-line mode 1:

This is most common using two lines control mode. The motor forward and reverse running decide by terminals X1 and X2. See function code setting as following:

| Function code | Name                            | Setting value | Function description |
|---------------|---------------------------------|---------------|----------------------|
| P0.18         | terminal command mode           | 0             | Two line 1           |
| P5.00         | X1 terminals function selection | 1             | Forward run (FWD)    |
| P5.01         | X2 terminals function selection | 2             | Reverse run (REV)    |

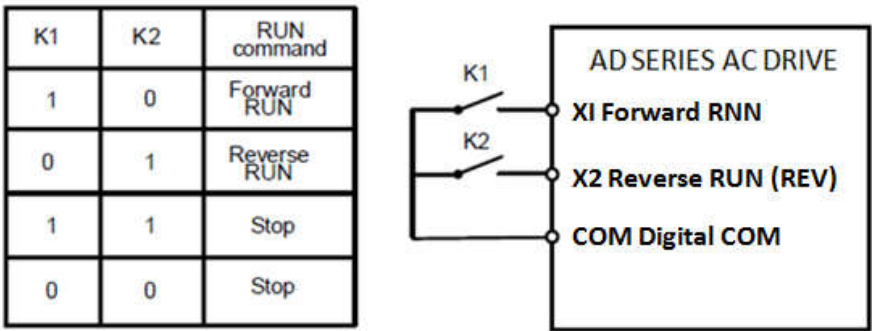


Fig. 602 tow line mode 1



As shown in the preceding figure, when only K1 is ON, the AC Drive instructs forward rotation. When only K2 is ON, the AC Drive instructs reverse rotation. When K1 and K2 are ON or OFF simultaneously, the AC Drive stop.

1: Two line mode 2:

In this mode, X1 is RUN enabled terminal, and X2 determines the running direction.

The parameters are set as below:

| Function code | Name                            | Value | Function Description         |
|---------------|---------------------------------|-------|------------------------------|
| P0.18         | Terminal command mode           | 1     | Two line 2                   |
| P5.00         | X1 terminals function selection | 1     | RUN enabled                  |
| P5.01         | X2 terminals function selection | 2     | Forward or reverse direction |

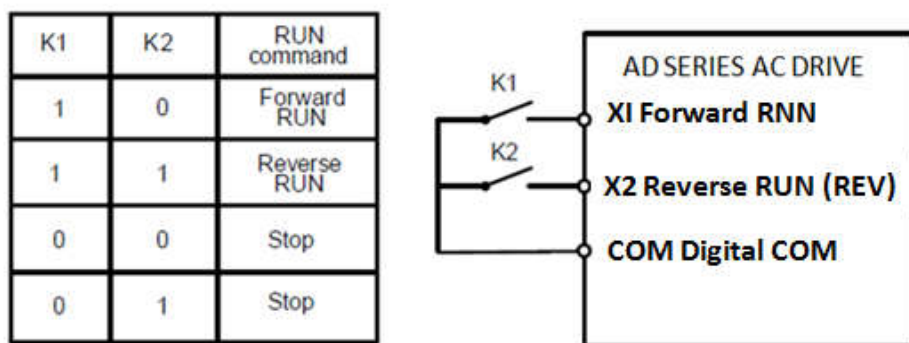


Fig. 6-3 two line mode 2

As shown in the preceding figure, if K1 is ON, the AC Drive instructs forward rotation when K2 is OFF, and instructs reverse rotation when K2 is ON. If K1 is OFF, the AC Drive stops.

2: 3 line control mode 1:

In this mode, X3 is RUN enabled terminal, and the direction is decided by X1 and X2.

The parameters are set as below:

| Function code | Name                            | Value | Function description |
|---------------|---------------------------------|-------|----------------------|
| P0.18         | Terminal command mode           | 2     | 3 lines mode 1       |
| P5.00         | X1 terminals function selection | 1     | Forward run (FWD)    |
| P5.01         | X2 terminals function selection | 2     | Reverse run (REV)    |
| P5.02         | X3 terminals function selection | 3     | Three-line control   |

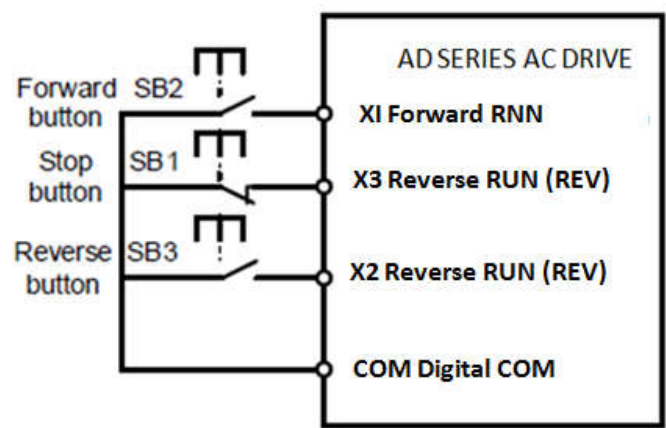


Fig 6-4 3 lines mode 1 ( normal close for starting)

As shown in the preceding figure, if SB1 is ON, the AC drive instructs forward rotation when SB2 is pressed to be ON and instructs reverse rotation when SB3 is pressed to be ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions on SB1, SB2 and SB3. And SB2 and SB3 button take effect once on close action edge.

Note: the above description is 3 lines normal close mode. In some application case, especial start and stop control in multiple positions. If the stop button place on normal close state. It will bring some wiring trouble.

In this matter, through P5.36=00100 setting can achieve normal open start.

Press SB2 button AC Drive will run in forward, press SB2 the AC Drive runs in reverse, press SB1 AC Drive will stop.

Please see below picture.

| Function code | Name                                       | Value | Function description          |
|---------------|--|-------|-------------------------------|
| P0.18         | Terminal command mode                      | 2     | 3 lines mode 1                |
| P5.00         | X1 terminals function selection            | 1     | Forward run (FWD)             |
| P5.01         | X2 terminals function selection            | 2     | Reverse run (REV)             |
| P5.02         | X3 terminals function selection            | 3     | 3 lines 1 control             |
| P5.36         | Input terminal Positive and negative logic | 00100 | X3 terminal normal open valid |

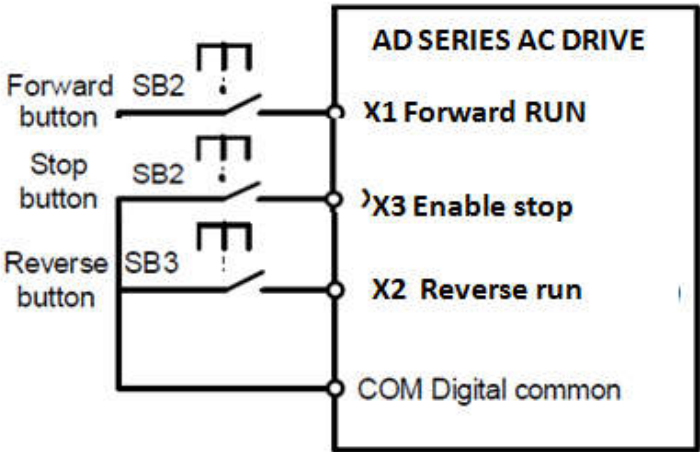


Fig. 65 3 line mode 1 ( normal open for starting)

3: 3 lines control mode 2:  
X3 is enable terminals in this mode, the running command given by X1, and rotate direction given by X2.  
The function code setting as following:

| Function code | Name                            | Value | Function description    |
|---------------|---------------------------------|-------|-------------------------|
| P0.18         | Terminal command mode           | 3     | 3 line mode 2           |
| P5.00         | X1 terminals function selection | 1     | Enable terminal         |
| P5.01         | X2 terminals function selection | 2     | Forward/reverse control |
| P5.02         | X3 terminals function selection | 3     | 3 line control          |
|               |                                 |       |                         |

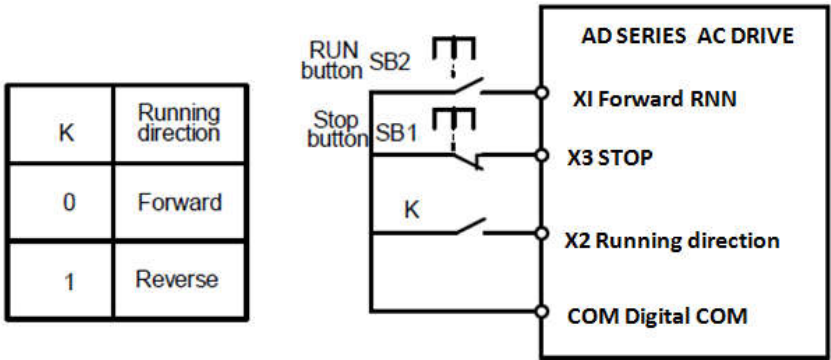


Fig 6-6 3 line mode 2

As shown in the preceding figure, if SB1 is ON, the AC drive starts running when SB2 is pressed to be ON; the AC drive instructs forward rotation when K is OFF and instructs reverse rotation when K is ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON, the SB1 button command take effect when close action edge.

### P1. Startup and stop group

|       |               |   |   |   |
|-------|---------------|---|---|---|
| P1.00 | Startup mode  |   | Factory setting                                       | 0 |
|       | Setting range | 0 | Direct start  |   |
|       |               | 1 | DC brake first and then start from starting frequency |   |
|       |               | 2 | reserve   |   |

0: Direct start

If the DC braking time is set for 0, the AC Drive start from starting frequency.

If the DC braking time is not 0, it will performance DC braking first, and then start from starting frequency.

1: braking first, and then start.

Perform DC braking P1.03, P1.04, and then start motor from starting frequency. it is suits for application, which load is not big, and motor starting might occurs in reverse.

|       |                                 |                  |        |
|-------|---------------------------------|------------------|--------|
| P1.01 | Starting frequency              | Factory setting  | 0.00Hz |
|       | Setting range                   | 0.00Hz ~ 10.00Hz |        |
| P1.02 | Starting frequency holding time | Factory setting  | 0.0s   |
|       | Setting range                   | 0.0s ~ 100.0s    |        |

In order to get enough motor torque, please set a appropriate starting frequency. it need place starting frequency for a holding time to help motor generate sufficient flux.

The start frequency don't limit by lower limit frequency P0.06. but the frequency reference below than starting frequency, AC Drive will not start and place standby states.

When the frequency reference large than starting frequency, motor will start with starting frequency.

The starting frequency is disable during switching between forward and reverse. The starting frequency also disable when carry out speed tracking.

|       |                            |               |      |
|-------|----------------------------|---------------|------|
| P1.03 | Startup DC braking current | factory set   | 0%   |
|       | Setting range              | 0% ~ 100%     |      |
| P1.04 | Startup DC braking time    | factory set   | 0.0s |
|       | Setting range              | 0.0s ~ 100.0s |      |

In generally, DC braking performance will stop motor completely first and then start. Pre-excite used for building the magnetic filed before the motor runs, to improve the response speed.

Starting DC braking only valid when startup mode set for direct start. At that time, AC Drive will performance DC braking with pre-set DC braking current first, and then to motor motor after DC braking holding time.

If the DC braking time is 0, start directly no DC braking. The bigger DC braking current, the larger braking torque.

The Dc braking current value setting is percent of rated current of AC Drive.

|       |               |             |                      |
|-------|---------------|-------------|----------------------|
| P1.05 | Stop mode     | Factory set | 0                    |
|       | Setting range | 0           | Deceleration to stop |
|       |               | 1           | Free stop            |

0: Decelerate to stop

After the stop command is enabled, the AC drive decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

1:Free stop.

After the stop command is enabled, the AC drive immediately stops the output. The motor will coast to stop (free stop ) based on the mechanical inertia.

|       |                                      |                    |        |
|-------|--------------------------------------|--------------------|--------|
| P1.06 | Initial frequency of stop DC braking | Factory set        | 0.00Hz |
|       | Setting range                        | 0.0 ~ maximumP0.04 |        |
| P1.07 | Waiting time of stop DC braking      | Factory set        | 0.0s   |
|       | Setting range                        | 0.0 ~ 100.0S       |        |
| P1.08 | Stop DC braking current              | Factory set        | 0%     |
|       | Setting range                        | 0% ~ 100%          |        |
| P1.09 | Stop DC braking time                 | Factory set        | 0.0s   |
|       | Setting range                        | 0.0 ~ 100.0S       |        |

P1.06 (Initial frequency of stop DC braking)

During the process of decelerating to stop, the AC drive starts DC braking when the running frequency is lower than the value set in P1.06.

P1.07 (Waiting time of stop DC braking)

When the running frequency decreases to the initial frequency of stop DC braking, the AC drive stops output for a certain period and then starts DC braking. This prevents faults such as over current caused due to DC braking at high speed.

P1.08 (Stop DC braking current)

This parameter specifies the output current at DC braking and is a percentage relative to the base value.

The bigger setting of this value, it larger DC braking capability can get, but will cause motor and AC Drive generating more heat, temperature is higher.

P1.09 (Stop DC braking time)

This parameter specifies the holding time of DC braking. If it is set to 0, DC braking is cancelled. The stop DC braking process is shown in the following figure.

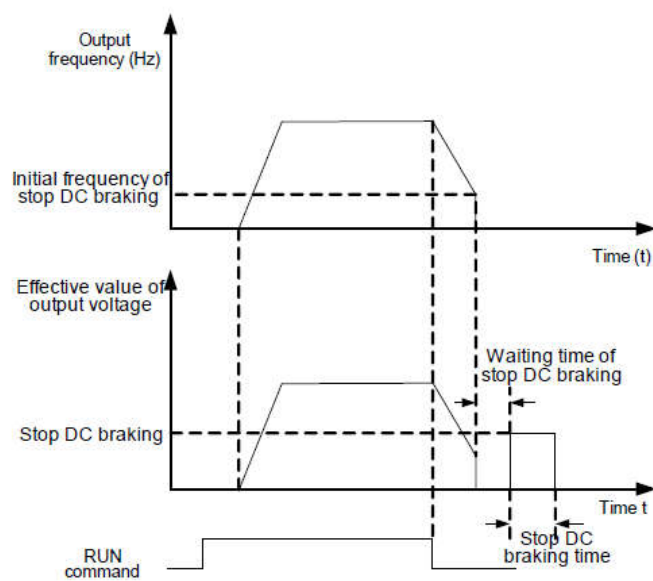


Fig 6-7 Stop DC braking process

|       |                 |             |      |
|-------|-----------------|-------------|------|
| P1.10 | Brake use ratio | Factory set | 100% |
|       | Set range       | 0% ~ 100%   |      |

It is valid only for the AC drive with internal braking unit and used to adjust the duty ratio of the braking unit. The larger the value of this parameter is, the better the braking result will be. However, too larger value causes great fluctuation of the AC drive bus voltage during the braking process.

|       |                   |   |                           |   |
|-------|-------------------|---|---------------------------|---|
| P1.11 | Inversion control |   | Factory setting           | 0 |
|       | Setting range     | 0 | Reverse runs is allowable |   |
|       |                   | 1 | reverse is forbidden      |   |

Please set this parameters to 1 for some application, which motor runs in reverse is forbidden.

|       |               |                 |      |
|-------|---------------|-----------------|------|
| P1.12 | Jog           | Factory setting | 5.00 |
|       | Setting range | 0.00 ~ P0.04    |      |

This parameters use to set frequency of AC Drive jog running. The acceleration and deceleration time of job can be set in P8.01 and P8.02.

## P2. Motor parameters group

P2 parameters group is motor vector control parameters group. AC Drive is sensitive to motor parameters in vector control mode. For the first time using, user should set motor parameters group according to the nameplate of motor.

When the same AC Drive used to serve for another motor, must need to set another motor parameters to AC Drive, otherwise AC Drive won't work properly.

| P2.00 | G/P type indicator |   | Factory setting                               | Per model |
|-------|--------------------|---|---|-----------|
|       | Setting range      | 0 | G type (constant load )                       |           |
|       |                    | 1 | P type (fan, pumps load variable torque load) |           |

0: For driving general purpose constant torque heavy load.

1: For driving fans pumps, etc variable torque light load

The power of P type mode for fans, pumps light load lower than G constant torque model one range.

Note: This value can't change after factory leaving.

For some fans pumps application, such as boost fans, deep well pump, which load is heavy. Select the AC Drive should according to the actual current.

| P2.01 | Motor type selection |   | Factory setting            | 0 |
|-------|----------------------|---|----------------------------|---|
|       | Setting range        | 0 | general asynchronous motor |   |
|       |                      | 1 | frequency AC Drive motor   |   |

The difference between general asynchronous and frequency AC Drive motor is heating dissipation.

The heat can't dissipated by external fans for asynchronous motor when low speed. When asynchronous motor runs in low speed in long timer, should derated power of AC drive.

| P2.02 | rated power     | Factory setting            | Per model |
|-------|-----------------|----------------------------|-----------|
|       | Setting range   | 0.1kW ~ 1000.0kW           |           |
| P2.03 | Rated frequency | Factory setting            | Per model |
|       | Setting range   | 0.01Hz ~ maximum frequency |           |
| P2.04 | Rated speed     | Factory setting            | Per model |
|       | Setting range   | 1rpm ~ 65535rpm            |           |
| P2.05 | Rated voltage   | Factory setting            | Per model |
|       | Setting range   | 1V ~ 2000V                 |           |
| P2.06 | Rated current   | Factory setting            | Per model |
|       | Setting range   | 0. 1 ~ 2000A               |           |

Set the above mentioned parameters according to the motor nameplate no matter whether V/F control vector control is adopted.

To achieve better V/F or vector control performance, motor auto-tuning is required. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters

|       |  |                   |           |
|-------|--|-------------------|-----------|
| P2.07 | Stator resistance<br>(asynchronous motor)              | Factory setting   | Per model |
|       | Setting range  | 0.001Ω ~ 65.535Ω  |           |
| P2.08 | Stator resistance<br>(asynchronous motor)              | Factory setting   | Per model |
|       | Setting range  | 0.001Ω ~ 65.535Ω  |           |
| P2.09 | Leakage inductive<br>reactance<br>(asynchronous motor) | Factory setting   | Per model |
|       | Setting range  | 0.01mH ~ 655.35mH |           |
| P2.10 | Mutual inductive<br>Reactance<br>(asynchronous motor)  | Factory setting   | Per model |
|       | Setting range  | 0.1mH ~ 6553.5mH  |           |
| P2.11 | No-load current<br>(asynchronous motor)                | Factory setting   | Per model |
|       | Setting range  | 0.01A ~ P2.06     |           |

P2.07 ~ P2.11 these parameters in generally can't find in nameplate of motor. Please perform motor auto tuning to get these parameters. only get P2.07 ~ P2.09 from static auto-tuning. Not only get these 5 parameters, but also can get encoder phase order, current loop PI parameters from performance motor rotating complete auto tuning.

The P2.07 ~ P2.11 parameters will be changed automatically when rated power of motor (P2.02) and rated voltage of motor (P2.05) changing,

If motor tuning can't performed well please consult motor manufacturer to get motor parameters correctly.

|       |   |                   |           |
|-------|---|-------------------|-----------|
| P2.12 | Stator resistance of<br>synchronous motor)  | Factory setting   | Per model |
|       | Setting range                               | 0.001Ω ~ 65.535Ω  |           |
| P2.13 | Shaft D inductance of<br>synchronous motor  | Factory setting   | Per model |
|       | Setting range                               | 0.01mH ~ 655.35mH |           |
| P2.14 | Shaft Q inductance of<br>(synchronous motor | Factory setting   | Per model |
|       | Setting range                               | 0.01mH ~ 655.35mH |           |
| P2.16 | Back EMF of<br>synchronous motor of         | Factory setting   | Per model |
|       | Setting range                               | 0.1V ~ 6553.5V    |           |

P2.12 ~ P2.16 are synchronous motor parameters. These parameters are unavailable on the nameplate of most synchronous motors and can be obtained by means of "Synchronous motor



no-load auto-tuning". Through "Synchronous motor with-load auto-tuning", only the encoder phase sequence and installation angle can be obtained.

Each time "Rated motor power" (P2.02) or "Rated motor voltage" (P2.05) is changed, the AC drive automatically modifies the values of P2.12 ~ P2.16.

You can also directly set the parameters based on the data provided by the synchronous motor manufacturer.

|       |                               |                 |      |
|-------|-------------------------------|-----------------|------|
| P2.17 | Encoder pulses per revolution | Factory setting | 1024 |
|       | Setting range                 | 1 ~ 65535       |      |

This parameter is used to set the pulses per revolution (PPR) of ABZ or UVW incremental encoder. In CLVC mode, the motor cannot run properly if this parameter is set incorrectly.

|       |               |   |                         |   |
|-------|---------------|---|-------------------------|---|
| P2.19 | Encoder type  |   | Factory setting         | 0 |
|       | Setting range | 0 | ABZ incremental encoder |   |
|       |               | 1 | Resolver                |   |
|       |               | 2 | Reserve                 |   |

AD800 can supports multiple types of encoder. Different PG cards are required for different types of encoder. Select the appropriate PG card for the encoder used. Any of the five encoder types is applicable to synchronous motor. Only ABZ incremental encoder and resolver are applicable to asynchronous motor.

After installation of the PG card is complete, set this parameter P2.19 and relative parameters properly based on the actual condition. Otherwise, the AC drive cannot run properly.

|       |   |   |                 |   |
|-------|---|---|-----------------|---|
| P2.21 | A/B phase sequence of ABZ incremental encoder |   | Factory setting | 0 |
|       | Setting range                                 | 0 | Forward         |   |
|       |   | 1 | Reserve         |   |

This parameter is valid only for ABZ incremental encoder (P2.19 = 0) and is used to set the A/B phase sequence of the ABZ incremental encoder.

It is valid for both asynchronous motor and synchronous motor. The A/B phase sequence can be obtained through "Asynchronous motor complete auto-tuning" or "Synchronous motor no-load auto-tuning".

|       |                            |                 |      |
|-------|----------------------------|-----------------|------|
| P2.22 | Encoder installation angle | Factory setting | 0.0° |
|       | Setting range              | 0.0° ~ 359.9°   |      |

This parameter is applicable only to synchronous motor. It is valid for ABZ incremental encoder, UVW incremental encoder, resolver and wire-saving UVW encoder, but invalid for SIN/COS encoder. It can be obtained through synchronous motor no-load auto-tuning or with-load auto-tuning.

After installation of the synchronous motor is complete, the value of this parameter must be obtained by motor auto-tuning. Otherwise, the motor cannot run properly.

|       |                           |                 |   |
|-------|---------------------------|-----------------|---|
| P2.23 | U, V, W phase sequence of | Factory setting | 0 |
|-------|---------------------------|-----------------|---|

|       |                          |   |                 |      |
|-------|--------------------------|---|-----------------|------|
|       | UVW encoder              |   |                 |      |
|       | Setting range            | 0 | Forward         |      |
|       |                          | 1 | Reserve         |      |
| P2.24 | UVW encoder angle offset |   | Factory setting | 0.0° |
|       | Setting range            |   | 0.0° ~ 359.9°   |      |

These two parameters are valid only when the U/V/W encoder is applied to a synchronous motor.

They can be obtained by synchronous motor no-load auto-tuning or with-load auto tuning.

After installation of the synchronous motor is complete, the values of these two parameters must be obtained by motor auto-tuning. Otherwise, the motor cannot run properly.

|       |                                  |  |                 |   |
|-------|----------------------------------|--|-----------------|---|
| P2.25 | Number of pole pairs of resolver |  | Factory setting | 1 |
|       | Setting range                    |  | 1 ~ 65535       |   |

If a resolver is applied, set the number of pole pairs properly.

|       |   |  |                                 |      |
|-------|---|--|---------------------------------|------|
| P2.26 | Encoder wire-break fault detection time |  | Factory setting                 | 0.0s |
|       | Setting range                           |  | 0.0s: operation<br>0.1s ~ 10.0s |      |

This parameter is used to set the time that a wire-break fault lasts. If it is set to 0.0s, the AC drive does not detect the encoder wire-break fault. If the duration of the encoder wire-break fault detected by the AC drive exceeds the time set in this parameter, the AC drive reports Err25.

|       |                       |    |   |   |
|-------|-----------------------|----|---|---|
| P2.27 | Auto-tuning selection |    | Factory setting                         | 0 |
|       | Setting range         | 0  | No auto-tuning                          |   |
|       |                       | 1  | Asynchronous motor static auto-tuning   |   |
|       |                       | 2  | Asynchronous motor complete auto-tuning |   |
|       |                       | 11 | Synchronous motor with-load auto-tuning |   |
|       |                       | 12 | Synchronous motor no-load auto-tuning   |   |

0: No auto-tuning    Auto-tuning is prohibited.

1: Asynchronous motor static auto-tuning

It is applicable to applications where complete auto-tuning cannot be performed because the asynchronous motor cannot be disconnected from the load.

Before performing static auto-tuning, properly set the motor type and motor nameplate parameters of P2.02 ~ P2.06 first. The AC drive will obtain parameters of P2.07 ~ P2.09 by static auto-tuning. Set this parameter to 1, and press RUN . Then, the AC drive starts static auto-tuning and display the frequency reference setting.

2: Asynchronous motor complete auto-tuning

To perform this type of auto-tuning, ensure that the motor is disconnected from the load. During the process of complete auto-tuning, the AC drive performs static auto-tuning first and then accelerates

to 80% of the rated motor frequency within the acceleration time set in P0.08. The AC drive keeps running for a certain period and then decelerates to stop within deceleration time set in P0.09.. Before performing complete auto-tuning, properly set the motor type, motor nameplate parameters of P2.02 ~ P2.06, when P0.00 set for 2 performance close loop vector control mode, also need set "Encoder type" (P2.18) and "Encoder pulses per revolution" (P2.19) first.

The AC drive will obtain motor parameters of P2.07 ~ P2.11, "A/B phase sequence of ABZ incremental encoder" (P2.21) and vector control current loop PI parameters of P3.11 ~ P3.14 by complete auto-tuning.

Note: if set this function code for 2, ( P0.01 must set for 0), when the AC Drive display LEATN and then press run button, AC Drive will performance auto tuning to stop .

It must check the P2.11 value after motor auto tuning, this value should be place within 1/3 ~ 1/2 of P2.06. if out of this range, please set it by manual.

#### 11: Synchronous motor with-load auto-tuning

It is applicable to scenarios where the synchronous motor cannot be disconnected from the load. During with-load auto-tuning, the motor rotates at the speed of 10 PRM.

Before performing with-load auto-tuning, properly set the motor type and motor nameplate parameters of P2.02 ~ P2.06 first.

By with-load auto-tuning, the AC drive obtains the initial position angle of the synchronous motor, which is a necessary prerequisite of the motor's normal running.

Before the first use of the synchronous motor after installation, motor a uto-tuning must be performed. Set this parameter to 11, and press RUN . Then, the AC drive starts with-load auto-tuning.

#### 12: Synchronous motor no-load auto-tuning

If the synchronous motor can be disconnected from the load, no-load auto-tuning is recommended, which will achieve better running performance compared with with-load auto-tuning.

During the process of no-load auto-tuning, the AC drive performs with-load auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in P0.08. The AC drive keeps running for a certain period and then decelerates to stop within the deceleration time set in P0.09.

Before performing no-load auto-tuning, properly set the motor type, motor nameplate parameters of P2.12 ~ P2.16, "Encoder type" (P2.19) and "Encoder pulses per revolution" (P2.18) and "Number of pole pairs of resolver" (P2.25) first.

The AC drive will obtain motor parameters of P2.12 ~ P2.16 encoder related parameters of P2.21, P2.22, P2.23, P2.24 and vector control current loop PI parameters of P3.11 ~ P3.14 by no-load auto-tuning.

Note: when this code set for 12, press the RUN button, AC Drive will perform no-load auto tuning.

Note: Auto tuning performance only in keypad mode, that is P0.01 set for 0. It can't performance auto tuning in terminals mode.

During the AC Drive auto tuning process, it will display LETTN, and running indicator LED will be flash, and then the running indicator LED will be turn off.

P3 .Motor Vector Control Parameters

Note: Group P3 is valid for vector control, and invalid for V/F control.

|       |                                |                                  |         |
|-------|--------------------------------|----------------------------------|---------|
| P3.00 | Speed loop proportional gain 1 | Factory setting                  | 30      |
|       | Setting range                  | 1 ~ 100                          |         |
| P3.01 | Speed loop integral time 1     | Factory setting                  | 0.50s   |
|       | Setting range                  | 0.01s ~ 10.00s                   |         |
| P3.02 | Switchover frequency 1         | Factory setting                  | 5.00Hz  |
|       | Setting range                  | 0.00 ~ P3.05                     |         |
| P3.03 | Speed loop proportional gain 2 | Factory setting                  | 15      |
|       | Setting range                  | 0 ~ 100                          |         |
| P3.04 | Speed loop integral time 2     | Factory setting                  | 1.00s   |
|       | Setting range                  | 0.01s ~ 10.00s                   |         |
| P3.05 | Switchover frequency 2         | Factory setting                  | 10.00Hz |
|       | Setting range                  | P3.02 ~ maximum output frequency |         |

Speed loop PI parameters vary with running frequencies of the AC drive.

If the running frequency is less than or equal to "Switchover frequency 1" (P3.02), the speed loop PI parameters are P3. 00 and P3.01.

If the running frequency is equal to or greater than "Switchover frequency 2" (P3.05), the speed loop PI parameters are P3. 03 and P3. 04.

If the running frequency is between P3-02 and P3-05, the speed loop PI parameters are obtained from the linear switchover between the two groups of PI parameters, as shown in Figure 6-8.

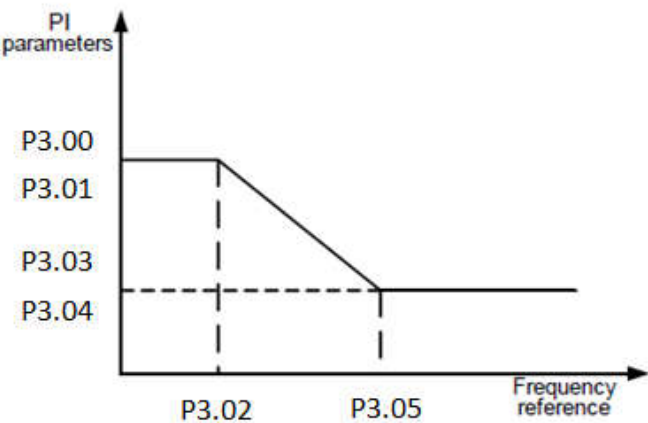


Figure 6-8 Relationship between running frequencies and PI parameters

The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator.

To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation.

The recommended adjustment method is as follows:

If the factory setting cannot meet the requirements, make proper adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

Note: Improper PI parameter setting may cause too large speed overshoot, and overvoltage fault may even occur when the overshoot drops.

|       |                          |                 |      |
|-------|--------------------------|-----------------|------|
| P3.06 | Vector control slip gain | Factory setting | 100% |
|       | Setting range            | 50% ~ 200%      |      |

In vector control mode, it is used to adjust speed stability accuracy of the motor. When the motor with load increasing, and runs at a very low speed, increase the value of this parameter; when load decrease, and runs at a very large speed, decrease the value of this parameter.

|       |                                    |                 |        |
|-------|------------------------------------|-----------------|--------|
| P3.07 | Time constant of speed loop filter | Factory setting | 0.000s |
|       | Setting range                      | 0.000s ~ 0.100s |        |

In the vector control mode, the output of the speed loop regulator is torque current reference. This parameter is used to filter the torque references. It need not be adjusted generally and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly.

If the value of this parameter is small, the output torque of the AC drive may fluctuate greatly, but the response is quick.

|       |                                     |                 |    |
|-------|-------------------------------------|-----------------|----|
| P3.08 | Vector control over-excitation gain | Factory setting | 64 |
|       | Setting range                       | 0 ~ 200         |    |

During deceleration of the AC drive, over-excitation control can restrain rise of the bus voltage to avoid the overvoltage fault. The larger the over-excitation gain is, the better the restraining effect is. Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. Too large over-excitation gain, however, may lead to an increase in output current. Therefore, set this parameter to a proper value in actual applications.

Set the over-excitation gain to 0 in applications of small inertia (the bus voltage will not rise during deceleration) or where there is a braking resistor.

|       |   |   |                         |        |
|-------|---|---|-------------------------|--------|
| P3.09 | Torque upper limit source in speed control mode             |   | Factory setting         | 0      |
|       | Setting range   | 0 | P3.10 value             |        |
|       |   | 1 | AI1                     |        |
|       |   | 2 | AI2                     |        |
|       |   | 3 | Potentiometer of keypad |        |
|       |   | 4 | PULSE trains (X5)       |        |
|       |   | 5 | Communication           |        |
|       |   | 6 | MIN(AI1,AI2)            |        |
|       |   | 7 | MAX(AI1,AI2)            |        |
| P3.10 | Digital setting of torque upper limit in speed control mode |   | Factory setting         | 150.0% |
|       | Setting range   |   | 0.0% ~ 200.0%           |        |

In the speed control mode, the maximum output torque of the AC drive is restricted by P3-.09. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of P3.10, and 100% of the value of P3.10 corresponds to the AC drive rated torque.

For details on the AI1, AI2, and potentiometer of keypad setting, see the description of the AI curves in group ( see P5.31 curve selecting), the pulse trains setting see the P5.26 ~ P5.30 introduction.

## P4. V/F Control Parameters

This group is valid only for V/F control, disable for vector control.

The V/F control mode is applicable to low load applications (fan or pump) or applications where one AC drive operates multiple motors or there is a large difference between the AC drive power and the motor power.

| P4.00 | V/F curve setting |   | Factory setting       | 0 |
|-------|-------------------|---|-----------------------|---|
|       | Setting range     | 0 | Linear V/F            |   |
|       |                   | 1 | Multi-point V/F       |   |
|       |                   | 2 | Square V/F            |   |
|       |                   | 3 | V/F separation mode 1 |   |
|       |                   | 4 | V/F separation mode 2 |   |

### 0: Linear V/F

It is applicable to common constant torque load. Output voltage is zero, when frequency output is 0. The output voltage is rated motor voltage, when output rated frequency. It is able to get any VF curve through P4.06 ~ P4.11 parameters points setting, see Fig. 6-10.

### 1: Multi-point V/F

It is applicable to special load such as dehydrator and centrifuge. Output voltage is zero, when frequency output is 0. The output voltage is rated motor voltage, when output rated frequency.

### 2: Square V/F

It is applicable to centrifugal loads such as fan and pump.

### 3: V/F separation mode 1

The output frequency and output voltage is independent. The output frequency is programmed by frequency source, and output voltage is decided by P4.12 (VF separation voltage).

### 4: VF separation mode 2.

In this mode, the output voltage and frequency have a proportional relationship, but this relationship is set by voltage source P4.12, and this relationship also related to the rated motor voltage and rated motor frequency in Group P2.

Assume that the voltage source input is X (0 ~ 100%), the relationship between V and F is :  $V/F = 2 \times X \times (\text{Rated motor voltage}) / (\text{Rated motor frequency})$

Note: this V/F separation is applicable for various of variable frequency power supply source, but user should pay more attention for this parameters adjusting. Because the improperly parameters setting might cause machine damage.

| P4.01 | Torque boost                      | Factory setting            | 0.0     |
|-------|-----------------------------------|----------------------------|---------|
|       | Setting range                     | 0.0% ~ 30%                 |         |
| P4.02 | Cut-off frequency of torque boost | Factory setting            | 50.00Hz |
|       | Setting range                     | 0.00Hz ~ Maximum frequency |         |

To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of AC drive at low frequency by modifying F4-01. If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer over current.

If the load is large and the motor startup torque is insufficient, increase the value of P4-01. If the load is small, decrease the value of P4-01. If it is set to 0.0, the AC drive performs automatic torque boost. In this case, the AC drive automatically calculates the torque boost value based on motor parameters including the stator resistance. P4-02 specifies the frequency under which torque boost is valid. Torque boost becomes invalid when this frequency is exceeded, as shown in the following figure.

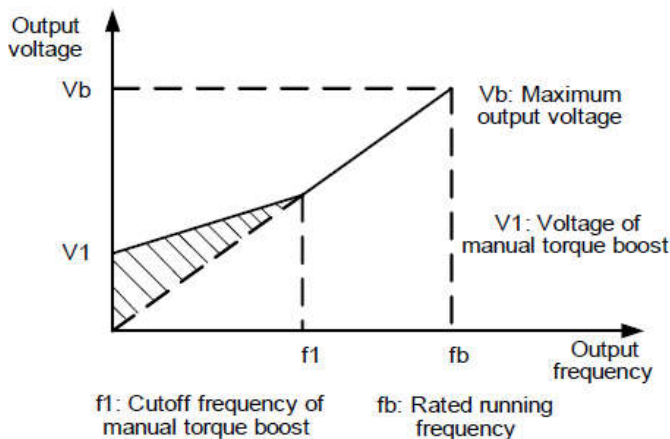


Figure 6-9 Manual torque boost

|       |                            |                 |      |
|-------|----------------------------|-----------------|------|
| P4.03 | V/F slip compensation gain | Factory setting | 0.0% |
|       | Setting range              | 0% ~ 200.0%     |      |

This parameter is valid only for the asynchronous motor.

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case of load change. If this parameter is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip. The rated motor slip is automatically obtained by the AC drive through calculation based on the rated motor frequency and rated motor rotational speed in group P2.

Generally, if the motor rotational speed is different from the target speed, slightly adjust this parameter.

|       |                          |                 |    |
|-------|--------------------------|-----------------|----|
| P4.04 | V/F over-excitation gain | Factory setting | 64 |
|       | Setting range            | 0 ~ 200         |    |

During deceleration of the AC drive, over-excitation can restrain rise of the bus voltage, preventing the overvoltage fault. The larger the over-excitation is, the better the restraining result is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. However, too large over-excitation gain may lead to an increase in the output current.



Set P4-09 to a proper value in actual applications. For light load application, which will not occurs over voltage alarm, set it for 0. Also in application which connect braking resistor, set it for 0.

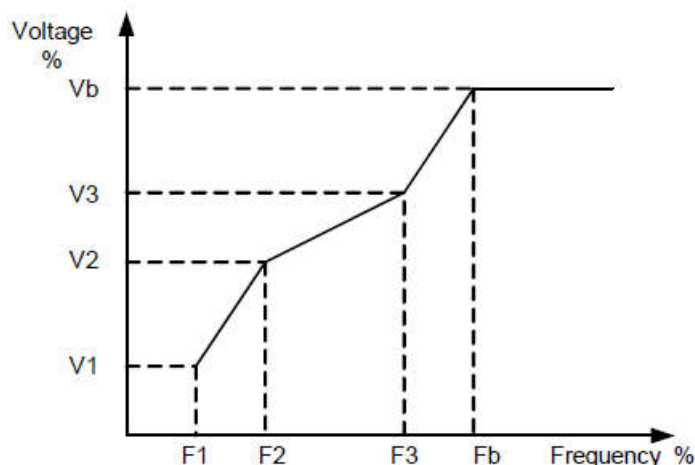
|       |                                  |                                       |        |
|-------|----------------------------------|---------------------------------------|--------|
| P4.05 | Multi-point V/F frequency 1 (F1) | Factory setting                       | 0.00Hz |
|       | Setting range                    | 0.00Hz ~ P4.07                        |        |
| P4.06 | Multi-point V/F voltage 1 (V1)   | Factory setting                       | 0.0%   |
|       | Setting range                    | 0.0% ~ 100.0%                         |        |
| P4.07 | Multi-point V/F frequency 2 (F2) | Factory setting                       | 0.00Hz |
|       | Setting range                    | P4.05 ~ P4.09                         |        |
| P4.08 | Multi-point V/F voltage 2 (V2)   | Factory setting                       | 0.0%   |
|       | Setting range                    | 0.0% ~ 100.0%                         |        |
| P4.9  | Multi-point V/F frequency 3 (F3) | Factory setting                       | 0.00Hz |
|       | Setting range                    | P4.07 ~ motor rated frequency (P2.03) |        |
| P4.10 | Multi-point V/F voltage 3 (V3)   | Factory setting                       | 0.0%   |
|       | Setting range                    | 0.0% ~ 100.0%                         |        |

P4.05 ~ P4.10, these 6 parameters are used to define the multi-point V/F curve.

The multi-point V/F curve is set based on the motor's load characteristic. The relationship between voltages and frequencies is:  $V1 < V2 < V3$ ,  $F1 < F2 < F3$

At low frequency, higher voltage may cause overheat or even burnt out of the motor and over current stall or over current protection of the AC drive.

Figure 6-10 Setting of multi-point V/F curve



V1-V3: V1-V3: 1st, 2nd and 3rd voltage percentages of multi -point V/F

F1-F3: 1st, 2nd and 3rd frequency percentages of multi -point V/F

Vb: motor rated voltage      Fb: motor rated frequency

Fig 6-10 Setting of multi-point V/F curve

|       |                                   |   |                           |   |
|-------|-----------------------------------|---|---------------------------|---|
| P4.11 | Voltage source for V/F separation |   | Factory setting           | 0 |
|       | Setting                           | 0 | Digital reference (P4.13) |   |

|       |   |   |                          |    |
|-------|---|---|--------------------------|----|
|       | range   | 1   | AI1                      |    |
|       |   | 2   | AI2                      |    |
|       |   | 3   | Potentiometer of keypad  |    |
|       |   | 4   | PULSE trains (X5)        |    |
|       |   | 5   | Multiple step terminals  |    |
|       |   | 6   | Simple LC                |    |
|       |   | 7   | PID                      |    |
|       |   | 8   | Communication            |    |
|       |   | 100.0% corresponding to rated voltage of motor<br>P2.05 |                          |    |
| P4.12 | Voltage digital reference<br>for V/F separation |   | Factory setting          | 0V |
|       | Setting range                                   |   | 0V ~ motor rated voltage |    |

V/F separation is generally applicable to scenarios such as induction heating, inverse power supply and motor torque control.

If V/F separated control is enabled, the output voltage can be set in P4.12 or by means of analog, multi-reference, simple PLC, PID or communication. If you set the output voltage by means of non-digital setting, 100% of the setting corresponds to the rated motor voltage. If a negative percentage is set, its absolute value is used as the effective value.

0: digital reference (P4.12), the voltage is set by P4.12.

1: AI1 reference, the voltage is set by analog signal.

2: AI2 reference, the voltage is set by analog signal.

3: Potentiometer of keypad,

4: PULSE trains (X5) , the voltage is set by pulse trains terminal. Range of voltage is 9V ~ 30V, frequency range is 0kHz ~ 100kHz.

5: Multiple step terminals.

When the voltage source is set by multiple step terminals, if need to set P5 ground and PA group to determine the relationship of signal reference to corresponding voltage reference. PA group parameters is present by percent, 100% is corresponding to motor rated voltage.

6: Simple PLC, when the voltage source is simple PLC, it need to set PA group parameters to determine the output voltage.

7: Process PID, voltage output determine by PID close loop, see P9 and PID description in detail.

8: Communication, the voltage is set by upper controller through communication.

The voltage source for V/F separation is set in the same way as the frequency source. For details, see P0-03. 100.0% of the setting in each mode corresponds to the rated motor voltage. If the corresponding value is negative, its absolute value is used.

|       |                                     |                 |      |
|-------|-------------------------------------|-----------------|------|
| P4.13 | Voltage rise time of V/F separation | Factory setting | 0.0s |
|       | Setting range                       | 0.0s ~ 1000.0s  |      |

VF rise time of V/F separation used to limit the time requested from 0V to rated motor voltage.

### P5. Input terminals group

The AD series provides 5 DI terminals (DI5 can be used for high-speed pulse input) and two analog input (AI) terminals. The optional extension card provides another 5 DI terminals ( DI6 to DI10).

| Function code | Name                                       | Factory setting                  | Remark    |
|---------------|--|----------------------------------|-----------|
| P5.00         | X1 terminals function define               | 1 (forward)                      | standard  |
| P5.01         | X2 terminals function define               | 2 (reverse)                      | standard  |
| P5.02         | X3 terminals function define               | 4 (Jog forward)                  | standard  |
| P5.03         | X4 terminals function define               | 1 (Multi-reference terminal 1)   | standard  |
| P5.04         | X5 terminals function define               | 13 (Multi-reference terminal 2 ) | standard  |
| P5.05         | X6 terminals function define (extension)   | 0                                | extension |
| P5.06         | X7 terminals function define (extension)   | 0                                | extension |
| P5.07         | X 8 terminals function define (extension)  | 0                                | extension |
| P5.08         | X 9 terminals function define (extension)  | 0                                | extension |
| P5.09         | X 10 terminals function define (extension) | 0                                | extension |

The following table lists the functions available for the XI terminals.

### Functions of XI terminals functions description.

| Set code | Function                 | Description   |
|----------|--------------------------|---|
| 0        | No operation             | Set 0 for reserved terminals to avoid malfunction.  |
| 1        | Forward running (FWD)    | The terminal is used to control forward or reverse RUN<br>2 Reverse RUN (REV) of the AC drive   |
| 2        | Reverse running (REV)    |   |
| 3        | 3 line control mode      | The terminal determines three-line control of the AC drive. For details, see the description of F0.18.  |
| 4        | Forward Jog (FJOG)       | FJOG indicates forward JOG running, while RJOG indicates reverse JOG running. The JOG frequency, acceleration time and deceleration time are described respectively in P1.12, P8.01 and P8.02 |
| 5        | Reverse Jog (RJOG)       |   |
| 6        | Cost to stop( free stop) | The AC drive blocks its output, the motor coasts to rest and is   |

| Set code | Function  | Description  |
|----------|---|--|
|          |   | not controlled by the AC drive. It is the same as coast to stop described in P1.05   |
| 7        | Fault reset (RESET)                                     | The terminal is used for fault reset function, the same as the function of RESET key on the operation panel. Remote fault reset is implemented by this function.   |
| 8        | Normally open (NO) input of external fault              | If this terminal becomes ON, the AC drive reports Err18 and performs the fault protection action.  |
| 9        | Frequency UP  | If the frequency is determined by external terminals, the terminals with the two functions are used as increment and decrement commands for frequency modification. When the frequency source is set by digital reference, it using to adjust frequency. P0.03 set for 0 or 1. |
| 10       | Frequency DOWN  |  |
| 11       | UP/DOWN reset (terminals, and keypad)                   | When frequency set by digital reference, this terminal can use to clear UP/DOWN or UP/DOWN button of keypad changing value, make P0-07.  |
| 12       | Multi-reference terminal 1                              | The setting of 16 speeds or 16 other references can be implemented through combinations of 16 states of these four terminals.  |
| 13       | Multi-reference terminal 2                              |  |
| 14       | Multi-reference terminal 3                              |  |
| 15       | Multi-reference terminal 4                              |  |
| 16       | Terminal 1 for acceleration/deceleration time selection | Totally 4 groups of acceleration/deceleration time can be selected through combinations of 2 states of these 2 terminals. See tale2.   |
| 17       | Terminal 2 for acceleration/deceleration time selection |  |
| 18       | Normally open (NC) input of external fault              | If this terminal becomes ON with external fault input, the AC drive reports Err18 and performs the fault protection action.  |
| 19       | External stop terminal                                  | Can use this terminal to stop AC Drive when in keypad control mode, this function equip to STOP button of keypad.  |
| 20       | Frequency source switchover                             | Use to switchover difference frequency source according to frequency source selection code function (P0.17)  |
| 21       | Pulse trains frequency input (only valid for X5).       | X5 takes as for pulse trains input terminal function.  |
| 22       | Switchover between main frequency source X and          | After this terminal becomes ON, the frequency source X is replaced by the preset frequency set in P0.08.   |

| Set code | Function   | Description   |
|----------|--|---|
|          | preset frequency   |   |
| 23       | Switchover between auxiliary frequency source Y and preset frequency | After this terminal is enabled, the frequency source Y is replaced by the preset frequency set in P0.07 .   |
| 24       | Command source switchover terminal                                   | If the command source is set to terminal control (P0.01=1) , this terminal is used to perform switchover between terminal control and keypad control.<br>If the command source is set to communication control (P0.01=2, this terminal is used to perform switchover between communication control and keypad control |
| 25       | PID pause  | PID is invalid temporarily. The AC drive maintains the current frequency output without supporting PID adjustment of frequency source.  |
| 26       | Reverse PID action direction   | After this terminal becomes ON, the PID action direction is reversed to the direction set in P0.03..  |
| 27       | PID integral pause   | After this terminal becomes ON, the integral adjustment function pauses. However, the proportional and differentiation adjustment functions are still valid.  |
| 28       | PID parameter switchover   | If the PID parameters switchover performed by means of XI terminal (P9.18=1), the PID parameters are P9.05 ~ P9.07 when the terminal becomes OFF; the PID parameters are F P9.15 ~ P9.17. when this terminal becomes ON.  |
| 29       | Counter input  | This terminal is used to count pulses.  |
| 30       | Counter reset  | This terminal is used to clear the counter status.  |
| 31       | Length count input   | This terminal is used to count the length.  |
| 32       | Length reset   | This terminal is used to clear the length.  |
| 33       | Timer is activate  | inner timer start to timing   |
| 34       | Swing frequency operation pause                                      | The AC drive outputs the central frequency, and the swing frequency function pauses.  |
| 35       | Reverse  |   |
| 36       | Acceleration /deceleration forbidden                                 | To protection AC Drive don't effected by extern signal except the stop command, to maintain current frequency output.   |
| 37       | DC braking immediately   | When this terminal is enable, AC Drive will switch to DC braking state.   |
| 38       | Command control  | Use to switchover command control mode between terminals  |

| Set code | Function                                     | Description  |
|----------|--|--|
|          | terminals switchover                         | and communication control. If current control is terminal control, it will change to communication mode once this terminal is activate, Vise Versa.  |
| 39       | Frequency changing enable                    | When this function is enable, the AC drive will not response to change when frequency has been modified, until this terminals is disable.  |
| 40       | Motor selection terminal                     | Enable to 2 motor parameters group switching, see table 3 in detail.   |
| 41       | Speed control/Torque control switchover      | This terminal enables the AC drive to switch over between speed control and torque control. When this terminal becomes OFF, the AC drive runs in the mode set in H0.00. When this terminal becomes ON, the AC drive switches over to the other control mode. |
| 42       | Running pause.                               | AC drive decelerate to stop but all running status and parameters will be record, such as PLC parameters, swing frequency, PID parameters. Ac drive will restore to before stop running status once this terminal signal is disable.                         |
| 43       | Reverse                                      |  |
| 44       | Reverse                                      |  |
| 45       | Reverse                                      |  |
| 46       | Torque control is forbidden                  | Forbidden enter to torque control mode, only speed control mode is valid.  |
| 18       | Normally closed (NC) input of external fault | After this terminal becomes ON, the AC drive reports Err18 and stops.  |
| 47       | Emergency stop                               | When this terminal becomes ON, the AC drive stops within the shortest time. During the stop process, the current remains at the set current upper limit. This function is used to satisfy the requirement of stopping the AC drive in emergency state.       |
| 48       | External STOP terminal 2                     | In any control mode (operation panel, terminal or communication), it can be used to make the AC drive decelerate to stop. In this case, the deceleration time is deceleration time 4.  |
| 49       | Deceleration DC braking                      | When this terminal becomes ON, the AC drive decelerates to the starting frequency of stop DC braking and then switches over to DC braking state.   |

| Set code | Function                       | Description  |
|----------|--------------------------------|--|
| 50       | Clear the current running time | When this terminal becomes ON, the AC drive's current running time is cleared. This function must be supported by P8.41 and P8.56. |

Attached table 1: Multi-reference terminal function description

The 4 multi-reference terminals have 16 state combinations, corresponding to 16 reference values, as listed in the following table. See below list in detail.

| K4  | K3  | K2  | K1  | Command setting    | Corresponding code |
|-----|-----|-----|-----|--------------------|--------------------|
| OFF | OFF | OFF | OFF | multi-reference 1  | PA.00              |
| OFF | OFF | OFF | ON  | multi-reference 2  | PA.01              |
| OFF | OFF | ON  | OFF | multi-reference 3  | PA.02              |
| OFF | OFF | ON  | ON  | multi-reference 4  | PA.03              |
| OFF | ON  | OFF | OFF | multi-reference 5  | PA.04              |
| OFF | ON  | OFF | ON  | multi-reference 6  | PA.05              |
| OFF | ON  | ON  | OFF | multi-reference 7  | PA.06              |
| OFF | ON  | ON  | ON  | multi-reference 8  | PA.07              |
| ON  | OFF | OFF | OFF | multi-reference 9  | PA.08              |
| ON  | OFF | OFF | ON  | multi-reference 10 | PA.09              |
| ON  | OFF | ON  | OFF | multi-reference 11 | PA.10              |
| ON  | OFF | ON  | ON  | multi-reference 12 | PA.11              |
| ON  | ON  | OFF | OFF | multi-reference 13 | PA.12              |
| ON  | ON  | OFF | ON  | multi-reference 14 | PA.13              |
| ON  | ON  | ON  | OFF | multi-reference 15 | PA.14              |
| ON  | ON  | ON  | ON  | multi-reference 16 | PA.15              |

When frequency source set as Multi step reference. The 100% of function code PA.00 ~ PA.15 corresponding to P0.04.

Attached table 2. Acceleration, deceleration time selection by terminals.

| Terminal s 1 | Terminals 2 | Acceleration, / deceleration time selection | Corresponding parameters |
|--------------|-------------|---|--------------------------|
| OFF          | OFF         | Terminals 1                                 | P0.08, P0.09             |
| OFF          | ON          | Terminals 2                                 | P8.03, P8.04             |
| ON           | OFF         | Terminals 3                                 | P8.05, P8.06             |
| ON           | ON          | Terminals 4                                 | P8.07, P8.08             |

Attached table 3: Applicable motor selection function.

| terminal<br>s 2 | terminals<br>2 | Motor selection | Corresponding<br>parameters |
|-----------------|----------------|-----------------|-----------------------------|
| OFF             | OFF            | Motor 1         | P2、 P3 group                |
| OFF             | ON             | Motor 2         | H2 group                    |

|       |                         |                    |        |
|-------|-------------------------|--------------------|--------|
| P5.10 | X terminals filter time | Factory<br>setting | 0.010s |
|       | Setting range           | 0.000s ~ 1.000s    |        |

To set X terminals software filter time P5.10. In some application cases, which input terminals is easy to interference cause malfunction, user can increase this value to improve anti-interference capability. However, increase of the X filter time will slow the response of detection. Set this parameter properly based on actual conditions.

|       |   |                    |        |
|-------|---|--------------------|--------|
| P5.11 | AI curve 1 minimum input                          | Factory<br>setting | 0.20V  |
|       | Setting range                                     | -10.00V ~ P5.13    |        |
| P5.12 | Corresponding setting of AI curve 1 minimum input | Factory<br>setting | 0.0%   |
|       | Setting range                                     | -100.00% ~ 100.0%  |        |
| P5.13 | AI curve 1 maximum input                          | Factory<br>setting | 10.00V |
|       | Setting range                                     | P5.11 ~ 10.00V     |        |
| P5.14 | Corresponding setting of AI curve 1 maximum input | Factory<br>setting | 100.0% |
|       | Setting range                                     | -100.00% ~ 100.0%  |        |
| P5.15 | AI1 filter time                                   | Factory<br>setting | 0.10s  |
|       | Setting range                                     | 0.00s ~ 10.00s     |        |

These parameters are used to define the relationship between the analog input voltage and the corresponding setting. When the analog input voltage exceeds the maximum value (P5.13), the maximum value is used. When the analog input voltage is less than the minimum value (P5.11), the value set in P5.32 (Setting for AI less than minimum input) is used, or take it as for 0.0%.

When the analog input is current input, 1 mA current corresponds to 0.5 V voltage.

P5.15 (AI1 filter time) is used to set the software filter time of AI1. If the analog input is liable to interference, increase the value of this parameter to stabilize the detected analog input.

However, increase of the AI filter time will slow the response of analog detection. Set this parameter properly based on actual conditions.

In different applications, 100% of analog input corresponds to different nominal values. For details, refer to the description of different applications.

Two typical setting examples are shown in the following figure.



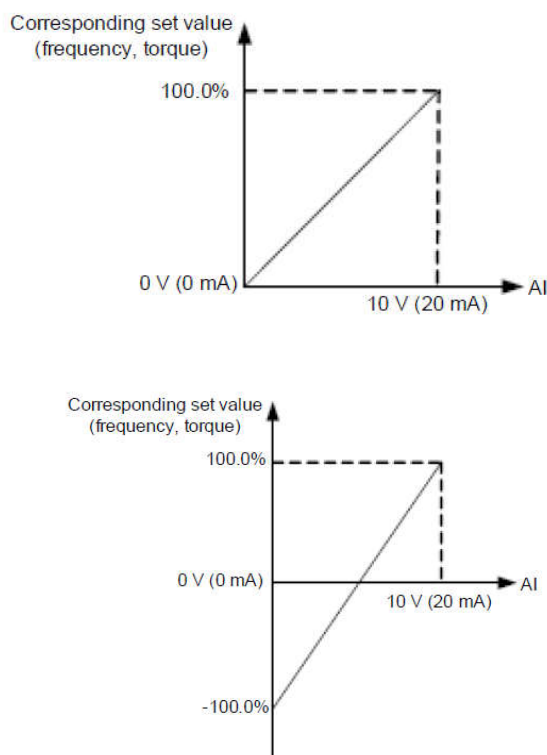


Fig. 6-11 Corresponding relationship between analog input and set values

|       |   |                   |        |
|-------|---|-------------------|--------|
| P5.16 | AI curve 2 minimum input                          | Factory setting   | 0.20V  |
|       | Setting range                                     | 0.00V ~ P5.18     |        |
| P5.17 | Corresponding setting of AI curve 2 minimum input | Factory setting   | 0.0%   |
|       | Setting range                                     | -100.00% ~ 100.0% |        |
| P5.18 | AI curve2 maximum input                           | Factory setting   | 10.00V |
|       | Setting range                                     | P5.16 ~ 10.00V    |        |
| P5.19 | Corresponding setting of AI curve 2 maximum input | Factory setting   | 100.0% |
|       | Setting range                                     | -100.00% ~ 100.0% |        |
| P5.20 | AI curve 2 AI1 filter time                        | Factory setting   | 0.10s  |
|       | Setting range                                     | 0.00s ~ 10.00s    |        |

The method of setting AI2 functions is similar to that of setting AI1 function.

|       |  |                 |       |
|-------|--|-----------------|-------|
| P5.21 | Potentiometer of keypad minimum input            | Factory setting | 0.20V |
|       | Setting range                                    | 0.00V ~ P5.23   |       |
| P5.22 | Corresponding setting of potentiometer of keypad | Factory setting | 0.0%  |

|       |  |                   |          |
|-------|--|-------------------|----------|
|       | minimum input  |                   |          |
|       | Setting range  | -100.00% ~ 100.0% |          |
| P5.23 | Potentiometer of keypad maximum input                          | Factory setting   | 10.00V   |
|       | Setting range  | P5.21 ~ 10.00V    |          |
| P5.24 | Corresponding setting of potentiometer of keypad maximum input | Factory setting   | 100.0%   |
|       | Setting range  | -100.00% ~ 100.0% |          |
| P5.25 | Potentiometer of keypad filter time                            | Factory setting   | 0.10s    |
|       | Setting range  | 0.00s ~ 10.00s    |          |
| P5.26 | Pulse trains minimum input                                     | Factory setting   | 0.00kHz  |
|       | Setting range  | 0.00kHz ~ P5.28   |          |
| P5.27 | Corresponding setting of Pulse trains minimum input            | Factory setting   | 0.0%     |
|       | Setting range  | -100.00% ~ 100.0% |          |
| P5.28 | Pulse trains maximum input                                     | Factory setting   | 50.00kHz |
|       | Setting range  | P5.26 ~ 10.00V    |          |
| P5.29 | Corresponding setting of Pulse trains maximum input            | Factory setting   | 100.0%   |
|       | Setting range  | -100.00% ~ 100.0% |          |
| P5.30 | Pulse trains filter time                                       | Factory setting   | 0.10s    |
|       | Setting range  | 0.00s ~ 10.00s    |          |

|       |  |              |   |     |
|-------|--|--------------|---|-----|
| P5.32 | AI less than minimum input setting selection |              | Factory setting   | 000 |
|       | Setting range                                | Unit's digit | AI 1less than minimum input setting selection                           |     |
|       |  | 0            | AI less than minimum input setting selection                            |     |
|       |  | 1            | 0.0%  |     |
|       |  | Ten's digit  | AI 2 less than minimum input setting selection(0 ~ 1, as same as above) |     |
|       |  | Hundr        | Potentiometer less than minimum input                                   |     |

|  |  |            |  |
|--|--|------------|--|
|  |  | ed's digit | setting selection(0 ~ 1, as same as above) |
|--|--|------------|--|

This parameter is used to determine the corresponding setting when the analog input voltage is less than the minimum value. The unit's digit, ten's digit and hundred's digit of this parameter respectively correspond to the setting for AI2, AI2 and potentiometer.

If the value of a certain digit is 0, when analog input voltage is less than the minimum input, the corresponding setting of the minimum input (P5.12、P5.17、P5.22) is used.

If the value of a certain digit is 1, when analog input voltage is less than the minimum input, the corresponding value of this analog input is 0.0%.

|       |                        |                 |      |
|-------|------------------------|-----------------|------|
| P5.33 | X1 response delay time | Factory setting | 0.0s |
|       | Setting range          | 0.0s ~ 3600.0s  |      |
| P5.34 | X2 response delay time | Factory setting | 0.0s |
|       | Setting range          | 0.0s ~ 3600.0s  |      |
| P5.35 | X2 response delay time | Factory setting | 0.0s |
|       | Setting range          | 0.0s ~ 3600.0s  |      |

These parameters are used to set the response delay time of the AC drive when the status of XI terminals changes. Currently, only X1, X2 and X3 support the response delay time function.

|       |                           |                      |   |       |
|-------|---------------------------|----------------------|---|-------|
| P5.36 | XI valid mode selection 1 |                      | Factory setting                                   | 00000 |
|       | Setting range             | Unit's digit         | X1 terminal valid state setting                   |       |
|       |                           | 0                    | High level valid                                  |       |
|       |                           | 1                    | Low level valid                                   |       |
|       |                           | Ten's digit          | X2 terminal valid state setting (0 ~ 1, as above) |       |
|       |                           | hundred's digit      | X3 terminal valid state setting (0 ~ 1, as above) |       |
|       |                           | Thousand's digit     | X4 terminal valid state setting (0 ~ 1, as above) |       |
|       |                           | Ten thousand's digit | X5 terminal valid state setting (0 ~ 1, as above) |       |

These parameters are used to set the valid mode of XI terminals.

0: High level valid, The XI terminal is valid when being connected with COM, and invalid when being disconnected from COM.

1: Low level valid The XI terminal is invalid when being connected with COM, and invalid when being disconnected from COM.

## P6. Output terminals group

The AD800 series AC drive provides 1 analog output terminal, 1 multi-function digital relay output terminal, 1 FM terminal (used for high-speed pulse output or open-collector switch signal output) as standard.

JI-350 Ac drive provides 1 multi-function analog output terminal. All the digital output terminal function can be defined by function code.

|       |                         |   |                           |   |
|-------|-------------------------|---|---------------------------|---|
| P6.00 | FM terminal output mode |   | Factory setting           | 0 |
|       | Setting range           | 0 | Pulse trains output (FMP) |   |
|       |                         | 1 | digital output (FMR)      |   |

The FM terminal is programmable multiplexing terminal. It can be used for high-speed pulse output (FMP), with maximum frequency of 100 kHz. Refer to F6-06 for relevant functions of FMP. It can also be used as open collector switch digital signal output (FMR).

|       |   |                 |   |
|-------|---|-----------------|---|
| P6.01 | FMR function (open-collector output terminal)           | Factory setting | 0 |
| P6.02 | Relay function (T/A-T/B-T/C)                            | Factory setting | 3 |
| P6.03 | Extension card relay function (TA1-TB1-TC1)             | Factory setting | 0 |
| P6.04 | DO1 function selection (open-collector output terminal) | Factory setting | 1 |
| P6.05 | Reserve   |                 |   |

### Multiple functions of output terminals description as following.

| Setting value | Function                              | description   |
|---------------|---------------------------------------|---|
| 0             | No output                             | The terminal has no function, set it for 0 to prevent malfunction                             |
| 1             | AC drive running                      | When the AC drive is running and has output frequency (can be zero), the terminal becomes ON. |
| 2             | Frequency reached                     | refer to function code P8.34 description  |
| 3             | Fault output (fault and stop)         | When the AC drive occurs fault and stop, the terminal becomes ON.                             |
| 4             | Frequency-level detection FDT1 output | Refer to function code P8.32, P8.33 description   |
| 5             | Frequency-level detection FDT2 output | Refer to function code P8.35, P8.36 description   |

| Setting value | Function  | description   |
|---------------|---|---|
| 6             | 0 speed running (no output at stop)               | If the AC drive is running with the output frequency of 0, the terminal becomes ON. If the AC drive is in the stop state, the terminal becomes OFF.                             |
| 7             | 0 speed running 2( stop with output)              | When Ac drive is running and output 0Hz, the terminals signal is ON. even in stop state, the terminal signal also is ON   |
| 8             | upper limit frequency reached                     | When the running frequency reached to upper limit frequency, terminals sent out ON signal.  |
| 9             | lower limit frequency reached (no output at stop) | When the running frequency reached to lower limit frequency, terminals signal is ON, in stop state, the signal is OFF.  |
| 10            | Frequency 1 reached                               | Refer to the descriptions of P8.37,P8.38  |
| 11            | Frequency 2 reached                               | Refer to the descriptions of P8.39, P8.40   |
| 12            | Reserve   |   |
| 13            | Reserve   |   |
| 14            | Timing reached                                    | If the timing function (P8.43) is valid, the terminal becomes ON after the current running time of the AC drive reaches the set time  |
| 15            | Set count value reached                           | When the value reach to Pb.08 set value, sent out ON signal.  |
| 16            | Designated count value reached                    | When the counter reached to Pb.09, sent out ON signal, refer to Pb group for counting function.   |
| 17            | Length reached                                    | The terminal becomes ON when the detected actual length exceeds the value set in Pb-05.   |
| 18            | under voltage status output t                     | If the AC drive is in under voltage state, the terminal becomes ON.   |
| 19            | motor overload pre-alarm                          | Sent out ON signal according to overload pre-warning setting value before motor over load protection, see the motor overload function code setting PC.00 ~ PC.02.               |
| 20            | AC drive overload pre-warning                     | The terminal becomes ON 10s before the AC drive overload protection action is performed.  |
| 21            | Frequency limited                                 | If the set frequency exceeds the frequency upper limit or lower limit and the output frequency of the AC drive reaches the upper limit or lower limit, the terminal becomes ON. |
| 22            | Torque limited                                    | In speed control mode, if the output torque reaches the torque limit, the AC drive enters the stall protection state and meanwhile the terminal becomes ON.                     |

| Setting value | Function  | description   |
|---------------|---|---|
| 23            | Ready for RUN                                   | When the AC drive main circuit and control circuit become stable, and the AC drive detects no fault and is ready for RUN, the terminal becomes ON.                            |
| 24            | AI1>AI2   | When the input of AI1 is larger than the input of AI2, the terminal becomes ON.   |
| 25            | AI1 input over range                            | When the analog input AI1 large than P8.53( AI1 input upper limit protection ) or less than P8.52 (AI1 input lower limit protection), it will sent out ON signal.             |
| 26            | lower frequency reached (stop also sent output) | When the running frequency reached lower limit frequency, sent out ON signal, still keep ON when stop status.   |
| 27            | Current running time reach                      | AC Drive runs over P8.56 setting value from this time, the terminal sent out ON.  |
| 28            | Reserve   |   |
| 29            | Alarm output                                    | When a fault happens, and this alarm action allow to continue running, AC Drive sent out alarm.   |
| 30            | current arrive 1 output                         | Refer to the descriptions of P8.48 and P8.49  |
| 31            | current arrive 2 output                         | Refer to the descriptions of P8.50 and P8.51  |
| 32            | missing load                                    | When AC Drive missing load, sent ON signal.   |
| 33            | Reverse   |   |
| 34            | Module temperature reached                      | If the heat sink temperature of the AC Drive module (P7.10) reaches the set module temperature threshold (P8.55), the terminal becomes ON                                     |
| 35            | Software current limit exceeded                 | Refer to the descriptions of P8.46 and P8.47.   |
| 36            | Reverse running                                 | When AC Drive change to reverse running, sent out ON signal   |
| 37            | Motor overheat warning                          | If the motor temperature reaches the temperature set in PC.59 (Motor overheat warning threshold), the terminal becomes ON. You can view the motor temperature by using C0-34. |
| 38            | PLC circle running finish                       | When PLC finished a circle running, sent out a pulse signal with 250ms width  |

|       |   |                 |   |
|-------|---|-----------------|---|
| P6.06 | FMP output function selection (pulse trains output) | Factory setting | 0 |
|-------|---|-----------------|---|

|       |                               |                 |   |
|-------|-------------------------------|-----------------|---|
| P6.07 | AO1 output function selection | Factory setting | 0 |
| P6.08 | AO2 output function selection | Factory setting | 1 |

The output pulse frequency of the FMP terminal ranges from 0.01 kHz to "Maximum FMP output frequency" (P6.09). The value of P6.09 is between 0.01 kHz and 100.00 kHz.

The output range of AO1 and AO2 is 0–10 V or 0–20 mA. The relationship between pulse and analog output ranges and corresponding functions is listed in the following table.

| Setting value | Function                       | Range (Corresponding to Pulse or Analog output Range 0.0%–100.0%) |
|---------------|--------------------------------|---|
| 0             | Running frequency              | 0 ~ maximum frequency   |
| 1             | Frequency reference            | 0 ~ maximum frequency   |
| 2             | Output current                 | 0 ~ 2 times motor current   |
| 3             | Output torque (absolute value) | 0 ~ 2 times rated motor torque                                    |
| 4             | Output power                   | 0 ~ 2 times rated power   |
| 5             | Output voltage                 | 0.0 to 1.2 times of rated AC drive voltage                        |
| 6             | PULSE train input              | 0.01kHz ~ 100.00kHz   |
| 7             | AI1                            | -10V ~ 10V  |
| 8             | AI2                            | 0V ~ 10V ( or 0mA ~ 20mA)   |
| 9             | Potentiometer of keypad        | 0V ~ 10V  |
| 10            | Length                         | 0 ~ maximum length  |
| 11            | Count value                    | 0 ~ maximum count   |
| 12            | Communication setting          | 0.0% ~ 100.0%   |
| 13            | Motor rotational speed         | 0 to rotational speed corresponding to maximum output frequency   |
| 14            | Output current                 | 0.0A ~ 1000.0A  |
| 15            | Output voltage                 | 0.0V ~ 1000.0V  |
| 16            | Output torque (real value)     | -2 times of rated motor torque to 2 times of rated motor torque   |

|       |                              |                     |       |
|-------|------------------------------|---------------------|-------|
| P6.09 | FMP output maximum frequency | Factory setting     | 50.00 |
|       | Setting range                | 0.01kHz ~ 100.00kHz |       |

If the FM terminal is used for pulse output, this parameter is used to set the maximum frequency of pulse output.

|       |                        |                 |      |
|-------|------------------------|-----------------|------|
| P6.10 | AO1 offset coefficient | Factory setting | 0.0% |
|-------|------------------------|-----------------|------|

|       |                                       |                   |      |
|-------|---------------------------------------|-------------------|------|
|       | Setting range                         | -100.0% ~ +100.0% |      |
| P6.11 | AO1 gain                              | Factory setting   | 1.00 |
|       | Setting range                         | -10 ~ +10         |      |
| P6.12 | Extension card AO2 offset coefficient | Factory setting   | 0.0% |
|       | Setting range                         | -100.0% ~ +100.0% |      |
| P6.13 | Extension card AO2 gain               | Factory setting   | 1.00 |
|       | Setting range                         | -10 ~ +10         |      |

Above parameters are used to correct the zero drift of analog output and the output amplitude deviation. They can also be used to define the desired AO curve.

If "b" represents zero offset, "k" represents gain, "Y" represents actual output, and "X" represents standard output, the actual output is:  $Y = kX + b$ .

The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20 mA) with no zero offset or gain adjustment.

For example, if the analog output is used as the running frequency, and it is expected that the output is 0 V when 0 frequency, output maximum frequency when output 5V, should set gain for 0.5, and 0 offset set of 0.0%.

If analog output is running frequency, expect to output 0 frequency when 2V output, maximum frequency when output 8V, the gain should set for 1.5, and 0 offset shall be set to 75%.

|       |  |                 |      |
|-------|--|-----------------|------|
| P6.14 | FMR digital output delay time            | Factory setting | 0.0s |
|       | Setting range                            | 0.0s ~ 3600.0s  |      |
| P6.15 | Relay 1 output ON delay time             | Factory setting | 0.0s |
|       | Setting range                            | 0.0s ~ 3600.0s  |      |
| P6.16 | (extension) Relay 1 output ON delay time | Factory setting | 0.0s |
|       | Setting range                            | 0.0s ~ 3600.0s  |      |
| P6.17 | DO1 output ON delay time                 | Factory setting | 0.0s |
|       | Setting range                            | 0.0s ~ 3600.0s  |      |
| P6.18 | (extension) DO2 output delay ON time     | Factory setting | 0.0s |
|       | Setting range                            | 0.0s ~ 3600.0s  |      |

These parameters are used to set the delay time of output terminals FMR, relay 1, relay 2, DO1 and DO2 from status change to actual output.

|       |                         |              |                 |       |
|-------|-------------------------|--------------|-----------------|-------|
| P6.19 | DO valid mode selection |              | Factory setting | 00000 |
|       | Setting range           | Unit's digit | FMR valid mode  |       |
|       |                         | 0            | Positive logic  |       |



|  |  |                      |   |
|--|--|----------------------|---|
|  |  | 1                    | Negative logic                            |
|  |  | Ten's digit          | Relay 1 valid mode(0 ~ 1, as above)       |
|  |  | Hundred's digit      | Relay 2 valid mode(0 ~ 1, as above)       |
|  |  | Thousand's digit     | DO1 terminal valid mode (0 ~ 1, as above) |
|  |  | Ten thousand's digit | DO2 terminal valid mode (0 ~ 1, as above) |

It is used to set the logic of output terminals FMR, relay 1, relay 2, DO1 and DO2.

0: Positive logic

The output terminal is valid when being connected with COM, and invalid when being disconnected from COM.

1: Positive logic

The output terminal is invalid when being connected with COM, and valid when being disconnected from COM.

|       |   |                 |      |
|-------|---|-----------------|------|
| P6.20 | FMR output OFF delay time               | Factory setting | 0.0s |
|       | Setting range                           | 0.0s ~ 3600.0s  |      |
| P6.21 | Relay 1 output OFF delay time           | Factory setting | 0.0s |
|       | Setting range                           | 0.0s ~ 3600.0s  |      |
| P6.22 | Extension Relay 2 output OFF delay time | Factory setting | 0.0s |
|       | Setting range                           | 0.0s ~ 3600.0s  |      |
| P6.23 | DO1 output OFF delay time               | Factory setting | 0.0s |
|       | Setting range                           | 0.0s ~ 3600.0s  |      |
| P6.24 | Extension DO2 output OFF delay time     | Factory setting | 0.0s |
|       | Setting range                           | 0.0s ~ 3600.0s  |      |

Use it set signal OFF relay time of output terminal FMR, relay 1, relay 2, DO1 and DO2.

**P7. Keypad operation and Display**

|       |               |                 |   |
|-------|---------------|-----------------|---|
| P7.00 | User password | Factory setting | 0 |
|       | Setting range | 0 ~ 65535       |   |
|       |               |                 |   |

Set P7.00 with none zero number for password, it will activate password protection function. if press PRG, it will display “-----”. The user need to input correct password to enter AC Drive, otherwise it can't access.

Set P7.00 for 00000 to reset password to make it disable.

|       |                                       |            |                                     |    |
|-------|---------------------------------------|------------|-------------------------------------|----|
| P7.01 | Function parameters display selection |            | Factory setting                     | 01 |
|       | Setting range                         | Unit digit | C group parameter select to display |    |
|       |                                       | 0          | No display                          |    |
|       |                                       | 1          | Display                             |    |
|       |                                       | Ten digit  | C group parameter select to display |    |
|       |                                       | 0          | No display                          |    |
|       |                                       | 1          | Display                             |    |

If need to access to set H group parameters or review C group parameter, please set this parameter.

H is advanced applications group parameters    C group is monitor parameters.

|       |                               |   |                  |   |
|-------|-------------------------------|---|------------------|---|
| P7.03 | Function code allow to modify |   | Factory setting  | 0 |
|       | Setting range                 | 0 | Allow to modify  |   |
|       |                               | 1 | Forbidden modify |   |

If set for 1, the parameter can't change to avoid malfunction. If need to modify parameters, please set it for 0 first.

|       |                            |   |   |   |
|-------|----------------------------|---|---|---|
| P7.04 | JOG key function selection |   | Factory setting   | 3 |
|       | Setting range              | 0 | JOG invalid   |   |
|       |                            | 1 | Switchover between keypad control and remote control ( terminals or communication control mode) |   |
|       |                            | 2 | Forward/reverse switchover  |   |
|       |                            | 3 | Forward JOG   |   |
|       |                            | 4 | Reverse JOG   |   |

Jog is multiple function key, user can select function through JOG key. It is valid during stop and running state.

0: this key is invalid.

1: Switchover between keypad control and remote command control (terminal or communication)

You can perform switchover from the current command source to the keypad control (local operation).

If the current command source is operation panel control, this key is invalid.

2: Switchover between forward rotation and reverse rotation

You can change the direction of the frequency reference by using the JOG key. It is valid only when the current command source is keypad control.

3: Forward JOG

You can perform forward JOG (FJOG) by using the JOG key.

4: Reverse JOG

You can perform reverse JOG (FJOG) by using the JOG key.

|       |                         |   |   |   |
|-------|-------------------------|---|---|---|
| P7.05 | STOP/RESET key function |   | Factory setting                               | 1 |
|       | Setting range           | 0 | STOP/RESET key enabled only in keypad control |   |
|       |                         | 1 | STOP/RESET key enabled in any operation mode  |   |

|       |                                 |  |  |    |   |
|-------|---------------------------------|--|--|----|---|
| P7.06 | LED running display parameter 1 | Unit digit:<br>Bit0: Running frequency<br>Bit1: Output current<br>Bit2: Output voltage<br>Bit3: Machine speed display                        | Hundred digit:<br>Bit0: X input terminals state<br>Bit1: DO output terminals state<br>Bit2: AI1 Voltage<br>Bit3: AI2 Voltage       | 33 | ☆ |
|       |                                 | Ten digit:<br>Bit0: DC bus voltage<br>Bit1: Frequency reference<br>Bit2: counting value<br>Bit3: Length value                                | Thousand digit:<br>Bit0: Reverse<br>Bit1: PID reference<br>Bit2: Output power<br>Bit3: Output torque                               |    |   |
|       |                                 | If need display above mention parameters, set the corresponding bit to 1, and set P0.06 to the hexadecimal equivalent of this binary number. |  |    |   |
| P7.07 | LED running display parameter 2 | Unit digit:<br>Bit0: linear velocity<br>Bit1: PID feedback<br>Bit2: PLC stage<br>Bit3: PLUSE input frequency                                 | Hundred digit<br>Bit0: auxiliary frequency Y<br>Bit1: encoder feedback<br>Bit2: actual feedback<br>Bit3: AI1 before revise voltage | 0  | ☆ |
|       |                                 | Ten digit:<br>Bit0: current power on time<br>Bit1: current running time  | Thousand digit:<br>Bit0: AI1 before revise voltage<br>Bit1: torque reference   |    |   |
|       |                                 |  |  |    |   |

|  |  |  |  |  |
|--|--|--|--|--|
|  |  | Bit2: remain running time<br>Bit3: main frequency ref.<br>Bit2: PLUSE input frequency<br>Bit3: communication                                 |  |  |
|  |  | If need display above mention parameters, set the corresponding bit to 1, and set P0.07 to the hexadecimal equivalent of this binary number. |  |  |

These two parameters are used to set the parameters that can be viewed when the AC drive is in the running state. You can view a maximum of 32 running state parameters that are displayed from the lowest bit of F7-06.

|       |                                |  |    |   |
|-------|--------------------------------|--|----|---|
| P7.08 | LED display parameters in stop | Unit digit:<br>Bit0: frequency reference.<br>Bit1: DC bus voltage<br>Bit2: AI1 voltage<br>Bit3: AI2 voltage<br>Ten digit:<br>Bit0: Reserve<br>Bit1: Counting value<br>Bit2: Length<br>Bit3: machine speed<br>Hundred digit:<br>Bit0: PID reference<br>Bit1: X terminal state<br>Bit2: D0 state | 33 | ☆ |
|       |                                | If a parameter needs to be displayed in stop mode, set the corresponding bit to 1, and set P7.08 to the hexadecimal equivalent of this binary number.  |    |   |

Setting method refer to 4.3 of chapter 4 description

|       |                                   |                 |        |
|-------|-----------------------------------|-----------------|--------|
| P7.09 | Machine speed display coefficient | Factory setting | 1.0000 |
|       | Setting range                     | 0.0001 ~ 6.5000 |        |

This parameter is used to adjust the relationship between the output frequency of the AC drive and the machine speed. For details, see the description of P7.15.

|       |  |                 |    |
|-------|--|-----------------|----|
| P7.10 | Heat sink temperature of AC Drive module | Factory setting | -- |
|-------|--|-----------------|----|

It is used to display the insulated gate bipolar transistor (IGBT) temperature of the AC Drive module, and the IGBT overheat protection value of the AC Drive module depends on the model

|       |                           |                 |              |
|-------|---------------------------|-----------------|--------------|
| P7.12 | Accumulative running time | Factory setting | Actual value |
|-------|---------------------------|-----------------|--------------|

It is used to display the accumulative running time of the AC drive.

| P7.15 | Number of decimal places for load speed display |   | Factory setting  |  |
|-------|---|---|------------------|--|
|       | Setting range                                   | 0 | 0 decimal place  |  |
|       |   | 1 | 1 decimal place  |  |
|       |   | 2 | 2 decimal places |  |
|       |   | 3 | 3 decimal places |  |

P7.15 is used to set the number of decimal places for machine speed display. The following gives an example to explain how to calculate the machine speed: Assume that P7.09 (Load speed display coefficient) is 2.000 and P7.15 is 2 (2 decimal places). When the running frequency of the AC drive is 40.00 Hz, the machine speed is  $40.00 \times 2.000 = 80.00$  (display of 2 decimal places).

If the AC drive is in the stop state, the load speed is the speed corresponding to the set frequency, namely, "set load speed". If the set frequency is 50.00 Hz, the load speed in the stop state is  $50.00 \times 2.000 = 100.00$  (display of 2 decimal places).

**P8. Auxiliary Functions**

|       |                                     |                              |       |
|-------|-------------------------------------|------------------------------|-------|
| P8.00 | Acceleration/deceleration time unit | Factory setting              | 1     |
|       | Setting range                       | 0: 1s<br>1: 0.1s<br>2: 0.01s |       |
| P8.01 | JOG running frequency               | Factory setting              | 20.0s |
|       | Setting range                       | 0.0s ~ 6500.0s               |       |
| P8.02 | JOG acceleration/deceleration time  | Factory setting              | 20.0s |
|       | Setting range                       | 0.0s ~ 6500.0s               |       |

|       |                     |                 |       |
|-------|---------------------|-----------------|-------|
| P8.03 | Acceleration time 2 | Factory setting | 20.0s |
|       | Setting range       | 0.0s ~ 6500s    |       |
| P8.04 | Deceleration time 2 | Factory setting | 20.0s |
|       | Setting range       | 0.0s ~ 6500s    |       |
| P8.05 | Acceleration time 3 | Factory setting | 20.0s |
|       | Setting range       | 0.0s ~ 6500s    |       |
| P8.06 | Deceleration time 3 | Factory setting | 20.0s |
|       | Setting range       | 0.0s ~ 6500s    |       |
| P8.07 | Acceleration time 4 | Factory setting | 20.0s |
|       | Setting range       | 0.0s ~ 6500s    |       |
| P8.08 | Deceleration time 4 | Factory setting | 20.0s |
|       | Setting range       | 0.0s ~ 6500s    |       |

The AD series provides a total of 4 groups of acceleration/deceleration time, that is, the preceding 3 groups and the group defined by P0.08/P0.09. Definitions of 4 groups are completely the same. You can switch over between the four groups of acceleration/deceleration time through different state combinations of XI terminals. For more details, see the descriptions of P5.00 ~ P5.05.

The acceleration and deceleration time unit is set by P8.00.

|       |  |   |                           |   |
|-------|--|---|---------------------------|---|
| P8.10 | Acceleration/deceleration time frequency reference |   | Factory setting           | 0 |
|       | Setting range                                      | 0 | Maximum frequency (P0.04) |   |
|       |  | 1 | Setting frequency         |   |
|       |  | 2 | 100Hz                     |   |

Acceleration/deceleration time is a request time that frequency from 0 to accelerate /decelerate to P8.10 frequency reference. See Fig. 6-1.

When P8.10 set for 1, the acceleration/deceleration time is vary with frequency reference. Please need to notice in application, If the frequency reference changes frequently, the acceleration/deceleration speed is also change.

|       |                          |                            |        |
|-------|--------------------------|----------------------------|--------|
| P8.11 | Jump frequency 1         | Factory setting            | 0.00Hz |
|       | Setting range            | 0.00Hz ~ maximum frequency |        |
| P8.12 | Jump frequency 2         | Factory setting            | 0.00Hz |
|       | Setting range            | 0.00Hz ~ maximum frequency |        |
| P8.13 | Frequency jump amplitude | Factory setting            | 0.00Hz |
|       | Setting range            | 0.00Hz ~ maximum frequency |        |

If the set frequency is within the frequency jump range, the actual running frequency is the jump frequency close to the set frequency. Setting the jump frequency helps to avoid the mechanical resonance point of the load.

The AD series can set two jump frequencies. If both are set to 0, the frequency jump function is disabled. The principle of the jump frequencies and jump amplitude is shown in the following figure.

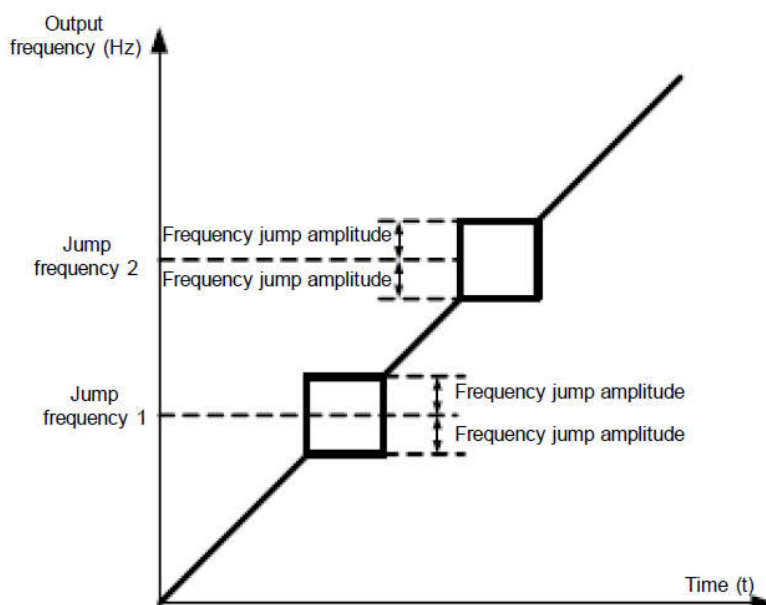


Figure 6-13 Principle of the jump frequencies and jump amplitude

|       |   |                      |   |
|-------|---|----------------------|---|
| P8.14 | Jump frequency during acceleration/deceleration | Factory setting      | 0 |
|       | Setting range                                   | 0: disable 1: enable |   |

It is used to set whether the jump frequencies are valid during acceleration/deceleration.

When the jump frequencies are valid during acceleration/deceleration, and the running frequency is within the frequency jump range, the actual running frequency will jump over the set frequency jump amplitude (rise directly from the lowest jump frequency to the highest jump frequency). The following figure shows the diagram when the jump frequencies are valid during acceleration/deceleration.

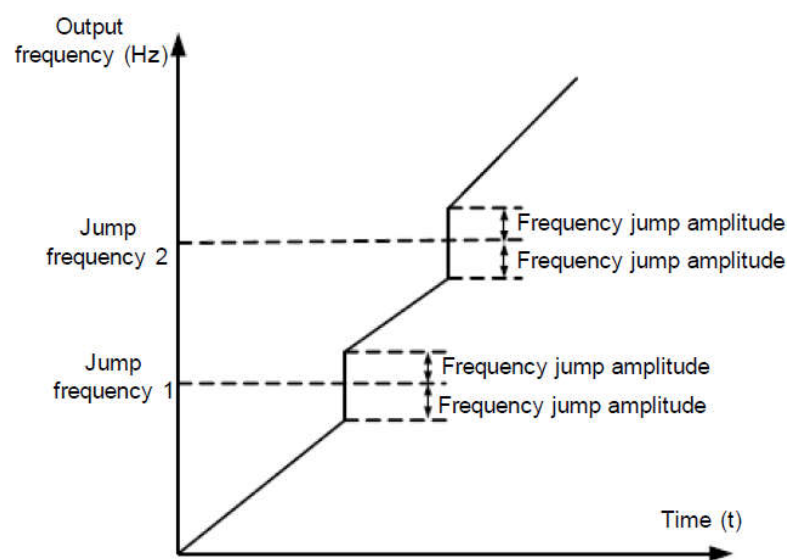


Figure 6-14 Diagram when the jump frequencies are valid during acceleration/deceleration

|       |                       |                         |   |
|-------|-----------------------|-------------------------|---|
| P8.17 | Terminal JOG Priority | Factory setting         | 0 |
|       | Setting range         | 0: disable    1: enable |   |

It is used to set whether terminal JOG is priority  
 If terminal JOG is preferred, the AC drive switches to terminal JOG running state when there is a terminal JOG command during the running process of the AC drive.

|       |                                 |   |                 |   |
|-------|---------------------------------|---|-----------------|---|
| P8.18 | Source of frequency upper limit |   | Factory setting | 0 |
|       | Setting range                   | 0 | Set by P0.05    |   |
|       |                                 | 1 | AI1             |   |
|       |                                 | 2 | AI2             |   |
|       |                                 | 3 | Potentiometer   |   |
|       |                                 | 4 | PULSE train     |   |
|       |                                 | 5 | Communication   |   |

It is used to set the source of the frequency upper limit, including digital setting (P0.05) , AI, pulse setting or communication setting. If the frequency upper limit is set by means of AI1, AI2, potentiometer of keypad, pulse train (X5) or communication, the setting is similar to that of the main frequency source X.For details, see the description of P0.03.  
 For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the AC drive reaches the upper limit, it will continue to run at this speed.

|       |                              |                                  |        |
|-------|------------------------------|----------------------------------|--------|
| P8.19 | upper limit frequency offset | Factory setting                  | 0.00Hz |
|       | Setting range                | 0.00Hz ~ maximum frequency P0.04 |        |



If the source of the frequency upper limit is analog input or pulse setting, the final frequency upper limit is obtained by adding the offset in this parameter P8.19 to the frequency upper limit set in P8.18.



|       |  |                                  |        |
|-------|--|----------------------------------|--------|
| P8.20 | Auxiliary frequency source offset frequency when operation | Factory setting                  | 0.00Hz |
|       | Setting range  | 0.00Hz ~ maximum frequency P0.04 |        |

This function code is valid only the frequency source is select by operation between main and auxiliary.

When the frequency reference is operation of main frequency X and auxiliary frequency Y. The final frequency reference is operation of X and Y, added P8.20 offset frequency, which to make frequency setting more flexible to meet more requirement.

|       |  |   |                     |   |
|-------|--|---|---------------------|---|
| P8.21 | Base frequency for UP/DOWN modification during running |   | Factory setting     | 0 |
|       | Setting range  | 0 | Running frequency   |   |
|       |  | 1 | Frequency reference |   |

This parameter is valid only when the frequency source is digital setting.

It is used to set the base frequency to be modified by using keys ,  and or the terminal UP/DOWN function. If the running frequency and set frequency are different, there will be a large difference between the AC drive's performance during the acceleration/ deceleration process.

|       |  |                 |   |      |
|-------|--|-----------------|---|------|
| P8.22 | Binding command source to frequency source |                 | Factory setting                                   | 0000 |
|       | Setting range                              | Unit digit      | Binding keypad command to frequency source        |      |
|       |  | 0               | No binding  |      |
|       |  | 1               | Frequency source by digital setting               |      |
|       |  | 2               | AI1   |      |
|       |  | 3               | AI2   |      |
|       |  | 4               | Potentiometer                                     |      |
|       |  | 5               | PULSE trains (X5)                                 |      |
|       |  | 6               | Multi-reference                                   |      |
|       |  | 7               | Simple PLC  |      |
|       |  | 8               | PID   |      |
|       |  | 9               | Communication reference                           |      |
|       |  | Ten's digit     | Binding terminal command to frequency source      |      |
|       |  | Hundred's digit | Binding communication command to frequency source |      |

|  |  |                |   |
|--|--|----------------|---|
|  |  | Thousand digit | Auto running, binding to frequency source selection |
|--|--|----------------|---|

It is used to bind the 3 running command sources with the 9 frequency sources, facilitating to implement synchronous switchover.

For details on the frequency sources, see the description of P0.03 (Main frequency source X selection). Different running command sources can be bound to the same frequency source. If a command source has a bound frequency source, the frequency source set in P0.03, P0.14, P0.15, P0.16, P0.17 no longer takes effect when the command source is effective

|       |                          |                    |        |
|-------|--------------------------|--------------------|--------|
| P8.23 | Terminal UP/DOWN rate /s | Factory setting    | 1.00Hz |
|       | Setting range            | 0.001Hz ~ 65.535Hz |        |

It is used to adjust the rate of change of frequency when the frequency is adjusted by means of terminal UP/DOWN

|       |                                 |   |                                     |   |
|-------|---------------------------------|---|-------------------------------------|---|
| P8.24 | Acceleration/ Deceleration mode |   | Factory setting                     | 0 |
|       | Setting range                   | 0 | Linear acceleration/deceleration    |   |
|       |                                 | 1 | S-curve acceleration/deceleration A |   |
|       |                                 | 2 | S-curve acceleration/deceleration B |   |

It is used to set the frequency change mode during the AC drive start and stop process.

0: Linear acceleration/deceleration

The output frequency increases or decreases in linear mode. The AD series AC drive provides four group of acceleration/deceleration time, which can be selected by using P5.00 ~ P5.08.

1: S-curve acceleration/deceleration A

The output frequency increases or decreases along the S curve. This mode is generally used in the applications where start and stop processes are relatively smooth, such as elevator and conveyor belt. P8.25 and P8.26 respectively define the time proportions of the start segment and the end segment.

2: S-curve acceleration/deceleration B

In this curve, the rated motor frequency B, fb is always the inflexion point. This mode is usually used in applications where acceleration/deceleration is required at the speed higher than the rated frequency

$t = (\frac{4}{9} \times (\frac{f}{f_b})^2 + \frac{5}{9}) \times T$  When the frequency is higher than the rated frequency, the acceleration/deceleration time is:  
In the formula, f is the set frequency, fb is the rated motor frequency and T is the acceleration time from 0 Hz to fb.

|       |  |                       |       |
|-------|--|-----------------------|-------|
| P8.25 | Time proportion of S-curve start segment | Factory setting       | 30.0% |
|       | Setting range                            | 0.0% ~ (100.0%-P8.26) |       |
| P8.26 | Time proportion of S-curve end segment   | Factory setting       | 30.0% |

|  |               |                       |
|--|---------------|-----------------------|
|  | Setting range | 0.0% ~ (100.0%-P8.25) |
|--|---------------|-----------------------|

These 2 parameters respectively define the time proportions of the start segment and the end segment of S-curve acceleration/deceleration. They must satisfy the requirement:

$$P8.25 + P8.26 \leq 100.0\%$$

In Figure 6-16,  $t_1$  is the time defined in F6-08, within which the slope of the output frequency change increases gradually.  $t_2$  is the time defined in 6-16, within which the slope of the output frequency change gradually decreases to 0. Within the time between  $t_1$  and  $t_2$ , the slope of the output frequency change remains unchanged, that is, linear acceleration/deceleration.

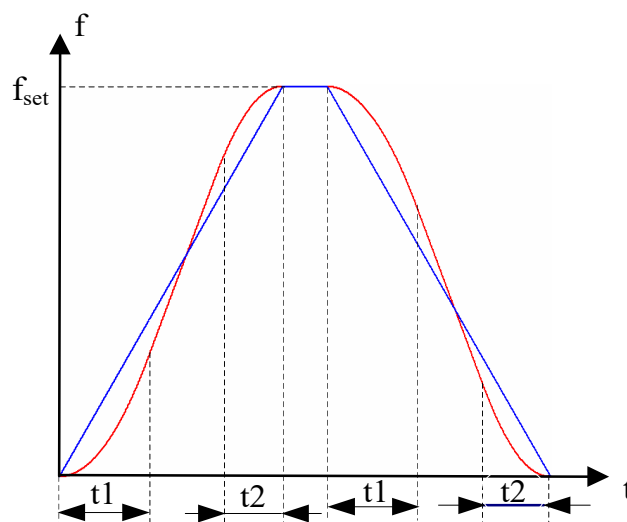


Figure 6-16 S-curve acceleration/deceleration A

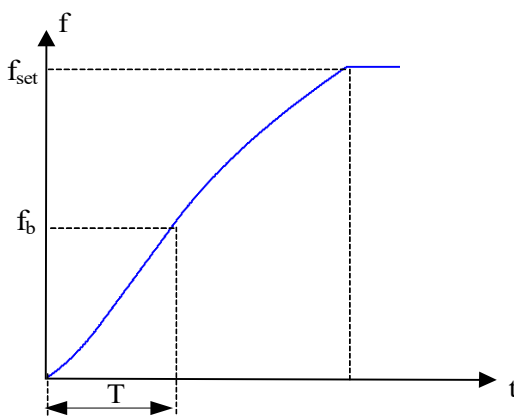


Figure 6-17 S-curve acceleration/deceleration B

|       |   |                 |      |
|-------|---|-----------------|------|
| P8.27 | Forward/Reverse rotation dead-zone time | Factory setting | 0.0s |
|       | Setting range                           | 0.0s ~ 3000.0s  |      |

It is used to set the time when the output is 0 Hz at transition of the AC drive forward rotation and reverse rotation, as shown in the following figure.

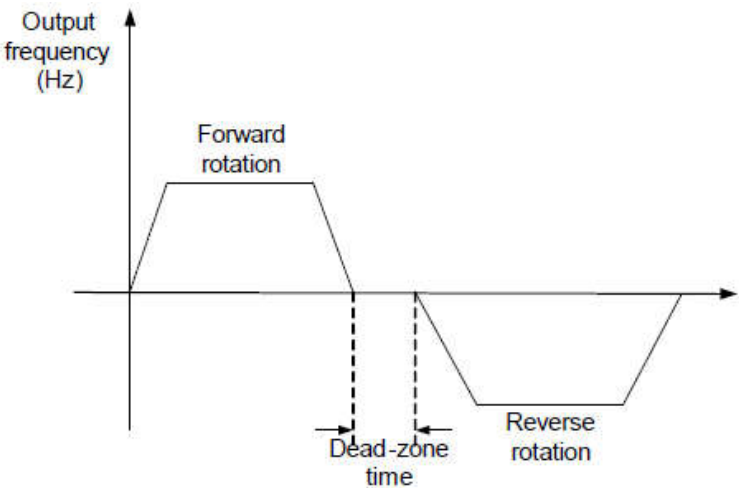


Fig 6-18 Forward/Reverse rotation dead-zone time

|       |   |                 |      |
|-------|---|-----------------|------|
| P8.28 | Stop delay time when running frequency lower than lower limit frequency | Factory setting | 0.0S |
|       | Setting range   | 0.0 ~ 600.0S    |      |

This parameter use to set stop delay time when performance f8.29 function.

|       |  |   |                                    |   |
|-------|--|---|------------------------------------|---|
| P8.29 | Running mode when set frequency lower than lower limit frequency |   | Factory setting                    | 0 |
|       | Setting range  | 0 | Running with lower limit frequency |   |
|       |  | 1 | Stop                               |   |
|       |  | 2 | 0 speed                            |   |

is used to set the AC drive running mode when the set frequency is lower than the frequency lower limit. The AD series drive provides three running modes to satisfy requirements of various applications.

|       |   |   |                 |   |
|-------|---|---|-----------------|---|
| P8.30 | Terminals start up protection when power on |   | Factory setting | 0 |
|       | Setting range                               | 0 | No protection   |   |
|       |   | 1 | Protection      |   |

This parameter is used to set whether to enable the safety protection. If it is set to 1, the AC drive does not respond to the run command valid upon AC drive power-on (for example, an input terminal

is ON before power-on). The AC drive responds only after the run command is cancelled and becomes valid again.

In addition, the AC drive does not respond to the run command valid upon fault reset of the AC drive. The run protection can be disabled only after the run command is cancelled.

In this way, the motor can be protected from responding to run commands upon power-on or fault reset in unexpected conditions.

|       |               |                  |        |
|-------|---------------|------------------|--------|
| P8.31 | Droop control | Factory setting  | 0.00Hz |
|       | Setting range | 0.00Hz ~ 10.00Hz |        |

This function is used for balancing the workload allocation when multiple motors are used to drive the same load. The output frequency of the AC drives decreases as the load increases. You can reduce the workload of the motor under load by decreasing the output frequency for this motor, implementing workload balancing between multiple motors.

|       |   |                                    |         |
|-------|---|------------------------------------|---------|
| P8.32 | Frequency detection value(FDT1)                   | Factory setting                    | 50.00Hz |
|       | Setting range                                     | 0.00Hz ~ maximum frequency         |         |
| P8.33 | Frequency detection hysteresis (FDT hysteresis 1) | Factory setting                    | 5.0%    |
|       | Setting range                                     | 0.0% ~ 100.0% (PDT1 voltage level) |         |

If the running frequency is higher than the value of F8-19, the corresponding DO terminal becomes ON. If the running frequency is lower than value of F8-19, the DO terminal goes OFF

Above 2 parameters are respectively used to set the detection value of output frequency and hysteresis value upon cancellation of the output. The value of P8.33 is a percentage of the hysteresis frequency to the frequency detection value (P8.32).

Fig 6-19 FDT function is shown in the following figure.

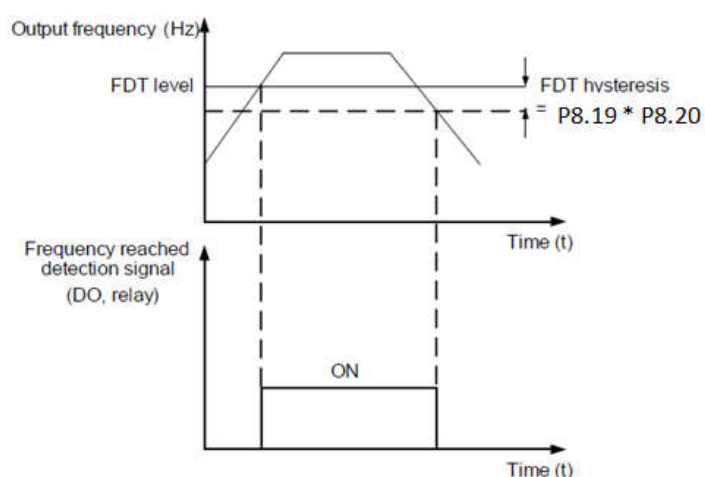


Fig 6-19 FDT showing

|       |                                      |                   |      |
|-------|--------------------------------------|-------------------|------|
| P8.34 | Detection range of frequency reached | Factory setting   | 0.0% |
|       | Setting range                        | 0.0% ~ 100.0% ( ) |      |

If the AC drive running frequency is within the certain range of the set frequency, the corresponding DO terminal becomes ON.

This parameter is used to set the range within which the output frequency is detected to reach the set frequency. The value of this parameter is a percentage relative to the maximum frequency. The detection range of frequency reached is shown in the following figure.

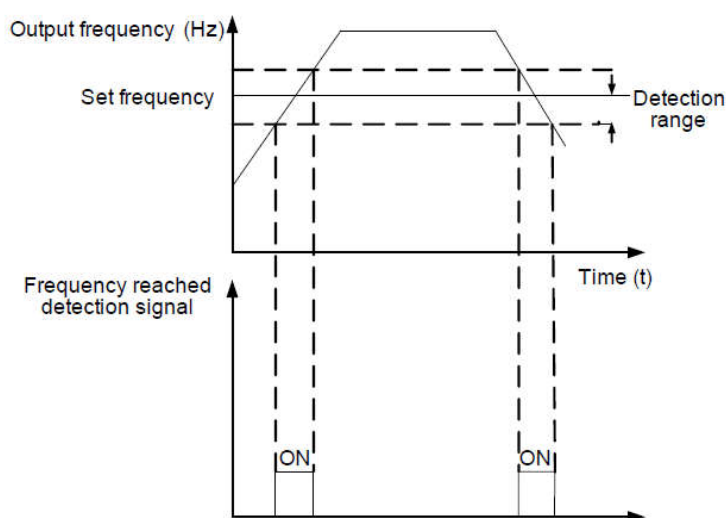


Figure 6-20 Detection range of frequency reached

|       |   |                            |         |
|-------|---|----------------------------|---------|
| P8.35 | Frequency detection value(FDT1)                   | Factory setting            | 50.00Hz |
|       | Setting range                                     | 0.00Hz ~ maximum frequency |         |
| P8.36 | Frequency detection hysteresis (FDT hysteresis 1) | Factory setting            | 5.0%    |
|       | Setting range                                     | 0.0% ~ 100.0% (PDT2 level) |         |

The frequency detection function is the same as FDT1 function. For details, refer to the descriptions of P8.32, P8.33.

|       |  |                            |         |
|-------|--|----------------------------|---------|
| P8.37 | Any frequency reaching detection value 1     | Factory setting            | 50.00Hz |
|       | Setting range                                | 0.00Hz ~ maximum frequency |         |
| P8.38 | Any frequency reaching detection amplitude 1 | Factory setting            | 5.0%    |
|       | Setting range                                | 0.0% ~ 100.0% (maximum     |         |

|       |  |                                   |         |
|-------|--|-----------------------------------|---------|
|       |  | frequency)                        |         |
| P8.39 | Any frequency reaching detection value 2     | Factory setting                   | 50.00Hz |
|       | Setting range                                | 0.00Hz ~ maximum frequency        |         |
| P8.40 | Any frequency reaching detection amplitude 2 | Factory setting                   | 5.0%    |
|       | Setting range                                | 0.0% ~ 100.0% (maximum frequency) |         |

If the output frequency of the AC drive is within the positive and negative amplitudes of the any frequency reaching detection value, the corresponding DO becomes ON.

The AD series AC drive provides two groups of any frequency reaching detection parameters, including frequency detection value and detection amplitude, as shown in the following figure.

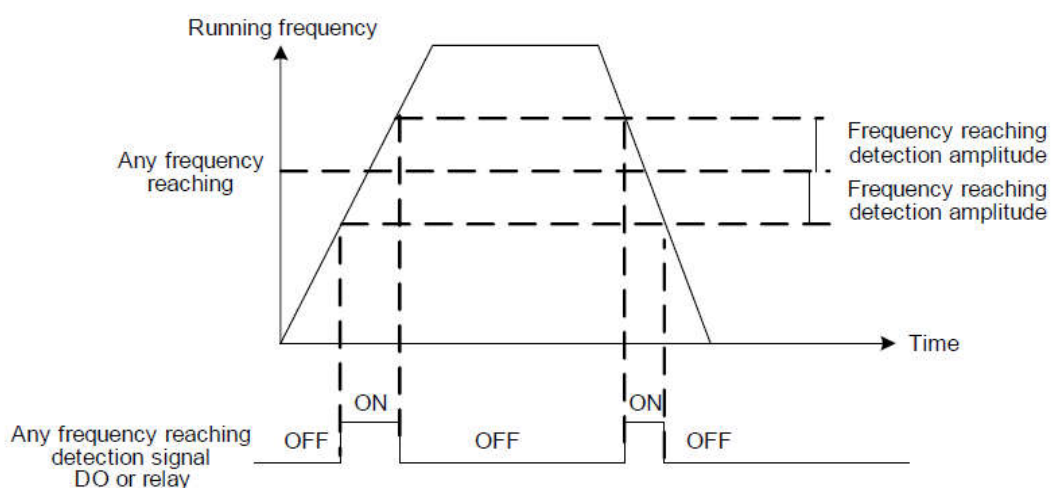


Figure 6-21 Any frequency reaching detection

|       |                                  |   |  |        |
|-------|----------------------------------|---|--|--------|
| P8.42 | Timing of running time selection |   | Factory setting                        | 0      |
|       | Setting range                    | 0 | P8.43 digital reference                |        |
|       |                                  | 1 | AI1                                    |        |
|       |                                  | 2 | AI2                                    |        |
|       |                                  | 3 | Potentiometer                          |        |
|       |                                  |   | 100% of analog corresponding to P8.43. |        |
| P8.43 | Timing of running time           |   | Factory setting                        | 0.0Min |
|       | Setting range                    |   | 0.0Min ~ 6500.0Min                     |        |

This group parameters use to set timing of AC drive running.

When the external programmable terminals timing selection is valid, the timing of AC Drive will activate, AC Drive will stop after a setting time, and the multiple output terminal DO will sent out ON signal as well.

Every time AC drive starting, the timing from 0 beginning, the rest running time can be check through C0.20.

The timing of running time set by P8.42、 P8.43, the unit is minute.

|       |                                   |  |       |
|-------|-----------------------------------|--|-------|
| P8.44 | Zero current detection level      | Factory setting  | 5.0%  |
|       | Setting range                     | 0.0% ~ 300.0%<br>(100% corresponding to rated motor current) stop without output |       |
| P8.45 | Zero current detection delay time | Factory setting  | 0.10s |
|       | Setting range                     | 00.01s ~ 600.00s   |       |

If the output current of the AC drive is equal to or less than the zero current detection level and the duration exceeds the zero current detection delay time, the corresponding DO becomes ON. The zero current detection is shown in the following figure.

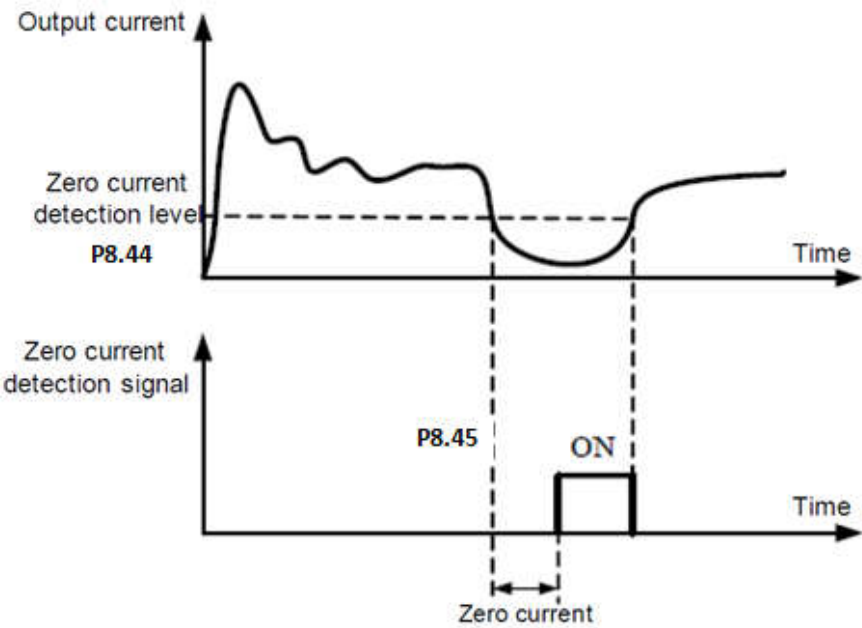


Figure 6-22 Zero current detection

|       |   |   |        |
|-------|---|---|--------|
| P8.46 | output over current threshold by software | Factory setting   | 200.0% |
|       | setting range                             | 0.0% (no detect) 0.1% ~ 300.0% (rated current of motor) |        |
| P8.47 | Output over current                       | Factory setting   | 0.00s  |



|  |                      |                 |  |
|--|----------------------|-----------------|--|
|  | detection delay time |                 |  |
|  | setting range        | 0.00s ~ 600.00s |  |

If the output current of the AC drive is equal to or higher than the over current threshold and the duration exceeds the detection delay time, the corresponding digital terminal DO becomes ON. The output over current detection function is shown in the following figure 6-23.

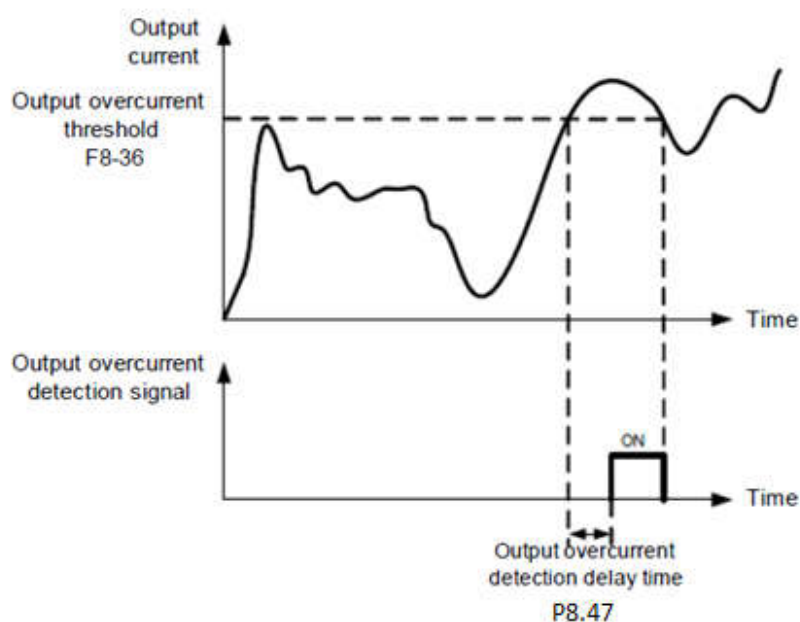


Fig. 6-23 output over current point by software setting

|       |                                  |  |        |
|-------|----------------------------------|--|--------|
| P8.48 | Any current reaching 1           | Factory setting                        | 100.0% |
|       | Setting range                    | 0.0% ~ 300.0%(rated current of motor)  |        |
| P8.49 | Any current reaching 1 amplitude | Factory setting                        | 0.0%   |
|       | Setting range                    | 0.0% ~ 300.0%( rated current of motor) |        |
| P8.50 | Any current reaching 2           | Factory setting                        | 100.0% |
|       | Setting range                    | 0.0% ~ 300.0%( rated current of motor) |        |
| P8.51 | Any current reaching 2 amplitude | Factory setting                        | 0.0%   |
|       | Setting range                    | 0.0% ~ 300.0%( rated current of        |        |

|  |        |
|--|--------|
|  | motor) |
|--|--------|

If the output current of the AC drive is within the positive and negative amplitudes of any current reaching detection value, the corresponding DO becomes ON.

The AD series drives provide two groups of any current reaching detection parameters, including current detection value and detection amplitudes, as shown in the 6-24 figure.

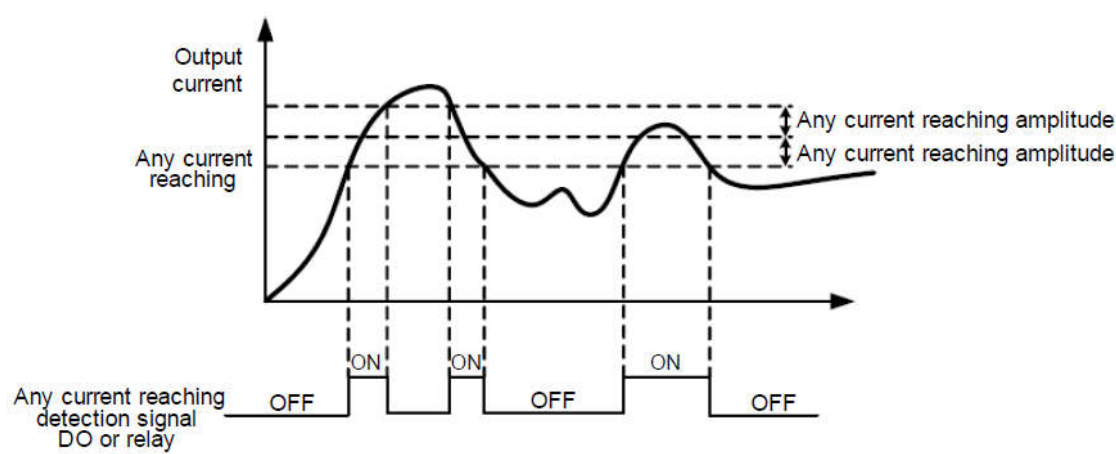


Fig 6-24 Any current reaching detection

|       |                               |                 |       |
|-------|-------------------------------|-----------------|-------|
| P8.52 | AI1 input voltage lower limit | Factory setting | 3.00V |
|       | Setting range                 | 0.00V ~ P8.53   |       |
| P8.53 | AI1 input voltage upper limit | Factory setting | 7.00s |
|       | Setting range                 | P8.52 ~ 11.00V  |       |

These 2 parameters are used to set the limits of the input voltage to provide protection on the AC drive. When the AI1 input is larger than the value of P8.53 or smaller than the value of P8.52, the corresponding DO becomes ON, indicating that AI1 input exceeds the limit

|       |                     |   |   |
|-------|---------------------|---|---|
| P8.54 | Cooling fan control | Factory setting   | 0 |
|       | Setting range       | 0: Fan working during running<br>1: Fan working continuously after power on |   |

It is used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the AC drive is in running state. When the AC drive stops, the cooling fan works if the heatsink temperature is higher than 40°C, and stops working if the heatsink temperature is lower than 40°C. If this parameter is set to 1, the cooling fan keeps working after power-on.

|       |                              |                 |      |
|-------|------------------------------|-----------------|------|
| P8.55 | Module temperature threshold | Factory setting | 75°C |
|       | Setting range                | 0°C ~ 100°C     |      |

When the heat sink temperature of the AC drive reaches the value of this parameter, the corresponding DO becomes ON, indicating that the module temperature reaches the threshold.

|       |                                |  |                    |        |
|-------|--------------------------------|--|--------------------|--------|
| P8.56 | This time running time reached |  | Factory setting    | 0.0Min |
|       | Setting range                  |  | 0.0Min ~ 6500.0Min |        |

When current running time from reached, AC drive digital DO become ON.

|       |               |   |                 |   |
|-------|---------------|---|-----------------|---|
| P8.57 | Motor select  |   | Factory setting | 0 |
|       | Setting range | 0 | Motor 1         |   |
|       |               | 1 | Motor 2         |   |

AD800 can support driving two motors at difference time for 1 AC Drive. It need configure motor nameplate, auto tuning, select difference control mode and ruining parameters.

Motor parameters group1 corresponding to parameters is P2 and P3. Motor parameters group 2 is H2.

JI-350 only can support one motor parameter setting.

P9. PID function group

PID control is a general process control method. By performing proportional, integral and differential operations on the difference between the feedback signal and the target signal, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled counter around the target value.

It is applied to process control such as flow control, pressure control and temperature control. The following figure shows the principle block diagram of PID control.

Figure 6-25 Principle block diagram of PID control

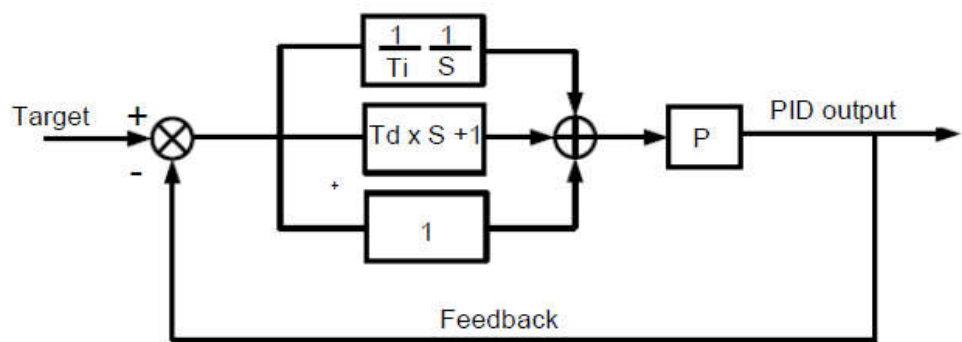


Fig 6-25 Process PID block diagram

|       |                               |   |                               |       |
|-------|-------------------------------|---|-------------------------------|-------|
| P9.00 | PID reference selection       |   | Factory setting               | 0     |
|       | Setting range                 | 0 | Function code P9.01 reference |       |
|       |                               | 1 | AI1                           |       |
|       |                               | 2 | AI2                           |       |
|       |                               | 3 | Potentiometer                 |       |
|       |                               | 4 | PULSE train setting (X5)      |       |
|       |                               | 5 | Communication                 |       |
|       |                               | 6 | Multiple step reference       |       |
| P9.01 | PID reference digital setting |   | Factory setting               | 50.0% |
|       | Setting range                 |   | 0.0% ~ 100.0%                 |       |

This parameter is used to select the channel of target process PID setting. The PID setting is a relative value and ranges from 0.0% to 100.0%. The PID feedback is also a relative value. The purpose of PID control is to make the PID setting and PID feedback equal.

|       |                     |   |                   |               |
|-------|---------------------|---|-------------------|---------------|
| P9.02 | PID feedback source |   | Factory setting   | 0             |
|       | Setting range       | 0 | AI1               |               |
|       |                     | 1 | AI2               |               |
|       |                     | 2 | Reserve           |               |
|       |                     | 3 | AI1-AI2           |               |
|       |                     | 4 | PULSE trains (X5) |               |
|       |                     |   | 5                 | Communication |

|  |  |   |               |
|--|--|---|---------------|
|  |  | 6 | AI1+AI2       |
|  |  | 7 | MAX(AI1, AI2) |
|  |  | 8 | MIN(AI1, AI2) |

This parameter is used to select the feedback signal channel of process PID.

The PID feedback is a relative value and ranges from 0.0% to 100.0%.

|       |                      |   |                 |   |
|-------|----------------------|---|-----------------|---|
| P9.03 | PID action direction |   | Factory setting | 0 |
|       | Setting range        | 0 | Positive        |   |
|       |                      | 1 | Negative        |   |

0: Positive action

When the feedback value is smaller than the PID setting, the AC drive's output frequency rises. For example, the winding tension control requires forward PID action.

1: Negative Reverse action

When the feedback value is smaller than the PID setting, the AC drive's output frequency reduces. For example, the unwinding tension control requires reverse PID action, water constant pressure system.

Note that this function is influenced by the DI function 35 "Negative PID action direction"

|       |                            |  |                 |      |
|-------|----------------------------|--|-----------------|------|
| P9.04 | PID setting feedback range |  | Factory setting | 1000 |
|       | Setting range              |  | 0 ~ 65535       |      |

This parameter is a non-dimensional unit. It is used for PID setting display (C0.13) and PID feedback display (C0.17).

Relative value 100% of PID setting feedback corresponds to the value of P9.04. If P9.04 is set to 3000 and PID setting is 100.0%, the PID setting display (C0.13) is 3000.

|       |                       |  |                  |        |
|-------|-----------------------|--|------------------|--------|
| P9.05 | Proportional gain Kp1 |  | Factory setting  | 20.0   |
|       | Setting range         |  | 0.0 ~ 100.0      |        |
| P9.06 | Integral time Ti1     |  | Factory setting  | 2.00s  |
|       | Setting range         |  | 0.01s ~ 10.00s   |        |
| P9.07 | Differential time Td1 |  | Factory setting  | 0.000s |
|       | Setting range         |  | 0.000s ~ 10.000s |        |

P9.05 (Proportional gain Kp1)

It decides the regulating intensity of the PID regulator. The higher the Kp1 is, the larger the regulating intensity is. The value 100.0 indicates when the deviation between PID feedback and PID setting is 100.0%, the adjustment amplitude of the PID regulator on the output frequency reference is the maximum frequency.

P9.06 (Integral time Ti1)

It decides the integral regulating intensity. The shorter the integral time is, the larger the regulating intensity is. When the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time set in P9.06. Then the adjustment amplitude reaches the maximum frequency.

## P9.07 (Differential time Td1)

It decides the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is. Differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency.

|       |   |                          |        |
|-------|---|--------------------------|--------|
| P9.08 | Cut-off frequency of PID reverse rotation | Factory setting          | 2.00Hz |
|       | Setting range                             | 0.00 ~ maximum frequency |        |

In some situations, only when the PID output frequency is a negative value (AC drive runs in reverse rotation), PID setting and PID feedback can be equal. However, too high reverse rotation frequency is prohibited in some applications, and P9.08 is used to determine the reverse rotation frequency upper limit.

|       |                     |                 |       |
|-------|---------------------|-----------------|-------|
| P9.09 | PID deviation limit | Factory setting | 0.01% |
|       | Setting range       | 0.0% ~ 100.0%   |       |

If the deviation between PID feedback and PID setting is smaller than the value of P9.09, PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize, effective for some closed-loop control applications.

|       |                        |                 |       |
|-------|------------------------|-----------------|-------|
| P9.10 | PID differential limit | Factory setting | 0.01% |
|       | Setting range          | 0.0% ~ 100.0%   |       |

It is used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Thus, the P9.10 PID differential regulation is restricted to a small range.

|       |                         |                 |       |
|-------|-------------------------|-----------------|-------|
| P9.11 | PID setting change time | Factory setting | 0.00s |
|       | Setting range           | 0.00 ~ 650.00s  |       |

The PID setting change time indicates the time required for PID setting changing from 0.0% to 100.0%. The PID setting changes linearly according to the change time, reducing the impact caused by sudden setting change on the system.

|       |                          |                 |       |
|-------|--------------------------|-----------------|-------|
| P9.12 | PID feedback filter time | Factory setting | 0.00s |
|       | Setting range            | 0.00 ~ 60.00s   |       |
| P9.13 | PID output filter time   | Factory setting | 0.00s |
|       | Setting range            | 0.00 ~ 60.00s   |       |

P9.12 is used to filter the PID feedback, helping to reduce interference on the feedback but slowing the response of the process closed-loop system.

P9.13 is used to filter the PID output frequency, helping to weaken sudden change of the AC drive output frequency but slowing the response of the process closed-loop system

|       |                       |                 |      |
|-------|-----------------------|-----------------|------|
| P9.15 | Proportional gain Kp2 | Factory setting | 20.0 |
|       | Setting range         | 0.0 ~ 100.0     |      |

|       |                                      |   |   |        |
|-------|--------------------------------------|---|---|--------|
| P9.16 | Integral time Ti2                    |   | Factory setting                         | 2.00s  |
|       | Setting range                        |   | 0.01s ~ 10.00s                          |        |
| P9.17 | Differential time Td2                |   | Factory setting                         | 0.000s |
|       | Setting range                        |   | 0.000s ~ 10.000s                        |        |
| P9.18 | PID parameter switchover condition   |   | Factory setting                         | 0      |
|       | Setting range                        | 0 | No switchover                           |        |
|       |                                      | 1 | X terminal                              |        |
|       |                                      | 2 | Automatic switchover based on deviation |        |
| P9.19 | PID parameter switchover deviation 1 |   | Factory setting                         | 20.0%  |
|       | Setting range                        |   | 0.0% ~ PA.20                            |        |
| P9.20 | PID parameter switchover deviation 2 |   | Factory setting                         | 80.0%  |
|       | Setting range                        |   | PA.19 ~ 100.0%                          |        |

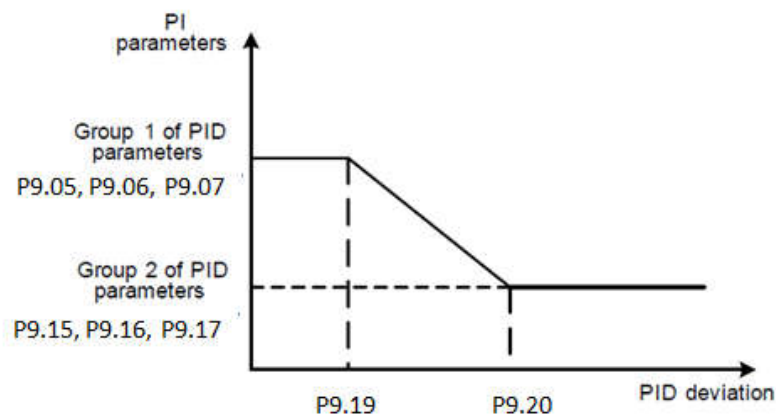
In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process.

These parameters are used for switchover between two groups of PID parameters. Regulator parameters P9.15 ~ P9.17 are set in the same way as P0.15 ~ P0.17.

The switchover can be implemented either via a XI terminal or automatically implemented based on the deviation.

If you select switchover via a XI terminal, the XI must be allocated with function 43 "PID parameter switchover". When the XI is OFF, group 1 (P0.15 ~ P0.17) will be selected. When the XI is ON, group 2 (P9.15 ~ P9.17) is selected.

If you select automatic switchover, when the absolute value of the deviation between PID feedback and PID setting is smaller than the value of P9.19, PID parameters will be selected group 1. When the absolute value of the deviation between PID feedback and PID setting is higher than the value of P9.20, group 2 is selected. For PID parameters. When the deviation is between P9.19 and P9.20, the PID parameters are the linear interpolated value of the two groups of parameter values. Please see Fig, 6-26 PID parameters switchover diagram.



6-26 PID parameters switchover

|       |                                |                 |       |
|-------|--------------------------------|-----------------|-------|
| P9.21 | PID initial value              | Factory setting | 0.0%  |
|       | Setting range                  | 0.0% ~ 100.0%   |       |
| P9.22 | PID initial value holding time | Factory setting | 0.00s |
|       | Setting range                  | 0.00 ~ 650.00s  |       |

When the AC drive starts. The PID output a constant PID initial value (P9.21), and will runs with a holding time (P9.22). Only after this, PID will carry out closed-loop algorithm

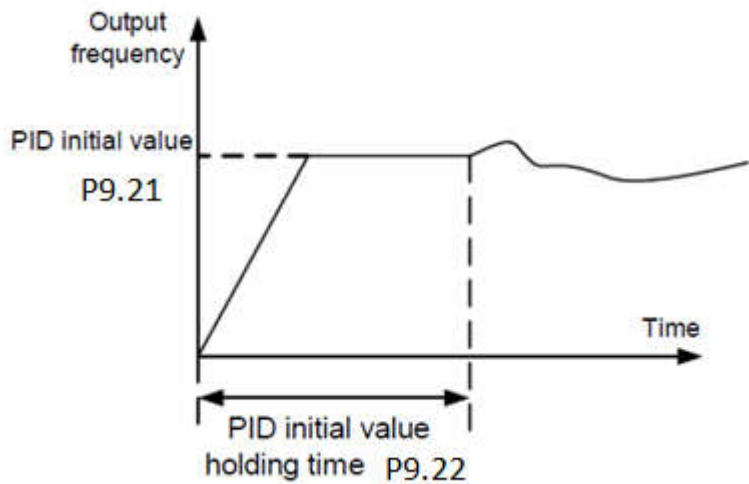


Figure 6-29 PID initial value function

|       |  |                 |       |
|-------|--|-----------------|-------|
| P9.23 | Maximum deviation between two PID outputs in forward direction | Factory setting | 1.00% |
|       | Setting range  | 0.00% ~ 100.00% |       |
| P9.24 | Maximum deviation between two PI D outputs in reverse          | Factory setting | 1.00% |



|  |               |                 |  |
|--|---------------|-----------------|--|
|  | direction     |                 |  |
|  | Setting range | 0.00% ~ 100.00% |  |

This function is used to limit the deviation between two PID outputs (2 ms per PID output) to suppress the rapid change of PID output and stabilize the running of the AC drive.

P9.23 and P9.24 respectively correspond to the maximum absolute value of the output deviation in forward direction and in reverse direction.

|       |                       |              |  |    |
|-------|-----------------------|--------------|--|----|
| P9.25 | PID integral property |              | Factory setting  | 00 |
|       | Setting range         | Unit's digit | Integral separated   |    |
|       |                       | 0            | Disable  |    |
|       |                       | 1            | Enable   |    |
|       |                       | Ten's digit  | Whether to stop integral operation when the output reaches the limit |    |
|       |                       | 0            | Continue integral operation  |    |
|       |                       | 1            | Stop integral operation  |    |

Integral separated, If it is set to valid, the PID integral operation stops when the XI allocated with function

22 "PID integral pause" is ON In this case, only proportional and differential operations take effect. If it is set to invalid, integral separated remains invalid no matter whether the XI allocated with function 22 "PID integral pause" is ON or not.

Whether to stop integral operation when the output reaches the limit, If "Stop integral operation" is selected, the PID integral operation stops, which may help to reduce the PID overshoot.

|       |                                      |  |      |
|-------|--------------------------------------|--|------|
| P9.26 | Detection value of PID feedback loss | Factory setting                                | 0.0% |
|       | Setting range                        | 0.0%: Not judging feedback loss; 0.1% ~ 100.0% |      |
| P9.27 | Detection time of PID feedback loss  | Factory setting                                | 0.0s |
|       | Setting range                        | 0.0s ~ 20.0s                                   |      |

These parameters are used to judge whether PID feedback is lost.

If the PID feedback is smaller than the value of P9.26 and the lasting time exceeds the value of P9.27, the AC drive reports Err33 and acts according to the selected fault protection action

|       |                       |   |                          |   |
|-------|-----------------------|---|--------------------------|---|
| P9.28 | PID operation at stop |   | Factory setting          | 0 |
|       | Setting range         | 0 | No PID operation at stop |   |
|       |                       | 1 | PID operation at stop    |   |

It is used to select whether to continue PID operation in the state of stop. Generally, the PID operation stops when the AC drive stops

|       |                            |   |                           |
|-------|----------------------------|---|---------------------------|
| P9.29 | Wakeup frequency           | Factory setting                                     | 0.0%                      |
|       | Setting range              | Sleeping frequency (P9.31) ~ max. frequency (P0.04) |                           |
| P9.30 | Wakeup delay time          | Factory setting                                     | 0.0s                      |
|       | Setting range              | Factory   |                           |
| P9.31 | Sleeping frequency         | Factory   | setting                   |
|       | Setting range              | 0.00Hz ~ Wakeup frequency (P9.29)                   |                           |
| P9.32 | Sleeping delay time        | Factory setting                                     | 0.0s                      |
|       | Setting range              | 0.0s ~ 6500.0s                                      |                           |
| P9.33 | Wake up function selection | Factory setting                                     | 0                         |
|       | Setting range              | 0   | Set by frequency (P9.29)  |
|       |                            | 1   | Set by percentage (P9.34) |
| P9.34 | Wake up threshold value    | Factory setting                                     | 0.0%                      |
|       | Setting range              | 0.0% ~ 100%   |                           |

These parameters are used to implement the dormant and wakeup functions in the water supply application.

When the AC drive is in running state, the AC drive enters the sleeping state and stops automatically after the sleeping delay time (P9.32) if the set frequency is lower than or equal to the sleeping frequency (P9.31).

When the AC drive is in sleeping state and the current running command is effective, the AC drives starts up after the wakeup delay time (P9.30) if the set frequency is higher than or equal to the wakeup frequency (P9.29).

Generally, set the wakeup frequency equal to or higher than the sleeping frequency. If the wakeup frequency and sleeping frequency are set to 0, the dormant and wakeup functions are disabled.

When the sleeping function is enabled, if the frequency source is PID, whether PID operation is performed in the sleeping state is determined by P9.28. In this case, select PID operation enabled in the stop state (P9.28=1).

The Wake up threshold value is corresponding to percentage of PID reference P9.01. In the sleeping mode, AC drive will restart after a delay time P9.30, once it meet conditions, which the PID feedback value is not larger than (P9.01) \*P9.34 setting.

In the sleeping mode, the RUN indicator of keypad will be flash slowly.

## PA. Multi-Reference and Simple PLC Function

The AD series AC drive multi-reference has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID. In addition, the multi-reference is relative value.

| Function code | Name                    | Setting range | Factory value |
|---------------|-------------------------|---------------|---------------|
| PA.00         | Multi-step frequency 1  | -100% ~ 100%  | 5.0%          |
| PA.01         | Multi-step frequency 2  | -100% ~ 100%  | 10.0%         |
| PA.02         | Multi-step frequency 3  | -100% ~ 100%  | 15.0%         |
| PA.03         | Multi-step frequency 4  | -100% ~ 100%  | 20.0%         |
| PA.04         | Multi-step frequency 5  | -100% ~ 100%  | 25.0%         |
| PA.05         | Multi-step frequency 6  | -100% ~ 100%  | 30.0%         |
| PA.06         | Multi-step frequency 7  | -100% ~ 100%  | 35.0%         |
| PA.07         | Multi-step frequency 8  | -100% ~ 100%  | 40.0%         |
| PA.08         | Multi-step frequency 9  | -100% ~ 100%  | 45.0%         |
| PA.09         | Multi-step frequency 10 | -100% ~ 100%  | 50.0%         |
| PA.10         | Multi-step frequency 11 | -100% ~ 100%  | 55.0%         |
| PA.11         | Multi-step frequency 12 | -100% ~ 100%  | 60.0%         |
| PA.12         | Multi-step frequency 13 | -100% ~ 100%  | 65.0%         |
| PA.13         | Multi-step frequency 14 | -100% ~ 100%  | 70.0%         |
| PA.14         | Multi-step frequency 15 | -100% ~ 100%  | 75.0%         |
| PA.15         | Multi-step frequency 16 | -100% ~ 100%  | 80.0%         |

Multi- step frequency can be the setting source of frequency, V/F separated voltage and process PID. The multi- step frequency is relative value and ranges from -100.0% to 100.0%. As frequency source, it is a percentage relative to the maximum frequency. when value is negative, stands for motor runs in reverse.

As V/F separated voltage source, it is a percentage relative to the rated motor voltage. As process PID setting source, it does not require conversion.

Multi-reference can be switched over based on different states of XI terminals. For details, see the descriptions of group P5.

Take example, when the main frequency is set by external potentiometer, the speed adjusting is available. Press the switch 1, frequency will be run with 45hz, press switch 2, AC Drive runs with 45hz, if release switch 2, restore to frequency reference setting by potentiometer.

Parameters setting as following:

| Function code | Setting value | Description                                      |
|---------------|---------------|--|
| P0.03         | 7             | Select control by multi-step frequency reference |
| P0.04         | 60.0          | Set maximum frequency                            |
| P0.05         | 60.0          | Set upper limit frequency                        |
| P5.03         | 12 (default ) | switch 1 connect to X4                           |
| P5.04         | 13 (default ) | switch 2 connect to X5                           |

|       |     |  |
|-------|-----|--|
| PA.00 | 100 | Maximum range of potentiometer adjusting ( relative to percentage of P0.04 ) |
| PA.01 | 30  | 20Hz corresponding to 30% of 60Hz.   |
| PA.02 | 75  | 45Hz corresponding to 75% of 60Hz.   |
| PA.51 | 1   | Potentiometer signal connect to AI1  |

|       |                         |   |   |   |
|-------|-------------------------|---|---|---|
| PA.16 | Simple PLC running mode |   | Factory setting                                     | 0 |
|       | Setting range           | 0 | Stop after the AC drive runs one cycle              |   |
|       |                         | 1 | Keep final values after the AC drive runs one cycle |   |
|       |                         | 2 | Repeat after the AC drive runs one cycle            |   |

Simple PLC can be either the frequency source or V/F separated voltage source.

When it used for frequency source, it has 3 running mode. It is disable when used for VF separation VF voltage source.

0: Stop after the AC drive runs one cycle

The AC drive stops after running one cycle, and will not start up until receiving another command.

1: Keep final values after the AC drive runs one cycle

The AC drive keeps the final running frequency and direction after running one cycle.

2: Repeat after the AC drive runs one cycle

The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving the stop command.

When simple PLC is used as the frequency source, whether parameter values of PA.00 to PA.15 are positive or negative determines the running direction. If the parameter values are negative, it indicates that the AC drive runs in reverse direction.

Bellow Fig illustrates simple PLC when used as frequency source

|       |   |              |                              |    |
|-------|---|--------------|------------------------------|----|
| PA.17 | Simple PLC memorized power down selection |              | Factory setting              | 00 |
|       | Setting range                             | Unit's digit | Retentive upon power failure |    |
|       |   | 0            | No                           |    |
|       |   | 1            | Yes                          |    |
|       |   | Ten's digit  | Retentive upon stop          |    |
|       |   | 0            | No                           |    |
|       |   | 1            | Yes                          |    |

PLC retentive upon power failure indicates that the AC drive memorizes the PLC running moment and running frequency before power failure and will continue to run from the memorized moment after it is powered on again. If the unit's digit is set to 0, the AC drive restarts the PLC process after it is powered on again.

PLC retentive upon stop indicates that the AC drive records the PLC running moment and running frequency upon stop and will continue to run from the recorded moment after it starts up again. If the ten's digit is set to 0, the AC drive restarts the PLC process after it starts up again.

|       |   |                      |         |
|-------|---|----------------------|---------|
| PA.18 | Simple PLC 1st step running time                                  | factory setting      | 0.0s(h) |
|       | Setting range   | 0.0s(h) ~ 6553.5s(h) |         |
| PA.19 | Acceleration/deceleration time of simple PLC step 1st             | factory setting      | 0       |
|       | Setting range   | 0 ~ 3                |         |
| PA.20 | Simple PLC 2 <sup>nd</sup> step running time                      | factory setting      | 0.0s(h) |
|       | Setting range   | 0.0s(h) ~ 6553.5s(h) |         |
| PA.21 | Acceleration/deceleration time of simple PLC step 2 <sup>nd</sup> | factory setting      | 0       |
|       | Setting range   | 0 ~ 3                |         |
| PA.22 | Simple PLC 3 <sup>rd</sup> step running time                      | factory setting      | 0.0s(h) |
|       | Setting range   | 0.0s(h) ~ 6553.5s(h) |         |
| PA.23 | Acceleration/deceleration time of simple PLC step 3 <sup>rd</sup> | factory setting      | 0       |
|       | Setting range   | 0 ~ 3                |         |
| PA.24 | Simple PLC 4 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |
|       | setting range   | 0.0s(h) ~ 6553.5s(h) |         |
| PA.25 | Acceleration/deceleration time of simple PLC step 4 <sup>th</sup> | factory setting      | 0       |
|       | setting range   | 0 ~ 3                |         |
| PA.26 | Simple PLC 5 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |
|       | setting range   | 0.0s(h) ~ 6553.5s(h) |         |
| PA.27 | Acceleration/deceleration time of simple PLC step 5 <sup>th</sup> | factory setting      | 0       |
|       | setting range   | 0 ~ 3                |         |
| PA.28 | Simple PLC 6 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |
|       | setting range   | 0.0s(h) ~ 6553.5s(h) |         |
| PA.29 | Acceleration/deceleration time of simple PLC step 6 <sup>th</sup> | factory setting      | 0       |
|       | setting range   | 0 ~ 3                |         |
| PA.30 | Simple PLC 7 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |

|       |  |                      |         |
|-------|--|----------------------|---------|
|       | setting range  | 0.0s(h) ~ 6553.5s(h) |         |
| PA.31 | Acceleration/deceleration time of simple PLC step 7 <sup>th</sup>  | factory setting      | 0       |
|       | setting range  | 0 ~ 3                |         |
| PA.32 | Simple PLC 8 <sup>th</sup> step running time                       | factory setting      | 0.0s(h) |
|       | setting range  | 0.0s(h) ~ 6553.5s(h) |         |
| PA.33 | Acceleration/deceleration time of simple PLC step 8 <sup>th</sup>  | factory setting      | 0       |
|       | setting range  | 0 ~ 3                |         |
| PA.34 | Simple PLC 9 <sup>th</sup> step running time                       | factory setting      | 0.0s(h) |
|       | setting range  | 0.0s(h) ~ 6553.5s(h) |         |
| PA.35 | Acceleration/deceleration time of simple PLC step 9 <sup>th</sup>  | factory setting      | 0       |
|       | setting range  | 0 ~ 3                |         |
| PA.36 | Simple PLC 10 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |
|       | setting range  | 0.0s(h) ~ 6553.5s(h) |         |
| PA.37 | Acceleration/deceleration time of simple PLC step 10 <sup>th</sup> | factory setting      | 0       |
|       | setting range  | 0 ~ 3                |         |
| PA.38 | Simple PLC 11 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |
|       | setting range  | 0.0s(h) ~ 6553.5s(h) |         |
| PA.39 | Acceleration/deceleration time of simple PLC step 11 <sup>th</sup> | factory setting      | 0       |
|       | setting range  | 0 ~ 3                |         |
| PA.40 | Simple PLC 12 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |
|       | setting range  | 0.0s(h) ~ 6553.5s(h) |         |
| PA.41 | Acceleration/deceleration time of simple PLC step 12 <sup>th</sup> | factory setting      | 0       |
|       | setting range  | 0 ~ 3                |         |
| PA.42 | Simple PLC 13 <sup>th</sup> step running time                      | factory setting      | 0.0s(h) |
|       | setting range  | 0.0s(h) ~ 6553.5s(h) |         |
| PA.43 | Acceleration/deceleration time of simple PLC step 13 <sup>th</sup> | factory setting      | 0       |
|       | setting range  | 0 ~ 3                |         |
| PA.44 | Simple PLC 14 <sup>th</sup> step                                   | factory setting      | 0.0s(h) |

|       |  |   |   |         |
|-------|--|---|---|---------|
|       | running time   |   |   |         |
|       | setting range  |   | 0.0s(h) ~ 6553.5s(h)                                |         |
| PA.45 | Acceleration/deceleration time of simple PLC step 14 <sup>th</sup> |   | factory setting                                     | 0       |
|       | setting range  |   | 0 ~ 3   |         |
| PA.46 | Simple PLC 15 <sup>th</sup> step running time                      |   | factory setting                                     | 0.0s(h) |
|       | setting range  |   | 0.0s(h) ~ 6553.5s(h)                                |         |
| PA.47 | Acceleration/deceleration time of simple PLC step 15 <sup>th</sup> |   | factory setting                                     | 0       |
|       | setting range  |   | 0 ~ 3   |         |
| PA.48 | Simple PLC 16 <sup>th</sup> step running time                      |   | factory setting                                     | 0.0s(h) |
|       | setting range  |   | 0.0s(h) ~ 6553.5s(h)                                |         |
| PA.49 | Acceleration/deceleration time of simple PLC step 16 <sup>th</sup> |   | factory setting                                     | 0       |
|       | setting range  |   | 0 ~ 3   |         |
| PA.50 | Simple PLC running time unit                                       |   | factory setting                                     | 0       |
|       | setting range  | 0 | S (s)   |         |
|       |  | 1 | h (H)   |         |
| PA.51 | The 1st step frequency reference                                   |   | Factory setting                                     | 0       |
|       | Setting range  | 0 | Digital PA.00                                       |         |
|       |  | 1 | AI1   |         |
|       |  | 2 | AI2   |         |
|       |  | 3 | Potentiometer                                       |         |
|       |  | 4 | PULSE trains  |         |
|       |  | 5 | PID   |         |
|       |  | 6 | Pre-set frequency by P0.07, and changed by UP/DOWN. |         |

It determines the setting channel of multi-step frequency 1. You can perform convenient switchover between the setting channels. When multi-step frequency or simple PLC is used as frequency source, the switchover between two frequency sources can be realized easily.

**Pb. Swing Frequency, Fixed Length and Count Group**

The swing frequency function is applied to the textile and chemical fiber fields and the applications where traversing and winding functions are required.

The swing frequency function indicates that the output frequency of the AC drive swings up and down with the set frequency as the center. The trace of running frequency at the time axis is shown in the 6-28 figure.

The swing amplitude is set in Pb-00 and P-01. When Pb-01 is set to 0, the swing amplitude is 0 and the swing frequency does not take effect.

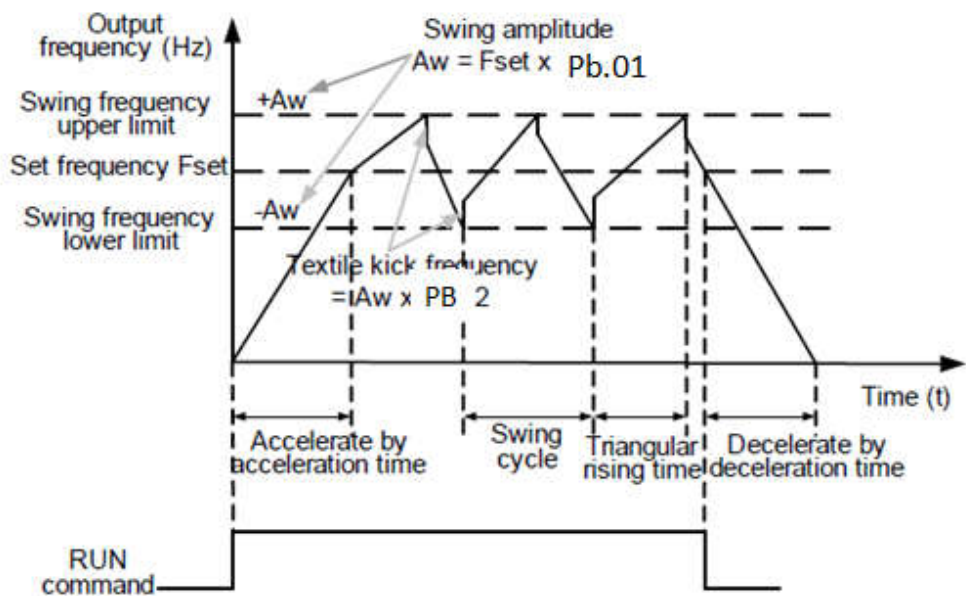


Figure 6-28 Swing frequency control

|       |                              |   |                                   |   |
|-------|------------------------------|---|-----------------------------------|---|
| Pb.00 | Swing frequency setting mode |   | factory setting                   | 0 |
|       | setting range                | 0 | Relative to the central frequency |   |
|       |                              | 1 | Relative to the maximum frequency |   |

This parameter is used to select the base value of the swing amplitude.

0: Relative to the central frequency (P0-07 frequency source selection)

It is variable swing amplitude system. The swing amplitude varies with the central frequency (set frequency).

1: Relative to the maximum frequency (P0-10 maximum output frequency)

It is fixed swing amplitude system. The swing amplitude is fixed.

|       |                           |                 |      |
|-------|---------------------------|-----------------|------|
| Pb.01 | Swing frequency amplitude | factory setting | 0.0% |
|-------|---------------------------|-----------------|------|



|       |                          |                 |      |
|-------|--------------------------|-----------------|------|
|       | setting range            | 0.0% ~ 100.0%   |      |
| Pb.02 | Jump frequency amplitude | factory setting | 0.0% |
|       | setting range            | 0.0% ~ 50.0%    |      |

This parameter is used to determine the swing amplitude and jump frequency amplitude.

The swing frequency is limited by the frequency upper limit and frequency lower limit.

If relative to the central frequency (Pb.00 = 0), the actual swing amplitude AW is the calculation result of P0.17 (Frequency source selection) multiplied by Pb.00=1.

If relative to the maximum frequency (Pb.00 = 1), the actual swing amplitude AW is the calculation result of Pb.00=1 (Maximum frequency) multiplied by Pb.01.

Jump frequency = Swing amplitude AW x PB-02 (Jump frequency amplitude).

If relative to the central frequency (Pb.00 = 0), the jump frequency is a variable value.

If relative to the maximum frequency (Pb.00 = 1), the jump frequency is a fixed value.

The swing frequency is limited by the frequency upper limit and frequency lower limit.

|       |   |                 |       |
|-------|---|-----------------|-------|
| Pb.03 | Swing frequency cycle                   | factory setting | 10.0s |
|       | setting range                           | 0.0s ~ 3000.0s  |       |
| Pb.04 | Triangular wave rising time coefficient | factory setting | 50.0% |
|       | setting range                           | 50.0% ~ 100.0%  |       |

Pb. 03 specifies the time of a complete swing frequency cycle.

Pb. 04 specifies the time percentage of triangular wave rising time to Pb. 03 (Swing frequency cycle).

Triangular wave rising time = Pb.03 (Swing frequency cycle) x Pb.04 (Triangular wave rising time coefficient, unit: s)

Triangular wave falling time = Pb.03 (Swing frequency cycle) x (1 – Pb.04 Triangular wave rising time coefficient ,unit: s)

|       |                            |                 |       |
|-------|----------------------------|-----------------|-------|
| Pb.05 | Set length                 | factory setting | 1000m |
|       | setting range              | 0m ~ 65535m     |       |
| Pb.06 | Actual length              | factory setting | 0m    |
|       | setting range              | 0m ~ 65535m     |       |
| Pb.07 | Number of pulses per meter | factory setting | 100.0 |
|       | setting range              | 0.1 ~ 6553.5    |       |

The preceding parameters are used for fixed length control.

The length information is collected by XI terminals. Pb.06 (Actual length) is calculated by dividing the number of pulses collected by the XI terminal by Pb.07 (Number of pulses each meter).

When the actual length PB-06 exceeds the set length in Pb.05, the DO terminal allocated with function 10 (Length reached) becomes ON.

During the fixed length control, the length reset operation can be performed via the XI terminal allocated with function 30. For details, see the descriptions of P5.00 ~ P5.09.

Allocate corresponding XI terminal with function 31 (Length count input) in applications. If the pulse frequency is high, X5 must be used.

|       |                        |                 |      |
|-------|------------------------|-----------------|------|
| Pb.08 | Set count value        | factory setting | 1000 |
|       | setting range          | 1 ~ 65535       |      |
| Pb.09 | Designated count value | factory setting | 1000 |
|       | setting range          | 1 ~ 65535       |      |

The count value needs to be collected by XI terminal. Allocate the corresponding XI terminal with function 25 (Counter input) in applications. If the pulse frequency is high speed, X5 must be used.

When the count value reaches the set count value (Pb.08), the DO terminal allocated with function 15 (Set count value reached) becomes ON. Then the counter stops counting.

When the counting value reaches the designated counting value (Pb.09), the DO terminal allocated with function 16 (Designated count value reached) becomes ON. Then the counter continues to count until the set count value is reached.

Pb.09 should be equal to or smaller than Pb.08.

Pb.09 should be equal to or smaller than Pb.08.

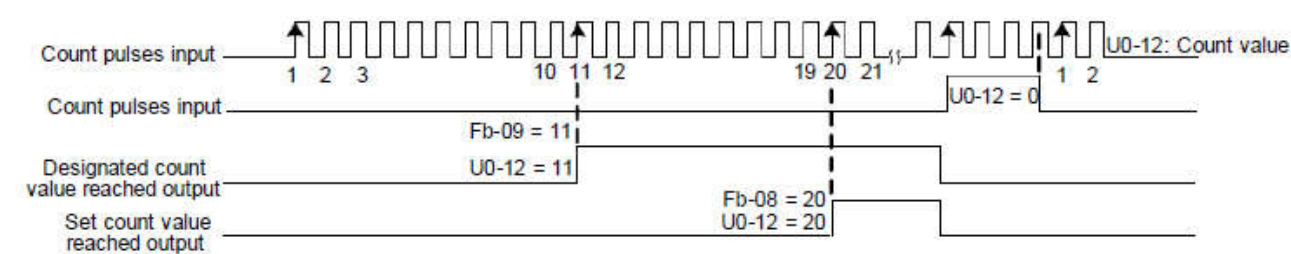


Fig 6-29 Reaching the set count value and designated count value

**PC. Fault and Protection**

|       |                                     |   |                 |   |
|-------|-------------------------------------|---|-----------------|---|
| PC.00 | Motor overload protection selection |   | factory setting | 1 |
|       | setting range                       | 0 | Disabled        |   |
|       |                                     | 1 | Enable          |   |
| PC.01 | Motor overload protection gain      |   | factory setting | 1 |
|       | setting range                       |   | 0.20 ~ 10.0     |   |

PC.00=0: The motor overload protective function is disabled. The motor is exposed to potential damage due to overheating. A thermal relay is suggested to be installed between the AC drive and the motor.

PC.01=1: The AC drive judges whether the motor is overloaded according to the inverse time-lag curve of the motor overload protection.

The inverse time-lag curve of the motor overload protection is:

$220\% \times (\text{PC.01}) \times \text{rated motor current}$  (if the load remains at this value for one minute, the AC drive reports motor overload fault), or  $150\% \times (\text{PC.01}) \times \text{rated motor current}$  (if the load remains at this value for 60 minutes, the AC drive reports motor overload fault)

Set PC.01 properly based on the actual overload capacity. If the value of PC.01 is set too large, damage to the motor may result because the motor overheats but the AC drive does not report the alarm.

|       |                                    |  |                 |     |
|-------|------------------------------------|--|-----------------|-----|
| PC.02 | Motor overload warning coefficient |  | factory setting | 80% |
|       | setting range                      |  | 50% ~ 100%      |     |

This function is used to give a warning signal to the control system via DO before motor overload protection. This parameter is used to determine the percentage, at which pre-warning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be.

When the accumulative output current of the AC drive is greater than the value of the overload inverse time-lag curve multiplied by PC.02, the DO terminal on the AC drive allocated with function 6 (Motor overload pre-warning) becomes ON.

|       |                                      |  |                 |      |
|-------|--------------------------------------|--|-----------------|------|
| PC.03 | Overvoltage stall gain               |  | factory setting | 0    |
|       | setting range                        |  | 0 ~ 100         |      |
| PC.04 | Overvoltage stall protective voltage |  | factory setting | 130% |
|       | setting range                        |  | 120% ~ 150%     |      |

When the DC bus voltage exceeds the value of PC.04 (Overvoltage stall protective voltage) during deceleration of the AC drive, the AC drive stops deceleration and keeps the present running frequency. After the bus voltage declines, the AC drive continues to decelerate.

PC.03 (Overvoltage stall gain) is used to adjust the overvoltage suppression capacity of the AC drive. The larger the value is, the greater the overvoltage suppression capacity will be. In the prerequisite of no overvoltage occurrence, set PC.03 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow.

For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and an overvoltage fault may occur.

If the overvoltage stall gain is set to 0, the overvoltage stall function is disabled. The overvoltage stall protective voltage setting 100% corresponds to the base values in the following table:  
below Overvoltage stall protective voltage setting 100% corresponds to base values

| Voltage Class | Corresponding Base Value |
|---------------|--------------------------|
| 1 phase 220V  | 290V                     |
| 3 phase 220V  | 290V                     |
| 3 phase 380V  | 530V                     |
| 3 phase 480V  | 620V                     |
| 3 phase 690V  | 880V                     |

|       |                                       |                 |      |
|-------|---------------------------------------|-----------------|------|
| PC.05 | Over current stall gain               | factory setting | 20   |
|       | setting range                         | 0 ~ 100         |      |
| PC.06 | Over current stall protective current | factory setting | 150% |
|       | setting range                         | 100% ~ 200%     |      |

When the output current exceeds the over current stall protective current during acceleration/ deceleration of the AC drive, the AC drive stops acceleration/deceleration and keeps the present running frequency. After the output current declines, the AC drive continues to accelerate/decelerate.

PC.06 (Over current stall gain) is used to adjust the over current suppression capacity of the AC drive. The larger the value is, the greater the over current suppression capacity will be. In the prerequisite of no over current occurrence, set PC.06 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and over current fault may occur.

If the over current stall gain is set to 0, the over current stall function is disabled.

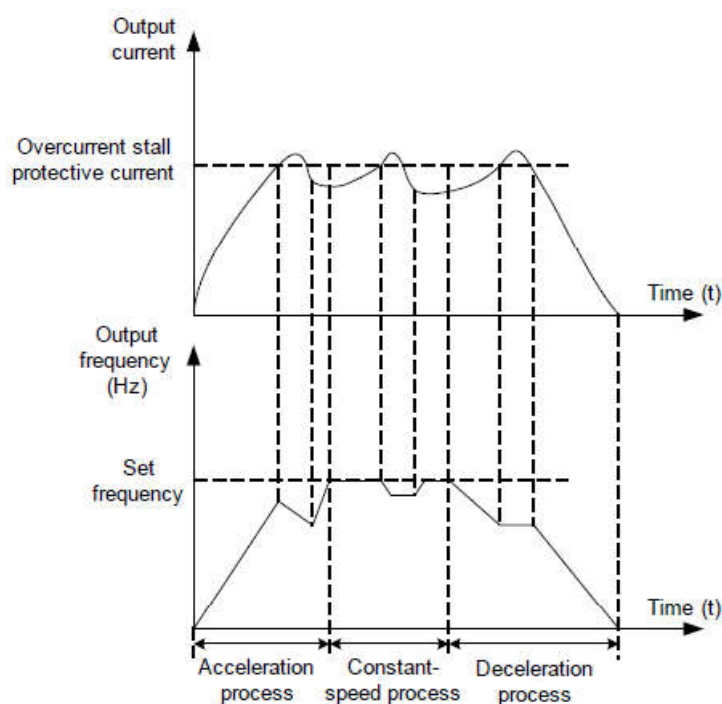


Diagram of the over current stall protection function

|       |                        |                 |   |
|-------|------------------------|-----------------|---|
| PC.08 | Fault auto reset times | factory setting | 0 |
|       | setting range          | 0 ~ 20          |   |

It is used to set the times of fault auto resets if this function is used. After the value is exceeded, the AC drive will remain in the fault state

|       |                                   |                 |   |
|-------|-----------------------------------|-----------------|---|
| PC.09 | DO action during fault auto reset | factory setting | 1 |
|       | setting range                     | 0: NO 1: Yes    |   |

It is used to decide whether the DO acts during the fault auto reset if the fault auto reset function is selected.

|       |                                   |                 |      |
|-------|-----------------------------------|-----------------|------|
| PC.10 | Time interval of fault auto reset | factory setting | 1.0s |
|       | setting range                     | 0.1s ~ 100.0s   |      |

It is used to set the waiting time from the alarm of the AC drive to fault auto reset

|       |                                |                       |   |
|-------|--------------------------------|-----------------------|---|
| PC.11 | Input phase missing protection | factory setting       | 1 |
|       | setting range                  | 0: forbidden 1: Allow |   |

It is used to determine whether to perform input phase missing.

|       |                       |                 |   |
|-------|-----------------------|-----------------|---|
| PC.12 | output phase missing. | factory setting | 1 |
|-------|-----------------------|-----------------|---|

|  | setting range | 0: forbidden | 1: Allow |
|--|---------------|--------------|----------|
|--|---------------|--------------|----------|

It is used to determine whether to perform output phase missing.

|       |                                   |   |
|-------|-----------------------------------|---|
| PC.13 | The first fault type              | 0: No fault<br>1: Over current upon accel. (E001)<br>2: Over current upon decel. (E002)<br>3: over current upon constant speed (E003)<br>4: over voltage upon accel. (E004)<br>5: over voltage upon decel. (E005)   |
| PC.14 | The second fault type             | 6: over voltage upon constant speed (E006)<br>7: control power fault E007)<br>8: under voltage fault (E008)<br>9: AC Drive parts fault (E009)<br>10: input phase missing (E010)<br>11: output phase missing (E011)<br>12: motor to ground short circuit fault(E012)<br>13: hardware of AC Drive fault (E013)<br>14: AC Drive overload (E014)<br>15: motor overload (E015)   |
| PC.15 | The third fault type( latest one) | 16: lgbt module overheat (E016)<br>17: parameters read/write abnormal (E017)<br>18: external fault (E018)<br>19: running time reached (E019)<br>20:: power on time reached (E020)<br>21: current detect fault (E021)<br>22: motor overheat (E022)<br>23: contactor abnormal (E023)<br>24: communication fault (E024)<br>25: Encoder/PG fault (E025)<br>26: motor auto tuning fault (E026)<br>27: initial position fault (E027)<br>28: quick current limit timeout (E028)<br>29: motor over speed (E029) |

|       |                            |   |
|-------|----------------------------|---|
|       |                            | 30: speed deviation too big (E030)<br>31: motor switchover fault during running (E031)<br>32: load missing (E032)<br>33: PID feedback missing during running (E033) |
| PC.16 | Frequency upon 3rd fault   | It displays the frequency when the latest fault occurs.   |
| PC.17 | Current upon 3rd fault     | It displays the current when the latest fault occurs.   |
| PC.18 | Bus voltage upon 3rd fault | It displays the bus voltage when the latest fault occurs.   |

|       |                                       |  |      |      |      |      |      |     |     |      |      |     |      |      |      |      |      |    |    |    |    |    |
|-------|---------------------------------------|--|------|------|------|------|------|-----|-----|------|------|-----|------|------|------|------|------|----|----|----|----|----|
| PC.19 | XI status upon 3rd fault              | <div>It shows the latest fault occurs of input XI terminals :</div> <div><table><tr><td>BIT9</td><td>BIT8</td><td>BIT7</td><td>BIT6</td><td>BIT5</td></tr><tr><td>X10</td><td>X9</td><td>X8</td><td>X7</td><td>X6</td></tr><tr><td>BIT4</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr><tr><td>X5</td><td>X4</td><td>X3</td><td>X2</td><td>X1</td></tr></table><div>When input terminals is ON, the corresponding bit is 1, when OFF the corresponding bit is OFF, The value is the equivalent decimal number converted from the XI status..</div></div> | BIT9 | BIT8 | BIT7 | BIT6 | BIT5 | X10 | X9  | X8   | X7   | X6  | BIT4 | BIT3 | BIT2 | BIT1 | BIT0 | X5 | X4 | X3 | X2 | X1 |
| BIT9  | BIT8                                  | BIT7   | BIT6 | BIT5 |      |      |      |     |     |      |      |     |      |      |      |      |      |    |    |    |    |    |
| X10   | X9                                    | X8   | X7   | X6   |      |      |      |     |     |      |      |     |      |      |      |      |      |    |    |    |    |    |
| BIT4  | BIT3                                  | BIT2   | BIT1 | BIT0 |      |      |      |     |     |      |      |     |      |      |      |      |      |    |    |    |    |    |
| X5    | X4                                    | X3   | X2   | X1   |      |      |      |     |     |      |      |     |      |      |      |      |      |    |    |    |    |    |
| PC.20 | Output terminal status upon 3rd fault | <div>It shows the latest fault occurs of DO output terminals :</div> <div><table><tr><td>BIT4</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr><tr><td>DO2</td><td>DO1</td><td>REL2</td><td>REL1</td><td>FMP</td></tr></table><div>When input terminals is ON, the corresponding bit is 1, when OFF the corresponding bit is OFF, The value is the equivalent decimal number converted from the XI status..</div></div>  | BIT4 | BIT3 | BIT2 | BIT1 | BIT0 | DO2 | DO1 | REL2 | REL1 | FMP |      |      |      |      |      |    |    |    |    |    |
| BIT4  | BIT3                                  | BIT2   | BIT1 | BIT0 |      |      |      |     |     |      |      |     |      |      |      |      |      |    |    |    |    |    |
| DO2   | DO1                                   | REL2   | REL1 | FMP  |      |      |      |     |     |      |      |     |      |      |      |      |      |    |    |    |    |    |

|       |                                       |  |
|-------|---------------------------------------|--|
| PC.21 | AC drive status upon 3rd fault        | Reserve  |
| PC.22 | Power-on time upon 3rd fault          | It displays the present power-on time when the latest fault occurs |
| PC.23 | Running time upon 3rd fault           | It displays the present running time when the latest fault occurs  |
| PC.24 | Frequency upon 2nd fault              | Same above as PC.16 ~ PC.23  |
| PC.25 | Current upon 2nd fault                |  |
| PC.26 | Bus voltage upon 2nd fault            |  |
| PC.27 | DI status upon 2nd fault              |  |
| PC.28 | Output terminal status upon 2nd fault |  |
| PC.29 | AC drive status upon 2nd fault        |  |
| PC.30 | Power-on time upon 2nd fault          |  |
| PC.31 | Running time upon 2nd fault           | Same above as PC.16 ~ PC.23  |
| PC.32 | Frequency upon 1st fault              |  |
| PC.33 | Current upon 2st fault                |  |
| PC.34 | Bus voltage upon 1st fault            |  |
| PC.35 | DI status upon 1st fault              |  |
| PC.36 | Output terminal status upon 1st fault |  |
| PC.37 | AC drive status upon 1st fault        |  |
| PC.38 | Power-on time upon 1st fault          |  |
| PC.39 | Running time upon 1st fault           |  |

It can record latest 3 fault type. If display 0,it means no fault.

The possibility fault occurs and trouble shooting, refer to fault diagnosis



|       |  |  |                    |       |
|-------|--|--|--------------------|-------|
| PC.45 | Action selection at instantaneous power failure                |  | Factory setting    | 0     |
|       | Setting range  | 0                                      | Disable            |       |
|       |  | 1                                      | Decelerate         |       |
|       |  | 2                                      | Decelerate to stop |       |
| PC.46 | Action pause judging voltage at instantaneous power failure    |  | Factory setting    | 100.0 |
|       | Setting range  | 0.0% ~ 100.0%                          |                    |       |
| PC.47 | Voltage rise again judging time at instantaneous power failure |  | Factory setting    | 0.50s |
|       | Setting range  | 0.00s ~ 100.00s                        |                    |       |
| PC.48 | Action judging voltage at instantaneous power failure          |  | Factory setting    | 80.0% |
|       | Setting range  | 60.0% ~ 100.0% ( Standard Dc voltage ) |                    |       |

Upon instantaneous power failure or sudden voltage dip, the DC bus voltage of the AC drive reduces. This function enables the AC drive to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the AC drive running continuously.

- If PC.45=1,, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates. Once the bus voltage resumes to normal, the AC drive accelerates to the set frequency. If the bus voltage remains normal for the time exceeding the value set in F9-61, it is considered that the bus voltage resumes to normal.
- If PC.45=2, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates to stop.

|       |                              |  |                 |       |
|-------|------------------------------|--|-----------------|-------|
| PC.49 | Protection upon load loss    |  | Factory setting | 0     |
|       | Setting range                | 0  | Disable         |       |
|       |                              | 1  | Enable          |       |
| PC.50 | Detection level of load loss |  | Factory setting | 10.0% |
|       | Setting range                | 0.0% ~ 100.0% ( Rated current of motor ) |                 |       |
| PC.51 | Detection level of load loss |  | Factory setting | 0.50s |
|       | Setting range                | 0.0s ~ 60.0                              |                 |       |

If protection upon load becoming 0 (load loss) is enabled, when the output current of the AC drive is lower than the detection level (PC.50) and the lasting time exceeds the detection time (PC.51), the output frequency of the AC drive automatically declines to 7% of the rated frequency. During the protection, the AC drive automatically accelerates to the set frequency if the load resumes to normal.

|       |                            |                                  |                 |       |
|-------|----------------------------|----------------------------------|-----------------|-------|
| PC.52 | Over-speed detection value |                                  | Factory setting | 15.0% |
|       | Setting range              | 0.0% ~ 50.0% (maximum frequency) |                 |       |
| PC.53 | Over-speed detection time  |                                  | Factory setting | 2.0s  |
|       | Setting range              | 0.0s ~ 60.0                      |                 |       |

This function is valid only when the AC drive runs in the CLVC mode P0.00=2.

If the actual motor rotational speed detected by the AC drive exceeds the maximum frequency and the excessive value is greater than the value of PC.52 and the lasting time exceeds the value of PC.53, the AC drive reports Err43 and acts according to the selected fault protection action.

If the over-speed detection time is 0.0s, the over-speed detection function is disabled.

|       |  |                                  |                 |      |
|-------|--|----------------------------------|-----------------|------|
| PC.54 | Detection value of too large speed deviation |                                  | Factory setting | 20%  |
|       | Setting range                                | (0.0% ~ 50.0% maximum frequency) |                 |      |
| PC.55 | Detection time of too large speed deviation  |                                  | Factory setting | 2.0s |
|       | Setting range                                | 0.0s ~ 60.0                      |                 |      |
| PC.56 | Reserve                                      |                                  |                 |      |

This function is valid only when the AC drive runs in the CLVC mode (P.00=2).

If the AC drive detects the deviation between the actual motor rotational speed detected by the AC drive and the set frequency is greater than the value of PC.54 and the lasting time exceeds the value of PC.55, the AC drive reports Err30 and according to the selected fault protection action.

PC.55 (Detection time of too large speed deviation) is 0.0s, this function is disabled.

|       |                          |   |                 |   |
|-------|--------------------------|---|-----------------|---|
| PC.57 | Motor temperature sensor |   | Factory setting | 0 |
|       | Setting range            | 0 | No sensor       |   |
|       |                          | 1 | PT100           |   |
|       |                          | 2 | PT1000          |   |

|       |                                 |             |                 |       |
|-------|---------------------------------|-------------|-----------------|-------|
| PC.58 | Motor overheat protection value |             | Factory setting | 100°C |
|       | Setting range                   | 0°C ~ 200°C |                 |       |
| PC.59 | Motor overheat pre-alarm value  |             | Factory setting | 90°C  |
|       | Setting range                   | 0°C ~ 200°C |                 |       |

Use this function use to detect motor temperature. It need the optional expansion card to assist to use. Provide two kinds temperature model. PC.59 can use to overheat pre-alarm protection.

|       |                     |   |                 |   |
|-------|---------------------|---|-----------------|---|
| PC.61 | rapid current limit |   | Factory setting | 1 |
|       | Setting range       | 0 | Disable         |   |
|       |                     | 1 | Enable          |   |

The rapid current limit function can reduce the AC drive's over current faults at maximum, guaranteeing uninterrupted running of the AC drive.

However, long-time rapid current limit may cause the AC drive to overheat, which is not allowed. In this case, the AC drive will report Err28, indicating the AC drive is overloaded and needs to stop

|       |                             |  |                 |        |
|-------|-----------------------------|--|-----------------|--------|
| PC.62 | Under voltage point setting |  | Factory setting | 100.0% |
|       | Setting range               |  | 60.0% ~ 140.0%  |        |

Use to set AC drive under voltage E0008 voltage setting, difference rated voltage 100% value corresponding to difference voltage point.

Single phase 220V or 3 phase 220V: 100% under voltage point is 200VDC.

3 phase 380V: 100% under voltage point is 350VDC

3 phase 480V: 100% under voltage pint is 450VDC.

**Pd. RS485 communication parameters group**

|       |   |               |                 |   |
|-------|---|---------------|-----------------|---|
| Pd.00 | serial communication protocol selection |               | factory setting | 0 |
|       | setting range                           | 0             | MODBUS protocol |   |
|       |   | 1             | Reserve         |   |
|       |   | 2             | Reserve         |   |
| Pd.01 | Baud rate                               |               | factory setting | 5 |
|       | setting range                           | Unit 's digit | MODBUS          |   |
|       |   | 0             | 300BPS          |   |
|       |   | 1             | 600BPS          |   |
|       |   | 2             | 1200BPS         |   |
|       |   | 3             | 2400BPS         |   |
|       |   | 4             | 4800BPS         |   |
|       |   | 5             | 9600BPS         |   |
|       |   | 6             | 19200BPS        |   |
|       |   | 7             | 38400BPS        |   |
|       |   | 8             | 57600BPS        |   |
|       |   | 9             | 115200BPS       |   |

Select baud rate of serial communication. Please take attention, baud rate setting of upper controller should be as same as AC drives. Otherwise it can't establish communication. The bigger baud rated, the bigger communication rate.

|       |               |   |                      |   |
|-------|---------------|---|----------------------|---|
| Pd.02 | Data format   |   | factory setting      | 0 |
|       | setting range | 0 | no parity (:N, 8, 2) |   |
|       |               | 1 | even parity ((8-E-1) |   |
|       |               | 2 | odd parity (8-O-1)   |   |
|       |               | 3 | no parity (8-N-1)    |   |

The date format between upper controller and ac drive should be accordance. Otherwise it can't communication.

|       |               |  |                              |   |
|-------|---------------|--|------------------------------|---|
| Pd.03 | Local address |  | factory setting              | 1 |
|       | setting range |  | 1 ~ 247, 0 broadcast address |   |

When the local address set to 0, it means for broadcast address, it can achieve upper controller broadcast function. the local address is uniqueness (except broadcast ). It is reason for realizing AC drive point to point control.

|       |                |                 |     |
|-------|----------------|-----------------|-----|
| Pd.04 | Response delay | factory setting | 2ms |
|       | setting range  | 0 ~ 20ms        |     |

Response delay parameters used to define interval time from AC drive received data finish to upper control sending data. If the the response delay less than system processing time, the response delay time will be use as for system process time.If it large than system process time. data sending to upper controller need to wait and delay, until the response time finish, when system data processing finished.

|       |                       |                             |      |
|-------|-----------------------|-----------------------------|------|
| Pd.05 | Communication timeout | factory setting             | 0.0s |
|       | setting range         | 0.0s(disable) ; 0.1 ~ 60.0s |      |

When this function code set to 0.02, this communication timeout is disable.

If the setting is valid, if the interval time between two communications over than the timeout value, system will occurs communication fault (E024). It should be set for disable in generally. It can be used to monitor AC drive communication status in succession communication system.

|       |                                    |               |                              |    |
|-------|------------------------------------|---------------|------------------------------|----|
| Pd.06 | data transmission format selection |               | factory setting              | 01 |
|       | setting range                      | Unit 's digit | Modbus                       |    |
|       |                                    | 0             | Nod standard Modbus protocol |    |
|       |                                    | 1             | Standard Modbus protocol     |    |
|       |                                    | Ten's digit   | Reserve                      |    |

**H0: Torque Control and Restricting Parameters**

|       |                     |   |                        |   |
|-------|---------------------|---|------------------------|---|
| H0.00 | Torque control mode |   | factory setting        | 0 |
|       | setting range       | 0 | Torque control disable |   |
|       |                     | 1 | Torque control enable  |   |

It is used to select the AC drive's control mode: speed control or torque control.

The AD series AC drive provides XI terminals with two torque related functions, function 46 (Torque control prohibited) and function 41 (Speed control/Torque control switchover). The two XI terminals need to be used together with H0.00 to implement speed control/torque control switchover.

If the XI terminal allocated with function 41 (Speed control/Torque control switchover) is OFF, the control mode is determined by H0.00. If the XI terminal allocated with function 41 is ON, the control mode is reverse to the value of H0.00. However, if the XI terminal with function 46 (Torque control prohibited) is ON, the AC drive is fixed to run in the speed control mode.

0: Torque control is disable, AC drive runs in speed control mode.

1: AC drive runs with torque control mode.

This two control mode can be selected by programmable multiple terminals X.

|       |   |   |                                   |        |
|-------|---|---|-----------------------------------|--------|
| H0.01 | Torque setting source in torque control |   | factory setting                   | 0      |
|       | setting range                           | 0 | By keypad digital setting (H0.03) |        |
|       |   | 1 | Analog AI1                        |        |
|       |   | 2 | Analog AI2                        |        |
|       |   | 3 | Potentiometer                     |        |
|       |   | 4 | PULSE pulse trains                |        |
|       |   | 5 | Communication                     |        |
|       |   | 6 | MIN(AI1,AI2)                      |        |
|       |   | 7 | MAX(AI1,AI2)                      |        |
| H0.03 | Torque setting by keypad digital value  |   | factory setting                   | 150.0% |
|       | Torque reference by digital             |   |                                   |        |
|       | setting range                           |   | -200.0% ~ 200.0%                  |        |

H0.01 is used to set the torque setting source. There are a total of eight torque setting sources.

The torque setting is a relative value. 100.0% corresponds to the AC drive's rated torque.

The setting range is -200.0% to 200.0%, indicating the AC drive's maximum torque is twice of the AC drive's rated torque.

If the torque setting is positive, the AC drive rotates in forward direction. If the torque setting is negative, the AC drive rotates in reverse direction.

0: Digital setting (H0-03) The target torque directly uses the value set in A0-03.

- 1: AI1
- 2: AI2
- 3: Potentiometer

The target torque is decided by analog input. The AD800 control board provides 2 AI terminals (AI1, AI2). AI1 is -10V ~ 10V voltage input, AI2 is -10V ~ 10V voltage input or 4–20 mA current input decided by jumper P1 on the control board.

User can set AI1, and AI2 input voltage corresponding to target frequency curve by P5.31 parameters.

#### 4: Pulse setting (XI5)

The target torque is set by XI5 (high-speed pulse). The pulse setting signal specification is 9–30 V (voltage range) and 0–100 kHz (frequency range). The pulse can only be input via XI5. The relationship (which is a 2-point line) between XI5 input pulse frequency and the corresponding value is set in F4-28 to F4-31. The corresponding value 100.0% of pulse input corresponds to the value of H0-03.

#### 5: Communication setting

The target torque is set by means of communication.

The data format is -100.0% ~ 100.0%, 100% value corresponding to torque setting of H0.03 percentage. Otherwise it determined by value of upper controller communication address OX1000, the data format is -100.0% ~ 100.0%, and 100% value corresponding to torque setting of H0.03 percentage.

|       |   |                            |         |
|-------|---|----------------------------|---------|
| H0.05 | Forward maximum frequency in torque control | factory setting            | 50.00Hz |
|       | setting range                               | 0.00Hz ~ maximum frequency |         |
| H0.06 | Reverse maximum frequency in torque control | factory setting            | 50.00Hz |
|       | setting range                               | 0.00Hz ~ maximum frequency |         |

These 2 parameters are used to set the maximum frequency in forward or reverse rotation in torque control mode.

In torque control, if the load torque is smaller than the motor output torque, the motor's rotational speed will rise continuously. To avoid runaway of the mechanical system, the motor maximum rotating speed must be limited in torque control.

You can implement continuous change of the maximum frequency in torque control dynamically by controlling the frequency upper limit.

|       |                                     |                 |       |
|-------|-------------------------------------|-----------------|-------|
| H0.07 | Acceleration time in torque control | factory setting | 0.00s |
|       | setting range                       | 0.00s ~ 65000s  |       |
| H0.08 | Deceleration time in torque control | factory setting | 0.00s |
|       | setting range                       | 0.00s ~ 65000s  |       |

In torque control, the difference between the motor output torque and the load torque determines the speed change rate of the motor and load. The motor rotational speed may change quickly and this

will result in noise or too large mechanical stress. The setting of acceleration/deceleration time in torque control makes the motor rotational speed change softly.

However, in applications requiring rapid torque response, set the acceleration/deceleration time in torque control to 0.00s.

For example, 2 AC drives are connected to drive the same load. To balance the load allocation, set one AC drive as master in speed control and the other as slave in torque control. The slave receives the master's output torque as the torque command and must follow the master rapidly. In this case, the acceleration/deceleration time of the slave in torque control is set to 0.0s.



**H3 Group multiple points curve AI parameters setting .**

|       |  |                  |        |
|-------|--|------------------|--------|
| H3.00 | AI curve 4 minimum input                               | Factory setting  | 0.00V  |
|       | Setting range  | -10.00V ~ H3.02  |        |
| H3.01 | AI curve 4 minimum input corresponding value           | Factory setting  | 0.0%   |
|       | Setting range  | -100.0% ~ 100.0% |        |
| H3.02 | AI curve 4 inflexion point 1 input                     | Factory setting  | 3.00V  |
|       | Setting range  | H3.00 ~ H3.04    |        |
| H3.03 | AI curve 4 inflexion point 1 input corresponding value | Factory setting  | 30.0%  |
|       | Setting range  | -100.0% ~ 100.0% |        |
| H3.04 | AI curve 4 inflexion point 2input                      | Factory setting  | 6.00V  |
|       | Setting range  | H3.02 ~ H3.06    |        |
| H3.05 | AI curve 4 inflexion point 2 input corresponding value | Factory setting  | 60.0%  |
|       | Setting range  | -100.0% ~ 100.0% |        |
| H3.06 | AI curve 4 inflexion maximum input                     | Factory setting  | 10.00V |
|       | Setting range  | H3.06 ~ 10.00V   |        |
| H3.07 | AI curve 4 inflexion maximum input corresponding value | Factory setting  | 100.0% |
|       | Setting range  | -100.0% ~ 100.0% |        |
| H3.08 | AI curve 5 minimum input                               | Factory setting  | 0.00V  |
|       | Setting range  | -10.00V ~ H3.10  |        |
| H3.09 | AI curve 5 minimum input corresponding value           | Factory setting  | 0.0%   |
|       | Setting range  | -100.0% ~ 100.0% |        |
| H3.10 | AI curve 5 inflexion point 1 input                     | Factory setting  | 3.00V  |
|       | Setting range  | H3.08 ~ H3.12    |        |
| H3.11 | AI curve 5 inflexion point 1 input corresponding value | Factory setting  | 30.0%  |
|       | Setting range  | -100.0% ~ 100.0% |        |
| H3.12 | AI curve 5 inflexion point 2input                      | Factory setting  | 6.00V  |

|       |  |                  |        |
|-------|--|------------------|--------|
|       | Setting range  | H3.10 ~ H3.14    |        |
| H3.13 | AI curve 5 inflexion point 2 input corresponding value | Factory setting  | 60.0%  |
|       | Setting range  | -100.0% ~ 100.0% |        |
| H3.14 | AI curve 5 inflexion maximum input                     | Factory setting  | 10.00V |
|       | Setting range  | H3.14 ~ 10.00V   |        |
| H3.15 | AI curve 5 inflexion maximum input corresponding value | Factory setting  | 100.0% |
|       | Setting range  | -100.0% ~ 100.0% |        |

The function of curve 4 and curve 5 as same as curve 1 to 3. The difference is that, Curve 1 to Curve 3 is straight line, only minimum and maximum two points setting is available. But there are 4 points possible to set among curve 4 and curve 5 for using in some application which need high precision of analog and frequency.

**C0. Monitor parameters group**

| Function code                      | Name                          | Min. unit | Communication address |
|------------------------------------|-------------------------------|-----------|-----------------------|
| <b>C0 monitor parameters group</b> |                               |           |                       |
| C0.00                              | Running frequency (Hz)        | 0.01Hz    | 5000H                 |
| C0.01                              | Output frequency (A)          | 0.01A     | 5001H                 |
| C0.02                              | Output voltage(V)             | 1V        | 5002H                 |
| C0.03                              | Machine speed display         | 1         | 5003H                 |
| C0.04                              | DC bus voltage                | 0.1V      | 5004H                 |
| C0.05                              | Frequency reference (Hz)      | 0.01Hz    | 5005H                 |
| C0.06                              | Counting value                | 1         | 5006H                 |
| C0.07                              | Length value                  | 1         | 5007H                 |
| C0.08                              | X terminals state             | 1         | 5008H                 |
| C0.09                              | DO output state               | 1         | 5009H                 |
| C0.10                              | AI1 voltage (V)               | 0.01V     | 500AH                 |
| C0.11                              | AI2 voltage (V)               | 0.01V     | 500BH                 |
| C0.12                              | Potentiometer voltage (V)     | 0.01V     | 500CH                 |
| C0.13                              | PID reference                 | 1         | 500DH                 |
| C0.14                              | Output power (kW)             | 0.1kW     | 500EH                 |
| C0.15                              | Output torque (%)             | 0.1%      | 500FH                 |
| C0.16                              | Linear speed                  | 1m/Min    | 5010H                 |
| C0.17                              | PID feedback                  | 1         | 5011H                 |
| C0.18                              | PLC step                      | 1         | 5012H                 |
| C0.19                              | PULSE input frequency (Hz)    | 0.01kHz   | 5013H                 |
| C0.20                              | Current power on time         | 1Min      | 5014H                 |
| C0.21                              | Current running time          | 0.1Min    | 5015H                 |
| C0.22                              | Remain running time           | 0.1Min    | 5016H                 |
| C0.23                              | Main frequency X display      | 0.01Hz    | 5017H                 |
| C0.24                              | Auxiliary frequency Y display | 0.01Hz    | 5018H                 |
| C0.25                              | Feedback speed (unit 0.1Hz)   | 0.1Hz     | 5019H                 |
| C0.26                              | Encoder feedback speed        | 0.01Hz    | 501AH                 |
| C0.27                              | Before AI1 revise voltage     | 0.001V    | 501BH                 |
| C0.28                              | Before AI2 revise voltage     | 0.001V    | 501CH                 |
| C0.29                              | Torque reference              | 0.01%     | 501DH                 |
| C0.30                              | PULSE input frequency         | 1Hz       | 501EH                 |

## Chapter 7. Fault diagnosis and trouble shooting

AD series AC drive provides a total of 24 pieces of fault information and protective functions. After a fault occurs, the AC drive implements the protection function, and displays the fault code on the operation panel (if the operation panel is available).

Before contacting EURONORM DRIVE SYSTEMS for technical support, you can first determine the fault type through P2.13 ~ PC.39, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the agent or EURONORM DRIVE SYSTEMS.

### 7.1. Fault code description and solution

| SN | Fault code | Fault name                       | Possible Causes  | Solutions  |
|----|------------|----------------------------------|--|--|
| 1  | E001       | Over current during acceleration | 1: The output circuit is grounded or short circuited.<br>2: Motor auto-tuning is not performed.<br>3: The acceleration time is too short.<br>4: Manual torque boost or V/F curve is not appropriate.<br>5: The voltage is too low.<br>6: The startup operation is performed on the rotating motor.<br>7: A sudden load is added during acceleration.<br>8: The AC drive model is of too small power class. | 1: Eliminate external faults.<br>2: Perform the motor auto tuning.<br>3: Increase the acceleration time.<br>4: Adjust the manual torque boost or V/F curve.<br>5: Adjust the voltage to normal range.<br>6: Select rotational speed tracking restart or start the motor after it stops.<br>7: Remove the added load.<br>8: Select an AC drive of higher power class. |
| 2  | E002       | Overcurrent During deceleration  | 1: The output circuit is grounded or short circuited.<br>2: Motor auto-tuning is not performed.<br>3: The acceleration time is too short.<br>4: Manual torque boost or V/F curve is not appropriate.<br>5: The voltage is too low.<br>6: The startup operation is performed on the rotating motor.<br>7: A sudden load is added during acceleration.<br>8: The AC drive model is of too                    | 1: Eliminate external faults.<br>2: Perform the motor autotuning.<br>3: Increase the acceleration time.<br>4: Adjust the manual torque boost or V/F curve.<br>5: Adjust the voltage to normal range.<br>6: Select rotational speed tracking restart or start the motor after it stops.<br>7: Remove the added load.<br>8: Select an AC drive of higher power class.  |

| SN | Fault code | Fault name                      | Possible Causes   | Solutions  |
|----|------------|---------------------------------|---|--|
|    |            |                                 | small power class.  |  |
| 3  | E003       | over current at constant speed  | 1: The output circuit is grounded or short circuited.<br>2: Motor auto-tuning is not performed.<br>3: The voltage is too low.<br>4: A sudden load is added during operation.<br>5: The AC drive model is of too small power class | 1: Eliminate external faults.<br>2: Perform the motor autotuning.<br>3: Adjust the voltage to normal range.<br>4: Remove the added load.<br>5: Select an AC drive of higher power class.           |
| 4  | E004       | Overvoltage during acceleration | 1: The input voltage is too high.<br>2: An external force drives the motor during acceleration.<br>3: The acceleration time is too short.<br>4: The braking unit and braking resistor are not installed.                          | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install a braking resistor.<br>3: Increase the acceleration time.<br>4: Install the braking unit and braking resistor.   |
| 5  | E005       | Overvoltage during deceleration | 1: The input voltage is too high.<br>2: An external force drives the motor during deceleration.<br>3: The deceleration time is too short.<br>4: The braking unit and braking resistor are not installed.                          | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install the braking resistor.<br>3: Increase the deceleration time.<br>4: Install the braking unit and braking resistor. |
| 6  | E006       | Overvoltage at constant speed   | 1: The input voltage is too high.<br>2: An external force drives the motor during deceleration  | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install the braking resistor.  |
| 7  | E007       | Control power supply fault      | The input voltage is not within the allowable range.  | Adjust the input voltage to the allowable range.   |
| 8  | E008       | Under voltage                   | 1: Instantaneous power failure occurs on the input power supply.<br>2: The AC drive's input voltage is not within the allowable range.<br>3: The bus voltage is abnormal.<br>4: The rectifier bridge and                          | 1: Reset the fault.<br>2: Adjust the voltage to normal range.<br>3: Contact the agent or Euronorm Drive Systems  |

| SN | Fault code | Fault name                 | Possible Causes  | Solutions  |
|----|------------|----------------------------|--|--|
|    |            |                            | buffer resistor are faulty.<br>5: The drive board is faulty.<br>6: The main control board is faulty.   |  |
| 9  | E009       | AC Drive parts fault       | 1.AC drive output short circuit<br>2. cable from AC drive to motor too long<br>3. IGBT module over heat<br>4. IGBT module damaged<br>5. driving abnormal   | 1.To check the cable insulation, to check with disconnect motor cable<br>2. add AC reactor<br>3. to contact Euronorm Drive Systems   |
| 10 | E010       | Input phase missing        | 1: The three-phase power input is abnormal.<br>2: The drive board is faulty.<br>3: The lightning board is faulty.<br>4: The main control board is faulty   | 1: Eliminate external faults.<br>2: Contact the agent or Euronorm Drive Systems  |
| 11 | E011       | Power output phase missing | 1: The cable connecting the AC drive and the motor is faulty.<br>2: The AC drive's three-phase outputs are unbalanced when the motor is running.<br>3: The drive board is faulty.<br>4: The module is faulty.  | 1: Eliminate external faults.<br>2: Check whether the motor three-phase winding is normal.<br>3: Contact the agent or Euronorm Drive Systems   |
| 12 | E012       | Short circuit to ground    | The motor is short circuited to the ground.  | Replace the cable or motor.  |
| 13 | Reserve    |                            |  |  |
| 14 | E014       | AC drive overload          | 1. Boost torque is too big under VF control<br>2. accel. and decel. time is too short<br>3.motor parameters setting is improperly<br>4.Restart motor which in counter rotate<br>5. The grid voltage is too lower<br>6. load is too big or motor block load | 1.Reduce boost torque<br>2. increase the accel./decel. time<br>3.reset motor parameters<br>4.Reduce current limit and adopt speed tracking<br>5. Too check grid voltage<br>6.To check load<br>7.change bigger power AC drive |

| SN | Fault code | Fault name                         | Possible Causes   | Solutions   |
|----|------------|------------------------------------|---|---|
|    |            |                                    | 7. AC drive selected is too load  |   |
| 15 | E015       | Motor load                         | 1. Motor have wrong parameters setting<br>2. Input voltage of grid is too low<br>3. Load is too big or motor is blocked   | 1, Reset the motor parameters<br>2, check the input source of grid<br>3, Check the motor load if in good condition  |
| 16 | E016       | Module overheat                    | 1: The ambient temperature is too high.<br>2: The air filter is blocked.<br>3: The fan is damaged.<br>4: The thermally sensitive resistor of the module is damaged.<br>5: The AC Drive module is damaged. | 1: Lower the ambient temperature.<br>2: Clean the air filter.<br>3: Replace the damaged fan.<br>4: Replace the damaged thermally sensitive resistor.<br>5: Replace the AC Drive module. |
| 17 | E017       | EEPROM read/write fault            | The EEPROM chip is damaged.   | Replace the main control board.   |
| 18 | E018       | External equipment fault           | Through multiple terminals X input external fault signal<br>2.Terminals error operation   | 1.runing reset<br>2.Contact Euronorm Drive Systems  |
| 19 | E019       | Accumulative running time reached  | The accumulative running time reaches the setting value.  | Clear the record through the parameter initialization function  |
| 20 | E020       | Accumulative power-on time reached | The accumulative power-on time reaches the setting value  | Clear the record through the parameter initialization function  |
| 21 | E021       | Current detect fault               | 1. Current hall detectc damaged<br>2.Driving board fault  | 1. check the hall and plug if loose<br>2. contact to Euronorm Drive Systems   |
| 22 | E022       | Overheat fault of motor            | 1.Motor temperature<br>2. motor temperature sensor fault  | 1.motor heat dissipation is not good<br>2.checkthe connecting of halls and sensor   |
| 23 | E023       | Contactor fault                    | 1.Contactor is abnormal<br>2.driving board and power  | 1.change the contactor<br>2.contact Euronorm Drive  |

| SN | Fault code | Fault name                   | Possible Causes  | Solutions  |
|----|------------|------------------------------|--|--|
|    |            |                              | supply is not good   | Systems  |
| 24 | E024       | Communication fault          | 1.Upper control abnormal<br>2.communication cable is not good<br>3.communicaiton parameters setting is correct                             | 1. Check the connection of upper controller<br>2. Check communication cable<br>3.To set correct parameters                                       |
| 25 | E025       | Encoder fault                | 1.Encoder type is not matching<br>2.wrong wiring of encoder<br>3.encoder is damaged<br>4.PG card abnormal                                  | 1.Set encoder parameters correct<br>2. Check wiring<br>3.To check encoder<br>4. Check PG card  |
| 26 | E026       | Motor auto-tuning fault      | 1: The motor parameters are not set according to the nameplate.<br>2: The motor auto-tuning times out.                                     | 1: Set the motor parameters according to the nameplate properly.<br>2: Check the cable connecting the AC drive and the motor.                    |
| 27 | E027       | Initial position fault       | The motor parameters are not set based on the actual situation   | Check that the motor parameters are set correctly and whether the setting of rated current is too small  |
| 28 | E028       | Hard ware current protection | 1.the load is too big or load blocked<br>2. motor auto tuning is not good<br>3.AC drive power is too small                                 | 1.Check motor and load<br>2.Try to run with VF control<br>3.Change bigger power AC drive   |
| 29 | E029       | Motor over-speed             | 1: The encoder parameters are set incorrectly.<br>2: The motor auto-tuning is not performed.<br>3: motor over speed setting is not correct | 1.reset encoder parameters<br>2.motor parameters indentify<br>3.to set parameters properly.  |
| 30 | E030       | Too large speed deviation    | 1: The encoder parameters are set incorrectly.<br>2: The motor auto-tuning is not performed.<br>3: Motor setting is not correct            | 1: Set the encoder parameters properly.<br>2: Perform the motor auto tuning.<br>3: Set motor parameters correctly based on the actual situation. |



If the user can't solve the problem, please contact local distributor or contact Euronorm Drive Systems directly.

## 7.2. Table below Troubleshooting to common faults of the AC drive

| S<br>N | Fault   | Possible Causes   | Solutions  |
|--------|---|---|--|
| 1      | There is no display at power-on.                          | 1: There is no power supply to the AC drive or the power input to the AC drive is too low.<br>2: The power supply of the switch on the drive board of the AC drive is faulty.<br>3: The rectifier bridge is damaged.<br>4: The control board or the operation panel is faulty.<br>5: The cable connecting the control board and the drive board and the operation panel breaks. | 1: Check the power supply.<br>2: Check the bus voltage.<br>3: Re-connect the keypad connector<br>4: Contact the agent or EURONORM DRIVE SYSTEMS for technical support. |
|        | "HC" is displayed at power-on.                            | 1: The cable between the drive board and the control board is in poor contact.<br>2: Related components on the control board are damaged.<br>3: The motor or the motor cable is short circuited to the ground.<br>4: The HALL device is faulty.<br>5: The power input to the AC drive is too low.   | 1: Re-connect the cable of keypad and cable of controller board.<br>2: Contact the agent or EURONORM DRIVE SYSTEMS for technical support.                              |
|        | "Err012" is displayed at power-on                         | 1: The motor or the motor output cable is short-circuited to the ground.<br>2: The AC drive is damaged.   | 1: Measure the insulation of the motor and the output cable with a megger.<br>2: Contact the agent or EURONORM DRIVE SYSTEMS for technical support                     |
|        | The AC drive display is normal upon power on. But "HC" is | 1: The cooling fan is damaged or locked-rotor occurs.<br>2: The external control terminal cable is short circuited  | 1: Replace the damaged fan.<br>2: Eliminate external fault.  |

|  |   |  |  |
|--|---|--|--|
|  | displayed after running and stops immediately.        |  |  |
|  | Err16 (module overheat) fault is reported frequently. | 1: The setting of carrier frequency is too high.<br>2: The cooling fan is damaged, or the air filter is blocked.<br>3: Components inside the AC drive are damaged (thermal coupler or others).                                   | 1: Reduce the carrier frequency (P0.11).<br>2: Replace the fan and clean the air filter.<br>3: Contact the agent or EURONORM DRIVE SYSTEMS for technical support.  |
|  | The motor does not rotate after the AC drive runs.    | 1: Check the motor and the motor cables.<br>2: The AC drive parameters are set improperly (motor parameters).<br>3: The cable between the drive board and the control board is in poor contact.<br>4: The drive board is faulty. | 1: Ensure the cable between the AC drive and the motor is normal.<br>2: Replace the motor or clear mechanical faults.<br>3: Check and re-set motor parameters.   |
|  | The XI terminals are disabled.                        | 1: The parameters are set incorrectly.<br>2: The external signal is incorrect.<br>3: The jumper bar across OP and +24 V becomes loose.<br>4: The control board is faulty.  | 1: Check and reset the parameters in group P5.<br>2: Re-connect the external signal cables.<br>3: Re-confirm the jumper bar across OP and +24 V.<br>4: Contact the agent or EURONORM DRIVE SYSTEMS for technical support |
|  | The motor speed is always low in CLVC mode.           | 1: The encoder is faulty.<br>2: The encoder cable is connected incorrectly or in poor contact.<br>3: The PG card is faulty.<br>4: The drive board is faulty  | 1: Replace the encoder and ensure the cabling is proper.<br>2: Replace the PG card.<br>3: Contact the agent or EURONORM DRIVE SYSTEMS for technical support  |
|  | The AC drive reports overcurrent                      | 1: The motor parameters are set improperly.<br>2: The acceleration/deceleration  | 1: Re-set motor parameters or re-perform the motor auto tuning.  |

|  |   |  |   |
|--|---|--|---|
|  | and overvoltage frequently.                   | time is improper.<br>3: The load fluctuates        | 2: Set proper acceleration/ deceleration time.<br>3: Contact the agent or EURONORM DRIVE SYSTEMS for technical support.   |
|  | Err 023 is reported upon power-on or running. | The soft startup contactor is not picked up.       | 1: Check whether the contactor cable is loose.<br>2: Check whether the contactor is faulty.<br>3: Check whether 24 V power supply of the contactor is faulty.<br>4: Contact the agent or EURONORM DRIVE SYSTEMS for technical support |
|  | “ 8888 “ is displayed upon power-on.          | Related component on the control board is damaged. | Replace the control board.  |

## Chapter 8. Maintenance and Troubleshooting

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the AC drive, which may cause potential faults or reduce the service life of the AC drive. Therefore, it is necessary to carry out routine and periodic maintenance.

### 8.1 Routine Maintenance

Routine maintenance involves checking:

- Whether the motor sounds abnormally during running
- Whether the motor vibrates excessively during running
- Whether the installation environment of the AC drive changes.
- Whether the AC drive's cooling fan works normally
- Whether the AC drive overheats

### 8.2. Routine cleaning involves

Keep the AC drive clean all the time.

Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.

Clear the oil stain on the cooling fan of the AC drive.

### 8.2. Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

- Check and clean the air duct periodically.
- Check whether the screws become loose.
- Check whether the AC drive is corroded.
- Check whether the wiring terminals show signs of arcing;
- Before measuring the insulating resistance with megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive.
- Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

### 8.3. Main circuit insulation test

Replacement of Vulnerable Components

The vulnerable components of the AC drive are cooling fan and filter electrolytic capacitor.

Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follows:

| Component | Service Life | Possible Damage Reason        | Judging Criteria   |
|-----------|--------------|-------------------------------|--|
| Fan       | 2 to 3 years | Bearing worn<br>• Blade aging | Whether there is crack on the blade<br>• Whether there is abnormal |

|                        |              |  |   |
|------------------------|--------------|--|---|
|                        |              |  | vibration noise upon startup  |
| Electrolytic capacitor | 4 to 5 years | Input power supply in poor quality <ul style="list-style-type: none"> <li>• High ambient temperature</li> <li>• Frequent load jumping</li> <li>• Electrolytic aging</li> </ul> | Whether there is liquid leakage. <ul style="list-style-type: none"> <li>• Whether the safe valve has projected.</li> <li>• Measure the static capacitance.</li> <li>• Measure the insulating resistance.</li> </ul> |

#### 8.4. Storage of the AC Drive

For storage of the AC drive, pay attention to the following two aspects:

- 1) Pack the AC drive with the original packing box provided by EURONORM DRIVE SYSTEMS
- 2) Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

#### 9.5. Warranty Agreement

- 1) Free warranty only applies to the AC drive itself.
- 2) EURONORM DRIVE SYSTEMS will provide 18-month warranty (starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.
- 3) Reasonable repair expenses will be charged for the damages due to the following causes:
  - Improper operation without following the instructions
  - Fire, flood or abnormal voltage.
  - Using the AC drive for non-recommended function
- 4) The maintenance fee is charged according to EURONORM DRIVE SYSTEMS's uniform standard. If there is an agreement, the agreement prevails.

## Appendix A. Selection of Power of Braking Resistor

In theory, the power of the braking resistor is consistent with the braking power. But in consideration that the de-rating is 70%, you can calculate the power of the braking resistor

according to the formula  $0.7 \times P_r = P_b \times D$ .

$P_r$  refers to the power of resistor.

$D$  refers to the braking frequency (percentage of the regenerative process to the whole working process)

| Application       | Elevator | Winding and unwinding | Centrifuge | Occasional braking load | General application |
|-------------------|----------|-----------------------|------------|-------------------------|---------------------|
| Braking Frequency | 20%–30%  | 20%–30%               | 50%–60%    | 5%                      | 10%                 |

Below table provides data for reference. You can select different resistance and power based on actual needs. However, the resistance must not be lower than the recommended value. The power may be higher than the recommended value.

The braking resistor model is dependent on the generation power of the motor in the actual system and is also related to the system inertia, deceleration time and potential energyload. For systems with high inertia, and/or rapid deceleration times, or frequent braking sequences, the braking resistor with higher power and lower resistance value should be selected.

Below table recommended values of braking resistor

| AC drive models   | Recommended Power | Recommended Braking resistor | Built in /external connect | Remark                            |
|-------------------|-------------------|------------------------------|----------------------------|-----------------------------------|
| Single phase 220V |                   |                              |                            |                                   |
| AD800S0.75G       | 80W               | ≥150Ω                        | Built in option            | Added B when built in after model |
| AD800S1.5G        | 100W              | ≥100Ω                        |                            |                                   |
| AD800S2.2G        | 100W              | ≥70Ω                         |                            |                                   |
| Single 220V       |                   |                              |                            |                                   |
| AD800-2T0.75G     | 150W              | ≥110Ω                        | Built in option            | Added B when built in after model |
| AD800-2T1.5G      | 250W              | ≥100Ω                        |                            |                                   |
| AD800-2T2.2G      | 300W              | ≥65Ω                         |                            |                                   |
| AD800-2T3.7G      | 400W              | ≥45Ω                         |                            |                                   |
| AD800-2T5.5G      | 800W              | ≥22Ω                         | Built in option            | Same as above                     |
| AD800-2T7.5G      | 1000W             | ≥16Ω                         |                            |                                   |
| AD800-2T11G       | 1500W             | ≥11Ω                         | Built in                   | Same as above                     |

| AC drive models | Recommended Power | Recommended Braking resistor | Built in /external connect | Remark      |
|-----------------|-------------------|------------------------------|----------------------------|-------------|
| AD800-2T15G     | 2500W             | $\geq 8\Omega$               | option                     |             |
| AD800-2T18.5G   | 3.7 kW            | $\geq 8.0\Omega$             | External                   | ADBU-35-A   |
| AD800-2T22G     | 4.5 kW            | $\geq 8\Omega$               | External                   | ADBU-35-A   |
| AD800-2T30G     | 5.5 kW            | $\geq 4\Omega$               | External                   | ADBU-70-A   |
| AD800-2T37G     | 7.5 kW            | $\geq 4\Omega$               | External                   | ADBU-70-A   |
| AD800-2T45G     | 4.5 kW×2          | $\geq 4\Omega \times 2$      | External                   | ADBU-70-A×2 |
| AD800-2T55G     | 5.5 kW×2          | $\geq 4\Omega \times 2$      | External                   | ADBU-70-A×2 |
| AD800-2T75G     | 16kW              | $\geq 1.2\Omega$             | External                   | ADBU-200-A  |

| 3 phase 380V   |          |                         |                   |             |
|----------------|----------|-------------------------|-------------------|-------------|
| AD800-4T0.75GB | 150W     | $\geq 300\Omega$        | Standard built in |             |
| AD800-4T1.5GB  | 150W     | $\geq 220\Omega$        |                   |             |
| AD800-4T2.2GB  | 250W     | $\geq 200\Omega$        |                   |             |
| AD800-4T3.7GB  | 300W     | $\geq 130\Omega$        |                   |             |
| AD800-4T5.5GB  | 400W     | $\geq 90\Omega$         |                   |             |
| AD800-4T7.5GB  | 500W     | $\geq 65\Omega$         |                   |             |
| AD800-4T11GB   | 800W     | $\geq 43\Omega$         |                   |             |
| AD800-4T15GB   | 1000W    | $\geq 32\Omega$         |                   |             |
| AD800-4T18.5G  | 1300W    | $\geq 25\Omega$         | Built in          | ADBU-35-B   |
| AD800-4T22G    | 1500W    | $\geq 22\Omega$         |                   | ADBU-35-B   |
| AD800-4T30G    | 2500W    | $\geq 16\Omega$         |                   | ADBU-35-B   |
| AD800-4T37G    | 3.7 kW   | $\geq 16.0\Omega$       | Built in option   | ADBU-35-B   |
| AD800-4T45G    | 4.5 kW   | $\geq 16\Omega$         |                   | ADBU-35-B   |
| AD800-4T55G    | 5.5 kW   | $\geq 8\Omega$          |                   | ADBU-70-B   |
| AD800-4T75G    | 7.5 kW   | $\geq 8\Omega$          |                   | ADBU-70-B   |
| AD800-4T93G    | 4.5 kW×2 | $\geq 8\Omega \times 2$ | External          | ADBU-70-B×2 |
| AD800-4T110G   | 5.5 kW×2 | $\geq 8\Omega \times 2$ | External          | ADBU-70-B×2 |
| AD800-4T132G   | 6.5 kW×2 | $\geq 8\Omega \times 2$ | External          | ADBU-70-B×2 |
| AD800-4T160G   | 16kW     | $\geq 2.5\Omega$        | External          | ADBU-200-B  |
| AD800-4T185G   | 18.5 kW  | $\geq 2.5\Omega$        | External          | ADBU-200-B  |

| AC drive models | Recommended Power | Recommended Braking resistor | Built in /external connect | Remark       |
|-----------------|-------------------|------------------------------|----------------------------|--------------|
| AD800-4T220G    | 22 kW             | $\geq 2.5\Omega$             | External                   | ADBU-200-B   |
| AD800-4T250G    | 12.5 kW×2         | $\geq 2.5\Omega \times 2$    | External                   | ADBU-200-B×2 |
| AD800-4T315G    | 16kW×2            | $\geq 2.5\Omega \times 2$    | External                   | ADBU-200-B×2 |
| AD800-4T355G    | 17kW×2            | $\geq 2.5\Omega \times 2$    | External                   | ADBU-200-B×2 |
| AD800-4T400G    | 14 kW×3           | $\geq 2.5\Omega \times 3$    | External                   | ADBU-200-B×3 |
| AD800-4T450G    | 15kW×3            | $\geq 2.5\Omega \times 3$    | External                   | ADBU-200-B×3 |

" X 2" indicates that two braking units with their respective braking resistor are connected in parallel.



## Appendix B. Communication protocol description

### Overview of communication agreement

Standard RS485 communication interface is collocated for the AC drive; ModBus communication agreement is adopted according to the international standard for active/passive communication. The user is able to make use of PC/PLC, upper computer and main station AC drive for centralized control (set up the revision status of control command, operation frequency and related functional code parameters of frequency converter; execute surveillance to the working status and fault information of frequency converter) and thus adapt to specific application requirements.

### 2.1. Protocol format

#### MOBUS RTU format

|   |               |               |      |           |   |
|---|---------------|---------------|------|-----------|---|
| Large than 3.5 bytes of transmission time | Slave address | Function code | Data | CRC check | Large than 3.5 bytes of transmission time |
| Frame starting                            |               | PDU           |      |           | Frame end                                 |

### 2.2 Slave machine address

2.2.1 (0 for broadcast address, the slave address can be set for 1 ~ 247)

### 2.3 PDU parts

2.3.1 Function code 03: ( read data )

Read multiple AC drive function code parameters, running status, monitor parameters and fault information, can read at most 6 continuous address of AC drive parameters.

Host machine data send

|                    |    |                                    |                                   |                                    |                                   |
|--------------------|----|------------------------------------|-----------------------------------|------------------------------------|-----------------------------------|
| PDU part           | 03 | Register starting address high bit | Resistor starting address low bit | High address of number of register | Low address of number of register |
| Date length (Byte) | 1  | 1                                  | 1                                 | 1                                  | 1                                 |

Slave machine response :

|                    |    |   |                       |
|--------------------|----|---|-----------------------|
| PDU part           | 03 | Read number of bytes( 2* number of register ) | Read content          |
| Date length (Byte) | 1  | 1   | 2* number of register |

### 2.3.2 Function 06 ( Write EEPROM)

Write operation command, running frequency, function code parameter for single Ac dive  
Host machine send.

|          |    |          |          |      |     |
|----------|----|----------|----------|------|-----|
| PDU part | 06 | Register | Register | High | Low |
|----------|----|----------|----------|------|-----|

|                       |   | starting<br>address<br>high bit | starting<br>address low<br>bit | address of<br>number of<br>register | address of<br>number of<br>register |
|-----------------------|---|---------------------------------|--------------------------------|-------------------------------------|-------------------------------------|
| Date length<br>(Byte) | 1 | 1                               | 1                              | 1                                   | 1                                   |

Slave machine response :

| PDU par               | 06 | Register<br>starting<br>address<br>high bit | Register<br>starting<br>address low<br>bit | High<br>address of<br>number of<br>register | Low<br>address of<br>number of<br>register |
|-----------------------|----|---|--|---|--|
| Date length<br>(Byte) | 1  | 1   | 1  | 1   | 1  |

### 2.3.3 Function code 10 (write RAM) :

Write operation command, running frequency, function code parameter for single Ac drive

If there are some mistake happens, the slave machine send objection response.

Objection response. :

| PDU parts          | 0x80+ function code | Objection response. code |
|--------------------|---------------------|--------------------------|
| Date length (Byte) | 1                   | 1                        |

Objection response mistake code types.

| Objection<br>response code | Corresponding mistake       |
|----------------------------|-----------------------------|
| 01                         | Password is wrong           |
| 02                         | Command code is wrong       |
| 03                         | CRC check wrong             |
| 04                         | Invalid address             |
| 05                         | Invalid parameters          |
| 06                         | Parameter change is invalid |
| 07                         | System is locked            |
| 08                         | Performing EEPROM operation |

## 2.4 CRC checking

| CRC check          | CRC low address | CRC high address |
|--------------------|-----------------|------------------|
| Data length (Byte) | 1               | 1                |

CRC hecking function as following

```

unsigned int crc_chk_value(unsigned char*data_value, unsigned char length)
{
    unsigned int crc_value=0xFFFF;
    inti;
    while(length--)
    {
        crc_value^=*data_value++;
        for(i=0;i<8;i++)
        {
            if(crc_value&0x0001)
                crc_value=( crc_value>>1)^0xA001;
            else
                crc_value=crc_value>>1;
        }
    }
    return(crc_value);
}

```

## 2.5 communication parameter definition

AC drive parameter address CRC calculation

| Register definition     | Register address space   |
|-------------------------|--|
| Function parameters     | Named P group for initial letter of function code, only change P letter for 0 is communication address. For example: the function code P8.14 communication address is 0x080E |
| Operation command       | 0x2000   |
| AC drive current status | 0x3000   |
| Fault information       | 0x3100   |
| Frequency reference     | 0x4000   |

Note :

2.5.1 it will cause the service life of EEPROM reducing if performance write function frequently. Only write the value of RAM OK in some parameters communication mode which no need storage.

2.5.2 Operation command code corresponding to running control code

|                        |                      |
|------------------------|----------------------|
| Operation command code | running control code |
|------------------------|----------------------|

|        |                           |
|--------|---------------------------|
| 0x0001 | Forward running           |
| 0x0002 | Reverse running           |
| 0x0003 | Forward Jog               |
| 0x0004 | Reverse Jog               |
| 0x0005 | Coast to stop (free stop) |
| 0x0006 | deceleration to stop      |
| 0x0007 | Fault reset               |

### 2.5. 3, AC drive status code corresponding indicator meaning:

| Ac drive status code | indicator meaning |
|----------------------|-------------------|
| 0x0001               | Forward running   |
| 0x0002               | Forward running   |
| 0x0003               | Stop              |

2.5.4 The high address of fault information code is 0, the low address corresponding to suffix E0. of AC drive fault code, for example, the fault information code 0x000C, stand for AC drive fault code E012.

### 2.5.5 Monitor parameters and its communication address. ( P7.02 set for 01)

| SN | Monitor content          | Communication W/R address |
|----|--------------------------|---------------------------|
| 0  | Running frequency (Hz)   | 5000H                     |
| 1  | Output current (A)       | 5001H                     |
| 2  | Output voltage (V)       | 5002H                     |
| 3  | Machine speed display    | 5003H                     |
| 4  | DC bus voltage (V)       | 5004H                     |
| 5  | Frequency reference (Hz) | 5005H                     |
| 6  | Count value              | 5006H                     |
| 7  | Length value             | 5007H                     |
| 8  | X input status           | 5008H                     |
| 9  | DO output status         | 5009H                     |
| 10 | AI1 voltage (V)          | 500AH                     |
| 11 | AI2 voltage (V)          | 500BH                     |
| 12 | Voltage of potentiometer | 500CH                     |
| 13 | PID reference            | 500DH                     |
| 14 | Output power (Kw)        | 500EH                     |
| 15 | Output torque(%)         | 500FH                     |

|    |                             |       |
|----|-----------------------------|-------|
| 16 | Linear speed                | 5010H |
| 17 | PID feedback                | 5011H |
| 18 | PLC step                    | 5012H |
| 19 | Input PULSE trains (Hz)     | 5013H |
| 20 | Current power on time       | 5014H |
| 21 | Current running time        | 5015H |
| 22 | The rest running time       | 5016H |
| 23 | Main frequency source       | 5017H |
| 24 | Auxiliary frequency source  | 5018H |
| 25 | Feedback speed ( unit0.1Hz) | 5019H |
| 26 | Encoder feedback speed      | 501AH |
| 27 | Before AI1 revise voltage   | 501BH |
| 28 | Before AI2 revise voltage   | 501CH |
| 29 | Torque reference            | 501DH |
| 30 | PULSE input frequency       | 501EH |
| 31 | Communication setting       | 501FH |

## 2.6 Take examples

### 2.6.1 Start 1# AC drive forward running

Host machine request:

| Slave address | Function code | Register starting address high bit | Register starting address low bit | register data high address | register data low address | CRC check low address | CRC check low address |
|---------------|---------------|------------------------------------|-----------------------------------|----------------------------|---------------------------|-----------------------|-----------------------|
| 01            | 06            | 20                                 | 00                                | 00                         | 01                        | 43                    | CA                    |

Slave machine response: AC drive forward running, feedback the same host machine request data.

### 2.6.2 Set AC drive running frequency is 50Hz

Host machine request:

| Slave address | Function code | Register starting address high bit | register starting address low bit | register data high address | register data low address | CRC check low address | CRC check low address |
|---------------|---------------|------------------------------------|-----------------------------------|----------------------------|---------------------------|-----------------------|-----------------------|
| 01            | 06            | 40                                 | 00                                | 27                         | 10                        | 86                    | 36                    |

Slave machine response: AC drive runs with 50Hz, feedback the same host machine request date.

2.6.3 Write AC drive current output voltage, frequency response: output frequency 227V.

Host machine request:

| Slave address | Function code | Register starting address high bit | Register starting address low bit | Register data high address | register data low address | CRC check low addresses | CRC check low address |
|---------------|---------------|------------------------------------|-----------------------------------|----------------------------|---------------------------|-------------------------|-----------------------|
| 01            | 03            | 50                                 | 02                                | 00                         | 01                        | 34                      | CA                    |

Slave machine response:

| Slave address | Function code | Read high address of date | Read low address of date | 1 <sup>st</sup> high address of register | 1 <sup>st</sup> low address of register | CRC check low addresses | CRC check low address |
|---------------|---------------|---------------------------|--------------------------|--|---|-------------------------|-----------------------|
| 01            | 03            | 00                        | 02                       | 00                                       | E3                                      | A5                      | 83                    |

## Appendix C PG card for encoder and expansion card

AD800 can performance close loop vector control to realize high precision speed and torque control. Please check carefully of PG card types for difference encoder

| Model      | description   | Mark                         |
|------------|---|------------------------------|
| AD800-PG0A | ABZ OC input PG card , with frequency dividing output | Maximum ratio: 100KHz        |
| AD800-PG0B | ABZ Differential input , frequency dividing output    | Maximum speed ratio : 500KHz |
| AD800-PG4A | Rotating resolver PG card                             | DB9 connector                |
| EC-01      | Function expansion card                               |                              |

### 1.AD800-PG0A wiring connector signal definition

| Terminals mark | Description                          |
|----------------|--------------------------------------|
| A              | Encoder output signal A              |
| B              | Encoder output signal B              |
| Z              | Encoder output signal Z              |
| 15V            | Supply 15V power to encoder          |
| COM            | Encoder power supply negative        |
| A1             | PG card1: 1 feedback output signal A |
| B1             | PG card1: 1 feedback output signal B |
| PE             | shielded wire of grounding           |

### 2. AD800-PG0B wiring connector signal definition :

| Terminals mark | Description                            |
|----------------|--|
| A+             | Encoder output signal A +              |
| A-             | Encoder output signal A-               |
| B+             | Encoder output signal B+               |
| B-             | Encoder output signal B-               |
| Z+             | Encoder output signal Z+               |
| Z-             | Encoder output signal Z-               |
| VDD            | Supply 15V power to encoder            |
| COM            | Encoder power supply negative          |
| PE             | shielded wire of grounding             |
|                |  |
| OA+            | PG card 1: 1 feedback output signal A+ |

|     |  |
|-----|--|
| OA- | PG card 1: 1 feedback output signal A- |
| OB+ | PG card 1: 1 feedback output signal B+ |
| OB- | PG card 1: 1 feedback output signal B- |
| OZ+ | PG card 1: 1 feedback output signal Z+ |
| OZ- | PG card 1: 1 feedback output signal Z- |
| COM | power supply signal grounding          |

### 3. AD800-PG4A wiring connector signal definition

| DB9 terminal SN | Description                          |
|-----------------|--------------------------------------|
| 1               | EXC1 resolver excitation negative    |
| 2               | EXC resolver excitation positive     |
| 3               | SIN resolver feedback SIN positive   |
| 4               | SINLO resolver feedback SIN negative |
| 5               | COS resolver feedback COS positive   |
| 6               | -                                    |
| 7               | -                                    |
| 8               | -                                    |
| 9               | COSLO rotation resolver COS negative |

### 4. Expansion function card EC-01

When the AD series standard built terminals can't meet application site requirement, can buy Euronorm Drive Systems company expansion option card. EC-01

| Terminals mark | Terminals                        | Function description   |
|----------------|----------------------------------|--|
| X6<br>COM      | Multi-function input terminal 6  | 1. Input specification: 24V DC, 5mA<br>2. frequency range: 0 ~ 200Hz<br>3. voltage range: 10V ~ 30V<br>Compatible with NPN/PNP input |
| X7<br>COM      | Multi-function input terminal 7  |  |
| X8<br>COM      | Multi-function input terminal 8  |  |
| X9<br>COM      | Multi-function input terminal 9  |  |
| X10<br>COM     | Multi-function input terminal 10 |  |
| 24V<br>COM     | Provide 24V power supply         | Provide 24V power supply, maximum current 200MA for external power supply of sensor or micro relay .                                 |
| OP             | External power supply input      | Power supply 24V connect on with this terminals with P11 jumper control, when using outside signal to drive X6 ~                     |



| Terminals mark | Terminals         | Function description  |
|----------------|-------------------|---|
|                | terminal          | X10 terminals, OP connect external power supply, P11 disconnect.  |
| AO2<br>GND     | Analog output DO2 | If output voltage or output current determined by P10 jumper, and the voltage range 0—10V, current signal 0—20mA                        |
| TA1 TB1<br>TC1 | Relay output      | Multi-function relay output: TA1 and TC1 is normal open, TA1 and TB1 is normal close<br>Contactor drive capability: AC250V 3A/DC 30V 1A |