USFULL®

# FU9000D Series

## High Performance Inverter

## User Manual

ZHEJIANG FULLWILL ELECTRIC CO., LTD.

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Thank you for purchasing the FU9000D Series AC drive developed by Fullwill Electric!

It is a general-purpose and high-performance current vector AC drive technically upgraded from the FU9000D series.

It is mainly used for controlling and adjusting the speed and torque of three-phase AC synchronous motor. Using high-performance vector control technology, the FU9000D series AC drive features high torque output at a low speed, excellent dynamic characteristics and superior overload capability.

It provides user-programmable features and background monitoring software and communication bus functions and supports multiple PG cards, delivering rich and powerful combined functions and stable performance. It can be used to drive multiple kinds of automated production equipment.

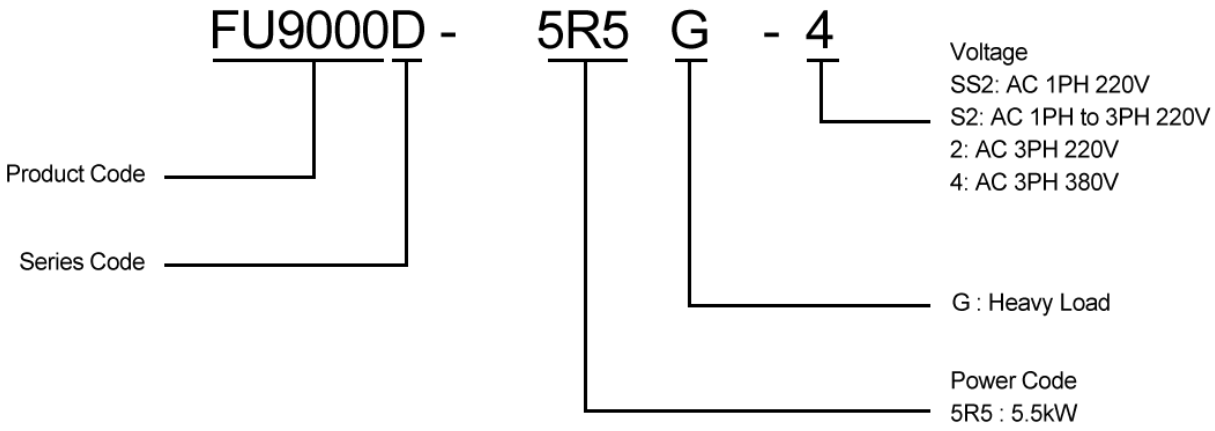

| **Announcement** |
| --- |
| ♦ To illustrate the details of the product, the illustrations in this manual sometimes show the state of the cover or safety cover removed. When using this product, be sure to install the casing or cover according to the regulations, and operate in accordance with the contents of the manual.<br>♦ The illustrations in this manual are for illustration only and may be different from the products you ordered.<br>♦ The company is committed to the continuous improvement of products, and product functions will be continuously upgraded. The information provided is subject to change without notice.<br>♦ If you have any problems during use, please contact with us. |

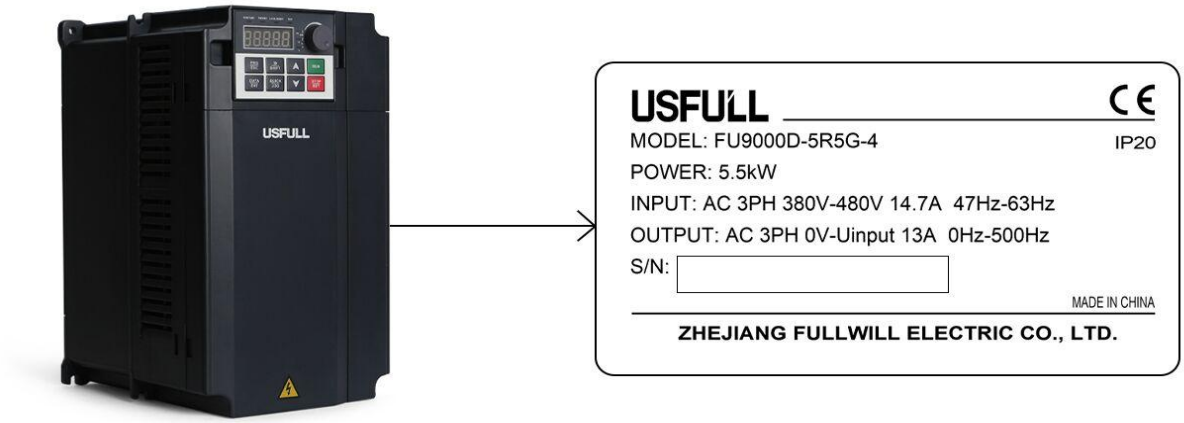
# CONTENT

# Chapter 1 Product Information

## 1.1 Designation Rules and Nameplate

Figure 1-1 Designation Rules and Nameplate of the FU9000D Series Inverter



# Chapter 2 Mechanical and Electrical Installation

## 2.1 Mechanical Installation

### 2.1.1 Installation Environment Requirements

| Item | Requirements |
|---|---|
| Ambient temperature | -10℃ ~ 50℃ |
| 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. |
| Mounting location | Free from direct sunlight, high humidity and condensation. |
| | Free from corrosive, explosive and combustible gas. |
| | Free from oil dirt, dust and metal powder. |
| Vibration A | Less than 0.6g.<br>Far away from the punching machine or the like. |
| Protective enclosure | The FU9000D series AC drives of plastic housing are the whole unit built-in products operated through remote control and need to be installed in the final system.The final system must have the required fireproof cover, electrical protective cover and mechanical protective cover, and satisfy the regional laws and regulations and related IEC requirements. |

### 2.1.2 Installation Clearance Requirements

The clearance that needs to be reserved varies with the power class of the FU9000D, as shown in the following figure.

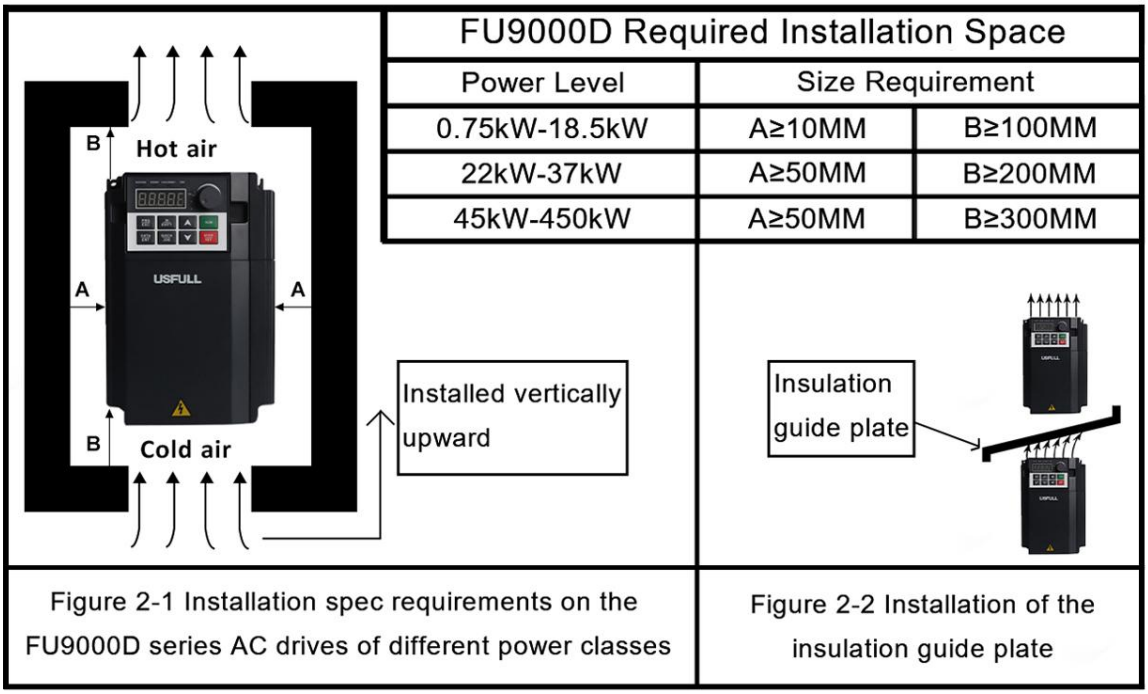



Figure 2-1 Installation spec requirements on the FU9000D series AC drives of different power classes

Figure 2-2 Installation of the insulation guide plate

If multiple AC drives are connected together, install them side by side. If one row of AC drives need to be installed above another row, install an insulation guide plate to prevent AC drives in the lower row from heating those in the upper row and causing faults.

## 2.2 Electrical Installation

### 2.2.1 Description of Main Circuit Terminals

Table 2-2 Description of Main Circuit Terminals of AC Drive

| Terminal | Name | Description |
|---|---|---|
| R, S, T | Three-phase power supply input terminals | Connect the three-phase power supply |
| R, T | Single-phase power supply input terminals | Connect the single-phase power supply |
| (+), (-) | Positive and negative terminal of DC bus | Common DC bus input point |
| (+), PB | Connecting terminals of braking resistor | Connect the braking resistor for the AC drive |
| U, V, W | AC drive output terminals | Connect a three-phase motor |
| PE | Grounding terminal | Must be grounded |

### 2.2.2 Wiring of AC Drive Main Circuit

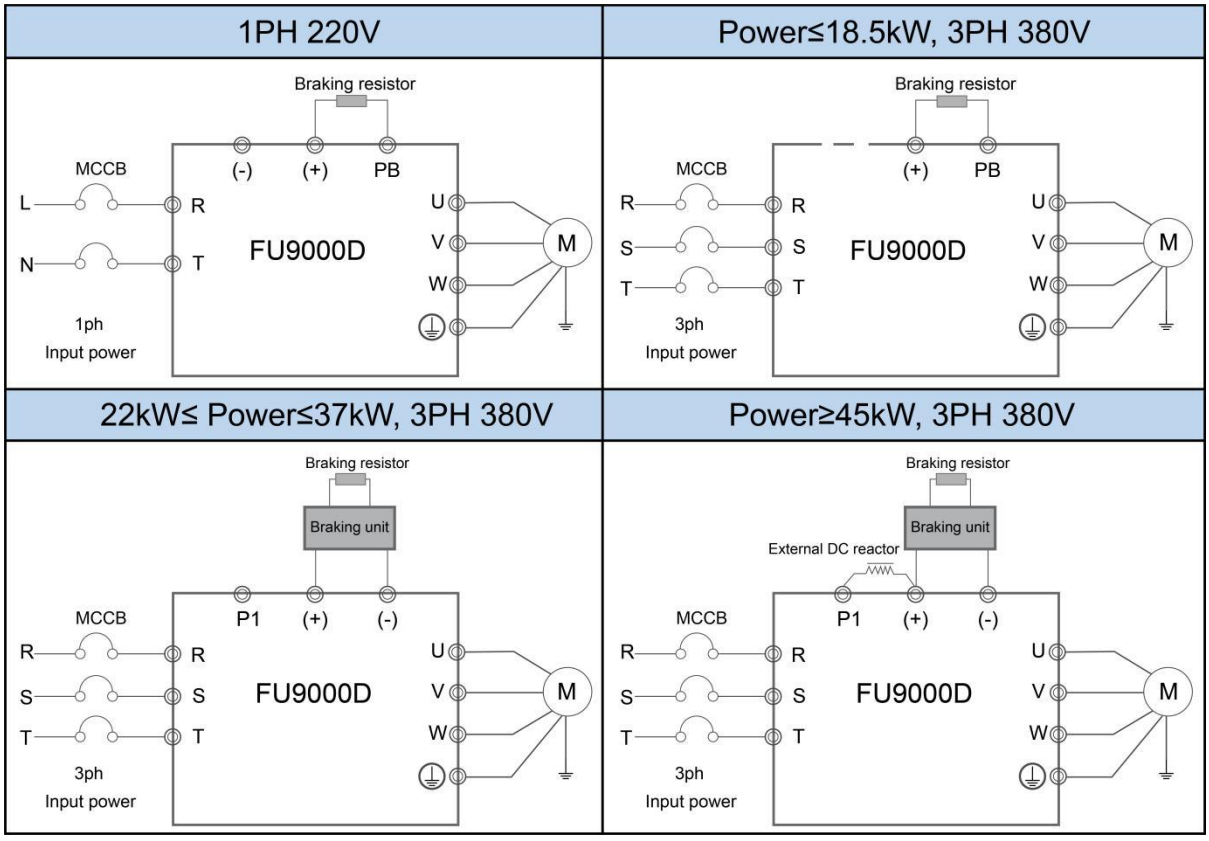



Figure 2-3 Wiring of AC Drive Main Circuit

### 2.2.3 Description of Control Circuit Terminals

Figure 2-4 Control Circuit Terminals Arrangement

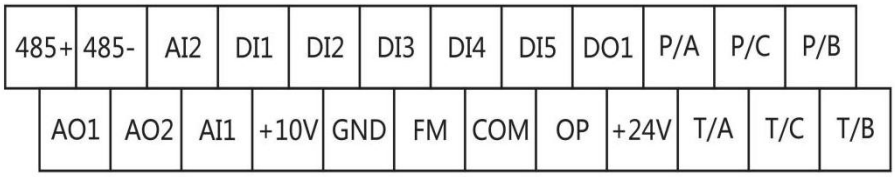



Table 2-3 FU9000D Description of Control Circuit Terminals

| Type | Terminal | Name | Function Description |
|---|---|---|---|
| Power supply | +10V-GND | External +10V power supply | Provide +10V power supply to external unit.<br>Max. output current: 10mA<br>Generally, it provides power supply to external potentiometer with resistance range of 1~5kΩ. |
| | +24V-COM | External +24V power supply | Provide +24V power supply to external unit.<br>Max. output current: 200mA<br>Generally, it provides power supply to DI/DO terminals and external sensors. |
| | OP | External power input terminal | Factory default: connect with +24V.<br>When using external signal to drive DI1~DI5, OP need to connect with external power, disconnect with +24V terminal. |
| Analog input | AI1-GND<br>AI2-GND | Analog input terminal | 1. Input range: 0~10V/0~20mA<br>2. AI1 decided by jumper J10 on the control board<br>3. AI2 decided by jumper J9 on the control board |
| Digital input | DI1 | Digital input 1 | 1. Switch input terminal, work with +24V & COM to form optical coupling isolation input<br>2. Input resistance: 2.4kΩ<br>3. Voltage range for level input: 9~30V |
| | DI2 | Digital input 2 | |
| | DI3 | Digital input 3 | |
| | DI4 | Digital input 4 | |
| | DI5 | High speed pulse input | Besides the feature of DI1 ~ DI4, can be high speed pulse input channel.<br>Max. input frequency: 100kHz |
| Analog output | AO1-GND<br>AO2-GND | Analog output terminal | 1. Output range: 0~10V/0~20mA<br>2. AO1 decided by jumper J7 on the control board<br>3. AO2 decided by jumper J4 on the control board |
| Digital output | FM-COM | High speed pulse output | It is limited by P5-00 (FM terminal output mode selection). When used as high speed pulse output, max. frequency 100kHz; can be used as integrated electric pole open circuit output as well. |
| Relay output | T/A-T/B | NC terminal | Contact driving capacity:<br>250VAC, 3A, cosφ= 0.4<br>30VDC, 1A |
| | T/A-T/C | NO terminal | |
| | P/A-P/B | NC terminal | |
| | P/A-P/C | NO terminal | |

### 2.2.4 Wiring of AC Drive Control Circuit

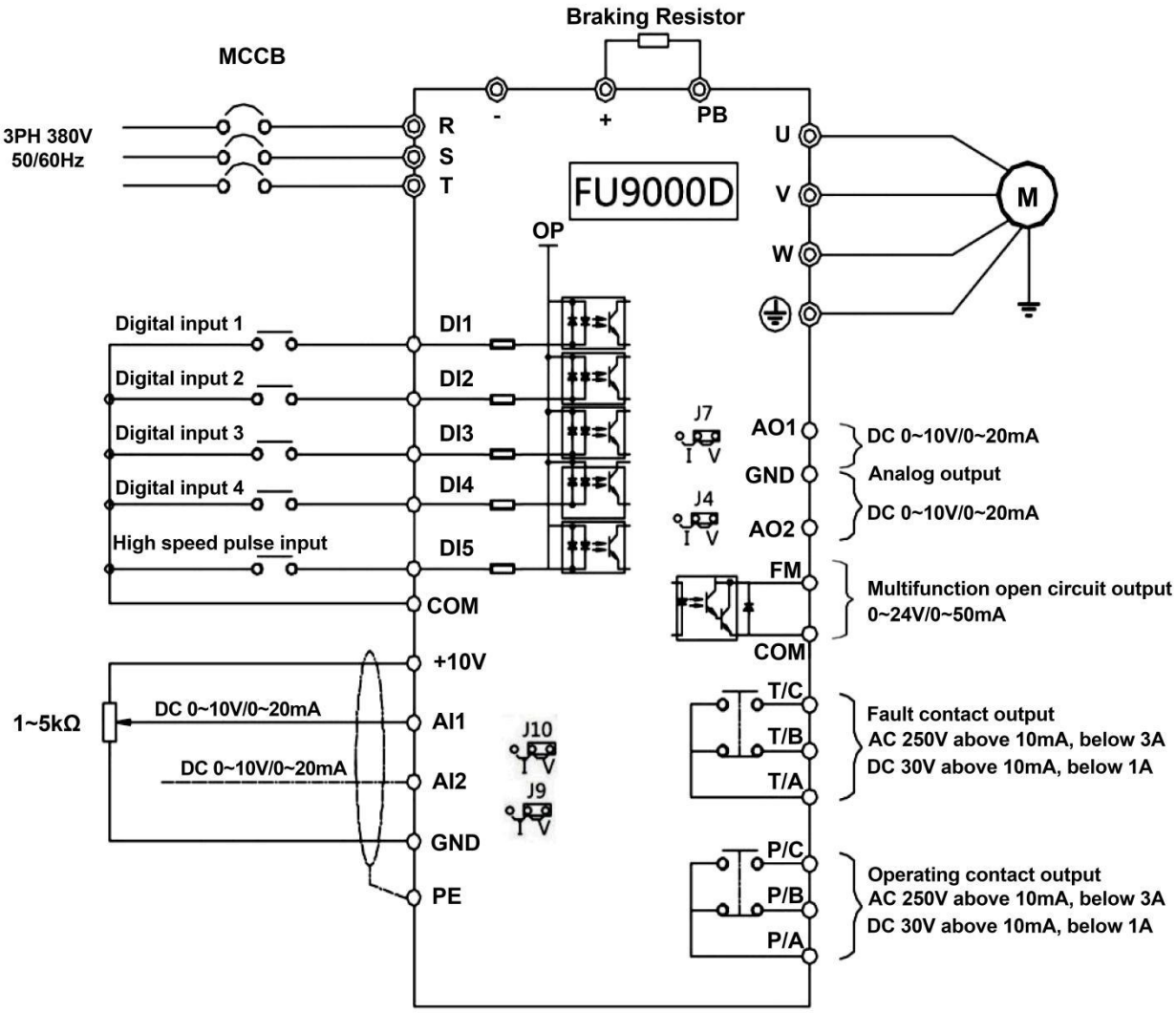



Figure 2-5 Wiring Mode of the AC Drive Control Circuit

1. All FU9000D series AC drives have the same wiring mode.
2. The figure here shows the wiring of 3 phase 380VAC AC drive.

◎ indicates main circuit terminal. ○ indicates control circuit terminal.

### 2.2.5 Description of Wiring of Signal 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 20m, as shown in figure 2-6.

In some situations where the analog signal is severely disturbed, a filter capacitor or ferrite core should be added to the analog signal source side, as shown in figure 2-7.

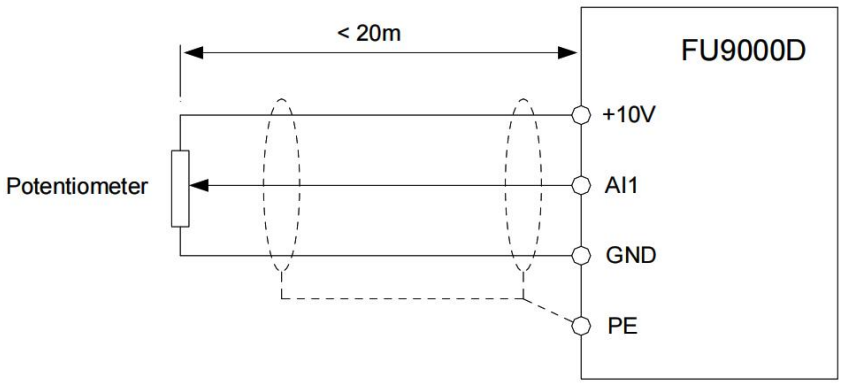



Figure 2-6 Wiring Mode of AI Terminals

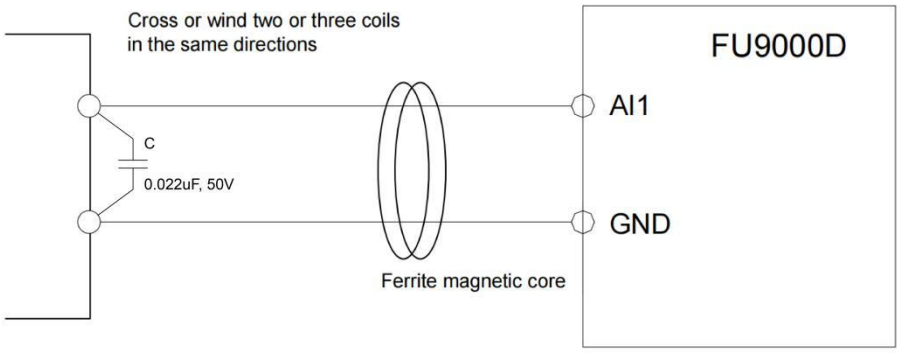



Figure 2-7 Install Filter Capacitor or Ferrite Magnetic Core

2) Wiring of DI terminals:

Generally, select shielded cable no longer than 20m. 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

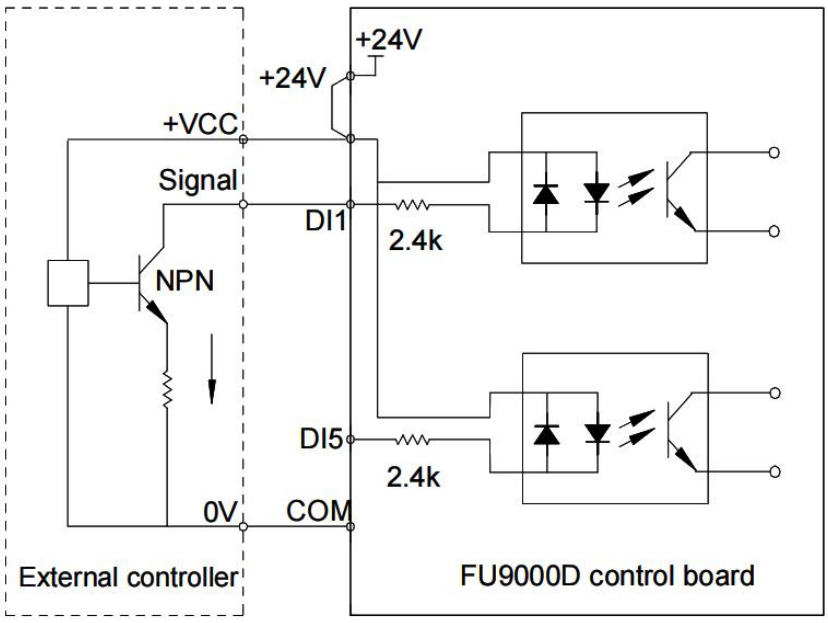



Figure 2-8 Wiring in SINK Mode

# Chapter 3 Operation Display and Application Examples

## 3.1 Operation Panel

You can modify the parameters, monitor the working status and start or stop the FU9000D by operating the operation panel, as shown in the following figure 3-1.

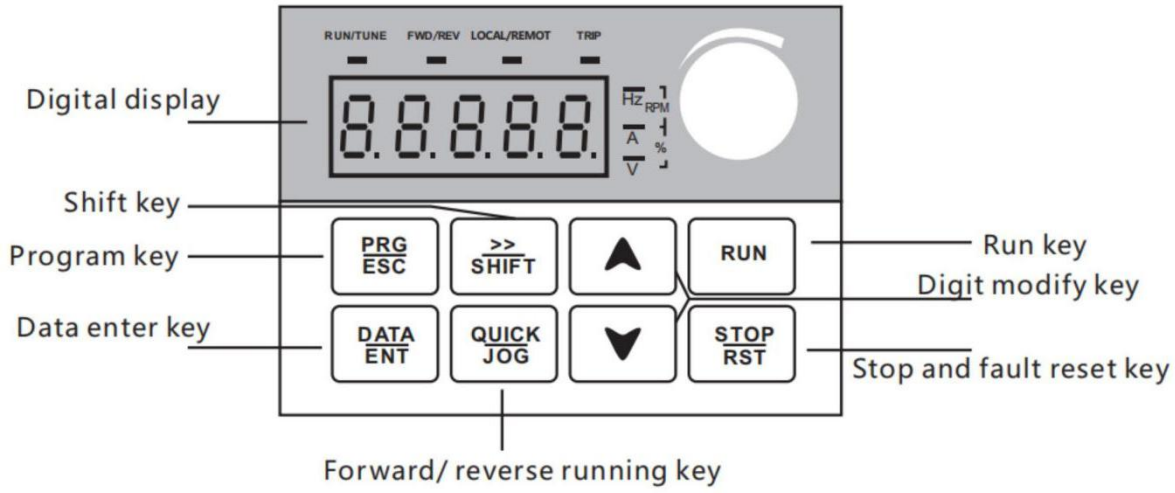
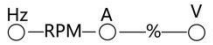



Figure 3-1 Details of the Operation Panel

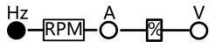
Table 3-1 Description of Status Indicator

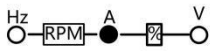
| Indicator | Indication |
|---|---|
| RUN/TUNE | Indicator ON: RUNNING status |
| | Indicator OFF: STOP status |
| | Indicator Flashing Slowly: Auto-tuning status |
| FWD/REV | Indicator ON: Forward motor rotation |
| | Indicator OFF: Reverse motor rotation |
| LOCAL/REMOT | Indicator ON: Under terminal control |
| | Indicator OFF: Under operating panel control |
| | Indicator Flashing: Under serial communication control |
| TRIP | Indicator Flashing Quickly: A fault condition |

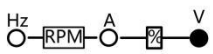


: Unit Indicators

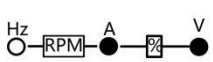
● : Indicators on ○ : Indicators off


Hz: Unit of frequency


A: Unit of current


V: Unit of voltage


RPM: Unit of rotation speed


%: Unit of perentage

Digital Display

The 5-digit LED display is able to display the following range of information:

• Setting frequency

• Output frequency

• Monitoring data

• Fault codes

Table 3-2 Description of Keys on the Operation Panel

| Key | Name | Function |
|---|---|---|
| PRG ESC | Programme | Enter or exit Level I menu. |
| DATA ENT | Confirm | Enter the menu interfaces level by level, and confirm the parameter setting. |
| ▲ | Increase | Increase data or function code. |
| ▼ | Decrease | Decrease data or function code. |
| >> SHIFT | Shift | Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters. |
| RUN | Run | Start the AC drive in the operation panel control mode. |
| STOP RST | Stop/Reset | - Stop the AC drive when it is in the running state<br>- Perform the reset operation when in the fault state.<br>The functions of this key are restricted to P7-02. |
| QUICK JOG | Multi-function | Function selection according to P7-01, can be defined as command source or direction. |
| | Menu Selection | Redirect among menu modes according to PP-03. |

## 3.2 Viewing and Modifying Function Codes

The operation panel of the FU9000D adopts three-level menu.

The three-level menu consists of function code group (Level I), function code (Level II), and function code setting value (Level III), as shown in the following figure 3-2.

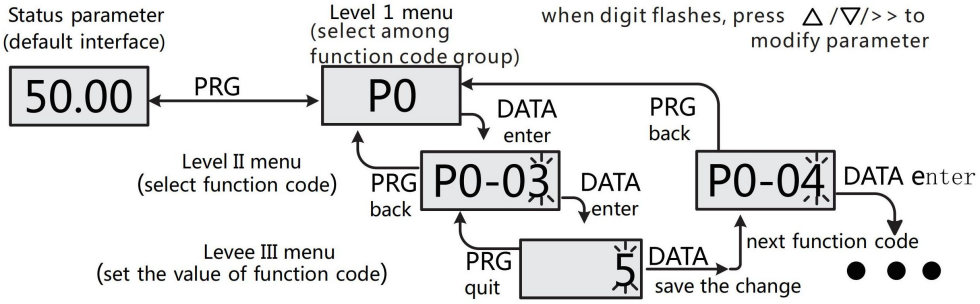



Figure 3-2 Three-level-menu Operation Chart

Note: You can return to Level II menu from Level III menu by pressing PRG key or DATA key.

• After press DATA key , the system saves the parameter setting, and goes back to Level II menu and shifts to the next function code.

• After press PRG key, the system directly returns to Level II menu and remains at the current function code, not save the parameter setting.

Example: Changing P3-02 from 10.00Hz to 15.00Hz.

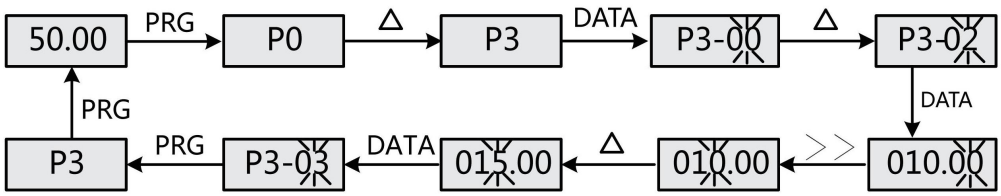



Figure 3-3 Example of Changing the Parameter Value

In Level III menu, if the parameter has no flashing digit, the parameter cannot be modified. Maybe:

• The displayed function code is only readable, such as AC drive model, actually detected parameter and running record parameter.

• The displayed function code is only readable in running state, need to stop running and change parameter.

## 3.3 Structure of Function Codes

| Function Code Group | Function | Description |
|---|---|---|
| P0-PP | Standard function code group | Compatible with FU9000D series function codes and adding some function codes. |
| D0-DC | Advanced function code group | Multi-motor parameters, AI/AO correction, optimization control, PLC card extension function setting. |
| U0-U3 | Running state function code group | Display of AC drive basic parameters. |

Table 3-3 Structure of Function Codes

In the function code display state, select the required function code pressing the key ▲ or ▼, as shown in the following figure 3-4.

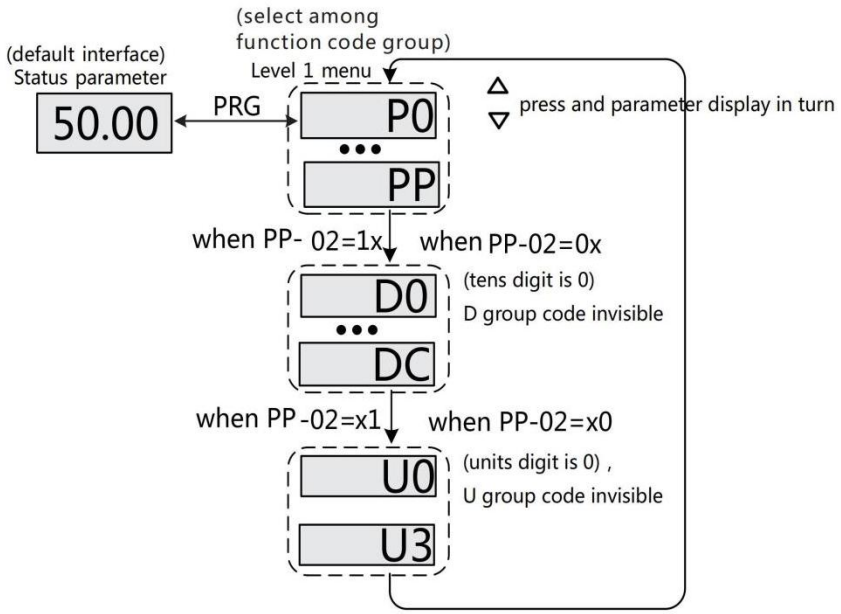



Figure 3-4 Quick View of Function Codes

PP-02 is used to determine whether group D and group U are displayed.

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| PP-02 | Parameter display property | Units digit: Group U display selection<br>0: Not display<br>1: Display | 11 |
| | | Tens digit: Group D display selection<br>0: Not display<br>1: Display | |

## 3.4 Definition and Operation of the Multi-function Key

You can define the function (command source switchover or rotation direction switchover) of the multi-function key in P7-01. For details, see the description of P7-01.

## 3.5 Viewing Status Parameters

In the stop or running state, you can press SHIFT key on the operation panel to display status parameters.

Whether parameters are displayed is determined by the 16 bits of values converted from the values of P7-03, P7-04, and P7-05 in the binary format.

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| P7-05 | LED display stop parameters | 0000 ~ FFFF<br>Bit00: Set frequency (Hz) Bit01: Bus voltage (V)<br>Bit02: DI input status Bit03: DO output status<br>Bit04: AI1 voltage (V) Bit05: AI2 voltage (V)<br>Bit06: AI3 voltage (V) Bit07: Count value<br>Bit08: Length value Bit09: PLC stage<br>Bit10: Load speed Bit11: PID reference<br>Bit12: Pulse reference frequency (kHz) | 33 |

In running state, five running status parameters are displayed by default, and you can set whether other parameters are displayed by setting P7-03 and P7-04, as listed in the following table.

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| P7-03 | LED display running parameters 1 | 0000 ~ FFFF<br>Bit00: Running frequency 1 (Hz)<br>Bit01: Set frequency (Hz)<br>Bit02: Bus voltage (V)<br>Bit03: Output voltage (V)<br>Bit04: Output current (A)<br>Bit05: Output power (kW)<br>Bit06: Output torque (%)<br>Bit07: DI input status<br>Bit08: DO output status<br>Bit09: AI1 voltage (V)<br>Bit10: AI2 voltage (V)<br>Bit11: AI3 voltage (V)<br>Bit12: Count value<br>Bit13: Length value<br>Bit14: Load speed display<br>Bit15: PID reference | 1F |
| P7-04 | LED display running parameters 2 | 0000 ~ FFFF<br>Bit00: PID feedback<br>Bit01: PLC stage<br>Bit02: Pulse reference frequency (kHz)<br>Bit03: Running frequency 2 (Hz)<br>Bit04: Remaining running time<br>Bit05: AI1 voltage before correction<br>Bit06: AI2 voltage before correction<br>Bit07: AI3 voltage before correction<br>Bit08: Motor speed<br>Bit09: Current power on-time (Hour)<br>Bit10: Current running time (Minute)<br>Bit11: Pulse reference frequency (Hz)<br>Bit12: Communication setting value<br>Bit13: Encoder feedback speed (Hz)<br>Bit14: Main frequency X display (Hz)<br>Bit15: Auxiliary frequency Y display (Hz) | 0 |

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

Select the required parameters by pressing. Set the values of the parameters by referring to the following example.

1. Determine the parameters to be displayed.

Running frequency, Bus voltage, Output voltage, Output current, Output frequency, Output torque, PID feedback, Encoder feedback speed

2. Set the binary data:

P7-03: 0000 0000 0111 1101B, P7-04: 0010 0000 0000 0001B

3. Convert the binary data to hexadecimal data:

P7-03: 007DH, P7-04: 2001H

The values displayed on the operation panel are respectively H.1043 and H.2001 respectively for P7-03 and P7-04.

# Chapter 4 Function Parameter Table

If PP-00 is set to a non-zero number, parameter protection is enabled. You must enter the correct user password to enter the menu.

To cancel the password protection function, enter with password and set PP-00 to 0.

Group P and Group D are standard function parameters. Group U includes the monitoring function parameters.

The symbols in the function code table are described as follows:

"☆": It is possible to modify the parameter with the drive in the stop and in the run status.

"★": It is not possible to modify the parameter with the drive in the run status.

"●": The parameter is the actual measured value and cannot be modified.

"*": The parameter is a factory parameter and can be set only by the manufacturer.

## 4.1 Standard Parameter Table

Table 4-1 Standard Parameters

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Group P0: Standard Parameters | | | | |
| P0-00 | G/P type display | 1: G (constant torque load)<br>2: P (fan and pump) | Model dependent | ● |
| P0-01 | Motor 1 control mode | 0: SVC<br>1: FVC<br>2: V/F | 0 | ★ |
| P0-02 | Command source selection | 0: Operation panel<br>1: Terminal<br>2: Serial communication | 0 | ☆ |
| P0-03 | Main frequency source X selection | 0: Digital setting (power off, value deleted)<br>1: Digital setting (power off, value remained)<br>2: AI1<br>3: AI2<br>4: AI3 (optional)<br>5: Pulse reference (DI5)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID reference<br>9: Communication setting<br>10: Keyboard with potentiometer (power off, value remained)<br>11: Keyboard with potentiometer (power off, value deleted)<br>12: Keyboard with potentiometer, change rate 1Hz | 10 | ★ |
| P0-04 | Auxiliary frequency source Y selection | Same to P0-03 | 0 | ★ |
| P0-05 | Base value of range of auxiliary frequency reference for main and auxiliary superposition | 0: Relative to max. frequency<br>1: Relative to main frequency reference | 0 | ☆ |
| P0-06 | Range of auxiliary frequency reference for main and auxiliary superposition | 0% ~ 150% | 100% | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P0-07 | Frequency source superposition selection | Units digit: Frequency reference selection<br>0: Main frequency reference<br>1: Main and auxiliary calculation (based on tens digit)<br>2: Switchover between main and auxiliary<br>3: Switchover between main and "main & auxiliary calculation"<br>4: Switchover between auxiliary and "main & auxiliary calculation"<br>Tens digit: Main and auxiliary calculation formula<br>0: Main + auxiliary<br>1: Main - auxiliary<br>2: Max. (main, auxiliary)<br>3: Min. (main, auxiliary) | 00 | ☆ |
| P0-08 | Preset frequency | 0.00Hz ~ Max. frequency (P0-10) | 50.00Hz | ☆ |
| P0-09 | Running direction | 0: Run in the default direction<br>1: Run in direction reverse to the default direction | 0 | ☆ |
| P0-10 | Max. frequency | 50.00Hz ~ 500.00Hz | 50.00Hz | ★ |
| P0-11 | Setting channel of frequency upper limit | 0: Set by P0-12<br>1: AI1 2: AI2<br>3: AI3 4: Pulse reference (DI5)<br>5: Communication reference | 0 | ★ |
| P0-12 | Frequency reference upper limit | Frequency lower limit (P0-14) to max. frequency (P0-10) | 50.00Hz | ☆ |
| P0-13 | Frequency reference upper limit offset | 0.00Hz ~ Max. frequency (P0-10) | 0.00Hz | ☆ |
| P0-14 | Frequency reference lower limit | 0.00Hz ~ Frequency upper limit (P0-12) | 0.00Hz | ☆ |
| P0-15 | Carrier frequency | Model dependent | Model dependent | ☆ |
| P0-16 | Carrier frequency adjustment with temperature | 0: No 1: Yes | 1 | ☆ |
| P0-17 | Acceleration time 1 | 0.00s ~ 650.00s (P0-19 = 2)<br>0.0s ~ 6500.0s (P0-19 = 1)<br>0s ~ 65000s (P0-19 = 0) | Model dependent | ☆ |
| P0-18 | Deceleration time 1 | 0.00s ~ 650.00s (P0-19 = 2)<br>0.0s ~ 6500.0s (P0-19 = 1)<br>0s ~ 65000s (P0-19 = 0) | Model dependent | ☆ |
| P0-19 | Acceleration/ Deceleration time unit | 0: 1s<br>1: 0.1s<br>2: 0.01s | 1 | ★ |
| P0-21 | Frequency offset of auxiliary frequency source for X and Y operation | 0.00Hz ~ Max. frequency (P0-10) | 0.00Hz | ☆ |
| P0-22 | Frequency reference resolution | 1: 0.1Hz 2: 0.01Hz | 2 | ★ |
| P0-23 | Retentive of digital setting frequency upon power failure | 0: Not retentive<br>1: Retentive | 0 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P0-24 | Motor parameter group selection | 0: Motor parameter group 1 | 0 | ★ |
| P0-25 | Acceleration/ Deceleration time base frequency | 0: Max. frequency (P0-10)<br>1: Setting frequency<br>2: 100Hz | 0 | ★ |
| P0-26 | Base frequency for UP/DOWN modification during running | 0: Running frequency<br>1: Setting frequency | 0 | ★ |
| P0-27 | Binding command source to frequency source | Units digit: Binding operation panel command to frequency source<br>0: No binding<br>1: Frequency source by digital setting<br>2: AI1<br>3: AI2<br>4: AI3<br>5: Pulse reference (DI5)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID reference<br>9: Communication setting<br>Tens digit: Binding terminal command to frequency source<br>Hundreds digit: Binding communication command to frequency source | 0000 | ☆ |
| P0-28 | Communication protocol | 0: Modbus protocol<br>1: Profibus-DP protocol/CANopen protocol | 0 | ☆ |
| Group P1: Motor 1 Parameters | | | | |
| P1-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor | 0 | ☆ |
| P1-01 | Rated motor power | 0.1kW ~ 1000.0kW | Model dependent | ☆ |
| P1-02 | Rated motor voltage | 1V ~ 2000V | Model dependent | ☆ |
| P1-03 | Rated motor current | 0.01A ~ 655.35A (VFD power ≤ 55kW)<br>0.1A ~ 6553.5A (VFD power > 55kW) | Model dependent | ☆ |
| P1-04 | Rated motor frequency | 0.01Hz ~ Max. frequency | Model dependent | ☆ |
| P1-05 | Rated motor rotational speed | 1RPM ~ 65535RPM | Model dependent | ☆ |
| P1-06 | Stator resistance (asynchronous motor) | 0.001Ω ~ 65.535Ω (VFD power ≤ 55kW)<br>0.0001Ω ~ 6.5535Ω (VFD power > 55kW) | Tuning parameter | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P1-07 | Rotor resistance (asynchronous motor) | 0.001Ω ~ 65.535Ω (VFD power ≤ 55kW)<br>0.0001Ω ~ 6.5535Ω (VFD power > 55kW) | Tuning parameter | ☆ |
| P1-08 | Leakage inductive reactance (asynchronous motor) | 0.01mH ~ 655.35mH (VFD power ≤ 55kW)<br>0.001mH ~ 65.535mH (VFD power > 55kW) | Tuning parameter | ☆ |
| P1-09 | Mutual inductive reactance (asynchronous motor) | 0.1mH ~ 6553.5mH (VFD power ≤ 55kW)<br>0.01mH ~ 655.35mH (VFD power > 55kW) | Tuning parameter | ☆ |
| P1-10 | No-load current (asynchronous motor) | 0.01A ~ P1-03 (VFD power ≤ 55kW)<br>0.1A ~ P1-03 (VFD power > 55kW) | Tuning parameter | ☆ |
| P1-27 | Encoder line number | 1 ~ 65535 | 1024 | ☆ |
| P1-28 | Encoder type | 0: ABZ encoder<br>2: Rotational encoder | 0 | ☆ |
| P1-30 | AB sequence of ABZ encoder | 0: Forward<br>1: Reverse | 0 | ☆ |
| P1-34 | Rotational encoder pole number | 1 ~ 65535 | 1 | ☆ |
| P1-36 | Speed feedback PG offline detect time | 0.0s: No action<br>0.1s ~ 10.0s | 0.0s | ☆ |
| P1-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning | 0 | ☆ |
| Group P2: Motor 1 Vector Control Parameters | | | | |
| P2-00 | Speed loop proportional gain 1 | 1 ~ 100 | 30 | ☆ |
| P2-01 | Speed loop integral time 1 | 0.01s ~ 10.00s | 0.50s | ☆ |
| P2-02 | Switchover frequency 1 | 0.00Hz ~ P2-05 | 5.00Hz | ☆ |
| P2-03 | Speed loop proportional gain 2 | 1 ~ 100 | 20 | ☆ |
| P2-04 | Speed loop integral time 2 | 0.01s ~ 10.00s | 1.00s | ☆ |
| P2-05 | Switchover frequency 2 | P2-02 ~ Max. output frequency | 10.00Hz | ☆ |
| P2-06 | Vector control slip gain | 50% ~ 200% | 100% | ☆ |
| P2-07 | SVC speed feedback filter time | 0.000s ~ 0.100s | 0.015s | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P2-09 | Torque limit source in speed control | 0: Set by P2-10<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse reference (DI5)<br>5: Set by communication<br>6: Min. (AI1, AI2)<br>7: Max. (AI1, AI2)<br>Full scale of 1-7 corresponds to P2-10. | 0 | ☆ |
| P2-10 | Digital setting of torque upper limit in speed control | 0.0% ~ 200.0% | 150.0% | ☆ |
| P2-11 | Torque limit source in speed control (generation) | 0: Set by P2-10 (same for generating and electric driving)<br>1: AI1 2: AI2<br>3: AI3<br>4: Pulse reference (DI5)<br>5: Set by communication<br>6: Min. (AI1, AI2)<br>7: Max. (AI1, AI2)<br>8: Set by P2-12<br>Full scale of 1-7 corresponds to P2-12. | 0 | ☆ |
| P2-12 | Digital setting of torque upper limit in speed control (generation) | 0.0% ~ 200.0% | 150.0% | ☆ |
| P2-13 | Excitation adjustment proportional gain | 0 ~ 60000 | 2000 | ☆ |
| P2-14 | Excitation adjustment integral gain | 0 ~ 60000 | 1300 | ☆ |
| P2-15 | Torque adjustment proportional gain | 0 ~ 60000 | 2000 | ☆ |
| P2-16 | Torque adjustment integral gain | 0 ~ 60000 | 1300 | ☆ |
| P2-17 | Speed loop integral property | Units digit: Integral separation<br>0: Disabled<br>1: Enabled | 0 | ☆ |
| P2-21 | Weak magnetic field max. torque coefficients | 50% ~ 200% | 0 | ☆ |
| P2-22 | Power generation limit enable | 0: Invalid<br>1: Effect all the time<br>2: Effect during constant speed<br>3: Effect during deceleration | 0 | ☆ |
| P2-23 | Upper limit of power generation | 0.0% ~ 200.0% | Model dependent | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Group P3: V/F Control Parameters | | | | |
| P3-00 | V/F curve setting | 0: Linear V/F<br>1: Multi-point V/F<br>2 ~ 9: Reserved<br>10: V/F complete separation<br>11: V/F half separation | 0 | ★ |
| P3-01 | Torque boost | 0.0%: Fixed torque boost<br>0.1% ~ 30.0% | Model dependent | ☆ |
| P3-02 | Cut-off frequency of torque boost | 0.00Hz ~ Max. output frequency (P0-10) | 50.00Hz | ★ |
| P3-03 | Multi-point V/F frequency 1 | 0.00Hz ~ P3-05 | 0.00Hz | ★ |
| P3-04 | Multi-point V/F voltage 1 | 0.0% ~ 100.0% | 0.0% | ★ |
| P3-05 | Multi-point V/F frequency 2 (F2) | P3-03 ~ P3-07 | 0.00Hz | ★ |
| P3-06 | Multi-point V/F voltage 2 (V2) | 0.0% ~ 100.0% | 0.0% | ★ |
| P3-07 | Multi-point V/F frequency 3 (F3) | P3-05 ~ Rated motor frequency (P1-04) | 0.00Hz | ★ |
| P3-08 | Multi-point V/F voltage 3 (V3) | 0.0% ~ 100.0% | 0.0% | ★ |
| P3-10 | V/F over-excitation gain | 0 ~ 200 | 64 | ☆ |
| P3-11 | V/F oscillation suppression gain | 0 ~ 100 | 40 | ☆ |
| P3-13 | Voltage source for V/F separation | 0: Set by P3-14<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse reference (DI5)<br>5: Multi-reference<br>6: Simple PLC<br>7: PID reference<br>8: Set by communication<br>Note: 100.0% corresponds to rated motor voltage. | 0 | ☆ |
| P3-14 | Digital setting of voltage for V/F separation | 0V ~ Rated motor voltage | 0V | ☆ |
| P3-15 | Voltage rise time of V/F separation | 0.0s ~ 1000.0s<br>Note: It is the time used for the voltage increases from 0V to rated motor voltage. | 0.0s | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P3-16 | Voltage decrease time of V/F separation | 0.0s ~ 1000.0s<br>Note: It is the time used for the voltage increases from 0V to rated motor voltage. | 0.0s | ☆ |
| P3-17 | V/F separation stop mode selection | 0: Frequency/Voltage separately decrease to 0<br>1: Voltage decrease to 0, then frequency decrease | 0 | ☆ |
| P3-18 | Over-current stall action current | 50% ~ 200% | 150% | ★ |
| P3-19 | Enable over-current stall | 0: Invalid<br>1: Valid | 1 | ★ |
| P3-20 | Over-current stall suppression gain | 0 ~ 100 | 20 | ☆ |
| P3-21 | Current compensation coefficient for double-speed over-current stall action | 50% ~ 200% | 50% | ★ |
| P3-22 | Over-voltage stall action voltage | 200.0 ~ 2000.0 | 380V: 760V<br>220V: 380V | ☆ |
| P3-23 | Enable over-voltage stall | 0: Invalid<br>1: Valid | 1 | ★ |
| P3-24 | Over-voltage stall suppression frequency gain | 0 ~ 100 | 30 | ☆ |
| P3-25 | Over-voltage stall suppression voltage gain | 0 ~ 100 | 30 | ☆ |
| P3-26 | Max. rise frequency limit of over-voltage stall | 0Hz ~ 50Hz | 5Hz | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Group P4: Input Terminals | | | | |
| P4-00 | DI1 function selection | 0: No function 1: Forward RUN (FWD)<br>2: Reverse RUN (REV) (Note: P4-11 shall be set when P4-00 is set to 1 or 2.)<br>3: Three-wire control 4: Forward JOG (FJOG)<br>5: Reverse JOG (RJOG) 6: Terminal UP<br>7: Terminal DOWN 8: Coast to stop<br>9: Fault reset (RESET) 10: RUN pause<br>11: External fault normally open (NO) input<br>12: Multi-reference terminal 1<br>13: Multi-reference terminal 2<br>14: Multi-reference terminal 3<br>15: Multi-reference terminal 4<br>16: Terminal 1 for acceleration/deceleration time selection<br>17: Terminal 2 for acceleration/deceleration time selection<br>18: Frequency command switchover<br>19: UP and DOWN setting clear (terminal, keypad)<br>20: Running command switchover terminal 1<br>21: Acceleration/Deceleration prohibited<br>22: PID pause 23: PLC status reset<br>24: Swing pause 25: Counter input<br>26: Counter reset 27: Length count input<br>28: Length reset<br>29: Torque control prohibited<br>30: Pulse input (enabled only for DI5)<br>31: Reserved<br>32: Immediate DC injection braking<br>33: External fault normally closed (NC) input<br>34: Frequency modification enabled<br>35: PID action direction reverse<br>36: External STOP terminal 1<br>37: Running command switchover terminal 2<br>38: PID integral disabled<br>39: Switchover between main frequency source and preset frequency<br>40: Switchover between auxiliary frequency source and preset frequency<br>41: Motor terminal selection 42: Reserved<br>43: PID parameter switchover<br>44: User-defined fault 1<br>45: User-defined fault 2<br>46: Speed control/Torque control switchover<br>47: Emergency stop<br>48: External STOP terminal 2<br>49: Deceleration DC injection braking<br>50: Clear the current running time<br>51: Two-wire/Three-wire mode switchover<br>52: Reverse frequency forbidden<br>53-59: Reserved | 1 | ☆ |
| P4-01 | DI2 function selection | | 4 | ☆ |
| P4-02 | DI3 function selection | | 9 | ☆ |
| P4-03 | DI4 function selection | | 12 | ☆ |
| P4-04 | DI5 function selection | | 13 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P4-10 | DI filter time | 0.000s ~ 1.000s | 0.010s | ☆ |
| P4-11 | Terminal command mode | 0: Two-line mode 1<br>1: Two-line mode 2<br>2: Three-line mode 1<br>3: Three-line mode 2 | 0 | ★ |
| P4-12 | Terminal UP/DOWN rate | 0.001Hz/s ~ 65.535Hz/s | 1.000Hz/s | ☆ |
| P4-13 | AI curve 1 min. input | 0.00V ~ P4-15 | 0.00V | ☆ |
| P4-14 | Corresponding setting of AI curve 1 min. input | -100.0% ~ 100.0% | 0.0% | ☆ |
| P4-15 | AI curve 1 max. input | P4-13 ~ 10.00V | 10.00V | ☆ |
| P4-16 | Corresponding setting of AI curve 1 max. input | -100.0% ~ 100.0% | 100.0% | ☆ |
| P4-17 | AI1 filter time | 0.00s ~ 10.00s | 0.10s | ☆ |
| P4-18 | AI curve 2 min. input | 0.00V ~ P4-20 | 0.00V | ☆ |
| P4-19 | Corresponding setting of AI curve 2 min. input | -100.0% ~ 100.0% | 0.0% | ☆ |
| P4-20 | AI curve 2 max. input | P4-18 ~ 10.00V | 10.00V | ☆ |
| P4-21 | Corresponding setting of AI curve 2 max. input | -100.0% ~ 100.0% | 100.0% | ☆ |
| P4-22 | AI2 filter time | 0.00s ~ 10.00s | 0.10s | ☆ |
| P4-23 | AI curve 3 min. input | -10.00V ~ P4-25 | -10.00V | ☆ |
| P4-24 | Corresponding setting of AI curve 3 min. input | -100.0% ~ 100.0% | -100.0% | ☆ |
| P4-25 | AI curve 3 max. input | P4-23 ~ 10.00 V | 10.00V | ☆ |
| P4-26 | Corresponding setting of AI curve 3 max. input | -100.0% ~ 100.0% | 100.0% | ☆ |
| P4-27 | AI3 filter time | 0.00s ~ 10.00s | 0.10s | ☆ |
| P4-28 | Pulse min. input | 0.00kHz ~ P4-30 | 0.00kHz | ☆ |
| P4-29 | Corresponding setting of pulse min. input | -100.0% ~ 100.0% | 0.0% | ☆ |
| P4-30 | Pulse max. input | P4-28 ~ 100.00kHz | 50.00kHz | ☆ |
| P4-31 | Corresponding setting of pulse max. input | -100.0% ~ 100.0% | 100.0% | ☆ |
| P4-32 | Pulse filter time | 0.00s ~ 10.00s | 0.10s | ☆ |
| P4-33 | AI curve selection | Units digit: AI1 curve selection<br>1: Curve 1 (2 points, see P4-13 ~ P4-16)<br>2: Curve 2 (2 points, see P4-18 ~ P4-21)<br>3: Curve 3 (2 points, see P4-23 ~ P4-26)<br>4: Curve 4 (4 points, see D6-00 ~ D6-07)<br>5: Curve 5 (4 points, see D6-08 ~ D6-15)<br>Tens digit: AI2 curve selection<br>Hundreds digit: AI3 curve selection | 321 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P4-34 | Setting for AI less than min. input | Units digit: AI1 lower than min. input setting<br>0: Corresponding percentage of min. input<br>1: 0.0%<br>Tens digit: AI2 lower than min. input setting<br>Hundreds digit: AI3 lower than min. input setting | 000 | ☆ |
| P4-35 | DI1 delay | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P4-36 | DI2 delay | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P4-37 | DI3 delay | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P4-38 | DI active mode selection | 0: High level active<br>1: Low level active<br>Units digit: DI1 active mode<br>Tens digit: DI2 active mode<br>Hundreds digit: DI3 active mode<br>Thousands digit: DI4 active mode<br>Ten thousands digit: DI5 active mode | 00000 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Group P5: Output Terminals | | | | |
| P5-00 | FM terminal output mode | 0: Pulse output (FMP)<br>1: Switch signal output (FMR) | 0 | ☆ |
| P5-01 | FMR function selection (terminal command mode) | 0: No output 1: AC drive running<br>2: Fault output (coast to stop)<br>3: Frequency-level detection FDT1 output<br>4: Frequency reached<br>5: Zero-speed running (no output at stop)<br>6: Motor overload pre-warning<br>7: AC drive overload pre-warning<br>8: Set count value reached<br>9: Designated count value reached<br>10: Length reached<br>11: PLC cycle complete<br>12: Accumulative running time reached<br>13: Frequency limited<br>14: Torque limited<br>15: Ready for RUN<br>16: AI1>AI2<br>17: Frequency upper limit reached<br>18: Frequency lower limit reached (no output at stop)<br>19: Under-voltage status output<br>20: Communication setting<br>21: Reserved 22: Reserved<br>23: Zero-speed running 2 (having output at stop)<br>24: Accumulative power-on time reached<br>25: Frequency level detection FDT2 output<br>26: Frequency 1 reached<br>27: Frequency 2 reached<br>28: Current 1 reached<br>29: Current 2 reached<br>30: Timing reached<br>31: AI1 input limit exceeded<br>32: Load loss<br>33: Reverse running<br>34: Zero current state<br>35: Module temperature reached<br>36: Software current limit exceeded<br>37: Frequency lower limit reached (having output at stop)<br>38: Alarm output<br>39: Motor overheat warning<br>40: Current running time reached<br>41: Fault output (there is no output if it is the coast to stop fault and under-voltage occurs.)<br>42: Reserved 43: Auxiliary pump | 0 | ☆ |
| P5-02 | Relay 1 function selection (T/A-T/B-T/C) | | 2 | ☆ |
| P5-03 | Relay 2 function selection (P/A-P/B-P/C) | | 0 | ☆ |
| P5-04 | DO1 output function selection | | 1 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P5-06 | FMP output function selection | 0: Running frequency<br>1: Set frequency 2: Output current<br>3: Output torque (absolute value)<br>4: Output power 5: Output voltage<br>6: Pulse input (100.0% = 100.0kHz)<br>7: AI1 8: AI2 9: AI3<br>10: Length 11: Count value<br>12: Communication setting<br>13: Motor rotational speed<br>14: Output current (100.0% = 1000.0A)<br>15: Output voltage (100.0% = 1000.0V)<br>16: Output torque (actual value) | 0 | ☆ |
| P5-07 | AO1 function selection | | 0 | ☆ |
| P5-08 | AO2 function selection | | 1 | ☆ |
| P5-09 | FMP max. output frequency | 0.01kHz ~ 100.00kHz | 50.00kHz | ☆ |
| P5-10 | AO1 offset coefficient | -100.0% ~ 100.0% | 0.0% | ☆ |
| P5-11 | AO1 gain | -10.00 ~ 10.00 | 1.00 | ☆ |
| P5-12 | AO2 offset coefficient | -100.0% ~ 100.0% | 0.0% | ☆ |
| P5-13 | AO2 gain | -10.00 ~ 10.00 | 1.00 | ☆ |
| P5-17 | FMR output delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P5-18 | Relay 1 output delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P5-19 | Relay 2 output delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P5-20 | Relay 3 output delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P5-22 | Active mode selection of DO output terminals | 0: Positive logic active<br>1: Negative logic active<br>Units digit: FMR active mode<br>Tens digit: Relay 1 active mode<br>Hundreds digit: Relay 2 active mode<br>Thousands digit: DO1 active mode | 00000 | ☆ |
| Group P6: Start/Stop Control | | | | |
| P6-00 | Start mode | 0: Direct start<br>1: Rotational speed tracking restart<br>2: Pre-excited start (asynchronous motor) | 0 | ☆ |
| P6-01 | Rotational speed tracking mode | 0: From frequency at stop | 0 | ★ |
| P6-02 | Rotational speed tracking speed | 1 ~ 100 | 20 | ☆ |
| P6-03 | Startup frequency | 0.00Hz ~ 10.00Hz | 0.00Hz | ☆ |
| P6-04 | Startup frequency holding time | 0.0s ~ 100.0s | 0.0s | ★ |
| P6-05 | Startup DC braking current/ pre-excited current | 0% ~ 100% | 0% | ★ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P6-06 | Startup DC braking time/ pre-excited time | 0.0s ~ 100.0s | 0.0s | ★ |
| P6-07 | Acceleration/ Deceleration mode | 0: Linear acceleration/deceleration<br>1, 2: S-curve acceleration/deceleration | 0 | ★ |
| P6-08 | Time proportion of S-curve start segment | 0.0% ~ (100.0% to P6-09) | 30.0% | ★ |
| P6-09 | Time proportion of S-curve end segment | 0.0% ~ (100.0% to P6-08) | 30.0% | ★ |
| P6-10 | Stop mode | 0: Decelerate to stop<br>1: Coast to stop | 0 | ☆ |
| P6-11 | Initial frequency of stop DC braking | 0.00Hz ~ Max. frequency | 0.00Hz | ☆ |
| P6-12 | Waiting time of stop DC braking | 0.0s ~ 100.0s | 0.0s | ☆ |
| P6-13 | Stop DC braking current | 0% ~ 100% | 0% | ☆ |
| P6-14 | Stop DC braking time | 0.0s ~ 100.0s | 0.0s | ☆ |
| P6-15 | Braking use ratio | 0% ~ 100% | 100% | ☆ |
| Group P7: Operation Panel and Display | | | | |
| P7-00 | Digital tube lack of picture inspection enable | 0 | 0 | ☆ |
| P7-01 | QUICK/JQG key function selection | 0: QUICK/JQG key disabled<br>1: Switchover between operation panel control and remote command control (terminal or communication)<br>2: Switchover between forward rotation and reverse rotation<br>3: Forward JOG<br>4: Reverse JOG | 0 | ★ |
| P7-02 | STOP/RESET key function | 0: STOP/RESET key enabled only in operation panel control<br>1: STOP/RESET key enabled in any operation mode | 1 | ☆ |
| P7-03 | LED display running parameters 1 | 0000 ~ FFFF<br>Bit00: Running frequency 1 (Hz)<br>Bit01: Frequency reference (Hz)<br>Bit02: Bus voltage (V)<br>Bit03: Output voltage (V)<br>Bit04: Output current (A)<br>Bit05: Output power (kW)<br>Bit06: Output torque (%)<br>Bit07: DI input state<br>Bit08: DO output state<br>Bit09: AI1 voltage (V)<br>Bit10: AI2 voltage (V)<br>Bit12: Count value<br>Bit13: Length value<br>Bit14: Load speed display<br>Bit15: PID reference | 1F | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P7-04 | LED display running parameters 2 | 0000 ~ FFFF<br>Bit00: PID feedback Bit01: PLC stage<br>Bit02: Pulse reference frequency (kHz)<br>Bit03: Running frequency 2 (Hz)<br>Bit04: Remaining running time<br>Bit05: AI1 voltage before correction (V)<br>Bit06: AI2 voltage before correction (V)<br>Bit08: Motor speed<br>Bit09: Current power-on time (Hour)<br>Bit10: Current running time (Min)<br>Bit11: Pulse reference frequency (Hz)<br>Bit12: Communication setting value<br>Bit13: Encoder feedback speed (Hz)<br>Bit14: Main frequency X display (Hz)<br>Bit15: Auxiliary frequency Y display (Hz) | 33 | ☆ |
| P7-05 | LED display stop parameters | 0000 ~ FFFF<br>Bit00: Frequency reference (Hz)<br>Bit01: Bus voltage (V)<br>Bit02: DI input state<br>Bit03: DO output state<br>Bit04: AI1 voltage (V)<br>Bit05: AI2 voltage (V)<br>Bit07: Count value<br>Bit08: Length value<br>Bit09: PLC stage<br>Bit10: Load speed<br>Bit11: PID reference<br>Bit12: Pulse reference (kHz) | 33 | ☆ |
| P7-06 | Load speed display coefficient | 0.0001 ~ 6.5000 | 1.0000 | ☆ |
| P7-07 | Heat sink temperature of inverter module | -20°C ~ 120°C | - | ● |
| P7-08 | Product number | - | - | ● |
| P7-09 | Accumulative running time | 0h ~ 65535h | - | ● |
| P7-10 | Performance software version | - | - | ● |
| P7-11 | Function software version | - | - | ● |
| P7-12 | Number of decimal places for load speed display | Units digit: Number of decimal places for U0-14<br>0: No decimal place<br>1: One decimal places<br>2: Two decimal places<br>Tens digit: Number of decimal places of U0-19/U0-29<br>1: One decimal places<br>2: Two decimal places | 20 | ☆ |
| P7-13 | Accumulative power-on time | 0h ~ 65535h | - | ● |
| P7-14 | Accumulative power consumption | 0kWh ~ 65535kWh | - | ● |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Group P8: Auxiliary Function | | | | |
| P8-00 | JOG running frequency | 0.00Hz ~ Max. frequency | 2.00Hz | ☆ |
| 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 | 0.00s ~ 650.00s (P0-19=2)<br>0.0s ~ 6500.0s (P0-19=1)<br>0s ~ 65000s (P0-19=0) | Model dependent | ☆ |
| P8-04 | Deceleration time 2 | | | |
| P8-05 | Acceleration time 3 | | | |
| P8-06 | Deceleration time 3 | | | |
| P8-07 | Acceleration time 4 | | 20.0s | ☆ |
| P8-08 | Deceleration time 4 | | | |
| P8-09 | Jump frequency 1 | 0.00Hz ~ Max. frequency | 0.00Hz | ☆ |
| P8-10 | Jump frequency 2 | | | |
| P8-11 | Frequency jump amplitude | 0.00Hz ~ Max. frequency | 0.00Hz | ☆ |
| P8-12 | Forward/Reverse rotation dead-zone time | 0.0s ~ 3000.0s | 0.0s | ☆ |
| P8-13 | Reverse control | 0: Enabled 1: Disabled | 0 | ☆ |
| P8-14 | Running mode when set frequency lower than frequency lower limit | 0: Run at frequency lower limit<br>1: Stop<br>2: Run at zero speed | 0 | ☆ |
| P8-15 | Drop control | 0.00% ~ 100.00% | 0.00% | ☆ |
| P8-16 | Accumulative power-on time threshold | 0h ~ 65000h | 0h | ☆ |
| P8-17 | Accumulative running time threshold | 0h ~ 65000h | 0h | ☆ |
| P8-18 | Startup protection selection | 0: Disabled<br>1: Enabled | 0 | ☆ |
| P8-19 | Frequency detection value (FDT1) | 0.00Hz ~ Max. frequency | 50.00Hz | ☆ |
| P8-20 | Frequency detection hysteresis (FDT1) | 0.0% ~ 100.0% (FDT1 level) | 5.0% | ☆ |
| P8-21 | Detection range of frequency reached | 0.0% ~ 100.0% (max. frequency) | 0.0% | ☆ |
| P8-22 | Jump frequency during acceleration/deceleration | 0: Disabled 1: Enabled | 0 | ☆ |
| P8-25 | Frequency switchover point between acceleration time 1 and 2 | 0.00Hz ~ Max. frequency | 0.00Hz | ☆ |
| P8-26 | Frequency switchover point between deceleration time 1 and 2 | 0.00Hz ~ Max. frequency | 0.00Hz | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P8-27 | Terminal JOG preferred | 0: Disabled 1: Enabled | 0 | ☆ |
| P8-28 | Frequency detection value (FDT2) | 0.00Hz ~ Max. frequency | 50.00Hz | ☆ |
| P8-29 | Frequency detection hysteresis (FDT2) | 0.0% ~ 100.0% (FDT2 level) | 5.0% | ☆ |
| P8-30 | Any frequency reaching detection value 1 | 0.00Hz ~ Max. frequency | 50.00Hz | ☆ |
| P8-31 | Any frequency reaching detection amplitude 1 | 0.0% ~ 100.0% (max. frequency) | 0.0% | ☆ |
| P8-32 | Any frequency reaching detection value 2 | 0.00Hz ~ Max. frequency | 50.00Hz | ☆ |
| P8-33 | Any frequency reaching detection amplitude 2 | 0.0% ~ 100.0% (max. frequency) | 0.0% | ☆ |
| P8-34 | Zero current detection level | 0.0% ~ 300.0%<br>100.0% (rated motor current) | 5.0% | ☆ |
| P8-35 | Zero current detection delay time | 0.01s ~ 600.00s | 0.10s | ☆ |
| P8-36 | Output over-current threshold | 0.0% (no detection)<br>0.1% ~ 300.0% (rated motor current) | 200.0% | ☆ |
| P8-37 | Output over-current detection delay time | 0.00s ~ 600.00s | 0.00s | ☆ |
| P8-38 | Any current reaching 1 | 0.0% ~ 300.0% (rated motor current) | 100.0% | ☆ |
| P8-39 | Any current reaching 1 amplitude | 0.0% ~ 300.0% (rated motor current) | 0.0% | ☆ |
| P8-40 | Any current reaching 2 | 0.0% ~ 300.0% (rated motor current) | 100.0% | ☆ |
| P8-41 | Any current reaching 2 amplitude | 0.0% ~ 300.0% (rated motor current) | 0.0% | ☆ |
| P8-42 | Timing function | 0: Disabled 1: Enabled | 0 | ★ |
| P8-43 | Timing duration source | 0: Set by P8-44<br>1: AI1<br>2: AI2<br>3: AI3<br>100% of analog input corresponds to the value of P8-44. | 0 | ★ |
| P8-44 | Timing duration | 0.0Min ~ 6500.0Min | 0.0Min | ★ |
| P8-45 | AI1 input voltage lower limit | 0.00V ~ P8-46 | 3.10V | ☆ |
| P8-46 | AI1 input voltage upper limit | P8-45 ~ 10.00V | 6.80V | ☆ |
| P8-47 | IGBT temperature threshold | 0°C ~ 100°C | 75°C | ☆ |
| P8-48 | Cooling fan working mode | 0: Working during drive running<br>1: Working continuously | 0 | ☆ |
| P8-49 | Wake-up frequency | Hibernating frequency (P8-51) to max. frequency (P0-10) | 0.00Hz | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P8-50 | Wake-up delay time | 0.0s ~ 6500.0s | 0.0s | ☆ |
| P8-51 | Hibernating frequency | 0.00Hz ~ Wake up frequency (P8-49) | 0.00Hz | ☆ |
| P8-52 | Hibernating delay time | 0.0s ~ 6500.0s | 0.0s | ☆ |
| P8-53 | Running time threshold this time | 0.0Min ~ 6500.0Min | 0.0Min | ☆ |
| P8-54 | Output power correction coefficient | 0.0% ~ 200.0% | 100.0% | ☆ |
| P8-55 | Wake-up level | 1% ~ 150% | 80% | ☆ |
| P8-56 | High speed frequency | 0.00Hz ~ P0-10 | 25.00Hz | ☆ |
| P8-57 | High speed frequency delay time | 0.0s ~ 600.0s | 60.0s | ☆ |
| P8-58 | Low speed frequency | 0.00Hz ~ P0-10 | 0.00Hz | ☆ |
| P8-59 | Low speed frequency delay time | 0.0s ~ 600.0s | 60.0s | ☆ |
| Group P9: Fault and Protection | | | | |
| P9-00 | Motor overload protection | 0: Disabled 1: Enabled | 1 | ☆ |
| P9-01 | Motor overload protection gain | 0.20 ~ 10.00 | 1.00 | ☆ |
| P9-02 | Motor overload pre-warning coefficient | 50% ~ 100% | 80% | ☆ |
| P9-03 | Over-voltage protection gain | 0 ~ 100 | 30 | ☆ |
| P9-04 | Over-voltage protection voltage | 200V ~ 2000V | 380V: 760V<br>220V: 380V | ☆ |
| P9-07 | Detection of short-circuit to ground upon power-on | 0: Disabled 1: Enabled | 1 | ☆ |
| P9-08 | Braking unit action voltage | 200V ~ 2000V | 380V: 690V<br>220V: 360V | ★ |
| P9-09 | Auto reset times | 0 ~ 20 | 0 | ☆ |
| P9-10 | Selection of DO action during auto reset | 0: Not action 1: Action | 0 | ☆ |
| P9-11 | Delay of auto reset | 0.1s ~ 100.0s | 1.0s | ☆ |
| P9-12 | Input phase loss/ Pre-charge relay protection | Units digit: Input phase loss protection<br>Tens digit: Pre-charge relay protection<br>0: Disabled<br>1: Enabled | 11 | ☆ |
| P9-13 | Output phase loss protection | 0: Disabled 1: Enabled | 1 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P9-14 | 1st fault type | 0: No fault 1: Reserved<br>2: Over-current during acceleration<br>3: Over-current during deceleration<br>4: Over-current at constant speed<br>5: Over-voltage during acceleration<br>6: Over-voltage during deceleration<br>7: Over-voltage at constant speed<br>8: Pre-charge resistor overload<br>9: Under-voltage<br>10: AC drive overload<br>11: Motor overload<br>12: Power input phase loss<br>13: Power output phase loss<br>14: IGBT overheat<br>15: External fault<br>16: Communication fault<br>17: Contactor fault<br>18: Current detection fault<br>19: Motor auto-tuning fault<br>20: Encoder/PG card fault<br>21: Parameter read and write fault<br>22: AC drive hardware fault<br>23: Motor short circuited to ground<br>24: Reserved 25: Reserved<br>26: Accumulative running time reached<br>27: User-defined fault 1<br>28: User-defined fault 2<br>29: Accumulative power-on time reached<br>30: Load lost<br>31: PID feedback lost during running<br>40: Fast current limit timeout<br>41: Motor switchover error during running<br>42: Too large speed deviation<br>43: Motor over-speed<br>45: Motor overheat<br>51: Initial position error<br>55: Slave error in master-slave control | - | ● |
| P9-15 | 2nd fault type | | - | ● |
| P9-16 | 3rd (latest) fault type | | - | ● |
| P9-17 | Frequency upon 3rd fault | 0.00Hz ~ 655.35Hz | 0.00Hz | ● |
| P9-18 | Current upon 3rd fault | 0.00A ~ 655.35A | 0.00A | ● |
| P9-19 | Bus voltage upon 3rd fault | 0.0V ~ 6553.5V | 0.0V | ● |
| P9-20 | DI state upon 3rd fault | 0 ~ 9999 | 0 | ● |
| P9-21 | DO state upon 3rd fault | 0 ~ 9999 | 0 | ● |
| P9-22 | AC drive state upon 3rd fault | 0 ~ 65535 | 0 | ● |
| P9-23 | Power-on time upon 3rd fault | 0s ~ 65535s | 0s | ● |
| P9-24 | Running time upon 3rd fault | 0.0s ~ 6553.5s | 0.0s | ● |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P9-27 | Frequency upon 2nd fault | 0.00Hz ~ 655.35Hz | 0.00Hz | ● |
| P9-28 | Current upon 2nd fault | 0.00A ~ 655.35A | 0.00A | ● |
| P9-29 | Bus voltage upon 2nd fault | 0.0V ~ 6553.5V | 0.0V | ● |
| P9-30 | DI status upon 2nd fault | 0 ~ 9999 | 0 | ● |
| P9-31 | DO status upon 2nd fault | 0 ~ 9999 | 0 | ● |
| P9-32 | AC drive status upon 2nd fault | 0 ~ 65535 | 0 | ● |
| P9-33 | Power-on time upon 2nd fault | 0s ~ 65535s | 0s | ● |
| P9-34 | Running time upon 2nd fault | 0.0s ~ 6553.5s | 0.0s | ● |
| P9-37 | Frequency upon 1st fault | 0.00Hz ~ 655.35Hz | 0.00Hz | ● |
| P9-38 | Current upon 1st fault | 0.00A ~ 655.35A | 0.00A | ● |
| P9-39 | Bus voltage upon 1st fault | 0.0V ~ 6553.5V | 0.0V | ● |
| P9-40 | DI status upon 1st fault | 0 ~ 9999 | 0 | ● |
| P9-41 | DO status upon 1st fault | 0 ~ 9999 | 0 | ● |
| P9-42 | AC drive status upon 1st fault | 0 ~ 65535 | 0 | ● |
| P9-43 | Power-on time upon 1st fault | 0s ~ 65535s | 0s | ● |
| P9-44 | Running time upon 1st fault | 0.0s ~ 6553.5s | 0.0s | ● |
| P9-47 | Fault protection action selection 1 | Units digit: Motor overload (Err11)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run<br>Tens digit: Power input phase loss (Err12)<br>Hundreds digit: Power output phase loss (Err13)<br>Thousands digit: External equipment fault (Err15)<br>Ten thousands digit: Communication fault (Err16) | 00000 | ☆ |
| P9-48 | Fault protection action selection 2 | Units digit: Encoder fault (Err20)<br>0: Coast to stop<br>Tens digit: EEPROM read-write fault (Err21)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>Hundreds digit: Overload fault action (Err10)<br>Thousands digit: Motor overheat (Err45)<br>Ten thousands digit: Accumulative running time reached (Err26) | 00000 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P9-49 | Fault protection action selection 3 | Units digit: User-defined fault 1 (Err27)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run<br>Tens digit: User-defined fault 2 (Err28)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run<br>Hundreds digit: Accumulative power-on time reached (Err29)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run<br>Thousands digit: Load lost (Err30)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run at 7% of rated motor frequency and restore to the frequency reference if the load recovers<br>Ten thousands digit: PID feedback lost during drive running (Err31)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run | 00000 | ☆ |
| P9-50 | Fault protection action selection 4 | Units digit: Too large speed deviation (Err42)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run<br>Tens digit: Motor over-speed (Err43)<br>Hundreds digit: Initial position fault (Err51) | 00000 | ☆ |
| P9-54 | Frequency selection for continuing to run upon fault | 0: Current running frequency<br>1: Run at set frequency<br>2: Run at upper limit frequency<br>3: Run at lower limit frequency<br>4: Backup frequency upon abnormality | 0 | ☆ |
| P9-55 | Backup frequency upon fault | 0.0% ~ 100.0%<br>(100.0% corresponds to max. frequency (P0-10)) | 100.0% | ☆ |
| P9-56 | Type of motor temperature sensor | 0: No temperature sensor<br>1: PT100<br>2: PT1000 | 0 | ☆ |
| P9-57 | Motor overheat protection threshold | 0°C ~ 200°C | 110°C | ☆ |
| P9-58 | Motor overheat pre-warning threshold | 0°C ~ 200°C | 90°C | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| P9-59 | Power dip ride-through function selection | 0: Disabled<br>1: Bus voltage constant control<br>2: Decelerate to stop | 0 | ★ |
| P9-60 | Threshold of power dip ride-through function disabled | 80% ~ 100% | 85% | ★ |
| P9-61 | Judging time of bus voltage recovering from power dip | 0.0s ~ 100.0s | 0.5s | ★ |
| P9-62 | Threshold of power dip ride-through function enabled | 60% ~ 100% | 80% | ★ |
| P9-63 | Load lost protection | 0: Disabled 1: Enabled | 0 | ☆ |
| P9-64 | Load lost detection level | 0.0% ~ 100.0% | 10.0% | ☆ |
| P9-65 | Load lost detection time | 0.0s ~ 60.0s | 1.0s | ☆ |
| P9-67 | Over-speed detection level | 0.0% ~ 50.0% (max. frequency) | 20.0% | ☆ |
| P9-68 | Over-speed detection time | 0.0s: Not detected 0.1s ~ 60.0s | 5.0s | ☆ |
| P9-69 | Detection level of speed error | 0.0% ~ 50.0% (max. frequency) | 20.0% | ☆ |
| P9-70 | Detection time of speed error | 0.0s: Not detected 0.1s ~ 60.0s | 5.0s | ☆ |
| P9-71 | Gain for power dip ride-through Kp | 0 ~ 100 | 40 | ☆ |
| P9-72 | Coefficient for power dip ride-through Ki | 0 ~ 100 | 30 | ☆ |
| P9-73 | Deceleration for power dip ride-through | 0.0s ~ 300.0s | 20.0s | ★ |
| Group PA: PID Function | | | | |
| PA-00 | PID reference setting channel | 0: Set by PA-01 1: AI1<br>2: AI2 3: AI3<br>4: Pulse reference (DI5)<br>5: Communication setting<br>6: Multi-reference | 0 | ☆ |
| PA-01 | PID digital setting | 0.0% ~ 100.0% | 50.0% | ☆ |
| PA-02 | PID feedback setting channel | 0: AI1 1: AI2<br>2: AI3 3: AI1 - AI2<br>4: Pulse reference (DI5)<br>5: Communication setting<br>6: AI1 + AI2<br>7: Max. (\|AI1\|, \|AI2\|)<br>8: Min. (\|AI1\|, \|AI2\|) | 0 | ☆ |
| PA-03 | PID operation direction | 0: Forward<br>1: Reverse | 0 | ☆ |
| PA-04 | PID reference and feedback range | 0 ~ 65535 | 1000 | ☆ |
| PA-05 | Proportional gain Kp1 | 0.0 ~ 1000.0 | 20.0 | ☆ |
| PA-06 | Integral time Ti1 | 0.01s ~ 10.00s | 2.00s | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| PA-07 | Differential time Td1 | 0.000s ~ 10.000s | 0.000s | ☆ |
| PA-08 | PID output limit in reverse direction | 0.00Hz ~ Max. frequency | 0.00Hz | ☆ |
| PA-09 | PID error limit | 0.0% ~ 100.0% | 0.0% | ☆ |
| PA-10 | PID differential limit | 0.00% ~ 100.00% | 0.10% | ☆ |
| PA-11 | PID reference change time | 0.00s ~ 650.00s | 0.00s | ☆ |
| PA-12 | PID feedback filter time | 0.00s ~ 60.00s | 0.00s | ☆ |
| PA-13 | PID output filter time | 0.00s ~ 60.00s | 0.00s | ☆ |
| PA-14 | Reserved | - | - | ☆ |
| PA-15 | Proportional gain Kp2 | 0.0 ~ 1000.0 | 20.0 | ☆ |
| PA-16 | Integral time Ti2 | 0.01s ~ 10.00s | 2.00s | ☆ |
| PA-17 | Differential time Td2 | 0.000s ~ 10.000s | 0.000s | ☆ |
| PA-18 | PID parameter switchover condition | 0: No switchover<br>1: Switchover via DI<br>2: Auto switchover based on PID error<br>3: Auto switchover based on running frequency | 0 | ☆ |
| PA-19 | PID error 1 for auto switchover | 0.0% ~ PA-20 | 20.0% | ☆ |
| PA-20 | PID error 2 for auto switchover | PA-19 ~ 100.0% | 80.0% | ☆ |
| PA-21 | PID initial value | 0.0% ~ 100.0% | 0.0% | ☆ |
| PA-22 | PID initial value active time | 0.00s ~ 650.00s | 0.00s | ☆ |
| PA-23 | Reversed | - | - | ☆ |
| PA-24 | | | | |
| PA-25 | PID integral property | Units digit: Integral separation<br>0: Disabled<br>1: Enabled<br>Tens digit: Whether to stop integral operation when the PID output reaches the limit<br>0: Continue integral operation<br>1: Stop integral operation | 00 | ☆ |
| PA-26 | Detection value of PID feedback loss | 0.0%: No detection<br>0.1% ~ 100.0% | 0.0% | ☆ |
| PA-27 | Detection time of PID feedback loss | 0.0s ~ 20.0s | 0.0s | ☆ |
| PA-28 | PID operation at stop | 0: Disabled<br>1: Enabled | 0 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Group Pb: Wobble Function, Fixed Length and Count | | | | |
| Pb-05 | Set length | 0m ~ 65535m | 1000m | ☆ |
| Pb-06 | Actual length | 0m ~ 65535m | 0m | ☆ |
| Pb-07 | Number of pulses per meter | 0.1 ~ 6553.5 | 100.0 | ☆ |
| Pb-08 | Set count value | 1 ~ 65535 | 1000 | ☆ |
| Pb-09 | Designated count value | 1 ~ 65535 | 1000 | ☆ |
| Group PC: Multi-reference and Simple PLC Function | | | | |
| PC-00 | Reference 0 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-01 | Reference 1 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-02 | Reference 2 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-03 | Reference 3 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-04 | Reference 4 | -100.0% ~ 100.2% | 0.0% | ☆ |
| PC-05 | Reference 5 | -100.0% ~ 100.2% | 0.0% | ☆ |
| PC-06 | Reference 6 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-07 | Reference 7 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-08 | Reference 8 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-09 | Reference 9 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-10 | Reference 10 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-11 | Reference 11 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-12 | Reference 12 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-13 | Reference 13 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-14 | Reference 14 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-15 | Reference 15 | -100.0% ~ 100.0% | 0.0% | ☆ |
| PC-16 | Simple PLC running mode | 0: Stop after running one cycle<br>1: Keep final values after running one cycle<br>2: Repeat after running one cycle | 0 | ☆ |
| PC-17 | Simple PLC retentive selection | Units digit: Retentive at power down<br>0: Not retentive<br>1: Retentive<br>Tens digit: Retentive at stop<br>0: Not retentive at stop<br>1: Retentive at stop | 00 | ☆ |
| PC-18 | Running time of simple PLC reference 0 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-19 | Acceleration/ Deceleration time of simple PLC reference 0 | 0 ~ 3 | 0 | ☆ |
| PC-20 | Running time of simple PLC reference 1 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-21 | Acceleration/ Deceleration time of simple PLC reference 1 | 0 ~ 3 | 0 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| PC-22 | Running time of simple PLC reference 2 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-23 | Acceleration/ Deceleration time of simple PLC reference 2 | 0 ~ 3 | 0 | ☆ |
| PC-24 | Running time of simple PLC reference 3 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-25 | Acceleration/ Deceleration time of simple PLC reference 3 | 0 ~ 3 | 0 | ☆ |
| PC-26 | Running time of simple PLC reference 4 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-27 | Acceleration/ Deceleration time of simple PLC reference 4 | 0 ~ 3 | 0 | ☆ |
| PC-28 | Running time of simple PLC reference 5 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-29 | Acceleration/ Deceleration time of simple PLC reference 5 | 0 ~ 3 | 0 | ☆ |
| PC-30 | Running time of simple PLC reference 6 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-31 | Acceleration/ Deceleration time of simple PLC reference 6 | 0 ~ 3 | 0 | ☆ |
| PC-32 | Running time of simple PLC reference 7 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-33 | Acceleration/ Deceleration time of simple PLC reference 7 | 0 ~ 3 | 0 | ☆ |
| PC-34 | Running time of simple PLC reference 8 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-35 | Acceleration/ Deceleration time of simple PLC reference 8 | 0 ~ 3 | 0 | ☆ |
| PC-36 | Running time of simple PLC reference 9 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-37 | Acceleration/ Deceleration time of simple PLC reference 9 | 0 ~ 3 | 0 | ☆ |
| PC-38 | Running time of simple PLC reference 10 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-39 | Acceleration/ Deceleration time of simple PLC reference 10 | 0 ~ 3 | 0 | ☆ |
| PC-40 | Running time of simple PLC reference 11 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-41 | Acceleration/ Deceleration time of simple PLC reference 11 | 0 ~ 3 | 0 | ☆ |
| PC-42 | Running time of simple PLC reference 12 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-43 | Acceleration/ Deceleration time of simple PLC reference 12 | 0 ~ 3 | 0 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| PC-44 | Running time of simple PLC reference 13 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-45 | Acceleration/ Deceleration time of simple PLC reference 13 | 0 ~ 3 | 0 | ☆ |
| PC-46 | Running time of simple PLC reference 14 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-47 | Acceleration/ Deceleration time of simple PLC reference 14 | 0 ~ 3 | 0 | ☆ |
| PC-48 | Running time of simple PLC reference 15 | 0.0s (h) ~ 6553.5s (h) | 0.0s (h) | ☆ |
| PC-49 | Acceleration/ Deceleration time of simple PLC reference 15 | 0 ~ 3 | 0 | ☆ |
| PC-50 | Time unit of simple PLC running | 0: s (second) 1: h (hour) | 0 | ☆ |
| PC-51 | Reference 0 source | 0: Set by PC-00<br>1: AI1 2: AI2<br>3: AI3 4: Pulse reference (DI5)<br>5: PID reference<br>6: Set by preset frequency (P0-08), modified via UP/DOWN key<br>7: Keyboard with electrodeless potentiometer<br>8: Keyboard with electrodeless potentiometer change rate 1Hz | 0 | ☆ |
| Group Pd: Communication | | | | |
| Pd-00 | Baud rate | Units digit: Modbus<br>0: 300BPS 1: 600BPS<br>2: 1200BPS 3: 2400BPS<br>4: 4800BPS 5: 9600BPS<br>6: 19200BPS 7: 38400BPS<br>8: 57600BPS 9: 115200BPS<br>Tens digit: Profibus-DP<br>0: 115200BPS 1: 208300BPS<br>2: 256000BPS 3: 512000BPS<br>Hundreds digit: Reversed<br>Thousands digit: CANlink<br>0: 20 1: 50 2: 100 3: 125<br>4: 250 5: 500 6: 1M | 0005 | ☆ |
| Pd-01 | Modbus data format symbol | 0: No check <8-N-2><br>1: Even parity check <8-E-1><br>2: Odd parity check <8-O-1><br>3: No check, data format <8-N-1> | 3 | ☆ |
| Pd-02 | Local address | 0: Broadcast address<br>1 ~ 247 (Modbus) | 1 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Pd-03 | Modbus response delay | 0ms ~ 20ms (valid for Modbus) | 2ms | ☆ |
| Pd-04 | Serial port communication timeout | 0.0s: Disabled<br>0.1s ~ 60.0s | 0.0s | ☆ |
| Pd-05 | Modbus protocol selection | Units digit: Modbus<br>0: Non-standard Modbus protocol<br>1: Standard Modbus protocol<br>Tens digit: Profibus-DP<br>0: PPO1 1: PPO2<br>2: PPO3 3: PPO5 | 30 | ☆ |
| Pd-06 | Current resolution read by communication | 0: 0.01A<br>1: 0.1A | 0 | ☆ |
| Group PE: Reserved | | | | |
| Group PP: Function Parameter Management | | | | |
| PP-00 | User password | 0 ~ 65535 | 0 | ☆ |
| PP-01 | Parameter initialization | 0: No operation<br>1: Restore factory parameters except motor parameters<br>2: Clear records | 0 | ★ |
| PP-02 | Parameter display property | Units digit: Group U display<br>0: Not displayed<br>1: Displayed<br>Tens digit: Group D display<br>0: Not displayed<br>1: Displayed | 11 | ★ |
| PP-04 | Selection of parameter modification | 0: Disabled<br>1: Enabled | 0 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| Group D0: Torque Control and Restricting Parameters | | | | |
| D0-00 | Speed/Torque control selection | 0: Speed control<br>1: Torque control | 0 | ☆ |
| D0-01 | Torque reference source in torque control | 0: Set by D0-03<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse reference (DI5)<br>5: Communication reference<br>6: Min. (AI1, AI2)<br>7: Max. (AI1, AI2)<br>Full range of values 1-7 corresponds to the digital setting of D0-03. | 0 | ★ |
| D0-03 | Torque digital setting in torque control | -200.0% ~ 200.0% | 150.0% | ★ |
| D0-05 | Forward max. frequency in torque control | 0.00Hz ~ Max. frequency | 50.00Hz | ☆ |
| D0-06 | Reverse max. frequency in torque control | 0.00Hz ~ Max. frequency | 50.00Hz | ☆ |
| D0-07 | Acceleration time in torque control | 0.00s ~ 65000.00s | 0.00s | ☆ |
| D0-08 | Deceleration time in torque control | 0.00s ~ 65000.00s | 0.00s | ☆ |
| Group D1: Reserved | | | | |
| Group D2: Motor 2 Parameters | | | | |
| D2-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor | 0 | ★ |
| D2-01 | Rated motor power | 0.1kW ~ 1000.0kW | Model dependent | ★ |
| D2-02 | Rated motor voltage | 1V ~ 2000V | Model dependent | ★ |
| D2-03 | Rated motor current | 0.01A ~ 655.35A (VFD power ≤ 55kW)<br>0.1A ~ 6553.5A (VFD power > 55kW) | Model dependent | ★ |
| D2-04 | Rated motor frequency | 0.01Hz ~ Max. frequency | Model dependent | ★ |
| D2-05 | Rated motor rotational speed | 1RPM ~ 65535RPM (VFD power > 55kW) | Model dependent | ★ |
| D2-06 | Stator resistance (asynchronous motor) | 0.001Ω ~ 65.535Ω (VFD power ≤ 55kW)<br>0.0001Ω ~ 6.5535Ω (VFD power > 55kW) | Tuning parameter | ★ |
| D2-07 | Rotor resistance (asynchronous motor) | 0.001Ω ~ 65.535Ω (VFD power ≤ 55kW)<br>0.0001Ω ~ 6.5535Ω (VFD power > 55kW) | Tuning parameter | ★ |
| D2-08 | Leakage inductive reactance (asynchronous motor) | 0.01mH ~ 655.35mH (VFD power ≤ 55kW)<br>0.001mH ~ 65.535mH (VFD power >55kW) | Tuning parameter | ★ |
| D2-09 | Mutual inductive reactance (asynchronous motor) | 0.1mH ~ 6553.5mH (VFD power ≤ 55kW)<br>0.01mH ~ 655.35mH (VFD power > 55kW) | Tuning parameter | ★ |
| D2-10 | No-load current (asynchronous motor) | 0.01A ~ D2-03 (VFD power ≤ 55kW)<br>0.1A ~ D2-03 (VFD power > 55kW) | Tuning parameter | ★ |
| D2-27 | Encoder line number | 1 ~ 65535 | 1024 | ★ |
| D2-28 | Encoder type | 0: ABZ encoder<br>2: Rotational encoder | 0 | ★ |
| D2-29 | Speed feedback PG selection | 0: Local PG<br>1: Extensive PG<br>2: Pulse input (DI5) | 0 | ★ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| D2-30 | AB sequence of ABZ encoder | 0: Forward<br>1: Reverse | 0 | ★ |
| D2-31 | Encoder install angle | 0.0° ~ 359.9° | 0.0° | |
| D2-34 | Rotational encoder pole number | 1 ~ 65535 | 1 | ★ |
| D2-36 | Speed feedback PG offline detect time | 0.0s: No action<br>0.1s ~ 10.0s | 0.0s | ★ |
| D2-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor partly static auto-tuning<br>2: Asynchronous motor completely dynamic auto-tuning<br>3: Asynchronous motor static dynamic auto-tuning | 0 | ★ |
| D2-38 | Speed loop proportional gain 1 | 1 ~ 100 | 30 | ☆ |
| D2-39 | Speed loop integral time 1 | 0.01s ~ 10.00s | 0.50s | ☆ |
| D2-40 | Switchover frequency 1 | 0.00Hz ~ D2-43 | 5.00Hz | ☆ |
| D2-41 | Speed loop proportional gain 2 | 1 ~ 100 | 20 | ☆ |
| D2-42 | Speed loop integral time 2 | 0.01s ~ 10.00s | 1.00s | ☆ |
| D2-43 | Switchover frequency 2 | D2-40 ~ Max. output frequency | 10.00Hz | ☆ |
| D2-44 | Vector control slip gain | 50% ~ 200% | 100% | ☆ |
| D2-45 | SVC torque filter time constant | 0.000s ~ 0.1000s | 0.015s | ☆ |
| D2-47 | Torque limit source in speed control | 0: Set by D2-48<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse reference (DI5)<br>5: Communication setting<br>6: Min. (AI1, AI2)<br>7: Max. (AI1, AI2)<br>Full scale of 1-7 corresponds to D2-48. | 0 | ☆ |
| D2-48 | Digital setting of torque upper limit in speed control | 0.0% ~ 200.0% | 150.0% | ☆ |
| D2-49 | Torque limit source in speed control (generation) | 0: Set by D2-48<br>1: AI1 2: AI2<br>3: AI3<br>4: Pulse reference (DI5)<br>5: Communication setting<br>6: Min. (AI1, AI2)<br>7: Max. (AI1, AI2)<br>8: Set by D2-50<br>Full scale of 1-7 corresponds to D2-50. | 0 | ☆ |
| D2-50 | Digital setting of torque upper limit in speed control (generation) | 0.0% ~ 200.0% | 150.0% | ☆ |
| D2-51 | Excitation adjustment proportional gain | 0 ~ 60000 | 2000 | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| D2-52 | Excitation adjustment integral gain | 0 ~ 60000 | 1300 | ☆ |
| D2-53 | Torque adjustment proportional gain | 0 ~ 60000 | 2000 | ☆ |
| D2-54 | Torque adjustment integral gain | 0 ~ 60000 | 1300 | ☆ |
| D2-55 | Speed loop integral property | Units digit: Integral separation<br>0: Disabled<br>1: Enabled | 0 | ☆ |
| D2-59 | Weak magnetic field max. torque coefficients | 50% ~ 200% | 100% | ☆ |
| D2-60 | Power generation limit enable | 0: Invalid<br>1: Effect all the time<br>2: Effect during constant speed<br>3: Effect during deceleration | 0 | ☆ |
| D2-61 | Upper limit of power generation | 0.0% ~ 200.0% | Model dependent | ☆ |
| D2-62 | Motor 2 control mode | 0: SVC<br>1: FVC<br>2: V/F | 0 | ★ |
| D2-63 | Motor 2 acceleration/ deceleration time selection | 0: Same as motor 1<br>2: Acceleration/Deceleration time 2<br>3: Acceleration/Deceleration time 3<br>4: Acceleration/Deceleration time 4 | 0 | ☆ |
| D2-64 | Motor 2 torque lift | 0.0%: Auto torque lift<br>0.1% ~ 30.0% | Model dependent | ☆ |
| D2-66 | Motor 2 shock suppression gain | 0 ~ 100 | 40 | ☆ |
| Group D5: Control Optimization Parameters | | | | |
| D5-00 | DPWM switchover upper limit frequency | 5.00Hz ~ Max. frequency | 8.00Hz | ☆ |
| D5-01 | PWM adjust method | 0: Asynchronous modulation<br>1: Synchronous modulation | 0 | ☆ |
| D5-02 | Dead zone compensation mode | 0: No compensation<br>1: Compensation mode 1 | 1 | ☆ |
| D5-03 | Random PWM depth | 0: Random PWM invalid<br>1~10: PWM load frequency random depth | 0 | ☆ |
| D5-04 | Fast current limit enable | 0: Disable 1: Enable | 1 | ☆ |
| D5-05 | Current detect compensation | 0 ~ 100 | 0 | ★ |
| D5-06 | Under-voltage point setting | 200V ~ 2000V | 380V: 350V<br>220V: 200V | ☆ |
| D5-08 | Dead time adjustment | 100% ~ 200% | 150% | ★ |
| D5-09 | Over-voltage point setting | 200V ~ 2200V | Model dependent | ★ |
| Group D6: AI Curve Setting | | | | |
| D6-00 | AI curve 4 min. input | -10.00V ~ D6-02 | 0.00V | ☆ |
| D6-01 | Corresponding setting of AI curve 4 min. input | -100.0% ~ 100.0% | 0.0% | ☆ |
| D6-02 | AI curve 4 turning point 1 input | D6-00 ~ D6-04 | 3.00V | ☆ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| D6-03 | Corresponding setting of AI curve 4 turning point 1 input | -100.0% ~ 100.0% | 30.0% | ☆ |
| D6-04 | AI curve 4 turning point 2 input | D6-04 ~ D6-06 | 6.00V | ☆ |
| D6-05 | Corresponding setting of AI curve 4 turning point 2 input | -100.0% ~ 100.0% | 60.0% | ☆ |
| D6-06 | AI curve 4 max. input | D6-04 ~ 10.00V | 10.00V | ☆ |
| D6-07 | Corresponding setting of AI curve 4 max. input | -100.0% ~ 100.0% | 100.0% | ☆ |
| D6-08 | AI curve 5 min. input | -10.00V ~ D6-10 | -10.00V | ☆ |
| D6-09 | Corresponding setting of AI curve 5 min. input | -100.0% ~ 100.0% | -100.0% | ☆ |
| D6-10 | AI curve 5 turning point 1 input | D6-08 ~ D6-12 | -3.00V | ☆ |
| D6-11 | Corresponding setting of AI curve 5 turning point 1 input | -100.0% ~ 100.0% | -30.0% | ☆ |
| D6-12 | AI curve 5 turning point 2 input | D6-10 ~ D6-14 | 3.00V | ☆ |
| D6-13 | Corresponding setting of AI curve 5 turning point 2 input | -100.0% ~ 100.0% | 30.0% | ☆ |
| D6-14 | AI curve 5 max. input | D6-12 ~ 10.00V | 10.00V | ☆ |
| D6-15 | Corresponding setting of AI curve 5 max. input | -100.0% ~ 100.0% | 100.0% | ☆ |
| D6-24 | Jump point of AI1 input corresponding setting | -100.0% ~ 100.0% | 0.0% | ☆ |
| D6-25 | Jump amplitude of AI1 input corresponding setting | 0.0% ~ 100.0% | 0.5% | ☆ |
| D6-26 | Jump point of AI2 input corresponding setting | -100.0% ~ 100.0% | 0.0% | ☆ |
| D6-27 | Jump amplitude of AI2 input corresponding setting | 0.0% ~ 100.0% | 0.5% | ☆ |
| D6-28 | Jump point of AI3 input corresponding setting | -100.0% ~ 100.0% | 0.0% | ☆ |
| D6-29 | Jump amplitude of AI3 input corresponding setting | 0.0% ~ 100.0% | 0.5% | ☆ |
| Group D8: Point to Point Communication | | | | |
| D8-00 | Point to point communication function selection | 0: Invalid<br>1: Valid | 0 | ☆ |
| D8-01 | Master/Slave selection | 0: Master<br>1: Slave | 0 | ☆ |
| D8-02 | Slave commands follow master-slave information exchange | Units digit: Slave command follow<br>0: Slave running, not follow master command<br>1: Slave running, follow master command.<br>Tens digit: Slave fault into transmit<br>0: Slave fault into no transmit<br>1: Slave fault into transmit<br>Hundreds digit: Master report slave offline<br>0: Slave offline, master no report fault<br>1: Slave offline, master report fault (Err16) | 011 | ★ |

| Function Code | Name | Setting Range | Default | Change |
|---|---|---|---|---|
| D8-03 | Slave receive data function selection | 0: Running frequency<br>1: Target frequency | 0 | ☆ |
| D8-04 | Zero offset of received data | -100.00% ~ 100.00% | 0.00% | ★ |
| D8-05 | Gain of received data | -10.00 ~ 100.00 | 1.00 | ★ |
| D8-06 | Detect time of point to point communication interrupt | 0.0s ~ 10.0s | 1.0s | ☆ |
| D8-07 | Master send data cycle of point to point communication | 0.001s ~ 10.000s | 0.001s | ☆ |
| D8-08 | Synchronous display frequency range | 0.20Hz ~ 10.00Hz | 0.50Hz | ☆ |
| Group DC: AI/AO Correction | | | | |
| DC-00 | AI1 measured voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-01 | AI1 display voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-02 | AI1 measured voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-03 | AI1 display voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-04 | AI2 measured voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-05 | AI2 display voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-06 | AI2 measured voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-07 | AI2 display voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-08 | AI3 measured voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-09 | AI3 display voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-10 | AI3 measured voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-11 | AI3 display voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-12 | AO1 target voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-13 | AO1 display voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-14 | AO1 measured voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-15 | AO1 display voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-16 | AO2 measured voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-17 | AO2 display voltage 1 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-18 | AO2 measured voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |
| DC-19 | AO2 display voltage 2 | -10.000V ~ 10.000V | Factory correction | ☆ |

## 4.2 Summary Table of Monitoring Parameters

Table 4-2 Monitoring Parameters

| Function Code | Name | Smallest Unit | Mailing Address |
|---|---|---|---|
| Group U0: Basic Monitoring Parameters | | | |
| U0-00 | Running frequency | 0.01Hz | 7000H |
| U0-01 | Setting frequency | 0.01Hz | 7001H |
| U0-02 | Bus voltage | 0.1V | 7002H |
| U0-03 | Output voltage | 1V | 7003H |
| U0-04 | Output current | 0.01A | 7004H |
| U0-05 | Output frequency | 0.1kW | 7005H |
| U0-06 | Output torque | 0.1% | 7006H |
| U0-07 | DI input status | 1 | 7007H |
| U0-08 | DO output state | 1 | 7008H |
| U0-09 | AI1 voltage | 0.01V | 7009H |
| U0-10 | AI2 voltage | 0.01V | 700AH |
| U0-11 | AI3 voltage | 0.01V | 700BH |
| U0-12 | Count value | 1 | 700CH |
| U0-13 | Length value | 1 | 700DH |
| U0-14 | Load speed | 1RPM | 700EH |
| U0-15 | PID reference | 1 | 700FH |
| U0-16 | PID feedback | 1 | 7010H |
| U0-17 | PLC stage | 1 | 7011H |
| U0-18 | Pulse input frequency | 0.01kHz | 7012H |
| U0-19 | Feedback speed | 0.01Hz | 7013H |
| U0-20 | Remaining running time | 0.1Min | 7014H |
| U0-21 | AI1 voltage before correction | 0.001V | 7015H |
| U0-22 | AI2 voltage before correction | 0.001V | 7016H |
| U0-23 | AI3 voltage before correction | 0.001V | 7017H |
| U0-24 | Motor speed | 1RPM | 7018H |
| U0-25 | Current power-on time | 1Min | 7019H |
| U0-26 | Current running time | 0.1Min | 701AH |
| U0-27 | Pulse input frequency | 1Hz | 701BH |
| U0-28 | Communication setting | 0.01% | 701CH |
| U0-29 | Encoder feedback speed | 0.01Hz | 701DH |
| U0-30 | Main frequency X display | 0.01Hz | 701EH |
| U0-31 | Auxiliary frequency Y display | 0.01Hz | 701FH |
| U0-32 | View the value of any memory address | 1 | 7020H |
| U0-34 | Motor temperature | 1℃ | 7022H |

| Function Code | Name | Smallest Unit | Mailing Address |
|---|---|---|---|
| U0-35 | Target torque | 0.1% | 7023H |
| U0-36 | Resolver position | 1 | 7024H |
| U0-37 | Power factor angle | 0.1° | 7025H |
| U0-38 | ABZ position | 1 | 7026H |
| U0-39 | V/F separation target voltage | 1V | 7027H |
| U0-40 | V/F separation output voltage | 1V | 7028H |
| U0-41 | DI input status visual display | 1 | 7029H |
| U0-42 | DO input status visual display | 1 | 702AH |
| U0-43 | DI function status visual display 1 (function 01-40) | 1 | 702BH |
| U0-44 | DI function status visual display 2 (function 41-80) | 1 | 702CH |
| U0-45 | Accident details | 1 | 703DH |
| U0-58 | Z signal counter | 1 | 703AH |
| U0-59 | Setting frequency (%) | 0.01% | 703BH |
| U0-60 | Operating frequency (%) | 0.01% | 703CH |
| U0-61 | AC drive status | 1 | 703DH |
| U0-62 | Current fault code | 1 | 703EH |
| U0-63 | Point-to-point communication Sending torque value | 0.01% | 703FH |
| U0-64 | Number of slaves | 1 | 7040H |
| U0-65 | Torque upper limit | 0.01% | 7041H |
| U0-66 | Type of communication extend card | 100: CANopen<br>200: Profibus-DP<br>300: CANlink | 7042H |
| U0-67 | Series number of communication extend card | Display range | - |
| U0-68 | DP card AC drive status | Bit01: Running direction<br>Bit02: AC drive fault or not<br>Bit03: Target frequency reached<br>Bit04 ~ Bit07: Reserved<br>Bit08 ~ Bit15: Fault code | 7043H |
| U0-69 | Transmitting DP speed | 0.00Hz ~ Max. frequency | 7044H |
| U0-70 | Transmitting DP motor speed | 0RPM ~ Rated motor | 7045H |
| U0-71 | Communication card dedicated current display | Display range | - |
| U0-72 | Communication fault status | Display range | - |
| U0-73 | Motor serial number | 0: Motor 1<br>1: Motor 2 | 7046H |
| U0-74 | AC drive output torque | 0.1% | 7047H |

# Chapter 5 Model Type Selection and Size

## 5.1 FU9000D Series Inverter Electrical Specifications

Table 5-1 Model and Technical Data of the FU9000D Series Inverter

| Model | Input Voltage | Rated Power (kW) | Horse Power (HP) | Rated Input Current (A) | Rated Output Current (A) |
|---|---|---|---|---|---|
| FU9000D-0R7G-S2 | 1PH 220V-240V | 0.75 | 1 | 8.2 | 4 |
| FU9000D-1R5G-S2 | | 1.5 | 2 | 14 | 7 |
| FU9000D-2R2G-S2 | | 2.2 | 3 | 23 | 9.6 |
| FU9000D-0R7G-2 | 3PH 220V-240V | 0.75 | 1 | 4.5 | 4 |
| FU9000D-1R5G-2 | | 1.5 | 2 | 8 | 7 |
| FU9000D-2R2G-2 | | 2.2 | 3 | 11 | 10 |
| FU9000D-004G-2 | | 4 | 5 | 14.6 | 13 |
| FU9000D-5R5G-2 | | 5.5 | 7.5 | 26 | 25 |
| FU9000D-7R5G-2 | | 7.5 | 10 | 35 | 32 |
| FU9000D-011G-2 | | 11 | 15 | 46.5 | 45 |
| FU9000D-015G-2 | | 15 | 20 | 62 | 60 |
| FU9000D-018G-2 | | 18.5 | 25 | 76 | 75 |
| FU9000D-022G-2 | | 22 | 30 | 92 | 91 |
| FU9000D-030G-2 | | 30 | 40 | 113 | 112 |
| FU9000D-037G-2 | | 37 | 50 | 157 | 150 |
| FU9000D-045G-2 | | 45 | 60 | 180 | 176 |
| FU9000D-055G-2 | | 55 | 75 | 214 | 210 |
| FU9000D-075G-2 | | 75 | 100 | 307 | 304 |
| FU9000D-0R7G-4 | 3PH 380V-480V | 0.75 | 1 | 3.4 | 2.5 |
| FU9000D-1R5G-4 | | 1.5 | 2 | 5 | 3.7 |
| FU9000D-2R2G-4 | | 2.2 | 3 | 5.8 | 5 |
| FU9000D-004G-4 | | 4.0 | 5 | 10.5 | 9 |
| FU9000D-5R5G-4 | | 5.5 | 7.5 | 14.6 | 13 |
| FU9000D-7R5G-4 | | 7.5 | 10 | 20.5 | 17 |
| FU9000D-011G-4 | | 11 | 15 | 26 | 25 |
| FU9000D-015G-4 | | 15 | 20 | 35 | 32 |
| FU9000D-018G-4 | | 18.5 | 25 | 38.5 | 37 |
| FU9000D-022G-4 | | 22 | 30 | 46.5 | 45 |
| FU9000D-030G-4 | | 30 | 40 | 62 | 60 |
| FU9000D-037G-4 | | 37 | 50 | 76 | 75 |
| FU9000D-045G-4 | | 45 | 60 | 92 | 91 |
| FU9000D-055G-4 | | 55 | 75 | 113 | 112 |
| FU9000D-075G-4 | | 75 | 100 | 157 | 150 |
| FU9000D-090G-4 | | 90 | 120 | 180 | 176 |
| FU9000D-110G-4 | | 110 | 150 | 214 | 210 |
| FU9000D-132G-4 | | 132 | 180 | 256 | 253 |
| FU9000D-160G-4 | | 160 | 220 | 307 | 304 |
| FU9000D-185G-4 | | 185 | 250 | 340 | 330 |

| Model | Input Voltage | Rated Power (kW) | Horse Power (HP) | Rated Input Current (A) | Rated Output Current (A) |
|---|---|---|---|---|---|
| FU9000D-200G-4 | 3PH 380V-480V | 200 | 280 | 385 | 377 |
| FU9000D-220G-4 | | 220 | 300 | 430 | 426 |
| FU9000D-250G-4 | | 250 | 330 | 468 | 465 |
| FU9000D-280G-4 | | 280 | 370 | 525 | 520 |
| FU9000D-315G-4 | | 315 | 420 | 590 | 585 |
| FU9000D-350G-4 | | 350 | 469 | 665 | 650 |
| FU9000D-400G-4 | | 400 | 530 | 785 | 725 |
| FU9000D-450G-4 | | 450 | 600 | 820 | 782 |
| FU9000D-500G-4 | | 500 | 670 | 883 | 820 |
| FU9000D-630G-4 | | 630 | 850 | 1080 | 1000 |

## 5.2 External Dimensions of the Keyboard

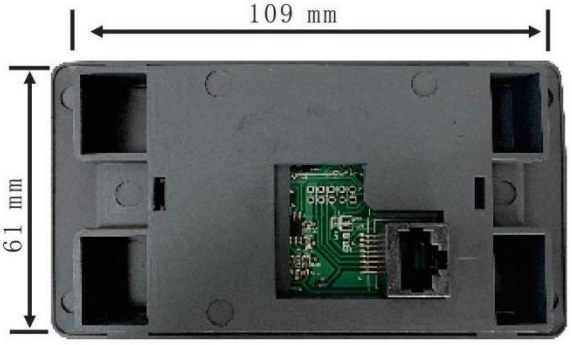




Figure 5-1-1 The Size of the External Keyboard

Figure 5-1-2 Opening Size of External Keyboard

Figure 5-1 External Dimensions of the External Keyboard (unit: mm)

## 5.3 FU9000D Series Inverter Appearance and Size

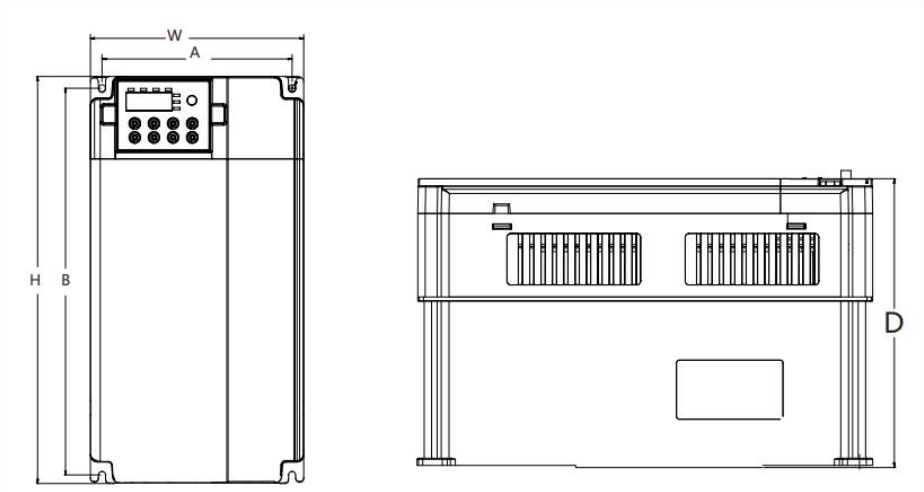



Figure 5-2 Plactic Structure

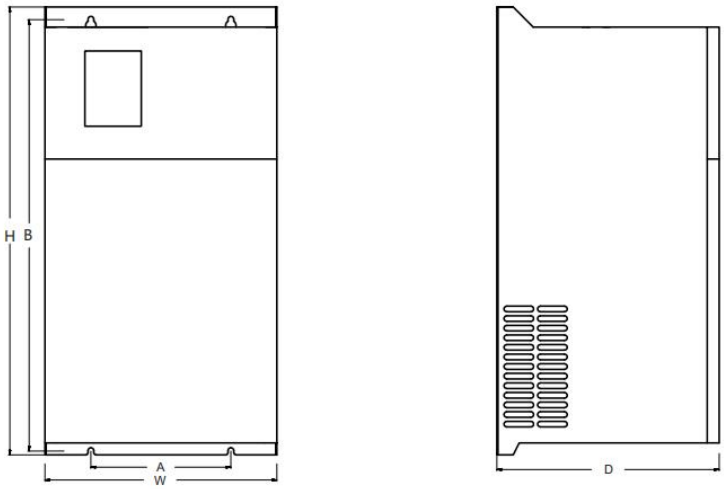



Figure 5-3 Iron Structure

Figure 5-2 & 5-3 Schematic Diagram of the External Dimensions and Installation Dimensions of FU9000D Series Inverter

| Model | Mounting Hole (mm) | | Dimensions (mm) | | | Installation Aperture (mm) | Weight (kg) |
|---|---|---|---|---|---|---|---|
| | A | B | H | W | D | | |
| Single Phase 220V-240V | | | | | | | |
| FU9000D-0R7G-S2 | 115 | 175 | 185 | 125 | 160 | Ø5 | 1.64 |
| FU9000D-1R5G-S2 | | | | | | | |
| FU9000D-2R2G-S2 | | | | | | | |
| Three Phase 220V-240V | | | | | | | |
| FU9000D-0R7G-2 | 115 | 175 | 185 | 125 | 160 | Ø5 | 1.64 |
| FU9000D-1R5G-2 | | | | | | | |
| FU9000D-2R2G-2 | | | | | | | |
| Three Phase 380V-480V | | | | | | | |
| FU9000D-0R7G-4 | 115 | 175 | 185 | 125 | 160 | Ø5 | 1.64 |
| FU9000D-1R5G-4 | | | | | | | |
| FU9000D-2R2G-4 | | | | | | | |
| FU9000D-004G-4 | | | | | | | |
| FU9000D-5R5G-4 | 130 | 242 | 255 | 145 | 170 | Ø5 | 3.2 |
| FU9000D-7R5G-4 | | | | | | | |
| FU9000D-011G-4 | 150 | 305 | 320 | 170 | 200 | Ø5.5 | 5.3 |
| FU9000D-015G-4 | | | | | | | |
| FU9000D-018G-4 | | | | | | | |
| FU9000D-022G-4 | 235 | 385 | 400 | 255 | 235 | Ø6.8 | 11.5 |
| FU9000D-030G-4 | | | | | | | |
| FU9000D-037G-4 | | | | | | | |
| FU9000D-045G-4 | 175 | 535 | 560 | 290 | 285 | Ø8 | 29 |
| FU9000D-055G-4 | | | | | | | |
| FU9000D-075G-4 | | | | | | | |
| FU9000D-090G-4 | 300 | 620 | 650 | 380 | 285 | Ø10 | 49 |
| FU9000D-110G-4 | | | | | | | |
| FU9000D-132G-4 | 250 | 720 | 750 | 400 | 340 | Ø10 | 58 |
| FU9000D-160G-4 | | | | | | | |
| FU9000D-185G-4 | 400 | 830 | 860 | 550 | 360 | Ø12 | / |
| FU9000D-200G-4 | | | | | | | |
| FU9000D-220G-4 | | | | | | | |
| FU9000D-250G-4 | 500 | 870 | 900 | 750 | 360 | Ø12 | / |
| FU9000D-280G-4 | | | | | | | |
| FU9000D-315G-4 | | | | | | | |
| FU9000D-350G-4 | 650 | 870 | 900 | 900 | 400 | Ø12 | / |
| FU9000D-400G-4 | | | | | | | |

## 5.4 Selection of Braking Unit and Braking Resistor

### 5.4.1 Selection of Braking Resistor Resistance

When braking almost all the regenerative energy of the motor is consumed on the braking resistor.

According to the formula: U*U/R = Pb

U: Braking voltage for stable braking of the system

(Different systems have different U values, generally 700V for 380VAC systems)

Pb: Braking power

### 5.4.2 Selection of Braking Resistor Power

Theoretically, the power of the braking resistor is the same as the braking power, but the derating is considered to be 70%.

According to the formula: 0.7*Pr = Pb*D

Pr: Resistor power

D: Braking frequency

(The proportion of the regeneration process in the entire working process)

| Common Applications | Elevator | Winding and unwinding | Crane and Hoist /Centrifuge | Occasional braking load | General application |
|---|---|---|---|---|---|
| Braking Frequency | 20% ~ 30% | 20% ~ 30% | 50% ~ 60% | 5% | 10% |

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 energy load. For systems with high inertia, and/or rapid deceleration times, and/or frequent braking sequences, the braking resistor with higher power and lower resistance value should be selected.

Table 5-4 Selection of FU9000D Inverter Braking Components

| Model | Recommended Power | Recommended Resistance | Braking Unit |
|---|---|---|---|
| Single Phase 220V-240V | | | |
| FU9000D-0R7G-S2 | 80W | ≥ 150Ω | Built-in (Standard) |
| FU9000D-1R5G-S2 | 100W | ≥ 100Ω | |
| FU9000D-2R2G-S2 | 100W | ≥ 70Ω | |
| Three Phase 220V-240V | | | |
| FU9000D-0R7G-2 | 150W | ≥ 110Ω | Built-in (Standard) |
| FU9000D-1R5G-2 | 250W | ≥ 100Ω | |
| FU9000D-2R2G-2 | 300W | ≥ 65Ω | |
| FU9000D-004G-2 | 400W | ≥ 45Ω | |
| FU9000D-5R5G-2 | 800W | ≥ 22Ω | |
| FU9000D-7R5G-2 | 1kW | ≥ 16Ω | |

| Model | Recommended Power | Recommended Resistance | Braking Unit |
|---|---|---|---|
| FU9000D-011G-2 | 1.5kW | ≥ 11Ω | External |
| FU9000D-015G-2 | 2.5kW | ≥ 8Ω | |
| FU9000D-018G-2 | 3.7kW | ≥ 6.7Ω | |
| FU9000D-022G-2 | 4.5kW | ≥ 6.7Ω | |
| FU9000D-030G-2 | 5.5kW | ≥ 5Ω | |
| FU9000D-037G-2 | 7.5kW | ≥ 3.3Ω | |
| FU9000D-045G-2 | 4.5kW*2 | ≥ 5Ω*2 | |
| FU9000D-055G-2 | 5.5kW*2 | ≥ 5Ω*2 | |
| FU9000D-075G-2 | 16kW | ≥ 3.3Ω*2 | |
| Three Phase 380V-480V | | | |
| FU9000D-0R7G-4 | 150W | ≥ 300Ω | Built-in (Standard) |
| FU9000D-1R5G-4 | 150W | ≥ 220Ω | |
| FU9000D-2R2G-4 | 250W | ≥ 200Ω | |
| FU9000D-004G-4 | 300W | ≥ 130Ω | |
| FU9000D-5R5G-4 | 400W | ≥ 90Ω | |
| FU9000D-7R5G-4 | 500W | ≥ 65Ω | |
| FU9000D-011G-4 | 800W | ≥ 43Ω | |
| FU9000D-015G-4 | 1kW | ≥ 32Ω | |
| FU9000D-018G-4 | 1.3kW | ≥ 25Ω | |
| FU9000D-022G-4 | 1.5kW | ≥ 22Ω | External<br>Optional built-in |
| FU9000D-030G-4 | 2.5kW | ≥ 16Ω | |
| FU9000D-037G-4 | 3.7kW | ≥ 12.6Ω | External |
| FU9000D-045G-4 | 4.5kW | ≥ 9.4Ω | |
| FU9000D-055G-4 | 5.5kW | ≥ 9.4Ω | |
| FU9000D-075G-4 | 7.5kW | ≥ 6.3Ω | |
| FU9000D-090G-4 | 4.5kW*2 | ≥ 9.4Ω*2 | |
| FU9000D-110G-4 | 5.5kW*2 | ≥ 9.4Ω*2 | |
| FU9000D-132G-4 | 6.5kW*2 | ≥ 6.3Ω*2 | |
| FU9000D-160G-4 | 16kW | ≥ 6.3Ω*2 | |
| FU9000D-200G-4 | 20kW | ≥ 2.5Ω | |
| FU9000D-220G-4 | 22kW | ≥ 2.5Ω | |
| FU9000D-250G-4 | 12.5kW*2 | ≥ 2.5Ω*2 | |
| FU9000D-280G-4 | 14kW*2 | ≥ 2.5Ω*2 | |
| FU9000D-315G-4 | 16kW*2 | ≥ 2.5Ω*2 | |
| FU9000D-355G-4 | 17kW*2 | ≥ 2.5Ω*2 | |
| FU9000D-400G-4 | 14kW*3 | ≥ 2.5Ω*3 | |
| FU9000D-450P-4 | 15kW*3 | ≥ 2.5Ω*3 | |

# Chapter 6 Maintenance and Fault Diagnosis

## 6.1 Daily Maintenance and Maintenance of the Inverter

### 6.1.1 Daily Maintenance

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.

Daily inspection items:

1) Whether the sound changes abnormally during motor operation.

2) Whether there is vibration during motor operation.

3) Whether the installation environment of the inverter has changed.

4) Whether the cooling fan of the inverter works normally.

5) Whether the inverter is overheated.

6) Daily cleaning.

7) Always keep the inverter in a clean state.

8) Effectively remove dust on the surface of inverter to prevent dust from entering the inverter. Especially metal dust.

9) Effectively remove oil stains on the cooling fan of the inverter.

### 6.1.2 Regular Inspection

Please regularly check the places that are difficult to check during operation.

Regular inspection items:

1) Check the air duct and clean it regularly.

2) Check whether the screws are loose.

3) Check that the inverter is corroded.

4) Check whether there are arc traces on the wiring terminals.

5) Main circuit insulation test.

Reminder: When measuring insulation resistance with a megger (please use a DC 500V megger), disconnect the main circuit line from the inverter. Do not use an insulation resistance meter to test the insulation of the control circuit. No need for high voltage test (completed at the factory).

### 6.1.3 Replacement of Vulnerable Parts of the Inverter

The vulnerable parts of the frequency converter are mainly cooling fans and electrolytic capacitors for filtering, and their service life is closely related to the environment and maintenance conditions. Normally, the life span is:

| Component | Service Life |
|---|---|
| Fan | 2 to 3 years |
| Electrolytic capacitor | 4 to 5 years |

Note: The standard replacement time is the time when used under the following conditions. The user can determine the replacement period according to the operating time.

・Ambient temperature: the annual average temperature is about 30°C

・Load factor: 80% or less

・Operation rate: less than 20 hours/day

1) Cooling fan

Possible causes of damage: bearing wear, blade aging.

Judgment criteria: whether there are cracks in fan blades, etc., and whether there are abnormal vibrations when starting the machine.

2) Filter electrolytic capacitor

Possible causes of damage: poor input power quality, high ambient temperature, frequent load jumps and electrolyte aging.

Judgment criteria: Whether there is liquid leakage, whether the safety valve has protruded, the measurement of electrostatic capacitance and the measurement of insulation resistance.

### 6.1.4 Storage of AC Drive

After purchasing the inverter, users must pay attention to the following points for temporary storage and long-term storage:

1) When storing, try to put it in the company's packaging box according to the original packaging.

2) Long-term storage will cause the deterioration of the electrolytic capacitor. It must be energized once within 2 years for at least 5 hours. The input voltage must be slowly raised to the rated value with a voltage regulator.

## 6.2 Warranty Instructions for AC Drive

1) The free warranty only refers to the inverter itself.

2) Under normal conditions of use, if there is a fault or damage, our company is responsible for a 12 months warranty (From the date of leaving the factory, the barcode on the nameplate shall prevail, and the contract agreement shall be executed in accordance with the agreement). Charge reasonable maintenance fees if warranty expired.

3) Within 18 months, if the following situations occur, a certain maintenance fee shall be charged.

·Damage to the machine caused by the user's failure to follow the regulations in the manual.

·Damage caused by fire, flood, abnormal voltage, etc.

·Damage caused when the inverter is used for abnormal functions.

4) The relevant service fees are calculated in accordance with the manufacturer’s unified standards. If there is a contract, the contract shall be treated as a priority.

## 6.3 Fault Alarm and Countermeasures

If a fault occurs during the operation of the FU9000D inverter system, the inverter will immediately protect the motor and stop output, the inverter fault relay contact will act simultaneously. The inverter panel will display the fault code. The fault types and common solutions corresponding to the fault code are shown in the table below.

The list in the table is for reference only. Please do not repair or modify without authorization. If the fault cannot be eliminated, please seek technical support from our company or the product agent.

Table 6-2 Solutions to the Faults of the FU9000D Series Inverter

| Fault Name | Display | Cause | Solution |
|---|---|---|---|
| Over-current during acceleration | Err02 | 1: Output circuit is grounded or short circuited. | 1: Eliminate external faults, check whether short circuit or open circuit happen in motor. |
| | | 2: Control mode is FVC or SVC, no parameter identify. | 2: Set motor parameters according to motor nameplate. |
| | | 3: Acceleration time is too short. | 3: Increase the acceleration time. |
| | | 4: Over-current stall prevention parameters are set improperly. | 4:<br>• Confirm over-current stall prevention (P3-19) has enabled.<br>• P3-18 too high, recommend 120% ~ 150%<br>• P3-20 too low, recommend 20 ~ 40 |
| | | 5: Manual torque boost or V/F curve is improper. | 5: Adjust the manual torque boost or V/F curve. |
| | | 6: Rotating motor is started. | 6: Select rotational speed tracking restart or start the motor after it stops. |
| | | 7: External disruption. | 7: Check fault records. If the current is far lower than over-current value, find interference source. If no interference source, problem may from drive board or hall element. |
| Over-current during deceleration | Err03 | 1: Output circuit is grounded or short circuited. | 1: Eliminate external faults, check whether short circuit or open circuit happen in motor. |
| | | 2: Control mode is FVC or SVC, no parameter identify. | 2: Set motor parameters according to motor nameplate. |
| | | 3: Deceleration time is too short. | 3: Increase the deceleration time. |
| | | 4: Over-current stall prevention parameters are set improperly. | 4:<br>• Confirm over-current stall prevention (P3-19) has enabled.<br>• P3-18 too high, recommend 120% ~ 150%<br>• P3-20 too low, recommend 20 ~ 40 |
| | | 5: No braking unit or braking resistor. | 5: Install braking unit or braking resistor. |
| | | 6: External disruption. | 6: Check fault records. If the current is far lower than over-current value, find interference source. If no interference source, problem may from drive board or hall element. |
| Over-current at constant speed | Err04 | 1: Output circuit is grounded or short circuited. | 1: Eliminate external faults, check whether short circuit or open circuit happen in motor. |
| | | 2: Control mode is FVC or SVC, no parameter identify. | 2: Set motor parameters according to motor nameplate. |
| | | 3: Over-current stall prevention parameters are set improperly. | 3:<br>• Confirm over-current stall prevention (P3-19) has enabled.<br>• P3-18 too high, recommend 120% ~ 150%<br>• P3-20 too low, recommend 20 ~ 40 |
| | | 4: AC drive power class is too small. | 4: In stable operation, if the running current has exceeded the rated current of the motor or the rated output current of the inverter, please select a higher power inverter. |
| | | 5: External disruption. | 5: Check fault records. If the current is far lower than over-current value, find interference source. If no interference source, problem may from drive board or hall element. |

| Fault Name | Display | Cause | Solution |
|---|---|---|---|
| Over-voltage during acceleration | Err05 | 1: Input voltage is too high. | 1: Adjust the voltage to normal range. |
| | | 2: An external force drives the motor during acceleration. | 2: Cancel the external force or install a braking resistor. |
| | | 3: Over-voltage stall prevention parameters are set improperly. | 3:<br>• Confirm over-voltage stall prevention (P3-23) has enabled.<br>• P3-22 too high, recommend 700V ~ 770V<br>• P3-24 too low, recommend 30 ~ 50 |
| | | 4: No braking unit or braking resistor. | 4: Install braking unit or braking resistor. |
| | | 5: Acceleration time is too short. | 5: Increase the accelerate time. |
| Over-voltage during deceleration | Err06 | 1: Over-voltage stall prevention parameters are set improperly. | 1:<br>• Confirm over-voltage stall prevention (P3-23) has enabled.<br>• P3-22 too high, recommend 700V ~ 770V<br>• P3-24 too low, recommend 30 ~ 50 |
| | | 2: An external force drives the motor during deceleration. | 2: Cancel the external force or install a braking resistor. |
| | | 3: Deceleration time is too short. | 3: Increase the deceleration time. |
| | | 4: No braking unit or braking resistor. | 4: Install braking unit or braking resistor. |
| Over-voltage at constant speed | Err07 | 1: Over-voltage stall prevention parameters are set improperly. | 1:<br>• Confirm over-voltage stall prevention (P3-23) has enabled:<br>• P3-22 too high, recommend 700V ~ 770V<br>• P3-24 too low, recommend 30 ~ 50<br>• P3-26 too low, recommend 5Hz ~ 20Hz |
| | | 2: An external force drives the motor during deceleration. | 2: Cancel the external force or install a braking resistor. |
| Pre-charge power fault | Err08 | 1: Bus voltage fluctuates around under-voltage threshold continuously. | 1: Contact the agent or USFULL. |
| Under-voltage | Err09 | 1: Instantaneous power failure occurs. | 1: Set P9-59 to enable the instantaneous power-off function. |
| | | 2: AC drive's input voltage is not within the allowable range. | 2: Adjust the voltage to normal range. |
| | | 3: Bus voltage is abnormal. | 3 ~ 4: Contact the agent or USFULL. |
| | | 4: Rectifier bridge, pre-charge resistor, drive board or control board is abnormal. | |
| AC drive overload | Err10 | 1: Load is too heavy or locked-rotor occurs on the motor. | 1: Reduce the load and check the motor and mechanical condition. |
| | | 2: AC drive power class is too small. | 2: Select an AC drive of higher power class. |

| Fault Name | Display | Cause | Solution |
|---|---|---|---|
| Motor overload | Err11 | 1: P9-01 is set incorrectly. | 1: Set P9-01 correctly. |
| | | 2: Load is too heavy or locked-rotor occurs on the motor. | 2: Reduce the load and check the motor and the mechanical condition. |
| | | 3: AC drive power class is too small. | 3: Select an AC drive of higher power class. |
| Power input phase loss | Err12 | 1: Three-phase input is abnormal. | 1: Eliminate external faults. |
| | | 2: Rectifier bridge, drive board, lightening protection board or control board is abnormal. | 2: Contact the agent or USFULL. |
| Power output phase loss | Err13 | 1: Motor faulty. | 1: Replace motor. |
| | | 2: Cable connection of AC drive and motor is abnormal. | 2: Check output cable is connected correctly. |
| | | 3: AC drive's three-phase outputs are unbalanced when the motor is running. | 3: Check whether the motor three-phase winding is normal. |
| | | 4: Drive board or IGBT is abnormal. | 4: Contact the agent or USFULL. |
| IGBT overheat | Err14 | 1: Ambient temperature is too high. | 1: Lower the ambient temperature. |
| | | 2: Ventilation duct is blocked. | 2: Clean the ventilation duct. |
| | | 3: Fan is damaged. | 3: Replace the fan. |
| | | 4: Thermally sensitive resistor of the IGBT is damaged. | 4 ~5: Contact the agent or USFULL. |
| | | 5: IGBT is damaged. | |
| External equipment fault | Err15 | 1: External fault signal is input via DI. | 1: Check external fault, confirm the restart is allowed (P8-18) and reset the operation. |
| | | 2: External fault signal is input via virtual I/O. | 2: Confirm group D1, group I/O setting are correct and reset the operation. |
| Communication fault | Err16 | 1: Host computer is in abnormal state. | 1: Check the cable of host computer. |
| | | 2: Communication cable is abnormal. | 2: Check the communication cable. |
| | | 3: P0-28 is set incorrectly. | 3: Set P0-28 correctly. |
| | | 4: Communication parameters in group Pd are set incorrectly. | 4: Set the communication parameters in group Pd correctly. |
| | | 5: After all check above, Err still exist, try factory recover. | |
| Contactor fault | Err17 | 1: Drive board, lightening protection board or power supply is abnormal. | 1 ~ 2: Contact the agent or USFULL. |
| | | 2: Contactor is abnormal. | |
| Current detection fault | Err18 | 1: Hall device is abnormal. | 1 ~ 2: Contact the agent or USFULL. |
| | | 2: Drive board is abnormal. | |
| Motor auto-tuning fault | Err19 | 1: Motor parameters are not set according to the nameplate. | 1: Set the motor parameters according to the nameplate. |
| | | 2: Motor auto-tuning times out. | 2: Check the cable connection of the AC drive and the motor. |
| Encoder fault | Err20 | 1: Encoder type is not matched. | 1: Set the encoder type correctly based on the actual situation. |
| | | 2: Encoder wiring is incorrect. | 2: Check PG card power supply and phase sequence. |
| | | 3: Encoder is damaged. | 3: Replace the encoder. |
| | | 4: PG card is abnormal. | 4: Replace the PG card. |

| Fault Name | Display | Cause | Solution |
|---|---|---|---|
| EEPROM read-write fault | Err21 | 1: EEPROM chip is damaged. | 1: Replace the main control board. |
| Short circuit to ground | Err23 | 1: Motor is short circuited to ground. | 1: Replace the cable or motor. |
| Accumulative running time reached | Err26 | 1: Accumulative running time reaches the setting value. | 1: Clear the record through the parameter initialization function. |
| User-defined fault 1 | Err27 | 1: User-defined fault 1 signal is input via DI. | 1 ~ 2: Reset the operation. |
| | | 2: User-defined fault 1 signal is input via virtual I/O. | |
| User-defined fault 2 | Err28 | 1: User-defined fault 2 signal is input via DI. | 1 ~ 2: Reset the operation. |
| | | 2: User-defined fault 2 signal is input via virtual I/O. | |
| Accumulative power-on time reached | Err29 | 1: Accumulative power-on time reaches the setting value. | 1: Clear the record through the parameter initialization function. |
| Load loss | Err30 | 1: AC drive running current is lower than P9-64. | 1: Check that the load is disconnected or the setting of P9-64 and P9-65 are correct. |
| PID feedback lost during running | Err31 | 1: PID feedback is lower than the setting of PA-26. | 1: Check the PID feedback signal or set PA-26 to a proper value. |
| Pulse-by-pulse current limit fault | Err40 | 1: Load is too heavy or locked-rotor occurs on the motor. | 1: Reduce the load and check the motor and mechanical condition. |
| | | 2: AC drive power class is too small. | 2: Select an AC drive of higher power class. |
| Motor switchover fault during running | Err41 | 1: Change the selection of the motor via terminal during running of the AC drive. | 1: Perform motor switchover after the AC drive stops. |
| Too large speed deviation | Err42 | 1: Encoder parameters are set incorrectly. | 1: Set the encoder parameters correctly. |
| | | 2: Motor auto-tuning is not performed. | 2: Perform the motor auto-tuning. |
| | | 3: P9-69 and P9-70 are set improperly. | 3: Set P9-69 and P9-70 properly based on the actual situation. |
| Motor over-speed | Err43 | 1: Encoder parameters are set incorrectly. | 1: Set the encoder parameters correctly. |
| | | 2: Motor auto-tuning is not performed. | 2: Perform the motor auto-tuning. |
| | | 3: P9-67 and P9-68 are set improperly. | 3: Set P9-67 and P9-68 properly based on the actual situation. |
| Motor overheat | Err45 | 1: Cable connection of temperature sensor becomes loose. | 1: Check cable connection of temperature sensor. |
| | | 2: Motor temperature is too high. | 2: Lower the carrier frequency or adopt other heat radiation measures. |
| Host control slave fault | Err55 | 1: Slave fault, check slave. | 1: Check according to slave Err code. |
| Braking unit overload | Err61 | 1: Braking resistor resistance is too small. | 1: Please refer to table 5-4. |
| Braking circuit Short-circuit | Err62 | 1: Braking IGBT is abnormal. | 1: Contact the agent or USFULL. |

## 6.4 Common Faults and Solutions

You may come across the following faults during the use of the AC drive. Refer to the following table for simple fault analysis:

Table 6-3 Troubleshooting to Common Faults of the AC Drive

| No. | Fault | Cause | Solution |
|---|---|---|---|
| 1 | There is no display at power-on. | 1: Power supply is not input or too low. | 1: Check the power supply. |
| | | 2: Switching power supply on the drive board of the AC drive is faulty. | 2: Check the bus voltage. |
| | | 3: Cable between control board and drive board, and between control board and operation panel breaks. | 3: Re-connect the 8-core and 34-core cable. |
| | | 4: Pre-charge resistor of the AC drive is damaged. | 4~6: Contact the agent or USFULL. |
| | | 5: Control board or operation panel is faulty. | |
| | | 6: Rectifier bridge is damaged. | |
| 2 | "000000" is displayed at power-on. | 1: Cable between drive board and control board is in poor contact. | 1: Re-connect the 8-core and 34-core cable. |
| | | 2: Related components on the control board are damaged. | 2~5: Contact the agent or USFULL. |
| | | 3: Motor or motor cable is short circuited to ground. | |
| | | 4: Hall device is faulty. | |
| | | 5: Power supply is too low. | |
| 3 | "Err23" is displayed at power-on. | 1: Motor or motor output cable is short circuited to ground. | 1: Measure the insulation of motor and output cable with a megger. |
| | | 2: AC drive is damaged. | 2: Contact the agent or USFULL. |
| 4 | The AC drive display is normal upon power-on. But "00000" is displayed after running and stops immediately. | 1: Cooling fan is damaged or locked-rotor occurs. | 1: Replace the fan. |
| | | 2: Control terminal wiring is short circuited. | 2: Eliminate short circuit fault. |
| 5 | Err14 (IGBT overheat) fault is reported frequently. | 1: Setting of carrier frequency is too high. | 1: Reduce the carrier frequency (P0-15). |
| | | 2: Cooling fan is damaged or ventilation duct is blocked. | 2: Replace the fan or clean the ventilation duct. |
| | | 3: Components inside the AC drive are damaged (thermocouple or others). | 3: Contact the agent or USFULL. |
| 6 | The motor does not rotate after the AC drive runs. | 1: Check the motor and the motor cables. | 1: Ensure the cable between the AC drive and the motor is normal. |
| | | 2: AC drive parameters are set incorrectly (motor parameters). | 2: Restore the factory parameters and reset parameters correctly. |
| | | 3: Cable between drive board and control board is in poor contact. | 3: Re-connect the 8-core and 34-core cable. |
| | | 4: Drive board is faulty. | 4: Contact the agent or USFULL. |

| No. | Fault | Cause | Solution |
|---|---|---|---|
| 7 | The DI terminals are disabled. | 1: Parameters are set incorrectly. | 1: Check and reset the parameters in group P4. |
| | | 2: External signal is incorrect. | 2: Re-connect the external signal cable. |
| | | 3: Control board is faulty. | 3: Contact the agent or USFULL. |
| 8 | The AC drive reports over-current and over-voltage frequently. | 1: Motor parameters are set incorrectly. | 1: Reset motor parameters or re-perform the motor auto-tuning. |
| | | 2: Acceleration/Deceleration time is improper. | 2: Set proper acceleration/ deceleration time. |
| | | 3: Load fluctuates. | 3: Contact the agent or USFULL. |
| 9 | Err17 is reported upon power-on or running. | 1: 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 24V power supply of the contactor is faulty.<br>4: Contact the agent or USFULL. |
| 10 | 8.8.8.8.8 is displayed upon power-on. | 1: Operation panel is damaged. | 1: Replace the operation panel. |

# Appendix A Definition of Communication Data Address

FU9000D supports four communication protocols (Modbus-RTU, CANopen, CANlink and Profibus-DP).

The user programmable card and point-to-point communication are derivation of CANlink protocol.

Host computer can implement control such as monitoring and parameter viewing and modification on the AC drive through communication protocols.

FU9000D communication data is classified into parameter data and non-parameter data.

The non-parameter data includes running commands, running status, running parameters and alarm information.

## A.1 Parameter Data

The parameter data provides important parameters of the AC drive. The parameter data is described as below:

| | | |
|---|---|---|
| Parameter Data | Group P (read-write) | P0, P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, Pb, PC, Pd, PE, PF |
| | Group D (read-write) | D0, D1, D2, D3, D4, D5, D6, D7, D8, D9, DA, DB, DC, DD, DE, DF |

Communication addresses of parameter data are defined as follows:

• When parameter data is read by means of communication

For groups P0 ~ PF and D0 ~ DF, the high 16 bits of the communication address indicate the group number and the low 16 bits indicate the parameter number in the group.

Example:

Communication address of P0-16 is F010H, where F0H represents group P0 and 10H is the hexadecimal data format of serial number 16 in the group.

Communication address of DC-08 is AC08H, where ACH represents group DC and 08H is the hexadecimal data format of serial number 8 in the group.

• When parameter data is written by means of communication

For groups P0 ~ PF, where the high 16 bits in communication address are 00 ~ 0F or F0 ~ FF is decided by whether the high 16 bits are written to EEPROM. The low 16 bits indicate parameter number in the group.

Example:

P0-16: If it need not be written to EEPROM, communication address is 0010H. If it needs to be written to EEPROM, communication address is F010H.

For groups D0 ~ DF, where the high 16 bits in communication address are 40 ~ 4F or A0 ~ AF is decided by whether the high 16 bits are written to EEPROM. The low 16 bits indicate parameter number in the group.

DC-08: If it need not be written to EEPROM, communication address is 4C08H. If it needs to be written to EEPROM, communication address is AC08H.

## A.2 Non-Parameter Data

| | | |
|---|---|---|
| Non-parameter Data | Status data (read-only) | Group U (monitoring parameters), AC drive fault description and AC drive running status |
| | Control parameters (write-only) | Control commands, communication setting values, DO control, AO1 control, AO2 control, high-speed pulse (FMP) output control and parameter initialization |

### A.2.1 Status Data

Status data includes group U, AC drive fault description and AC drive running status.

• Group U (monitoring parameters)

The high 16 bits in communication address of U0 ~ UF is 70 to 7F and the low 16 bits indicate the function code number in the group.

For example, the communication address of U0-11 is 700BH.

• AC drive fault description

When fault description is read via communication, the communication address is 8000H. You can obtain current fault code of the AC drive by reading the address. (See P9-14)

• AC drive running status

When the drive running status is read via communication, the communication address is 3000H. You can obtain current running status information of the AC drive by reading the address. The running status is defined in the following table:

| Communication Address of AC Drive Running Status | Definition |
|---|---|
| 3000H | 1: Forward run |
| | 2: Reverse run |
| | 3: Stop |

### A.2.2 Control Parameters

The control parameters include control commands, communication setting values, DO control, AO1 control, AO2 control, high-speed pulse (FMP) output control and parameter initialization.

• Control commands

When P0-02 (command source selection) is set to 2 (communication control), you can implement control such as start/stop of the AC drive by using communication address. The control commands are defined in the following table:

| Communication Address of Control Commands | Definition |
|---|---|
| 2000H | 1: Forward run |
| | 2: Reverse run |
| | 3: Forward jog |
| | 4: Reverse jog |
| | 5: Coast to stop |
| | 6: Decelerate to stop |
| | 7: Fault reset |

• Communication setting values

Communication setting values include data set via communication such as frequency reference, torque limit, V/F separation voltage, PID reference and PID feedback.
Communication address is 1000H.
The range is -10000 to 10000 and corresponding value range is -100.00% ~ 100.00%.

• DO control

When DO terminal is set for function 20 (communication control), host computer can implement control on DO terminals of the drive through communication address 2001H. Control on DO terminals of the drive is defined in the following table:

| Communication Address of DO Control | Definition |
|---|---|
| 2001H | Bit01: DO1 output control |
| | Bit01: DO2 output control |
| | Bit02: Relay 1 output control |
| | Bit03: Relay 2 output control |
| | Bit04: FMR output control |
| | Bit05: VDO1 |
| | Bit06: VDO2 |
| | Bit07: VDO3 |
| | Bit08: VDO4 |
| | Bit09: VDO5 |

• AO1 control, AO2 control and high-speed pulse (FMP) output control

When AO1, AO2 and FMP are set to function 12 (communication setting), host computer can implement control on AO and high-speed pulse outputs by means of communication addresses. The definition is provided in the following table:

| Communication Address of AO1, AO2 and FMP Output | | Definition |
|---|---|---|
| AO1 | 2002H | 0 to 7FFF indicates 0% to 100% |
| AO2 | 2003H | |
| FMP | 2004H | |

• Parameter initialization

This function is required when you need to perform parameter initialization on the drive by using host computer.
If PP-00 (user password) is set to a non-zero value, pass password verification first. Host computer performs parameter initialization within 30s after password verification is successful.
Communication address of password verification via communication is 1F00H. Directly write correct user password to this address to perform password verification.
Communication address of parameter initialization by means of communication is 1F01H, defined in the following table:

| Communication Address of Parameter Initialization | Definition |
|---|---|
| 1F01H | 1: Restore default settings |
| | 2: Clear records |

# Appendix B FU9000D Modbus Communication Protocol

The drive provides RS485 communication interface and supports Modbus-RTU communication protocol.

The user can implement centralized control, such as setting running commands and function codes, and reading running status and fault information of the AC drive, by using a PC or PLC.

## B.1 Protocol Content

This protocol defines content and format of transmitted messages during serial communication, including master polling (or broadcasting) format and master coding method (function code for the action, transmission data and error check).

The slave uses the same structure in response, including action confirmation, data returning and error check. If an error occurs when the slave receives a message, or the slave cannot complete the action required by the master, the slave returns a fault message as a response to the master.

### B.1.1 Application

The AC drive is connected to a "single-master multi-slave" PC/PLC control network with RS485 bus.

### B.1.2 Bus Structure

• Interface mode

The RS485 extension card FU90TX1 must be inserted into the AC drive.

• Topological structure

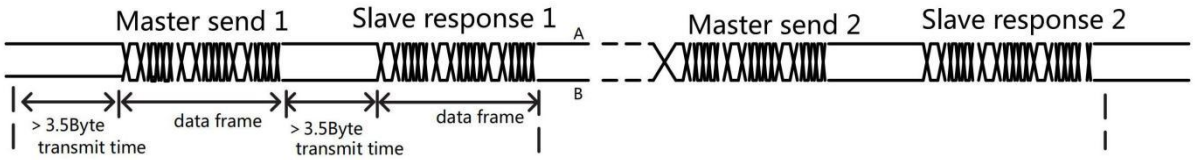
The system consists of a single master and multiple slaves. In the network, each communication device has a unique slave address. A device is the master (can be a PC, PLC or HMI) and initiates communication to perform parameter read or write operations on slaves. The other devices (slaves) provide data to respond to query or operations from the master. At the same moment, either the master or the slave transmits data and the other can only receives data.

The address range of the slaves is 1 to 247, and 0 is broadcast address. Slave address must be unique in the network.

• Transmission mode of communication

The asynchronous serial and half-duplex transmission mode is used. During asynchronous serial communication, data is sent frame by frame in the form of message.

In Modbus-RTU protocol, an interval of at least 3.5-byte time marks the end of the previous message. A new message starts to be sent after this interval.




In theory, host computer can read several consecutive parameters (can reach up to 12) but the last parameter it reads must not jump to the next parameter group. Otherwise, an error occurs on response.

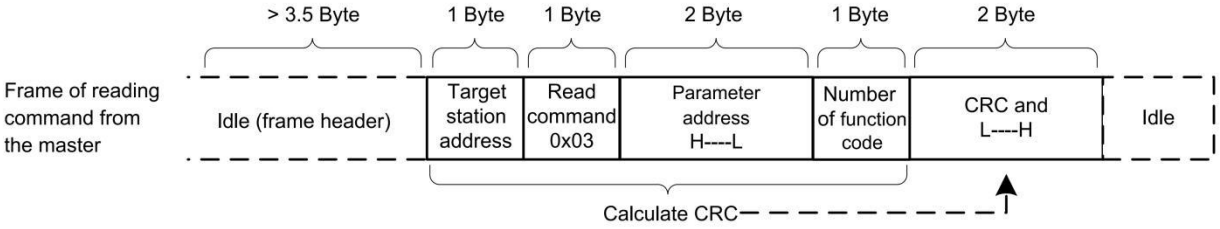
## B.2 Data Format

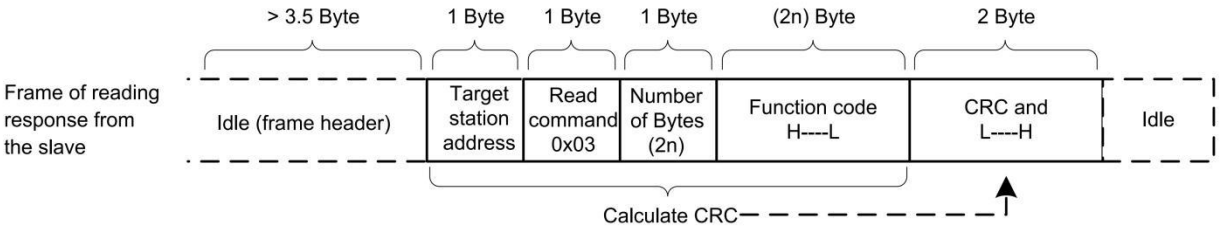
The drive supports reading and writing of word-type parameters only.

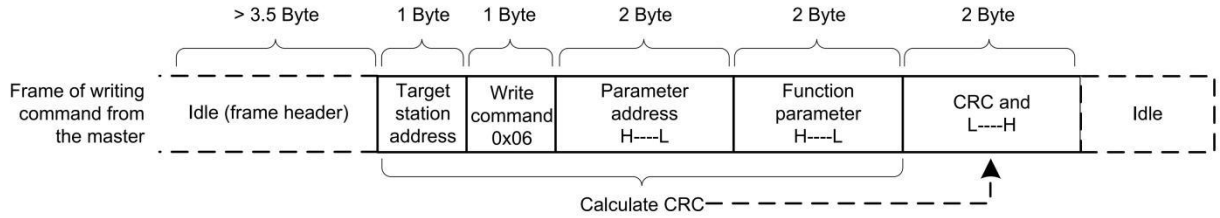
Reading command is 0x03 and writing command is 0x06.

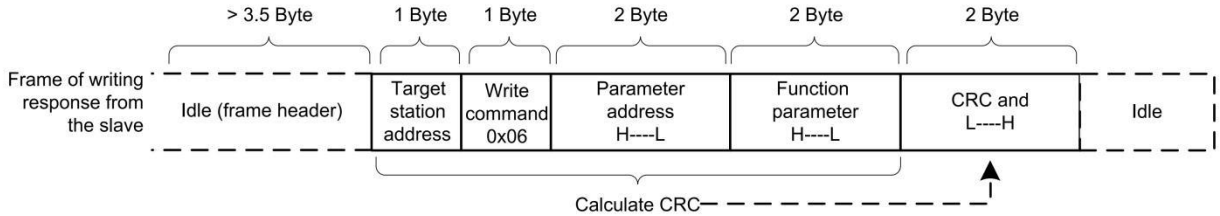
It does not support reading and writing of bytes or bits.

The Modbus-RTU protocol communication data format of the drive is as follows:

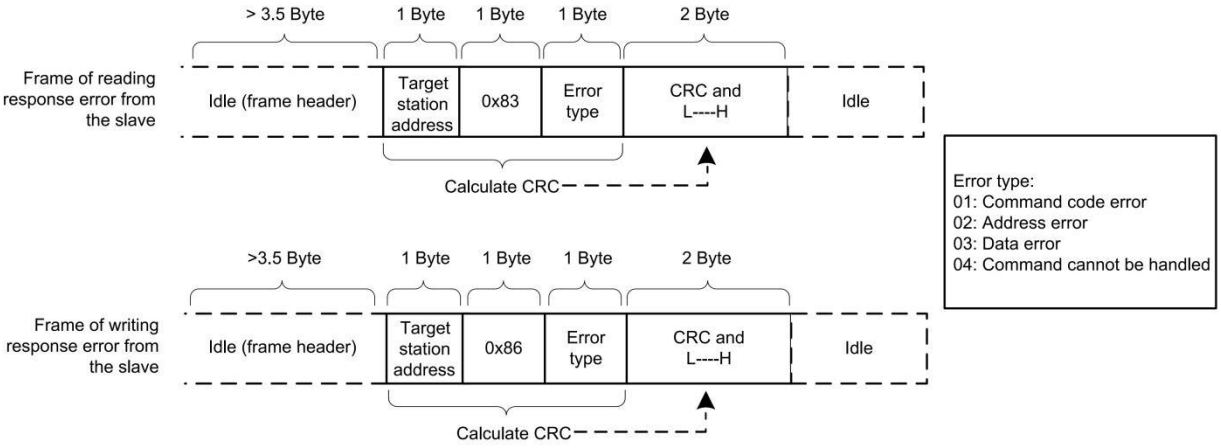



If the slave detects a communication frame error or reading/writing failure is caused by other reasons, an error frame will be returned as follows:



The frame format is described in the following table:

| | |
|---|---|
| Frame header (START) | Greater than the 3.5-byte transmission idle time |
| Slave address (ADR) | Communication address:<br>0: Broadcast address<br>1 ~ 247 |
| Command code (CMD) | 03: Read slave parameters 06: Write slave parameters |
| Function code address (H) | It is the internal parameter address of the AC drive, expressed in hexadecimal format. The parameters include functional parameters and non-functional parameters (running status and running command). During transmission, low-order bytes follow the high -order bytes. |
| Function code address (L) | |
| Number of function codes (H) | It is the number of function codes read by this frame. If it is 1, it indicates that one function code is read. During transmission, low bytes follow high bytes. In the present protocol, only one function code is read once, and this field is unavailable. |
| Number of function codes (L) | |
| Data (H) | It is response data or data to be written. During transmission, low-order bytes follow the high-order bytes. |
| Data (L) | |
| CRC CHK high bytes | It is the detection value (CRC16 verification value). During transmission, low-order bytes follow the high-order bytes. |
| CRC CHK low bytes | |
| END | 3.5-byte transmission time |

■ CRC Check

In Modbus-RTU mode, a message includes a CRC-based error-check field. The CRC field checks content of entire message. The CRC field is two bytes, containing a 16-bit binary value. The CRC field is calculated by transmitting device, and then added to message. The receiving device recalculates a CRC value after receiving message, and compares the calculated value with the CRC value in the received CRC field.

The CRC is first stored to 0xFFFF. Then a procedure is invoked to process the successive 8-bit byte in the message and the value in the register. Only the eight bits in each character are used for the CRC. The start bit, stop bit and the parity bit do not apply to the CRC.

During generation of the CRC, each eight-bit character is in exclusive-OR (XOR) with the content in the register. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register then performs XOR with a preset value. If the LSB was a 0, no XOR is performed . This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is in XOR with the register's current value, and the process repeats for eight more shifts as described above. The final value of the register, after all the bytes of the message have been applied, is the CRC value.

The CRC is added to the message from the low-order byte followed by the high-order byte. The CRC simple function is as follows:

```
unsigned int crc_chk_value（unsigned char *data_value,unsigned char length）
{
      unsigned int crc_value=0xFFFF;
      int i;
      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）;
}
```

## B.3 Definition of Communication Parameter Addresses

■ Read and Written Parameters

Function parameter can be read and written.

(Except those which cannot be changed because they are only for the factory use or for monitoring.)

Parameter group number and parameter identifying number are used to express parameter address:

• High-order bytes: F0 ~ FF (Groups P), A0 ~ AF (Groups D), 70 ~ 7F (Group U)

• Low-order bytes: 00 ~ FF

For example, to read parameter P3-12, communication address is expressed as 0xF30C.

Note:

• Group PF: They are factory parameters. The parameters cannot be read or changed.

• Group U: These parameters can only be read.

Some parameters cannot be modified when the AC drive is running.

Some parameter cannot be modified regardless of status of the AC drive.

In addition, pay attention to setting range, unit and description of parameters when modifying them.

| Parameter Group | Visited Address | Parameter Address in RAM |
|---|---|---|
| P0 ~ PE | 0xF000 ~ 0xFEFF | 0x0000 ~ 0x0EFF |
| D0 ~ DC | 0xA000 ~ 0xACFF | 0x4000 ~ 0x4CFF |
| U0 | 0x7000 ~ 0x70FF | - |

Frequent storage to the EEPROM reduces its service life. Therefore, in communication mode, users can change values of certain parameters in RAM rather than storing the setting.

• For groups P parameters, users only need to change high order F of the function code address to 0.

• For groups D parameters, users only need to change high order A of the function code address to 4.

The function code addresses are expressed as follows:

• High-order bytes: 00 ~ 0F (Groups P), 40 ~ 4F (Groups D)

• Low-order bytes: 00 ~ FF

For example, if function code P3-12 can not be stored into EEPROM, the address is expressed as 030C.

If function code D0-05 can not be stored into EEPROM, the address is expressed as 4005.

It is an invalid address when being read. It can only be used for writing RAM.

Users can also use command code 07H to implement this function.

■ Stop/Run Parameters:

| Parameter Address | Description | Parameter Address | Description |
|---|---|---|---|
| 1000H | Communication setting value (decimal): -10000 ~ 10000 | 1010H | PID reference |
| 1001H | Running frequency | 1011H | PID feedback |
| 1002H | Bus voltage | 1012H | PLC process |
| 1003H | Output voltage | 1013H | Pulse input frequency, unit: 0.01kHz |
| 1004H | Output current | 1014H | Feedback speed, unit: 0.1Hz |
| 1005H | Output power | 1015H | Remaining running time |
| 1006H | Output torque | 1016H | AI1 voltage before correction |
| 1007H | Running speed | 1017H | AI2 voltage before correction |
| 1008H | DI input indication | 1018H | AI3 voltage before correction |
| 1009H | DO output indication | 1019H | Linear speed |
| 100AH | AI1 voltage | 101AH | Current power-on time |
| 100BH | AI2 voltage | 101BH | Current running time |
| 100CH | AI3 voltage | 101CH | Pulse input frequency, unit: 1Hz |
| 100DH | Counting value input | 101DH | Communication reference |
| 100EH | Length value input | 101EH | Actual feed back speed |
| 100FH | Load speed | 101FH | Main frequency X reference display |
| - | - | 1020H | Auxiliary frequency Y reference display |
| Note | • Communication setting value indicates percentage: 10000 corresponds to 100.00%, and -10000 corresponds to -100.00%.<br>• With regard to frequency, communication reference is a percentage of P0-10 (max. frequency).<br>• With regard to torque, communication reference is a percentage of P2-10 and D2-48 (corresponding to motor 1 and motor 2, respectively). | | |

Control command input to AC drive (write-only):

| Command Word Address | Command Word Function |
|---|---|
| 2000H | 0001: Forward run |
| | 0002: Reverse run |
| | 0003: Forward jog |
| | 0004: Reverse jog |
| | 0005: Coast to stop |
| | 0006: Decelerate to stop |
| | 0007: Fault reset |

Read AC drive state (read-only):

| Command Word Address | Command Word Function |
|---|---|
| 3000H | 0001: Forward run |
| | 0002: Reverse run |
| | 0003: Stop |

Parameter lock password check: If "8888H" is returned, it indicates that password check is passed:

| Password Address | Password Content |
|---|---|
| 1F00H | ***** |

DO terminal control (write-only):

| Command Address | Command Content |
|---|---|
| 2001H | Bit00: DO1 control |
| | Bit01: DO2 control |
| | Bit02: Relay 1 control |
| | Bit03: Relay 2 control |
| | Bit04: FMR control |
| | Bit05: VDO1 |
| | Bit06: VDO2 |
| | Bit07: VDO3 |
| | Bit08: VDO4 |
| | Bit09: VDO5 |

AO1 control (write-only):

| Command Address | Command Content |
|---|---|
| 2002H | 0 ~ 7FFF indicates 0% ~ 100%. |

AO2 control (write-only):

| Command Address | Command Content |
|---|---|
| 2003H | 0 ~ 7FFF indicates 0% ~ 100%. |

Pulse output control (write-only):

| Command Address | Command Content |
|---|---|
| 2004H | 0 ~ 7FFF indicates 0% ~ 100%. |

AC drive fault description:

| Fault Address | AC Drive Fault Information | |
|---|---|---|
| 8000H | 0000: No fault | 0015: Parameter read and write fault |
| | 0001: Reserved | 0016: AC drive hardware fault |
| | 0002: Over-current during acceleration | 0017: Motor short circuited to ground |
| | 0003: Over-current during deceleration | 0018: Reserved |
| | 0004: Over-current during constant speed | 0019: Reserved |
| | 0005: Over-voltage during acceleration | 001A: Accumulative running time reached |
| | 0006: Over-voltage during deceleration | 001B: User-defined fault 1 |
| | 0007: Over-voltage during constant speed | 001C: User-defined fault 2 |
| | 0008: Pre-charge resistance overload | 001D: Accumulative power-on time reached |
| | 0009: Under-voltage fault | 001E: Load lost |
| | 000A: AC drive overload | 001F: PID feedback lost during running |
| | 000B: Motor overload | 0028: Fast current limit time out |
| | 000C: Input lost phase | 0029: Motor switchover error during running |
| | 000D: Output lost phase | 002A: Too large speed deviation |
| | 000E: IGBT overheat | 002B: Motor over-speed |
| | 000F: External fault | 002D: Motor overheat |
| | 0010: Communication fault | 005A: Incorrect setting of PPR of the encoder |
| | 0011: Contactor fault | 005B: Not connecting the encoder |
| | 0012: Current detection fault | 005C: Initial position error |
| | 0013: Motor tuning fault | 005E: Speed feedback error |
| | 0014: Encoder/PG card fault | |
| Note | • PPR: Pulses per revolution | |

## B.4 Group Pd Communication Parameter Description

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| Pd-00 | Baud rate | Units digit: (Modbus)<br>0: 300BPS<br>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 | 0005 |

This parameter is used to set transmission speed between host computer and AC drive.

Note that baud rate of host computer must be the same as that of AC drive.

Otherwise, communication shall fail. The higher baud rate is, the faster communication will be.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| Pd-01 | Data format | 0: No check <8-N-2><br>1: Even parity check <8-E-1><br>2: Odd parity check <8-O-1><br>3: No check, data format <8-N-1> | 3 |

Note that data format of host computer must be the same as that of AC drive. Otherwise, communication shall fail.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| Pd-02 | Local address | 0: Broadcast address<br>1 ~ 249 | 1 |

This parameter is used to set address of AC drive. This address is unique (except broadcast address), which is basis for point-to-point communication between host computer and AC drive.

When local address is set to 0 (broadcast address), AC drive can only receive and execute broadcast commands of host computer, but will not respond to host computer.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| Pd-03 | Response delay | 0ms ~ 20ms (valid for Modbus) | 2ms |

This parameter sets interval between AC drive completing receiving data and AC drive sending data to host computer.

If response delay is shorter than system processing time, system processing time shall prevail.

If response delay is longer than system processing time, system sends data to host computer only after response delay is up.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| Pd-04 | Communication time out | 0.0s: Disabled<br>0.1s ~ 60.0s | 0.0s |

When AC drive does not receive communication signal within time set in this parameter, it detects communication timeout fault (Err16).

Generally, this parameter is set to 0.0s. In applications with continuous communication, you can use this parameter to monitor communication status.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| Pd-05 | Modbus protocol selection | Units digit: Modbus<br>0: Non-standard Modbus protocol<br>1: Standard Modbus protocol | 01 |

Pd-05=1: Standard Modbus protocol.

Pd-05=0: When reading command, slave return byte is 1 more digit than standard Modbus protocol.

Please refer to “ B.2 Data Format ”.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| Pd-06 | Current resolution read by communication | 0: 0.01A<br>1: 0.1A | 0 |

This parameter is used to set unit of output current read by communication.

# Appendix C Further Information

## C.1 Product and Service Inquiries

Address any inquiries about the product to your local USFULL offices, quoting the type designation and serial number of the unit in question. A listing of USFULL sales, support and service contacts can be found by navigating to www.usfull.com.

## C.2 Feedback of USFULL Inverters Manuals

Your comments on our manuals are welcomed to go to www.usfull.com and select online feedback of contact us.

USFULL®

**ZHEJIANG FULLWILL ELECTRIC CO., LTD.**

Add: Building 10, No.699 Lingzhan Road, Kunpeng Street, Dongtou District,
Wenzhou City, Zhejiang Province, China
Website: www.usfull.com
E-mail: fullwill@usfull.com