# Contents

# Chapter 1 Safety Information and Precautions

## 1.1 Electrical Safety

Extreme care must be taken at all times when working with the inverter or within the area of the inverter. The voltages used in the inverter can cause severe electrical shock or burns and is potentially lethal. Only authorized and qualified personnel should be allowed to work on inverter.

## 1.2 Machine/System Design and Safety of Personnel

- Machine/system design, installation, commissioning startups and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and the contents of this manual. If incorrectly installed, the inverter may present a safety hazard.
- The inverter uses high voltages and currents, carries a high level of stored electrical energy in the DC bus capacitors even after power OFF. These high voltages are potentially lethal.
- The inverter is NOT intended to be used for safety related applications/functions. The electronic "STOP & START" control circuits within the inverter must not be relied upon for the safety of personnel. Such control circuits do not isolate mains power voltages from the output of the inverter. The mains power supply must bedisconnected by a electrical safety isolation device before accessing the internal parts of the inverter.
- Safety risk assessments of the machine or process system which uses an inverter must be undertaken by the user and or by their systems integrator/designer. In particular the safety assessment/design must take into consideration the consequences of the inverter failing or tripping out during normal operation and whether this leads to a safe stop position without damaging machine, adjacent equipment and machine operators/users. This responsibility lies with the user or their machine/process system integrator.

## 1.3 Working Environment and Handling

Matters related to transport, storage, installation, IP rating, working environment and inverter tolerance limits (temperature, ambient, voltage, pollution, vibration etc) can be found within this manual. The guidelines and recommendations should be followed in order to gain long term trouble free operation as the lifetime of the inverter is dependent on the working environment and correct handling of the product in the initial installation stage.

## 1.4 Electrical Installation - Safety

- Mains power supply isolation switch should be fitted to the inverter. The mains power supply must be disconnected via the isolation switch before any cover of the inverter can be removed or before any servicing work is undertaken.
- Stored charge in the DC bus capacitors of the inverter is potentially lethal after the mains power has been disconnected. The mains power must be isolated at least 10 minutes before any work can be undertaken as the stored charge will have been discharged through the internal bleed resistor fitted across the DC bus capacitors. .
- Power wire, motor wire and control wire should be all connected firmly. Earth must be reliable and earth resistance must be lower than 10Ω；
- Human body electrostatic will damage inner sensitive components seriously. Before operation, please follow ESD measures. Otherwise, there is danger of inverter damage；
- Inverter output voltage is pulse wave. If components such as capacitor which improves power factor and

pressure-sensitive resistance for anti-thunder and so on are installed at the output side, please dismantle them；

- No switch components such as breaker and contactor at the output side (If there must be one, please make sure the output current is 0 while the switch acting)；
- No matter where the fault is, there is danger of serious accident. So there must be additional external prevent measures or other safety devices；
- Only used in application fields as maker stated. No use in equipments related to special fields such as emergency, succor, ship, medical treatment, aviation, nuclear and etc；

## 1.5 Before Use

On receiving your order, please check the package and confirm intact before opening, and check if there's any damage, scratch or dirt (damages caused during transportation are not within the company's warranty). If there's any damage caused during transportation, please contact us or the transport company immediately. After confirming the receipt of the goods intact, please re-confirm if the product and your order are consistent.

# Chapter 2 Product Information

## 2.1 Naming rules and rated parameters

PV210 - 4T - 7.5G (H)

① ② ③ ④ ⑤

| Field | Identification | Label description |
|---|---|---|
| Drivers series | ① | PV210 series Solar photovoltaic water pump inverter |
| Voltage level | ② | 1T:DC60V—DC400V, Suitable for driving pumps with 110VAC<br>2T:DC60V—DC450V, Suitable for driving pumps with 220VAC<br>4T:DC200V—DC800V, Suitable for driving pumps with 380VAC |
| Adaptive motor power | ③ | 0.75:0.75KW 1.5:1.5KW 2.2:2.2KW<br>3.7: 3.7KW 5.5:5.5KW 7.5:7.5KW |
| Inverter type | ④ | G:Type G machine |
| Suffix | ⑤ | 2T:Support up to 500V input<br>4T:Support up to 900V input |

## 2.2 Specification and rated parameters

| SN | Models | Output current(A) | Output frequency range | Applicable for pumps |
|---|---|---|---|---|
| **1T type: 60V DC to 400V DC input , Output:3-phase 110 ~ 230VAC, suitable for AC110 pump** | | | | |
| 1 | PV210-1T-0.75G | 7A | 0~600Hz | 0.75KW |
| 2 | PV210-1T-1.5G | 10A | 0~600Hz | 1.5KW |
| 3 | PV210-1T-2.2G | 16A | 0~600Hz | 2.2KW |
| **2T type: 60V DC to 450V DC input (With suffix "H" support up to 500V input ), output:3-phase 220 ~ 240VAC, suitable for AC220 pump** | | | | |
| 4 | PV210-2T-0.75G | 4A | 0~600Hz | 0.75KW |
| 5 | PV210-2T-1.5G | 7A | 0~600Hz | 1.5KW |
| 6 | PV210-2T-2.2G | 10A | 0~600Hz | 2.2KW |
| 7 | PV210-2T-3.7G | 16A | 0~600Hz | 3.7KW |
| **4T type: 200V DC to 800V DC input (With suffix "H" support up to 900V input), output:3-phase 230 ~ 460VAC,suitable for AC380 pump** | | | | |
| 8 | PV210-4T-3.7G | 10A | 0~600Hz | 3.7KW |
| 9 | PV210-4T-5.5G | 14A | 0~600Hz | 5.5KW |
| 10 | PV210-4T-7.5G | 18A | 0~600Hz | 7.5KW |

## 2.3 Technical specifications

| Item | | Specification |
|---|---|---|
| **Power input** | Voltage | 1T: 60V DC to 400V DC<br>2T: 60V DC to 500V DC<br>4T: 200V DC to 900V DC |
| **Power output** | Adaptive motor type | Three-phase asynchronous motor, permanent magnet synchronous motor |
| | MPPT efficiency | maximal efficiency ≥99% |
| | Output voltage | 1T:3-phase 110 ~ 230VAC<br>2T:3-phase 220 ~ 240VAC<br>4T:3-phase 230 ~ 460VAC<br>inaccuracy<5% |
| | Output frequency | 0～600Hz;unit:0.01Hz |
| | Overload capacity | G type: 150% rated current/1 min, 180% rated current/10s, 200% rated current/0.5s |
| **Main control performance** | Motor control mode | V/F without PG , VC without PG , MPPT |
| | Speed control range | Vector control without PG, rated load 1:100 |
| | Steady speed | VC without PG: ≤2% rated synchronized speed |
| | Starting torque | VC without PG: when 0.5Hz, 150% rated torque |
| | Torque response | VC without PG: ≤20ms; |
| **Product basic functions** | Torque boost capacity | Auto torque upgrade 0.0%～100.0%;<br>Manual torque upgrade 0.0%～30.0% |
| | V/F curve | 4 modes: one linearity torque characteristic curve ,one self-setting V/F curve mode, one drop torque characteristic curve (1.1- 2.0 powers),and square V/F curve mode. |
| | Acceleration /Deceleration curve | 2 modes: linear Acceleration/Deceleration and S curve Acceleration/Deceleration. |
| | Rated output voltage | Rely on power supply voltage compensate function, while motor rated voltage is 100%, set it at the range of 50-100%(output can not over input voltage). |
| | Auto energy-saving running | While under V/F control mode, according to load situation, auto-optimize output voltage to save energy. |
| | Standard functions | PID control, speed track, power off restart, jump frequency, upper/lower frequency limit control, program operation, multi- speed, RS485. |
| | Frequency setting channels | Keyboard digital setting, keyboard potentiometer , Communication given. |
| | Running command channel | External Keyboard given、DI terminal given, communication given |
| | Input command signal | Start, stop, FWD/REV, JOG, multi-step speed, reset, ACC/DEC time selection, frequency given channel selection, exterior fault alarm. |
| **Protective function** | | Overvoltage, under-voltage, current limit, over-current, overload, electric thermal relay, overheat, overvoltage stall, data protection, rapid speed protection, output phase failure protection. |
| **Environment** | Install place | altitude ≤ 1000m,above 1000m down the rated amount, each increase of 100m down the rated mount of 1%;no condensation, ice ,rain, snow, hail; solar radiation below 700W/㎡, air pressure 70-106 kPa. |
| | Temperature, humidity | -10 ～ + 50 ℃, derating above 40 ℃, maximum temperature 60 ℃ (no-load operation)5% to 95% RH (non-condensing) |
| | Storage temperature | -20 ～+60℃ |

| Item | | Specification |
|---|---|---|
| | Protection grade | IP00 |
| | Cooling method | Natural cooling/Forced air cooling |

# Chapter 3 Installation and Wiring

In order to ensure the safe use of the product by the user, maximize the performance of the inverter, and ensure the reliable operation of the inverter, please use this product strictly in accordance with the environmental, wiring, and ventilation requirements described in this chapter.

## 3.1 Control Terminal Specification

### 3.1.1 Schematic diagram of board layout

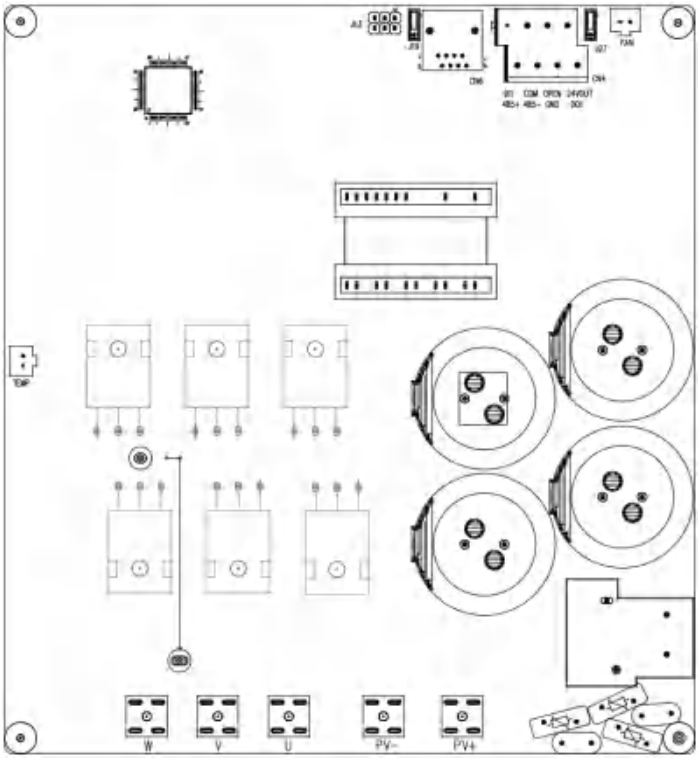



Fig. 3.1-1 Schematic diagram of the board layout

### 3.1.2 Function description of the control terminals

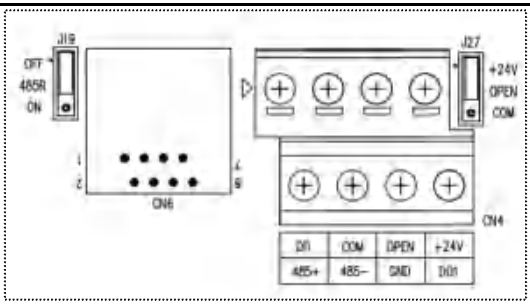
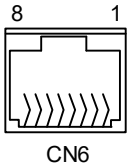



Fig. 3.1-2 Control terminals of the board layout

| Type | Terminal | Terminal name | Terminal function definition |
|---|---|---|---|
| **Power** | +24V-COM | External 24V power supply | Provide + 24 V power supply to the outside, and the maximum output is 200mA,Isolated from GND interiorly. |
| **Digital input** | DI1-COM | Digital input terminal | 1.Optical coupling isolation, compatible with bipolar input, internal impedance 3.6 kΩ .<br>2.Multi-function digital input, through F5-00 to set the function. Inverter default for the internal supply of +24V power, COM for the common end.<br>3.When the external power supply is used, the cable connection mode see Figure 3.2-3 and 3.2-5. The voltage range of the external power supply is +24V±10%. |
| **Digital output** | DO1 | Digital output terminal | Open collector output, programmable action object, maximum output DC24V / 50mA |

### 3.1.3 Communication interface

The RJ45 communication interface includes RS485 of standard Modbus communication and reserved external keyboard. The specific signal definition is as follows:




CN6

| Pin | Name | Description |
|---|---|---|
| 1、2 | GND | Power reference ground |
| 3、4 | +5V | +5V power supply |
| 5 | RS485- | RS485(MODBUS communication protocol) |
| 7 | RS485+ | |
| 6 | 485- | External Keyboard 485 communication (reserved) |
| 8 | 485+ | |

### 3.1.4 Description of connection function of conversion terminal

**Function diagram and description of transfer switch**

| Tag number | Wiring Diagrams | Choose location | Function Description |
|---|---|---|---|
| J27 |  | 24V the port | When the OPEN terminal is connected to 24V, the DI and COM short input are valid. Can also use the NPN input type (Factory default). |
| |  | COM the port | When dial this end, the OPEN terminal is connected to COM. In this case, the DI and 24V short input are valid. PNP input type is also supported. |
| J19 |  | OFF | Disconnect RS485 communication terminal resistance (Factory default). |
| |  | ON | RS485 communication terminal resistance is connected. |

## 3.2 Wiring mode of Electric.al circuit

### 3.2.1 Wiring Diagram

The wiring mode of the control circuit of the frequency converter is shown in the figure on the following page:

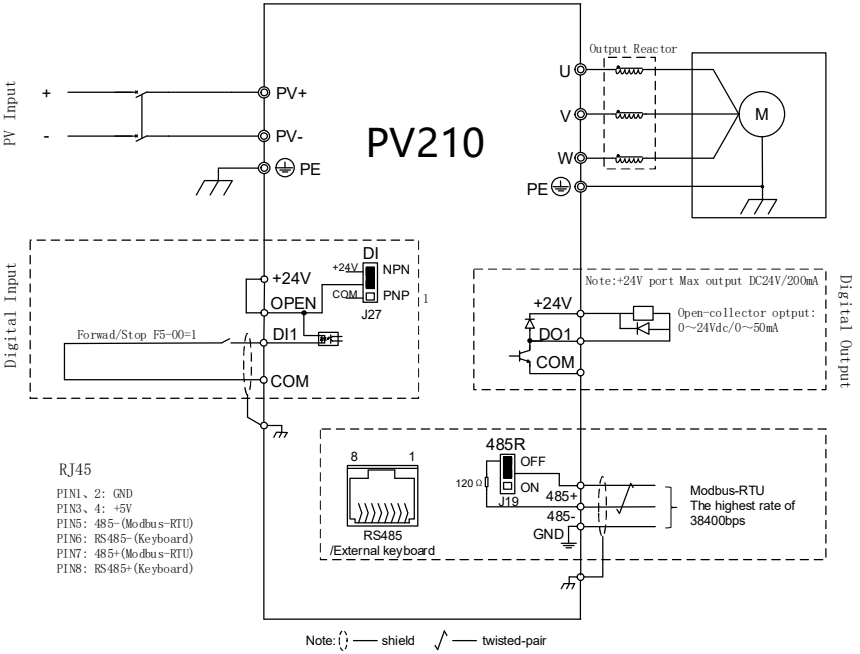



Fig. 3.2-1 Wiring diagram

**Notice:**

① Terminal ◎ Indicates the main loop terminal, ○ indicates the control loop terminal;

② Signal cables and power cables must be routed separately, and the control cables and power cables should be crossed at a 90-degree Angle as far as possible.The analog signal line reference diagram describes the selection of linear, power cable is the best choice of shielded three core cable.

#### 3.2.2 Multi function contact input connection

Multifunctional digital input terminals support NPN or PNP connection type. DI1 terminal is flexibly connected to external devices. You can select the NPN or PNP mode through the jump cap at J27 on the control board (the factory default mode is NPN).

Connection mode of NPN characteristic transistor:

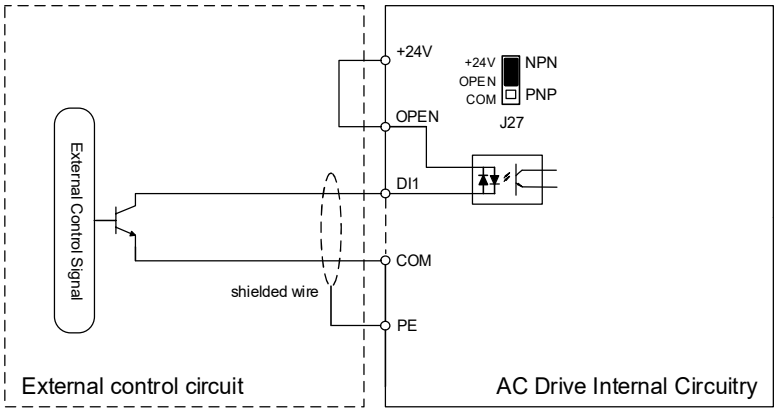



Fig. 3.2-2 NPN mode Uses the internal power supply

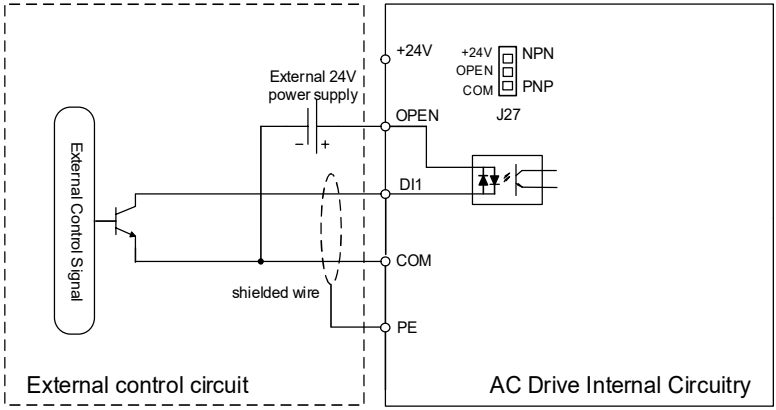



Fig. 3.2-3 NPN mode Uses external power supplies

Precautions:

If the external power supply is connected in NPN mode, remove the jump cap in position J27.

Connection mode of PNP characteristic transistor:

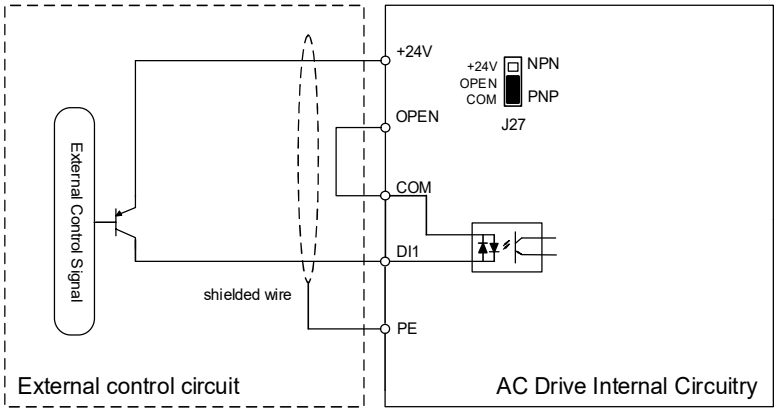



Fig. 3.2-4 PNP mode uses an internal power supply

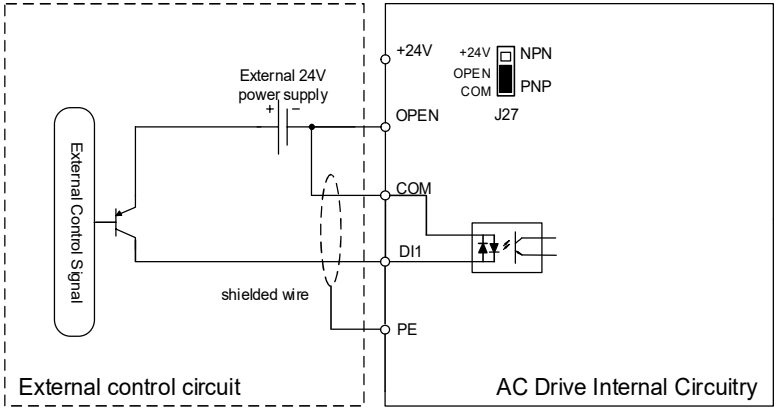
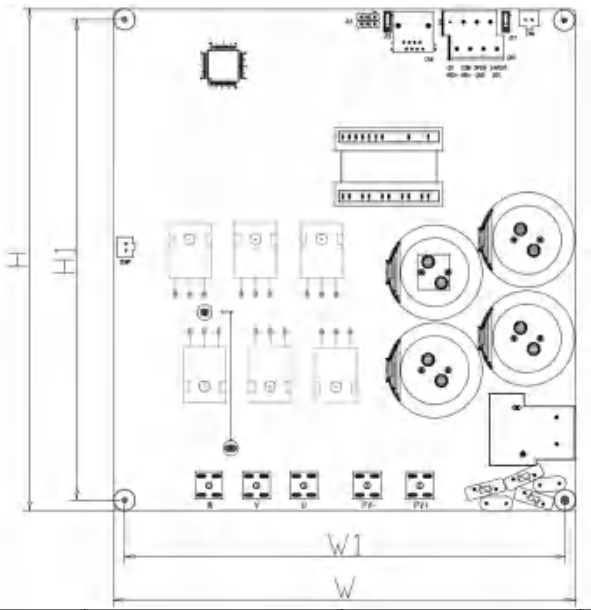



Fig. 3.2-5 PNP mode uses an external power supply

## 3.3 Product dimensions




| Inverter model | External dimensions (mm) | | Installation dimensions (mm) | | Mounting aperture |
|---|---|---|---|---|---|
| | W | H | W1 | H1 | |
| PV210-1T-0.75G | 140 | 130 | 132 | 122 | 4-Φ3.5 |
| PV210-1T-1.5G | | | | | |
| PV210-1T-2.2G | 175 | 190 | 167 | 182 | |
| PV210-2T-0.75G(H) | 140 | 130 | 132 | 122 | |
| PV210-2T-1.5G(H) | | | | | |
| PV210-2T-2.2G(H) | | | | | |
| PV210-2T-3.7G(H) | 175 | 190 | 167 | 182 | |
| PV210-4T-3.7G(H) | 145 | 148 | 137 | 140 | |
| PV210-4T-5.5G(H) | 175 | 190 | 167 | 182 | |
| PV210-4T-7.5G(H) | | | | | |

**Notice:**

① 1T-1.5G and below power section, 2T-2.2G and below power section and 4T-3.7G machine wiring should be equipped with type 6.3 spring female spade terminal;

② For other power segment models, circular cold pressure OT 4-6 terminal wiring is recommended to ensure reliability.

# Chapter 4 Keyboard Operation Instructions

## 4.1 Operation of Dual-line display LED control panel

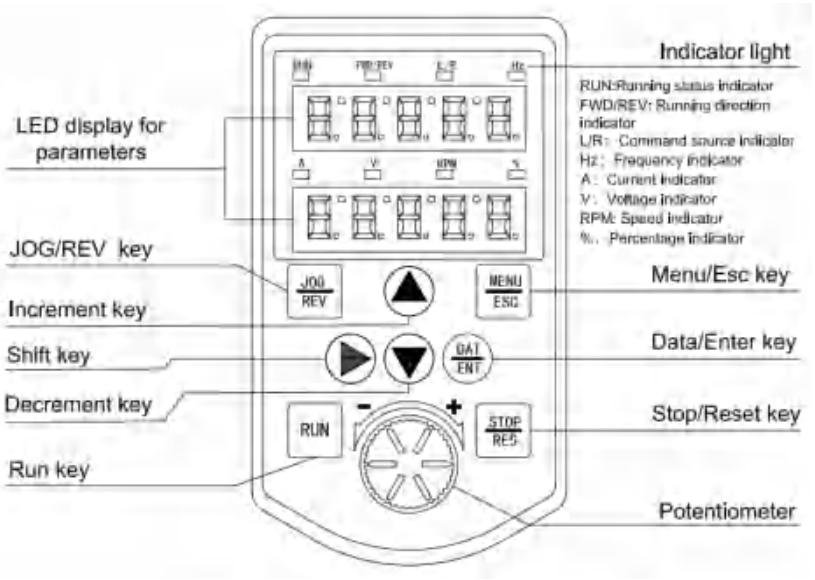



Fig. 4.1-1 Dual-line display LED control panel layout and instructions

### 4.1.1 Key function

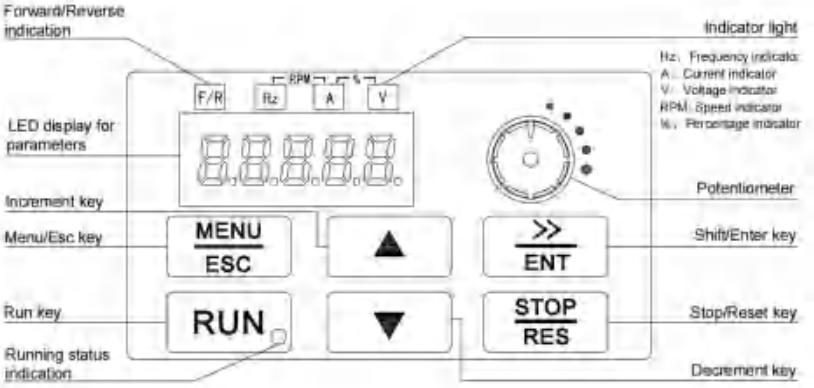
| Symbol | Key name | Meaning |
|---|---|---|
| | JOG/REV | Perform a function switchover as defined by the setting of F7-07 |
| | MENU/ESC | Enter or exit Level 1 menu.<br>Return to the previous menu. |
| | Increment | When navigating a menu, it moves the selection up through the screens available.<br>When editing a parameter value, it increases the displayed value.<br>When inverter is in RUN mode, it increases the speed. |
| | Decrement | When navigating a menu, it moves the selection down through the screens available.<br>When editing a parameter value, it decreases the displayed value.<br>When the inverter is in RUNNING mode, it decreases the speed. |

| Symbol | Key name | Meaning |
|---|---|---|
|  | Shift | Select the displayed parameter in the STOP or RUNNING status.<br>Select the digit to be modified when modifying a parameter value. |
|  | DAT/ENT | Enter each level of menu interface.<br>Confirm displayed parameter setting. |
|  | Potentiometer | Clockwise rotation increases the operation value, and<br>counterclockwise rotation decreases the operation value. |
|  | RUN | Start the inverter when using the operating panel control mode.<br>It is inactive when using the terminal or communication control<br>mode. |
|  | STOP/RES | Stop the inverter when the drive is in the RUNNING status.<br>Perform a reset operation when the drive is in the FAULT status. |

### 4.1.2 Indicator light description

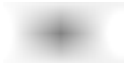
| Status Indicators | Indication |
|---|---|
| RUN | ON indicates the RUNNING status.<br>OFF indicates the STOP status. |
| FWD/REV | ON indicates forward motor rotation.<br>OFF indicates reverse motor rotation. |
| L/R | ON indicates under terminal control.<br>OFF indicates under operating panel control.<br>FLASHING indicates under serial communication control. |
| Hz | Hz for frequency |
| A | A for current |
| V | V for voltage |
| RPM | RPM for motor speed |
| % | Percentage |

## 4.2 Operation of Single-line display LED control panel




### 4.2.1 Key Functions on Control Panel

| Symbol | Key name | Meaning |
|---|---|---|
| | MENU/ESC | 1) Enter or exit Level 1 menu.<br>2) Return to the previous menu. |
| | Increment | 1) When navigating a menu, it moves the selection up through the screens available.<br>2) When editing a parameter value, it increases the displayed value.<br>3) When the Inverter is in RUNNING mode, it increases the speed. |
| | Decrement | 1) When navigating a menu, it moves the selection down through the screens available.<br>2) When editing a parameter value, it decreases the displayed value.<br>3) When the Inverter is in RUNNING mode, it decreases the speed. |
| | Shift/Enter | 1) In the stop display interface and the operation display interface, you can select the display parameters. When modifying the parameters, you can select the modification bit of the parameters. Long time (≥1s), you can enter the menu interface step by step, set parameters to confirm. |

| Symbol | Key name | Meaning |
|---|---|---|
|  | RUN | Start the Inverter when using the operating panel control mode.<br>It is inactive when using the terminal or communication control mode. |
|  | STOP/RES | 1) Stop the Inverter when the drive is in the RUNNING status.<br>2) Perform a reset operation when the drive is in the FAULT status. |
|  | Potentiometer | A clockwise rotation increases the operation value and a counterclockwise rotation decreases the operation value. |

### 4.1.2 Status Indicators

| Status Indicators | Display light name | Indication |
|---|---|---|
| RUN | Running status indication | ON indicates the RUNNING status.<br>OFF indicates the STOP status.<br>Blinking indicates the fault alarm state. |
| F/R | Forward/Reverse indication | ON indicates forward motor rotation.<br>OFF indicates reverse motor rotation.<br>Blinking indicates the forward/reverse switchover status. |
| Hz | Frequency indication | Hz for frequency |
| A | Current indication | A for current |
| V | Voltage indication | V for voltage |
| Hz+A | Rotation speed indication | The current displayed parameter is speed, unit: RPM |
| A+V | Percentage indication | The displayed parameter is percentage (unit: %) |

# Chapter 5 Function Parameter Table

This chapter just provides function parameter table.

## 5.1 Description of the meanings in the function code parameter brief table

"●": Parameter can be changed in the running state.

"○": Parameter can't be changed in the running state.

"×": Parameter can be read only.

"–": Factory setting parameter, only factory can set.

"※": Parameter is related to the model.

## 5.2 Basic parameters

| NO. | Function description | Factory default | Range of settings and definition | Fea ture | Address |
|---|---|---|---|---|---|
| F0-00 | Rated current | | | ○ | 0x000 |
| F0-01 | Motor control mode | 0 | 0: VF Control (AM)<br>1: No PG vector control (AM)<br>~~2: With PG vector control (AM)~~<br>3: No PG vector control (FM)<br>~~4: With PG vector control (FM)~~<br>5: VF separation control (AM)<br>6: 3-line Single-Phase Control (AM) | ○ | 0x001 |
| F0-02 | Run command channel | 0 | 0: Keyboard control 1: Terminal control<br>2: RS485 communication control ~~3: Optional card~~ | ○ | 0x002 |
| F0-03 | Main Frequency reference source A | 0 | 0: Keyboard number given<br>1: potentiometer of keyboard given<br>2: Voltage/Current analog AI1 given<br>3: Voltage/Current analog AI2 given(Expansion card reserved)<br>4: Terminal pulse HDI given(Expansion card reserved)<br>5: RS485 communication given<br>6: Terminal UP/DW control<br>7: PID control given<br>8: Program control (PLC) given<br>9: Multi-steps speed given<br>10: Optional card | ● | 0x003 |
| F0-04 | Auxiliary Frequency reference source B | 1 | | ● | 0x004 |
| F0-05 | The reference source selection of auxiliary frequency source B | 0 | 0: Max. output frequency as reference source<br>1: Set frequency of channel A as reference source | ● | 0x005 |
| F0-06 | Frequency given source selection | 0 | 0: Main Frequency reference source A<br>1: Auxiliary Frequency reference source B<br>2: A+B<br>3: A-B<br>4: Max. value of A and B<br>5: Min. value of A and B | ● | 0x006 |

| | | | | | |
|---|---|---|---|---|---|
| F0-07 | Running Command Binding | 0000 | **Unit:** keyboard command instruction binding<br>**Tens:** terminal command instruction binding<br>**Hundreds**: communication command instruction binding<br>**Thousands**: optional card command instruction binding<br>0: no binding<br>1: keyboard number given frequency<br>2: Potentiometer of keyboard given<br>3: Voltage/Current analog AI1 given<br>4:Voltage/Current analog AI2 given(Expansion card reserved)<br>5:Terminal pulse HDI given(Expansion card reserved)<br>6:RS485 communication given<br>7: Terminal UP/DW control<br>8: PID control given<br>9: Program control (PLC) given<br>A: Multi-steps speed given<br>B: Optional card | ● | 0x007 |
| F0-08 | Keyboard digital setting frequency | 50.00Hz | 0～upper limit | ● | 0x008 |
| F0-09 | Max frequency output | 50.00Hz | upper limit～600.00Hz | ○ | 0x009 |
| F0-10 | Upper limit frequency source selection | 0 | 0: Upper limit frequency digital given<br>1: potentiometer of keyboard given<br>2: Voltage/Current analog AI1 given<br>3: Voltage/Current analog AI2 given(Expansion card reserved)<br>4: Terminal pulse HDI given(Expansion card reserved)<br>5: RS485 communication given<br>6: Optional card | ● | 0x00A |
| F0-11 | Upper frequency limit digital setting | 50.00Hz | Lower limit frequency～max frequency | ● | 0x00B |
| F0-12 | Lower limit frequency | 0.00Hz | 0.00～upper limit frequency | ● | 0x00C |
| F0-13 | Lower limit frequency running mode | 1 | 0: Stop output<br>1: Run at lower limit frequency | ○ | 0x00D |
| F0-14 | ACC time 0 | Model set | 0.01～650.00s | ※ | 0x00E |
| F0-15 | DEC time 0 | Model set | | ※ | 0x00F |
| F0-16 | Rotary direction selection | 0000 | **Unit: running direction takes the opposite**<br>0: Direction unchanged<br>1: Direction takes the opposite<br>**Tens:running direction prohibited**<br>0: Forward and reverse commands are allowed<br>1: Only FWD command allowed<br>2: Only REV command allowed<br>**Hundreds: frequency control direction selection**<br>0: Invalid 1: Valid<br>**Thousands: torque control direction selection**<br>0: Invalid 1: Valid | ○ | 0x010 |
| F0-17 | PWM carrier frequency | Model set | 0.7～16.0kHz | ※ | |

| | | | | | |
|---|---|---|---|---|---|
| F0-18 | PWM control mode | 1111 | **Unit: carrier associated with temperature**<br>0: Temperature independent<br>1: Temperature dependent<br>**Tens:carrier associated with output frequency**<br>0:not associated 1: associated<br>**Hundreds: random PWM valid**<br>0: Prohibited 1: Valid<br>**Thousands: PWM modulation mode**<br>0: Only use three-phase modulation<br>1: Two-phase and three-phase modulation automatically switched | ● | |
| F0-19 | Parameter initialization | 0 | 0: No action<br>1: Restore factory default (not restoring motor parameters)<br>2: Restore factory default (restoring motor parameters)<br>3: Clear malfunction records | | 0x013 |

**F1 Start-stop control parameter group**

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F1-00 | Start-up running mode | 0 | 0: Start by start-up frequency<br>1: DC injection at first then start by start-up frequency<br>2: Speed tracking, and judge the direction then start | ○ | 0x100 |
| F1-01 | Start pre-excitation time | 0.00s | 0.00～60.00s | ○ | 0x101 |
| F1-02 | Start-up frequency | 0.50Hz | 0.00～60.00Hz | ○ | 0x102 |
| F1-03 | Start-up frequency holding time | 0.0s | 0.0～50.0s | ○ | 0x103 |
| F1-04 | DC injection current before start | 60.0% | 0.0～150.0% | ○ | 0x104 |
| F1-05 | DC injection time before start | 0.0s | 0.0～60.0s | ○ | 0x105 |
| F1-06 | Speed tracking time | 0.50s | 0.00～60.00s | ○ | 0x106 |
| F1-07 | Speed tracking delay when stop | 1.00s | 0.00～60.00s | ○ | 0x107 |
| F1-08 | Speed tracking Mode | 0010 | **Unit: The frequency selection of Speed tracking**<br>0:Speed tracking from Max. Output frequency<br>1:Speed tracking from stop Output frequency<br>**Tens :The direction selection of Speed tracking**<br>0:bidirectional 1:Unidirectional | ○ | 0x108 |
| F1-09 | Reserved | --- | --- | ○ | 0x109 |
| F1-10 | Stop mode | 0 | 0:DEC stop 1:Free stop | ○ | 0x10A |
| F1-11 | DC braking initial frequency when stop | 1.00Hz | 0.00～50.00Hz | ○ | 0x10B |
| F1-12 | DC braking current | 60.0% | 0.0～150.0% | | 0x10C |
| F1-13 | DC braking hold time when stop | 0.0s | 0.0～60.0s | ○ | 0x10D |
| F1-14 | Stop detection frequency | 0.50Hz | 0.00～50.00Hz | ● | 0x10E |
| F1-15 | Reserved | --- | --- | --- | 0x10F |

| | | | | | |
|---|---|---|---|---|---|
| F1-16 | ACC/DEC selection | 0010 | **Unit: time base selection**<br>0: max frequency<br>1: fixed frequency 50Hz 2: set frequency<br>**Tens:S ACC/DEC selection**<br>0: Beeline ACC/DEC 1: S Curve ACC/DEC<br>**Hundreds &Thousands: reserved** | ○ | 0x110 |
| F1-17 | ACC start time for S curve | 0.10s | 0.00～10.00 | ○ | 0x111 |
| F1-18 | ACC end time for S curve | 0.10s | 0.00～10.00 | ○ | 0x112 |
| F1-19 | DEC start time for S curve | 0.10s | 0.00～10.00 | ○ | 0x113 |
| F1-20 | DEC end time for S curve | 0.10s | 0.00～10.00 | ○ | 0x114 |
| F1-21 | ACC time 1 | 10.00s | 0.01～650.00s | ● | 0x115 |
| F1-22 | DEC time 1 | 10.00s | 0.01～650.00s | ● | 0x116 |
| F1-23 | ACC time 2 | 10.00s | 0.01～650.00s | ● | 0x117 |
| F1-24 | DEC time 2 | 10.00s | 0.01～650.00s | ● | 0x118 |
| F1-25 | ACC time 3 | 10.00s | 0.01～650.00s | ● | 0x119 |
| F1-26 | DEC time 3 | 10.00s | 0.01～650.00s | ● | 0x11A |
| F1-27 | DEC time at emergency stop | 1.00s | 0.01～650.00s | ● | 0x11B |
| F1-28 | FWD&REV dead time | 0.0s | 0.0～120.0s | ○ | 0x11C |
| F1-29 | Zero speed torque frequency threshold | 0.50Hz | 0.00～10.00Hz | ● | 0x11D |
| F1-30 | Zero speed torque coefficient | 60.0% | 0.0～150.0% | ● | 0x11E |
| F1-31 | Zero speed torque holding time | 0 | 0.0～6000.0s<br>If set 6000.0S,always hold without time limit | ● | 0x11F |
| F1-32～F1-34 | | Reserved | | | |
| F1-35 | Power off restart action selection | 0 | 0:Invalid 1:Valid | ○ | 0x123 |
| F1-36 | Power off restart waiting time | 0.50s | 0.00～60.00s | ○ | 0x124 |
| F1-37 | JOG running curve setting | 1 | 0:S curve 1:Beeline | ○ | 0x125 |
| F1-38 | JOG running frequency setting | 5.00Hz | 0.00～Max frequency | ● | 0x126 |
| F1-39 | JOG ACC time | 10.00s | 0.01～650.00s | ● | 0x127 |
| F1-40 | JOG DEC time | 10.00s | 0.01～650.00s | ● | 0x128 |

## F2 Motor parameter group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F2-00 | Motor mode | 0 | 0: Asynchronous motors (AM)<br>1: Permanent magnet synchronous motors (PM) | × | 0x200 |
| F2-01 | Number of motor poles | 4 | 2～98 | ○ | 0x201 |

| | | | | | |
|---|---|---|---|---|---|
| F2-02 | Motor rated power | Model set | 0.1～1000.0kW | ※ | 0x202 |
| F2-03 | Motor rated frequency | Model set | 0.01～max frequency | ※ | 0x203 |
| F2-04 | Motor rated speed | Model set | 1～65000rpm | ※ | 0x204 |
| F2-05 | Motor rated voltage | Model set | 0～1500V | ※ | 0x205 |
| F2-06 | Motor rated current | Model set | 0.1～2000.0A | ※ | 0x206 |
| F2-07 | Asynchronous motor no-load current | Model set | 0.1～650.0A | ※ | 0x207 |
| F2-08 | Asynchronous motor stator resistance | Model set | 0.01～50.00% | ※ | 0x208 |
| F2-09 | Asynchronous motor rotor resistance | Model set | 0.01～50.00% | ※ | 0x209 |
| F2-10 | Asynchronous motor stator leakage inductance | Model set | 0.01～50.00% | ※ | 0x20A |
| F2-11 | Asynchronous motor stator inductance | Model set | 0.1～2000.0% | ※ | 0x20B |
| F2-12 | Synchronous motor stator resistance | Model set | 0.01～50.00% | ※ | 0x20C |
| F2-13 | Synchronous motor D-axis inductance | Model set | 0.01～200.00% | ※ | 0x20D |
| F2-14 | Synchronous motor Q-axis inductance | Model set | 0.01～200.00% | ※ | 0x20E |
| F2-15 | Synchronous motor with a reverse electromotive force | Model set | 1～1500V | ※ | 0x20F |
| F2-16 | Synchronous motor encoder installation angle | Model set | 0.0° ～360.00° | ※ | 0x210 |
| F2-20 | Motor parameters self-adjustment selections | 0 | 0: No operation<br>1: Rotary type self-tuning<br>2: Static type self-tuning<br>3: Stator resistance self-tuning | ○ | 0x214 |
| F2-21 | Synchronous machine poles searching function | 0010 | **Unit: closed-loop vector**<br>0: OFF<br>1: ON<br>2: On, only operate firstly when electrify<br>**Tens: open-loop vector**<br>0: OFF<br>1: ON<br>2: ON, only operate firstly when electrify | ○ | 0x215 |
| F2-30 | Speed feedback or encoder mode | 0000 | **Unit: encoder mode**<br>0: Common ABZ encoder<br>1: Resolver encoder<br>**Tens: encoder direction**<br>0: same direction<br>1: reverse direction<br>**Hundreds: wire break inspection**<br>0: OFF<br>1: ON<br>**Thousands:Z pulse correction enabled**<br>0: OFF<br>1: ON | ○ | 0x21E |
| F2-31 | ABZ encoder lines | 1024 | 1 | ○ | 0x21F |
| F2-32 | Wire break inspection time | 2.000s | 0.100～60.000s | ● | 0x220 |
| F2-33 | Resolver encoder poles | 2 | 2～128 | ○ | 0x221 |

| | | | | | |
|---|---|---|---|---|---|
| F2-36 | First-order filter of encoder speed inspection | 1.0ms | 0.0～100.0ms | ● | 0x224 |

## F3 Vector control parameter group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F3-00 | ASR(speed loop) proportional gain 1 | 10.00 | 0.01～100.00 | ● | 0x300 |
| F3-01 | ASR integral time 1 | 0.200s | 0.000～6.000s | ● | 0x301 |
| F3-02 | ASR filter time1 | 0.0ms | 0.0～100.0ms | ● | 0x302 |
| F3-03 | ASR switch frequency 1 | 0.00Hz | [F3-07]～Max frequency | ● | 0x303 |
| F3-04 | ASR (speed loop) proportional gain 2 | 10.00 | 0.01～100.00 | ● | 0x304 |
| F3-05 | ASR (speed loop) integral time 2 | 0.200s | 0.000～6.000s | ● | 0x305 |
| F3-06 | ASR filter time 2 | 0.0ms | 0.0～100.0ms | ● | 0x306 |
| F3-07 | ASR switch frequency 2 | 0.00Hz | 0.00～[F3-03] | ● | 0x307 |
| F3-08 | Electric motor torque limit | 250.0% | 0.0～400.0% | ● | 0x308 |
| F3-09 | Power generation torque limit | 250.0% | 0.0～400.0% | ● | 0x309 |
| F3-10 | Current loop D-axis proportional gain | 1.000 | 0.001～4.000 | ● | 0x30A |
| F3-11 | Current loop D-axis integral gain | 1.000 | 0.001～4.000 | ● | 0x30B |
| F3-12 | Current loop Q-axis proportional gain | 1.000 | 0.001～4.000 | ● | 0x30C |
| F3-13 | Current loop Q-axis integral gain | 1.000 | 0.001～4.000 | ● | 0x30D |
| F3-15 | Vector control motor slip compensation | 100.0% | 0.0～250.0% | ● | 0x30F |
| F3-16 | Vector control start torque | 0.0% | 0.0～250.0% | | 0x310 |
| F3-17 | Reserved | --- | --- | | 0x311 |
| F3-18 | Over excitation braking gain | 100.0% | 0.0～500.0% | ● | 0x312 |
| F3-19 | Over excitation braking | 100.0% | 0.0～250.0% | ● | 0x313 |
| F3-20 | Motor constant power area power limit | 250.0% | 0.0～400.0% | ● | 0x314 |
| F3-21 | Motor weak magnetic current upper limit | 60.0% | 0.0～250.0% | ● | 0x315 |
| F3-22 | Motor weak magnetic feed forward gain | 10.0% | 0.0～200.0% | ● | 0x316 |
| F3-23 | Motor weak magnetic gain | 10.0% | 0.0～500.0% | ● | 0x317 |
| F3-24 | Motor weak magnetic voltage coefficient | 97.0% | 0.0～120.0% | ● | 0x318 |
| F3-25 | Low frequency pull in current | 10.0% | 0.0～50.0% | ● | 0x319 |
| F3-26 | High frequency pull in current | 10.0% | 0.0～50.0% | ● | 0x31A |
| F3-27 | Frequency of current pulled in | 10.0% | 0.0～100.0% | ● | 0x31B |

| | | | | | |
|---|---|---|---|---|---|
| F3-28 | Vector control energy saving function | 0 | 0:OFF 1:ON | ● | 0x31C |
| F3-29 | Energy saving control gain | 50.0% | 0.0～80.0% | ● | 0x31D |
| F3-30 | Energy saving control low-pass filter | 0.010s | 0.000～6.000s | ● | 0x31E |
| F3-32 | MTPA gain | 100.0% | 0.0～400.0% | ● | 0x320 |
| F3-33 | MTPA filter time | 1.0ms | 0.0～100.0ms | ● | 0x321 |

## F4 V/F control parameter group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F4-00 | Linear V/F curve selection | 0 | 0: Beeline VF curve<br>1-9: 1.1-1.9 power VF curve<br>10: square VF curve<br>11: Multi-point V / F (F4-01～F4-10); | ○ | 0x40 |
| F4-01 | V / F voltage V1 | 3.0% | 0.0～100.0% | ○ | 0x401 |
| F4-02 | V / F frequency F1 | 1.00Hz | 0.00～max frequency | ○ | 0x402 |
| F4-03 | V / F voltage V2 | 28.0% | 0.0～100.0% | ○ | 0x403 |
| F4-04 | V / F frequency F2 | 10.00Hz | 0.00～max frequency | ○ | 0x404 |
| F4-05 | V / F voltage V3 | 55.0% | 0.0～100.0% | ○ | 0x405 |
| F4-06 | V / F frequency F3 | 25.00Hz | 0.00～max frequency | ○ | 0x406 |
| F4-07 | V / F voltage V4 | 78.0% | 0.0～100.0% | ○ | 0x407 |
| F4-08 | V / F frequency F4 | 37.50Hz | 0.00～max frequency | ○ | 0x408 |
| F4-09 | V / F voltage V5 | 100.0% | 0.0～100.0% | ○ | 0x409 |
| F4-10 | V / F frequency F5 | 50.00Hz | 0.00～max frequency | ○ | 0x40A |
| F4-11 | Output voltage percentage | 100.0% | 25.0～120.0% | ○ | 0x40B |
| F4-12 | Torque boost | 0.0% | 0.0～30.0% | ● | 0x40C |
| F4-13 | Torque boost cut-off frequency | 100.0% | 0.0～100.0% | ● | 0x40D |
| F4-14 | V / F slip compensation gain | 100.0% | 0.0～200.0% | ● | 0x40E |
| F4-15 | V / F slip compensation limit | 100.0% | 0.0～300.0% | ● | 0x40F |
| F4-16 | V / F slip compensation filtering | 0.200s | 0.000～6.000s | ● | 0x410 |
| F4-17 | Oscillation suppression gain | 100.0% | 0.0～900.0% | ● | 0x411 |
| F4-18 | Reserved | --- | --- | | 0x412 |
| F4-19 | V / F automatic energy saving control | 0 | 0: off 1:on | ○ | 0x413 |
| F4-20 | Lower limit of energy-saving step-down frequency | 15.00Hz | 0.0～50.00Hz | ○ | 0x414 |
| F4-21 | Energy-saving step-down voltage lower limit | 50.0% | 20.0～100.0% | ○ | 0x415 |
| F4-22 | Energy-saving buck voltage regulation rate | 0.010V/mS | 0.000～0.200V/mS | ● | 0x416 |
| F4-23 | Energy saving buck voltage pick-up rate | 0.200V/mS | 0.000～2.000V/mS | ● | 0x417 |

## F5 Multi-function terminal parameter group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F5-00 | DI1 terminal function selection | 1 | Refer to attached list 5.3 | ○ | 0x500 |
| F5-01 | DI2 terminal function selection | 2 | Refer to attached list 5.3 | ○ | 0x501 |
| F5-02 | DI3 terminal function selection | 3 | Refer to attached list 5.3 | ○ | 0x502 |
| F5-03 | DI4 terminal function selection | 4 | Refer to attached list 5.3 | ○ | 0x503 |
| F5-04 | DI5 terminal function selection | 0 | Refer to attached list 5.3 | ○ | 0x504 |
| F5-05 | DI6 terminal function selection | 5 | Refer to attached list 5.3 | ○ | 0x505 |
| F5-06 | DI7 terminal function selection | 6 | Refer to attached list 5.3 | ○ | 0x506 |
| F5-07 | DI8 terminal function selection | 7 | Refer to attached list 5.3 | ○ | 0x507 |
| F5-08 | DI1～DI4 terminal characteristics selection | 0000 | 0: closed effective 1: open effective<br>**Unit:** DI1<br>**Tens:**DI2<br>**Hundreds:** DI3<br>**Thousands:** DI4 | ● | 0x508 |
| F5-09 | DI5～DI8 terminal characteristics selection | 0000 | 0: closed effective 1: open effective<br>**Unit:** DI5<br>**Tens:**DI6<br>**Hundreds:** DI7<br>**Thousands**: DI8 | ● | 0x509 |
| F5-10 | DI1 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x50A |
| F5-11 | DI1 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x50B |
| F5-12 | DI2 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x50C |
| F5-13 | DI2 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x50D |
| F5-14 | DI3 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x50E |
| F5-15 | DI3 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x50F |
| F5-16 | DI4 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x510 |
| F5-17 | DI4 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x511 |
| F5-18 | DI5 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x512 |
| F5-19 | DI5 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x513 |
| F5-20 | DI6 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x514 |
| F5-21 | DI6 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x515 |
| F5-22 | DI7 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x516 |
| F5-23 | DI7 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x517 |
| F5-24 | DI8 valid detection delay | 0.010 | 0.000～6.000s | ● | 0x518 |
| F5-25 | DI8 invalid detection delay | 0.010 | 0.000～6.000s | ● | 0x519 |
| F5-26 | Terminal control running mode | 0 | 0: two-wire system 1<br>1: two-wire system 2<br>2: Three-wire system 1<br>3: three-wire system 2 | ● | 0x51A |
| F5-27 | Terminal operate protection | 0111 | 0: off 1: on<br>**Unit:**terminal start protection when exiting abnormally<br>**Tens:**Jog terminal start protection when abnormal exit<br>**Hundreds:**start protection when command channel is switched to terminal<br>**Thousands:** reserved | ○ | 0x51B |

| | | | | | |
|---|---|---|---|---|---|
| F5-28 | HDI input minimum frequency | 0.00kHz | 0.00～50.00kHz | ● | 0x51C |
| F5-29 | HDI min frequency corresponding setting | 0.00% | 0.00～100.00% | ● | 0x51D |
| F5-30 | HDI input max frequency | 50.00kHz | 0.00～50.00kHz | ● | 0x51E |
| F5-31 | HDI max frequency corresponding setting | 100.00% | 0.00～100.00% | ● | 0x51F |
| F5-32 | HDI filter time | 0.100s | 0.000～9.000s | ● | 0x520 |
| F5-33 | HDI cutoff frequency | 0.010kHz | 0.000～1.000kHz | ● | 0x521 |
| F5-34 | UP/DW terminal control mode | 0 | 0: Frequency power-down storage<br>1: Frequency is not stored when power is off<br>2: Adjustable during operation, reset when shutdown | ○ | 0x522 |
| F5-35 | Terminal UP / DW control frequency rate | 0.50Hz/s | 0.01～50.00Hz/s | ● | 0x523 |
| F5-36 | Reserved | --- | --- | | 0x524 |
| F5-37 | Timer time unit | 0 | 0:Second 1:Minute 2:Hour | ● | 0x525 |
| F5-38 | Timer setting value | 0 | 0～65000 | ● | 0x526 |
| F5-39 | Reserved | --- | --- | | 0x527 |
| F5-40 | Counter input frequency | 0 | 0～6000 | | 0x528 |
| F5-41 | Counter max value | 1000 | 0～65000 | ● | 0x529 |
| F5-42 | Counter setting value | 500 | 0～65000 | ● | 0x52A |
| F5-43 | Reserved | --- | --- | | 0x52B |
| F5-44 | Output terminal polarity selection | 0000 | 0: positive polarity 1: negative polarity<br>**Unit:** DO terminal<br>**Tens:** Relay 1<br>**Hundreds**: Relay 2<br>**Thousands:** Reserved | | 0x52C |
| F5-45 | DO output terminal | 1 | Refer to attached list 5.4 | ● | 0x52D |
| F5-46 | Relay 1 output | 4 | Refer to attached list 5.4 | ● | 0x53E |
| F5-47 | Relay 2 output | 11 | Refer to attached list 5.4 | ● | 0x53F |
| F5-48 | DO output delay time | 0.010s | 0.000～6.000s | ● | 0x530 |
| F5-49 | Relay 1 output delay | 0.010s | 0.000～6.000s | ● | 0x531 |
| F5-50 | Relay 2 output delay | 0.010s | 0.000～6.000s | ● | 0x532 |
| F5-51 | Output frequency level 1(FDT1) | 30.00Hz | 0.00～Max. frequency | ● | 0x533 |
| F5-52 | FDT1 lag | 1.00Hz | 0.00～Max. frequency | ● | 0x534 |
| F5-53 | Output frequency level 1(FDT2) | 50.00Hz | 0.00～Max. frequency | ● | 0x535 |
| F5-54 | FDT2 lag | 1.00Hz | 0.00～Max. frequency | ● | 0x536 |
| F5-55 | Detected value reaches the given frequency | 2.00Hz | 0.00～50.00Hz | ● | 0x537 |

## F6 Analog terminal parameter group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F6-00 | AI1 Lower limit | 0.00V | 0.00～10.00V | ● | 0x600 |
| F6-01 | AI1 Lower limit corresponding setting | 0.00% | -100.00～100.00% | ● | 0x601 |

| | | | | | |
|---|---|---|---|---|---|
| F6-02 | AI1 upper limit | 10.00V | 0.00～10.00V | ● | 0x602 |
| F6-03 | AI1 upper limit corresponding setting | 100.00% | -100.00～100.00% | ● | 0x603 |
| F6-04 | AI1 filter time | 0.010s | 0.000～6.000s | ● | 0x604 |
| F6-05 | AI1 voltage / current selection | 0 | 0: voltage 1: current | ● | 0x605 |
| F6-06 | AI2 Lower limit | 0.00V | -10.00V～10.00V | ● | 0x606 |
| F6-07 | AI2 Lower limit corresponding setting | 0.00% | -100.00～100.00% | ● | 0x607 |
| F6-08 | AI2 upper limit | 10.00V | -10.00V～10.00V | ● | 0x608 |
| F6-09 | AI2 upper limit corresponding setting | 100.00% | -100.00～100.00% | ● | 0x609 |
| F6-10 | AI2 filter time | 0.010s | 0.000～6.000s | ● | 0x60A |
| F6-11 | AI2 voltage / current selection | 0 | 0: voltage 1: current | ● | 0x60B |
| F6-12 | AI1 terminal function | 0 | Refer to attached list 5.3 | ○ | 0x60C |
| F6-13 | AI1 high level setting | 70.00% | 0.00～100.00% | ● | 0x60D |
| F6-14 | AI1 low level setting | 30.00% | 0.00～100.00% | ● | 0x60E |
| F6-15 | AI2 terminal function | 0 | Refer to attached list 5.3 | ○ | 0x60F |
| F6-16 | AI2 high level setting | 70.00% | 0.00～100.00% | ● | 0x610 |
| F6-17 | AI2 low level setting | 30.00% | 0.00～100.00% | ● | 0x611 |
| F6-18 | Valid state setting when analog used as terminal | 0000 | 0: low level 1: high level<br>**Unit:** AI1<br>**Tens**:AI2 | ● | 0x612 |
| F6-19 | Analog input curve selection | 0000 | 0: Beeline (default) 1: curve 1 2: curve 2<br>**Unit**: AI1<br>**Tens** :AI2 | ● | 0x613 |
| F6-20 | Reserved | --- | --- | | 0x614 |
| F6-21 | Curve 1 lower limit | 0.00V | 0.00～10.00V | ● | 0x615 |
| F6-22 | Curve 1 lower limit | 0.0% | 0.00～100.00% | ● | 0x616 |
| F6-23 | Curve 1 inflection point 1 input voltage | 3.00V | 0.00～10.00V | ● | 0x617 |
| F6-24 | Curve 1 inflection point 1 corresponding setting | 30.00% | 0.00～100.00% | ● | 0x618 |
| F6-25 | Curve 1 inflection point 2 input voltage | 6.00V | 0.00～10.00V | ● | 0x619 |
| F6-26 | Curve 1 inflection point 2 corresponding setting | 60.00% | 0.00～100.00% | ● | 0x61A |
| F6-27 | Curve 1 upper limit | 10.0V | 0.00～10.00V | ● | 0x61B |
| F6-28 | Curve 1 upper limit corresponding setting | 100.00% | 0.00～100.00% | ● | 0x61C |
| F6-29 | Curve 2 lower limit | 0.00V | 0.00～10.00V | ● | 0x61D |
| F6-30 | Curve 2 lower limit corresponding setting | 0.00% | 0.00～100.00% | ● | 0x61E |
| F6-31 | Curve 2 inflection point 1 input voltage | 3.00V | 0.00～10.00V | ● | 0x61F |
| F6-32 | Curve 2 inflection point 1 corresponding setting | 30.00% | 0.00～100.00% | ● | 0x620 |
| F6-33 | Curve 2 inflection point 2 input voltage | 6.00V | 0.00～10.00V | ● | 0x621 |

| | | | | | |
|---|---|---|---|---|---|
| F6-34 | Curve 2 inflection point 2 corresponding setting | 60.00% | 0.00～100.00% | ● | 0x622 |
| F6-35 | Curve 2 upper limit | 10.00V | 0.00～10.00V | ● | 0x623 |
| F6-36 | Curve 2 upper limit corresponding setting | 100.00% | 0.00～100.00% | ● | 0x624 |
| F6-37 | AO output signal selection | 0000 | **Unit:AO1**<br>0:0～10V 1:4.00～20.00mA<br>2:0.00～20.00mA 3:FM frequency pulse output·<br>**Tens :AO2 (extended card)**<br>0:0～10V 1:4.00～20.00mA<br>2:0.00～20.00mA | ● | 0x625 |
| F6-38 | AO1 output selection | 0 | 0: Given frequency<br>1: Output frequency<br>2: Output current<br>3: Input voltage<br>4: Output voltage<br>5: Machine speed<br>6: Given torque<br>7: Output torque<br>8: PID given value<br>9: PID feedback value<br>10: Output power<br>11: Bus voltage<br>12: AI1<br>13: AI2<br>14: HDI input value<br>15,16: IGBT temperature 1,2<br>17: RS485 given | ● | 0x626 |
| F6-39 | AO2(extended card) output selection | 1 | | ● | 0x627 |
| F6-40 | AO1 output gain | 100.0% | 25.0～200.0% | ● | 0x628 |
| F6-41 | AO1 analog outputsignal bias | 0.0% | -10.0～10.0% | ● | 0x629 |
| F6-42 | AO1 output filter | 0.010s | 0.000～6.000s | ● | 0x62A |
| F6-43 | AO2(extended card) output gain | 100.0% | 25.0～200.0% | ● | 0x62B |
| F6-44 | AO2(extended card) analog output signal bias | 0.0% | -10.0%～10.0% | ● | 0x62C |
| F6-45 | AO2(extended card) output filter | 0.010s | 0.000～6.000s | ● | 0x62D |
| F6-46 | AO1 FM frequency output lower limit | 0.20kHz | 0.00～100.00kHz | ● | 0x62E |
| F6-47 | AO1 FM frequency output upper limit | 50.00kHz | 0.00～100.00kHz | ● | 0x62F |

## F7 System parameters

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| F7-00 | Parameter and key lock selections | 0 | 0: Not locked<br>1: Function parameter locked<br>2: Function parameter and key locked (except for RUN、STOP、JOG/REV)<br>3: All function parameter and key locked | ● | 0x700 |
| F7-01 | User password | 0 | 0～9999 | ● | 0x701 |
| F7-07 | Keyboard JOG/REV selection | 0 | 0: REV 1: JOG 2:Reverse | ○ | 0x707 |
| F7-08 | STOP key setting | 1 | 0: Non-keyboard control mode is invalid<br>1: Non-keyboard control mode stops according to stop mode<br>2: Non-keyboard control mode stop according tofree stop mode | ○ | 0x708 |
| F7-09 | UP/DOWN key selection | 0011 | **Unit: keyboard UN/DOWN key modify selection**<br>0: Invalid<br>1: Modify frequency setting by key board numbers F0-08<br>2: Modify PID give setting by key board numbers FA-01<br>**Tens :power off storage selection**<br>0: No save frequency after power off<br>1: Save frequency after power off<br>**Hundreds:action limit**<br>0: Operation stop for adjusting<br>1: Adjusting only in operation, stop for holding<br>2: Adjusting in operation, stop for clearing | ○ | 0x709 |
| F7-10 | Keyboard potentiometer lower limit | 0.50V | 0.00～5.00V | ● | 0x70A |
| F7-11 | Corresponds to the lower limit of the keyboard | 0.00 | 0.00～100.00% | ● | 0x70B |
| F7-12 | Keyboard potentiometer upper limit | 4.50V | 0.00～5.00V | ● | 0x70C |
| F7-13 | Keyboard potentiometer upper limit correspondence | 100.00 | 0.00～100.00% | ● | 0x70D |
| F7-14 | The display content of the first line in running state | 1101 | **Unit and Tens:** display the first group 00～63<br>**Hundreds and Thousands:** display the second group 00～63 | ● | 0x70E |
| F7-15 | The display content of the first line in running state | 0402 | Same as F7-14 | ● | 0x70F |
| F7-16 | The display content of the first line in stop state | 1100 | Same as F7-14 | ● | 0x710 |
| F7-17 | The display content of the first line in stop state | 0402 | Same as F7-14 | ● | 0x711 |
| F7-18 | The display content of the second line in running state | 0402 | Same as F7-14 | ● | 0x712 |
| F7-19 | The display content of the second line in running state | 1210 | Same as F7-14 | ● | 0x713 |
| F7-20 | The display content of the second line in stop state | 0402 | Same as F7-14 | ● | 0x714 |
| F7-21 | The display content of the second line in stop state | 1210 | Same as F7-14 | ● | 0x715 |

| | | | | | |
|---|---|---|---|---|---|
| F7-22 | Keyboard display item setting | 0000 | **Unit: output frequency selection**<br>0: Aim frequency<br>1: Running frequency<br>**Hundreds: power display dimension**<br>0: Power display percentage (%)<br>1: Power display kilowatt (KW) | ● | 0x716 |
| F7-24 | Rotate speed display | 100.0% | 0.0～500.0% | ● | 0x718 |
| F7-25 | Power display coefficient | 100.0% | 0.0～500.0% | ● | 0x719 |

## F8 Enhanced Function Parameter Group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F8-00 | Jump frequency 1 | 0.00Hz | 0.00～max frequency | ● | 0x800 |
| F8-01 | Jump frequency amplitude 1 | 0.00Hz | 0.00～max frequency | ● | 0x801 |
| F8-02 | Jump frequency 2 | 0.00Hz | 0.00～max frequency | ● | 0x802 |
| F8-03 | Jump frequency amplitude 2 | 0.00Hz | 0.00～max frequency | ● | 0x803 |
| F8-04～F8-07 | | Reserved | | | |
| F8-08 | Swing frequency control | 0 | 0: invalid 1: valid | ● | 0x808 |
| F8-09 | Swing frequency amplitude control | 0 | 0: relative center frequency<br>1: Relative maximum frequency | ● | 0x809 |
| F8-10 | Reserved | | | | |
| F8-11 | Swing frequency amplitude | 10.0% | 0.0～100.0% | ● | 0x80B |
| F8-12 | Kick frequency amplitude | 10.0% | 0.0～50.0% | ● | 0x80C |
| F8-13 | Swing frequency ACC time | 5.00s | 0.00～650.00s | ● | 0x80D |
| F8-14 | Swing frequency DEC time | 5.00s | 0.00～650.00s | ● | 0x80E |
| F8-15 | Fan control | 1 | 0: Fan runs after inverter is powered on<br>1: Shutdown is related to temperature, and running is running<br>2: The shutdown fan stops, and the operation is related to temperature | ● | 0x80F |
| F8-16 | Energy consumption braking enabled | 0 | 0: OFF 1: ON | ● | 0x810 |
| F8-17 | Energy consumption braking action voltage | 135.0% | 115.0%～150.0% | ● | 0x811 |
| F8-18 | Energy use brake usage | 10.0% | 0.0～100.0% | ● | 0x812 |
| F8-19～F8-20 | | Reserved | | | |

## F9 Protection and Malfunction Parameter Group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| F9-00 | OC suppression function | 0 | 0: Suppression valid<br>1: ACC/DEC valid, constant speed invalid | ○ | 0x900 |
| F9-01 | OC suppression point | 160.0% | 0.0 ～ 300.0% | ● | 0x901 |
| F9-02 | OC suppression gain | 100.0% | 0.0 ～ 500.0% | ● | 0x902 |

| | | | | | |
|---|---|---|---|---|---|
| F9-03 | Current hardware protection settings | 0001 | **Unit:** CBC(cycle by cycle, limit current according to its waveform)<br>0: off 1: on<br>**Tens: OC protection interference** suppression<br>0: off 1: First grade 2: Second grade<br>**Hundreds: SC protection interference** suppression<br>0: off 1: First grade 2: Second grade<br>**Thousands: Reserved** | ○ | 0x903 |
| F9-04～F9-05 | | Reserved | | | |
| F9-06 | Bus overvoltage suppression function | 0012 | **Unit: Over voltage suppression**<br>0: Invalid 1: Valid in DEC<br>2: Valid both in ACC/DEC<br>**Tens: Over-excitation control**<br>0: off 1: on<br>**Hundreds and Thousands: Reserved** | ○ | 0x906 |
| F9-07 | Bus overvoltage suppression | 130.0% | 110.0 ～ 150.0% | ※ | 0x907 |
| F9-08 | Bus overvoltage suppression gain | 100.0% | 0.0 ～ 500.0% | ● | 0x908 |
| F9-09 | Bus undervoltage suppression function | 0 | 0: Invalid1: Valid | ○ | 0x909 |
| F9-10 | Bus undervoltage suppression point | 80.0% | 60.0 ～ 90.0% | ※ | 0x90A |
| F9-11 | Bus undervoltage suppression gain | 100.0% | 0.0 ～ 500.0% | ● | 0x90B |
| F9-12 | Bus undervoltage protection point | 60.0% | 60.0 ～ 90.0% | ※ | 0x90C |
| F9-13 | Reserved | | | | 0x90D |
| F9-14 | Short-circuit detection after power on | 0 | 0: off 1: on | ○ | 0x90E |
| F9-15 | Phase missing protection | 0011 | **Unit: Output phase missing protection**<br>0: off 1:on<br>**Tens: Input phase missing protection**<br>0: off 1: Open Alarm<br>2: Open Fault(STOP VFD)<br>**Hundreds and Thousands: Reserved** | ● | 0x90F |
| F9-16 | Motor overload protection curve coefficient | 100.0% | 0.0～250.0% | ● | 0x910 |

| | | | | | |
|---|---|---|---|---|---|
| F9-17 | Load warning checkout setting | 0000 | **Unit: checkout selection (protection 1)**<br>0: No detection<br>1: detection load is too large<br>2: Only at constant speed detects excessive load<br>3: detection of insufficient load<br>4: Detects insufficient load only at constant speed<br>**Tens: Alarm selection**<br>0: Alarm, continue running<br>1: fault protection action and free stop<br>**Hundreds: Check Out Selection (Protection 2)**<br>0: No detection<br>1: detection load is too large<br>2: Only at constant speed detects excessive load<br>3: detection of insufficient load<br>4: Detects insufficient load only at constant speed<br>**Thousands: Alarm selection**<br>0: Alarm, continue running<br>1: fault protection action and free stop | ○ | 0x911 |
| F9-18 | Load early detection level 1 | 130.0% | 0.0～200.0% | ○ | 0x912 |
| F9-19 | Load warning detection time 1 | 5.0s | 0.0～60.0s | ○ | 0x913 |
| F9-20 | Load early detection level 2 | 30.0% | 0.0～200.0% | ○ | 0x914 |
| F9-21 | Load warning detection time 2 | 5.0s | 0.0～60.0s | ○ | 0x915 |
| F9-22 | Reserved | --- | --- | | 0x916 |
| F9-23 | Protection action of speed bias excess | 0000 | **Unit: Detection selection**<br>0: Not detected<br>1: Detected only at constant speed<br>2: Detecting<br>**Tens: Alarm selection**<br>0: Free stop and report fault<br>1: Alarm and continue operation<br>**Hundreds and Thousands: Reserved** | ○ | 0x917 |
| F9-24 | Detection threshold when speed bias excess | 10.0% | 0.0～60.0% | ○ | 0x918 |
| F9-25 | Detection time when speed bias excess | 2.0s | 0.0～60.0s | ○ | 0x919 |
| F9-26 | Rapid protection action | 0000 | **Unit:checkout selection**<br>0: No detection<br>1: only at constant speed<br>2: Always detect<br>**Tens:Alarm selection**<br>0: Free stop and report fault<br>1: Alarm and continue operation<br>**Hundreds and thousands: reserved** | ○ | 0x91A |
| F9-27 | Fast detection threshold | 110.0% | 0.0～150.0% | ○ | 0x91B |
| F9-28 | Fast detection time | 0.010s | 0.000～2.000s | ○ | 0x91C |

| | | | | | |
|---|---|---|---|---|---|
| F9-29～F9-36 | | Reserved | | | |
| F9-37 | Failure self-recovery times | 0 | 0～5 | ○ | 0x925 |
| F9-38 | Failure self-recovery interval | 1.0s | 0.1～100.0s | ○ | 0x926 |

**FA PID control parameter group**

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| FA-00 | PID controller given signal source | 0 | 0: Keyboard numeric PID given<br>1: keyboard potentiometer given<br>2: AI1 given<br>3: AI2<br>4: Pulse HDI given<br>5: RS485 communication given<br>6: Optional card<br>7: terminal selection | ● | 0xA00 |
| FA-01 | Keyboard digit PID given / feedback | 50.0% | 0.00～100.0% | ● | 0xA01 |
| FA-02 | PID given changing time | 1.00s | 0.00～60.00s | ● | 0xA02 |
| FA-03 | PID controller feedback signal source | 2 | 0: Keyboard numeric PID given<br>1: keyboard potentiometer given<br>2: AI1 given<br>3: AI2<br>4: Pulse HDI given<br>5: RS485 communication given<br>6: Optional card<br>7: terminal selection | ● | 0xA03 |
| FA-04 | Feedback signal filter time | 0.010s | 0.000～6.000s | ● | 0xA04 |
| FA-05 | Feedback signal gain | 1.00 | 0.00～10.00 | ● | 0xA05 |
| FA-06 | Maximum feedback signal | 100.0 | 0～100.0 | ● | 0xA06 |
| FA-07 | PID control selection | 0100 | **Unit:**feedback characteristic selection<br>0: Positive characteristic<br>1: negative characteristics<br>**Tens:**closed-loop bypass hold output<br>0: Output is cleared when closed loop bypass<br>1: Output hold when closed loop bypass<br>**Hundreds**: alignment selection<br>0: non-center aligned<br>1: center-aligned<br>**Thousands:** Differential Adjustment Properties<br>0: Differentiate the deviation<br>1: Differentiate feedback | ○ | 0xA07 |
| FA-08 | PID preset output | 100.0% | 0.0～100.0% | ● | 0xA08 |
| FA-09 | PID preset output running | 0.0s | 0.0～6500.0s | ● | 0xA09 |
| FA-10 | PID control deviation limit | 0.0% | 0.0～100.0% | ● | 0xA0A |
| FA-11 | Proportional gain P1 | 0.100 | 0.000～8.000 | ● | 0xA0B |
| FA-12 | Integration time I1 | 1.0s | 0.0～600.0s | ● | 0xA0C |
| FA-13 | Differential time D1 | 0.000s | 0.000～6.000s | ● | 0xA0D |
| FA-14 | Proportional gain P2 | 0.100 | 0.000～8.000 | ● | 0xA0E |

| | | | | | |
|---|---|---|---|---|---|
| FA-15 | Integration time I2 | 1.0s | 0.0～600.0s | ● | 0xA0F |
| FA-16 | Differential time D2 | 0.000s | 0.000～6.000s | ● | 0xA10 |
| FA-17 | PID Parameter switching condition | 0 | 0: No switch<br>1: DI terminal switching<br>2: switch based on deviation | ● | 0xA11 |
| FA-18 | Low value of switching deviation | 20.0% | 0.0～100.0% | ● | 0xA12 |
| FA-19 | High value of switching deviation | 80.0% | 0.0～100.0% | ● | 0xA13 |
| FA-21 | Differential limit | 5.0% | 0.0～100.0% | ● | 0xA15 |
| FA-22 | PID output upper limit | 100.0% | 0.0～100.0% | ● | 0xA16 |
| FA-23 | PID output lower limit | 0.0% | 0.0～[FA-22] | ● | 0xA17 |
| FA-24 | PID output filter time | 0.0s | 0.000～6.000s | ● | 0xA18 |
| FA-25 | Feedback wire break detection time | 1.0s | 0.0～120.0s | ● | 0xA19 |
| FA-26 | Feedback wire break action selection | 0 | 0: Continue without failure<br>1: Stop and report failure<br>2: keep running, output alarm<br>3: Run at current frequency and alarm | ● | 0xA1A |
| FA-27 | Wire break alarm upper limit | 100.0% | 0.0～100.0% | ● | 0xA1B |
| FA-28 | Wire break alarm lower limit | 0.0% | 0.0～100.0% | ● | 0xA1C |
| FA-29 | Dormancy selection | 0 | 0:OFF 1:ON | ● | 0xA1D |
| FA-30 | Dormant frequency | 30.00Hz | 0.00～50.00Hz | ● | 0xA1E |
| FA-31 | Dormant delay time | 3.0S | 0.0～3600.0S | ● | 0xA1F |
| FA-32 | Wake-up bias | 5.0% | 0.0～50.0% | ● | 0xA20 |
| FA-33 | Wake-up delay | 0.0S | 0.0～60.0S | ● | 0xA21 |

## Fb Fault Record Parameter Group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| Fb-00 | Trouble shooting information | -- | See fault message code table for details | × | 0xB00 |
| Fb-01 | Fault type | -- | See fault message code table for details | × | 0xB01 |
| Fb-02 | Fault operating frequency | -- | 0.00～Max frequency | × | 0xB02 |
| Fb-03 | Fault output voltage | -- | 0～1500V | × | 0xB03 |
| Fb-04 | Fault output current | -- | 0.1～2000.0A | × | 0xB04 |
| Fb-05 | Fault bus voltage | -- | 0～3000V | × | 0xB05 |
| Fb-06 | Failure module temperature | -- | 0～100℃ | × | 0xB06 |
| Fb-07 | Fault inverter status | -- | **Unit:running direction**<br>0: forward 1: reverse<br>**Tens:running status**<br>0: shutdown 1: speed up<br>2: slowdown 3: constant speed<br>**Hundreds and thousands: reserved** | × | 0xB07 |
| Fb-08 | Fault input terminal status | -- | See input terminal state diagram | × | 0xB08 |
| Fb-09 | Fault output terminal status | -- | See output terminal state diagram | × | 0xB09 |
| Fb-10 | Previous failure type | -- | See fault message code table for details | × | 0xB0A |

| | | | | | |
|---|---|---|---|---|---|
| Fb-11 | Frequency of previous fault operation | -- | 0.00～Max frequency | × | 0xB0B |
| Fb-12 | Last fault output voltage | -- | 0～1500V | × | 0xB0C |
| Fb-13 | Last fault output current | -- | 0.1～2000.0A | × | 0xB0D |
| Fb-14 | Last faulted bus voltage | -- | 0～3000V | × | 0xB0E |
| Fb-15 | Last failed module | -- | 0～100℃ | × | 0xB0F |
| Fb-16 | Status of the previous fault inverter | -- | **Unit:running direction**<br>0: forward 1: reverse<br>**Tens:running status**<br>0: shutdown 1: steady speed<br>2: speed up 3: slow down<br>**Hundreds and thousands: reserved** | × | 0xB10 |
| Fb-17 | Last fault input terminal status | -- | See input terminal state diagram | × | 0xB11 |
| Fb-18 | Last fault output terminal status | -- | See output terminal state diagram | × | 0xB12 |
| Fb-19 | First two failure types | -- | See fault message code table for details | × | 0xB13 |
| Fb-20 | First three failure types | -- | See fault message code table for details | × | 0xB14 |

## FC Multi-speed, PLC function parameter group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| FC-00 | Multi-speed frequency 1 | 10.00Hz | 0.00～Max frequency | ● | 0xC00 |
| FC-01 | Multi-speed frequency 2 | 20.00Hz | 0.00～Max frequency | ● | 0xC01 |
| FC-02 | Multi-speed frequency 3 | 30.00Hz | 0.00～Max frequency | ● | 0xC02 |
| FC-03 | Multi-speed frequency 4 | 40.00Hz | 0.00～Max frequency | ● | 0xC03 |
| FC-04 | Multi-speed frequency 5 | 50.00Hz | 0.00～Max frequency | ● | 0xC04 |
| FC-05 | Multi-speed frequency 6 | 40.00Hz | 0.00～Max frequency | ● | 0xC05 |
| FC-06 | Multi-speed frequency 7 | 30.00Hz | 0.00～Max frequency | ● | 0xC06 |
| FC-07 | Multi-speed frequency 8 | 20.00Hz | 0.00～Max frequency | ● | 0xC07 |
| FC-08 | Multi-speed frequency 9 | 10.00Hz | 0.00～Max frequency | ● | 0xC08 |
| FC-09 | Multi-speed frequency 10 | 20.00Hz | 0.00～Max frequency | ● | 0xC09 |
| FC-10 | Multi-speed frequency 11 | 30.00Hz | 0.00～Max frequency | ● | 0xC0A |
| FC-11 | Multi-speed frequency 12 | 40.00Hz | 0.00～Max frequency | ● | 0xC0B |
| FC-12 | Multi-speed frequency 13 | 50.00Hz | 0.00～Max frequency | ● | 0xC0C |
| FC-13 | Multi-speed frequency 14 | 40.00Hz | 0.00～Max frequency | ● | 0xC0D |
| FC-14 | Multi-speed frequency 15 | 30.00Hz | 0.00～Max frequency | ● | 0xC0E |
| FC-15 | Multi-speed frequency running mode selection | 0000 | **Unit: cycle mode**<br>0: Stop after single cycle<br>1: Continuous cycles<br>2: Keep final value after single cycle<br>**Tens: Time unit**<br>0: second 1: minute 2:hour<br>**Hundreds: Power down memory**<br>0: Not save 1: save<br>**Thousands: Start mode**<br>0: Restart from the 1st stage<br>1: Restart from the stop stage | ● | 0xC0F |

| | | | | | |
|---|---|---|---|---|---|
| | | | 2: Continue running from the time when stop | | |
| FC-16 | Multi-speed 1 running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC10 |
| FC-17 | Multi-speed2running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC11 |
| FC-18 | Multi-speed 3running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC12 |
| FC-19 | Multi-speed4running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC13 |
| FC-20 | Multi-speed5running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC14 |
| FC-21 | Multi-speed6running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC15 |
| FC-22 | Multi-speed7running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC16 |
| FC-23 | Multi-speed 8running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC17 |
| FC-24 | Multi-speed9running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC18 |
| FC-25 | Multi-speed10running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC19 |
| FC-26 | Multi-speed 11running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC1A |
| FC-27 | Multi-speed12running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC1B |
| FC-28 | Multi-speed 13running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC1C |
| FC-29 | Multi-speed14running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC1D |
| FC-30 | Multi-speed15running time | 10.0 | 0.0～6500.0(s/m/h) | ● | 0xC1E |
| FC-31 | Multi- speed frequency 1-15 direction and ACC/DEC time | 0000 | **Unit** :the running direction of this paragraph<br>0: forward 1: reverse<br>**Tens:**<br>ACC / DEC time of this speed<br>0: acceleration / deceleration time 0<br>1: acceleration / deceleration time 1<br>2: acceleration / deceleration time 2<br>3: acceleration / deceleration time 3<br>**Hundreds and thousands**:<br>Reserved | ● | 0xC1F |
| FC-32 | | 0000 | | ● | 0xC20 |
| FC-33 | | 0000 | | ● | 0xC21 |
| FC-34 | | 0000 | | ● | 0xC22 |
| FC-35 | | 0000 | | ● | 0xC23 |
| FC-36 | | 0000 | | ● | 0xC24 |
| FC-37 | | 0000 | | ● | 0xC25 |
| FC-38 | | 0000 | | ● | 0xC26 |
| FC-39 | | 0000 | | ● | 0xC27 |
| FC-40 | | 0000 | | ● | 0xC28 |
| FC-41 | | 0000 | | ● | 0xC29 |
| FC-42 | | 0000 | | ● | 0xC2A |
| FC-43 | | 0000 | | ● | 0xC2B |
| FC-44 | | 0000 | | ● | 0xC2C |
| FC-45 | | 0000 | | ● | 0xC2D |
| FC-46～FC-48 | | Reserved | | | |

## Fd Communication control function parameter group

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| Fd-00 | Master-slave machine selection | 0 | 0: Slave machine 1: Main machine | ○ | 0xD00 |
| Fd-01 | 485 communication address | 1 | 1～247 | ○ | 0xD01 |
| Fd-02 | 485 communication baud rate selection | 3 | 0:1200 bps 1:2400 bps<br>2:4800 bps 3:9600 bps<br>4:19200 bps 5:38400 bps | ○ | 0xD02 |

| | | | | | |
|---|---|---|---|---|---|
| Fd-03 | Modbus data format | 0 | 0:(N,8,1) 1:(E,8,1)<br>2:(O,8,1) 3:(N,8,2)<br>4:(E,8,2) 5:(O,8,2) | ○ | 0xD03 |
| Fd-04 | Communication ratio setting | 1.00 | 0.00～5.00 | ● | 0xD04 |
| Fd-05 | Modbus communication answer delay | 0ms | 0～500ms | ● | 0xD05 |
| Fd-06 | Communication timeout failure time | 1.0s | 0.1～100.0s | ● | 0xD06 |
| Fd-07 | Modbus communication fault action mode selection | 0 | 0: No detection<br>1: Alarm and free stop<br>2: Alarm and continue running<br>3: Forced stop | ● | 0xD07 |
| Fd-08 | Modbus Responds dispose | 0 | 0: Have response 1: No response | ● | 0xD08 |
| Fd-09 | Main machine sending selection | 0031 | **Unit:**the first group of transmission frame selection<br>0: Invalid<br>1: Main machine run command<br>2: Main machine given frequency<br>3: Main machine output frequency<br>4: Main machine upper limit frequency<br>5: Main machine given torque<br>6: Main machine output torque<br>7, 8: Reserved<br>9: Main machine given PID<br>A: Main machine feedback PID<br>**Tens:**the second group transmitting frame selection<br>**Hundreds:**the third group transmitting frame selection<br>**Thousands:** the fourth group transmitting frame selection<br>same as above | ● | 0xD09 |
| Fd-10 | RS485 Communication port configuration | 0 | 0: Modbus communication<br>1: serial port communication | ● | 0xD0A |

**FE Torque Control Parameters**

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| FE-00 | Torque/Speed control | 0 | 0:Speed control<br>1:Torque control Torque/Speed control | ● | 0xE00 |
| FE-01 | Torque given channels selection | 0 | 0: Keyboard number setting<br>1: Potentiometer of keyboard given<br>2: Voltage/Current analog AI1 given<br>3: Voltage/Current analog AI2 given<br>4: Terminal pulse HDI given<br>5: RS485 communication given | ● | 0xE01 |
| FE-02 | Torque keyboard number setting | 0.0% | 0～100.0% | ● | 0xE02 |
| FE-03 | Torque input lower limit | 0.00% | 0.00～100.00% | ● | 0xE03 |

| | | | | | |
|---|---|---|---|---|---|
| FE-04 | Lower limit corresponding setting | 0.00% | -200.00～200.00% | ● | 0xE04 |
| FE-05 | Torque input upper limit | 100.00% | 0.00～100.00% | ● | 0xE05 |
| FE-06 | Upper limit corresponding setting | 100.00% | -200.00～200.00% | ● | 0xE06 |
| FE-07 | Given first-order filter time | 0.100s | 0.000～6.000s | ● | 0xE07 |
| FE-08 | Output torque upper limit | 150.0% | 0～200.0% | ● | 0xE08 |
| FE-09 | Output torque lower limit | 0% | 0～200.0% | ● | 0xE09 |
| FE-10 | Torque control FWD speed limit selection | 0 | 0:function code FE-12setting<br>1:potentiometer of keyboard×FE-12;<br>2:AI1×FE-12;<br>3:AI2×FE-12;<br>4:HDI×FE-12;<br>5:RS485 communication given×FE-12 | ● | 0xE0A |
| FE-11 | Torque control REV speed limit selection | 0 | 0:function code FE-13setting<br>1:potentiometer of keyboard×FE-13;<br>2:AI1×FE-13;<br>3:AI2×FE-13;<br>4:HDI×FE-13;<br>5:RS485 communication given×FE-13 | ● | 0xE0B |
| FE-12 | Torque control FWD max speed limit | 100.0% | 0.0～100.0% | ● | 0xE0C |
| FE-13 | Torque control REV max speed limit | 100.0% | 0.0 ～ 100.0% | ● | 0xE0D |

## A0 Photovoltaic Pump Special Parameters

| NO. | Function description | Factory default | Range of settings and definition | Feature | Address |
|---|---|---|---|---|---|
| A0-00 | Photovoltaic water pump mode | 0002 | **Uint: Mode selection**<br>0:Variable frequency control mode<br>1:CVT mode for solar<br>2:MPPT mode<br>**Tens: Motor selection**<br>0: Three phase motor<br>1: Single phase motor<br>**Hundreds: Pump clean**<br>0:Invalid 1:valid<br>**Thousands: Reserved** | ○ | |
| A0-01 | CVT Target voltage | 81.0% | 0.0%～100.0% | ● | |
| A0-02 | VOC Voltage | read-only | 0.0V～999.9V | | |
| A0-03 | MPPT Voltage upper limit | 100.0% | 20.0%～200.0% | ● | |
| A0-04 | MPPT Voltage Low Limit | 50.0% | 20.0%～200.0% | ● | |
| A0-05 | MPPT Search interval | 1.0s | 0.1s～30.0s | ● | |
| A0-06 | MPPT Adjust gain | 100 | 0～9999 | ● | |
| A0-07 | Frequency adjusting gain | 10.0%(AM)<br>40.0%( PM) | 0.1%～500.0% | ● | |

| | | | | | |
|---|---|---|---|---|---|
| A0-08 | Photovoltaic water pump function selection 1 | 1100H | 0: Invalid ； 1: valid<br>**Unit:**Constant torque frequency limit selection<br>**Tens:**Reserved<br>**Hundreds:**Voltage surge updates VOC voltage<br>**Thousands:** Fast frequency falling function | ● | |
| A0-09 | Constant torque frequency limiting factor | 100.0% | 80.0%～150.0% | ● | |
| A0-10 | Voltage surge threshold | 5.0% | 0.0%～20.0% | ● | |
| A0-11 | Fast frequency reduction threshold | 5.0% | 3.0%～15.0% | ● | |
| A0-12 | Fast frequency reduction gain | 2 | 0～20 | ● | |
| A0-13 | Frequency adjusted filtering time | 0.002 | 0.001～2.000S | ● | |
| A0-14 | Sleep voltage threshold | 250V | 0～1000V | ● | |
| A0-15 | Sleep recovery voltage | 350V | 0～1000V | ● | |
| A0-16 | Waiting time of sleep and shutdown | 60.0s | 0.0～3000.0s | ● | |
| A0-17 | Detection of low frequency protection frequency | 10.00Hz | 0.00～300.00Hz | ● | |
| A0-18 | Detection time of low frequency protection | 10.0s | 0.0～3000.0s | ● | |
| A0-19 | Automatic recovery time of low frequency protection | 10.0s | 0.0～3000.0s | ● | |
| A0-20 | Detection current of dry protection | 0.0A | 0.0～999.9A | ● | |
| A0-21 | Detection time of drying protection | 10.0s | 0.0～3000.0s | ● | |
| A0-22 | Automatic recovery time of dry protection | 60.0s | 0.0～3000.0s | ● | |
| A0-23 | Detection current of over current protection | 0.0A | 0.0A～999.9A | ● | |
| A0-24 | Detection time of Over current protection | 10.0s | 0.0s～3000.0s | ● | |
| A0-25 | Automatic recovery time of over current protection | 60.0s | 0.0s～3000.0s | ● | |
| A0-26 | Minimum power protection value | 0.00kw | 0.00kw～650.00kw | ● | |
| A0-27 | Detection time of minimum power protection | 10.0s | 0.0s～3000.0s | ● | |
| A0-28 | Automatic recovery time of minimum power protection | 60.0s | 0.0s～3000.0s | ● | |

| | | | | | |
|---|---|---|---|---|---|
| A0-29 | Alarm recovery mode | 0000H | 0:Autorecovery 1:Manual recovery<br>**Unit:**Low frequency protection<br>**Tens:**Dry protection<br>**Hundreds:**Over current and overload protection<br>**Thousands:** Minimum power protection | ● | |
| A0-30 | Detection time of full water protection | 10.0s | 0.0s～3000.0s | ● | |
| A0-31 | Exit time of full water protection | 10.0s | 0.0s～3000.0s | ● | |
| A0-32 | Accessibility function | 0110H | **Unit:**<br>0: The upper limit is limited by the given frequency<br>1: The upper limit frequency is limited by the rated frequency of the motor<br>**Tens:**<br>0: The min Hz is 0;<br>1: The lower limit frequency is minimum to 1/4 of the motor rated frequency | | |
| A0-33 | DC current correction bias | 0.01A | 0.00A～99.99A | ● | |
| A0-34 | DC current correction ratio | 100.0% | 0.0%～999.9% | ● | |
| A0-35 | Power curve 0 | 0.50kw | 0.00kw～99.99kw | ● | |
| A0-36 | Power curve 1 | 1.00kw | 0.00kw～99.99kw | ● | |
| A0-37 | Power curve 2 | 1.50kw | 0.00kw～99.99kw | ● | |
| A0-38 | Power curve 3 | 2.00kw | 0.00kw～99.99kw | ● | |
| A0-39 | Power curve 4 | 2.50kw | 0.00kw～99.99kw | ● | |
| A0-40 | Flow curve 0 | 0.0$m^3$/h | 0.0$m^3$/h～999.9$m^3$/h | ● | |
| A0-41 | Flow curve 1 | 5.0 $m^3$/h | 0.0 $m^3$/h～999.9 $m^3$/h | ● | |
| A0-42 | Flow curve 2 | 10.0$m^3$/h | 0.0 $m^3$/h～999.9$m^3$/h | ● | |
| A0-43 | Flow curve 3 | 15.0$m^3$/h | 0.0 $m^3$/h～999.9$m^3$/h | ● | |
| A0-44 | Flow curve 4 | 20.0$m^3$/h | 0.0 $m^3$/h～999.9$m^3$/h | ● | |
| A0-45 | Flow calculation correction bias | 0.0$m^3$ | 0.0$m^3$～999.9$m^3$ | ● | |
| A0-46 | Flow correction gain | 100.0% | 0.0%～999.9% | ● | |
| A0-47 | Clearing cycle of daily flow / daily electricity | 7.0h | 0.0h～24.0h | ● | |
| A0-48 | Initiating frequency of dry run protection | 0.00Hz | 0.00Hz～150.00Hz | ● | |
| A0-49 | Resvered | --- | --- | ● | |
| A0-50 | Resvered | --- | --- | ● | |
| A0-51 | Resvered | --- | --- | ● | |
| A0-52 | Water tank fulling Level detecting method | 0 | 0: Single point detect<br>1: Two points detect | ● | |

| | | | | | |
|---|---|---|---|---|---|
| A0-53 | Pump cleaning setting frequency | 25.00Hz | 0.00Hz～300.00Hz | ● | |
| A0-54 | FWD cleaning time | 60 | 0s～3000s | ● | |
| A0-55 | REV cleaning time | 60 | 0s～3000s | ● | |
| A0-56 | Recycle times of cleaning | 10 | 0～100h | ● | |

## 5.3 Terminal input function selection

| | | | |
|---|---|---|---|
| 0: No function | 1: FWD | 2: REV | 3: 3-line running(DI) |
| 4: FWD JOG | 5: REV JOG | 6: Free stop | 7: Emergency stop |
| 8: Fault reset | 9: External Fault input | 10: Frequency UP | 11: Frequency DW |
| 12: UP/DW clear | 13: Channel A to Channel B | 14: Frequency channel switched to A | 15: Frequency channel switched to B |
| 16: Multi-speed terminal 1 | 17: Multi-speed terminal2 | 18: Multi-speed terminal3 | 19: Multi-speed terminal4 |
| 20: PID control cancel | 21: PID control pause | 22: PID trait switch | 23: PID gain switch |
| 24: PID given switch 1 | 25: PID given switch2 | 26: PID given switch3 | 27: PID feedback switch1 |
| 28: PID feedback switch2 | 29: PID feedback switch3 | 30: PLC pause | 31: PLC restart |
| 32: ACC/DEC time selection terminal 1 | 33: ACC/DEC time selection terminal 2 | 34: ACC/DEC pause | 35: Swing frequency input |
| 36: Swing frequency pause | 37: Swing frequency reset | 38: Speed torque control switch | 39: Run pause |
| 40: Timer trigger terminal | 41: Timer clear terminal | 42: Counter input terminal | 43: Counter clear terminal |
| 44: DC braking command | 45: Pre-excitation command terminal | 46: Command channel switch to keyboard | 47: Command channel switch toterminal |
| 48: Command channel switch to RS485 | 49: Command channel switch to expansion card | 50: Operation banned | 51: FWD banned |
| 52: REV banned | 53: Water-full detect alarm 1 | 54: Water-full detect alarm 2 | 55: Hybrid mode |
| 56: Dry running input | 57: MPPT tracking stop | Reserved | |

## 5.4 Terminal output function selection

| | | | |
|---|---|---|---|
| 0: No output | 1: Inverter running | 2: REV running | 3: FWD running |
| 4: Fault warning 1,enable output including fault reset auto period | 5: Fault trip alarm 2(no alarm when fault self-recovery) | 6: External fault stop | 7: External fault stop Under voltage |
| 8: Ready for running | 9: Output frequency level detection 1(FDT1) | 10: Output frequency level detection 2(FDT2) | 11: Reach given frequency |
| 12: 0 speed running | 13: Reach upper limit frequency | 14: Reach lower frequency limit | 15: Program run cycle completed |
| 16: Program running segment completed | 17: PID feedback exceeds upper limit | 18: PID feedback under lower limit | 19: PID feedback sensor wires break |
| 20: Timer time arrived | 21: Counter reaching max value | 22: Counter reach set value | 23: Braking |
| 24: PG feedback wire break | 25: Emergency stopping | 26: Load pre-alarm output 1 | 27: Load pre-alarm output 2 |
| 28: RS485 given | Reserved | | |

## 5.5 Monitoring code

| Function code number | Function name | Unit and definition | Address |
|---|---|---|---|
| U1-00 | Given frequency | 0.01Hz | 2100H |
| U1-01 | Output frequency | 0.01Hz | 2101H |
| U1-02 | Output current | 0.1A | 2102H |
| U1-03 | DC voltage of PV arrays | 0.1V | 2103H |
| U1-04 | Output voltage | 0.1V | 2104H |
| U1-05 | Motor(pump)speed | 1RPM | 2105H |
| U1-06 | Intput voltage | 0.1V | 2106H |
| U1-07 | Output power | 0.1% | 2107H |
| U1-08 | Given torque | 0.1% | 2108H |
| U1-09 | Output torque | 0.1% | 2109H |
| U1-10 | PID given value | 0.1% | 210AH |
| U1-11 | PID feedback value | 0.1% | 210BH |
| U1-12 | Module temperature 1 | 0.1℃ | 210CH |
| U1-13 | Module temperature 2 | 0.1℃ | 210DH |
| U1-14 | Input terminal DI on state | See input terminal diagram | 210EH |
| U1-15 | Output terminal DO on state | See output terminal diagram | 210FH |
| U1-16 | Input value of analog signal AI1 | 0.001V | 2110H |
| U1-17 | Input value of analog signal AI2 | 0.001V/0.001mA | 2111H |
| U1-18 | Pulse signal HDI input value | 0.001kHz | 2112H |
| U1-19 | Analog output AO1 | 0.01V | 2113H |
| U1-20 | Analog output AO2 | 0.01V/0.01mA/0.01kHz | 2114H |
| U1-21 | Counter count values | | 2115H |
| U1-22 | Running time of this time | 0.1H | 2116H |
| U1-23 | Cumulative running time | H | 2117H |
| U1-24 | Power factor Angle | 1° | 2118H |
| U1-25 | Power grade of the Inverter | kW | 2119H |
| U1-26 | Rated voltage of the Inverter | V | 211AH |
| U1-27 | Rated current of the Inverter | A | 211BH |
| U1-28 | Software version | | 211CH |

| | | | |
|---|---|---|---|
| U1-29 | Inverter Working status | 0:Stop<br>1:Running<br>2:Sleep<br>3:Low speed protection<br>4:Dry run protection<br>5:Overcurrent protection<br>6:Minimum power protection | 211DH |

## 5.6 Fault code table

| Communication code | Fault display | Fault name | Troubleshooting | Solution |
|---|---|---|---|---|
| 1 | E. SC1 | System abnormal | ● The acceleration time is set too short;<br>● The output of the inverter is short-circuited between phases or to ground;<br>● The module is damaged;<br>● Electromagnetic interference. | ● Prolong the acceleration time appropriately;<br>● Check peripheral equipment and restart after troubleshooting;<br>● Seek technical support from manufacturers;<br>● Check the wiring, grounding, and shielding. |
| 4 | E.oC1 | ACC over current | ● The acceleration time is set too short;<br>● Start the rotating motor;<br>● The capacity of the inverter is too small. | ● Prolong the acceleration time appropriately;<br>● The motor stops or restarts after speed tracking;<br>● Use inverters with matching capacity levels |
| 5 | E.oC2 | DEC over current | ● The deceleration time is set too short;<br>● Large potential energy load or load inertia;<br>● The capacity of the inverter is too small. | ● Prolong the deceleration time appropriately;<br>● External braking resistor or braking unit;<br>● Select the inverter with matching capacity level. |
| 6 | E.oC3 | Overcurrent at constant speed | ● Sudden load change;<br>● The grid voltage is low. | ● Check the change of load and eliminate it;<br>● Check the input power and remove the fault. |
| 7 | E.oU1 | ACC over voltage | ● Power supply voltage fluctuation exceeds the limit;<br>● Start the rotating motor. | ● Detect the grid voltage and remove the fault;<br>● The motor stops or restarts after speed tracking; |
| 8 | E.oU2 | DEC over voltage | ● The DEC time is set too short;<br>● Load potential energy or inertia is too large;<br>● The power supply voltage has exceeded the limit. | ● Prolong the DEC time appropriately;<br>● Increase the capacity of the inverter or add a braking unit;<br>● Check the input power and remove the fault. |

| | | | | |
|---|---|---|---|---|
| 9 | E.oU3 | Overvoltage at constant speed | ● The power supply voltage has exceeded the limit. | ● Check the input power and remove the fault. |
| 11 | E.LU2 | Under voltage when running | ● The power supply voltage is too low;<br>● There is a large inrush current in the power grid;<br>● The internal DC main contactor is not closed. | ● Check the input power and remove the fault;<br>● Improve the power supply system;<br>● Seek technical support from the manufacturer. |
| 12 | E.oL1 | Motor overload | ● The grid voltage is low;<br>● Motor overload protection coefficient is not set properly;<br>● The motor is stalled or the load is too heavy;<br>● Low speed running. | ● Check the input power;<br>● Use inverters with matching capacity levels;<br>● For long-term low-speed operation, select a dedicated motor.<br>● Speed regulation overload coefficient |
| 13 | E.oL2 | Inverter overload | ● The load is too heavy<br>● The acceleration time is set too short;<br>● Start the rotating motor; | ● Use inverters with matching capacity levels;<br>● Prolong the acceleration time appropriately;<br>● The motor stops or restarts after speed tracking; |
| 14 | E.ILF | Input phase loss | ● The input power is abnormal;<br>● The internal circuit is abnormal; | ● Check the input power;<br>● Seek technical support from the manufacturer. |
| 15 | E.oLF | Output phase loss | ● The three-phase output of the inverter is lacking. | ● Check the output voltage, current and motor wiring; |
| 16 | E.oH1 | Motor overheat | ● The ambient temperature is too high;<br>● The air duct is blocked or the fan is abnormal;<br>● The temperature detection circuit is faulty. | ● Make the operating environment of the inverter meet the specifications;<br>● Drain the air duct or replace the fan of the same model;<br>● Seek technical support from the manufacturer. |
| 17 | E.oH2 | Inverter overheat | ● The ambient temperature is too high;<br>● The air duct is blocked or the fan is abnormal;<br>● The temperature detection circuit is faulty. | ● Make the operating environment of the inverter meet the specifications;<br>● Drain the air duct or replace the fan of the same model;<br>● Seek technical support from the manufacturer. |
| 18 | E. EF | External fault | ● External equipment failure protection action. | ● Check external equipment. |
| 19 | E.SE1 | RS485 communication fault | ● The baud rate is set incorrectly;<br>● Communication connection is broken;<br>● The communication format does not match the host computer. | ● Set the matching baud rate;<br>● Check communication connections;<br>● Set the matching communication format. |

| | | | | |
|---|---|---|---|---|
| 20 | E.HAL | Current detection fault | ● Detection circuit failure;<br>● Motor phase imbalance. | ● Seek technical support;<br>● Check the motor and wiring. |
| 21 | E.AT1 | Motor static self-learning fault | ● Motor detection timeout;<br>● Start static detection while the motor is rotating;<br>● The difference between the capacity of the motor and the inverter is too large;<br>● The motor parameters are set incorrectly. | ● Check the motor wiring;<br>● Test after the motor stops steady;<br>● Replace the inverter model;<br>● Reset according to the motor nameplate. |
| 26 | E.EEP | Storage fault | ● Electromagnetic interference during storage;<br>● EEPROM is damaged. | ● Re-enter and save;<br>● Seek technical support from the manufacturer. |
| 23 | E.PID | PID feedback fault | ● PID feedback disconnect alarm upper limit<br>● PID feedback disconnection alarm lower limit<br>● The feedback sensor is faulty or badly wired | ● Check the sensor status<br>● Correct wiring<br>● Confirm the setting values of FA-27 and FA-28 |
| 40 | E.Gnd | Ground short circuit fault | ● The motor short circuit to ground | ● Check the UVW of inverter is connected to the ground |
| 28 | E. PG | PG card connection fault | ● PG card connect the inverter fault | ● check the PG wiring |
| 10 | E.OU4 | Over voltage at stop | ● The power supply voltage has exceeded the limit. | ● Check the input power and remove the fault.<br>● Seek technical support from the manufacturer. |
| 22 | E.AT2 | Motor dynamic self-learning fault | ● Start detection while the motor is rotating;<br>● Motor with load detection;<br>● Motor detection timeout;<br>● The difference between the capacity of the motor and the inverter is too large;<br>● The motor parameters are set incorrectly. | ● Test after the motor stops steady;<br>● Disconnect the motor load and re-test;<br>● Check the motor wiring;<br>● Replace the inverter model;<br>● Reset according to the motor nameplate. |
| 34 | E.IAE | Learning fault of Initial position angle | ● The parameters set fault;<br>● Detection circuit fault; | ● Replacement of inverter type;<br>● Reset according to motor nameplate.<br>● Seek technical support from the manufacturer. |
| 36 | E.DEV | Speed deviation excess | ● The Speed over the max frequency.<br>● Detection circuit fault; | ● Change the Max frequency and Upper frequency.<br>● Seek technical support from the manufacturer. |

| | | | | |
|---|---|---|---|---|
| 37 | E.SPD | Stall protection | ● Inverter over voltage;<br>● Detection circuit fault; | ● Change the over voltage set.<br>● Seek technical support from the manufacturer. |
| 30 | E.LD1 | Load protection 1 | ● The motor is stalled over the set value.<br>● Detection circuit fault; | ● Change the set value.<br>● Seek technical support from the manufacturer. |
| 31 | E.LD2 | Load protection 2 | ● The motor is stalled over the set value.<br>● Detection circuit failure; | ● Change the set value.<br>● Seek technical support from the manufacturer. |
| 33 | E.LOC | CPU verification fault | ● CPU is Locked. | ● Seek technical support from the manufacturer. |
| 35 | E.PST | Synchronous motor out-of step | ● The motor is stalled or the load is too heavy;<br>● Detection circuit failure; | ● Change the Power of inverter;<br>● Seek technical support from the manufacturer. |

**Alarm code table**

| Communication code | Alarm display | Alarm name | Communication code | Alarm display | Alarm name |
|---|---|---|---|---|---|
| 64 | A.PID | PID feedback wires brake alarm | 71 | A.LoC | CPU Locked alarm |
| 65 | A.LD1 | Load protection alarm 1 | 72 | A.SLP | Sleep mode alarm |
| 66 | A.LD2 | Load protection alarm 1 | 73 | A.LFr | Low frequency alarm |
| 67 | A.DEF | Speed deviation excess alarm | 74 | A.LLd | Dry running alarm |
| 68 | A.SPD | Stall protection alarm | 75 | A.OLd | Over current alarm |
| 69 | A.SE | RS485 Communication alarm | 76 | A.LPr | Minimum power alarm |
| 70 | A.oLF | Output phase loss alarm | 77 | A.FuL | Water full alarm |

# Chapter 6 Regular Inspection and Maintenance

## 6.1 Inspection

Frequency inverter is composed by semi-conductive components, passive electronic component and motive component. All of these components have useful life. Even under normal working environment, some of the components cannot work after the life time. To avoid malfunction, daily checking, periodic overhaul, component changing and other maintenance should be carried out to prevent.

●Daily checking: To avoid machine damage and to prolong life time, please check the following items every day.

| Check item | Check content | Standard of criterion |
|---|---|---|
| Input and output voltage | Check whether the power supply voltage meets the requirements and whether there is phase failure | Refer to the requirements of the name plate |
| Operating environment | Confirm whether the installation environment meets the requirements | Identify the source and deal with it properly |
| Cooling system | Working condition of cooling fan of frequency converter | There is no dirt and debris blocking the air duct |
| Motor | Check if there is abnormal vibration or noise | Whether there is abnormal heating, abnormal noise and vibration |
| Load condition | Whether the output current of frequency converter is higher than the rated value of motor or frequency converter and lasts for a certain time | Confirm whether there is overload and whether the inverter selection is correct |

●Periodic inspection:According to the operating environment and working conditions, the frequency converter shall be inspected regularly every 3-6 months.

| Check item | Check content | Strategy adopted |
|---|---|---|
| Motor | ● Insulation resistance inspection;<br>● Check if there is abnormal vibration or noise. | ● Tighten machine and electric connection and lubricate the machine components. |
| Electric connection | ● Whether there is any discoloration of the wires and connection parts, whether the insulation layer is damaged, cracked, discolored, and aged;<br>● Whether the connection terminals are worn, damaged, or loose; | ● Replace damaged wires;<br>● Tighten loose terminals and replace damaged terminals;<br>● Measure the ground resistance and tighten the corresponding ground terminal. |
| Mechanical connection | ● Whether there is abnormal vibration and noise, and whether there is loosening. | ● Tighten, lubricate, and replace defective parts. |
| semi-conductive component | ● Whether it is stained with garbage and dust;<br>● Whether there is a noticeable change in appearance. | ● Clean operating environment;<br>● Replace damaged parts. |
| Electrolytic capacitor | ● Check for leaks, discoloration, cracks, and exposed, swollen, cracked, or leaking safety valves. | ● Replace damaged parts. |

| Check item | Check content | Strategy adopted |
|---|---|---|
| PCB | ● Check if there is any odor, discoloration, severe rust, and whether the connector is correct and reliable. | ● Fastening connection<br>● Clean the printed circuit board;<br>● Replace damaged printed circuit boards; |
| Cooling system | ● Whether the cooling fan is damaged or blocked;<br>● Whether the heat sink is stained with garbage, dust, or dirt;<br>● Whether the air intake or exhaust is blocked or contaminated with foreign objects. | ● Clean operating environment;<br>● Replace damaged parts. |
| Keyboard | ● Whether it is damaged. Check whether display is complete. | ● Change damaged component |

**Attention:**

Do not perform related operations with the power on, otherwise there is a danger of death due to electric shock. When carrying out related work, please cut off the power and confirm that the DC voltage of the main circuit has dropped to a safe level. Wait 5 minutes before carrying out related work.

- Component replacement:Different kinds of parts have different service life. The service life of parts is closely related to the service environment and maintenance condition. Cooling fan and electrolytic capacitor are vulnerable parts. Carry out daily inspection according to the table below. If there is any abnormality, please replace it in time.

| Part name | life cycle | Cause of damage |
|---|---|---|
| Fan | 2~3 years | Bearing wear and blade aging |
| Electrolytic capacitor | 4~5 years | The environment temperature is high and the electrolyte volatilizes |

The replacement of other components requires very strict maintenance technology and product familiarity, and after replacement, it must be strictly tested before it can be used. Therefore, it is not recommended that users replace other internal components by themselves. If it really needs to be replaced, please contact the agent where you purchased the product or our sales department.

## 6.2 Product storage

After purchasing the frequency converter, the temporary storage and long-term storage must pay attention to:

- When storing, try to put them into the packing box of our company according to the original package;
- The long-term storage will lead to the deterioration of the electrolytic capacitor. It must be ensured that the electrolytic capacitor is powered on once within 2 years for at least 5 hours, and the input voltage must be slowly raised to the rated value with a voltage regulator.

# Chapter 7 Operation Guidance

## 7.1 Asynchronous Motor Pump Drive Operation Guidance

1) Wiring:

Confirmed the solar pump drive if mating with motor.

Correctly connecting "+""-" of solar panel to corresponding "PV+""PV-" pole of inverter wiring terminals. Otherwise it will cause inverter damage.

Connect motor wire and ground wire to corresponding U, V, W, E terminals.

2). Parameters setting and trial run:

Set F0-01 to 0, F0-02 for 1, and F0-09, F0-11, F0-14, F0-15 parameters setting according to application site.

Set motor(pump) parameters according to nameplate of pump.Set solar pump MPPT mode A0-00 for 1 or 2.

Run the inverter, and confirm the motor running direction.

3) Common problems and solutions

a, Q:Well-lit conditions, the pump is running, but the water is very small.

A:Check if the pump motor direction is reversed.

b, Q:Well-lit conditions, the drive is in standby mode 0.00Hz.

A:Check U1-29, observe what protection status is the drive in currently, check whether the parameters set is reasonable.

c, Q:DC current is incorrectly displayed.

A:Adjust A0-33 ,A0-34 for calibration.

d, Q:Well-lit conditions, frequency severe beating during operation.

A:Reasonably adjust A0-07value, the adjustment is recommended to be in the vicinity of the default, too big or too small will cause frequency oscillation.

## 7.2 Synchronous Motor Pump Drive Operation Guidance

1) Wiring:

Confirm if the solar pump drive matches with the motor.

Connecting "+""-" of solar panel to corresponding"PV+""PV-"pole of inverter wiring terminals. Otherwise it will cause inverter damage.

Connect motor wire and ground wire to corresponding U, V, W, E terminals.

2) Parameters setting and trial run:

a.Set F0-01 to 3, F0-02 for 1, and F0-09, F0-11,F0-14、F0-15can be set according to demand.

b.Set motor (pump) parameters according to nameplate of pump. Then Set F2-20for 1, the keypad will show "Tune", press RUN to start motor auto tuning. This process takes about three minutes;

Note:

1. If you can disconnect the motor and load, self-learning would be better;

2. The self-learning need to be done with enough sunshine and when the solar panels can provide enough energy.

c. Set solar pump MPPT mode A0-00 for 1 or 2.

d.Run the inverter, and confirm the motor running direction.

3) Common problems and solutions

a, Q:Well-lit conditions, the pump is running, but the water is very small.

A:Check if the pump motor direction is reversed.

b, Q:Well-lit conditions, the drive is in standby mode 0.00Hz.

A:Check U1-29, observe what protection status is the drive in currently, check whether the parameters set is reasonable.

c, Q:DC current is incorrectly displayed.

A:Adjust A0-33,A0-34 for calibration.

d, Q:Well-lit conditions, frequency severe beating during operation.

A:Reasonably adjust A0-07 value, the adjustment is recommended to be in the vicinity of the default, too big or too small will cause frequency oscillation.

## 7.3 Introduction of photovoltaic water pump function

**A. Sleep Function**

During the photovoltaic pump operation, the inverter will go into sleep state when the DC voltage provided by solar panels is lower than A0-14 (sleep voltage threshold) due to objective factors, while the keyboard warning "A.SLP"; when DC voltage provided by solar panels rises back to A0-15 (sleep recovery voltage) point, start timing and after A0-16 (sleep shutdown waiting time), the drive starts running.

**B. Low-frequency Protection Function**

During the operation of the photovoltaic pump, for some reason, the output frequency is lower than A0-17 (low frequency detection frequency), and after A0-18 (under frequency detection time) time, enters into the standby protection state, while the keyboard warning "A.LFr"; after entering into the standby protection state and after A0-19 (frequency protection automatic recovery) time, automatically resume to running state.

**C. Dry Run Protection**

During the operation of the photovoltaic pump, for some reason, the output current is less than A0-20 (dry protection current detection), and after A0-21(dry protection detection time) time, enters into standby protection state, while the keyboard warning "A.LLd"; after entering into the standby protection state and after A0-22 (dry protection automatic recovery)time, automatically resume to running state.

**D. Over-current Protection**

During the operation of the photovoltaic pump, for some reason, the output current is greater than A0-23(over current point setting), and after A0-24 (over current protection detect time) time, enters into standby protection state, while the keyboard warning " A.oLd "; after entering into the standby protection state and after A0-25 (over current protection auto recovery)time, automatically resume to running state.

**E. Minimum Power Protection**

During the operation of the photovoltaic pump, for some reason, the output power is less than A0-26(minimum power protection value), and after A0-27 (minimum power protection detection time) time, enters into standby protection state, while the keyboard warning "A.LPr"; after entering into the standby protection state and after A0-28 (minimum power automatic recovery)time, automatically resume to running state.

**F. Full Water Protection**

Detect the water full alarm and low water level through two DI terminals, realizing automatic water level control. Where in A0-30 is the water overfill protection detection time and A0-31 is full water protection exit time, DI3 terminal is photovoltaic water full detection alarm signal input, DI4 terminal is photovoltaic water full detection alarm reset input,the warning signal is shown as "A.Ful".

G. **Alarm Recovery Mode**:

0: automatic recovery; 1: manual recovery

This option is for low frequency protection, dry protection, over-current protection, minimum power function; you can select the alarm restoration by A0-29. When you select 0 for automatic recovery, during fault warning displaying, you can also press the "RESET" button to stop operation; during fault warning displaying, you can press the "RESET" button to manually clear, you can also press "RESET" button to achieve stop operation.

**H. PQ Curve Function**

This model provides a self-defined PQ curve for users to set up five groups of PQ corresponding points according to the pump cases, to achieve real-time traffic speed, daily flow, cumulative flow, generating capacity, cumulative electricity consumption; of which by default, daily flow and generating capacity are calculated based on 7h in a day.

**I. Status Check**

When the photovoltaic pump is running, you can check U1-29 to confirm the current operating status.

# Appendix1:Modbus Communication Protocol

- **Communication Frame Structure**

Communication data format is as follows: The byte composition: Including initiation bit, 8 data bit, check bit and stop bit.

| Initiation Bit | Bit1 | Bit2 | Bit3 | Bit4 | Bit5 | Bit6 | Bit7 | Bit8 | Check bit | Stop bit |
|---|---|---|---|---|---|---|---|---|---|---|

One frame message must be transmitted as a continued data flow, and if there is a interval over 1.5 byte before ending, the receiving equipment will clear the half-baked information. And the next byte will be considered as the address field of a new frame. Similarly, if the interval between a new frame start-up and the former frame is smaller than 3.5 byte time, the receiving equipment will consider that it is the continuation of former one frame. Since the jumbled frame, the final CRC checking value is incorrect, which would lead to the communication mistake.

- **Communication command and examples**

Read command:03H,Read N words.Up to 20 words read in succession.

Example:The slave machine address is 01H,read 3 successive words of start address 2100H(U1-00), The structure of the frame is described as follows:

| RTU Main machine command | | RTU slave machine return message(normal) | | RTU slave machine return message(abnormal) | |
|---|---|---|---|---|---|
| START | 3.5 bytes | START | 3.5 bytes | START | 3.5 bytes |
| Slave address | 01H | Slave address | 01H | Slave address | 01H |
| Command code | 03H | Command code | 03H | Command code | 83H |
| start address high bits | 21H | Return data numbers | 06H | Fault code | 04H |
| start address low bits | 00H | high bit of 2100H | 13H | CRC CHK low bits | 40H |
| Data numbers high bits | 00H | low bit of 2100H | 88H | CRC CHK high bits | F3H |
| Data numbers low bits | 03H | high bit of 2101H | 00H | END | 3.5 bytes |
| CRC CHK low bits | 0FH | low bit of 2101H | 00H | | |
| CRC CHK high bits | F7H | high bit of 2102H | 00H | | |
| END | 3.5 bytes | low bit of 2102H | 00H | | |
| | | CRC CHK low bits | 90H | | |
| | | CRC CHK high bits | A6H | | |
| | | END | 3.5 bytes | | |

**Write command:**06H,Write a word data to the specified data address, this command can change the parameter of inverter.

**Example:**Write 1388Hto the address 3000H of the slave controller. The structure of the frame is described as follows:

| RTU Main machine command | | RTU slave machine return message(normal) | | RTU slave machine return message(abnormal) | |
|---|---|---|---|---|---|
| START | 3.5 bytes | START | 3.5 bytes | START | 3.5 bytes |
| Slave address | 01H | Slave address | 01H | Slave address | 01H |
| Command code | 06H | Command code | 06H | Command code | 86H |
| start address high bits | 30H | Data address high bits | 30H | Fault code | 01H |
| start address low bits | 00H | Data address low bits | 00H | CRC CHK low bits | 83H |
| Data high bits | 13H | Data high bits | 13H | CRC CHK high bits | AOH |
| Data low bits | 88H | Data low bits | 88H | END | 3.5 bytes |
| CRC CHK low bits | 8BH | CRC CHK low bits | 8BH | | |
| CRC CHK high bits | 9CH | CRC CHK high bits | 9CH | | |
| END | 3.5 bytes | END | 3.5 bytes | | |

- **Communication Control Parameter Group Address Specification:**

| Function Specification | Address Definition | Data Meaning Specification | | | R/W |
|---|---|---|---|---|---|
| Communication Given Frequency | 0x3000 or 0x2000 | 0～60,000 is corresponding to 0.00Hz～600.00Hz | | | W/R |
| Communication Command Setting | 0x3001 or 0x2001 | 0000H:No order<br>0001H:FWD running<br>0002H:REV running<br>0003H:FWD jog<br>0004H:REV jog | | 0005H:DEC stop<br>0006H:free stop<br>0007H:Fault reset<br>0008H:Running banned command<br>0009H:Running allowed command | W/R |
| State of Inverter | 0x3002 or 0x2002 | Bit0 | 0: stop | 1:running | R |
| | | Bit1 | 0:non-acc state | 1: ACC | |
| | | Bit2 | 0:non-dec state | 1: DEC | |
| | | Bit3 | 0: Forward | 1: REV | |
| | | Bit4 | 0: normal | 1: fault | |
| | | Bit8 | 0: normal | 1: Sleep | |
| | | Bit9 | 0: normal | 1:Low frequency | |

| Function Specification | Address Definition | Data Meaning Specification | | | R/W |
|---|---|---|---|---|---|
| | | Bit10 | 0: normal | 1:Dry run | |
| | | Bit11 | 0: normal | 1:Over current | |
| | | Bit12 | 0: normal | 1:Low power | |
| Frequency Inverter Fault | 0x3003 or 0x2003 | current inverter fault code(refer to fault code table) | | | R |
| Communication Given Upper | 0x3004 or 0x2004 | 0～32000 is corresponding to 0.00Hz～320.00Hz | | | W/R |
| Communication Torque Setting | 0x3005 or 0x2005 | 0～1000 is corresponding to 0.0～100.0% | | | W/R |
| The FWD Max Frequency limit in Torque Control | 0x3006 or 0x2006 | 0～1000 is corresponding to 0.0～100.0% | | | W/R |
| The REV Max Frequency limit in Torque Control | 0x3007 or 0x2007 | 0～1000 is corresponding to 0.0～100.0% | | | W/R |
| Communication Given PID Setting | 0x3008 or 0x2008 | 0～1000 is corresponding to 0.0～100.0% | | | W/R |
| Communication Given PID Feedback | 0x3009 or 0x2009 | 0～1000 is corresponding to 0.0～100.0% | | | W/R |
| AO output | 0x3021 or 0x2021 | 0-10000 corresponds output 0-10V,0-20mA | | | R |

**Note:** The other function code addresses refer to “Communication Address “of function code table. While using writing command (06 H), if the highest digit of parameter function code address domain is 0, it only write in the RAM of inverter, and on storage when power off; if the high half digit of parameter function code address is 1, it write in EEPROM, which means power off storage. For instance, F0 parameter group: 0X00XX (RAM); 0X10XX (EEPROM)

● **List of fault code meanings for abnormal response information from salve machine:**

| Fault Code | Meanings | Fault Code | Meanings |
|---|---|---|---|
| 1 | Order code fault | 7 | Reserved |
| 3 | CRC checking fault | 8 | Inverter busy(EEPROM is storing) |
| 4 | Illegal address | 9 | Value over limit |
| 5 | Illegal data | 10 | Reserved parameters can’t be modify |
| 6 | Unable to modify when running | 11 | Number of Bytes wrong when reading |