

# Canroon

## CV900S Series Solar Pumping Inverter User Manual

### 1. Technical Index and Specification

|                     |                                        |                                                                                                     |
|---------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------|
| Input/Output        | AC input voltage (V)                   | 1-phase (2S) : 220~260<br>3-phase (4T) : 380~480                                                    |
|                     | Max. DC voltage (V)                    | 1-phase (2S) : 400<br>3-phase (4T) : 800                                                            |
|                     | Start-up voltage (V)                   | 1-phase (2S) : 180<br>3-phase (4T) : 280                                                            |
|                     | Lowest working voltage (V)             | 1-phase (2S) : 150<br>3-phase (4T) : 250                                                            |
|                     | Recommended DC input voltage range (V) | 1-phase (2S) : 200~390<br>3-phase (4T) : 300~750                                                    |
|                     | Recommended MPP voltage (V)            | 1-phase (2S) : 330<br>3-phase (4T) : 550                                                            |
| Environment         | Ambient temperature                    | -10°C~+40°C<br>(please run the inverter in derated capacity when ambient temperature is -30°C~50°C) |
|                     | Ambient humidity                       | 5%~95%RH, without condensing drops                                                                  |
|                     | Surroundings                           | Indoors (without direct sunlight, corrosive or flammable gas, oil fog and dust)                     |
|                     | Altitude                               | Running in derated capacity above 1000m, derate 10% for every 1000m rise.                           |
| Structure           | Protection level                       | IP20                                                                                                |
|                     | Cooling method                         | Air cooling with fan control                                                                        |
| Installation Method |                                        | Wall-hanging type, cabinet type                                                                     |

### 2. Safety and Installation Precautions of Frequency Converter

#### 2.1 Safety, Installation Precautions, Use Environment, Installation Direction and Space

##### 2.1.1 Safety Precautions

- ▲ Do not install this equipment in an explosive gas atmosphere, or there will be explosion hazards.
- ▲ Only qualified individuals should proceed with wiring, or there will be electric shock hazards. Do not conduct any wiring during the system power on to avoid the electric shock..
- ▲ Do not touch control terminals, internal circuit board and its components, or there will be electric shock hazard.
- ▲ Earth terminal must be exactly grounded when using inverter. Grounding must be confirmed with the national electric safety regulation and other electric code.
- ▲ Do not connect AC power to output terminal (U, V, W) of inverter. The only terminal the AC power allowed to be connected is R, S, T (or L1, L2 single--phrase source inverter).
- ▲ Static electricity on human body can damage MOS device. Do not touch PCB and IGBT without anti-static measure.
- ▲ Do not lose screws, spacers and other metallic foreign bodies inside the driver to avoid fire hazard and driver damage.
- ▲ Do not connect 220V AC power to internal control terminal of the driver, or there will be serious damage to the driver.
- ▲ If overcurrent protection occurs after start the driver, confirm again the external wiring and then power on and run the driver.
- ▲ Do not switch off the power to stop the driver. Cut off power source after the motor stops running.
- ▲ Do not install the driver in places with direct sunlight.

##### 2.1.2 Installation Precautions

|                                                                                                                                                                                                                 |               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|                                                                                                                              | <b>DANGER</b> |
| <b>1. Ensure the power has been cut off before wiring.</b><br>Electric shock and fire hazard.                                                                                                                   |               |
| <b>2. Ask electric engineering professionals to conduct wiring.</b><br>Electric shock and fire hazard.                                                                                                          |               |
| <b>3. Earth terminals must be reliable grounded.</b><br>(380V class: especially the third grounding)<br>Electric shock and fire hazard.                                                                         |               |
| <b>4. Check if its action is effective after emergency brake terminal is connected.</b><br>Injury risk (wiring responsibility should be heard by users).                                                        |               |
| <b>5. Do not touch output terminals directly. The output terminal is connected directly to motor.</b><br>There should be no short circuit between output terminals.<br>Electric shock and short circuit hazard. |               |
| <b>6. Install the terminal cover before power on, and ensure power off when dismantling the terminal cover.</b><br>Electric shock hazard.                                                                       |               |
| <b>7. Conduct check and maintenance after 5~8 minutes after power off when internal residual electricity is discharged completely.</b><br>Hazard of residual voltage in electrolytic capacitor.                 |               |



### CAUTION

1. Check if the voltage of power inlet wire agrees with rated input voltage of inverter.  
Injury and fire hazard.
2. Connect brake resistor or brake unit according to wiring diagram.  
Fire hazard.
3. Choose screw driver and wrench with specified torque to fasten terminals.  
Fire hazard.
4. Do not connect the power input wire to output U, V, W terminals.  
It will cause internal damage to inverter if load the voltage on output terminals.
5. Do not dismantle the front panel cover, only the terminal cover needs to be dismantled when wiring.  
It may cause internal damage to inverter.

#### 2.1.3 Operation Environment

- ① No corrosive gases, vapors, dust or oily dust, no direct sunlight.
- ② No floating dust and metal particle.
- ③ Ambient humidity 20%~90% RH.
- ④ Vibration less than 5.9m/s<sup>2</sup>(0.6g).
- ⑤ No electromagnetic interference.
- ⑥ Ambient temperature -10°C~40°C. Ensure good ventilation when ambient temperature exceeds 40°C.
- ⑦ Use electric cabinet or remote control method in non-standard operation environment and ensure good ventilation and heat dissipation. The service life of inverter lies in installing environment and operation condition. But even in standard environment, a long-term continuous running can guarantee a life of no more than 5 years for electrolytic capacitor and about 3 years for cooling fan. An update or a thorough maintenance in advance is recommended.

#### 2.1.4 Installing Direction and Space

To ensure a good cooling cycle, the inverter must be installed vertically, and keep enough space from surroundings.

### 2.2 Nameplate Introduction and Inverter Series Type

#### 2.2.1 Nameplate Introduction

|                                                                                                                                                                                                                                                                                                              |                |                                                                                     |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------|------------------|
| <p>Model type —————→ <b>Type: CV900S-037G-14TF</b></p> <p>Power —————→ <b>Power: 37 kW</b></p> <p>Input specifications —————→ <b>Input: DC 250~800V</b></p> <p>Output specifications —————→ <b>AC 3PH 380~480V 47~63Hz</b></p> <p>Serial number —————→ <b>Output: 3PH 0~480V 0~300Hz 75A</b></p> <p>S/N:</p> |                |  |                  |
|                                                                                                                                                                                                                                                                                                              |                | MADE IN CHINA                                                                       |                  |
| ①                                                                                                                                                                                                                                                                                                            | Product Series | CV900S special for photovoltaic pump                                                |                  |
| ②                                                                                                                                                                                                                                                                                                            | Model Power    | 00A: 0.4KW ~ 500: 500KW                                                             |                  |
| ③                                                                                                                                                                                                                                                                                                            | Load Type      | G: constant torque                                                                  |                  |
| ④                                                                                                                                                                                                                                                                                                            | Output         | 1: 3-phase                                                                          | 2: 1-phase       |
| ⑤                                                                                                                                                                                                                                                                                                            | Voltage Grade  | 1: 110V                                                                             | 2: 220V 4: 380V  |
| ⑥                                                                                                                                                                                                                                                                                                            | Input          | S: 1-phase                                                                          | T: 3-phase       |
| ⑦                                                                                                                                                                                                                                                                                                            | Cooling Method | F: air cooling                                                                      | W: water cooling |

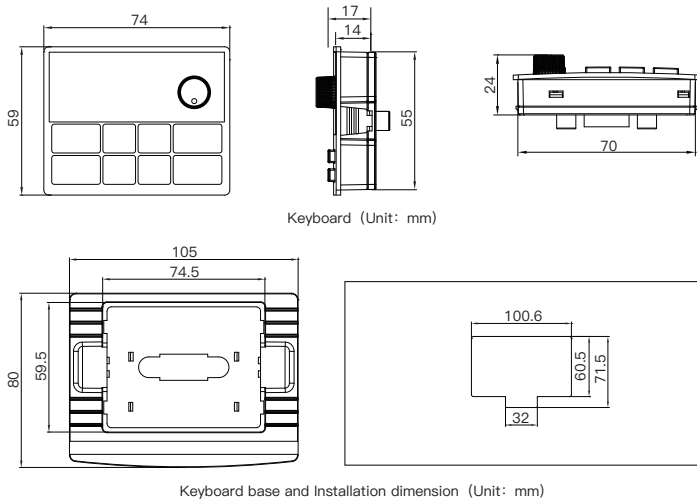
#### 2.2.2 Inverter Series Type

| Voltage Classes | Model No.        | Rated Power (KW) | Rated Output Current (A) |
|-----------------|------------------|------------------|--------------------------|
| 220V 1-phase    | CV900S-00AG-12SF | 0.4              | 2.4                      |
| 220V 1-phase    | CV900S-00BG-12SF | 0.75             | 4.5                      |
| 220V 1-phase    | CV900S-001G-12SF | 1.5              | 7                        |
| 220V 1-phase    | CV900S-002G-12SF | 2.2              | 10                       |
| 220V 1-phase    | CV900S-003G-12SF | 3                | 13                       |
| 220V 1-phase    | CV900S-004G-12SF | 3.7              | 16                       |
| 220V 1-phase    | CV900S-005G-12SF | 5.5              | 20                       |
| 220V 1-phase    | CV900S-007G-12SF | 7.5              | 30                       |
| 220V 1-phase    | CV900S-011G-12SF | 11               | 42                       |
| 380V 3-phase    | CV900S-00BG-14TF | 0.75             | 2.5                      |
| 380V 3-phase    | CV900S-001G-14TF | 1.5              | 3.7                      |
| 380V 3-phase    | CV900S-002G-14TF | 2.2              | 5                        |
| 380V 3-phase    | CV900S-003G-14TF | 3                | 6.8                      |
| 380V 3-phase    | CV900S-004G-14TF | 3.7              | 9                        |
| 380V 3-phase    | CV900S-005G-14TF | 5.5              | 13                       |
| 380V 3-phase    | CV900S-007G-14TF | 7.5              | 17                       |
| 380V 3-phase    | CV900S-011G-14TF | 11               | 25                       |
| 380V 3-phase    | CV900S-015G-14TF | 15               | 32                       |
| 380V 3-phase    | CV900S-018G-14TF | 18.5             | 37                       |
| 380V 3-phase    | CV900S-022G-14TF | 22               | 45                       |
| 380V 3-phase    | CV900S-030G-14TF | 30               | 60                       |
| 380V 3-phase    | CV900S-037G-14TF | 37               | 75                       |
| 380V 3-phase    | CV900S-045G-14TF | 45               | 90                       |
| 380V 3-phase    | CV900S-055G-14TF | 55               | 110                      |
| 380V 3-phase    | CV900S-075G-14TF | 75               | 150                      |

| Voltage Classes | Model No.        | Rated Power (KW) | Rated Output Current (A) |
|-----------------|------------------|------------------|--------------------------|
| 380V 3-phase    | CV900S-090G-14TF | 90               | 176                      |
| 380V 3-phase    | CV900S-110G-14TF | 110              | 210                      |
| 380V 3-phase    | CV900S-132G-14TF | 132              | 253                      |
| 380V 3-phase    | CV900S-160G-14TF | 160              | 300                      |
| 380V 3-phase    | CV900S-185G-14TF | 185              | 340                      |
| 380V 3-phase    | CV900S-200G-14TF | 200              | 380                      |
| 380V 3-phase    | CV900S-220G-14TF | 220              | 420                      |
| 380V 3-phase    | CV900S-250G-14TF | 250              | 470                      |
| 380V 3-phase    | CV900S-280G-14TF | 280              | 520                      |
| 380V 3-phase    | CV900S-315G-14TF | 315              | 600                      |
| 380V 3-phase    | CV900S-355G-14TF | 355              | 640                      |
| 380V 3-phase    | CV900S-400G-14TF | 400              | 750                      |
| 380V 3-phase    | CV900S-450G-14TF | 450              | 830                      |
| 380V 3-phase    | CV900S-500G-14TF | 500              | 930                      |

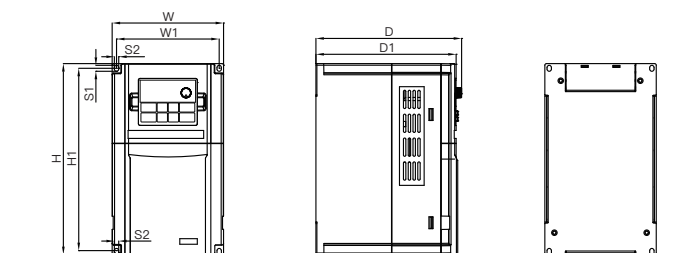
## 2.3 Overall Dimensions and Installation Dimensions

### 2.3.1 Appearance and Dimension of Keypad

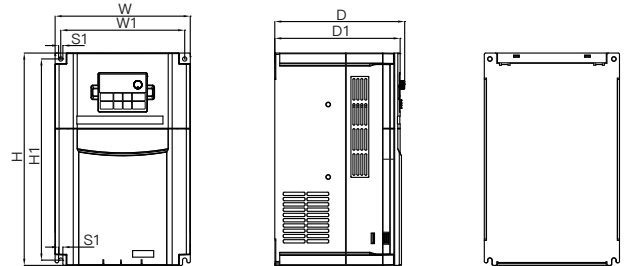


### 2.3.2 Product Overall Dimension and Installation Dimension

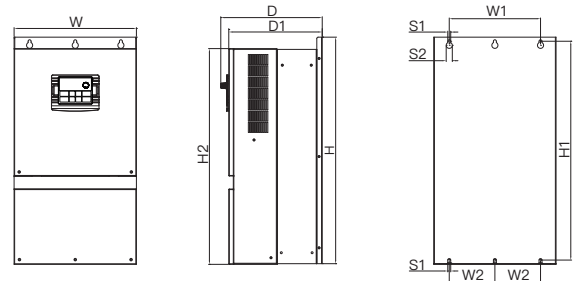
| Model No.        | W (mm) | H (mm) | D (mm) | W1 (mm) | H1 (mm) | H2 (mm) | D1 (mm) | S1 (mm) | S2 (mm) |
|------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| CV900S-00AG-12SF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-00BG-12SF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-001G-12SF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-002G-12SF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-003G-12SF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-00BG-14TF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-001G-14TF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-002G-14TF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-003G-14TF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-004G-14TF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |
| CV900S-005G-14TF | 95     | 212    | 149    | 78      | 194     | 194     | 142     | Ø10     | Ø5      |



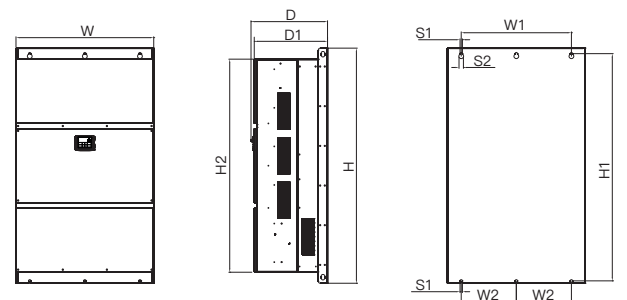
| Model No.        | W(mm) | H(mm) | D(mm) | W1(mm) | H1(mm) | D1(mm) | S1(mm) | S2(mm) |
|------------------|-------|-------|-------|--------|--------|--------|--------|--------|
| CV900S-004G-12SF | 140   | 240   | 183   | 129    | 229    | 176    | Ø8     | Ø6     |
| CV900S-005G-12SF | 140   | 240   | 183   | 129    | 229    | 176    | Ø8     | Ø6     |
| CV900S-007G-14TF | 140   | 240   | 183   | 129    | 229    | 176    | Ø8     | Ø6     |
| CV900S-011G-14TF | 140   | 240   | 183   | 129    | 229    | 176    | Ø8     | Ø6     |



| Model No.        | W(mm) | H(mm) | D(mm) | W1(mm) | H1(mm) | D1(mm) | S1(mm) |
|------------------|-------|-------|-------|--------|--------|--------|--------|
| CV900S-007G-12SF | 205   | 322   | 197   | 188    | 305    | 190    | Ø7     |
| CV900S-011G-12SF | 205   | 322   | 197   | 188    | 305    | 190    | Ø7     |
| CV900S-015G-14TF | 205   | 322   | 197   | 188    | 305    | 190    | Ø7     |
| CV900S-018G-14TF | 205   | 322   | 197   | 188    | 305    | 190    | Ø7     |
| CV900S-022G-14TF | 205   | 322   | 197   | 188    | 305    | 190    | Ø7     |



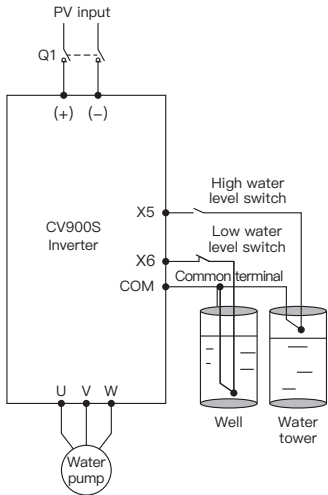
| Model No.        | W (mm) | H (mm) | D (mm) | W1 (mm) | W2 (mm) | H1 (mm) | H2 (mm) | D1 (mm) | S1 (mm) | S2 (mm) |
|------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| CV900S-030G-14TF | 270    | 463    | 223.9  | 201.5   | 100     | 444.5   | 437.7   | 206.3   | Ø6.5    | Ø13.5   |
| CV900S-037G-14TF | 270    | 463    | 223.9  | 201.5   | 100     | 444.5   | 437.7   | 206.3   | Ø6.5    | Ø13.5   |
| CV900S-045G-14TF | 320    | 522    | 257.6  | 200     | 100     | 499     | 489     | 240     | Ø9      | Ø16.5   |
| CV900S-055G-14TF | 320    | 522    | 257.6  | 200     | 100     | 499     | 489     | 240     | Ø9      | Ø16.5   |
| CV900S-075G-14TF | 340    | 720    | 305.6  | 260     | 130     | 700.5   | 663     | 288     | Ø9      | Ø16.5   |
| CV900S-090G-14TF | 340    | 720    | 305.6  | 260     | 130     | 700.5   | 663     | 288     | Ø9      | Ø16.5   |
| CV900S-110G-14TF | 340    | 720    | 305.6  | 260     | 130     | 700.5   | 663     | 288     | Ø9      | Ø16.5   |
| CV900S-132G-14TF | 380    | 720    | 305.6  | 260     | 130     | 700.5   | 663     | 288     | Ø9      | Ø16.5   |
| CV900S-160G-14TF | 380    | 720    | 305.6  | 260     | 130     | 700.5   | 663     | 288     | Ø9      | Ø16.5   |



| Model No.        | W (mm) | H (mm) | D (mm) | W1 (mm) | W2 (mm) | H1 (mm) | H2 (mm) | D1 (mm) | S1 (mm) | S2 (mm) |
|------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| CV900S-185G-14TF | 470    | 830    | 347.1  | 343     | 171.5   | 791     | 743     | 329.5   | Ø11     | Ø24     |
| CV900S-200G-14TF | 470    | 830    | 347.1  | 343     | 171.5   | 791     | 743     | 329.5   | Ø11     | Ø24     |
| CV900S-220G-14TF | 470    | 830    | 347.1  | 343     | 171.5   | 791     | 743     | 329.5   | Ø11     | Ø24     |
| CV900S-250G-14TF | 540    | 1060   | 416.6  | 420     | 210     | 1031.5  | 970     | 399     | Ø13     | Ø26     |
| CV900S-280G-14TF | 540    | 1060   | 416.6  | 420     | 210     | 1031.5  | 970     | 399     | Ø13     | Ø26     |
| CV900S-315G-14TF | 540    | 1060   | 416.6  | 420     | 210     | 1031.5  | 970     | 399     | Ø13     | Ø26     |
| CV900S-355G-14TF | 650    | 1090   | 416.6  | 420     | 210     | 1061.5  | 1000    | 399     | Ø13     | Ø26     |
| CV900S-400G-14TF | 650    | 1090   | 416.6  | 420     | 210     | 1061.5  | 1000    | 399     | Ø13     | Ø26     |
| CV900S-450G-14TF | 750    | 1280   | 416.6  | 600     | 300     | 1237    | 1160    | 399     | Ø13     | Ø26     |
| CV900S-500G-14TF | 750    | 1280   | 416.6  | 600     | 300     | 1237    | 1160    | 399     | Ø13     | Ø26     |

2.4 Basic Running Wiring

The wiring parts of inverter include major loop and control loop. Open the cover of I/O terminals, users can see the major loop terminal and control loop terminal, and must conduct the wiring according to the following diagram.

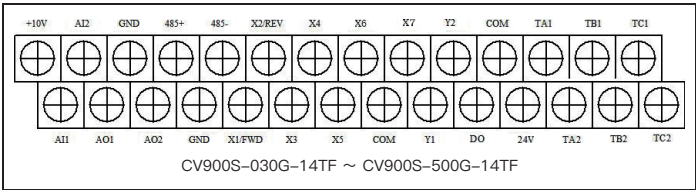
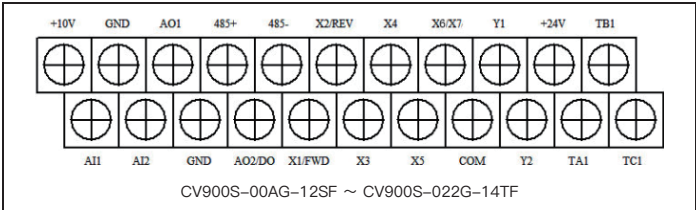


2.5 DiagramTerminal Diagram and Function Description

2.5.1 Function Description of Major Loop

| Terminal Identification | Terminal Name   | Terminal Function Description                                                                                              |
|-------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------|
| R、S、T                   | AC input        | 3 PH AC input terminal, connect with power grid                                                                            |
| L1、L2                   | AC input        | 1 PH AC input terminal, connect with power grid                                                                            |
| (+)、(-)                 | Solar DC input  | Photovoltaic panels input terminal                                                                                         |
| U、V、W                   | Inverter output | 3 PH AC input terminal, connect to the pumps motors                                                                        |
| ⏏                       | Safety ground   | Safety ground terminal, each machine must be grounded<br>Note: The ground terminal is located at the bottom of the chassis |

2.5.2 Control Loop Terminal Diagram



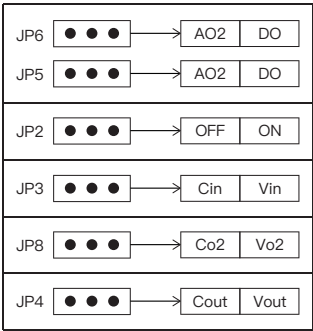
2.5.3 Control Loop Terminal Function Table

| Functional Specification of Control Loop Terminal |                 |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
|---------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Category                                          | Terminal Number | Functions                                                                                                                                                                                                                                                                                                                                             | Specification                                                                                                   |
| Multi-functional digital input terminal           | X1              | Effective when short circuit between (X1、X2、X3、X4、X5、X6、X7) ~COM, and the functions are set by parameters F4.00~F4.06. (Common port: COM)                                                                                                                                                                                                             | INPUT, 0~24V level signal, low level effective, 5mA.                                                            |
|                                                   | X2              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
|                                                   | X3              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
|                                                   | X4              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
|                                                   | X5              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
|                                                   | X6              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
|                                                   | X7              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
| Digital output terminal                           | Y1              | Multi-functional programmable collector open circuit output channel 2. (Common port: COM)                                                                                                                                                                                                                                                             | OUTPUT, maximum load current≤50mA.                                                                              |
|                                                   | Y2              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |
|                                                   | DO              | Reserved.                                                                                                                                                                                                                                                                                                                                             |                                                                                                                 |
| Analog input/output terminal                      | AI1             | AI1 receives voltage/current input. Jumper CN4 (for jumper terminal AI1) can select voltage or current input mode, and voltage input is the default one. For current input, just short the middle and another pin with the jumper cap. AI2 only receives voltage input. Measuring range setting is function code F4.09~F4.18. (Reference ground: GND) | INPUT, input voltage range: 0~10V (input impedance: 100KΩ), input current range 0~20mA (input impedance: 500Ω). |
|                                                   | AI2             |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |

| Category                     | Terminal Number | Functions                                                                   | Specification                                                                                                   |
|------------------------------|-----------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Analog input/output terminal | AO1             | Reserved                                                                    | Reserved                                                                                                        |
|                              | AO2             | Reserved                                                                    | Reserved                                                                                                        |
| Relay output terminal        | TA1             | Two-channel programmable relay output terminal, See F4.21.                  | TA-TB: normal close; TA-TC: normal open. Contact compacity: 250VAC/2A (COSΦ=1); 250VAC/1A (COSΦ=0.4), 30VDC/1A. |
|                              | TA2             |                                                                             |                                                                                                                 |
|                              | TB1             |                                                                             |                                                                                                                 |
|                              | TB2             |                                                                             |                                                                                                                 |
|                              | TC1             |                                                                             |                                                                                                                 |
| Power port                   | TC2             | 24V is the common power for circuits of all digital signal input terminals. | Maximum output current 200mA                                                                                    |
|                              | +24V            |                                                                             |                                                                                                                 |

- ▲ Control terminal AI1 can input both voltage and current signal, while AI2 can only input voltage signal; users can conduct corresponding jumper on master control board according to signal type.
- ▲ Connecting weak analog signal is easily affected by external disturbance. So wiring should be as short as possible. The external control line should be set with isolating device or shielding line, and should be grounded.
- ▲ Input order signal line and frequency meter should be wired separately with shielding, and away from major loop wiring.
- ▲ Control loop wiring should be over 0.75 mm², and STP (shielded twisted pair) is recommended. The connecting part of control loop terminals should be enameled with tin, or process metal joint with cold pressing.
- ▲ While connecting analog signal output devices, malfunction may occur because of interference from inverter, which can be solved by fixing with capacitor or ferrite bead to the analog signal output device.

2.6 Jumpers And Corresponding Relationships



|           |      |                                                            |
|-----------|------|------------------------------------------------------------|
| JP5 & JP6 | AO2  | AO2 of AO2/DO reserved                                     |
|           | DO   | DO of AO2/DO reserved                                      |
| JP2       | OFF  | Non-connecting for matched resistance of 485 communication |
|           | ON   | Connecting for matched resistance of 485 communication     |
| JP3       | Cin  | AI1 input current signal                                   |
|           | Vin  | AI1 input voltage signal                                   |
| JP8       | VO2  | AO2 reserved                                               |
|           | CO2  | AO2 reserved                                               |
| JP4       | Vout | AO1 reserved                                               |
|           | Cout | AO1 reserved                                               |

2.7 Wiring Notices

- ▲ Cut off the input power of inverter while dismantling and changing the motor.
- ▲ Switching of motor or work frequency power supply should only be conducted when the inverter stops output.
- ▲ To reduce the effect of EMI (electromagnetic interference), add a surge absorber when electromagnetic connector and relay are close to inverter.
- ▲ Do not connect AC input power to output terminal U, V, W of inverter.
- ▲ Add an isolating device to the external control line or use shield line.
- ▲ Input order signal line should be wired separately with shielding, and away from major loop wiring.
- ▲ When carrier frequency is less than 4kHz, keep the distance between inverter and motor within 50m; when carrier frequency exceeds 4kHz, make an appropriate reduction of the distance, and better lay the wire in metal tube.
- ▲ When adding peripherals (filters, reactors, etc.) to the inverter, check the ground resistance with 1000V framagger and ensure the value is above 4 MΩ.
- ▲ Do not add phase advance capacitor or RC snubber to the U, V, W terminal of inverter.
- ▲ If the inverter starts frequently, do not cut off the power, use the COM/RUN of control terminal to conduct start and stop so as not to damage the rectifier bridge.
- ▲ The earth terminal must be grounded reliably (grounding impedance should be under 10 Ω) to avoid accidents, or there might be electric leakage.
- ▲ Choose the wire diameter according to national electrical code while conducting major loop wiring.

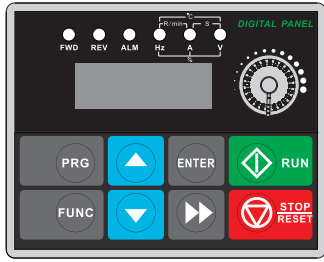
2.8 Spare Circuit

It may cause big downtime loss or other accidental failure during inverter failure or tripping. Adding spare circuit is recommended under this circumstance to ensure safety.

Note: confirm and test the operation characteristic of the spare circuit in advance to ensure the working frequency and the phase sequence of converted frequency are agreed.

### 3. Operation Panel and Operation Method

#### 3.1 Operation Panel Keys



| Key | Name                      | Function Description                                                                                                                                                                                                                                                                     |
|-----|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | Programming /escape key   | Enter or escape from programming                                                                                                                                                                                                                                                         |
|     | Increase key              | Data or function code increase (speed up the increasing rate by keeping pressing the key)                                                                                                                                                                                                |
|     | Decrease key              | Data or function code decrease (speed up the decreasing rate by keeping pressing the key)                                                                                                                                                                                                |
|     | Enter key                 | Enter into sub-menu items or confirm data.                                                                                                                                                                                                                                               |
|     | Run key                   | Enter into run mode under keypad model.                                                                                                                                                                                                                                                  |
|     | Function key              | Reserved                                                                                                                                                                                                                                                                                 |
|     | Shift / monitor key       | Choose the bit of the data which is to be set and modified when the inverter is in edit status.                                                                                                                                                                                          |
|     | Stop / reset key          | In common run status the inverter will be stopped according to set mode after press this key if run command channel is set as keyboard stop effective mode. The inverter will be reset and resume normal stop status after pressing this key when the inverter is in malfunction status. |
|     | Analog potentiometer knob | Set the frequency; when F0.05=6, digital encoder can set the frequency as linkage control with increase/decrease key.                                                                                                                                                                    |

#### 3.2 LED and Indicator Light Description

| Item             |                 | Function Description                                    |                                                                                                                                       |
|------------------|-----------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Display Function | Digital Display | Display current run status parameter and set parameter. |                                                                                                                                       |
|                  | LED Indicator   | Hz、A、V                                                  | Displayed physical quantity unit (current A, voltage V, frequency Hz)                                                                 |
|                  |                 | ALM                                                     | Alarm indicator light, indicate that the VFD is in over current or over voltage suppressing status or failure alarm status currently. |
|                  |                 | FWD                                                     | This indicator light turns green when the VFD is in forward running status.                                                           |
|                  |                 | REV                                                     | This indicator light turns red when the VFD is in reverse running status.                                                             |

#### 3.3 Unit Indicator Light Description

| Item           |               | Function Description                                                                   |
|----------------|---------------|----------------------------------------------------------------------------------------|
| Unit Indicator | LED indicator |                                                                                        |
|                | A             | Current displayed parameter is current with unit of A, LED indicator light A is on     |
|                | V             | Current displayed parameter is voltage with unit of V, LED indicator light V is on     |
|                | Hz            | Current displayed parameter is frequency with unit of Hz, LED indicator light Hz is on |
|                | %             | Current displayed parameter is percentage, LED indicator light Hz and V are on         |
|                | r/min         | Current displayed parameter is rotational speed, LED indicator light Hz and A are on   |
|                | m/s           | Current displayed parameter is linear velocity, LED indicator light V and A are on     |
|                | °C            | Current displayed parameter is temperature, LED indicator light V, A and Hz are on     |

#### 3.4 Monitoring Parameter Display

Keypad display status is classified as power-on initialization display, function code and monitoring parameters display, malfunction alarm status display, run status parameters display. After power-on, LED will display "P.OFF", then enter setting frequency display status.



Power-on parameter display (Initialization display "P.OFF")

When the inverter is stopped, the keypad displays stopped state monitoring parameters, factory setting is digital setting frequency. As is shown in the follow figure, unit indicator light reminds that the unit of current displayed parameter is Hz.

Enter monitoring menu by pressing , and check each monitoring parameter by , and .



Stop status parameter display (Display set frequency "50.00")

#### 3.5 Run Status Parameter Display

The inverter enters into run status when receiving effective run command and run status monitoring parameters normally output frequency is displayed on the keypad. As in the follow figure shows, unit is displayed as Hz.

Enter monitoring menu by pressing , and check each monitoring parameter by , and .



Run status parameter display (Display current output frequency "20.00")

#### 3.6 Malfunction Alarm Display

The inverter enters into malfunction alarm display status upon detecting failure signal and display failure code (as shown in the follow figure); press to check relative parameters of stopped inverter; to check failure information, press and enter into program mode to check D group parameter. After troubleshooting, conduct fault resetting by key on the keypad, by control terminal or communication command. Keep displaying fault code if fault exist continuously.



Fault alarm display of over current during accelerating

**Warning:** For some serious fault, such as inverse module protect, over current, over voltage, etc., do not conduct fault reset forcibly to make the inverter run again without fault elimination confirmed, or might cause damage to the inverter.

#### 3.7 Function Code Editing Display

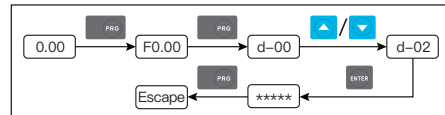
Under stop, run or fault alarm status, press key to enter editing status which is displayed as two classes menu (input the password first if it is preset, see password unlock instruction). Press key to enter items one class by one class. Under function parameter display status, press to conduct storage operation, press key to return to the upper class menu without storing modified parameter.

#### 3.8 Monitoring Parameter

Example 1: check monitoring parameter item d-02 (output current)

Method 1:

- Press key to enter programming status, LED displays function code F0.00, press again key, LED displays function code d-00, flicker bit stays in ones place, adjust key or key until the monitoring code turns d-02.
- Press key, the according value of d-02 displays and the indicator light of unit "A" is on.
- Press key, escape from monitoring status.



Method 2:

Under monitoring mode interface, press key, switch to next monitoring parameter item d-xx, press key to move flicker bit to ones digit of the monitoring code, then adjust key or key until the monitoring code displays d-02, then operate according to step ② and step ③ of method 1.

Example 3: check fault monitoring parameter in fault status

Note:

- Under fault status press key and check D group monitoring parameter ranging from d-00 to d-22.
- If the fault wasn't eliminated during checking the fault parameter, the interface will automatically switch to fault alarm display 5s later after stopping operation.
- The fault code displays ranging from d-16 to d-22 (the current status and latest 3 times).

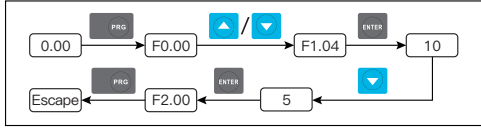
#### 3.9 Function Code Setting

The function parameter system of this inverter includes function code F0~FA, fault code E group and monitoring code D group. Each function group is consisted of several function code, which is marked as (function group code + function code). For example, "F5.08" means eighth function code in the fifth function group.

Function code setting example:

Example 1: Revise the water shortage detection time of solar pump from 10S to 5S (F1.04 from 10S to 5S).

- Press key to enter programming status, LED displays function code F0.00, flicker bit stays in the ones digit.
- Press key, move the flicker bit among the hundreds place, tens place and ones place.
- Press key or key to modify the digit in the according digit place. LED displays F1.04.
- Press key, it displays the according value (10) of F1.04.
- Press key 5 times to change it to 5.
- Press key, save the value of F1.04 and displays next function code F2.00.
- Press key, escape from programming status.



### 3.10 User Password Setting and Function Code Edit

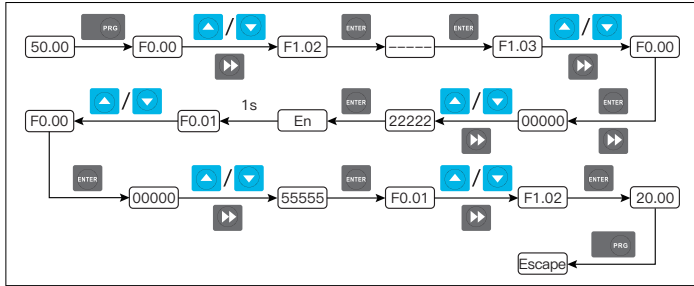
User password setting is used for preventing unauthorized people from checking and modifying function parameter. Factory set of user password F0.00 is "00000", user can conduct parameter setting in this interface (parameter set here is only not restricted by password protection, but is restricted by conditions like whether is revisable during running, the monitoring parameters, etc.).

When setting the user password, press five-digit number and press **ENTER** confirm, the password will take effect automatically 3 minutes later, or just power down to make it effective. After that, if the password is not set right, keypad will display "—Err—", and when checking function codes, all will display "—-----" except the password item (displays "00000"). These function codes parameters can't be checked and modified until the password is set right and the keypad displays "—En---".

When password modifying is required, choose function code F0.00, and press **PRG** to enter password authentication status. Move to modifying status after password verified successfully. Input a new password and press **ENTER** to confirm. Power-down or wait for 3 minutes, the new password will take effect.

Example 1: change user password "22222" to "55555", check function code F1.02.

- Press **PRG** to enter programming status, LED displays function code F0.00, flicker bit stays in the ones place.
- Press **▶▶**, move flicker bit among hundreds place, tens place and ones place of function items.
- Press **▲** key or **▼** key to modify the digit in the according digit place. LED displays F1.02.
- Press **ENTER**, the according data "-----" of F1.02 is displayed.
- Press **PRG** to enter F1.03, repeat step 2 and step 3, check according data "00000" of F0.00.
- Press **▲** key or **▼** key to modify the digit in the according digit place, LED displays "22222", and the password is set up.
- Press **ENTER**, it displays "—En---", meanwhile function code displays F0.01.
- Repeat step 2 and step 3, check the according data "00000" of F0.00 and modify it to "55555", press **ENTER** to end the password changing, enter F0.01 item.
- Repeat step 2 and step 3, check the according data "20.00" of F1.02, conduct modifying by **▲** key or **▼** key.
- Press **PRG**, escape from edit status.



## 4. Function Parameter Table and Description

### 4.1 Monitoring Parameter Group and Fault Record

NOTE: "◆"—the actual detected parameter, not modifiable.

| D Group – Monitoring Parameter Group and Fault Record |                                 |                                                                                                |              |                 |              |
|-------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------|--------------|-----------------|--------------|
| Function Code                                         | Name                            | Set Range                                                                                      | Minimum Unit | Factory Default | Modification |
| d-00                                                  | Output frequency                | 0.00~maximum output frequency<br>【F0.08】                                                       | 0.01Hz       | 0.00            | ◆            |
| d-01                                                  | Set frequency                   | 0.00~maximum output frequency<br>【F0.08】                                                       | 0.01Hz       | 0.00            | ◆            |
| d-02                                                  | Output current                  | 0.0~6553.5A                                                                                    | 0.1A         | 0.0             | ◆            |
| d-03                                                  | Output voltage                  | 0~999V                                                                                         | 1V           | 0               | ◆            |
| d-04                                                  | Motor revolving speed (RPM/min) | 0~36000 (RPM/min)                                                                              | 1            | 0               | ◆            |
| d-05                                                  | Bus voltage (V)                 | 0~999V                                                                                         | 1V           | 0               | ◆            |
| d-06                                                  | Input voltage (V)               | 0~999V                                                                                         | 1V           | 0               | ◆            |
| d-07                                                  | PID set value (bar, Kg)         | 0.00~60.00 (bar, Kg)                                                                           | 0.01         | 0.00            | ◆            |
| d-08                                                  | PID pressure feedback (bar, Kg) | 0.00~60.00 (bar, Kg)                                                                           | 0.01         | 0.00            | ◆            |
| d-09                                                  | Analog input AI1 (V/mA)         | 0.00~10.00V                                                                                    | 0.01V        | 0.00            | ◆            |
| d-10                                                  | Analog input AI2 (V)            | 0.00~10.00V                                                                                    | 0.01V        | 0.00            | ◆            |
| d-11                                                  | Input terminal status           | 0~7FH<br>Note: the sequence from high to low order digit in binary system X7/X6/X5/X4/X3/X2/X1 | 1            | 0               | ◆            |
| d-12                                                  | Output terminal status          | 0~7H<br>Note: the sequence from high to low order digit in binary system R1/Y2/Y1              | 1            | 0               | ◆            |

| Function Code | Name                            | Set Range                                                                                                                                                                                                                                                                           | Minimum Unit | Factory Default | Modification |
|---------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|--------------|
| d-13          | Inverter running status         | 0~FFFFH<br>BIT0: run/stop<br>BIT1: reverse/forward<br>BIT2: zero-speed running<br>BIT3: reserved<br>BIT4: accelerating<br>BIT5: decelerating<br>BIT6: constant speed running<br>BIT7~BIT8: reserved<br>BIT9: overcurrent limit<br>BIT10: overvoltage limit<br>BIT11~BIT15: reserved | 1            | 0               | ◆            |
| d-14          | Radiator temperature            | 0.0℃~+110.0℃                                                                                                                                                                                                                                                                        | 0.1℃         | 0.0             | ◆            |
| d-15          | Output power                    | 0.0~6553.5KW                                                                                                                                                                                                                                                                        | 0.1KW        | 0.0             | ◆            |
| d-16          | The third to last fault type    | 0~32                                                                                                                                                                                                                                                                                | 1            | 0               | ◆            |
| d-17          | The second to last fault type   | 0~32                                                                                                                                                                                                                                                                                | 1            | 0               | ◆            |
| d-18          | Last fault type                 | 0~32                                                                                                                                                                                                                                                                                | 1            | 0               | ◆            |
| d-19          | Current fault type              | 0~32                                                                                                                                                                                                                                                                                | 1            | 0               | ◆            |
| d-20          | Run frequency of current fault  | 0.00~<br>【F0.09】 upper limit of frequency                                                                                                                                                                                                                                           | 0.01Hz       | 0.00            | ◆            |
| d-21          | Output current of current fault | 0.0~6553.5A                                                                                                                                                                                                                                                                         | 0.1A         | 0.0             | ◆            |
| d-22          | Busbar voltage of current fault | 0~999V                                                                                                                                                                                                                                                                              | 1V           | 0               | ◆            |

### 4.1 Function Code

NOTE:

- — Modifiable parameter under any condition
- × — Not modifiable parameter under run status
- ◆ — The actual detected parameter, not modifiable
- ◇ — Factory parameter, only modifiable for factory, not allowed for users modifying

| F0 Group — Basic Function Group               |                                    |                                                                                                                                                                                                                                                                                                        |                    |                    |              |
|-----------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------|
| Function Code                                 | Name                               | Set Range                                                                                                                                                                                                                                                                                              | Minimum Unit       | Factory Default    | Modification |
| F0.00                                         | User password                      | 0~65535<br>Note 1: 0~9; without password protect<br>Note 2: it takes 3 minutes to take effect of the successfully set password<br>Note 3: invalid for write-protect, and can not be initialized.                                                                                                       | 1                  | 0                  | ○            |
| F0.01                                         | Pressure set                       | 0.00~ 【F0.02】 (bar, Kg)                                                                                                                                                                                                                                                                                | 0.01               | 5.00               | ○            |
| F0.02                                         | Sensor range                       | 0.00~60.00 (bar, Kg)                                                                                                                                                                                                                                                                                   | 0.01               | 10.00              | ○            |
| F0.03                                         | Running direction                  | 0: forward<br>1: reverse<br>2: prevent reversing                                                                                                                                                                                                                                                       | 1                  | 0                  | ×            |
| F0.04                                         | Operation command channel          | 0: operation panel run command channel<br>1: terminal run command channel<br>2: communication run command channel                                                                                                                                                                                      | 1                  | 0                  | ○            |
| F0.05                                         | Frequency source                   | 0: digital set 1 (keypad ▲/▼ key, encoder+F0.06)<br>1: digital set 2 (terminal UP/DOWN adjustment+F0.07)<br>2: digital set 3 (communication set)<br>3: AI1 analog set (0~10V/20mA)<br>4: AI2 analog set (0~10V)<br>5: PID control set<br>6: panel Potentiometer<br>7: MPPT implemented (solar pumping) | 1                  | 5                  | ○            |
| F0.06                                         | Frequency source digital setting 1 | 0.00Hz~ 【F0.08】 upper limit of frequency                                                                                                                                                                                                                                                               | 0.01Hz             | 50.00              | ○            |
| F0.07                                         | Frequency source digital setting 2 | 0.00Hz~ 【F0.08】 upper limit of frequency                                                                                                                                                                                                                                                               | 0.01Hz             | 50.00              | ○            |
| F0.08                                         | Maximum output frequency           | MAX {50.00, 【F0.09】 } ~ 300.00                                                                                                                                                                                                                                                                         | 0.01Hz             | 60.00              | ×            |
| F0.09                                         | Upper limit frequency              | 【F0.10】 ~ 【F0.08】                                                                                                                                                                                                                                                                                      | 0.01Hz             | 60.00              | ×            |
| F0.10                                         | Lower limit frequency              | 0.00Hz~ 【F0.09】                                                                                                                                                                                                                                                                                        | 0.01Hz             | 0                  | ×            |
| F0.11                                         | Acceleration time 1                | 0.1~3600.0S<br>0.4~4.0KW 7.5S<br>5.5~30.0KW 15.0S                                                                                                                                                                                                                                                      | 0.1S               | Depending on model | ○            |
| F0.12                                         | Deceleration time 1                | 37.0~132.0KW 30.0S<br>160.0~630.0KW 60.0S                                                                                                                                                                                                                                                              | 0.1S               | Depending on model | ○            |
| F0.13                                         | Carrier frequency                  | 1.0~16.0KHz<br>0.4~4.0KW 4.0KHz 1.0~16.0KHz<br>5.5~30KW 3.0KHz 1.0~16.0KHz<br>37~132KW 2.0KHz 1.0~10.0KHz<br>160~630KW 1.2KHz 1.0~5.0 KHz                                                                                                                                                              | 0.1KHz             | Depending on model | ○            |
| F1 Group — Photovoltaic Pump Parameter Groups |                                    |                                                                                                                                                                                                                                                                                                        |                    |                    |              |
| F1.00                                         | MPPT high point working voltage    | 380V: 【F1.01】 ~1000 537V<br>220V: 【F1.01】 ~500 311V                                                                                                                                                                                                                                                    | 1V                 | Depending on model | ○            |
| F1.01                                         | MPPT low point working voltage     | 380V: 0~ 【F1.00】 350V<br>220V: 0~ 【F1.00】 200V                                                                                                                                                                                                                                                         | Depending on model | Depending on model | ○            |

| Function Code                                                 | Name                                                                             | Set Range                                                                                                                                                                                                                                                 | Minimum Unit                                     | Factory Default    | Modification |
|---------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------|--------------|
| F1.02                                                         | Min operation frequency for water outlet                                         | 0.00Hz~ 【F0.09】                                                                                                                                                                                                                                           | 0.01                                             | 20.00              | ○            |
| F1.03                                                         | Ratio of water shortage detection current to no-load current                     | 80.0~300.0% * 【F7.05】                                                                                                                                                                                                                                     | 0.1%                                             | 150                | ○            |
| F1.04                                                         | Detection time of photovoltaic water pump water shortage                         | 0~250s                                                                                                                                                                                                                                                    | 0.1%                                             | 1                  | ○            |
| F1.05                                                         | MPPT voltage given selection                                                     | 0: Voltage given<br>1: Maximum power tracking given 1 (VF mode)<br>2: Maximum power tracking given 2 (vector mode)                                                                                                                                        | 0~2                                              | 0                  | ×            |
| F1.06                                                         | Maximum power tracking minimum voltage reference                                 | This function code can be used to set the minimum voltage reference during maximum power tracking. The minimum voltage reference for maximum power tracking =the photovoltaic panel maximum operating voltage/the photovoltaic panel open circuit voltage | 50.0%~100.0%                                     | 81.0               | ×            |
| F1.07                                                         | Speed adjustment coefficient                                                     | This parameter can adjust the output frequency corresponding to the maximum power point and should be set appropriately. Excessive setting will cause field weakening. This parameter is only valid for F1.05=1.                                          | 0.000~2.000                                      | 1000               | ○            |
| F1.08                                                         | Operation undervoltage protection action selection                               | 0: Forbidden<br>1: Allowed (undervoltage is considered a fault)                                                                                                                                                                                           | 0~1                                              | 0                  | ×            |
| F1.09                                                         | Under voltage protection level                                                   | 220V: 180~280V 200V<br>380V: 330~480V 350V                                                                                                                                                                                                                | 220V: 100~260V<br>180V<br>380V: 160~480V<br>280V | Depending on model | ×            |
| F2 Group — PFC, SPFC Water Supply and Online Parameters Group |                                                                                  |                                                                                                                                                                                                                                                           |                                                  |                    |              |
| F2.00                                                         | PFC, SPFC water supply enabling                                                  | 0: disabled<br>1: PFC enabled<br>2: SPFC enabled<br>Note: need support of external hardware                                                                                                                                                               | 1                                                | 0                  | ×            |
| F2.01                                                         | Delay time of terminal disconnect and connect                                    | 0.0~6000.0s                                                                                                                                                                                                                                               | 0.1s                                             | 0.1                | ○            |
| F2.02                                                         | SPFC Water polling time                                                          | 0.0~6000.0h                                                                                                                                                                                                                                               | 0.1h                                             | 48.0               | ○            |
| F2.03                                                         | On-line function time                                                            | 0: disabled<br>1: enabled                                                                                                                                                                                                                                 | 1                                                | 0                  | ○            |
| F2.04                                                         | On-line polling time                                                             | 0~65535H                                                                                                                                                                                                                                                  | 1H                                               | 72                 | ○            |
| F3 Group — PID Control Parameters                             |                                                                                  |                                                                                                                                                                                                                                                           |                                                  |                    |              |
| F3.00                                                         | PID input channel                                                                | 0: AI1<br>1: AI2<br>2: pressure setting (bar, Kg)<br>3: panel potentiometer setting                                                                                                                                                                       | 1                                                | 2                  | ○            |
| F3.01                                                         | PID feedback channel                                                             | 0: AI1<br>1: AI2                                                                                                                                                                                                                                          | 1                                                | 0                  | ○            |
| F3.02                                                         | PID sign                                                                         | 0: positive<br>1: negative                                                                                                                                                                                                                                | 1                                                | 0                  | ×            |
| F3.03                                                         | Proportional gain KP                                                             | 0.01~100.00                                                                                                                                                                                                                                               | 0.01                                             | 2.50               | ○            |
| F3.04                                                         | Integral time Ti                                                                 | 0.01~10.00s                                                                                                                                                                                                                                               | 0.01s                                            | 0.10               | ○            |
| F3.05                                                         | Error limit                                                                      | 0.0~100.0%                                                                                                                                                                                                                                                | 0.1%                                             | 0.0%               | ○            |
| F3.06                                                         | PID upper limit of frequency                                                     | 0.00~300.00Hz                                                                                                                                                                                                                                             | 0.01Hz                                           | 50.00              | ×            |
| F3.07                                                         | Sleep mode                                                                       | 0: disabled<br>1: sleep when feedback pressure exceeding or lower than sleep threshold<br>2: sleep when feedback pressure and output frequency are stable                                                                                                 | 1                                                | 1                  | ×            |
| F3.08                                                         | Deviation limit of feedback when entering sleep state compared with set pressure | 0.0~10.0%<br>Note: this parameter is only valid to the second sleep mode.                                                                                                                                                                                 | 0.1%                                             | 0.5%               | ○            |
| F3.09                                                         | Threshold value of sleeping                                                      | 100.0~200.0%<br>Note: this threshold value is the percentage of given pressure, and it is only valid for the first sleep mode.                                                                                                                            | 0.1%                                             | 100.0%             | ○            |
| F3.10                                                         | Threshold value of awaking                                                       | 0.0~100.0%<br>Note: this threshold value is the percentage of given pressure.                                                                                                                                                                             | 0.1%                                             | 90.0%              | ○            |
| F3.11                                                         | Delay time of sleep                                                              | 0.0~3600.0s                                                                                                                                                                                                                                               | 0.1s                                             | 100.0              | ○            |
| F3.12                                                         | Delay time of awaking                                                            | 0.0~3600.0s                                                                                                                                                                                                                                               | 0.1s                                             | 5.0                | ○            |
| F3.13                                                         | Delay time of adding pump                                                        | 0.0~3600.0s                                                                                                                                                                                                                                               | 0.1s                                             | 10.0               | ○            |
| F3.14                                                         | Delay time of reducing pump                                                      | 0.0~3600.0s                                                                                                                                                                                                                                               | 0.1s                                             | 10.0               | ○            |
| F3.15                                                         | Lower limit frequency of reducing pump                                           | 0.0~600.00Hz                                                                                                                                                                                                                                              | 0.01Hz                                           | 35.00              | ×            |

| Function Code                                    | Name                                                    | Set Range                                                                                                                                                                                                                                              | Minimum Unit | Factory Default | Modification |
|--------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|--------------|
| F3.16                                            | Sleep frequency                                         | 0.00Hz~ 【F0.09】                                                                                                                                                                                                                                        | 0.01Hz       | 20.00           | ×            |
| F3.17                                            | Reserved                                                | —                                                                                                                                                                                                                                                      | —            | —               | ○            |
| F3.18                                            | Water shortage detection setting value                  | 0.0~100.0% * sensor range                                                                                                                                                                                                                              | 0.1%         | 0.0%            | ○            |
| F3.19                                            | Detection time of water shortage                        | 0.0~3600.0s                                                                                                                                                                                                                                            | 0.1s         | 10.0            | ○            |
| F4 Group — Terminal Parameters Group             |                                                         |                                                                                                                                                                                                                                                        |              |                 |              |
| F4.00                                            | Input X1 function                                       | 0: control terminal idle<br>1: forward run (FWD)<br>2: reverse run (REV)                                                                                                                                                                               | 1            | 1               | ×            |
| F4.01                                            | Input X2 function                                       | 3: external reset signal input (RST)<br>4: external fault normally-open input<br>5: external fault normally-close input                                                                                                                                | 1            | 2               | ×            |
| F4.02                                            | Input X3 function                                       | 6: external stop control<br>7: frequency increase<br>8: frequency decrease<br>9: start/stop                                                                                                                                                            | 1            | 3               | ×            |
| F4.03                                            | Input X4 function                                       | 10: running allowed<br>11: interlock1<br>12: interlock2                                                                                                                                                                                                | 1            | 0               | ×            |
| F4.04                                            | Input X5 function                                       | 13: interlock3<br>14: PFC start/stop<br>Note: If F2.00 is non-zero, F4.00~F4.06 will default to the functions of 9, 10, 11, 12, 13 and 14.                                                                                                             | 1            | 0               | ×            |
| F4.05                                            | Input X6 function                                       |                                                                                                                                                                                                                                                        | 1            | 0               | ×            |
| F4.06                                            | Input X7 function                                       |                                                                                                                                                                                                                                                        | 1            | 0               | ×            |
| F4.07                                            | Terminal function detection when power on               | 0: terminal operation command invalid when power on<br>1: terminal operation command valid when power on                                                                                                                                               | 1            | 0               | ○            |
| F4.08                                            | Delay time of automatically stat when power on          | 0~65535s                                                                                                                                                                                                                                               | 1            | 0               | ○            |
| F4.09                                            | AI1 input lower limit                                   | 0.00V/0.00mA~10.00V/20.00mA                                                                                                                                                                                                                            | 0.01V        | 0.00            | ○            |
| F4.10                                            | AI1 lower limit corresponding physical quantity set     | -100.0%~100.0%                                                                                                                                                                                                                                         | 0.1%         | 0.0%            | ○            |
| F4.11                                            | AI1 input upper limit                                   | 0.00V/0.00mA~10.00V/20.00mA                                                                                                                                                                                                                            | 0.01V        | 10.00           | ○            |
| F4.12                                            | AI1 upper limit corresponding physical quantity setting | -100.0%~100.0%                                                                                                                                                                                                                                         | 0.1%         | 100.0%          | ○            |
| F4.13                                            | AI1 input smoothing time                                | 0.00s~10.00s                                                                                                                                                                                                                                           | 0.01s        | 0.05            | ○            |
| F4.14                                            | AI2 input lower limit                                   | 0.00V~10.00V                                                                                                                                                                                                                                           | 0.01V        | 0.00            | ○            |
| F4.15                                            | AI2 lower limit corresponding physical quantity setting | -100.0%~100.0%                                                                                                                                                                                                                                         | 0.1%         | 0.0%            | ○            |
| F4.16                                            | AI2 input upper limit                                   | 0.00V~10.00V                                                                                                                                                                                                                                           | 0.01V        | 10.00           | ○            |
| F4.17                                            | AI2 upper limit corresponding physical quantity setting | -100.0%~100.0%                                                                                                                                                                                                                                         | 0.1%         | 100.0%          | ○            |
| F4.18                                            | AI2 input filtering time                                | 0.00s~10.00s                                                                                                                                                                                                                                           | 0.01s        | 0.05            | ○            |
| F4.19                                            | Open collector output terminal Y1                       | 0: no output<br>1: fault output<br>2: upper limit arrival of output frequency<br>3: lower limit arrival of output frequency                                                                                                                            | 1            | 0               | ×            |
| F4.20                                            | Open collector output terminal Y2                       |                                                                                                                                                                                                                                                        | 1            | 0               | ×            |
| F4.21                                            | Programmable relay R1 output                            | 4: running indication signal<br>5: indication when inverter stops or during zero-speed running.                                                                                                                                                        | 1            | 1               | ×            |
| F4.22                                            | Reserved                                                |                                                                                                                                                                                                                                                        | —            | —               | ×            |
| F4.23                                            | Logic setting of output terminal (Y1~Y2)                | 0~3H<br>0 is positive logic, i.e. terminal Yi is enabled when it connects with common terminal and disabled if disconnected.<br>1 is negative logic, i.e. terminal Yi is disabled when it connects with common terminal and enabled when disconnected. | 1            | 0               | ×            |
| F5 Group — Water Pump Protection Parameter Group |                                                         |                                                                                                                                                                                                                                                        |              |                 |              |
| F5.00                                            | Anti-freezing function                                  | 0: off<br>1: on, counted in seconds<br>2: on, counted in minutes                                                                                                                                                                                       | 1            | 0               | ×            |
| F5.01                                            | Anti-freezing protection action interval                | 0~9999s/min                                                                                                                                                                                                                                            | 1s/min       | 300             | ○            |
| F5.02                                            | Anti-freezing protection action frequency               | 0.0~frequency upper limit                                                                                                                                                                                                                              | 0.1Hz        | 10.00           | ○            |
| F5.03                                            | Anti-freezing protection action time                    | 0~9999s/min                                                                                                                                                                                                                                            | 1s/min       | 60              | ○            |
| F5.04                                            | High pressure alarm set value                           | 【F5.05】 ~100.0% * sensor range                                                                                                                                                                                                                         | 0.1%         | 90              | ○            |
| F5.05                                            | Low pressure alarm set value                            | 0.0%~ 【F5.04】<br>Note: This setting is a percentage of the sensor's range                                                                                                                                                                              | 0.1%         | 0.0             | ○            |
| F5.06                                            | Alarm delay time of abnormal pressure                   | 0~65535s<br>Note: alarm delay time for high / low pressure                                                                                                                                                                                             | 0.1s         | 3               | ○            |

| Function Code                            | Name                                                | Set Range                                                                                                                                                                                                                                           | Minimum Unit                                    | Factory Default    | Modification |
|------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------|--------------|
| F5.07                                    | Auto reset times of water shortage                  | 0~100<br>the setting value of 100 means unlimited times                                                                                                                                                                                             | 1                                               | 0                  | ×            |
| F5.08                                    | Auto reset interval of water shortage               | 0.1~60.0s                                                                                                                                                                                                                                           | 0.1                                             | 20.0               | ×            |
| F5.09                                    | Water shortage detection time                       | 0.0~999.9s                                                                                                                                                                                                                                          | 0.1s                                            | 60.0               | ○            |
| F5.10                                    | Waiting time of water shortage detection 1          | 0.1~999.9min                                                                                                                                                                                                                                        | 0.1min                                          | 6.0min             | ×            |
| F5.11                                    | Waiting time of water shortage detection 2          | 0.1~999.9min                                                                                                                                                                                                                                        | 0.1min                                          | 1.0min             | ○            |
| F5.12                                    | Automatic detection of water shortage selection     | 0: disabled<br>1: enabled                                                                                                                                                                                                                           | 1                                               | 1                  | ×            |
| <b>F6 Group -- RS485 Communication</b>   |                                                     |                                                                                                                                                                                                                                                     |                                                 |                    |              |
| F6.00                                    | Local address                                       | 0: broadcast address<br>1~247 : slave                                                                                                                                                                                                               | 1                                               | 1                  | ×            |
| F6.01                                    | Baud rate setting                                   | 0: 2400BPS<br>1: 4800BPS<br>2: 9600BPS<br>3: 19200BPS<br>4: 38400BPS<br>5: 115200BPS                                                                                                                                                                | 1                                               | 3                  | ×            |
| F6.02                                    | Data format                                         | 0: no parity (N, 8, 1) for RTU<br>1: even parity (E, 8, 1) for RTU<br>2: odd parity (O, 8, 1) for RTU<br>3: no parity (N, 8, 2) for RTU<br>4: even parity (E, 8, 2) for RTU<br>5: odd parity (O, 8, 2) for RTU<br>ASCII mode is reserved at present | 1                                               | 1                  | ×            |
| F6.03                                    | Response delay                                      | 0~200ms                                                                                                                                                                                                                                             | 1ms                                             | 5                  | ×            |
| F6.04                                    | Transmission response                               | 0: response for write operation<br>1: no response for write operation                                                                                                                                                                               | 1                                               | 0                  | ×            |
| F6.05                                    | Ratio correlation coefficient                       | 0.01~10.00                                                                                                                                                                                                                                          | 0.01                                            | 1.00               | ○            |
| F6.06                                    | Communication mode                                  | 0: general mode<br>1: MD380 mode                                                                                                                                                                                                                    | 1                                               | 0                  | ×            |
| F6.07                                    | Action of RS485 communication error                 | 0: protection action and coast to stop<br>1: alarm and maintain the current operation<br>2: alarm and stop according to the preset mode                                                                                                             | 1                                               | 1                  | ×            |
| F6.08                                    | RS485 communication timeout detect                  | 0.0: no detect<br>0.1~100.0s<br>note: communication time out detection is disabled in stop status                                                                                                                                                   | 0.1s                                            | 0.0                | ○            |
| <b>F7 Group -- Motor Parameters</b>      |                                                     |                                                                                                                                                                                                                                                     |                                                 |                    |              |
| F7.00                                    | Motor's rated power                                 | 0.4~999.9KW                                                                                                                                                                                                                                         | 0.1KW                                           | Depending on model | ×            |
| F7.01                                    | Motor's rated frequency                             | 0.01Hz~ 【F0.08】 maximum frequency                                                                                                                                                                                                                   | 0.01Hz                                          | 50.00              | ×            |
| F7.02                                    | Motor's rated speed                                 | 0~6000rpm                                                                                                                                                                                                                                           | 1rpm                                            | Depending on model | ×            |
| F7.03                                    | Motor's rated voltage                               | 0~999V                                                                                                                                                                                                                                              | 1V                                              | Depending on model | ×            |
| F7.04                                    | Motor's rated current                               | 0.1~6553.5A                                                                                                                                                                                                                                         | 0.1A                                            | Depending on model | ×            |
| F7.05                                    | No-load current of asynchronous motor               | 0.01~655.35A                                                                                                                                                                                                                                        | 0.01A                                           | Depending on model | ×            |
| <b>F8 Group -- Protective Parameters</b> |                                                     |                                                                                                                                                                                                                                                     |                                                 |                    |              |
| F8.00                                    | Motor overload protection factor                    | 20.0%~120.0%                                                                                                                                                                                                                                        | 0.1%                                            | 100.0%             | ×            |
| F8.01                                    | Overvoltage limit level                             | 220V: 350~390V 370V<br>380V: 600~780V 700V                                                                                                                                                                                                          | 1V                                              | Depending on model | ×            |
| F8.02                                    | Current limiting threshold                          | 80%~200% * inverter rated current                                                                                                                                                                                                                   | 1%                                              | Depending on model | ×            |
| F8.03                                    | Phase loss protection of input and output           | 0: disabled<br>1: disabled for input, enabled for output<br>2: enabled for input, disabled for output<br>3: enabled                                                                                                                                 | 1                                               | Depending on model | ×            |
| F8.04                                    | Delay time of input phase loss protection           | 0.0~30.0s                                                                                                                                                                                                                                           | 0.1s                                            | 1.0                | ○            |
| F8.05                                    | Detection reference of output phase loss protection | 0%~100% * inverter rated current                                                                                                                                                                                                                    | 1%                                              | 50%                | ×            |
| F8.06                                    | Delay time of input phase loss protection           | 0: disabled<br>1: enabled                                                                                                                                                                                                                           | 1                                               | 0                  | ○            |
| F8.07                                    | Instantaneous power down frequency reduction point  | Set the instantaneous power--off frequency reduction point                                                                                                                                                                                          | 220: 180~330V<br>250V<br>380V: 300~550V<br>450V | Depending on model | ×            |

| Function Code                                | Name                                                     | Set Range                                                                                                                                                                                                                                                                                                                                                                                                        | Minimum Unit | Factory Default | Modification |
|----------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|--------------|
| F8.08                                        | Instantaneous power--off frequency reduction coefficient | Set the reduction coefficient of instantaneous power--off frequency, 0 means the instantaneous stop and non--stop function is invalid                                                                                                                                                                                                                                                                            | 1~100        | 0               | ○            |
| F8.09                                        | Voltage control function                                 | LED units: AVR function<br>0: invalid<br>1: Valid throughout<br>2: Only valid when decelerating<br>LED ten digits: over modulation selection<br>0: invalid<br>1: Effective<br>LED Hundreds: Dead Zone Compensation Option<br>0: invalid<br>1: Effective<br>Thousands of LEDs: Vibration suppression options<br>0: invalid<br>1: Vibration suppression mode 1<br>2: Oscillation suppression mode 2<br>3: reserved | 0000~3112    | 2102            | ×            |
| F8.10                                        | Stop mode                                                | 0: decelerate to stop<br>1: free stop                                                                                                                                                                                                                                                                                                                                                                            | 0~1          | 0               | ×            |
| <b>F9 Group -- Interface Parameter Group</b> |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                  |              |                 |              |
| F9.00                                        | Monitoring parameter selection in operation status       | 0~22                                                                                                                                                                                                                                                                                                                                                                                                             | 1            | 8               | ○            |
| F9.01                                        | Monitoring parameter selection in stop status            | 0~22                                                                                                                                                                                                                                                                                                                                                                                                             | 1            | 8               | ○            |
| F9.02                                        | Parameter initialization                                 | 0: disabled<br>1: restore to factory defaults (all user parameters except motor parameters)<br>2: restore to factory defaults (all user parameters)<br>3: clear fault record                                                                                                                                                                                                                                     | 1            | 0               | ×            |
| F9.03                                        | Write--protect                                           | 0: allow all parameters to be modified (some are not during operation)<br>1: only allow F0.06 and F9.03 to be modified<br>2: only allow F9.03 to be modified<br>Note: these above limitations are invalid to this function code and F0.00                                                                                                                                                                        | 1            | 0               | ○            |
| F9.04                                        | Inverter type                                            | 0: G type (constant torque load type)<br>1: P type (fan, water pump load type)                                                                                                                                                                                                                                                                                                                                   | 1            | 0               | ×            |
| F9.05                                        | Write--protect                                           | 0: linear curve<br>1: decreasing torque curve 1 (1.3 power)<br>2: decreasing torque curve 2 (1.5 power)<br>3: decreasing torque curve 3 (1.7 power)<br>4: square curve                                                                                                                                                                                                                                           | 1            | 4               | ×            |

## 5. Communication Protocol

### 5.1 RTU Mode And Format

When the controller communicates on the Modbus in RTU mode, every 8-bit byte in the message is divided into two 4-digit hexadecimal characters. The main advantage of this mode is the density of characters transmitted at the same baud rate. Above ASCII mode, each message must be transmitted continuously.

#### 5.1.1 Each Byte Format In RTU Mode

Encoding system: 8 bits binary, hexadecimal 0~9, A~F.  
Data bits: 1 start bit, 8 bits of data (lowest bit sent first), 1 stop bit, 1 parity bit can be selected. (Reference RTU data frame is sequence diagram)  
Error check zone: cyclic redundancy check (CRC)

#### 5.1.2 Bit Sequence Diagram Of RTU Data Frame

With parity: 

|       |   |   |   |   |   |   |   |   |     |      |
|-------|---|---|---|---|---|---|---|---|-----|------|
| Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Far | Stop |
|-------|---|---|---|---|---|---|---|---|-----|------|

 No parity: 

|       |   |   |   |   |   |   |   |   |      |
|-------|---|---|---|---|---|---|---|---|------|
| Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Stop |
|-------|---|---|---|---|---|---|---|---|------|

### 5.2 Register Address And Function Code Of The Inverter

#### 5.2.1 Supported Function Codes

| Function Code | Function Description                   |
|---------------|----------------------------------------|
| 03            | Read multiple registers                |
| 06            | Write single register                  |
| 10            | Write multiple registers in succession |

#### 5.2.2 Register Address

| Register Function            | Address                          |
|------------------------------|----------------------------------|
| Control command input        | 0x2000                           |
| Monitoring parameter reading | 0xD000 (0x1D00) ~0xD016 (0x1D16) |
| MODBUS frequency setting     | 0x2001                           |
| Parameter settings           | 0x0000~0x0905                    |

### 5.2.3 03H Read Multiple Parameters (Read Up To 8 Items In A Row)

Inquiry information frame format (send frame):

|                       |     |
|-----------------------|-----|
| Address               | 01H |
| Function              | 03H |
| Starting data address | 00H |
|                       | 01H |
| Number of Data (Byte) | 00H |
|                       | 02H |
| CRC CHK Low           | 95H |
| CRC CHK High          | CBH |

Data analysis of this paragraph:

01H is the inverter address  
03H read function code  
0001H is the same as F0.01 of the control panel  
0002H is the number of items in the read menu,  
and two items F0.01 and F0.02  
95CBH is a 16-bit CRC checksum

Response information frame format (return frame):

|               |     |
|---------------|-----|
| Address       | 01H |
| Function      | 03H |
| DataNum*2     | 04H |
| Data1 [2Byte] | 00H |
|               | 64H |
| Data2 [2Byte] | 00H |
|               | 64H |
| CRC CHK Low   | BAH |
| CRC CHK High  | 07H |

Data analysis of this paragraph:

01H is the inverter address  
03H is read function code  
04H is the product of read terms \* 2  
0064H is to read the data of F0.01  
0064H is to read the data of F0.02 item  
BA07H is a 16-bit CRC check code

Example:

| Name                                                                                                                                                       | Frame Format                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Read the data of F0.01 and F0.02                                                                                                                           | Send frame: 01H 03H 0001H 0002H 95CBH       |
|                                                                                                                                                            | Return frame: 01H 03H 04H 0064H 0064H BA07H |
| Read the data of F2.01 item                                                                                                                                | Send frame: 01H 03H 0201H 0001H D472H       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 000FH F840H       |
| Read monitoring parameters of item d-00 (addresses D000H and 1D00H are common)                                                                             | Send frame: 01H 03H D000H 0001H BCCAH       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 1388H B512H       |
|                                                                                                                                                            | Send frame: 01H 03H 1D00H 0001H 8266H       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 1388H B512H       |
| Read the status of the inverter when it is stopped (addresses A000H and 1A00H are common, refer to the description of the inverter's running status later) | Send frame: 01H 03H A000H 0001H A60AH       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 0040H B9B4H       |
|                                                                                                                                                            | Send frame: 01H 03H 1A00H 0001H 8312H       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 0040H B9B4H       |
| Read fault code E-18 (address E000H and 1E00H are common, refer to the fault code table of the inverter)                                                   | Send frame: 01H 03H E000H 0001H B3CAH       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 0012H 3849H       |
|                                                                                                                                                            | Send frame: 01H 03H 1E00H 0001H 8222H       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 0012H 3849H       |
| Read the pre-alarm code A-17 (addresses E001H and 1E01 are common, refer to the pre-alarm code table of the inverter)                                      | Send frame: 01H 03H E001H 0001H E20AH       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 0011H 7848H       |
|                                                                                                                                                            | Send frame: 01H 03H 1E01H 0001H D3E2H       |
|                                                                                                                                                            | Return frame: 01H 03H 02H 0012H 7848H       |

### 5.2.4 06H Write A Single Parameter

Inquiry information frame format (send frame):

|                       |     |
|-----------------------|-----|
| Address               | 01H |
| Function              | 06H |
| Starting data address | 20H |
|                       | 00H |
| Data (2Byte)          | 00H |
|                       | 01H |
| CRC CHK Low           | 43H |
| CRC CHK High          | CAH |

Response information frame format (return frame):

|                       |     |
|-----------------------|-----|
| Address               | 01H |
| Function              | 06H |
| Starting data address | 20H |
|                       | 00H |
| Number of data (Byte) | 00H |
|                       | 01H |
| CRC CHK Low           | 43H |
| CRC CHK High          | CAH |

Data analysis of this paragraph:

If the setting is correct, the same input data is returned

Example:

| Name          | Frame Format                            |
|---------------|-----------------------------------------|
| Forward       | Send frame: 01H 06H 2000H 0001H 43CAH   |
|               | Return frame: 01H 06H 2000H 0001H 43CAH |
| Reverse       | Send frame: 01H 06H 2000H 0009H 420CH   |
|               | Return frame: 01H 06H 2000H 0009H 420CH |
| Downtime      | Send frame: 01H 06H 2000H 0003H C20BH   |
|               | Return frame: 01H 06H 2000H 0003H C20BH |
| Free shutdown | Send frame: 01H 06H 2000H 0004H 83C9H   |
|               | Return frame: 01H 06H 2000H 0004H 83C9H |

| Name             | Frame Format                            |
|------------------|-----------------------------------------|
| Reset            | Send frame: 01H 06H 2000H 0010H 43CAH   |
|                  | Return frame: 01H 06H 2000H 0010H 43CAH |
| Forward rotation | Send frame: 01H 06H 2000H 0002H 03CBH   |
|                  | Return frame: 01H 06H 2000H 0002H 03CBH |
| Reverse jog      | Send frame: 01H 06H 2000H 000AH 020DH   |
|                  | Return frame: 01H 06H 2000H 000AH 020DH |

### 5.2.5 10H Write Multiple Parameters Continuously

Inquiry information frame format (send frame):

|                       |     |
|-----------------------|-----|
| Address               | 01H |
| Function              | 10H |
| Starting data address | 01H |
|                       | 00H |
| Number of Data (Byte) | 00H |
|                       | 02H |
| DataNum*2             | 04H |
| Data1 (2Byte)         | 00H |
|                       | 01H |
| Data2 (2Byte)         | 00H |
|                       | 02H |
| CRC CHK Low           | 2EH |
| CRC CHK High          | 3EH |

Data analysis of this paragraph:

01H is the inverter address  
10H is write function code  
0100H is the same as F1.00 of the control panel  
0002H is the number of registers  
04H is the total number of bytes  
(2 \* number of registers)  
0001H is the data of F1.00  
0002H is the data of F1.01  
2E3EH is a 16-bit CRC checksum

Response information frame format (return frame):

|                       |     |
|-----------------------|-----|
| Address               | 01H |
| Function              | 10H |
| Starting data address | 01H |
|                       | 00H |
| Number of data (Byte) | 00H |
|                       | 02H |
| CRC CHK Low           | 40H |
| CRC CHK High          | 34H |

Data analysis of this paragraph:

01H is the inverter address  
10H is write function code  
0100H is the data for writing F1.00  
0002H is the number of items in the write menu,  
and two items F1.00 and F1.01  
4034H is a 16-bit CRC check code

Example:

| Name                                                     | Frame Format                                          |
|----------------------------------------------------------|-------------------------------------------------------|
| Set the parameters of F1.00 and F1.01 to 1 and 2.        | Send frame: 01H 10H 0100H 0002H 04H 0001H 0002H 2E3EH |
|                                                          | Return frame: 01H 10H 0100H 0002H 4034H               |
| Forward and communicate with the given frequency of 50Hz | Send frame: 01H 10H 2000H 0002H 04H 0001H 1388H 36F8H |
|                                                          | Return frame: 01H 10H 2000H 0002H 4A08H               |
| Set the parameter of F1.00 item to 1                     | Send frame: 01H 10H 0100H 0001H 02H 0001H 7750H       |
|                                                          | Return frame: 01H 10H 0100H 0001H 0035H               |

### 5.3 Other Register Address Function Description:

| Function Description                      | Address Definition | Meaning Of Data                                                                                         |             |                                                                                                                                        |
|-------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------|
|                                           |                    | Byte                                                                                                    | Place       | Meaning                                                                                                                                |
| Inverter running status                   | A000H (1A00H)      | Byte1                                                                                                   | Bit7        | 0: no action<br>1: overload pre-alarm                                                                                                  |
|                                           |                    |                                                                                                         | Bit6 ~ Bit5 | 0: INV_220V<br>1: INV_380V<br>2: INV_660V<br>3: INV_1140V                                                                              |
|                                           |                    |                                                                                                         | Bit4        | 0: no action<br>1: power-down storage                                                                                                  |
|                                           |                    |                                                                                                         | Bit3        | 0: no action<br>1: reset                                                                                                               |
|                                           |                    |                                                                                                         | Bit2 ~ Bit1 | 0: reserved<br>1: reserved<br>2: reserved                                                                                              |
|                                           |                    |                                                                                                         | Bit0        | 0: operation panel run command channel<br>1: terminal run command channel<br>2: communication operation command channel<br>3: reserved |
|                                           |                    | Byte0                                                                                                   | Bit7        |                                                                                                                                        |
|                                           |                    |                                                                                                         |             |                                                                                                                                        |
| Inverter running status                   | A000H (1A00H)      | Byte0                                                                                                   | Bit6        | 0: no action<br>1: bus voltage is normal                                                                                               |
|                                           |                    |                                                                                                         | Bit5        | 0: no action<br>1: undervoltage                                                                                                        |
|                                           |                    |                                                                                                         | Bit4        | 0: no action<br>1: jog                                                                                                                 |
|                                           |                    |                                                                                                         | Bit3        | 0: forward<br>1: reverse                                                                                                               |
|                                           |                    |                                                                                                         | Bit2 ~ Bit1 | 1: speed up<br>2: deceleration operation<br>3: run at a constant speed                                                                 |
|                                           |                    |                                                                                                         | Bit0        | 0: stop status<br>1: running status                                                                                                    |
| Read inverter fault code                  | E000H (1E00H)      | Addresses E000H and 1E00H are common (see fault code table, read function code 03H example)             |             |                                                                                                                                        |
| Read the fault alarm code of the inverter | E001H (1E01H)      | Addresses E001H and 1E01H are common (see the pre-alarm code table, read the function code 03H example) |             |                                                                                                                                        |

#### 5.4 Inverter Fault Code Table:

| Fault Code | Keyboard Display Content | Fault Information                           |
|------------|--------------------------|---------------------------------------------|
| 0000H      | —                        | Fault free                                  |
| 0001H      | E-01                     | Overcurrent during accelerated operation    |
| 0002H      | E-02                     | Overcurrent during deceleration operation   |
| 0003H      | E-03                     | Overcurrent during constant speed operation |
| 0004H      | E-04                     | Overvoltage during accelerated operation    |
| 0005H      | E-05                     | Overvoltage during deceleration operation   |
| 0006H      | E-06                     | Overvoltage during constant speed operation |
| 0007H      | E-07                     | Bus undervoltage                            |
| 0008H      | E-08                     | Motor overload                              |
| 0009H      | E-09                     | Inverter overload                           |
| 000AH      | E-10                     | Reserve                                     |
| 000BH      | E-11                     | Power module failure                        |
| 000CH      | E-12                     | Phase loss on input side                    |
| 000DH      | E-13                     | Phase loss or current imbalance output side |
| 000EH      | E-14                     | Output short to ground fault                |
| 000FH      | E-15                     | Radiator overheating                        |
| 0011H      | E-17                     | RS485 communication fault                   |
| 0014H      | E-20                     | Current detection error                     |
| 0016H      | E-22                     | EEPROM read and write fault                 |
| 0016H      | E-22                     | PID feedback disconnected                   |
| 0018H      | E-24                     | Voltage feedback disconnection              |
| 001EH      | E-32                     | Water shortage                              |

#### 5.5 Inverter Pre-alarm Code Table:

| Alarm Code | Keyboard Display | Fault Information                                         |
|------------|------------------|-----------------------------------------------------------|
| 0000H      | —                | Fault free                                                |
| 0011H      | A-17             | RS485 communication fault alarm                           |
| 0032H      | A-50             | High voltage alarm                                        |
| 0033H      | A-51             | Low voltage alarm                                         |
| 0034H      | A-52             | No slaves detected in the master network (online)         |
| 0035H      | A-53             | Master not detected in slave network (online)             |
| 0036H      | A-54             | Slave addresses in the same network are the same (online) |

#### 5.6 Control Command Word Format (See Writing Function Code 06H Example):

| Address | Place     | Meaning                                                           |
|---------|-----------|-------------------------------------------------------------------|
| 2000H   | Bit7~Bit5 | Reserve                                                           |
|         | Bit4      | 0: no action<br>1: reset                                          |
|         | Bit3      | 0: forward<br>1: reverse                                          |
|         | Bit2~Bit0 | 100: free stop<br>011: shutdown<br>010: jog operation<br>001: run |

#### 5.7 The Meaning Of The Error Code Of The Slave Responding To The Abnormal Information:

| Error Code | Description                                   |
|------------|-----------------------------------------------|
| 01H        | Illegal function code                         |
| 02H        | Illegal address                               |
| 03H        | Illegal data                                  |
| 04H        | Illegal register length                       |
| 05H        | CRC check error                               |
| 06H        | Cannot be modified during parameter operation |
| 07H        | Parameters cannot be modified                 |
| 08H        | Upper inverter control command is invalid     |
| 09H        | Parameters are protected by password          |
| 0AH        | Wrong password                                |

#### 5.8 Communication Address Corresponding To All Parameters Of The Inverter:

| Function Code | Communication Address       |
|---------------|-----------------------------|
| F0.00~F0.13   | 0000H~000DH                 |
| F1.00~F1.04   | 0100H~0004H                 |
| F2.00~F2.04   | 0200H~0204H                 |
| F3.00~F3.19   | 0300H~0313H                 |
| F4.00~F4.23   | 0400H~0417H                 |
| F5.00~F5.12   | 0500H~050CH                 |
| F6.00~F6.08   | 0600H~0608H                 |
| F7.00~F7.05   | 0700H~0705H                 |
| F8.00~F8.06   | 0800H~0806H                 |
| F9.00~F9.05   | 0900H~0905H                 |
| d-00~d-22     | D000H (1D00H)~D016H (1D16H) |

Note:

(1). In the above examples, the address of the inverter is 01 for the convenience of explanation. When the inverter is a slave, the address is set in the range of 1 to 247. If any data in the frame format is changed, the verification is performed. The code must be recalculated. You can download the CRC 16-bit check code calculation tool online.

(2). The starting address of the monitoring item is D000, and each item is offset by the corresponding hexadecimal value based on this address, and then added to the starting address. For example: the monitoring start item is d-00, and the corresponding starting address is D000H (1D00H). Now read the monitoring item d-18, 18-00 = 18, 18 is converted into hexadecimal 12H, then d-18 The read address is D000H + 12H = D012H (1D00H + 12H = 1D12H). The addresses D000H and 1D00H are common.

(3). The frame format when the slave's response message is abnormal: inverter address + (80H + function code) + error code + 16-bit CRC check code; if the slave returns a frame of 01H + 83H + 04H + 40F3H; 01H is from Machine address, 83H is 80H + 03H, which indicates a read error, 04H indicates an illegal data length, and 40F3H is a 16-bit CRC check code.

## 6. Troubleshooting

### 6.1 Fault information and Troubleshooting

Any abnormality occurs during operation, the inverter will lock PWM output immediately and enter the fault protection status. Meanwhile, the flashing fault code on the keyboard indicates the current fault information. At the same time, the fault indicator ALM lights up. At this time, you need to check the cause of the fault and the corresponding treatment method according to the methods in this section. If the problem still cannot be solved, please contact our company directly. For the corresponding solutions, see Table (A) and Table (B) for fault diagnosis and troubleshooting.

| Fault Code | Fault Descriptions                       | Possible Reasons                                                 | Actions                                                               |
|------------|------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|
| E-01       | Over-current in Acc process              | Too short Acc time (including tuning process)                    | Prolong the Acc time                                                  |
|            |                                          | Restart the rotating motor                                       | Start after setting as DC brake, or rotational speed tracking start   |
|            |                                          | Drive power is too small                                         | Select a higher power drive                                           |
|            |                                          | V/F curve is not suitable                                        | Adjust V/F curve or torque boost                                      |
| E-02       | Over-current in Dec process              | Too short Dec time (including tuning process)                    | Prolong the Dec time                                                  |
|            |                                          | Too low driver's power                                           | Select the drive with large capacity                                  |
|            |                                          | The load inertia is too high                                     | Connect suitable braking resistor or braking unit                     |
| E-03       | Over-current in constant speed operation | Low network voltage                                              | Check the power supply                                                |
|            |                                          | Sudden change or abnormal of load                                | Check the load or reduce the change of the load                       |
|            |                                          | Too low driver's power                                           | Select the driver with larger capacity                                |
| E-04       | Over voltage in Acc process              | Abnormal supply voltage (including tuning process)               | Check the power supply                                                |
|            |                                          | The driver is restarted with a rotating motor                    | Start after setting as DC braking, or rotational speed tracking start |
|            |                                          | Special potential energy load                                    | Connect suitable braking resistor or braking unit                     |
| E-05       | Over voltage in Dec process              | Too short Dec time (including tuning process)                    | Prolong the Dec time                                                  |
|            |                                          | The load inertia is too high                                     | Connect suitable braking resistor or braking unit                     |
|            |                                          | Abnormal of supply voltage                                       | Check the power supply                                                |
| E-06       | Over voltage in constant-speed operating | Abnormal of supply voltage                                       | Check the power supply                                                |
|            |                                          | Special potential energy load                                    | Connect suitable braking resistor or braking unit                     |
| E-07       | Bus undervoltage                         | Abnormal of supply voltage or disconnecting of contactor (relay) | Check supply voltage or seek help from manufacturer                   |
| E-08       | Motor overload                           | Improper setting of V/F curve or torque boost                    | Adjust V/F curve and torque boost value                               |
|            |                                          | Low network voltage                                              | Check network voltage                                                 |
|            |                                          | Motor blocked or load sudden change                              | Check load                                                            |
|            |                                          | Incorrect setting of motor overload protection factor            | Correct the setting                                                   |
| E-09       | Driver overload                          | Improper setting of V/F curve or torque boost                    | Adjust V/F curve and torque boost value                               |
|            |                                          | Low network voltage                                              | Check network voltage                                                 |
|            |                                          | Too short Acc time                                               | Prolong Acc time                                                      |
| E-10       | Reserved                                 | Reserved                                                         | Reserved                                                              |
| E-11       | Function module fault                    | Short circuit or grounded of driver output                       | Check motor wiring                                                    |
|            |                                          | Instantaneous over current of driver                             | Refer to actions of over current                                      |
|            |                                          | Obstruction of damage of ventilation channel                     | Clear the ventilation channel or replace the fan                      |
|            |                                          | control board abnormal or interference serious                   | Seek help from manufacturer                                           |
|            |                                          | Power device damage                                              | Seek help from manufacturer                                           |

| Fault Code | Fault Descriptions                     | Possible Reasons                                                                                                             | Actions                                                                                                                                      |
|------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| E-12       | Input phase loss                       | Phase loss of power supply                                                                                                   | Check power supply and wiring                                                                                                                |
| E-13       | Output phase loss or current imbalance | Output phase failure among phase U, V, W                                                                                     | Check the driver's output wiring                                                                                                             |
| E-14       | Reserved                               | Reserved                                                                                                                     | Reserved                                                                                                                                     |
| E-15       | Heatsink overheat                      | Ambient over-temperature<br>Fan damage                                                                                       | Lower the ambient temperature<br>Replace the fan                                                                                             |
| E-16       | Reserved                               | Reserved                                                                                                                     | Reserved                                                                                                                                     |
| E-17       | RS485 communication failure            | RS485 channel interference<br>Communication timeout                                                                          | Check whether the communication wiring is shield, whether the wiring is correct; consider connecting filter capacitor if necessary.<br>Retry |
| E-18       | Reserved                               | Reserved                                                                                                                     | Reserved                                                                                                                                     |
| E-19       | External device fault                  | Input terminal of external device fault is closed                                                                            | Disconnect the terminal and clear the faults (check the fault cause)                                                                         |
| E-20       | Current detection fault                | Hall device or amplification circuit fault<br>Auxiliary power supply is damaged<br>Hall or power board wiring is bad contact | Seek help from manufacturer<br>Seek help from manufacturer<br>Seek help from manufacturer                                                    |
| E-22       | EEPROM R/W fault                       | EEPROM fault                                                                                                                 | Seek help from manufacturer                                                                                                                  |
| E-24       | PID feedback disconnecting             | PID feedback wire is loosen<br>Feedback value lower than disconnection detection value                                       | Check feedback wiring<br>Adjust detection input threshold                                                                                    |
| E-32       | Water lack fault                       | Pump lack of water                                                                                                           | Check whether there is water in the pump                                                                                                     |

Table A Fault Diagnosis and Troubleshooting

| Alarm Code | Fault Information                                           |
|------------|-------------------------------------------------------------|
| A-17       | RS485 communication fault alarm                             |
| A-50       | High voltage alarm                                          |
| A-51       | Low voltage alarm                                           |
| A-52       | Slave device can't be detected from the host device network |
| A-53       | Host device can't be detected from the slave network        |
| A-54       | The slave device address are the same from the same network |

Table B Fault Diagnosis and Troubleshooting

## 6.2 Abnormal Phenomena Solution

During the driver operation, the common abnormal phenomena and solving actions are as showed in Table C.

| Phenomena                                                     | Possible Reasons of Fault and Actions to Take                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Motor not running                                             | LED no display<br>Check whether there is power failure, or phase loss of input power, check if the power line is connected correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                               | LED no display, but the internal charging indicator is on<br>Check if there is problems with wiring or socket related to keypad. Measure the voltage of internal control source to check if the switching power supply is functioning well. If not, check its inlet wire, start oscillation and stabilivolt to see if they works well.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                               | Motor droning<br>The motor load is too much. Reduce the load.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                               | No abnormal phenomena<br>Check if it is in trip status or hasn't reset after tripping, check whether it is in restart status after power down, whether the keypad is reset, whether it is in program running status, multi-speed operation status, some specific operation status or non-operation status. Try recovering factory set.<br>Check whether the running command is sent.<br>Check whether the operation frequency is set at 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                               | The motor can not Acc/Dec successfully<br>Improper setting of Acc/Dec time. Increase the value of Acc/Dec time.<br>The current limit is set too low. Increase the value.<br>Over-voltage protection action during decelerating. Increase the decelerating time.<br>Improper setting of carrier frequency, too much load may cause oscillation.<br>The load is too heavy, and the torque is not enough. Increase torque boost value in V/F mode. If not working, switch to auto torque boost mode, and the motor parameters should be in consistent with the actual value. If still not working, switch to flux vector control mode, and check the motor parameters and actual values to see if they are matched, meanwhile tune the motor parameters.<br>Mismatching of motor power and driver power. Set the motor parameters at actual value.<br>One driver for several motor. Please change the torque boost mode to manual mode. |
| The motor can rotate, but speed regulation can't be realized. | Improper setting of upper and lower limit of frequency.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                               | The frequency is set too low, or the frequency gain is set too low.<br>Check whether the speed adjustment mode is in consistent with frequency setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Phenomena                                                     | Possible Reasons of Fault and Actions to Take                                                                                                                                              |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The motor can rotate, but speed regulation can't be realized. | Check whether the load is too heavy, whether it is in overvoltage stalled state or overcurrent limiting state.                                                                             |
| Speed changing during motor running                           | Frequent fluctuation of load. Decrease the changing.                                                                                                                                       |
|                                                               | Serious mismatching of rated value of the driver and motor. Set the motor parameters as actual value.                                                                                      |
|                                                               | Frequency setting potentiometer is in bad connect or the frequency setting signal is in fluctuation. Switch to digit setting mode or increase filter time constant of analog input signal. |
| The rotation direction of motor is in reverse                 | Adjust phase sequence of output terminal U, V, W.                                                                                                                                          |
|                                                               | Set the running direction as reverse (F0.03=1).<br>Caused by phase loss of output. Check the motor wiring immediately.                                                                     |

Table C Common Abnormal Phenomena and Counteractions

## 7. Maintenance

### 7.1 Routine Maintenance

Many factors such as ambient temperature, humidity, smog, internal component aging will give rise to the occurrence of potential faults. Therefore, it is necessary to conduct routine and periodic maintenance during storage or using of the driver.

When the driver operates normally, please check if there are the following items:

- (1). Abnormal sound or vibration of the motor;
- (2). Abnormal heat producing from the driver or motor;
- (3). High ambient temperature;
- (4). Whether the load current is as usual;
- (5). Whether the cooling fan of the driver runs normally.

### 7.2 Periodic Maintenance

To maintain a long-term normal operation, it is necessary to conduct periodic maintenance according to the working life of internal electronic components. The working life varies with the operation condition. The following table is for reference.

| Part                   | Normal Working Life |
|------------------------|---------------------|
| Cooling fan            | 2~3 years           |
| Electrolytic capacitor | 4~5 years           |
| PCB                    | 5~8 years           |

You should check the driver every 3 months or 6 months according to the actual environment, thus could lower fault risks and maintain a long-term stable operation.

**General Inspection:**

- (1). Whether screws of control terminals are loose. If so, tighten them with a screwdriver;
- (2). Whether the main circuit terminals are properly connected; whether the cable or copper bar joints and screws are over heated;
- (3). Whether the power cables and control cables are damaged, check especially for any wear on the cable insulation;
- (4). Whether the connecting of power cable and cold pressing joint is loose, whether the insulating tapes around the joint are aged or stripped;
- (5). Clear the dust on PCBs and air ducts, and take anti-static measure;
- (6). Before performing insulation tests to the driver, dismantle the wiring between the driver and the power supply, the driver and motor, and all main circuit input/output terminals should be short-circuited with conductors. Then proceed insulation test to the ground. Please use qualified 500V Mega-Ohm-Meter (or with corresponding voltage shift of insulation tester); please do not use faulted meter. Insulation test of single main circuit terminal to ground is prohibited, or the driver can be damaged. After testing, remember to dismantle all the wire that short-circuit main circuit terminals.
- (7). If performing insulation test to the motor, be sure to disconnect the cables between the driver and it. Otherwise, the driver might be damaged.

## Appendix A: Accessories And Use

### A.1 GPRS module and monitoring APP

Pump inverter support optional GPRS module for remote monitoring. GPRS module and inverter connected through 485 communication, and it will monitor the inverter running status in real time through the mobile APP application or webpage.  
GPRS module and inverter connection method:

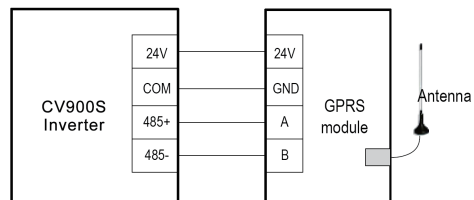


Figure A-1 Connection of GPRS Module and Inverter

For more detailed information, please refer to the "GPRS / GPS Adapter Manual" supporting the GPRS module, or contact the factory technical support. Please provide the model number of the product and the serial number of the product when consulting.

### A.2 Cable

#### A.2.1 Power Cable

The dimensions of the input power and motor cables should comply with local regulations.

Note: If the electrical conductivity of the motor cable shield does not meet the requirements, a separate PE conductor must be used.

A.2.2 Control Cables

Relay cables require a cable with a metal braided shield.  
The keyboard should be connected with a network cable. For places with complex electromag-  
netic environment, it is recommended to use a shielded cable.  
Shielded twisted pair is recommended for communication cable.  
**Note:** Analog and digital signals are routed separately using different cables.  
Before connecting the input power cables to the frequency converter, check the insulation of the  
input power cables in accordance with local regulations.

Standard Model Power Cable Selection Recommended Table:

| Model No.        | Recommended Cable Size (mm2) |     | Specification Of<br>Terminal Screw | Tightening<br>torque (NM) |
|------------------|------------------------------|-----|------------------------------------|---------------------------|
|                  | (+)/(–), R/S/T, U/V/W        | PE  |                                    |                           |
| CV900S–00AG–12SF | 1.5                          | 1.5 | M3                                 | 0.8                       |
| CV900S–00BG–12SF | 1.5                          | 1.5 | M3                                 | 0.8                       |
| CV900S–001G–12SF | 2.5                          | 2.5 | M3                                 | 0.8                       |
| CV900S–002G–12SF | 2.5                          | 2.5 | M3                                 | 0.8                       |
| CV900S–003G–12SF | 2.5                          | 2.5 | M4                                 | 1.2~1.5                   |
| CV900S–004G–12SF | 4                            | 4   | M4                                 | 1.2~1.5                   |
| CV900S–005G–12SF | 6                            | 6   | M4                                 | 1.2~1.5                   |
| CV900S–007G–12SF | 10                           | 10  | M5                                 | 2~2.5                     |
| CV900S–011G–12SF | 25                           | 25  | M6                                 | 4~6                       |
| CV900S–00BG–14TF | 1.5                          | 1.5 | M3                                 | 0.8                       |
| CV900S–001G–14TF | 1.5                          | 1.5 | M3                                 | 0.8                       |
| CV900S–002G–14TF | 1.5                          | 1.5 | M3                                 | 0.8                       |
| CV900S–003G–14TF | 2.5                          | 2.5 | M4                                 | 1.2~1.5                   |
| CV900S–004G–14TF | 2.5                          | 2.5 | M4                                 | 1.2~1.5                   |
| CV900S–005G–14TF | 2.5                          | 2.5 | M4                                 | 1.2~1.5                   |
| CV900S–007G–14TF | 4                            | 4   | M4                                 | 1.2~1.5                   |
| CV900S–011G–14TF | 6                            | 6   | M4                                 | 1.2~1.5                   |
| CV900S–015G–14TF | 10                           | 10  | M5                                 | 2~1.5                     |
| CV900S–018G–14TF | 16                           | 16  | M5                                 | 2~1.5                     |
| CV900S–022G–14TF | 25                           | 16  | M6                                 | 4~6                       |
| CV900S–030G–14TF | 25                           | 16  | M6                                 | 4~6                       |
| CV900S–037G–14TF | 35                           | 16  | M6                                 | 4~6                       |
| CV900S–045G–14TF | 35                           | 16  | M8                                 | 8~10                      |
| CV900S–055G–14TF | 35                           | 16  | M8                                 | 8~10                      |
| CV900S–075G–14TF | 50                           | 25  | M8                                 | 8~10                      |
| CV900S–090G–14TF | 50                           | 25  | M8                                 | 8~10                      |
| CV900S–110G–14TF | 70                           | 35  | M8                                 | 8~10                      |
| CV900S–132G–14TF | 95                           | 50  | M10                                | 16~20                     |
| CV900S–160G–14TF | 95                           | 50  | M10                                | 16~20                     |
| CV900S–185G–14TF | 120                          | 70  | M12                                | 28~35                     |
| CV900S–200G–14TF | 150                          | 70  | M12                                | 28~35                     |
| CV900S–220G–14TF | 150                          | 70  | M12                                | 28~35                     |
| CV900S–250G–14TF | 150                          | 70  | M12                                | 28~35                     |
| CV900S–280G–14TF | 185                          | 95  | M12                                | 28~35                     |
| CV900S–315G–14TF | 240                          | 120 | M12                                | 28~35                     |
| CV900S–355G–14TF | 240                          | 120 | M16                                | 70~80                     |
| CV900S–400G–14TF | 300                          | 150 | M16                                | 70~80                     |
| CV900S–450G–14TF | 300                          | 150 | M16                                | 70~80                     |
| CV900S–500G–14TF | 400                          | 185 | M16                                | 70~80                     |

**Note:** The recommended cable size for the main circuit can be used under conditions of ambient  
temperature of 40 degrees Celsius, wiring distance of 100 m or less and rated current.  
If the control cable and power cable must cross, the angle between the control cable and the  
power cable must be 90 degrees.  
Insulation resistance will be reduced if the motor is wet inside. If moisture is suspected, dry the  
motor and measure again.

A.3 Reactor

When the distance between the inverter and the motor exceeds 50 meters, due to the parasitic  
capacitance effect of the long cable to the ground leading to excessive leakage current, the  
inverter is prone to frequent overcurrent protection, and in order to avoid damage to the motor  
insulation, an output reactor make up. When the distance between the inverter and the motor  
exceeds 100 meters, please consult the manufacturer's technical support directly.  
**Note:** The output reactor, the design output voltage drop of 1% ± 15%.  
The above options are external, customers need to be specified in the purchase.

Appendix B: Recommended Solar Module Configurations

B.1 Photovoltaic Pumps Inverter Recommended Battery Pack Configuration

| Model No.        | Solar Module Open Circuit Voltage Level |                                                        |                        |                                                        |
|------------------|-----------------------------------------|--------------------------------------------------------|------------------------|--------------------------------------------------------|
|                  | 37±1V                                   |                                                        | 45±1V                  |                                                        |
|                  | Component<br>power±5Wp                  | Number of strings<br>per string *<br>Number of strings | Component<br>power±5Wp | Number of strings<br>per string *<br>Number of strings |
| CV900S–00AG–12SF | 250                                     | 11*1                                                   | 300                    | 9*1                                                    |
| CV900S–00BG–12SF | 250                                     | 11*1                                                   | 300                    | 9*1                                                    |

| Model No.        | Solar Module Open Circuit Voltage Level |                                                        |                        |                                                        |
|------------------|-----------------------------------------|--------------------------------------------------------|------------------------|--------------------------------------------------------|
|                  | 37±1V                                   |                                                        | 45±1V                  |                                                        |
|                  | Component<br>power±5Wp                  | Number of strings<br>per string *<br>Number of strings | Component<br>power±5Wp | Number of strings<br>per string *<br>Number of strings |
| CV900S–001G–12SF | 250                                     | 11*1                                                   | 300                    | 9*1                                                    |
| CV900S–002G–12SF | 250                                     | 11*1                                                   | 300                    | 9*1                                                    |
| CV900S–003G–12SF | 250                                     | 11*2                                                   | 300                    | 9*2                                                    |
| CV900S–004G–12SF | 250                                     | 11*2                                                   | 300                    | 9*2                                                    |
| CV900S–005G–12SF | 250                                     | 11*3                                                   | 300                    | 9*3                                                    |
| CV900S–007G–12SF | 250                                     | 11*3                                                   | 300                    | 9*3                                                    |
| CV900S–011G–12SF | 250                                     | 11*5                                                   | 300                    | 9*5                                                    |
| CV900S–00BG–14TF | 250                                     | 18*1                                                   | 300                    | 15*1                                                   |
| CV900S–001G–14TF | 250                                     | 18*1                                                   | 300                    | 15*1                                                   |
| CV900S–002G–14TF | 250                                     | 18*1                                                   | 300                    | 15*1                                                   |
| CV900S–003G–14TF | 250                                     | 20*1                                                   | 300                    | 16*1                                                   |
| CV900S–004G–14TF | 250                                     | 20*1                                                   | 300                    | 16*1                                                   |
| CV900S–005G–14TF | 250                                     | 18*2                                                   | 300                    | 15*2                                                   |
| CV900S–007G–14TF | 250                                     | 18*2                                                   | 300                    | 15*2                                                   |
| CV900S–011G–14TF | 250                                     | 18*3                                                   | 300                    | 15*3                                                   |
| CV900S–015G–14TF | 250                                     | 18*4                                                   | 300                    | 15*4                                                   |
| CV900S–018G–14TF | 250                                     | 18*5                                                   | 300                    | 15*5                                                   |
| CV900S–022G–14TF | 250                                     | 18*6                                                   | 300                    | 15*6                                                   |
| CV900S–030G–14TF | 250                                     | 18*8                                                   | 300                    | 15*8                                                   |
| CV900S–037G–14TF | 250                                     | 18*9                                                   | 300                    | 15*9                                                   |
| CV900S–045G–14TF | 250                                     | 18*12                                                  | 300                    | 15*12                                                  |
| CV900S–055G–14TF | 250                                     | 18*14                                                  | 300                    | 15*15                                                  |
| CV900S–075G–14TF | 250                                     | 18*18                                                  | 300                    | 15*22                                                  |
| CV900S–090G–14TF | 250                                     | 18*22                                                  | 300                    | 15*30                                                  |
| CV900S–110G–14TF | 250                                     | 18*26                                                  | 300                    | 15*36                                                  |
| CV900S–132G–14TF | 250                                     | 18*32                                                  | 300                    | 15*40                                                  |
| CV900S–160G–14TF | 250                                     | 18*38                                                  | 300                    | 15*48                                                  |
| CV900S–185G–14TF | 250                                     | 18*44                                                  | 300                    | 15*50                                                  |
| CV900S–200G–14TF | 250                                     | 18*48                                                  | 300                    | 15*56                                                  |
| CV900S–220G–14TF | 250                                     | 18*32                                                  | 300                    | 15*60                                                  |
| CV900S–250G–14TF | 250                                     | 18*60                                                  | 300                    | 15*68                                                  |
| CV900S–280G–14TF | 250                                     | 18*68                                                  | 300                    | 15*76                                                  |
| CV900S–315G–14TF | 250                                     | 18*78                                                  | 300                    | 15*86                                                  |
| CV900S–355G–14TF | 250                                     | 18*88                                                  | 300                    | 15*96                                                  |
| CV900S–400G–14TF | 250                                     | 18*104                                                 | 300                    | 15*110                                                 |
| CV900S–450G–14TF | 250                                     | 18*118                                                 | 300                    | 15*124                                                 |
| CV900S–500G–14TF | 250                                     | 18*132                                                 | 300                    | 15*140                                                 |

Appendix C: Inverter AC / DC Switching Scheme

C.1 Program Introduction

Under normal circumstances, the inverter does not allow AC, DC access at the same time. To  
achieve AC / DC simultaneous access, the external configuration switching control circuit, the  
following provides a reference program:

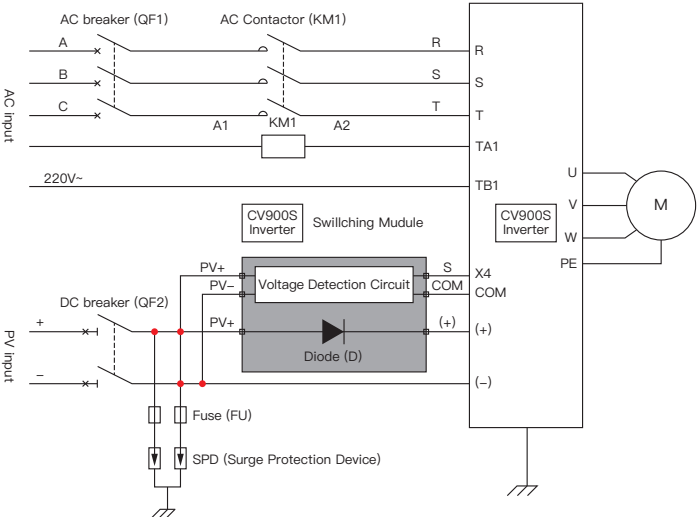


Figure C-1 AC / DC input switching scheme of the inverter

C.2 Low-Voltage Electrical Appliances Selection Table For Reference

| Model No.        | AC Circuit Breaker (A) | DC Circuit Breaker | Ac Contactor (A) | lightning Protector    | Fuse Protector     | Diode IFAV/ VRRM |
|------------------|------------------------|--------------------|------------------|------------------------|--------------------|------------------|
| CV900S-00AG-12SF | 16                     | 16A/1000VDC        | 16               | Type II<br>1000<br>VDC | 30A<br>Fast Fuse   | 25A/<br>1600V    |
| CV900S-00BG-12SF | 16                     | 16A/1000VDC        | 16               |                        |                    |                  |
| CV900S-001G-12SF | 25                     | 16A/1000VDC        | 25               |                        |                    |                  |
| CV900S-002G-12SF | 25                     | 25A/1000VDC        | 25               |                        | 80A<br>Fast Fuse   | 55A/<br>1600V    |
| CV900S-003G-12SF | 40                     | 25A/1000VDC        | 40               |                        |                    |                  |
| CV900S-004G-12SF | 40                     | 63A/1000VDC        | 40               |                        |                    |                  |
| CV900S-005G-12SF | 50                     | 63A/1000VDC        | 50               |                        | 150A<br>Fast Fuse  | 110A/<br>1600V   |
| CV900S-007G-12SF | 63                     | 63A/1000VDC        | 63               |                        |                    |                  |
| CV900S-011G-12SF | 100                    | 100A/1000VDC       | 100              |                        |                    |                  |
| CV900S-00BG-14TF | 10                     | 16A/1000VDC        | 12               |                        | 30A<br>Fast Fuse   | 25A/<br>1600V    |
| CV900S-001G-14TF | 10                     | 16A/1000VDC        | 12               |                        |                    |                  |
| CV900S-002G-14TF | 10                     | 16A/1000VDC        | 12               |                        |                    |                  |
| CV900S-003G-14TF | 25                     | 16A/1000VDC        | 25               |                        | 30A<br>Fast Fuse   | 25A/<br>1600V    |
| CV900S-004G-14TF | 25                     | 16A/1000VDC        | 25               |                        |                    |                  |
| CV900S-005G-14TF | 25                     | 25A/1000VDC        | 25               |                        |                    |                  |
| CV900S-007G-14TF | 40                     | 25A/1000VDC        | 40               |                        | 80A<br>Fast Fuse   | 55A/<br>1600V    |
| CV900S-011G-14TF | 50                     | 63A/1000VDC        | 50               |                        |                    |                  |
| CV900S-015G-14TF | 63                     | 63A/1000VDC        | 63               |                        |                    |                  |
| CV900S-018G-14TF | 63                     | 100A/1000VDC       | 63               |                        | 150A<br>Fast Fuse  | 110A/<br>1600V   |
| CV900S-022G-14TF | 100                    | 100A/1000VDC       | 95               |                        |                    |                  |
| CV900S-030G-14TF | 100                    | 100A/1000VDC       | 95               |                        |                    |                  |
| CV900S-037G-14TF | 125                    | 125A/1000VDC       | 115              |                        | 200A<br>Fast Fuse  | 200A/<br>1600V   |
| CV900S-045G-14TF | 160                    | 165A/1000VDC       | 120              |                        |                    |                  |
| CV900S-055G-14TF | 200                    | 200A/1000VDC       | 160              |                        |                    |                  |
| CV900S-075G-14TF | 225                    | 225A/1000VDC       | 160              |                        | 400A<br>Fast Fuse  | 400A/<br>1600V   |
| CV900S-090G-14TF | 315                    | 315A/1000VDC       | 200              |                        |                    |                  |
| CV900S-110G-14TF | 350                    | 350A/1000VDC       | 250              |                        |                    |                  |
| CV900S-132G-14TF | 400                    | 400A/1000VDC       | 315              |                        | 500A<br>Fast Fuse  | 500A/<br>1600V   |
| CV900S-160G-14TF | 500                    | 500A/1000VDC       | 315              |                        |                    |                  |
| CV900S-185G-14TF | 630                    | 630A/1000VDC       | 400              |                        |                    |                  |
| CV900S-200G-14TF | 630                    | 630A/1000VDC       | 400              |                        | 800A<br>Fast Fuse  | 800A/<br>1600V   |
| CV900S-220G-14TF | 700                    | 700A/1000VDC       | 500              |                        |                    |                  |
| CV900S-250G-14TF | 800                    | 800A/1000VDC       | 500              |                        |                    |                  |
| CV900S-280G-14TF | 800                    | 800A/1000VDC       | 630              |                        | 1000A<br>Fast Fuse | 1000A/<br>1600V  |
| CV900S-315G-14TF | 1000                   | 1000A/1000VDC      | 630              |                        |                    |                  |
| CV900S-355G-14TF | 1000                   | 1000A/1000VDC      | 800              |                        |                    |                  |
| CV900S-400G-14TF | 1000                   | 1000A/1000VDC      | 800              |                        | 1200A<br>Fast Fuse | 1200A/<br>1600V  |
| CV900S-450G-14TF | 1250                   | 1250A/1000VDC      | 1000             |                        |                    |                  |
| CV900S-500G-14TF | 1250                   | 1250A/1000VDC      | 1000             |                        |                    |                  |

Warranty Card

Product Information:

Product Name: \_\_\_\_\_

Customer Name: \_\_\_\_\_

Model Type: \_\_\_\_\_

Customer Address: \_\_\_\_\_

Purchase Date: \_\_\_\_\_

Contact Number: \_\_\_\_\_

Warranty Terms:

1. From the date of original shipment, we guarantee warranty of 12 months for free, and paid service for a lifetime;

2. Product failure caused by the following reasons are not included in 12 months warranty guarantee:

(1) Users didn't conduct right operation according to user's manual;

(2) Equipment has been repaired or modified by user's without consent of manufacturer;

(3) Fault caused by operation outside standard scope of application;

(4) Abnormal aging or fault result from bad operating environment;

(5) Damage caused by force majeure lie earthquake, fire, flood, thunderstrike, abnormal voltage, or other natural disasters;

(6) Damage caused by improper delivery or external force.

3. Manufacturer preserves the right to refuse warranty service for the following condition:

(1) Damage of beyond recognition of brand, trade mark, serial number, nameplate, and other manufacturer marks;

(2) Payment is not finished according to contract;

(3) Intentional concealment to our after-sale service provider of wrong operation during setting, wiring, operation, maintenance or other process.

4. For failing products, Canroon preserve the right to entrust others for warranty issues.

Certificate

Inspector: \_\_\_\_\_ QC 001

Test Date: \_\_\_\_\_

The product is inspected according to the standard.