# User Manual

# Variable Frequency Drive
# 0.75-3.7KW

**Version: 1.0**

# Table of Contents

# 1. Safety Precautions

Please read this manual carefully before transportation, installation, operation and maintenance of this product, and follow all safety precautions in this manual in any of the practices; if fail to do so, it may introduce the risk of personal injury (including the potential for death) or equipment damage.

We will not be liable for any injuries and equipment damage caused by your or your customer's negligence and failure to follow our instructions.

## 1.1. Security information definition

**Danger:** Failure to comply with relevant requirements may cause serious personal injury and even death.

**Warning:** Failure to comply with relevant requirements may result in personal injury or equipment damage.

**Notice:** Steps need to be taken to ensure correct operation.

**Trained and qualified professionals:** The staff who have passed required professional electrical training and safety education to become familiar with the installation, commission, operation and maintenance of this equipment and the knowledge to avoid all kinds of emergency situations.

## 1.2. Warning signs

The warnings are used to warn the situations that may cause serious personal injury or equipment damage with suggestions to avoid said risk.

The following warning signs are the ones used in this manual:

| Sign | Name | Description |
|---|---|---|
|  | Danger | Failure to comply with the relevant requirements will cause serious personal injury and even death. |
|  | warning | Failure to comply with relevant requirements may lead to personal injury or equipment damage. |
|  | Static sensitive | Failure to comply with relevant requirements may damage the PCBA board. |
|  | High temperature | The base of the inverter generates high temperature. Do not touch that area. |
| NOTICE | NOTICE | Steps need to be taken to ensure correct operation. |

## 1.3. Safety guidance

Only trained and qualified personnel are allowed to perform related operations.

Do not perform wiring, inspection, and replacement of components while the power is on.Before wiring and checking, first must ensure that all input power has been disconnected, and then wait at least 10 minutes or check if the DC bus voltage is lower than 36V.

Unauthorized modification of the inverter is strictly prohibited; otherwise it may cause fire, electric shock or injuries.

When the machine is running, the base of the radiator may generate high temperature. Do not touch that area to avoid burns.

The electronic components in the inverter are electrostatic sensitive. Anti-static measures must be taken during operation.

### 1.3.1. Handling and installation

Do not install the inverter on flammable materials nor adhere to flammable materials.
Connect the brake options according to the wiring diagram.
Do not operate the inverter if there is any damage or missing part.
To reduce the risk of electric shock, do not touch the inverter directly or with any wet objects.

**NOTICE:**

- The tools for transportation and installation shall satisfy all requirements to ensure the normal and safe operation of the inverter and to avoid personal injury, while the installer must take proper mechanical protection such as anti-smashing shoes and working clothes to ensure personal safety,.
- Do not only hold the front cover during transportation or it may be separated accidently.
- Lift and handle the product gently during transportation and installation, otherwise it may be damaged.
- It must be installed in a place that can keep it away from children and public.
- If the installation site is located in a place whose height above sea level is more than 2000m, the inverter cannot satisfy the IEC61800-5-1 requirements for proper low voltage protection.
- Install this product in a suitable environment (see "Installation Environment" chapter for details).
- Prevent screws, cables and any other conductive objects from falling into the inverter.
- When the inverter is running, the leakage current may exceed 3.5mA. Be sure to apply reliable grounding measures, where the ground resistance shall be less than 10Ω and the conductivity (or the cable cross-section area) of the PE grounding conductor and that of the phase conductors are the same.
- The R、S、T/L、N terminals are for the power input, while the U, V, and W are for the output. Please connect the input power cables and the output cables correctly; otherwise the inverter will be damaged.

## 1.3.2. Commission and operation

Before wiring the inverter terminals, must cut off all connected power and then wait at least 10 minutes.

When the inverter is in operation, it contains and carries high voltage. Any operation or setting not completely rely on keyboard operation is forbidden.

This product is not intended for and cannot be used as an "emergency stop measure". For emergency motor braking purpose, an extra mechanical brake apparatus must be applied.

**NOTICE:**

- Do not switch the input power of this product ON/OFF in a short interval.
- Before reusing this product after a long period of storage, perform a thorough inspection, capacitor setting, and trial operation.
- Before starting the inverter, must put the front cover back in order to reduce the risk of electric shock.

## 1.3.3. Inspection, maintenance and component replacement

The maintenance, inspection or component replacement of the inverter must be carried out by trained and qualified professionals.

Before any maintenance, inspection or component replacement, all power supplies connected to the inverter must be cut off and then wait at least 10 minutes.
During any maintenance, maintenance and component replacement, proper measures must be taken to prevent conductive objects such as screws and cables from falling into the inverter along with anti-static measures for protecting the inverter and its internal components.

**NOTICE:**

- Tighten the screws with proper torque.
- During maintenance, inspection and component replacement, avoid contact with the inverter and its components and do not carry nor wear flammable materials.
- Do not perform insulation withstand voltage test on this product, nor use a megohmmeter to test the control circuit of the inverter.

## 1.3.4. Disposal

The components in the inverter contain heavy metals. The inverter to be disposed must be treated and handled as industrial waste.

**NOTICE:**

- The components in the inverter may explode when burned.
- Plastic parts such as panels generate poisonous gas when burned.
- Do not dispose the inverter at will. Its disposal requires special treatment.

# 2. Product Introduction

## 2.1. Quick start

### 2.1.1. Unpack and inspection

After receiving the product, you need to inspect the followings:

- Does the package appear intact with no sign of damp? If not, please contact us.
- Is the model identification printed on the package consistent with your purchase order? If not, please contact us.
- Unpack and check whether there is any abnormality such as water stains inside the packing box and whether there is any sign of damage or crack on the machine shell. If any abnormality or damage found, please contact us.
- Is the nameplate on the product consistent with the model identification printed on the box? If not, please contact us.
- Is there any accessory missing (including the manual and keyboard, etc.)? If so, please contact us.

### 2.1.2. Usage confirmation

When customers formally start using the inverter, please confirm:

- What is the type of load that the inverter will drive? And will the inverter be overloaded in actual operation?
- Does the inverter need to amplify it power level?
- Is the actual motor current value less than the rated current value of the inverter?
- Is the control accuracy required by the motor can be satisfied by the inverter?
- Is the grid voltage consistent with the rated voltage of the inverter?

### 2.1.3. Environment confirmation

Before the installation and useage of the inverter, please confirm the followings:

- Does the ambient temperature of the inverter exceed 40℃? If so, derate the capacity at a rate of 1% for every 1℃ increase. Furthermore, do not use the inverter in an environment above 50℃.

  NOTICE: For the inverter installed in a cabinet, the ambient temperature above mentioned shall be the air temperature inside the cabinet.
- Is the ambient temperature of the inverter lower than -10℃? If so, please add heating devices.

  NOTICE: For the inverter installed in a cabinet, the ambient temperature above mentioned shall be the air temperature inside the cabinet.
- If the inverter's installation site is located at a place whose altitude is more than1000m and does not exceed 3000m, derate the capacity at a rate of 1% for every 100m increase; If the altitude exceeds 2000m, connect an isolation transformer at the input side of the inverter; If it is more

than 3000m and does not exceed 5000m, consult us for technical advice; If more than 5000m, the inverter is not recommended.

- Does the ambient humidity of the inverter's installation site exceed 90%? Is there any sign of condensation? If so, you need to take some extra measures to protect inverter from humidity.
- Is there any sign of direct sunlight or creature intruder in the inverter's site? If so, you need to take extra measures to protect the inverter from such.
- Is there dust, explosive and flammable gas in the inverter's site? If so, you need to take extra measures to protect the inverter from such.

## 2.1.4. Installation confirmation

After the inverter is installed, check the installation to confirm following points:

- Do the current capacity of the input power cable and also that of motor cable meet the actual load requirement?
- Are the accessories for the inverter (Including input reactor, input filter, output reactor, output filter, and braking resistor) selected and installed correctly? Do the cables used to connect those accessories meet their current capacity requirements?
- Is the inverter installed on flame-retardant materials? Are the heat-generating accessories (reactors, braking resistors, etc.) of the inverter set away from flammable materials?
- Are all control cables so routed that they are separate from power cables? Does the wiring fully consider the EMC characteristic requirements?
- Are all grounding measures properly grounded in accordance with the requirements of the inverter?
- Is the inverter so installed that there is enough space left around it as instructed in the manual?
- Is the inverter installed in the way instructed in the manual? Try to install it in vertical position if possible.
- Are the external wiring terminals of the inverter fixed tightly with the torque required?
- Is there any screw, cable, or other conductive objects left in the inverter? If so, please remove it.

## 2.1.5. Basic commission

Before putting the inverter into operation, follow the steps below to complete the basic commission:

- Is the self-learning feature required here? If there is such necessity, please disconnect the motor load to activate the dynamic parameter self-learning; if it is not possible to disconnect the load, choose the static self-learning feature.
- Adjust the acceleration and deceleration intervals according to the actual load conditions.
- Confirm whether the motor rotation direction is consistent with the requirement by inching activating the motor. If it is opposite, it is recommended to change the direction by switching any two of the motor's three phase cables.
- Set all control parameters and put the system into operation to verify their accuracy.

## 2.2. Specifications

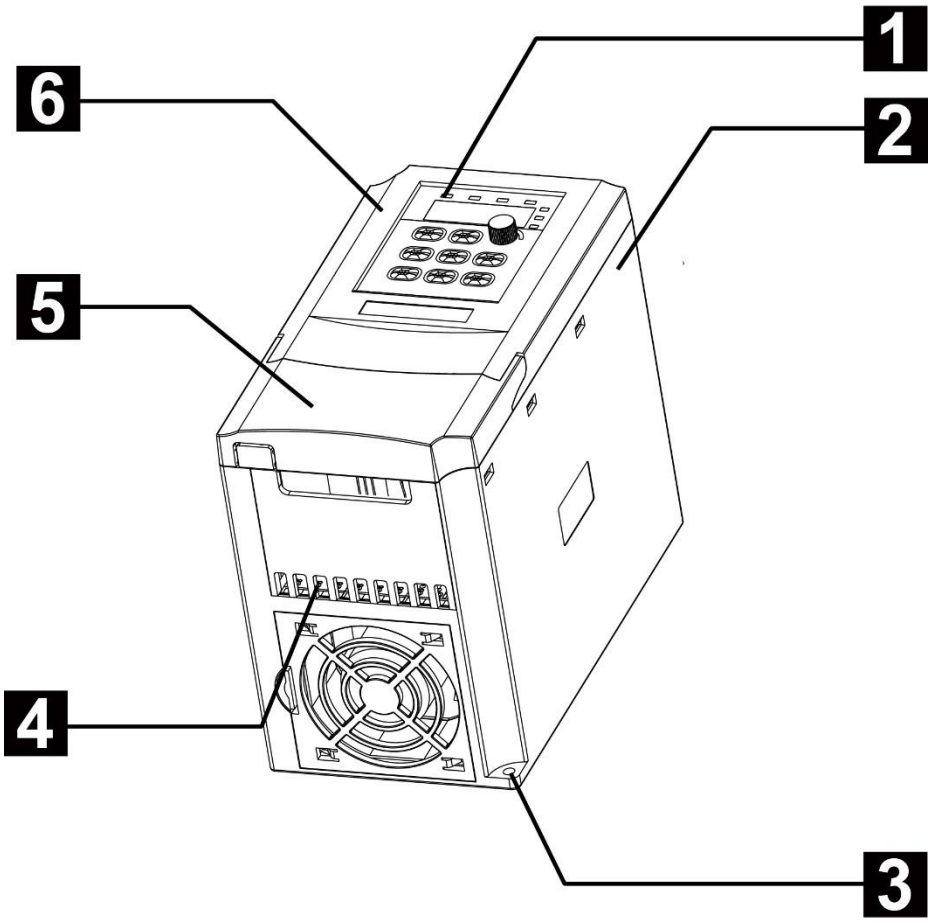
| Functional Descriptions | Specifications |
|---|---|
| **INPUT** | |
| Input Voltage | AC,1PH,220V(-15%)～240V(+10%)<br>AC,3PH,380V(-15%)～440V(+10%) |
| Rated Frequency | 50/60 Hz |
| Frequency Range | ±5% (47.5 ~ 63Hz) |
| **OUTPUT** | |
| Output Voltage | 0- Input Voltage |
| Maximum Output Frequency | 0.1 ~ 500HZ |
| Output Power | Please refer to Rated Parameter table |
| Output Current | Please refer to Rated Parameter table |
| **BASIC PARAMETERS** | |
| Highest frequency | Vector control: 0～500Hz |
| | V/F control：0～500Hz |
| Carrier frequency | 0.8KHz~8KHz(Support up to 16KHz carrier frequency) |
| | Adjusted automatically according to the load characteristics. |
| Input frequency resolution | Digital setting: 0.01Hz |
| | Analog setting: Highest frequency×0.025% |
| Control mode | Open-loop vector control (SVC)<br>V/F control |
| Starting torque | 0.5Hz/150% (SVC) |
| Adjustable speed ratio | 1：100 (SVC) |
| Speed control accuracy | ±0.5% (SVC) |
| Overload capability | 150% of rated current: 60 seconds<br>170% of rated current: 12 seconds<br>190% of rated current: 1.5 seconds |
| Torque boost | Auto torque boost; Range of manual torque boost 0.1%~30.0% |
| V/F curve | Three types: Linear, Multi-point, square curve (1.2 power, 1.4 power, 1.6 power, 1.8 power, 2 power) |
| V/F separation | Full separation, Half separation |
| Acceleration and deceleration time | Linear and S-curve acceleration and deceleration modes available. The range of acceleration and deceleration time is 0.0~6500.0s. |
| DC braking | DC braking frequency: 0.00Hz ~ Maximum frequency |
| | Braking time: 0.0s~36.0s |
| | Braking current value: 0.0%~100.0% |
| JOG control | JOG frequency range: 0.00Hz ~ Maximum frequency (5Hz in default). |
| | JOG acceleration and deceleration time: 0.0s~6500.0s. |
| Built-in PID | Simplify the establishment of a closed-loop control system |
| Automatic voltage regulation (AVR) | Keep the output voltage in stable when the grid voltage fluctuates. |

| | |
|---|---|
| Stall prevention from overvoltage and overcurrent | The current and voltage are limited automatically during operation to prevent frequent tripping due to over-current and over-voltage. |
| Rapid current limit | Reduce the risk of over-current faults to keep VFD operated normally. |
| Torque limit and control | Limit the torque automatically during operation to prevent frequent tripping due to over-current. |
| Braking unit | Built-in braking unit for 18.5KW and below models |
| **SPECIAL FEATURES** | |
| Deceleration to stop | In case of power loss, the energy from load feedback is used to compensate and decelerate the motor until standstill, to prevent mechanical damage. |
| Rapid current limit | Reduce the risk of over-current faults to keep VFD operated normally. |
| Virtual IO | Supportfive sets of virtual DIDO to facilitate logic control |
| Timer control | Setting range: 0.0Min ~ 6500.0Min |
| Communication | Modbus |
| **INPUT/OUTPUT** | |
| Command source | Operation panel, control terminal and serial communication port. |
| Frequency source | Digital setting, Analog voltage setting, Analog current setting, Pulse setting and Serial port setting. |
| Auxiliary frequency source | 5 options to provide flexible auxiliary frequency fine-tuning and frequency synthesis. |
| Input terminals | 4 digital input terminals, one of which supports high-frequency pulse input up to 50kHz |
| Output terminals | 1 analog input terminal supporting 0 ~ 10V voltage input or 0 ~ 20mA current input |
| **DISPLAY BUTTONS** | |
| LED display | Display parameters |
| Key lock and function selection | It allows users to partially or fully lock the keys or define operated range for partial keys to prevent misoperation |
| Protective function | Motor short-circuit detection at power-on, output phase loss protection, over-current protection, over-voltage protection, under-voltage protection, overheat protection, overload protection and etc. |
| **ENVIRONMENT** | |
| Storage temperature | -20°C ~ 60°C |
| Operation temperature | -10°C ~ 50°C (If temperarture is higher than 40°C, the output capacity will be derated 1% per 1°C increase) |
| Storage humidity | ＜90%RH |
| Operation humidity | ＜90%RH |
| Noise Level | 50dBA max. |
| **OTHERS** | |
| EMC | Standards: |
| | IEC 61800-3, C3 |
| Safety | Standards: |
| | IEC 61800-5-1 |
| **INTERACE** | |
| Communication Port | RS-485 |

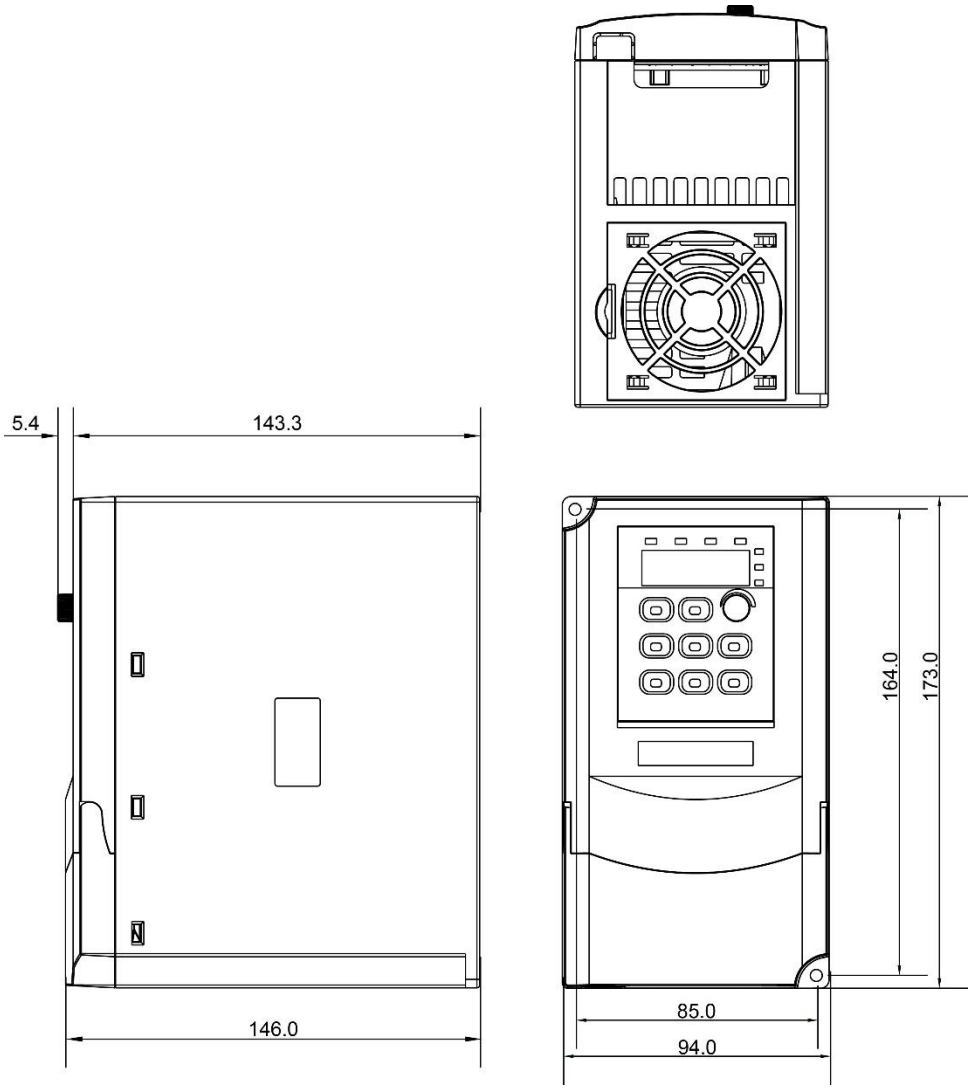
## 2.3. Rated Parameters

| MODEL | Nominal Capacity (KVA) | Input Current (A) | Output Current (A) | Applicable Motor Output (KW) | Applicable Motor Output (HP) |
|---|---|---|---|---|---|
| **Single Phase 220V 50/60Hz** | | | | | |
| 0.75G-S2 | 1.5 | 8.2 | 4 | 0.75 | 1 |
| 1.5G-S2 | 3 | 14 | 7 | 1.5 | 2 |
| 2.2G-S2 | 4 | 23 | 9.6 | 2.2 | 3 |
| **3-Phase 380V 50/60Hz** | | | | | |
| 0.75G-T4 | 1.5 | 3.4 | 2.1 | 0.75 | 1 |
| 1.5G-T4 | 3 | 5 | 3.8 | 1.5 | 2 |
| 2.2G-T4 | 4 | 5.8 | 5.1 | 2.2 | 3 |
| 3.7G-T4 | 6 | 10.5 | 9 | 3.7 | 5 |

## 2.4. Schematic diagram




1. Operation keyboard
2. Cabinet
3. Bottom installation hole
4. Input-output hole
5. Flip cover
6. Front cover




0.75KW—3.7KW schematic diagram & dimensions

## Installation Dimension

| MODEL | Instillation Position(mm) | | Overall Dimensions(mm) | | | Instillation Position(mm) | Weight(kg) |
|---|---|---|---|---|---|---|---|
| | A | B | H | W | D | | |
| 0.75G-S2 | 85 | 164 | 173 | 94 | 146 | 4 | 1.4 |
| 1.5G-S2 | | | | | | | |
| 2.2G-S2 | | | | | | | |
| 0.75G-T4 | | | | | | | |
| 1.5G-T4 | | | | | | | |
| 2.2G-T4 | | | | | | | |
| 3.7G-T4 | | | | | | | |

# 3. Installation instructions

Only trained and qualified professionals are allowed to perform the tasks described in this chapter. Please follow the instructions stated in "Safety Precautions" for any such tasks. Ignoring any of the safety precautions may lead to personal injury or death or equipment damage.

During the installation process, all power source connected to the inverter shall already be disconnected. If not, disconnect the power sources and wait at least 10 minutes before resuming installation.

The installation plan and design of the inverter must comply with the local relevant laws and regulations. We will not bear any responsibility for any violation regarding the installation hereof. Furthermore, the warranty or quality assurance provided with the inverter will not cover any incident or malfunction due to user's ignorance of the instructions hereof.

## 3.1. Equipment installation

### 3.1.1. Installation environment

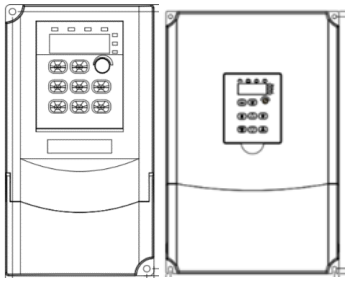
To expect long term high performance and normal operation from the inverter, a proper installation site selection becomes critical.

| Environment | Requirements |
|---|---|
| Site | Indoors and free from direct sunlight, dust, corrosive gas, flammable gas, oil mist, water vapor, dripping water or salt, etc. |
| Altitude | Below 1000m |
| Ambient temperature | －10℃~＋40℃ ( For 40℃~50℃, use with derating)<br>For better reliability, please use the inverter in a place where the temperature does not change rapidly.<br>When installing it in a closed space such as a cabinet, please use a cooling fan or air conditioner for cooling to prevent the internal temperature from exceeding the limit.<br>If expecting the inverter to be restarted after a long period in a low temperature condition, an extra external heating measure will be required for eliminating the ice frozen inside beforehand to prevent the risk of machine damage. |
| Humidity | Lower than 95%RH with no condense |
| Vibration | Smaller than 5.9m/s$^2$ (0.6g) |
| Storage temperature | －20℃~＋60℃ |
| IP rating | IP20 |
| Distribution System | TN,TT |

## 3.1.2. Installation direction

The inverter can be wall-mounted or installed in a cabinet.

The inverter must be installed in the vertical direction. Please check the installation is in the direction as required in the below:



Vertically Mounted

## 3.1.3. Installation method

The inverter supports wall-mount installation, and the installation method is as follows:

（1）Wall Mount

（2）DIN Rail


（3）Seamless Installation

*Please install according to the actual

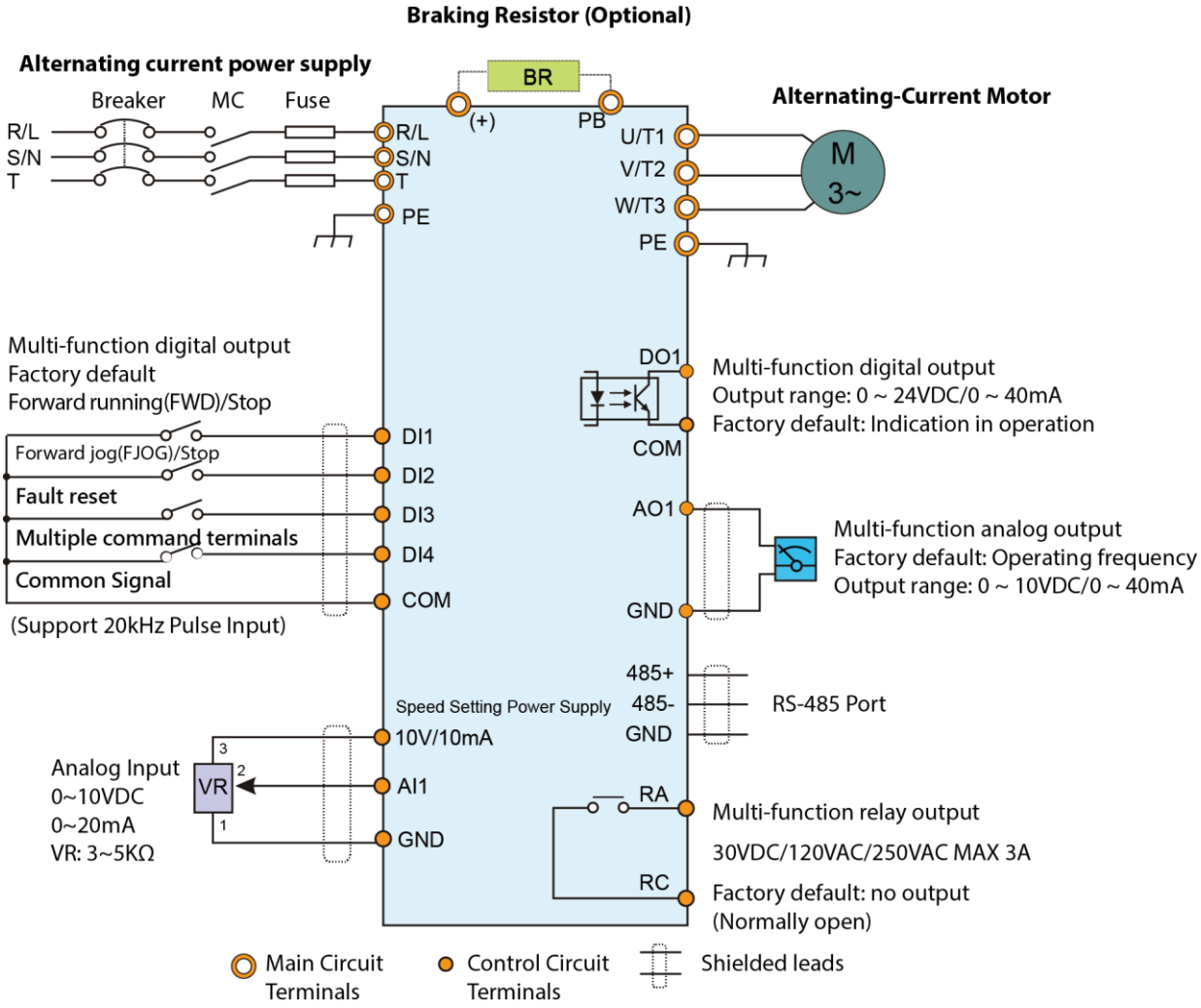
Installation hole positions of different models.

Steps:

1. Mark the location of the mounting hole.
2. Fix the screws or bolts to the marked positions.
3. Lean the inverter against the wall.
4. Fasten the screws to fix the inverter to the wall.

## 3.2. Standard wiring

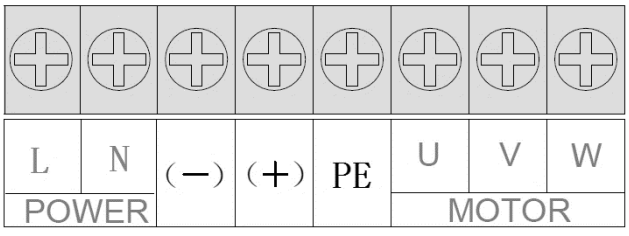
The wiring diagram below shows the inverter's main circuit and control circuit:



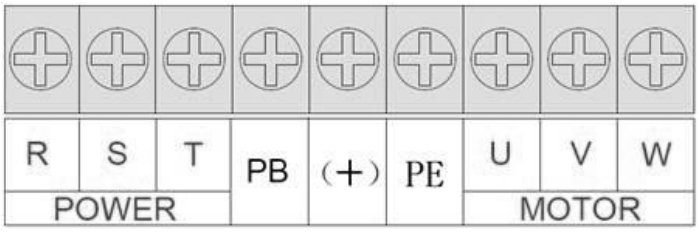

NOTICE: Fuses, braking resistors, input resistances, input filters, output resistances and output filters are all optional accessories. For details, please refer to "Peripheral Options" section.

### 3.2.1. Diagram of main circuit terminals

The main terminal diagram is as shown below:




Single-phase




Three-phase

The function for each terminal is as below:

| Terminal symbol | Terminal name | Function description |
|---|---|---|
| L、N | Single-phase AC input terminals | Three-phase AC power connection point |
| (-)、(+) | DC bus positive and negative terminals | Common DC bus input point |
| PE | Ground terminal | Connect to ground |
| U、V、W | VFD output terminals | Connect to three-phase motor |

Single-phase

| Terminal symbol | Terminal name | Function description |
|---|---|---|
| R、S、T | Three-phase AC input terminals | Three-phase AC power connection point |
| (PB)、(+) | External braking resistor terminal | Connect to braking resistor |
| PE | Safety ground terminal | Connect to ground |
| U、V、W | Three-phase AC output terminals | Connect to three-phase motor |

Three-phase

**NOTICE:**

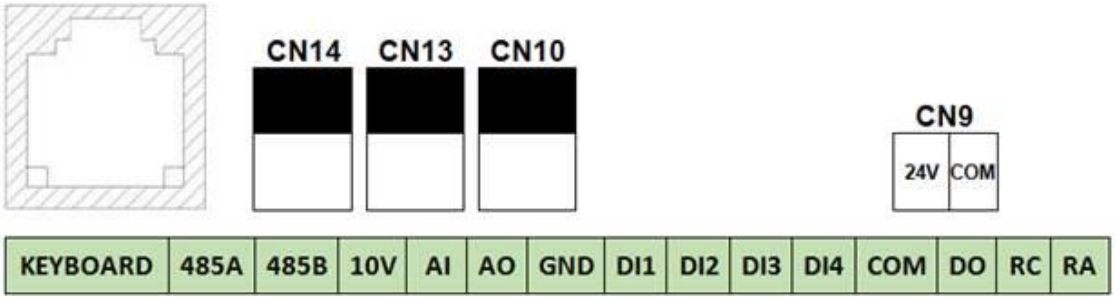
- The use of asymmetrical motor cables is prohibited. If the motor cable comes with a symmetrical grounding conductor along with the conductive shielding layer, please ground the conductor at the inverter end and the motor end.
- Route the motor cables, input power cables and control cables separately.

## 3.2.2. Steps for main circuit terminal wiring

1. Connect the ground wire of the input power cable directly to the ground (PE) terminal of the VFD, and connect the single-phase (three-phase) input cable to the terminals L, N (R, S, T), and confirm its connection is reliabile.
2. Connect the ground wire of the motor cable to the ground (PE) terminal of the VFD, and connect the three-phase motor cable to the terminals U, V, and W, and confirm its connection is reliabile.
3. Connect the optional brake resistor with cable to the designated position.
4. If conditions permit, mechanically fix all cables outside the VFD.
5. DC bus (+) (-) terminal has residual voltage, must wait until the display sreen is completely off, and confirmed 10 minutes after the power off before wiring operation, otherwise there is a risk of electric shock

## 3.2.3. Control terminal diagram

The diagram of the control terminals is as below:



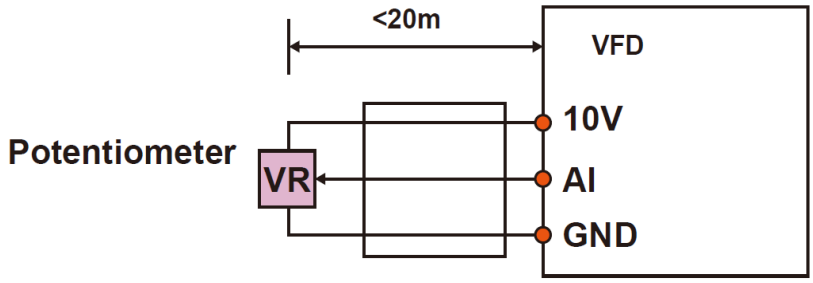

The function of each control terminals is as stated below:

| Category | Terminal Label | Name | Description |
|---|---|---|---|
| Communication | RS485A | RS485 COM port | RS485 differential signal positive terminal |
| | RS485B | | RS485 differential signal negative terminal |
| Analog input | AI1 | Analog input terminal 1 | Analog voltage/current input |
| Analog output | AO1 | Analog output terminal 1 | Analog voltage/current output |
| Digital input | DI1 | Digital input terminal 1 | Normal digital input |
| | DI2 | Digital input terminal 2 | Normal digital input |
| | DI3 | Digital input terminal 3 | Normal digital input |
| | DI4 | Digital input terminal 4 | Normal digital input/high frequency pulse input |
| | COM | Digital input common terminal | Digital input common terminal |
| Digital output | DO1 | Digital output terminal 1 | Normal digital output/high frequency pulse output |
| Power supply | 10V | +10V power supply | Provide +10V power supply |
| | GND | +10V power ground | Reference ground for analog signal and +10V power supply |
| Others | RA/RC | Relay output | |
| | KEYBOARD | External keyboard | |

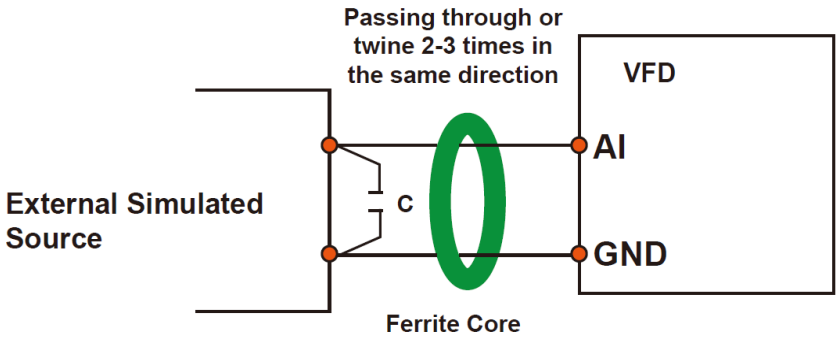
The function for each short-circuit terminal is as below:

| NO. | Name | Pin number | Label | Function |
|---|---|---|---|---|
| CN13 | AI | ①—② | V | Analog AI1 voltage input |
| | | ②—③ | I | Analog AI1 current input |
| CN10 | AO | ①—② | V | Analog AO1 voltage output |
| | | ②—③ | I | Analog AO1 current output |
| CN14 | RJ45 | ① —② | OFF | Disconnects the RJ45 external keyboard and enables the internal keyboard is enabled. |
| | | ② —③ | ON | Enables the RJ45 external keyboard and disables the internal keyboard is enabled. |

Analog input terminals: The analog voltage signal is so weak that it is particularly easy to receive external interference. In order to reduce such interference, it is a general practice to use a shielded cable while shortening the length of wiring as short as possible or at least no more than 20m, as shown in below figure.

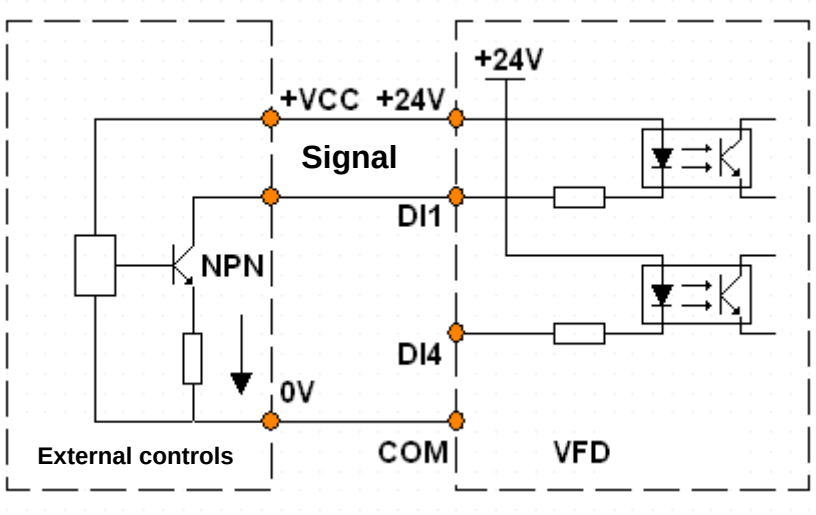



In cases that the analog signal still gets severely interfered, a filter capacitor or ferrite core is required to be connected to the analog signal source side, as shown in below figure.



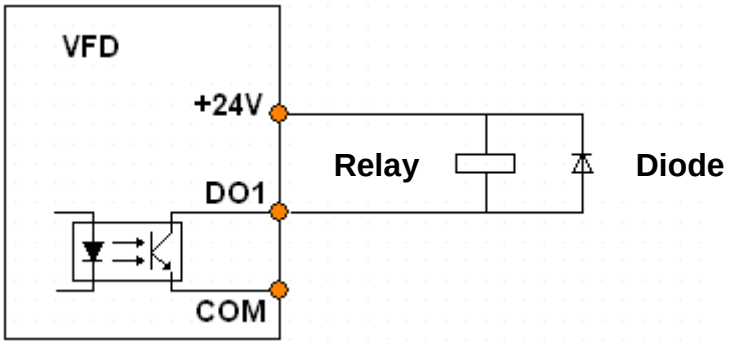

Digital input terminal: It is a general practice to use a shielded cable while shortening the length of wiring as short as possible or at least no more than 20m. If it works in active driving mode, a filtering measure shall be applied to reduce the crosstalk interference to the power source.

It is recommended to use it in contact control method. The digital terminal wiring is as below:




Digital output terminals: If the digital output terminal is used to drive a relay, an absorption diode shall be connected in parallel with the relay coil. Otherwise, it may cause damage to the DC 24V power supply.

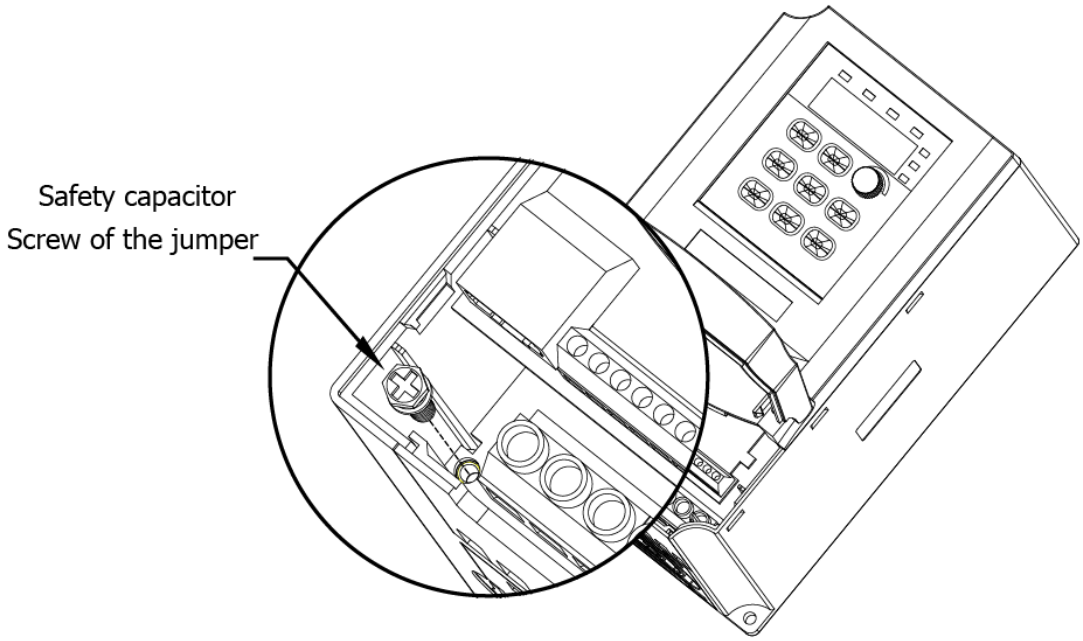
NOTICE: The absorption diode must be connected in correct polarity, as shown in Figure 3-15. Otherwise, an output from the digital output terminal will directly cause the DC 24V power supply to be burned and damaged.



## 3.2.4. Grid System Requirements

- This product is suitable for a neutral grounded power grid system. If it is used in a power grid IT system (neutral point to ground insulation or high impedance grounding), the safety capacitor (EMC) to ground jumper needs to be removed. As shown by the screws in the figure below, and the filter cannot be installed, otherwise it may cause injury or damage to the VFD.

- In the configuration of residual current circuit breaker. If a residual-current device (RCD) is used and it trips at start, the safety capacitor (EMC) can be removed from the ground wire, as shown by the screw in the figure below




安规电容(EMC)对地跳线位置示意图

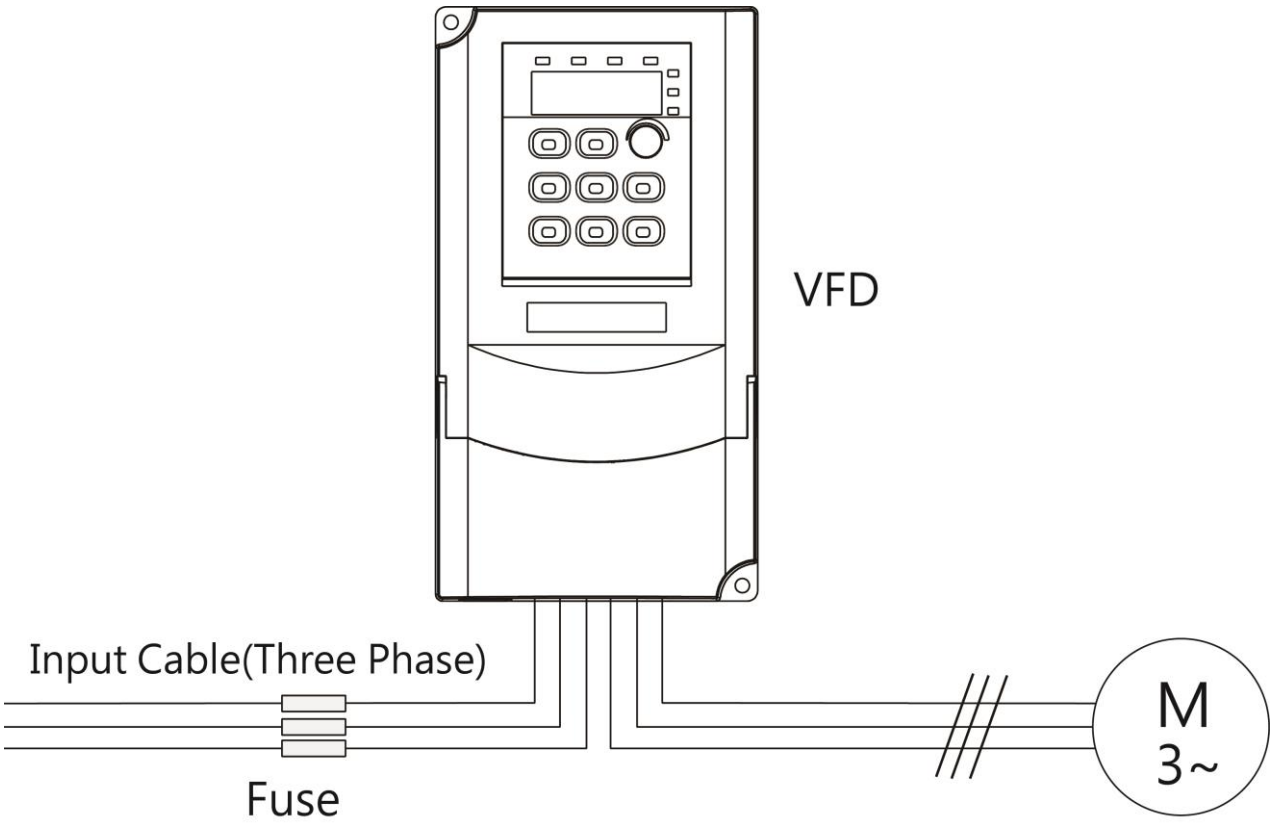
Schematic diagram of the jumper position of the safety capacitor (EMC) to the ground

## 3.3. Wiring protection

### 3.3.1. Short circuit protection for the inverter and the input power cable

It is necessary to apply protection device (such as fuse) to prevent the inverter and input power cable from overheat due to short-circuit events.

Such protection device shall be deployed according to the following guidelines.




NOTICE: Follow the instructions hereof to select the fuses, which will not only protect the input power cable as well as the inverter against a external short-circuit fault but also will provide proper protection to equipments in the same circuit when an internal short-circuit fault occurs inside the inverter.

### 3.3.2. Protection for the motor and motor cables

As long as the motor cables are selected according to the rated current of the inverter, the inverter provides short-circuit protection for the motor cable and also the motor. Featuring a motor thermal overload protection, the inverter can protect the motor by directly stopping the output and the current if necessary.

If the inverter is connected to multiple motors, each motor along with its cables needs to be deployed a dedicated thermal overload switch or circuit breaker. There also need fuses to protect them against short-circuit faults.

### 3.3.3. Bypass connection

For important usages, it usually needs to set up a switching circuit between power grid and the inverter to guarantee that whole system maintains its normal operation even when the inverter fails. For some special practices, such as those where the inverter is dedicated only for soft start, the systems that will switch to power grid after the start also need a corresponding bypass.

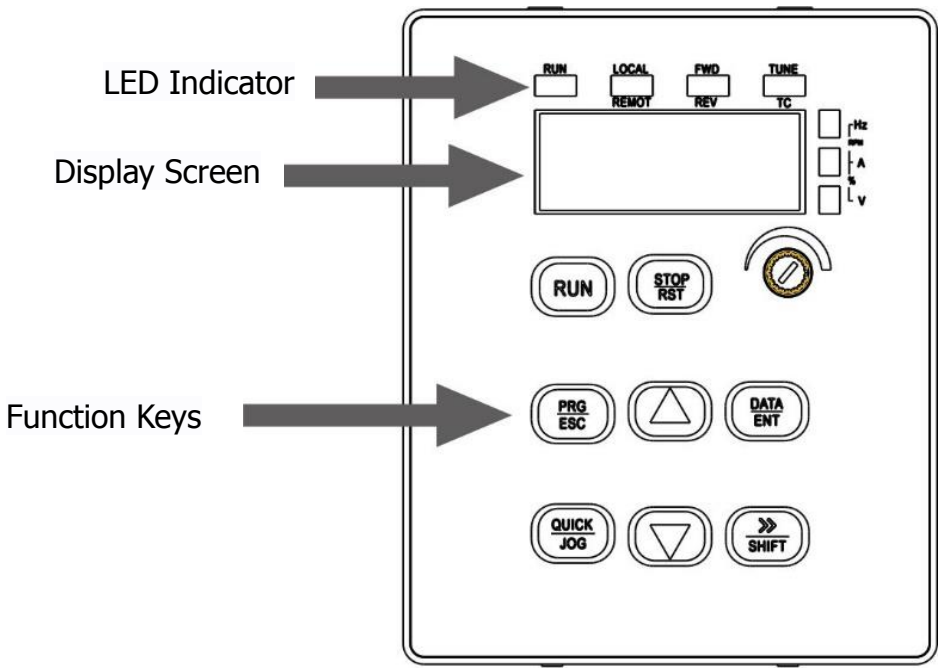
Do not connect the power source to the output terminals U, V and W of the inverter. The voltage carried on the motor cables can cause permanent damage to the inverter.

NOTICE: If there is a need to switch frequently, it is advised to use a switch or contactor with a mechanical interlock to ensure that the motor terminals will not be connected to the input power cables and the inverter outputs at the same time.

# 4. Keyboard operation

## 4.1. Keyboard introduction

The keyboard is used to display the inverter status data and to configure the parameters.




### 4.1.1.LED Indicator

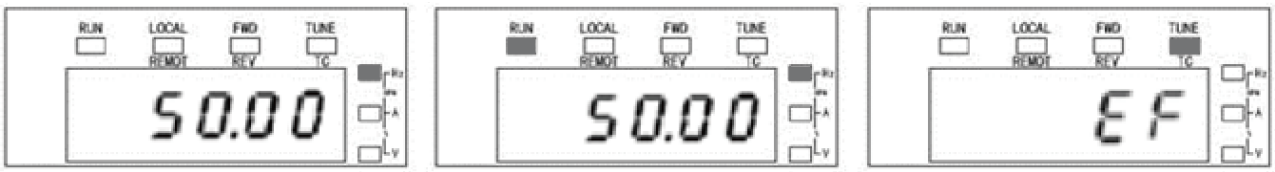
| LED Indicator | | | Messages |
|---|---|---|---|
| Hz | Red | Solid On | Output frequency value is displayed on the LED screen. |
| A | Red | Solid On | Output current value is displayed on the LED screen. |
| V | Red | Solid On | Output voltage value is displayed on the LED screen. |
| A and V | Red | Solid on | Output power value is displayed on the LED screen. |
| RUN | Red | Solid on | The inverter is running. |
| LOCAL/REMOT | Red | Solid on | Terminal start stop control mode |
| | | Solid off | Panel start stop control mode |
| | | Flashing | Communication start stop control mode |
| FWD/REV | Red | Solid on | The motor is in reverse running state |
| | | Solid off | The motor is in forward running state |
| TUNE/TC | Red | Solid on | Torque control mode |
| | | Fast flashing | Fault state |
| | | Slow flashing | Parameter self-learning state |

### 4.1.2.Function Buttons

| Function Button | Description |
|---|---|
| PRG/ESC | To enter or exit setting mode. |
| DATE/ENT | To confirm the selection/value in setting mode. |
| RUN | In the keyboard operation mode, used for running operation |
| STOP/RST | ● In the running state, press this button to stop the running operation;<br>● In the fault alarm state, it can be used for reset operation. The feature of this key is restricted by the function code FA -01 (STOP/RES key function). |
| ▲ | To increase the setting value. |
| ▼ | To decrease the setting value. |
| ►► /SHIFT | In the shutdown display interface and operation display interface, the parameters to be displayed can be selected circularly; when modifying the parameters, the modification bit of the parameters can be selected. |
| QUICK/JOG | ● When FF-03 is not equal to 0, different menu modes can be switched according to the values in FF-03.<br>● When FF-03 is equal to 0, specific functions can be selected according to the value in FA-00, such as command source switching, forward / reverse switching, etc |
| Potentiometer | ● Adjust the output frequency;<br>● Adjust the output frequency with the main frequency;<br>● Limit the maximum torque;<br>● Adjust the upper limit of output frequency;<br>● Adjust the output voltage amplitude when V/F is separated. |

## 4.2. Keyboard display

The display allows you to switch between screens showing shutdown status, operation status, function code editing status, and fault alarm status.




### 4.2.1. Shutdown screen

When the inverter is in shutdown mode, the display shows the shutdown status parameters. In the shutdown state, a variety of state parameters can be displayed. Starting from the screen showing

FA-04 (shutdown status), you can select to show those parameters by changing the two-digital fields. For the definition of each digital code, please refer to the description of the FA-04 function codes.

Under the shutdown status, there are 11 parameters available, which are: Frequency settings, Bus voltage, DI input status, DO output status, AI1 voltage, AI2 voltage, Count value, Length value, PLC stage, Load speed, PULSE input pulse frequency. You can select to show those parameters circularly by changing the two-digital fields starting from FA-04 by pressing 》/SHIFT button.

### 4.2.2. Operation status screen

Once the inverter receives a valid running command and enters the running state, the keyboard displays the operation state parameter, the "RUN" indicator on the keyboard lights on while the "FWD/REV" light is on or off depending on the motor turning direction.

Under this operation status, there are 32 parameters available, which are: Operating frequency, Frequency setting, Bus voltage, Output voltage, Output current, Output power, Output torque, DI input status, DO output status, AI1 voltage, AI2 voltage, Count value, Length value, Load speed, PID setting , PID feedback, PLC stage, PULSE input pulse frequency, Operating frequency 2, Remaining running time, Linear speed, Current power-on time, Current operation time, PULSE input pulse frequency, Communication setting, Main frequency X, Auxiliary frequency Y, Target torque value, Power factor angle, VF separation target voltage, Visual DI input status, and Visual DO input status. Starting from code "FA-02" or "FA-03", press <DATA> button to activate the two digital selection and press < 》/SHIFT > button to circularly change the parameter code.

### 4.2.3. Fault status screen

When the inverter detects a fault signal, it enters the fault alarm status, the keyboard displays the fault code, and the "TC" indicator on the keyboard flashes. The fault reset operation can be executed via the "STOP/RST" key, control terminal or a communication command.

As long as the fault persists, the fault code will be displayed.

### 4.2.4. Function code editing screen

In the shutdown, operation or fault alarm screens, you can press the "PRG/ESC" key to enter the editing screen (if a user password is required here, see the description of FF-00), the editing screen is a three-level menu, and the levels are: Function code set → Function code label → Function code parameter. By pressing the "DATA/ENT" key, you can enter into the function code label screen and then the function parameter screen. In the function parameter screen, you can save the parameter by pressing the "DATA/ENT" key. By pressing the "PRG/ESC", you can exit the current menu and back to the previous menu screen.

## 4.3. Keyboard operation

Various operations of the inverter can be executed via the keyboard. For the description of function codes, please see the function code summary table.

## 4.3.1. Modification of the inverter function code

The inverter provides a three-level menu, and the three levels are:

1. Function code set number (First level menu);
2. Function code label (Second level menu);
3. Function code value (Third level menu)

NOTICE: When in the third-level menu, a press on the "PRG/ESC" key or the "DATA/ENT" key allows you to return to the second-level menu. The difference between the two keys is:

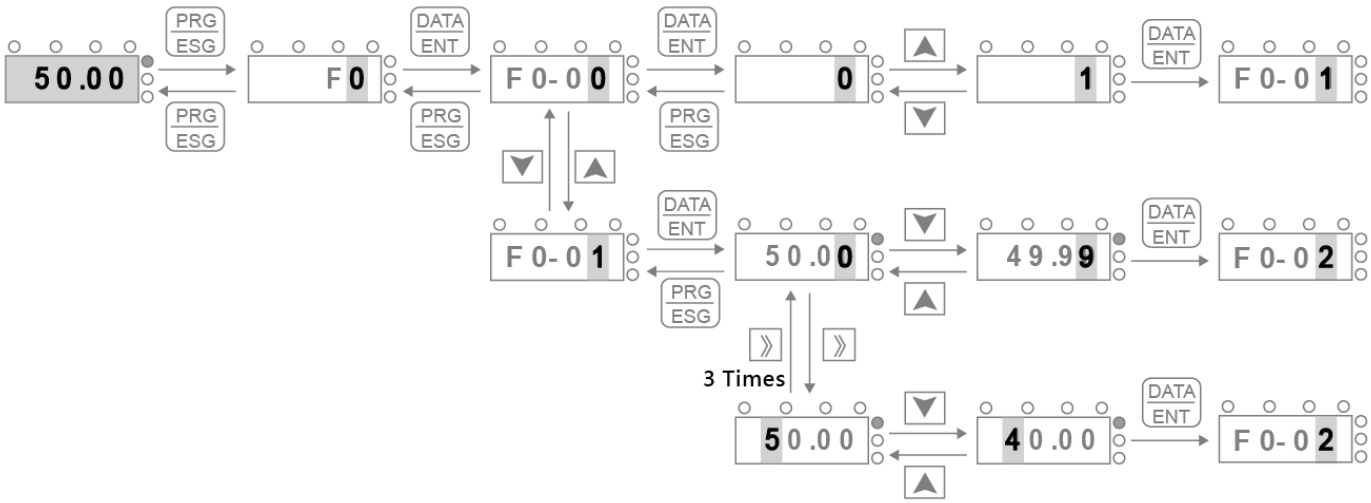
A press on the “DATA/ENT” key will first save the parameter of the current function code and then not only return to the second-level menu but also move to the next function code.

A press on the "PRG/ESC" key will directly return to the second-level menu and at the current function code, without saving the parameter.

In the three-level menu, if none of the parameter digits is flashing, it means that the function code cannot be modified due to one of the reasons below:

- This parameter is one of the unmodifiable parameters such as testing parameters, recorded operating parameters, etc;
- This parameter cannot be modified in the operation state. The modification is allowed only when the inverter is stopped.

Example: Modifying the parameter of the function code code F0-00 from 0 to 1; F0-01 from 50.00 to 50.01 or 40.00.



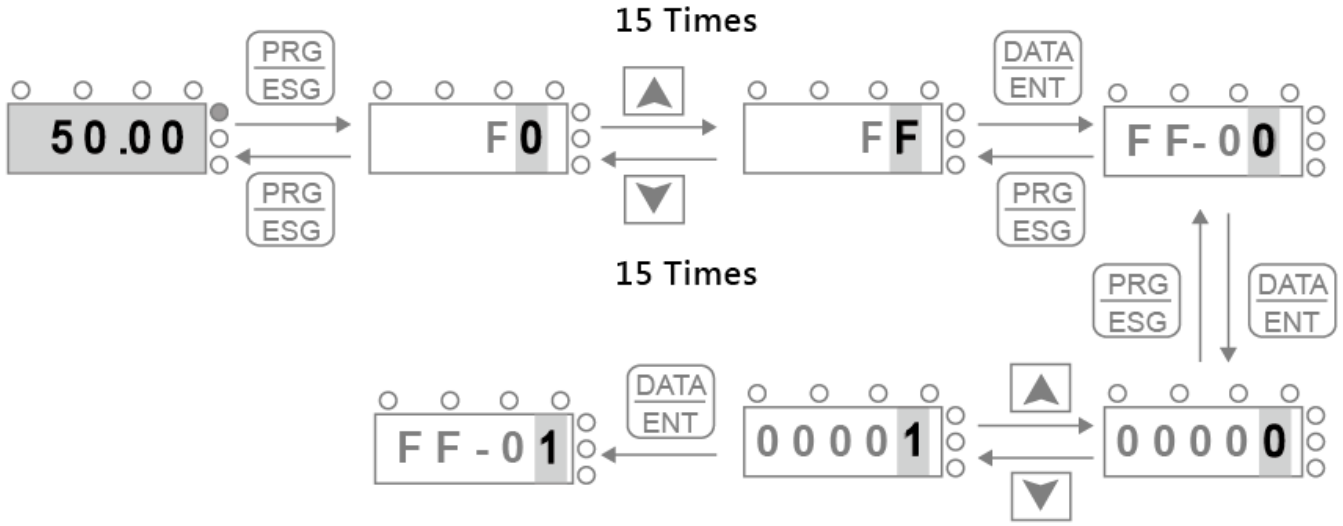

Parameter modification diagram

### 4.3.2. Password protection

The inverter comes with a user password protection feature. When FF-00 is change to a non-zero value, the value becomes the user password and will be effective after you exit from the function code editing state. Afterward, every time you press the "PRG/ESC" key to try editing the function code, "00000" will be displayed and prompt you to enter the password and only correct password allows you to go further.

If you want to disable the password feature, just set the FF-00 to 0.

The password feature will become effective in one minute after you exit the function code editing state. Afterward, every time you press the "PRG/ESC" key to try editing the function code, "00000" will be displayed and prompt you to enter the password and only correct password allows you to go further.




**Password setting diagram**

# 5. Function parameter list

The function parameters of the VFD series inverters are grouped by their functions into 23 sets including F0 ~ F9, FA ~ FF, P0 ~ P5, and U0. Each function set consists of several function codes. A three-level menu is built here to allow you to access and handle the function codes. For example, "F1-06" means the No. 6 function code of the F1 set. Among them, P5 is a special one and is a factory function parameter which users are not allowed to access.

In order to facilitate the setting of function codes via the keyboard, the first-level menu shows the function set number, the second-level menu shows the function code number, and the third-level menu shows the function code parameter.

1. The columns of the function table are as follows:

The first column is "Function code", which is the numbering of the corresponding function parameter sets and parameters;

The second column is "Name", which is the full name of the corresponding function parameter;

The third column is "Range", which describes the details of the corresponding function parameter;

The forth column is "Default", which is the default value of the corresponding function parameter;

The fifth column is "Modification", which is the modification attribute showing the modifiable availability and condition as described below:

"☆": It is modifiable no matter the inverter is in stop or running mode;

"★": It is not modifiable if the inverter is running;

"●": It is non-modifiable because it is a test record.

(The inverter will automatically check and save the attribute of each parameter to prevent the parameters from being accidently changed.)

2. The parameter is expressed in decimal (DEC) format. If it is changed to hexadecimal format, each digit of the parameter value can be edited independently and ranges from 0 to F.
3. "Default" indicates that the corresponding function code parameter has been refreshed and restored to its default value as a result of a restore operation. But the detected and recorded values will not be restored.
4. In order to protect the parameters more effectively, the inverter comes with a password protection feature. Once a user password is set and activated (where the non-0 parameter of FF-00 is the password), every time the user press the PRG/ESC key and try to edit function codes, the system will first prompt for the user password verification by displaying "00000". Unless the user enters the correct user password, the system will not allow further action. For the manufacturer setting parameters, a manufacturer's password must be entered correctly before editing. (It is advised users not to modify the parameters set by the manufacturer. If the parameters are set incorrectly, the inverter may work abnormally or even be damaged.) When the password protection feature is not activated, the user password can be changed at any time. Only the password set last time will be the one to be used. When the value of FF-00 is set to 0, the user password feature will be disable; if the value is not 0, said value will become the password protecting the parameters from being modified. The user password feature also applies for the modification attempt via a serial communication.

**NOTICE:** The inverter will automatically check and save the modification attribute of each parameter to prevent the parameters from being accidently changed.

## 5.1 F0 (Basic function)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F0-00 | First motor control method | 0：Speed sensor less vector control (SVC)<br>1：V/F control | 0 | ★ |
| F0-01 | Preset frequency | 0.00Hz ~ Max. frequency (F0-09) | 50.00Hz | ☆ |
| F0-02 | Main frequency source X selection | 0: Digital setting (preset frequency F0-01, UP/DOWN modifiable, data loss when power off)<br>1: Digital setting (preset frequency F0-02, UP/DOWN modifiable, data loss when power off)<br>2：AI1<br>3: AI2 (rotary potentiometer)<br>4: PULSE pulse setting (DI4)<br>5: Multiple instructions<br>6: Simple PLC<br>7: PID<br>8: Communication setting | 0 | ★ |
| F0-03 | Auxiliary frequency source Y selection | Same as F0-02 (Main frequency source X selection) | 0 | ★ |
| F0-04 | Y range selection of auxiliary frequency source during superposition | 0：Relative to the maximum frequency<br>1：Relative to frequency source X | 0 | ☆ |
| F0-05 | Y range of auxiliary frequency source when superposition | 0% ~ 150% | 0% | ☆ |
| F0-06 | Frequency source superposition selection | Units digit: Frequency source selection<br>0: Main frequency source X<br>1: Result of Main and auxiliary calculation (the algorithm used here is determined by the tenth digit)<br>2: Switch between main frequency source X and auxiliary frequency source Y<br>3: Switch between main frequency source X and result of main and auxiliary calculation results<br>4: Switch between auxiliary frequency source Y and result of main and auxiliary calculation<br>Tens digit: Algorithm of main and auxiliary frequency source calculation | 00 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | | 0: Main + Auxiliary | | |
| | | 1: Main—Auxiliary | | |
| | | 2: The bigger one of the two | | |
| | | 3: The smaller one of the two | | |
| F0-07 | Frequency digital setting memory after shutdown | 0:dumped ; 1:saved | 0 | ☆ |
| F0-08 | Operation direction selection | 0: Default direction ( FWD/REV indicator off) | 0 | ☆ |
| | | 1: Opposite of the default direction ( FWD/REV indicator always on) | | |
| F0-09 | Maximum frequency | 50.00Hz ~ 500.00Hz | 50.00Hz | ★ |
| F0-10 | Upper limit frequency source | 0: F0-11 setting | 0 | ★ |
| | | 1: AI1 | | |
| | | 2: AI2 (Rotary potentiometer) | | |
| | | 3: PULSE pulse setting | | |
| | | 4: Communication setting | | |
| F0-11 | Upper frequency | Lower limit frequency F0-12 ~ Maximum frequency F0-09 | 50.00Hz | ☆ |
| F0-12 | Lower limit frequency | 0.00Hz ~ Upper limit frequency F0-11 | 0.00Hz | ☆ |
| F0-13 | Acceleration time 1 | 0.00s ~ 650.00s(F0-15=2) | Model determination | ☆ |
| | | 0.0s ~ 6500.0s(F0-15=1) | | |
| | | 0s ~ 65000s(F0-15=0) | | |
| F0-14 | Deceleration time 1 | 0.00s ~ 650.00s(F0-15=2) | Model determination | ☆ |
| | | 0.0s ~ 6500.0s(F0-15=1) | | |
| | | 0s ~ 65000s(F0-15=0) | | |
| F0-15 | Acceleration and deceleration time unit | 0：1s | 1 | ★ |
| | | 1：0.1s | | |
| | | 2：0.01s | | |
| F0-16 | Base frequency of acceleration and deceleration time | 0：Maximum frequency (F0-09) | 0 | ★ |
| | | 1：Set frequency (F0-01) | | |
| | | 2：100Hz | | |
| F0-17 | Frequency command resolution | 1：0.1Hz | 2 | ◎ |
| | | 2：0.01Hz | | |
| F0-18 | Carrier frequency | 1.0kHz ~ 16.0kHz | Model determination | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F0-19 | Temperature based adjustment for carrier frequency | 0：Disable<br>1：Enable (carrier frequency lower limit 1 KHz)<br>2：Enable (carrier frequency lower limit 2 KHz)<br>3：Enable (carrier frequency lower limit 3 KHz)<br>4：Enable (carrier frequency lower limit 4 KHz) | 1 | ☆ |
| F0-20 | Command source bundling frequency source | Units digit: Operation panel command binding frequency source selection | 0 | ☆ |
| | | 0: No binding | | |
| | | 1: Digital setting frequency | | |
| | | 2: AI1 | | |
| | | 3: AI2 (rotary potentiometer) | | |
| | | 4: PULSE pulse setting (DI4) | | |
| | | 5: Multi-speed | | |
| | | 6: Simple PLC | | |
| | | 7: PID | | |
| | | 8: Communication setting | | |
| | | Tens digit: Terminal command binding frequency source selection（As same as the unit digit） | | |
| | | Hundreds digit: Communication command binding frequency source selection（As same as the unit digit） | | |
| F0-21 | Command source selection | 0: Operation panel command channel (LED off) | 0 | ☆ |
| | | 1: Terminal command channel (LED on) | | |
| | | 2: Communication command channel (LED flashing) | | |
| F0-22 | GP type display | 1: G type (constant torque load) | Model determination | ● |
| | | 2: P type (air blower, pump load) | | |

## 5.2 F1 set (Start/Stop control parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F1-00 | Start method | 0: Direct start-up<br>1: Speed tracking start-up | 0 | ☆ |
| F1-01 | Speed tracking method | 0: Start from the stop frequency<br>1: Start from zero speed<br>2: Start from the maximum frequency<br>3: Start from the grid frequency | 0 | ★ |
| F1-02 | Start frequency | 0.00Hz ~ 10.00Hz | 0.00Hz | ☆ |
| F1-03 | Start frequency hold time | 0.0s ~ 100.0s | 0.0s | ★ |
| F1-04 | Start DC braking current | 0 ~ 100% | 0% | ★ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F1-05 | Start DC braking time | 0.0s ~ 100.0s | 0.0s | ★ |
| F1-06 | Stop method | 0: By deceleration control<br>1: Free stop | 0 | ☆ |
| F1-07 | Start frequency of DC braking stop | 0.00Hz ~ Maximum frequency | 0.00Hz | ☆ |
| F1-08 | Waiting time of DC braking stop | 0.0s ~ 100.0s | 0.0s | ☆ |
| F1-09 | DC braking stop current | 0% ~ 100% | 0% | ☆ |
| F1-10 | DC braking stop time | 0.0s ~ 100.0s | 0.0s | ☆ |
| F1-11 | Acceleration and deceleration method | 0: Linear acceleration and deceleration<br>1: S curve acceleration and deceleration A<br>2: S curve acceleration and deceleration B | 0 | ★ |
| F1-12 | S curve start time ratio | 0.0% ~ (100.0%-F1-13) | 30.0% | ★ |
| F1-13 | S curve end time ratio | 0.0% ~ (100.0%-F1-12) | 30.0% | ★ |
| F1-14 | Dynamic braking point | 310.0 ~ 800.0 | 700.0 | ☆ |
| F1-15 | Brake usage rate | 0 ~ 100% | 100% | ☆ |
| F1-16 | Motor speed tracks tempo | 1~ 100 | 20 | ☆ |
| F1-17 | Motor speed tracks close-loop current KP | 0~ 1000 | 500 | ☆ |
| F1-18 | Motor speed tracks close-loop current KI | 0~ 1000 | 800 | ☆ |
| F1-19 | Motor speed tracks close-loop current value | 30~ 200 | 100 | ★ |
| F1-20 | Motor speed tracks close-loop current limit value | 10~ 100 | 30 | ★ |
| F1-21 | Motor speed tracks voltage rise time | 0.5~ 3.0 | 1.1 | ★ |
| F1-22 | De-magnetizing time | 0.00~ 5.00 | 1.00 | ★ |

## 5.3 F2 set V/F control parameters

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F2-00 | Torque boost | 0.0%：(Automatic torque boost)<br>0.1% ~ 30.0% | Model determination | ☆ |
| F2-01 | Torque boost cut-off frequency | 0.00Hz ~ Maximum frequency (F0-09) | 10.00Hz | ★ |
| F2-02 | VF slip compensation gain | 0.0% ~ 200.0% | 0.0% | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F2-03 | VF overexcitation gain | 0 ~ 200 | 60 | ☆ |
| F2-04 | VF oscillation suppression gain | 0 ~ 100 | Model determination | ☆ |
| F2-05 | VF curve setting | 0: Linear V/F<br>1: Multipoint V/F<br>2: Square V/F<br>3: 1.2 power V/F<br>4: 1.4 power V/F<br>5: 1.6 power V/F<br>6: 1.8 power V/F<br>10: VF full separate mode<br>11: VF semi-separate mode | 0 | ★ |
| F2-06 | Multipoint VF frequency point 1 | 0.00Hz ~ F2-08 | 0.00Hz | ★ |
| F2-07 | Multi-point VF voltage point 1 | 0.0% ~ 100.0% | 0.0% | ★ |
| F2-08 | Multipoint VF frequency point 2 | F2-06 ~ F2-10 | 0.00Hz | ★ |
| F2-09 | Multi-point VF voltage point 2 | 0.0% ~ 100.0% | 0.0% | ★ |
| F2-10 | Multipoint VF frequency point 3 | F2-08 ~ Motor rated frequency (F3-03) | 0.00Hz | ★ |
| F2-11 | Multi-point VF voltage point 3 | 0.0% ~ 100.0% | 0.0% | ★ |
| F2-12 | Oscillation suppression gain mode | 0~4 | 3 | ★ |
| F2-13 | VF separate voltage source | 0: Digital setting (F2-13)<br>1: AI1<br>2: AI2 (rotary potentiometer)<br>3: PULSE pulse setting (DI4)<br>4: Multi-segment instructions<br>5: Simple PLC<br>6: PID<br>7: Communication setting<br>NOTICE: 100.0% correspond to the rated voltage of the motor | 0 | ☆ |
| F2-14 | VF separate voltage digital setting | 0V ~ Rated voltage of motor (F3-01) | 0V | ☆ |
| F2-15 | Voltage acceleration time of VF separation | 0.0s ~ 1000.0s<br>NOTICE: The time interval from 0V to the rated voltage of the motor | 0.0s | ☆ |
| F2-16 | Voltage deceleration time of VF separation | 0.0s ～ 1000.0s<br>NOTICE: The time interval from 0V to the rated voltage of the motor | 0.0s | ☆ |
| F2-17 | Shutdown mode selection of VF separation | 0：Frequency/voltage independently reduced to 0<br>1: After the voltage is reduced to 0, the frequency is reduced again | 0 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F2-18 | Action current of overcurrent stall | 50~ 200% | 150% | ★ |
| F2-19 | Overcurrent stall enable | 0：Disable<br>1：Enable | 1 | ★ |
| F2-20 | Suppression gain of overcurrent stall | 0~ 100 | 20 | ☆ |
| F2-21 | Double speed over current stall action Current compensation coefficient | 50~ 200% | 50% | ★ |
| F2-22 | Operation voltage of overvoltage stall | 200.0~ 800.0V | 760.0V | ★ |
| F2-23 | Overvoltage stall enable | 0：Disable<br>1：Enable | 1 | ★ |
| F2-24 | Suppress frequency gain of overvoltage stall | 0~ 100 | 30 | ☆ |
| F2-25 | Suppress voltage gain of overvoltage stall | 0~ 100 | 30 | ☆ |
| F2-26 | Maximum ascent limit frequency of overvoltage stall | 0~ 50Hz | 5Hz | ★ |
| F2-27 | Time constant of slip compensation | 0.1~ 10.0 | 0.5 | ☆ |
| F2-28 | Automatic frequency rise enable | 0：Disable<br>1：Enable | 0 | ★ |
| F2-29 | Minimum Electric state torque current | 10~ 100% | 50% | ★ |
| F2-30 | Maximum generating state torque current | 10~ 100% | 20% | ★ |
| F2-31 | Automatic frequency rise KP | 0~ 100 | 50 | ☆ |
| F2-32 | Automatic frequency rise KI | 0~ 100 | 50 | ☆ |
| F2-33 | In-line torque compensation gain | 80~ 150 | 100 | ★ |

## 5.4 F3 set (First motor vector control parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F3-00 | Motor rated power | 0.1kW ~ 1000.0kW | Model determination | ★ |
| F3-01 | Motor rated voltage | 1V ~ 2000V | Model determination | ★ |
| F3-02 | Motor rated current | 0.01A ~ 655.35A (Inverter power ≤55kW)<br>0.1A ~ 6553.5A (Inverter power >55kW) | Model determination | ★ |
| F3-03 | Motor rated frequency | 0.01Hz ~ Maximum frequency | Model determination | ★ |
| F3-04 | Motor rated speed | 1rpm ~ 65535rpm | Model determination | ★ |
| F3-05 | Asynchronous motor stator resistance | 0.001Ω ~ 65.535Ω (Inverter power≤55kW) | Tuning parameters | ★ |
| | | 0.0001Ω ~ 6.5535Ω (Inverter | | |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | | power>55kW) | | |
| F3-06 | Asynchronous motor rotor resistance | 0.001Ω ~ 65.535Ω (Inverter power≤55kW)<br>0.0001Ω ~ 6.5535Ω (Inverter power>55kW) | Tuning parameters | ★ |
| F3-07 | Asynchronous motor leakage inductance | 0.01mH ~ 655.35mH (Inverter power ≤ 55kW)<br>0.001mH ~ 65.535mH (Inverter power>55kW) | Tuning parameters | ★ |
| F3-08 | Asynchronous motor mutual inductance | 0.1mH ~ 6553.5mH (Inverter power≤55kW)<br>0.01mH ~ 655.35mH (Inverter power>55kW) | Tuning parameters | ★ |
| F3-09 | Asynchronous motor no-load current | 0.01A ~ F3-02 (Inverter power≤55kW)<br>0.1A ~ F3-02 (Inverter power>55kW) | Tuning parameters | ★ |
| F3-10 | Tuning options | 0：No operation<br>1: Asynchronous machine static parameter tuning<br>2: Asynchronous machine dynamic complete tuning<br>3: Asynchronous machine static complete tuning | 0 | ★ |

## 5.5 F4 set (Vector control parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F4-00 | Speed loop proportional gain 1 | 1 ~ 100 | 30 | ☆ |
| F4-01 | Speed loop integral time 1 | 0.01s ~ 10.00s | 0.50s | ☆ |
| F4-02 | Switching frequency 1 | 0.00 ~ F4-05 | 5.00Hz | ☆ |
| F4-03 | Speed loop proportional gain 2 | 1 ~ 100 | 20 | ☆ |
| F4-04 | Speed loop integral time 2 | 0.01s ~ 10.00s | 1.00s | ☆ |
| F4-05 | Switching frequency 2 | F4-02 ~ Maximum frequency (F0-09) | 10.00Hz | ☆ |
| F4-06 | SVC speed feedback filter time | 0.000s ~ 1.000s | 0.000s | ☆ |
| F4-07 | Speed loop integral properties | Units digit: Integral separation<br>0: Disable<br>1: Enable | 0 | ☆ |
| F4-08 | Vector control slip gain | 50% ~ 200% | 100% | ☆ |
| F4-09 | Torque upper limit source for speed control mode | 0: Function code F4-10 setting<br>1: AI1<br>2: AI2 (Rotary potentiometer) | 0 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | | 3: PULSE pulse setting | | |
| | | 4: Communication setting | | |
| | | The full scale of option 1-4 corresponds to F4-10 | | |
| F4-10 | Torque upper limit digital setting for speed control mode | 0.0% ~ 200.0% | 150.0% | ☆ |
| F4-11 | Speed control (brake) torque upper limit source | 0：Function code F4-12 setting | 0 | ☆ |
| | | 1：AI1 | | |
| | | 2：AI2 (Rotary potentiometer) | | |
| | | 3：PULSE pulse setting | | |
| | | 4：Communication setting | | |
| | | 1-4: Communication setting<br>The full scale of option 1-4 corresponds to F4-12 | | |
| F4-12 | Speed control (brake) torque upper limit digital setting | 0.0% ～ 200.0% | 150.0% | ☆ |
| F4-14 | Proportional gain of excitation regulation | 0 ～ 60000 | 2000 | ★ |
| F4-15 | Integrating gain of excitation regulation | 0 ～ 60000 | 1300 | ★ |
| F4-16 | Proportional gain of torque adjustment | 0 ～ 60000 | 2000 | ★ |
| F4-17 | Integrating gain of torque adjustment | 0 ～ 60000 | 1300 | ★ |
| F4-18 | Synchro flux-weakening mode | 0~ 2 | 0 | ☆ |
| F4-19 | Synchro flux-weakening factor | 0~ 1 | 0 | ☆ |
| F4-20 | Maximum flux-weakening current | 100~ 110 | Model determination | ★ |
| F4-21 | Automatic tuning factor of flux-weakening | 50~ 200 | 100 | ☆ |
| F4-22 | Generating state torque enable selection under speed mode | 0~ 1 | 0 | ★ |

## 5.6 F5 set (Torque control parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F5-00 | Speed/torque control mode options | 0: Speed control<br>1: Torque control | 0 | ☆ |
| F5-01 | Torque setting source options for torque control mode | 0: Digital setting (F5-03)<br>1: AI1<br>2: AI2 (Rotary potentiometer)<br>3: PULSE pulse (DI4)<br>4: Communication setting | 0 | ☆ |
| F5-03 | Torque digital setting for torque control mode | -200.0% ~ 200.0% | 150.0% | ☆ |
| F5-04 | Torque filtering | 0 ~ 100.0% | 0.0% | ☆ |
| F5-05 | Maximum frequency of torque forward | 0.00Hz ~ Maximum frequency (F0-09) | 50.00Hz | ☆ |
| F5-06 | Torque reverse maximum frequency | 0.00Hz ~ Maximum frequency (F0-09) | 50.00Hz | ☆ |
| F5-07 | Torque acceleration time | 0.00s ~ 650.00s | 0.00s | ☆ |
| F5-08 | Torque deceleration time | 0.00s ~ 650.00s | 0.00s | ☆ |

## 5.7 F6 set (Input terminal parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F6-00 | DI1 terminal function options | 0: No function<br>1: Forward running FWD or running command<br>2: Reverse running REV or forward and reverse direction command (NOTICE: When set to 1 or 2, F4-11needs to be set accordingly. For details, see the function code parameter description)<br>3: Three-line operation control<br>4: Forward jog (FJOG)<br>5: Reverse jog (RJOG)<br>6: Terminal UP<br>7: Terminal DOWN<br>8: Free stop<br>9: Fault reset (RESET)<br>10: Operation pause<br>11: External fault normally open input<br>12: Multi-section command terminal 1 | 1 | ★ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F6-01 | DI2 terminal function options | 13: Multi-segment command terminal 2<br>14: Multi-stage command terminal 3<br>15: Multi-section command terminal 4<br>16: Acceleration/deceleration time selection terminal 1<br>17: Acceleration and deceleration time selection terminal 2<br>18: Frequency source switching<br>19: UP/DOWN setting clear (terminal, keyboard)<br>20: Control command switching terminal 1<br>21: Prohibition of acceleration and deceleration<br>22: PID pause<br>23: PLC status reset<br>24: Swing frequency pause<br>25: Counter input | 4 | ★ |
| F6-02 | DI3 terminal function options | 26: Counter reset<br>27: Length count input<br>28: Length reset<br>29: Disable torque control<br>30: PULSE frequency input (only valid for DI4)<br>31: Immediate DC braking<br>32: External fault normally closed input<br>33: Enable frequency modification<br>34: Reverse PID action direction<br>35: External stop terminal 1<br>36: Control command switching terminal 2<br>37: Suspend PID integration | 9 | ★ |
| F6-03 | DI4 terminal function options | 38: Frequency source X and preset frequency switch<br>39: Frequency source Y and preset frequency switch<br>40: PID parameter switching<br>41: User-defined fault 1<br>42: User-defined fault 2<br>43: Speed control/torque control switch<br>44: Emergency stop<br>45: External stop terminal 2<br>46: Deceleration DC braking<br>47: Clear the current running time | 13 | ★ |
| F6-04 | DI filter time | 0.000s ~ 1.000s | 0.010s | ☆ |

| Code | Name | Range | | Default | Modification |
|---|---|---|---|---|---|
| F6-05 | DI1 delay time | 0.0s ~ 3600.0s | | 0.0s | ★ |
| F6-06 | DI2 delay time | 0.0s ~ 3600.0s | | 0.0s | ★ |
| F6-07 | DI3 delay time | 0.0s ~ 3600.0s | | 0.0s | ★ |
| F6-08 | DI terminal active mode options | 0: Active high | | 0 | ★ |
| | | 1: Active low | | | |
| | | Units digit: DI1 | | | |
| | | Tens digit: DI2 | | | |
| | | Hundreds digit: DI3 | | | |
| | | Thousands digit: DI4 | | | |
| F6-09 | Terminal command mode | 0: Two-line mode 1 | | 0 | ★ |
| | | 1: Two-line mode 2 | | | |
| | | 2: Three-line mode 1 | | | |
| | | 3: Three-line mode 2 | | | |
| F6-10 | Terminal UP/DOWN change rate | 0.001Hz/s ~ 65.535Hz/s | | 1.000Hz/s | ☆ |
| F6-11 | AI curve 1 minimum input | 0.00V ~ F6-13 | | 0.00V | ☆ |
| F6-12 | AI1 curve minimum input corresponding setting | -100.0% ~ +100.0% | | 0.0% | ☆ |
| F6-13 | AI curve 1 maximum input | F6-11 ~ +10.00V | | 10.00V | ☆ |
| F6-14 | AI1 curve maximum input corresponding setting | -100.0% ~ +100.0% | | 100.0% | ☆ |
| F6-15 | AI1 filter time | 0.00s ~ 10.00s | | 0.10s | ☆ |
| F6-16 | AI2 curve minimum input | 0.00V ~ F6-18 | | 0.00V | ☆ |
| F6-17 | AI2 curve minimum input corresponding setting | -100.0% ~ +100.0% | | 100.0% | ☆ |
| F6-18 | AI2 curve maximum input | F6-16 ~ +10.00V | | 3.31V | ☆ |
| F6-19 | AI2 curve maximum input corresponding setting | -100.0% ~ +100.0% | | 0.0% | ☆ |
| F6-20 | Potentiometer filter time | 0.00s ~ 10.00s | | 0.10s | ☆ |
| F6-21 | AI curve selection | Units digit | AI1 curveselection | 21 | ☆ |
| | | 1 | Curve 1 (2 points, see F6-11 ~ F6-14) | | |
| | | 2 | Curve 2 (2 points, see F6-16 ~ F6-19) | | |
| | | 3 | Curve 3（6points, see P3-04～P3-15） | | |
| | | Tens digit | Potentiometer curve selection, same as above | | |
| F6-22 | Options for AI lower than minimum input | Units digit | Option for AI1 lower than the minimum input setting | 00 | ☆ |
| | | 0 | Minimum input setting | | |
| | | 1 | 0.0% | | |

| Code | Name | Range | | Default | Modification |
|---|---|---|---|---|---|
| | | Tens digit | Option for potentiometer value lower than the minimum input setting, same as above | | |
| F6-24 | PULSE minimum input | 0.00kHz ~ F4-26 | | 0.00kHz | ☆ |
| F6-25 | PULSE minimum input corresponding setting | -100.0% ~ 100.0% | | 0.0% | ☆ |
| F6-26 | PULSE maximum input | F6-24 ~ 100.00kHz | | 50.00kHz | ☆ |
| F6-27 | PULSE maximum input corresponding setting | -100.0% ~ 100.0% | | 100.0% | ☆ |
| F6-28 | PULSE filter time | 0.00s ~ 10.00s | | 0.10s | ☆ |

## 5.8 F7set (Output terminal parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F7-00 | Digital output selection | 0: High-speed pulse output<br>1: Normal digital output | 0 | ☆ |
| F7-01 | RELAY1 output function selection | 0: No output<br>1: Inverter-in-operation<br>2: Fault output (for free stop fault)<br>3: Frequency level detection FDT1 output<br>4: Frequency reached<br>5: Running at zero speed (no output when inverter stops)<br>6: Motor overload pre-alarm<br>7: Inverter overload pre-alarm<br>8: Set count value reached<br>9: Designated count value reached<br>10: Length reached<br>11: PLC cycle completed<br>12: Accumulated operation time reached<br>13: Frequency being limited<br>14: Torque being limited<br>15: Operation ready<br>16: Upper limit frequency reached<br>17: Lower limit frequency reached (operation related)<br>18: Undervoltage status output<br>19: Communication settings<br>20: Operation at zero speed signal 2 (also output when operation stops)<br>21: Accumulated power-on time reached<br>22: Frequency level detection FDT2<br>23: Frequency 1 reached<br>24: Frequency 2 reached<br>25: Current 1 reached<br>26: Current 2 reached<br>27: Time out<br>28: AI1 input overloaded<br>29: Load dropping<br>30: Reverse running<br>31: Zero current state | 0 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F7-02 | DO output function selection | 32: Module temperature reached<br>33: Output current limit exceeded<br>34: Lower limit frequency reached (also output when the inverter stops)<br>35: Alarm (all faults)<br>36: Operation Times Up<br>37 : Fault (only for free stop faults and not for undervoltage faults) | 1 | ☆ |
| F7-03 | AO output function selection | 0: Operating frequency<br>1: Set frequency<br>2: Output current<br>3: Output torque (absolute value of torque)<br>4: Output power<br>5: Output voltage<br>6: PULSE input (100.0% corresponds to 100.0kHz)<br>7: AI1<br>8: AI2 (keyboard rotary potentiometer)<br>9: Length<br>10: count value<br>11: Communication settings<br>12: Motor speed<br>13: Output current (100.0% corresponds to 1000.0A)<br>14: Output voltage (100.0% corresponds to 1000.0V)<br>15: Output torque (actual torque value) | 0 | ☆ |
| F7-04 | High-speed pulse output function selection | | 0 | ☆ |
| F7-05 | Maximum frequency of high-speed pulse output | 0.01KHz~100.00KHz | 50.00KHz | ☆ |
| F7-06 | AO bias coefficient | -100.0% ~ +100.0% | 0.0% | ☆ |
| F7-07 | AO gain | -10.00 ~ +10.00 | 1.00 | ☆ |
| F7-08 | AO output filter time | 0.000s ~ 1.000s | 0.000s | ☆ |
| F7-10 | RELAY1 output delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| F7-11 | DO output delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| F7-12 | DO output valid state selection | 0: Positive logic<br>1: Inverse logic<br>Units digit: RELAY1<br>Tens digit: DO1 | 00 | ☆ |

## 5.9 F8 set (Fault and protection, accelerated overcurrent)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F8-00 | Motor overload protection selection | 0: Disable 1: Enable | 1 | ☆ |
| F8-01 | Motor overload protection gain | 0.20 ~ 10.00 | 1.00 | ☆ |
| F8-02 | Motor overload warning coefficient | 50% ~ 100% | 80% | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F8-03 | Overvoltage stall gain | 0 ~ 100 | 20 | ☆ |
| F8-04 | Overvoltage stall protection voltage | 120% ~ 150% | 130% | ☆ |
| F8-05 | Over churn gain | 0 ~ 100 | 20 | ☆ |
| F8-06 | Over-current stall protection current | 100% ~ 200% | 150% | ☆ |
| F8-07 | Power-on ground short-circuit protection options | 0: Disable 1: Enable | 1 | ☆ |
| F8-08 | Automatic fault reset times | 0 ~ 20 | 0 | ☆ |
| F8-09 | Fault during automatic fault reset<br>Relay action selection | 0: Operation halt<br>1: Operation | 0 | ☆ |
| F8-10 | Automatic fault reset interval time | 0.1s ~ 100.0s | 1.0s | ☆ |
| F8-12 | Output phase loss protection option | 0: Disable 1: Enable | 1 | ☆ |
| F8-13 | Type of first fault | 0: No fault<br>1: Wave-by-wave current limiting fault<br>2: Acceleration overcurrent<br>3: Deceleration overcurrent<br>4: Constant speed overcurrent<br>5: Acceleration overvoltage<br>6: Deceleration overvoltage<br>7: Constant speed overvoltage<br>8: Buffer resistor overload<br>9: Undervoltage<br>10: Inverter overload<br>11: Motor overload<br>12: Input phase loss<br>13: Output phase loss<br>14: The module overheated<br>15: External fault<br>16: Communication abnormal<br>17: Contactor abnormal<br>18: Abnormal current detection<br>19: Abnormal motor tuning<br>20: Abnormal Parameter reading and writing<br>21: Inverter hardware abnormal<br>22: Ground short circuit of motor<br>23: Running time reached<br>24: User-defined fault 1 | — | ● |
| F8-14 | Type of second fault | | ~ | ● |
| F8-15 | Type of third (latest) fault | | — | ● |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | | 25: User-defined fault 2<br>26: Power-on time reached<br>27: Offload<br>28: PID feedback lost during operation (frequency source)<br>34：SVC stall failure | | |
| F8-16 | Frequency at the third (latest) fault | — | — | ● |
| F8-17 | Current at the third (latest) fault | — | — | ● |
| F8-18 | Bus voltage at the third (latest) fault | — | — | ● |
| F8-19 | Input status at the third (latest) fault | — | — | ● |
| F8-20 | Output status at the third (latest) fault | — | — | ● |
| F8-21 | Inverter status at the third (latest) fault | — | — | ● |
| F8-22 | Power-on time at the third (latest) fault | — | — | ● |
| F8-23 | Operation time at the third (latest) fault | — | — | ● |
| F8-24 | Frequency at the second fault | — | — | ● |
| F8-25 | Current at the second fault | — | — | ● |
| F8-26 | Bus voltage at the second fault | — | — | ● |
| F8-27 | Input status at the second fault | — | — | ● |
| F8-28 | Output status at the second fault | — | — | ● |
| F8-29 | Inverter status at the second fault | — | — | ● |
| F8-30 | Power-on time at the second fault | — | — | ● |
| F8-31 | Operation time at the second fault | — | — | ● |
| F8-32 | Frequency at the first fault | — | — | ● |
| F8-33 | Current at the first fault | — | — | ● |
| F8-34 | Bus voltage at the first fault | — | — | ● |
| F8-35 | Input status at the first fault | — | — | ● |
| F8-36 | Output status at the first fault | — | — | ● |

| Code | Name | Range | | Default | Modification |
|---|---|---|---|---|---|
| F8-37 | Inverter status at the first fault | — | | — | ● |
| F8-38 | Power-on time at the first fault | — | | — | ● |
| F8-39 | Operation time at the first fault | — | | — | ● |
| F8-40 | Fault protection action selection 1 | Units digit | Motor overload (11) | 00000 | ☆ |
| | | 0 | Free stop | | |
| | | 1 | Stop by shutdown sequence | | |
| | | 2 | Continue operation | | |
| | | Tens digit | Input phase loss(12) | | |
| | | Hundreds digit | Output phase loss (E13)（As same as the unit digit） | | |
| | | Thousands digit | External failure (E15)（As same as the unit digit） | | |
| | | Ten Thousands digit | Communication abnormal (E16)（As same as the unit digit） | | |
| F8-41 | Fault protection action selection 2 | Units digit | Function code reading and writing abnormal (20) | 00000 | ☆ |
| | | 0 | Free stop | | |
| | | 1 | Stop by shutdown sequence | | |
| | | Tens digit | Operation time reached (E23)（As same as the F8-40 unit digit） | | |
| | | Hundreds digit | User-defined fault 1(E24)（As same as the F8-40 unit digit） | | |
| | | Thousands digit | User-defined fault 2(E25)（As same as the F8-40 unit digit） | | |
| | | Ten Thousands digit | Power-on time reach(E26)（As same as the F8-40 unit digit） | | |
| F8-42 | Fault protection action selection 3 | Units digit | Offload(E27)（As same as the F8-40 unit digit） | 00000 | ☆ |
| | | Tens digit | PID feedback lost during operation (E28)（As same as the F8-40 unit digit） | | |
| F8-45 | Frequency selection for continuous operation in spite of faults | 0: Current operating frequency | | 0 | ☆ |
| | | 1: Set frequency | | | |
| | | 2: Upper limit frequency | | | |
| | | 3: Lower limit frequency | | | |
| | | 4: Abnormal standby frequency | | | |
| F8-46 | Abnormal backup frequency | 0.0% ~ 100.0% | | 100.0% | ☆ |
| | | (100.0% corresponding to F0-09) | | | |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F8-47 | Instantaneous failure tolerance function selection | 0: Invalid<br>1: Decelerate<br>2: Decelerate to stop | 0 | ☆ |
| F8-48 | Voltage set for suspending operation in case of instantaneous failure | 80.0% ~ 100.0% | 90.0% | ☆ |
| F8-49 | Voltage recovery waiting time for continuing operation in case of instantaneous failure | 0.00s ~ 100.00s | 0.50s | ☆ |
| F8-50 | Voltage set for continuing operation in case of instantaneous failure | 60.0% ~ 100.0%(Standard bus voltage) | 80.0% | ☆ |
| F8-51 | Offload protection options | 0: Disable<br>1: Enable | 0 | ☆ |
| F8-52 | Offload detection level | 0.0% ~ 100.0% | 10.0% | ☆ |
| F8-53 | Offload detection time | 0.0s ~ 60.0s | 1.0s | ☆ |
| F8-54 | Overspeed detection value | 0.0% ~ 50.0%(Maximum frequency) | 20.0% | ☆ |
| F8-55 | Overspeed detection time | 0.0s: No detection<br>0.1 ~ 60.0s | 1.0s | ☆ |
| F8-56 | Excessive speed deviation detection value | 0.0% ~ 50.0%(Maximum frequency) | 20.0% | ☆ |
| F8-57 | Excessive speed deviation detection time | 0.0s: No detection<br>0.1 ~ 60.0s | 5.0s | ☆ |
| F8-58 | Deceleration to stop Kp | 0~100 | 30 | ★ |
| F8-59 | Deceleration to stop Ki | 0.0~300.0 | 20.0 | ★ |
| F8-60 | Time setting of Deceleration to stop | 0~65535s | 0s | ☆ |

## 5.10 F9 set(Auxiliary function parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F9-00 | Jog operation frequency | 0.00Hz ~ Maximum frequency (F0-09) | 5.00Hz | ☆ |
| F9-01 | Jog acceleration time | 0.0s ~ 6500.0s | 20.0s | ☆ |
| F9-02 | Jog deceleration time | 0.0s ~ 6500.0s | 20.0s | ☆ |
| F9-03 | Acceleration time 2 | 0.0s ~ 6500.0s | Model determination | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F9-04 | Deceleration time 2 | 0.0s ~ 6500.0s | Model determination | ☆ |
| F9-05 | Acceleration time 3 | 0.0s ~ 6500.0s | Model determination | ☆ |
| F9-06 | Deceleration time 3 | 0.0s ~ 6500.0s | Model determination | ☆ |
| F9-07 | Acceleration time 4 | 0.0s ~ 6500.0s | Model determination | ☆ |
| F9-08 | Deceleration time 4 | 0.0s ~ 6500.0s | Model determination | ☆ |
| F9-09 | Acceleration time 1/2 switching frequency point | 0.00Hz ~ Maximum frequency (F0-09) | 0.00Hz | ☆ |
| F9-10 | Deceleration time 1/2 switching frequency point | 0.00Hz ~ Maximum frequency (F0-09) | 0.00Hz | ☆ |
| F9-11 | Terminal jog priority | 0: Disable 1: Enable | 0 | ☆ |
| F9-12 | Forward and reverse dead time | 0.0s ~ 3000.0s | 0.0s | ☆ |
| F9-13 | Reverse control | 0: Enable 1: Disable | 0 | ☆ |
| F9-14 | Action when the set frequency is lower than lower limit frequency | 0: Continue operation at lower limit frequency<br>1: Stop operation<br>2: Continue operation at zero speed | 0 | ☆ |
| F9-15 | Power-on time limit | 0h ~ 65000h | 0h | ☆ |
| F9-16 | Operation time limit | 0h ~ 65000h | 0h | ☆ |
| F9-17 | Protection feature option | 0: Disable 1: Enable | 0 | ☆ |
| F9-18 | Frequency detection value (FDT level) | 0.00Hz ~ Maximum frequency (F0-09) | 50.00Hz | ☆ |
| F9-19 | Frequency detection hysteresis value | 0.0% ~ 100.0% (FDT1 level) | 5.0% | ☆ |
| F9-20 | Reached frequency detection range | 0.0% ~ 100.0% (Maximum frequency F0-09) | 0.0% | ☆ |
| F9-21 | Frequency detection value (FDT1) | 0.00Hz ~ Maximum frequency | 50.00Hz | ☆ |
| F9-22 | Frequency detection hysteresis value (FDT1) | 0.0% ~ 100.0% (FDT2 level) | 5.0% | ☆ |
| F9-23 | Arbitrary reached frequency detection value 1 | 0.00Hz ~ Maximum frequency | 50.00Hz | ☆ |
| F9-24 | Arbitrary reached frequency detection width 1 | 0.0% ~ 100.0% (Maximum frequency F0-09) | 0.0% | ☆ |
| F9-25 | Arbitrary reached frequency detection value 2 | 0.00Hz ~ Maximum frequency | 50.00Hz | ☆ |
| F9-26 | Arbitrary reached frequency detection width 2 | 0.0% ~ 100.0% (Maximum frequency F0-09) | 0.0% | ☆ |
| F9-27 | Zero current detection level | 0.0% ~ 300.0%<br>100.0% corresponding to motor rated current | 5.0% | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| F9-28 | Zero current detection delay time | 0.01s ~ 600.00s | 0.10s | ☆ |
| F9-29 | Output overcurrent value | 0.0% (No detection)<br>0.1% ~ 300.0% ((Motor rated current F3-02) | 200.0% | ☆ |
| F9-30 | Output overcurrent detection delay time | 0.00s ~ 600.00s | 0.00s | ☆ |
| F9-31 | Arbitrary reached current 1 | 0.0% ~ 300.0%(Motor rated current F3-02) | 100.0% | ☆ |
| F9-32 | Arbitrary reached current 1 width | 0.0% ~ 300.0%(Motor rated current F3-02) | 0.0% | ☆ |
| F9-33 | Arbitrary reached current 2 | 0.0% ~ 300.0%(Motor rated current F3-02) | 100.0% | ☆ |
| F9-34 | Arbitrary reached current 2 width | 0.0% ~ 300.0%(Motor rated current F3-02) | 0.0% | ☆ |
| F9-35 | Timer feature option | 0: Disable 1: Enable | 0 | ★ |
| F9-36 | Timer operation time selection | 0: F9-37 setting<br>1: AI1<br>2: AI2 (Rotary potentiometer)<br>Analog input range corresponds to F9-37 | 0 | ★ |
| F9-37 | Timer counting time selection | 0.0Min ~ 6500.0 Min | 0.0Min | ★ |
| F9-38 | Module temperature limit | 0℃~ 100℃ | 75℃ | ☆ |
| F9-39 | Current operation time limit | 0.0 ~ 6500.0 Min | 0.0Min | ☆ |
| F9-40 | AI1 input voltage | 0.00V ~ F9-41 | 3.10V | ☆ |
| F9-41 | Lower limit of protection value | F9-40 ~ 11.00V | 6.80V | ☆ |
| F9-42 | AI1 input voltage | 0: Fan runs during operation<br>1: Fan keeps running | 0 | ☆ |
| F9-43 | Upper limit of protection value | Sleep frequency (F9-45) ~ Maximum frequency (F0-09) | 0.00Hz | ☆ |
| F9-44 | Cooling fan control | 0.0s ~ 6500.0s | 0.0s | ☆ |
| F9-45 | Wake up frequency | 0.00Hz ~ Wake-up frequency (F9-43) | 0.00Hz | ☆ |
| F9-46 | Wake-up delay time | 0.0s ~ 6500.0s | 0.0s | ☆ |
| F9-47 | Output power factor | 0.0~200.0 | 100.0 | ☆ |

## 5.11 FA set (Keyboard and display parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FA-00 | QUICK/JOG key function | 0：MF.K disabled | 0 | ★ |
| | | 1: Switch between operation panel command channel and remote command channel (terminal command channel or communication command channel) | | |
| | | 2: Forward and reverse switching | | |
| | | 3: Forward jog | | |
| | | 4: Reverse jog | | |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FA-01 | STOP/RESET key function | 0: Only in keyboard operation mode, the stop function of STOP/RES key is enabled<br>1: In any operation mode, the stop function of the STOP/RES key is enabled | 1 | ☆ |
| FA-02 | LED display parameters 1 for operation mode | 0000 ~ FFFF<br>Bit00: Operation frequency 1 (Hz)<br>Bit01: Set frequency (Hz)<br>Bit02: Bus voltage (V)<br>Bit03: Output voltage (V)<br>Bit04: Output current (A)<br>Bit05: Output power (kW)<br>Bit06: Output torque (%)<br>Bit07: DI input status<br>Bit08: DO output status<br>Bit09: AI1 voltage (V)<br>Bit10: AI2 voltage (V)<br>Bit11: Count value<br>Bit12: Length value<br>Bit13: Load speed display<br>Bit14: PID setting<br>Bit15: PID feedback | 003F | ☆ |
| FA-03 | LEDLED display parameters 2 for operation mode | 0000 ~ FFFF<br>Bit00: PLC stage<br>Bit01: PULSE input pulse frequency (kHz)<br>Bit02: Operation frequency 2 (Hz)<br>Bit03: Remaining operation time<br>Bit04: Linear speed<br>Bit05: Current power-on time (Hour)<br>Bit06: Current running time (Min)<br>Bit07: PULSE input pulse frequency (Hz)<br>Bit08: Communication setting value<br>Bit09: Main frequency X display (Hz)<br>Bit10: Auxiliary frequency Y display (Hz)<br>Bit11: Target torque value<br>Bit12: Power factor angle<br>Bit13: VF separation target voltage (V)<br>Bit14: Visual display of DI input status<br>Bit15: Visual display of DO input status | 0000 | ☆ |
| FA-04 | LED display parameters for stop mode | 0001～FFFF<br>Bit00: Set frequency (Hz)<br>Bit01: Bus voltage (V)<br>Bit02: DI input status<br>Bit03: DO output status | 0033 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | | Bit04: AI1 voltage (V) | | |
| | | Bit05: AI2 voltage (V) | | |
| | | Bit06: Count value | | |
| | | Bit07: Length value | | |
| | | Bit08: PLC stage | | |
| | | Bit09: Load speed | | |
| | | Bit10: PULSE input pulse frequency (kHz) | | |
| FA-05 | Load speed display coefficient | 0.0001 ~ 6.5000 | 1.0000 | ☆ |
| FA-06 | Inverter module radiator temperature | 0.0℃ ~ 100.0℃ | - | ● |
| FA-07 | Cumulative operation time | 0h ~ 65535h | - | ● |
| FA-08 | Load speed display decimal digits | Unit digit: Load speed display decimal places | 21 | ☆ |
| | | 0: 0 decimal digit | | |
| | | 1: 1 decimal digit | | |
| | | 2: 2 decimal digits | | |
| | | 3: 3 decimal digits | | |
| | | Tens digit: U0-18/U0-34 display decimal places | | |
| | | 1: 1 decimal place | | |
| | | 2: 2 decimal place | | |
| FA-09 | Accumulated power-on time | 0 ~ 65535h | - | ● |
| FA-10 | Accumulated power consumption | 0 ~ 65535kw/h | - | ● |
| FA-11 | Product code | - | - | ● |
| FA-12 | Serial number 1 | - | - | ● |
| FA-13 | Serial number 2 | - | - | ● |
| FA-14 | Serial number 3 | - | - | ● |
| FA-15 | Serial number 4 | - | - | ● |
| FA-16 | Software version number | - | - | ● |

## 5.12 FB set (Control optimization parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FB-00 | DPWM switching upper limit frequency | 0.00Hz ~ 15.00Hz | 12.00Hz | ☆ |
| FB-01 | PWM modulation method | 0: Asynchronous modulation | 0 | ☆ |
| | | 1: Synchronous modulation | | |
| FB-02 | Random PWM | 0: Random PWM is invalid | 0 | ☆ |
| | | 1 ~ 10: PWM carrier frequency random depth | | |
| FB-03 | Dead zone | 0：Disable | 1 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | compensation mode selection | 1：Enable | | |
| FB-04 | Dead zone time adjustment（Use 1140V） | 100% ~ 200% | 150% | ☆ |
| FB-05 | Wave-by-wave current limit enable | 0：Disable<br>1：Enable | 1 | ☆ |
| FB-06 | Current detection delay compensation | 0 ~ 100 | 5 | ☆ |
| FB-07 | Undervoltage point setting | 200.0V ~ 2000.0V | Model determination | ☆ |
| FB-08 | Overvoltage point setting | 200.0V ~ 2500.0V | Model determination | ★ |
| FB-09 | SVC optimization mode selection | 0：Not optimized (deleted)<br>1：Optimization mode 1<br>2：Optimization mode 2 | 2 | ★ |

## 5.13 FC set (PID function parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FC-00 | PID set-point source | 0: FC-01 setting<br>1: AI1<br>2: AI2 (Keyboard rotary potentiometer)<br>3: PULSE pulse (DI4)<br>4: Communication<br>5: Multi-step instruction | 0 | ☆ |
| FC-01 | PID value set-point | 0.0% ~ 100.0% | 50.0% | ☆ |
| FC-02 | PID feedback source | 0: AI1<br>1: PULSE pulse setting (DI4)<br>2: Communication setting | 0 | ☆ |
| FC-03 | PID action direction | 0: Forward<br>1: Reverse | 0 | ☆ |
| FC-04 | PID set-point feedback range | 0 ~ 65535 | 1000 | ☆ |
| FC-05 | Proportional gain Kp1 | 0.0 ~ 1000.0 | 20.0 | ☆ |
| FC-06 | Integration time Ti1 | 0.01s ~ 10.00s | 2.00s | ☆ |
| FC-07 | Differential time Td1 | 0.000s ~ 10.000s | 0.000s | ☆ |
| FC-08 | PID reverse cutoff frequency | 0.00 ~ Maximum frequency (F0-09) | 2.00Hz | ☆ |
| FC-09 | PID deviation limit | 0.0% ~ 100.0% | 0.0% | ☆ |
| FC-10 | PID differential limit | 0.00% ~ 100.00% | 0.10% | ☆ |
| FC-11 | PID set-point change time | 0.00 ~ 650.00s | 0.00s | ☆ |
| FC-12 | PID feedback filter time | 0.00 ~ 60.00s | 0.00s | ☆ |
| FC-13 | PID output filter time | 0.00 ~ 60.00s | 0.00s | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FC-14 | Factory reserved | —— | —— | —— |
| FC-15 | Proportional gain Kp2 | 0.0 ~ 100.0 | 20.0 | ☆ |
| FC-16 | Integration time Ti2 | 0.01s ~ 10.00s | 2.00s | ☆ |
| FC-17 | Differential time Td2 | 0.000s ~ 10.000s | 0.000s | ☆ |
| FC-18 | PID parameter switching conditions | 0: Never<br>1: Switch via DI terminal<br>2: Automatically switch according to deviation | 0 | ☆ |
| FC-19 | PID parameter switching deviation 1 | 0.0% ~ FC-20 | 20.0% | ☆ |
| FC-20 | PID parameter switching deviation 2 | FC-19 ~ 100.0% | 80.0% | ☆ |
| FC-21 | PID initial value | 0.0% ~ 100.0% | 0.0% | ☆ |
| FC-22 | PID initial value holding time | 0.00 ~ 650.00s | 0.00s | ☆ |
| FC-23 | The maximum deviation between two PID outputs | 0.00% ~ 100.00% | 1.00% | ☆ |
| FC-24 | The minimum deviation between two PID outputs | 0.00% ~ 100.00% | 1.00% | ☆ |
| FC-25 | PID integral properties | Units digit: integral separation<br>0: invalid<br>1: Effective<br>Tens digit: Whether to stop integration after output reaches limit<br>0: Continue<br>1: Stop | 00 | ☆ |
| FC-26 | PID feedback loss detection value | 0.0%: No feedback loss detection<br>0.1% ~ 100.0% | 0.0% | ☆ |
| FC-27 | PID feedback loss detection time | 0.0s ~ 20.0s | 0.0s | ☆ |
| FC-28 | PID operation mode | 0: No operation when the inverter stops<br>1: Proceed operation when the inverter stops | 0 | ☆ |

## 5.14 FD set (Swing frequency, fixed length and counting parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FD-00 | Swing frequency setting | 0: Relative to the center frequency<br>1: Relative to the maximum frequency | 0 | ☆ |
| FD-01 | Swing frequency amplitude | 0.0% ~ 100.0% | 0.0% | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FD-02 | Kick frequency amplitude | 0.0% ~ 50.0% | 0.0% | ☆ |
| FD-03 | Swing frequency period | 0.1s ~ 3000.0s | 10.0s | ☆ |
| FD-04 | Triangular wave rise time of swing frequency | 0.1% ~ 100.0% | 50.0% | ☆ |
| FD-05 | Set length | 0m ~ 65535m | 1000m | ☆ |
| FD-06 | Actual length | 0m ~ 65535m | 0m | ☆ |
| FD-07 | Number of pulses per meter | 0.1 ~ 6553.5 | 100.0 | ☆ |
| FD-08 | Set count value | 1 ~ 65535 | 1000 | ☆ |
| FD-09 | Designated count value | 1 ~ 65535 | 1000 | ☆ |

## 5.15 FE set (Multi-segment instruction, simple PLC parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FE-00 | Multi-segment command 0 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-01 | Multi-segment command 1 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-02 | Multi-segment command 2 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-03 | Multi-segment command 3 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-04 | Multi-segment command 4 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-05 | Multi-segment command 5 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-06 | Multi-segment command 6 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-07 | Multi-segment command 7 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-08 | Multi-segment command 8 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-09 | Multi-segment command 9 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-10 | Multi-segment command 10 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-11 | Multi-segment command 11 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-12 | Multi-segment command 12 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-13 | Multi-segment command 13 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-14 | Multi-segment command 14 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-15 | Multi-segment command 15 | -100.0% ~ 100.0% | 0.0% | ☆ |
| FE-16 | PLC operation mode | 0: Stop at the end of a single operation<br>1: Stop at the end a single operation and keep the end value<br>2: Repeat operation | 0 | ☆ |

| Code | Name | Range | | Default | Modification |
|---|---|---|---|---|---|
| FE-17 | PLC power down memory selection | Units digit | Memory save option for Power-down | 00 | ☆ |
| | | 0 | Don’t save | | |
| | | 1 | Save | | |
| | | Tens digit | Memory save option for shutdown | | |
| | | 0 | Don’t save | | |
| | | 1 | Save | | |
| FE-18 | PLC segment 0 execution time selection | 0.0s(h) ~ 6553.5s(h) | | 0.0s(h) | ☆ |
| FE-19 | PLC section 0 acceleration and deceleration time selection | 0 ~ 3 | | 0 | ☆ |
| FE-20 | PLC segment 1 execution time selection | 0.0s(h) ~ 6553.5s(h) | | 0.0s(h) | ☆ |
| FE-21 | PLC section 1 acceleration and deceleration time selection | 0 ~ 3 | | 0 | ☆ |
| FE-22 | PLC segment 2 execution time selection | 0.0s(h) ~ 6553.5s(h) | | 0.0s(h) | ☆ |
| FE-23 | PLC section 2 acceleration and deceleration time selection | 0 ~ 3 | | 0 | ☆ |
| FE-24 | PLC segment 3 execution time selection | 0.0s(h) ~ 6553.5s(h) | | 0.0s(h) | ☆ |
| FE-25 | PLC section 3 acceleration and deceleration time selection | 0 ~ 3 | | 0 | ☆ |
| FE-26 | PLC segment 4 execution time selection | 0.0s(h) ~ 6553.5s(h) | | 0.0s(h) | ☆ |
| FE-27 | PLC section 4 acceleration and deceleration time selection | 0 ~ 3 | | 0 | ☆ |
| FE-28 | PLC segment 5 execution time selection | 0.0s(h) ~ 6553.5s(h) | | 0.0s(h) | ☆ |
| FE-29 | PLC section 5 acceleration and deceleration time selection | 0 ~ 3 | | 0 | ☆ |
| FE-30 | PLC segment 6 execution time selection | 0.0s(h) ~ 6553.5s(h) | | 0.0s(h) | ☆ |
| FE-31 | PLC section 6 acceleration and deceleration time | 0 ~ 3 | | 0 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | selection | | | |
| FE-32 | PLC segment 7 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-33 | PLC section 7 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-34 | PLC segment 8 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-35 | PLC section 8 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-36 | PLC segment 9 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-37 | PLC section 9 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-38 | PLC segment 10 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-39 | PLC section 10 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-40 | PLC segment 11 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-41 | PLC section 11 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-42 | PLC segment 12 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-43 | PLC section 12 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-44 | PLC segment 13 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-45 | PLC section 13 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-46 | PLC segment 14 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-47 | PLC section 14 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FE-48 | PLC segment 15 execution time selection | 0.0s(h) ~ 6553.5s(h) | 0.0s(h) | ☆ |
| FE-49 | PLC section 15 acceleration and deceleration time selection | 0 ~ 3 | 0 | ☆ |
| FE-50 | PLC operation time unit | 0: s (second )<br>1: h (hour) | 0 | ☆ |
| FE-51 | Multi-segment command 0 set-point options | 0: Function code FE-00<br>1: AI1<br>2: AI2 (keyboard rotary potentiometer)<br>3: PULSE pulse<br>4: PID<br>5: Set by preset frequency (F0-01) and adjustable using UP/DOWN keys | 0 | ☆ |

## 5.16 FF set (Function code management parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| FF-00 | User password | 0 ~ 65535 | 0 | ☆ |
| FF-01 | Parameter initialization | 0: No operation<br>1: Restore parameters to factory values, except motor parameters<br>2: Clear recorded data<br>4: Backup user's current parameters<br>5: Restore to user's backup parameters | 0 | ★ |
| FF-02 | Function parameter set display options | Units digit: U set display<br>0: Disable<br>1: Enable<br>Tens digit: P set display<br>0: Disable<br>1: Enable | 11 | ★ |
| FF-03 | Customized parameter set display selection | Units digit: User-defined parameter set display<br>0: Disable<br>1: Enable<br>Tens digit: User-modified parameter set display<br>0: Disable<br>1: Enable | 00 | ☆ |
| FF-04 | Read-only user password | 0: Editable<br>1: Not editable | 0 | ☆ |

## 5.17 P0 set (Communication parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P0-00 | Baud rate | 0: 300BPS<br>1: 600BPS<br>2: 1200BPS<br>3: 2400BPS<br>4: 4800BPS<br>5: 9600BPS<br>6: 19200BPS<br>7: 38400BPS<br>8: 57600BPS<br>9: 115200BPS | 5 | ☆ |
| P0-01 | Data Format | 0: No parity (8-N-2)<br>1: Even parity (8-E-1)<br>2: Odd parity (8-O-1)<br>3: No parity (8-N-1) | 0 | ☆ |
| P0-02 | Local address | 0：Broadcast address<br>1 ~ 247 | 1 | ☆ |
| P0-03 | Response delay | 0 ~ 20ms | 2 | ☆ |
| P0-04 | Communication timeout | 0.0: Invalid<br>0.1 ~ 60.0s | 0 | ☆ |
| P0-05 | MODBUS communication data format | 0: Non-standard MODBUS protocol<br>1: Standard MODBUS protocol | 0 | ☆ |
| P0-06 | Communication reading current resolution | 0: 0.01A<br>1: 0.1A | 0 | ☆ |

## 5.18 P1 set (Virtual IO parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P1-00 | VDI1 terminal function options | 0 ~ 47 | 0 | ★ |
| P1-01 | VDI2 terminal function options | 0 ~ 47 | 0 | ★ |
| P1-02 | VDI3 terminal function options | 0 ~ 47 | 0 | ★ |
| P1-03 | VDI4 terminal function options | 0 ~ 47 | 0 | ★ |
| P1-04 | VDI5 terminal function options | 0 ~ 47 | 0 | ★ |
| P1-05 | VDI terminal valid state source | Units digit: Virtual VDI1<br>0: Determined by the state of virtual VDOx<br>1: Determined by the state of function code P1-06<br>Tens digit: Virtual VDI2<br>Hundreds digit: Virtual VDI3 | 00000 | ★ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| | | Thousands digit: Virtual VDI4<br>Ten Thousands digit: Virtual VDI5 | | |
| P1-06 | VDI terminal function code setting valid state | Units digit: Virtual VDI1<br>0: Disable<br>1: Enable<br>Tens digit: Virtual VDI2<br>Hundreds digit: Virtual VDI3<br>Thousands digit: Virtual VDI4<br>Ten Thousands digit: Virtual VDI5 | 00000 | ★ |
| P1-07 | AI1 terminal function options (used as DI) | Same as P1-00 | 0 | ★ |
| P1-08 | Factory reserved | —— | —— | —— |
| P1-09 | Effective state options for AI1 used as DI | 0: High active<br>1: Low active | 0 | ★ |
| P1-10 | Virtual VDO1 output option | 0: Internally short connected to physical DIx<br>1 ~ 37: See the physical DO output options in F5 set | 0 | ☆ |
| P1-11 | Virtual VDO2 output option | Same as P1-10 | 0 | ☆ |
| P1-12 | Virtual VDO3 output option | Same as P1-10 | 0 | ☆ |
| P1-13 | Virtual VDO4 output option | Same as P1-10 | 0 | ☆ |
| P1-14 | Virtual VDO5 output option | Same as P1-10 | 0 | ☆ |
| P1-15 | VDO1 delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P1-16 | VDO2 delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P1-17 | VDO3 delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P1-18 | VDO4 delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P1-19 | VDO5 delay time | 0.0s ~ 3600.0s | 0.0s | ☆ |
| P1-20 | VDO output terminal valid state selection | Units digit: VDO1<br>0: Positive logic<br>1: Inverse logic<br>Tens digit: VDO2<br>Hundreds digit: VDO3<br>Thousands digit: VDO4<br>Ten Thousands digit: VDO5 | 00000 | ☆ |

## 5.19 P2 set (AIAO calibration parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P2-00 | Voltage 1 before AI1 calibration curve calibration | 0.500V ~ 4.000V | Factory calibration | ☆ |
| P2-01 | Voltage 1 after AI1 calibration curve calibration | 0.500V ~ 4.000V | Factory calibration | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P2-02 | Voltage 2 before AI1 calibration curve calibration | 6.000V ~ 9.999V | Factory calibration | ☆ |
| P2-03 | Voltage 2 after AI1 calibration curve calibration | 6.000V ~ 9.999V | Factory calibration | ☆ |
| P2-04 | Voltage 1 before AI2 calibration curve calibration | 0.500V ~ 4.000V | Factory calibration | ☆ |
| P2-05 | Voltage 1 after AI2 calibration curve calibration | 0.500V ~ 4.000V | Factory calibration | ☆ |
| P2-06 | Voltage 2 before AI2 calibration curve calibration | 6.000V ~ 9.999V | Factory calibration | ☆ |
| P2-07 | Voltage 2 after AI2 calibration curve calibration | 6.000V ~ 9.999V | Factory calibration | ☆ |
| P2-08 | Voltage 1 before AO calibration curve calibration | 0.500V ~ 4.000V | Factory calibration | ☆ |
| P2-09 | Voltage 1 after AO calibration curve calibration | 0.500V ~ 4.000V | Factory calibration | ☆ |
| P2-10 | Voltage 2 before AO calibration curve calibration | 6.000V ~ 9.999V | Factory calibration | ☆ |
| P2-11 | Voltage 2 after AO calibration curve calibration | 6.000V ~ 9.999V | Factory calibration | ☆ |

## 5.20 P3 set ( AI curve setting parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P3-00 | AI1 jumping point | -100.0% ~ 100.0% | 0.0% | ☆ |
| P3-01 | AI1 jump range | 0.0% ~ 100.0% | 0.5% | ☆ |
| P3-02 | AI2 jumping point | -100.0% ~ 100.0% | 0.0% | ☆ |
| P3-03 | AI2 jump range | 0.0% ~ 100.0% | 0.5% | ☆ |
| P3-04 | AI curve minimum input 3 | 0.00V～P3-06 | 0.00V | ☆ |
| P3-05 | AI curve minimum input 3 corresponding setting | -100.0%～+100.0% | 0.0% | ☆ |
| P3-06 | AI curve setting of 3 inflection point and 1 input value | P3-04～P3-08 | 2.00V | ☆ |
| P3-07 | AI curve setting of 3 inflection point and 1 input value setting | -100.0%～+100.0% | 20.0% | ☆ |
| P3-08 | AI curve setting of 3 inflection point and 2 input value | P3-06～P3-10 | 4.00V | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P3-09 | AI curve setting of 3 inflection point and 2 input value setting | -100.0%～+100.0% | 40.0% | ☆ |
| P3-10 | AI curve setting of 3 inflection point and 3 input value | P3-08～P3-12 | 6.00V | ☆ |
| P3-11 | AI curve setting of 3 inflection point and 3 input value setting | -100.0%～+100.0% | 60.0% | ☆ |
| P3-12 | AI curve setting of 3 inflection point and 4 input value | P3-10～P3-14 | 8.00V | ☆ |
| P3-13 | AI curve setting of 3 inflection point and 4 input value setting | -100.0%～+100.0% | 80.0% | ☆ |
| P3-14 | AI curve maximum input 3 | P3-12～+10.00V | 10.00V | ☆ |
| P3-15 | AI curve maximum input 3 corresponding setting | -100.0%～+100.0% | 100.0% | ☆ |

## 5.21 P4 set (User-defined function code parameters)

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P4-00 | User-defined function code 0 | F0-00 ~ FF-xx<br>P0-00 ~ Px-xx<br>U0-00 ~ U0-xx | F0.10 | ☆ |
| P4-01 | User-defined function code 1 | | F0.02 | ☆ |
| P4-02 | User-defined function code 2 | | F0.03 | ☆ |
| P4-03 | User-defined function code 3 | | F0.07 | ☆ |
| P4-04 | User-defined function code 4 | | F0.08 | ☆ |
| P4-05 | User-defined function code 5 | | F0.17 | ☆ |
| P4-06 | User-defined function code 6 | | F0.18 | ☆ |
| P4-07 | User-defined function code 7 | | F3.00 | ☆ |
| P4-08 | User-defined function code 8 | | F3.01 | ☆ |
| P4-09 | User-defined function code 9 | | F4.00 | ☆ |
| P4-10 | User-defined function code 10 | | F4.01 | ☆ |
| P4-11 | User-defined function code 11 | | F4.02 | ☆ |
| P4-12 | User-defined function code 12 | | F5.04 | ☆ |
| P4-13 | User-defined function code 13 | | F5.07 | ☆ |

| Code | Name | Range | Default | Modification |
|---|---|---|---|---|
| P4-14 | User-defined function code 14 | | F6.00 | ☆ |
| P4-15 | User-defined function code 15 | | F6.01 | ☆ |
| P4-16 | User-defined function code 16 | | F6.02 | ☆ |
| P4-17 | User-defined function code 17 | | F6.03 | ☆ |
| P4-18 | User-defined function code 18 | | F7.00 | ☆ |
| P4-19 | User-defined function code 19 | | F7.01 | ☆ |
| P4-20 | User-defined function code 20 | | F7.02 | ☆ |
| P4-21 | User-defined function code 21 | | F7.03 | ☆ |
| P4-22 | User-defined function code 22 | | FA.00 | ☆ |
| P4-23 | User-defined function code 23 | | F0.00 | ☆ |
| P4-24 | User-defined function code 24 | | F0.00 | ☆ |
| P4-25 | User-defined function code 25 | | F0.00 | ☆ |
| P4-26 | User-defined function code 26 | | F0.00 | ☆ |
| P4-27 | User-defined function code 27 | | F0.00 | ☆ |
| P4-28 | User-defined function code 28 | | F0.00 | ☆ |
| P4-29 | User-defined function code 29 | | F0.00 | ☆ |
| P4-30 | User-defined function code 30 | | F0.00 | ☆ |
| P4-31 | User-defined function code 31 | | F0.00 | ☆ |

## 5.22 U0 set (Monitoring parameters)

| Code | Name | Units | Communication address |
|---|---|---|---|
| U0-00 | Operating frequency (Hz) | 0.01Hz | 7000H |
| U0-01 | Setting frequency (Hz) | 0.01Hz | 7001H |
| U0-02 | Bus voltage (V) | 0.1V | 7002H |
| U0-03 | Output voltage (V) | 1V | 7003H |
| U0-04 | Output current (A) | 0.01A | 7004H |
| U0-05 | Output power (kW) | 0.1kW | 7005H |
| U0-06 | Output torque (%) | 0.10% | 7006H |
| U0-07 | DI input status | 1 | 7007H |
| U0-08 | DO output status | 1 | 7008H |
| U0-09 | AI1 voltage (V) | 0.01V | 7009H |
| U0-10 | Rotary potentiometer voltage(V) | 0.01V | 700AH |
| U0-11 | Count value | 1 | 700BH |

| | | | |
|---|---|---|---|
| U0-12 | Length value | 1 | 700CH |
| U0-13 | Load speed display | 1 | 700DH |
| U0-14 | PID setting | 1 | 700EH |
| U0-15 | PID feedback | 1 | 700FH |
| U0-16 | PLC stage | 1 | 7010H |
| U0-17 | PULSE input pulse frequency (Hz) | 0.01kHz | 7011H |
| U0-18 | Feedback speed (Hz) | 0.1Hz | 7012H |
| U0-19 | Remaining running time | 0.1Min | 7013H |
| U0-20 | Line speed | 1m/Min | 7014H |
| U0-21 | Current power-on time | 1Min | 7015H |
| U0-22 | Current running time | 0.1Min | 7016H |
| U0-23 | PULSE input pulse frequency | 1Hz | 7017H |
| U0-24 | Communication settings | 0.01% | 7018H |
| U0-25 | Inverter running status | 0.01Hz | 7019H |
| U0-26 | Main frequency X display | 0.01Hz | 701AH |
| U0-27 | Auxiliary frequency Y display | 0.01Hz | 701BH |
| U0-28 | Target torque (%) | 0.10% | 701CH |
| U0-29 | Power factor angle | 0.1° | 701DH |
| U0-30 | VF separation target voltage | 1V | 701EH |
| U0-31 | VF separation output voltage | 1V | 701FH |
| U0-32 | VF oscillation coefficient | 1 | 7020H |
| U0-33 | Temperature | 1℃ | 7021H |
| U0-40 | DI input status visual display | —— | 7028H |
| U0-41 | Visual display of DO input status | —— | 7029H |
| U0-42 | DI function status visual display | —— | 702AH |
| U0-43 | Visual display of DO function status | —— | 702BH |

# 6.Malfunction

## 6.1.Prevention

This chapter introduces the preventive maintenance practices that are vital to keep the inverter's normal operation.

### 6.1.1. Periodic inspection

For the inverters installed in an environment that meets the requirements instructed in this manual, it only requires minimum maintenance. The table below lists the recommended daily maintenance cycle. For more details, please contact us.

| Items | | Checking content | Method | Requirements |
|---|---|---|---|---|
| Environment | | The ambient temperature, humidity, vibration and presence of dust, gas, oil mist, water droplets, etc. | Visual inspection and instrument measurement | Meet the product requirements. |
| | | Are there any foreign objects such as tools and dangerous items lying around? | Visual inspection | No such items lying around. |
| Keyboard | | Can the display be read clearly? | Visual inspection | The characters are displayed normally. |
| | | Are there any signs of incomplete character displayed? | Visual inspection | Meet the product requirements. |
| Main circuit | Public | Any bolts loose or missing? | Tighten the bolts | No such abnormality. |
| | | Are the machines and insulators deformed, cracked, broken, or discolored due to overheating or aging? | Visual inspection | No such abnormality. |
| | | Any dirt or dust attached? | Visual inspection | No such abnormality.<br>NOTICE: The discoloration of the copper and aluminum bus does not necessary means a problem with the characteristics. |
| | Cables and wires | Does the conductor show any signs of discoloration or deformation due to overheating? | Visual inspection | No such abnormality. |
| | | Any cracks or discoloration on the protective layer? | Visual inspection | No such abnormality. |
| | Terminal block | Any damage? | Visual inspection | No such abnormality. |

| | | | | |
|---|---|---|---|---|
| | Resistance | Any peculiar smell due to overheating? | Smell and visual inspection | No such abnormality. |
| | | Any disconnection? | Multimeter measurement | The resistance values shall be within ±10% of their standard values. |
| | Transformers, reactors | Any abnormal vibration or odor? | Hearing, smell, visual inspection | No such abnormality. |
| Cooling system | Cooling fan | Any abnormal noise and vibration? | Hearing, visual inspection, spinning it by hand | Smooth rotation. |
| | | Any bolts or parts loose? | Tighten it. | No such abnormality. |
| | | Any discoloration due to overheating? | Visual inspection and judge the remaining product life based on the maintenance information | No such abnormality. |
| | Ventilation duct | Any foreign object clogs the cooling fans, air inlets, and exhaust vents blocked? | Visual inspection | No such abnormality. |

## 6.1.2. Cooling fans

The designed product life of the cooling fan for this inverter exceeds 25,000 operating hours, while the actual service life varies according to the actual usage and the ambient temperature. The service time of the inverter can be checked through FA-07 parameter (which is the accumulated service time of this machine).

A noisy bearing often is the sign warning potential fan failures. If this happens to a critical inverter, please replace the fan immediately. The required spare parts of the fans are available from us.

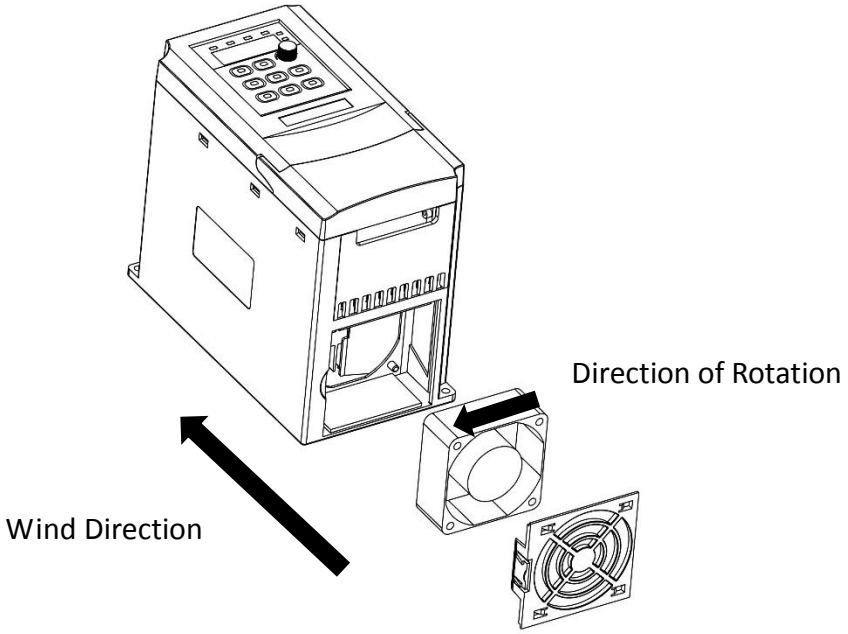
| | |
|---|---|
|  | ✧ Read carefully and follow the instructions given in "Safety Precautions" section. Ignoring any of these may cause personal injury or death or equipment damage. |

1. Stop the system and cut off the AC power supply, and then wait for a time no less than the time marked on the inverter.

2. Use a screwdriver to pry the fan baffle up from the cabinet and remove it.

3. Take out the fan and pull out the power terminal of the fan.

4. Install a new fan into the inverter by repeating the previous steps in the reverse order. NOTICE that the wind direction of the fan shall be consistent with that of the inverter, as shown below:




Three-phase 380V 2.2KW fan maintenance diagram

5. Turn on the power supply.

## 6.1.3. Capacitance

If the inverter has been left unused more than a reasonable time of period for storage, it is necessary to restore the capacitance of the DC bus before use according to the operation instructions. The storage shall be calculated from the delivery date.

| Period | Instructions |
|---|---|
| Less than 1 year | No need to restore. |
| 1 to 2 years | Before running for the first time, the inverter must be energized for 1 hour. |
| 2 to 3 years | Use an adjustable regulated voltage power supply to charge the inverter:<br>• Apply 25% of rated voltage for 30 minutes;<br>• Apply 50% of rated voltage for 30 minutes;<br>• Apply 75% of rated voltage for 30 minutes;<br>• Finally apply 100% of rated voltage for 30 minutes. |
| More than 3 years | Use an adjustable regulated voltage power supply to charge the inverter:<br>• Apply 25% of rated voltage for 2 hours;<br>• Apply 50% of rated voltage for 2 hours;<br>• Apply 75% of rated voltage for 2 hours;<br>• Finally apply 100% of rated voltage 2 hours. |

The usage of an adjustable voltage power supply to charge the inverter: The choice of adjustable power supply depends on the inverter's power supply specification. For inverters with

single-phase/three-phase 220V AC input voltage, a single 220VAC/2A voltage regulator can be the choice. Single-phase or three-phase inverters can be charged with single-phase voltage regulation power supply (L+ connects to R, N connects to S or T). Because all DC bus capacitors connect to a same rectifier, they will be charged at the same time.

When charging a high-voltage inverter, the voltage requirements must be fulfilled (such as 380V). Since capacitor charging requires almost no current, a small-capacity power supply (2A is sufficient) will be enough for the operation.

#### 6.1.3.1. Electrolytic capacitor replacement

| | |
|---|---|
|  | ✧ Read carefully and follow the instructions given in "Safety Precautions" section. Ignoring any of these may cause personal injury or death or equipment damage. |

When the electrolytic capacitor in the inverter has been used for more than 35,000 operation hours, they need to be replaced with new ones. For specific replacement details, please contact your local distributor or installer.

### 6.1.4. Power cables

| | |
|---|---|
|  | ✧ Read carefully and follow the instructions given in "Safety Precautions" section. Ignoring any of these may cause personal injury or death or equipment damage. |

1. Stop the system and cut off the AC power supply, and then wait for a time no less than the time marked on the inverter.

2. Check the tightness of the power cable connection.

3. Power-on.

## 6.2. Troubleshooting

| | |
|---|---|
|  | ✧ The staff who have passed required professional electrical training and safety education to become familiar with the installation, commission, operation and maintenance of this equipment and the knowledge to avoid all kinds of emergency situations. Read carefully and follow the instructions given in "Safety Precautions" section. |

### 6.2.1. Alarm and fault indications

Here the TC indicator is used to indicate fault events (See "Keyboard Operation Process" for details). When the indicator is on, the keyboard display shows an alarm or fault code by which to indicate the type of the abnormal state. Function codes F8-13 ~ F8-15 record the type of the last three faults encountered by the inverter. Function codes F8-16 ~ F8-23, F8-24 ~ F8-31, F8-32 ~ F8-39 record the operation data of the inverter when the last three faults occurred. Using the information given in this chapter, it is possible to find out the causes of most alarms or faults and hence their trouble shooting measures. For those fault events that you cannot determine the causes as instructed,

please contact our local office.

### 6.2.2. Reset from fault

The inverter can be reset by pressing the STOP/RST key on the keyboard, digital input, or turning off the inverter's power supply. After successfully troubleshooting, the motor can be restarted.

### 6.2.3. Inverter faults and their countermeasures

When a fault happens, follow the steps below to handle the situation:

1. Check if the keyboard displays any abnormal event? If so, please contact us or our local office.
2. If the keyboard shows no sign of abnormality, check the function codes of F8 set for the corresponding fault record parameters to determine the actual state when the current fault occurs.
3. By referring to the table below, check if there is any abnormality description matching with your situation.
4. Try to solve the problem or seek help from qualified technicians.
5. After successfully solve the problem, reset the system and start operation.

| Code | Type | Possible causes | Troubleshooting |
|---|---|---|---|
| E01 | Wave-by-wave current limiting fault | 1. The load is too large or the motor rotation is blocked<br>2. The selected inverter does not have sufficient capacity for your current usage. | 1. Reduce the load or check the motor's mechanical conditions.<br>2. Replace with a new inverter with higher power rating. |
| E02 | Overcurrent when accelerating | 1. The output circuit of the inverter is grounded or short-circuited.<br>2. Vector control mode is selected but its relative parameters have not been tuned properly.<br>3. The acceleration time is too short.<br>4. Improper manual torque boost or V/F curve selection.<br>5. The output voltage is low<br>6. Try to start the motor when it is still rotating.<br>7. Load suddenly increases during acceleration.<br>8. The selected inverter does not have sufficient capacity.<br>9. The grid voltage is low. | 1. Solve peripheral problems.<br>2. Tune the motor parameters.<br>3. Increase the acceleration time.<br>4. Adjust manual torque boost or V/F curve.<br>5. Adjust the voltage to normal range.<br>6. Select speed tracking start feature or wait for the motor to stop and then start it.<br>7. Remove the increased load<br>8. Replace with a new inverter with higher power rating.<br>9. Use a voltage-boost device to boost the input voltage. |
| E03 | Overcurrent when decelerating | 1. The output circuit of the inverter is grounded or short-circuited.<br>2. Vector control mode is selected but its relative parameters have not been tuned properly. | 1. Solve peripheral problems.<br>2. Tune the motor parameters.<br>3. Increase the deceleration time.<br>4. Adjust the voltage to normal range. |

| Code | Type | Possible causes | Troubleshooting |
|---|---|---|---|
| | | 3. Deceleration time is too short.<br>4. Output voltage is too low.<br>5. Load suddenly increases during deceleration.<br>6. No braking unit and braking resistor are installed<br>7. The inverter does not have sufficient capacity.<br>8. V/F control mode is selected and the overexcitation gain is too large<br>9. The grid voltage is too low. | 5. Remove the increased load.<br>6. Install braking unit and braking resistor.<br>7. Replace with a new inverter with suitable power rating.<br>8. Decrease the overexcitation gain.<br>9. Use a voltage-boost device to boost the input voltage. |
| E04 | Overcurrent during constant speed operation | 1. Abrupt or abnormal load increase<br>2. The grid voltage is too low.<br>3. The inverter does not have sufficient capacity.<br>4. The output circuit of the inverter is grounded or short-circuited.<br>5、Vector control mode is selected but its relative parameters have not been tuned properly.<br>6. Output voltage is too low. | 1、Remove the increased load.<br>2. Use a voltage-boost device to boost the input voltage.<br>3. Replace with a new inverter with higher power rating.<br>4. Solve peripheral problems.<br>5. Tune the motor parameters.<br>6. Adjust the voltage to normal range. |
| E05 | Overvoltage during acceleration | 1. Abnormal input voltage<br>2. There is an external force that drags the motor during acceleration<br>3. The acceleration is too short.<br>4. No braking unit and braking resistor are installed | 1. Adjust the voltage to normal range.<br>2. Remove the external force or install braking resistors.<br>3. Increase the acceleration time.<br>4. Install braking units and braking resistors. |
| E06 | Overvoltage during deceleration | 1. The input voltage is too high.<br>2. There is an external force that drags the motor during deceleration.<br>3. The deceleration time is too short.<br>4. No braking unit and braking resistor are installed. | 1. Adjust the voltage to normal range.<br>2. Remove the external force or install braking resistors.<br>3. Increase the deceleration time.<br>4. Install braking units and braking resistors. |
| E07 | Overvoltage during constant speed operation | 1. The input voltage is too high.<br>2. There is an external force that drags the motor during the operation. | 1. Adjust the voltage to normal range.<br>2. Remove the external force or install braking resistors. |
| E08 | Snubber resistor overload | 1. The input voltage is not within the specified range. | 1. Adjust the voltage to the range required by the specification. |

| Code | Type | Possible causes | Troubleshooting |
|---|---|---|---|
| E09 | Undervoltage | 1. Instantaneous power failure.<br>2. The input voltage of the inverter is not within the range required by the specification.<br>3. Abnormal bus voltage.<br>4. Abnormal rectifier bridge and buffer resistance<br>5. Abnormal drive board.<br>6. Abnormal control board. | 1. Reset the system.<br>2. Adjust the voltage to the normal range.<br>3. Seek technical support.<br>4. Seek technical support.<br>5. Seek technical support.<br>6. Seek technical support. |
| E10 | Inverter overload | 1. Something stalls the motor<br>2. The load is too large and the capacity of the inverter is too small<br>3. Accelerate too fast<br>4. Try to restart the motor while it is still rotating. | 1. Check the motor and mechanical condition.<br>2. Replace with a new inverter with higher power rating.<br>3. Increase the acceleration time.<br>4. Select speed tracking start feature or wait for the motor to stop and then restart it. |
| E11/A11 | Motor overload | 1. Wrong setting of motor rated current<br>2. The motor is blocked or the load increases suddenly<br>3. The grid voltage is too low.<br>4. Is the motor protection parameter F8-01 properly set? | 1. Correct the current value to match the motor's rated current.<br>2. Reduce the load and check the motor and mechanical conditions.<br>4. Correct the parameter. |
| E12/A12 | Input phase loss | None (reserved) | —— |
| E13/A13 | Output phase loss | 1. Wrong wiring between the inverter and the motor.<br>2. The three-phase output of the inverter is out of balance while the motor is running<br>3. Abnormal drive board.<br>4. Abnormal module. | 1. Solve peripheral problems.<br>2. Check the three-phase windings of the motor are normal and solve the problem if any.<br>3. Seek technical support.<br>4. Seek technical support. |
| E14 | Module overheating | 1. Air duct is blocked/ a fan is damaged<br>2. The ambient temperature is too high<br>3. The auxiliary power supply is damaged and the drive voltage is undervoltage<br>4. Abnormal control board.<br>5. Module thermistor is damaged<br>6. The inverter module is damaged | 1. Clean the air duct and replace the fan.<br>2. Lower the ambient temperature.<br>3. Seek technical support.<br>4. Seek technical support.<br>5. Replace the thermistor.<br>6. Seek technical support. |
| E15/A15 | External fault | 1. An external fault signal is | 1. Check the abnormal external |

| Code | Type | Possible causes | Troubleshooting |
|---|---|---|---|
| | | received via multi-function terminal DI<br>2. An external fault signal is received via virtual IO. | device, and reset the system after solving the problem.<br>2. Reset the system. |
| E16/A16 | Abnormal communication | 1. An upper stream device is abnormal.<br>2. Abnormal communication wiring.<br>3. Communication parameters of P0 set are not set correctly. | 1. Check the wiring of the device.<br>2. Check the communication wiring.<br>3. Correct the parameter settings. |
| E17 | Contactor failure | None (reserved) | —— |
| E18 | Abnormal current detected | 1. The auxiliary power supply is damaged<br>2. Abnormal amplifier circuit<br>3. Current detection chip is damaged | Seek technical support. |
| E19 | Abnormal motor tuning | 1. The motor capacity does not match the inverter capacity<br>2. Motor parameters are not set according to the nameplate<br>3. Timeout during parameter tuning | 1. Choose a suitable inverter according to the motor capacity<br>2. Set the motor parameters correctly according to the nameplate.<br>3. Check the wiring between the inverter and the motor. |
| E20/A20 | EEPORM parameter read and write error | 1. EEPROM chip is damaged. | 1. Replace the main control board. |
| E21 | Factory debugging | —— | —— |
| E22 | Motor is short to ground | 1. The motor is short-circuited to ground | Replace cables or the motor |
| E23/A23 | Operation time is reached | 1. The accumulated operation time reaches the set value. | Use the parameter initialization feature to clear the record data. |
| E24/A24 | User-defined fault 1 | 1. User-defined fault 1 signal is received via multi-function terminal DI<br>2. User-defined fault 1 is received via virtual IO. | 1. Check the abnormal external device, and reset the system after solving the problem.<br>2. Reset the system. |
| E25/A25 | User-defined fault 2 | 1. User-defined fault 2 signal is received via multi-function terminal DI<br>2. User-defined fault 2 is received via virtual IO. | 1. Check the abnormal external device, and reset the system after solving the problem.<br>2. Reset the system. |

| Code | Type | Possible causes | Troubleshooting |
|---|---|---|---|
| E26/A26 | Power-on time is reached | 1. The accumulated power-on time reaches the set value | 1. Use the parameter initialization feature to clear the record data. |
| E27/A27 | Load loss | 1. The inverter running current is less than the value set in F8-52. | 1. Check whether the load is disconnected or whether the parameters set in F8-52 and F8-53 are suitable for the actual operation. |
| E28/A28 | PID feedback lost during operation | 1. PID feedback disconnection<br>2. PID feedback source disappears<br>3. PID feedback is less than the value set in FC-26 | Check the PID feedback signal or adjust the value set in FC-26 to an appropriate one. |
| E29 | Speed deviation is too large | 1. The motor is blocked.<br>2. The parameters set in F8-56 and F8-57 are not suitable for the speed deviation detection.<br>3. Something wrong happens in the wiring between the inverter output terminal UVW and the motor. | 1. Check whether the machine is normal and whether the motor parameters are properly set.<br>2. Correct the parameters set in F8-56 and F8-57.<br>3. Check whether the wiring between the inverter and the motor is disconnected |
| E42 | Temperature sensor failure | 1. The temperature sensor is damaged<br>2. The ambient temperature is too low when starting<br>3. Poor contact of temperature sensor | 1、Seek technical support<br>2. Seek technical support<br>3、Seek technical support |

# Appendix A. Communication protocol

## A.1.Introduction of MODBUS protocol

The MODBUS protocol is a software protocol that has become a universal language for use in electronic controllers. Through this protocol, the controller (device) can communicate with other devices via the network (i.e., signal transmission line, or physical layer, such as RS485). It is now a general industrial standard through which control devices produced by different manufacturers can be connected into an industrial network that can be centralized monitored.

The MODBUS protocol provides two transmission modes: ASCII mode and RTU (Remote Terminal Units) mode. All devices in the same MODBUS network must be set to a same transmission mode. In the same MODBUS network, beside the same transmission mode, the basic parameters such as baud rate, data bits, parity bits, and stop bits must also be same for all devices. This product only supports RTU transmission mode.

The MODBUS network is a single-master and multiple-slave control network; that is, only one device in the same MODBUS network is allowed to act as a master device, while the other devices are all slave ones. The so-called master is a device that has the privilege to take initiative to send information across the MODBUS network to control and query other devices (slave). The so-called slave is a passive device that can only send data messages to the MODBUS network after receiving a control or query message (command) from the master. This action is known as a response. After sending out a command to a slave, the master generally waits a period of time for the controlled or queried slave to respond it. This ensures that only one device sends information to the MODBUS network at the same time to avoid signal conflicts.

Normally, users can set the computer (PC), PLC, IPC, and HMI as a master to achieve centralized control. Setting a device as a master means not that such setting can be enabled by pushing a certain button or switch nor that has its information been given some kind of special format. It means merely a convention. For example, when a host computer is running and its operator click a send-command button, the host computer is allowed to initially send out the commands even when it cannot receive commands from other devices. Then, the host computer is agreed to be the master. Furthermore, for example, when the designer designs the inverter in that way that the inverter is allowed to send information only when it has received a command, the inverter is conventionally treated as a slave device.

A master can communicate with one single slave and can broadcast information to all slaves. For commands that are intended for a specific slave, the slave is required to return a response message. As for broadcasted information from the master, the slave does not need to feedback its response.

# A.2.Usage of this inverter

The MODBUS protocol used by this inverter is RTU mode, and the physical layer (network line) is two-wire RS485.

## A.2.1. Two-wire RS485

The two-wire RS485 interface works in half-duplex and adopts differential transmission signaling, which is also known as balanced signaling, to handle its signal. It uses a pair of twisted wires, one of which is defined as A (+) and the other is defined as B (-). Normally, the positive level between the sending driver A and B ranging from +2 \to +6V is read as logic "1", and the level ranging from -2V to -6V is read as logic "0".

The “485+” marked on the inverter terminal board is the terminal for A, and 485- is for B.

Communication baud rate (P0-00) refers to the number of binary bits transmitted in one second; hence its unit is bits per second (bps). The higher the baud rate is set, the faster the transmission speed and the worse the interference tolerance. When using 0.56mm (24AWG) twisted pair as the communication cable, depending on the baud rate, the maximum transmission distance is as follows:

| Baud rate | Max. distance | Baud rate | Max. distance | Baud rate | Max. distance | Baud rate | Max. distance |
|---|---|---|---|---|---|---|---|
| 2400BPS | 1800m | 4800BPS | 1200m | 9600BPS | 800m | 19200BPS | 600m |

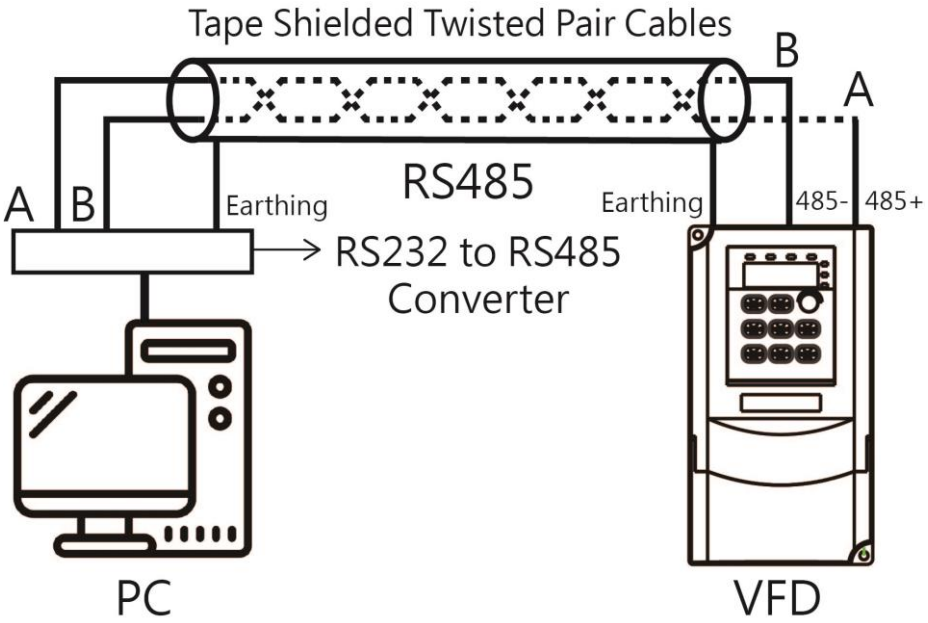
For RS485 long-distance communication, it is recommended to use shielded cables and use the shielding layer as the ground wire.

When devices are few and the distance between them is short, the whole network is expected to work well without a terminal load resistor. However, the performance deteriorates as the distance increases. Therefore, at a longer distance, it is advised to use a 120Ω terminal resistor.

### A.2.1.1. Stand-alone application

Figure 7.1 shows a MODBUS field wiring diagram formed by a single inverter and a PC. Because computers generally do not come with RS485 interfaces, the RS232 interface or USB interface of the computer needs to be converted to a RS485 using a converter. Connect the A terminal of RS485 to the 485+ terminal on the inverter terminal board, and connect the RS485 terminal B to the 485- terminal on the inverter terminal board. It is recommended to use shielded twisted pair cables as much as possible. When using a RS232-to-RS485 converter, the RS232 interface on the computer is connected to the RS232 interface of the converter, where the cable length shall be as short as possible and no more than 15m. It is recommended to plug the RS232-to-RS485 converter directly on the computer. Similarly, when using a USB-RS485 converter, the cable shall be also as short as possible.

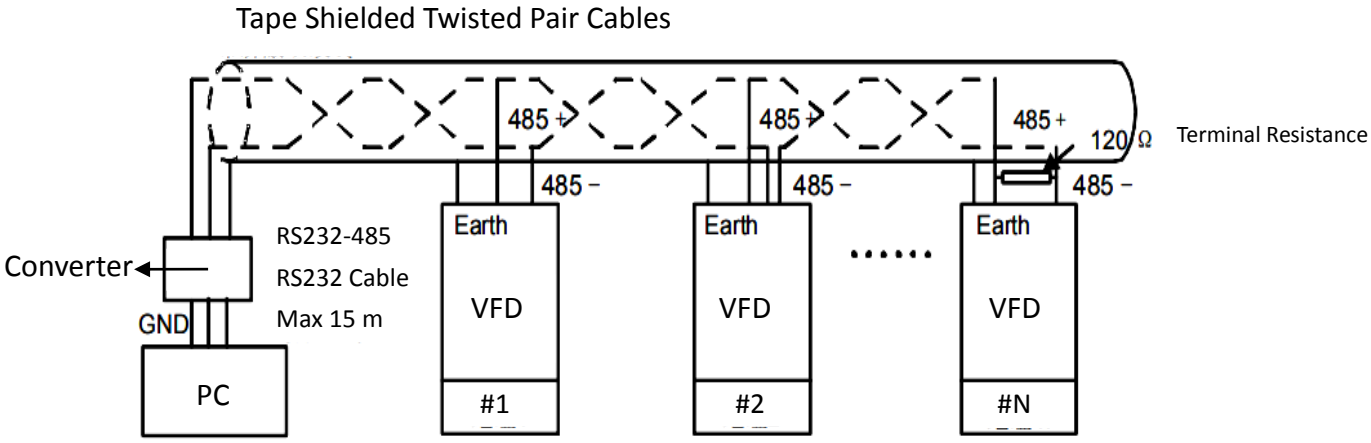
After the wiring is completed, select the correct port (which is the one connected to the RS232-RS485 converter, such as COM1) for the host settings of the computer, and set the basic parameters such as communication baud rate and data bit check to the same of the inverter.




Physical wiring diagram of RS485 for stand-alone application

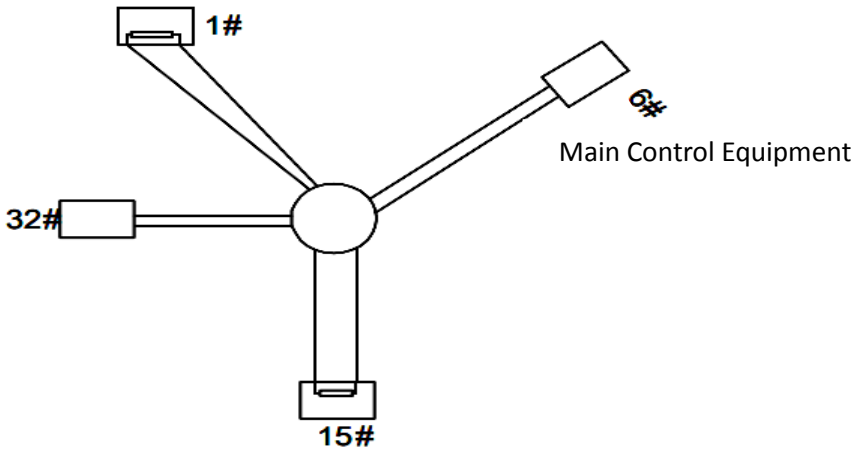
## A.2.1.2. Multi-device application

In an actual multi-device application, it is common practice to adopt either daisy connection or star connection. The RS485 industrial bus standard requires the daisy chain connection between devices and 120Ω terminal resistors to be connected at both ends, as shown in Figure 7.2.




Application of daisy connection

The below figure shows a star connection diagram. In this case, terminal resistors are required to be connected to the two devices (1# and 15#) whose connection distances are the longest two among all.




Star connection

Multi-device connection shall use shielded cable as possible as you can. The basic parameters such as baud rate and data bit check of all devices on a RS485 connection must be the same and each device shall be assigned a unique address.

# A.2.2.RTU mode

## A.2.2.1. RTU communication field structure

When a controller is set to communicate in RTU (Remote Terminal Unit) mode on a MODBUS network, each 8-bit byte of a message contains two 4-bit hexadecimal characters. The main advantage of this approach is that more data can be transmitted than the ASCII approach at the same baud rate.

**Coding system**

- One start bit.
- 8 data bits, least significant bit sent first. Each 8-bit frame contains two hexadecimal characters (which are 0...9，A...F).
- 1 bit for even-odd parity check (if such check is not required, no such bit)
- 1 stop bit if parity is used, and 2 bits if no parity

**Error Check Field**

- CRC (Cyclic Redundancy Check)

The description of the data format is as follows:

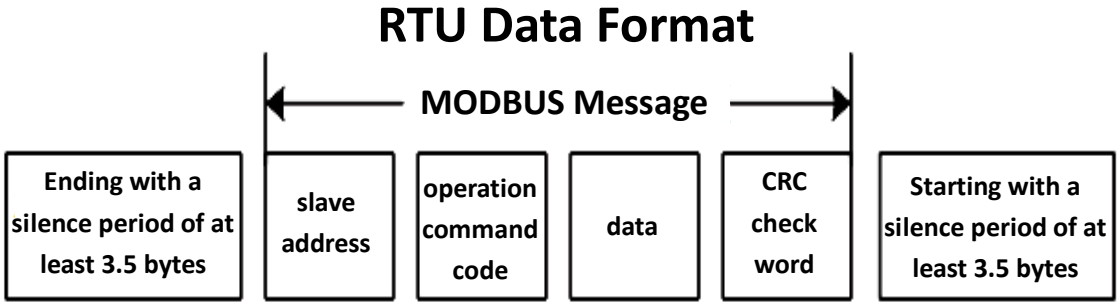
11-bit character frame (BIT1 ~ BIT8 are data bits)

| Start bit | BIT1 | BIT2 | BIT3 | BIT4 | BIT5 | BIT6 | BIT7 | BIT8 | Check bit | Stop bit |
|---|---|---|---|---|---|---|---|---|---|---|

In a character frame, the most important ones are the data bits. The start bit, check bit and stop bit are so added that they guarantee the data bits to be transferred to counter devices correctly. In

actual communication, the data bits, parity, and stop bits must be kept in same format.

In RTU mode, a new frame transmission always starts with a silence period of at least 3.5 bytes. On a network where the transmission rate is calculated at the baud rate, the transmission time of 3.5 bytes can be easily identified. The following data fields are sequentially: slave address, operation command code, data and CRC check word. The transmission bytes of each field are hexadecimal (0...9, A...F). Network devices always keep monitoring the activity of the communication bus. When the first field (address information) appears, every network devices will check their address with the byte. With the completion of the transmission of the last byte, there comes a silence period of 3.5 bytes to indicate the end of the frame. After this, a new transmission starts.




A frame of information must be transmitted in a continuous data stream. If a suspended interval of more than 1.5 bytes happens before the end of the entire frame transmission, the receiving device will clear received data because it is incomplete, and mistakenly treat the next incoming byte as the address field of a new frame. Similarly, if the silence period preceding a new frame transmission is less than 3.5 bytes, the receiving device will treat next incoming byte as a part of the previous frame. This will cause frame disorder and incorrect final CRC value is, which lead to communication failure.

Standard Structure of RTU Frame:

| | |
|---|---|
| Frame header (START) | T1-T2-T3-T4 (Transmission time of 3.5 bytes) |
| Slave address field (ADDR) | Communication address: 0~247 (decimal) ("0" for the broadcast address) |
| Function field (CMD) | 03H: Read slave parameters;<br>06H: Write slave parameters; |
| Data field<br>DATA (N-1)<br>…<br>DATA (0) | Data of 2*N bytes: This part is the main content of communications, and is also the core of the data exchange. |
| CRCCHK lower bit | Detection value: CRC value (16BIT). |
| CRCCHK higher bit | |
| Frame tail (END) | T1-T2-T3-T4 (Transmission time of 3.5 bytes) □ |

## A.2.2.2. RTU communication frame error check

In the process of data transmission, sometimes an error occurs to the sent data due to various reasons (such as electromagnetic interference). For example, in a case that a part of the information

to be sent is logic "1" and the A-B potential difference on RS485 is expected 6V, when an electromagnetic interference happens and change the potential difference to -6V, other devices will mistake the part as s logic "0". If there is no error check, the devices receiving the data will never know that they received wrong information and respond incorrectly response which may lead to serious consequences. That is why a verification measure counts.

The idea of verification is that the sender perform calculation on the data to be sent using a fixed algorithm and attaches the result to the back end of the data and sends them together. After receiving the information, the receiver calculates the data based on the same algorithm, and compares its result with the attached result. If the results are the same, it proves that the data is received correctly, otherwise the received content is considered wrong.

The frame error check mainly consists of two parts, namely the single-byte bit check (odd/even check, using the check bit in the character frame) and the entire frame data check (CRC check).

**Byte bit check (Parity check)**

Users can select different bit check modes according to their needs, where "no parity check" is also an option. Based no the selections, it will affect the check bit setting of each byte.

The approach of even parity: It introduces an even parity bit in prior of data transmission to indicate whether the number of "1" in the transmitted data is odd or even. When it is even, the parity bit is "0"; otherwise it is "1", by which to keep the parity of the data unchanged.

The approach of odd parity: It introduces an odd parity bit in prior of data transmission to indicate whether the number of "1" in the transmitted data is odd or even. When it is odd, the parity bit is "0", otherwise it is "1", by which to keep the parity of the data unchanged.

For example, supposing the data bit that needs to be transmitted is "11001110", the data contains five "1"s. If even parity is used, the even parity bit is "1", and if odd parity is used, the odd parity bit is "0" ". When transmitting data, the parity bit is calculated and placed in the frame's parity bit, and the receiving device must also perform parity check. If the parity of the received data is found to be inconsistent with the preset, a communication error has occurred.

**CRC (Cyclical Redundancy Check)**

RTU frame format includes a frame error detection field that is calculated using CRC. The CRC field is used to detect the entire content of frame. The CRC field has two bytes, including 16 bits of binary values. It is added to the frame as a result of calculation performed by the transmission device. The receiving device recalculates the CRC of frame, and compares it with the value in the received CRC field. If the two CRC values are not same, it means a transmission error.

CRC is first stored in 0xFFFF, and then a process is called to process six or more consecutive bytes in the frame with the value in the current register. Only the 8-bit data in each character is valid for CRC. The start bit, stop bit and parity check bit are invalid.

During CRC generation, each 8-bit character is independently performed "XOR" operation with the content of the register. The result moves to the least significant bit (LSB) direction, and the most valid bit (MSB) is filled in with 0. LSB is the one to be extracted for detection. If LSB is 1, the register

independently conducts “XOR” operation with the preset value; if LSB is 0, there will be no further operation. The entire process will be repeated for eight times. After the completion of the last bit (the 8th bit), the next 8-bit byte will independently be performed “XOR” operation with the current value of the register. The final value of register is the CRC value after the execution of all bytes in the frame.

The CRC calculation method used here is based on the international standard CRC principle. When editing CRC algorithm, users can refer to the standard CRC algorithm and write a CRC calculation program to fully meet their requirements.

A simple function (in C language) for CRC calculation is provided below for reference:

```
unsigned int crc_cal_value(unsigned char* data_value, unsigned char data_length)
{
  int i;
  unsigned int crc_value = 0xffff; while(data_length--)
  {
    crc_value ^ = *data_value ++;
    for(i=0; i<8; i++)
    {
      if(crc_value & 0x0001)crc_value = (crc_value >> 1) ^ 0xa001;
      else crc_value = crc_value >> 1;
    }
  }
  return(crc_value);
}
```

In ladder logic, CKSM calculates the CRC value from the frame content using tale loop-up method, which provides benifits such as simple programming and fast operation speed. However, the process requires large ROM space. Please use this approach cautiously in the cases that there is only limit process space available.

# A.3. Command code and communication data

## A.3.1. Command Code: 03H (00000011 in binary format), read N words (available for a maximum of consecutive 16 words)

Command code 03H means that the host reads data from the inverter, where the number of data to be read is specified in the "number of data" part of the command and is up to 16 data. The read address must be consecutive. The byte length occupied by each data is 2 bytes, which is also knows as one word. Afterward, the commands mentioned here are all expressed in hexadecimal format (a number followed by an "H" indicates it is a hexadecimal number), and one hexadecimal occupies one byte. This command is used to read the working status of the inverter.

For example: From an inverter with the slave address 01H, read two words consecutively starting from data address 0004H (i.e read data from 0004H and 0005H), where the structure of the frames

are as follows:

| **RTU Master Command (sent from the master to the inverter)** | | **RTU Slave Response (sent from the inverter to the master)** | |
|---|---|---|---|
| START | T1-T2-T3-T4 | START | T1-T2-T3-T4 |
| ADDR | 01H | ADDR | 01H |
| CMD | 03H | CMD | 03H |
| | | Number of bytes | 04H |
| Higher bits of start address | 00H | Higher bits of data in address 0004H | 13H |
| Lower bits of start address | 04H | Lower bits of data in address 0004H | 88H |
| Higher bits of number of data | 00H | Higher bits of data in address 0005H | 00H |
| Lower bits of number of data | 02H | Lower bits of data in address 0005H | 00H |
| Lower bits of CRC | 85H | Lower bits of CRCCHK | 7EH |
| Higher bits of CRC | CAH | Higher bits of CRCCHK | 9DH |
| END | T1-T2-T3-T4 | END | T1-T2-T3-T4 |

T1-T2-T3-T4 (3.5 bytes of transmission time) in START and END rows is the transmission idle time (whose length is at least 3.5 bytes) reserved for RS485 communication, which guarantees enough time interval to let devices distinguish two pieces of information without confusing them into one piece of information;

ADDR is set to 01H. It means that the command is sent to the inverter with address 01H. The length of ADDR is one byte;

CMD is set to 03H, which means is used to read data from the inverter. The length of CMD is one byte;

"Start address" indicates the start point of the data reading operation. The length of the start address is two bytes with the higher bits in the front of the lower bits.

"Number of data" indicates the number of data to read, the unit is “Word”. The start address is set to 0004H and the number of data is to 0002H, which means the operation is to read data from the two addresses 0004H and 0005H.

The CRC check occupies two bytes, where the lower bits form the first byte and the higher bits form the last byte.

**Description of the response message:**

ADDR is set to 01H. It means that the command is sent to the inverter with address 01H. The length of ADDR is one byte;

CMD is set to 03H, which means the message sent by the inverter is a response to the read

command 03H from the master. The length of CMD is one byte;

The "Number of bytes" byte represents the number of bytes from itself (not included) to the CRC byte (not included). Here, 04 means that there are 4 bytes from "Number of byte number" byte to "Lower bits of CRCCHK " bytes, which are "Higher bits of data address 0004H", "Lower bits of data address 0004H, " Higher bits of data address 0005H", and " Lower bits of data address 0005H";

The data amount stored in one piece of data is two bytes, with higher bits in the front and lower bits in the back. It can be seen from the information that the data stored in the data address 0004H is 1388H, and the data in the address 0005H is 0000H.

The CRC check occupies two bytes, where the lower bits consist the first byte and the higher bits consist the later byte.

## A.3.2. Command code: 06H (00000110 in binary format), write one word

This command indicates the master's request to writes data into the inverter. One such command can only be used to write one word of data, not multiple words. It is for changing the operation mode of the inverter.

For example, in an write operation trying to write 5000 (1388H) into the address 0008H of the inverter with the slave address 02H, the structure of the frames are as follows

| **RTU Master Command (sent from the master to the inverter)** | | **RTU Slave Response (sent from the inverter to the master)** | |
|---|---|---|---|
| START | T1-T2-T3-T4 | START | T1-T2-T3-T4 |
| ADDR | 02H | ADDR | 02H |
| CMD | 06H | CMD | 06H |
| Higher bits of target memory address | 00H | Higher bits of target memory address | 00H |
| Lower bits of target memory address | 04H | Lower bits of target memory address | 04H |
| Higher bits of data to be written | 13H | Higher bits of data to be written | 13H |
| Lower bits of data to be written | 88H | Lower bits of data to be written | 88H |
| LOWER BITS OF CRCCHK | C5H | LOWER BITS OF CRCCHK | C5H |
| HIGHER BITS OF CRCCHK | 6EH | HIGHER BITS OF CRCCHK | 6EH |
| END | T1-T2-T3-T4 | END | T1-T2-T3-T4 |

NOTICE: The command format is mainly introduced in section A.2 and section A.3.

# A.4. Definition of data address

This section introduces the definition of communication data address, which is used for controlling the inverter operation mode and obtaining the inverter's status information and related functional parameters.

## A.4.1.Functional code parameter expression rule

A parameter address consists of two bytes, where the first byte stores higher bits and the later byte stores lower bits. Both bytes are ranging from 00 ~ ffH. The parameter address can be translated from the code name of its corresponding functional code. The part before "-" in the function code consists the higher byte and the part after "-" consists the lower byte, where the both parts need to be converted to hexadecimal number. Taking function code F5-05 as an example, since "F5" consists the higher byte and "05" consist the lower byte, the parameter address will be F505H after hexadecimal conversion. Taking another example, if the function code is FE-17, the parameter address will be FE11H.

NOTICE:

1. P5 set is the factory parameters and cannot be read or changed by users. Besides, some parameters cannot be changed when the inverter is running; some parameters cannot be changed regardless of the state of the inverter; when changing function code parameters, pay attention to and follow the parameter setting range, unit and related instructions.
2. In addition, it the EEPROM is frequently used by store operation, the service life of the EEPROM may be shorter than expectation. As some users have suspected, some function codes do not need to be stored during a communication process, altering their value in the on-chip RAM brings the same effect. To achieve this, just change the highest bit of the corresponding function code address from F to 0, U to 7, and P to 4. For example, if you find that you don't need to store function code F0-07 into EEPROM and want to change its value in RAM, just change the address to 0007H. However, this kind of address is only valid for writing purpose and will become invalid for any reading operation.

## A.4.2. Address of other MODBUS functions

In addition to handling the parameters of the inverter, the master can also control the inverter, such as running, stopping, etc., as well as monitoring the status of the inverter. The following table lists the parameters of other functions:

| Function | Address | Data description | R/W feature |
|---|---|---|---|
| Communication control command | 2000H | 0001H: Forward running | W |
| | | 0002H: Reverse running | |
| | | 0003H: Forward jogging | |
| | | 0004H: Reverse jogging | |
| | | 0005H: Free stop | |
| | | 0006H: Deceleration stop | |
| | | 0007H: Fault reset | |
| Communication setting address | 1000H | Communication frequency (0 ~ Fmax (Unit: 0.01Hz) ) | W |
| | 2001H | 0001H：Relay closed | |
| | | 0002H：DO1 output high | |
| | 2002H | AO output settings (Range: 0~ x7FFF，where 0x7FFF corresponding to 100.0%) | W |
| Inverter status word | 3000H | 0001H: In operation | R |
| Inverter fault code | 8000H | See description of fault types | R |

The R/W feature indicates the read/write availability of the function. For example, "Communication control command" is a write available feature and accepts a write command (06H) for controlling the inverter. The R available features can only be read but written, and the W available feature can only be written but read.

**NOTICE:** When using the above table to operate the inverter, some parameters needs be enabled in advance. For example, if you want to execute a run or stop operation, you need to set the "Operation command channel" (F0-21) to "Communication operation command channel". For another example, when you want to handle "PID set-point", you need to set the "PID set-point source selection" (FC -00) to "Communication set-point".

## A.4.3. Fieldbus ratio

In actual usage, communication data is expressed in hexadecimal format, and hexadecimal format cannot express decimal point. For example, 50.12Hz cannot be expressed in hexadecimal. However, we can increase it by a factor of 100 times into an integer (5012), so that 1394H in hexadecimal (that is 5012 in decimal) can be used to represent 50.12.

The factor used here to increase a non-integer into an integer is called the fieldbus ratio.

The fieldbus ratio is determined based on the decimal point of the "setting range" or "default value" listed in the function parameter table. If there are n decimal digits after the decimal point (for example, n=1), the fieldbus ratio m is set to the nth power of 10 (m=10). For details, see the following example:

| Function code | Name | Description | Default | Changeable |
|---|---|---|---|---|
| F0-01 | Preset frequency | 0.00HZ~maximum frequency (F0-09) | 50.00HZ | ☆ |
| F0-13 | Acceleration time 1 | Range: 0.0 ~3600.0s (when F0-15 is set to 1) | Model determination | ☆ |

Since the "setting range" or "factory value" of the preset frequency F0-01 has two decimal digits, the fieldbus ratio value is 100. If the value received by the host computer is 5000, that means "Threshold frequency" of the inverter is 50.00HZ (50.00=5000÷100).
Consider a case of using MODBUS communication to set the acceleration time to 20.0s. First, increase 20.0 by a factor of 10 to an integer 200, which is C8H in hexadecimal. Then send:

**01 06 F0 0D 00 C8 2A 9F**

Inverter address/ Write command/ Parameter address/ Parameter data/ CRC check

After receiving the instruction, the inverter change 200 to 20.0 using the fieldbus ratio, and then set the acceleration time to 20s.

Furthermore, after sending out the "acceleration time" parameter command, the upper device receive a response message from the inverter:

**01 03 02 00 64 B9 AF**

Inverter address/ Write command/ Two-byte data/ Parameter data/ CRC check

The parameter data is 0064H and is 100 in decimal. Decrease 100 by the factor of 10 to 10.0, which indicates that the sleep recovery delay time is 10s.

## A.4.4.Error message response

While using communication control, it is inevitable to encounter errors. You may accidently send a write command to a parameter that can only be read but written, and the inverter send back an error message response. Here, the error message response is sent from the inverter to the master, and their code means as below:

| Code | Name | Description |
|---|---|---|
| 01H | Wrong password | The password written into the password verification address does not match the password set in FF-00. |
| 02H | Read and write command error | Read/write command is not either 03H or 06H |
| 03H | CRC check error | An data transmission error happened and caused inconsistent sending and receiving |
| 04H | Invalid address | For the inverter, the data address required by the upper computer is not allowed to be accessed, particularly when the address is a register address or an invalid one. |
| 05H | Invalid parameter | The received data field contains an unacceptable value. This value indicates an error found in the remaining part of a combined request. NOTICE: It does not necessarily mean that the data item submitted to a register for storage contains a value that is not expected by the process. |
| 06H | Parameters are read-only | The parameters required by the upper device via a write operation are read-only ones. |
| 07H | System lock | The user password is set and does not being entered yet;<br>Factory parameters cannot be changed by users |
| 08H | Storing parameters | The store operation for previous parameters has not been completed. |

For example, trying to set the "Motor control mode" of the inverter whose address is 01H (F0-00 parameter address is F000H) to 02, the command as below is set:

**01 06 F0 00 00 02 3B 0B**

Inverter address/ Read command/ Parameter address/ Parameter data/ CRC check

However, the setting range of the "Motor control mode" is 0 ~ 1, which means 2 is a value exceeding the range. At this time, the inverter returns an error message response message which reads as follows:

**01 06 80 01 00 05 31 C9**

Inverter address/ Write command/ Abnormal response code/ Error code/ CRC check

The abnormal response code 8001H indicates that the MODBUS communication is abnormal. The error code 05H shows the written parameter is out of range and invalid.

## A.5.Examples of read and write operations

Refer to chapter A.3 for the format of read and write commands.

### A.5.1. Example of read command 03H

Example 1: To read the temperature value of the inverter that is stored in address FA06H, the command sent to the inverter reads:

**01 03 FA 06 00 01 54 D3**

Inverter address/ Read command/ Parameter address/ Number of data/ CRC check

If the response reads:

**01 03 01 00 1B 08 4F**

Inverter address/ Read command/ Number of data/ Data content/ CRC check

The data content returned by the inverter is 001BH, which implies the temperature of the inverter is 27°C.

### A.5.2.Example of write command 06H

Example 1: To request the inverter with address 03H to run forward. Referring to "Parameter List of Other Functions", the address of "Communication Control Command" parameter is 2000H, and the forward operation value is 0001. See below:

| Function | Address | Data description | R/W feature |
|---|---|---|---|
| Communication control command | 2000H | 0001H: Forward running | W |
| | | 0002H: Reverse running | |
| | | 0003H: Forward jogging | |
| | | 0004H: Reverse jogging | |
| | | 0005H: Free stop | |
| | | 0006H: Deceleration stop | |
| | | 0007H: Fault reset | |

The command sent by the master reads:

**03 06 20 00 00 01 42 28**

Inverter address/ Write command/ Parameter address/ Forward running/ CRC check

If the operation is successfully completed, the response information returned is reads as follows (same as the command sent by the master):

**03 06 20 00 00 01 42 28**

Inverter address/ Write command/ Parameter address/ Forward running/ CRC check

Example2: To the inverter with address 03H, send a command to set its "Maximum output frequency"to 100Hz.

| Code | Name | Parameter description | Default | Changeability |
|---|---|---|---|---|
| F0-09 | Maximum output frequency | Used to set the maximum output frequency of the inverter. It is the basis of frequency settings and the basis of acceleration and deceleration. Please pay attention to set it properly.<br>Setting range: P00.04 ~ 400.00Hz | 50.00Hz | ★ |

Judging from the number of decimal digits, the fieldbus ratio of "Maximum Output Frequency" (F0-09) is 100. Multiply 100Hz by the ratio and you get 10000, which is 2710H in hexadecimal expression.

The master sends a command that reads:

**03 06 00 03 27 10 71 16**

Inverter address/ Write command/ Parameter address/ Forward running/ CRC check

If the command is successful completed, the response information will reads as below (same as the command sent by the master):

**03 06 00 03 27 10 71 16**

Inverter address/ Write command/ Parameter address/ Forward running/ CRC check

## A.6. Common communication fault

Common communication faults include: No response and abnormal faults returned from the inverter.

Possible reasons for no response faults are:

1. Wrong serial port selection. For example, the converter uses COM1 while COM2 is selected for communication;

2. The settings of baud rate, data bit, stop bit, check bit and other parameters are inconsistent with those of the inverter;

3. RS485 bus is connected in reverse polarity (+ and -);

# Appendix B. Technical Data

## B.1. Using derated inverter

### B.1.1.Capicity

Determine the inverter specifications based on the rated motor current and power. In order to achieve the rated motor power given in the table, the rated output current of the inverter shall be no less than that of the motor, while the rated power of the inverter also shall be no less than that of the motor.

**NOTICE:**

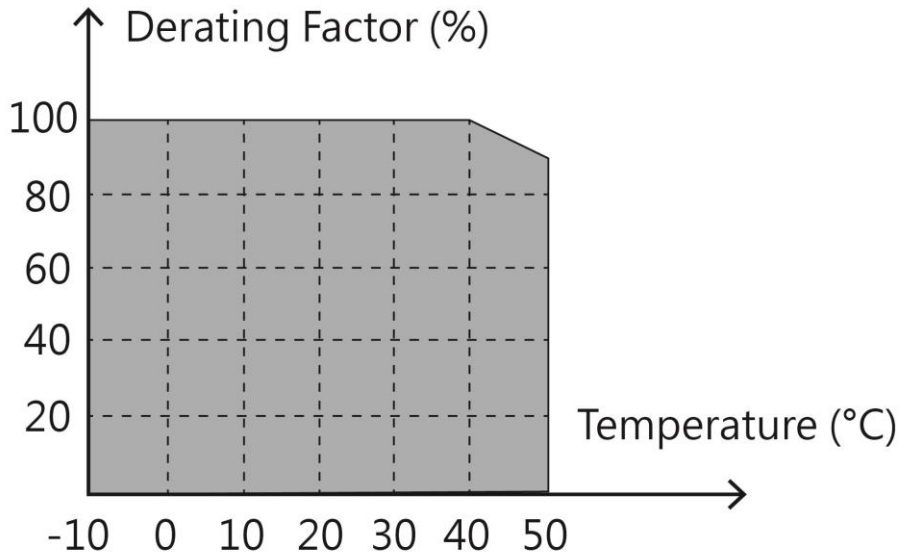
- The maximum acceptable motor shaft power is limited to 1.5 times of the motor rated power. If the limit is exceeded, the inverter will automatically limit the motor's torque and current. This feature can effectively protect the input bridge from overload.
- The rated capacity is the capacity for an environment whose ambient temperature is 40℃.
- Check the public DC system to confirm the total power connected through the public DC system does not exceed the rated power of the motor.

### B.1.2.Derating

If the ambient temperature of the installation site exceeds 40°C, the altitude exceeds 1000m, or the switching frequency changes from 4 kHz to 8.12 or 15 kHz, the inverter must be derated.

#### B.1.2.1. Temperature derating

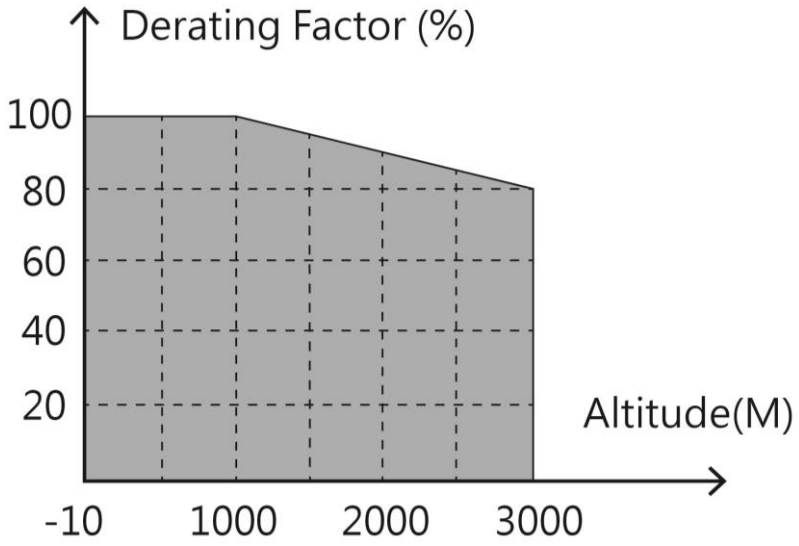
When the temperature ranges from +40℃ to +50℃, the rated output current shall decrease by 1% every 1℃ increase. Please refer to the figure below for actual derating.



**NOTICE:** It is not recommended to use the inverter in an environment whose temperature is above 50°C. The customer shall be solely responsible for the consequences arising from ignoring such advice.

### B.1.2.2.Altitude derating

The inverter can output rated power when installed below the altitude of 1000m. If the altitude exceeds 1000m and less than 3000m, please derate it at a rate of 1% for every 100m increase. The specific derating rate is shown in the figure below.




When the altitude exceeds 2000m, please configure an isolated inverter at the input end of the inverter.

When the altitude exceeds 3000m and less than 5000m, please consult us for further technical advice. This product is not recommended to be used at an altitude above 5000m.

### B.1.2.3. Carrier frequency derating

For an inverter, its carrier frequency setting range varies according to its power level, just like its rated power is defined by its factory carrier frequency. If the actual carrier frequency exceeds the factory value, the power of the inverter needs to be derated at a rate of 10% for every 1 kHz increase in the carrier frequency.

## B.2.CE

## B.2.1.CE mark

The CE mark on the nameplate indicates that this inverter has passed CE certification and complies with the European Low Voltage Directive (2006/95/EC) and Electromagnetic Compatibility Directive (2004/108/EC).

## B.2.2. Compliance with EMC specifications

The European Union stipulates that electrical and electronic equipment sold in Europe must meet the emission limits of electromagnetic disturbances that cannot exceed the relevant standards and

have electromagnetic immunity capabilities that can work normally in a certain electromagnetic environment. The EMC product standard (EN61800-3:2004) specifies the electromagnetic compatibility standards and specific test methods for speed control electric drive system products. Our products must strictly comply with these EMC regulations.

## B.3. EMC specifications

The EMC product standard (EN 61800-3:2004) specifies the EMC requirements for inverter products.

Application environment classification:

- First-type environment: Civil environments, including those application environments that are directly connected to the low-voltage power grid that supplies power to civilians without going through an intermediate transformer.
- Second-type environment: all environments except those directly connected to the application environment of the low-voltage power supply grid that supplies power to civilians.

Four categories of inverters:

- C1 type inverter: The rated voltage is lower than 1000V and is used in a first-type environment.
- C2 type inverter: The rated voltage is lower than 1000V, not a plug, socket or mobile device. For usage in a first-type environment, it must be installed and operated by professional personnel.

**NOTICE**: While no longer restricting the power distribution of an inverter, the EMC standard IEC/EN 61800-3 is still applied to the usage, installation and commissioning. Related professional personnel or organizations are required to possess the necessary skills, including EMC-related knowledge, to install and/or tune electric drive systems.

- C3 type inverter: The rated voltage is lower than 1000V and can be used in a second-type environment but a first-type environment.
- C4 type inverter: The rated voltage is higher than 1000V or the rated current ≧ 400A, and can be used with a complex system in a second-type environment.

### B.3.1.C2-type

For conducted interference tolerance, it requires following measures:

1. Select the optional EMC filter by referring to "Appendix C. Peripheral Options" and install it according to the instructions in the EMC filter manual.
2. Follow the instructions in this manual to select the motor and control cables.
3. Install the inverter according to the method described in this manual.

In a domestic environment, this product may general radio interference and require additional prevention measures.

### B.3.2.C3-type

The interference tolerance of the inverter meets the requirements of the second-type environment specified in the IEC/EN 61800-3 standard.

For conducted interference tolerance, it requires following measures:

1. Select the optional EMC filter from the "Peripheral options" and install it according to the instructions in the EMC filter manual.
2. Follow the instructions in this manual to select the motor and control cables.
3. Install the inverter according to the method described in this manual.

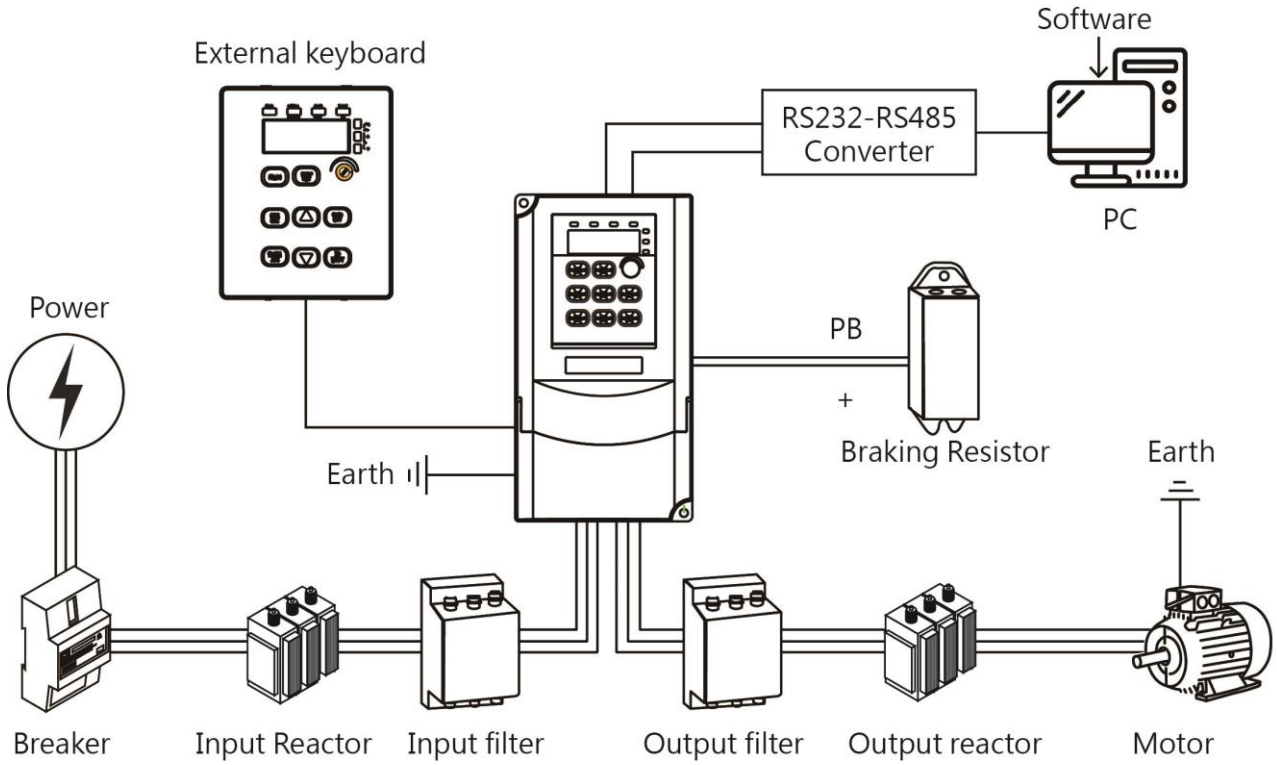
A C3-type inverter is not allowed to be used with a civil low-voltage public power grid; or it will generate radio frequency electromagnetic interference.

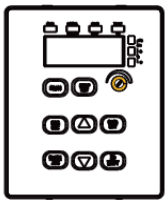
# Appendix C. Peripheral Options

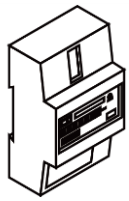
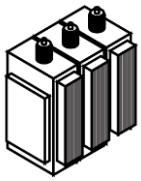
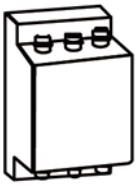
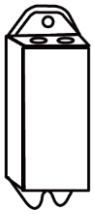
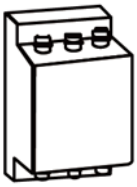
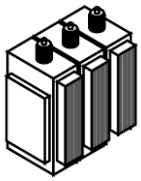
This chapter describes the optional accessories of the inverter.

## C.1. Peripheral wiring

The diagram below shows the external wiring of the inverter.




| Part | Name | Description |
|---|---|---|
|  | External keyboard | Including external keyboard with parameter copy feature and external keyboard without the feature.<br>When the external keyboard with parameter copy feature is enabled, the local keyboard will turn itself off; when the external keyboard without parameter copy feature is enabled, the local keyboard and the external keyboard become active at the same time. |
|  | Cable | Used for transmitting electrical signals. |

| | | |
|---|---|---|
|  | Breaker | Prevents electric shock accidents and protects against ground short circuits that may cause leakage current fires (please select a leakage circuit breaker that is designed for inverters and has the function of suppressing high-order harmonics. The rated sensitive current of the circuit breaker shall be greater than 30mA for one inverter). |
|  | Input reactor | Suitable for improving the power factor of the input side of the inverter and can suppress high-order harmonic current. |
|  | Input filter | Suppresses the electromagnetic interference transmitted by the inverter to the public grid through the input power line. Please install it during installation and as close to the input terminal side of the inverter as possible. |
|  | Braking resistor | Uses its resistance consuming the regenerative energy of the motor to shorten the deceleration time. |
|  | Output filter | Suppresses the interference generated from the wiring on the output side of the inverter. Please install it as close as possible to the output terminal of the inverter. |
|  | Output reactor | Extends the effective transmission distance of the inverter and effectively suppresses the instant high voltage generated when the IGBT of the inverter is switched on and off. |

# C.2.Power source

Ensure that the inverter voltage level is consistent with the grid voltage.

# C.3.Cable

## C.3.1.Power cable

The specifications of the input power cables and motor cables shall comply with local regulations.

**NOTICE**: If the electrical conductivity of the motor cable shielding layer fails to meet the requirements, an additional PE conductor shall be used with the cables.

## C.3.2.Control Cable

All cables used for analog control or frequency input shall be shielded cables.

The relay cables need to be cables with metal braided shield.

The keyboard needs to be connected with a network cable. If use it in a harsh electromagnetic environment, a shielded network cable is recommended.

**NOTICE:**

- The analog signal and digital signal are routed separately using designated cables.
- Before connecting the input power cables for the inverter, check the insulation of the input power cables according to local regulations.

| Model | Recommended cable size (mm²) | | | | Set Screws | |
|---|---|---|---|---|---|---|
| | RST<br>UVW | PE | P1 (+) | PB (+)<br>(-) | Screw spec | Torque（Nm） |
| 0.75G-S2 | 1.5 | 1.5 | 1-4 | 1-4 | M3 | 0.8 |
| 1.5G-S2 | 2.5 | 2.5 | 1-4 | 1-4 | M3 | 0.8 |
| 2.2G-S2 | 2.5 | 2.5 | 1-4 | 1-4 | M3 | 0.8 |
| 0.75G-T4 | 1.5 | 1.5 | 1.5 | 1.5 | M4 | 1.2~1.5 |
| 1.5G-T4 | 1.5 | 1.5 | 1.5 | 1.5 | M4 | 1.2~1.5 |
| 2.2G-T4 | 2.5 | 2.5 | 2.5 | 2.5 | M4 | 1.2~1.5 |
| 3.7G-T4 | 2.5 | 2.5 | 2.5 | 2.5 | M4 | 2~2.5 |

**NOTICE:**

- The recommended cable specifications for the main circuit are based on the conditions including the ambient temperature below 40 degrees Celsius, the wiring distance below 100 m, and current flow of the rated value.
- Terminal (+) and PB are the terminals for connecting the braking resistor.
- If the control cable and power cable must cross, the angle between the control cable and the power cable must be 90 degrees.
- If the inside of the motor is wet, the insulation resistance will decrease. If any sign of moisture is suspected, dry the motor and then measure it insulation resistance again.

## C.4. Circuit breaker and electromagnetic contactor

In order to prevent overload, you need to add a fuse.

A manual control circuit breaker (MCCB) needs to be installed between the AC power source and the inverter. The breaker shall be able to lock in the disconnected position to facilitate installation and maintenance. The capacity of the circuit breaker shall be set between 1.5 and 2 times of the rated current of the inverter.

According to the mechanism of the circuit breaker, if fail to comply with the manufacturer's instructions, thermionic gas may gasp from the circuit breaker case when a short circuit event happens. To ensure safety, special care must be taken when installing and placing the circuit breaker. Follow the manufacturer's instructions to handle it.

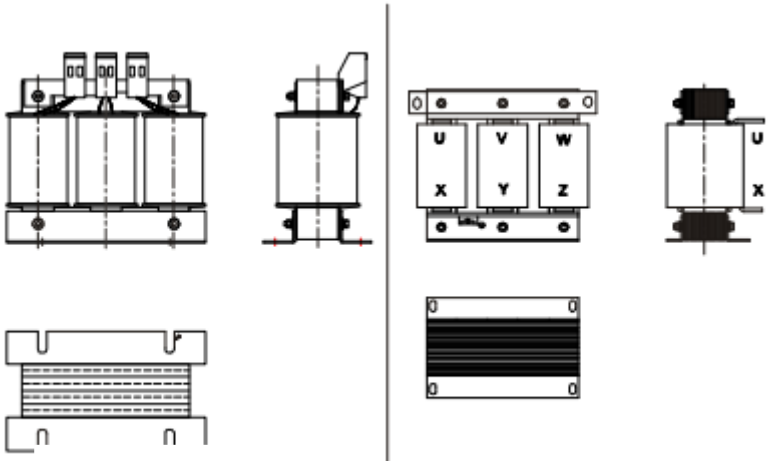
In order to effectively cut off the input power of the inverter when the system fails, it is advised to have an electromagnetic contactor installed on the input side to control the on and off of the main circuit power to ensure safety.

| Model | Breaker rated current（A） | Fuse（A） | Recommended contactor rated current（A） |
|---|---|---|---|
| 0.75G-S2 | 16 | 16 | 12 |
| 1.5G-S2 | 25 | 25 | 25 |
| 2.2G-S2 | 50 | 40 | 32 |
| 0.75G-T4 | 6 | 6 | 9 |
| 1.5G-T4 | 10 | 16 | 12 |
| 2.2G-T4 | 16 | 16 | 12 |
| 3.7G-T4 | 16 | 25 | 12 |

## C.5.Reactor

In order to prevent the instantaneous large current from flowing into the input power circuit and damaging the rectifier when the power grid provides high-voltage input, an AC reactor needs to be connected to the input side. This measure can also improve the power factor on the input side.

When the distance between the inverter and the motor exceeds 50 meters, the leakage current become bigger due to increasing parasitic capacitance effect between the long cable and the ground, which makes the inverter prone to frequent overcurrent protection and may cause damage to the motor insulation. To prevent this, an output reactor is required. When using one inverter to serve multiple motors, it is necessary to add up the cable length of each motor to obtain the total motor cable length. When the total length is more than 50 meters, an output reactor must be added on the output side of the inverter. When the distance between the inverter and the motor is between 50 and 100 meters, please select the model according to the following table. When it exceeds 100 meters, please directly consult the manufacturer for more technical support.




Output Reactor　　Input Reactor

| Model | Input Reactor | Output Reactor |
|---|---|---|
| 1.5G-T4 | ACL2-1.5K-4 | OCL2-1.5K-4 |
| 2.2G-T4 | ACL2-2.2K-4 | OCL2-2.2K-4 |
| 3.7G-T4 | ACL2-3.7K-4 | OCL2-3.7K-4 |

**NOTICE:**

- For input reactors, the design input rated voltage drop is 2%±15%. For output reactors, the design output rated voltage drop is 1%±15%.
- All the above-mentioned optional accessories are not included in the product package. Customers need to place additional order for them if necessary.

# C.6.Braking resistor

## C.6.1.Select braking resistor

When the inverter decelerates with a large inertial load or needs to decelerate rapidly, the motor will be generating electricity and the energy will be transferred to the inverter DC link through the inverter bridge, which causes the inverter bus voltage to rise. When the rising bus voltage exceeds a certain value, the inverter will report an overvoltage fault event. In order to prevent this from happening, a brake component will be required here.

The design, installation, commissioning and operation of the equipment must be carried out by trained and qualified professionals.

During the task, all provisions in the "Warning" must be followed; otherwise it may lead to serious personal injury or major property damage.

Non-professional construction personnel are not allowed to perform the installation. Otherwise the circuit of the inverter or braking may be accidently damaged.

Before connecting the optional braking resistor to the inverter, please read the instruction manual of the braking resistor carefully.

Do not connect the braking resistor to terminals other than PB and (+). Otherwise it will cause the braking circuit and the inverter damaged and will lead to a fire accident.

Please connect the optional brake resistor to the inverter in the way as shown in the wiring diagram. If any wrong wiring, the inverter along with other devices may be damaged.

| **Model** | **Braking Unit** | **Braking resistor at 100% of the barking tourque** （Ω） | **The consumped power of the barking resistor (KW)** （**10% braking**） | **The consumped power of the barking resistor (KW)** （**50% braking**） | **The consumped power of the barking resistor (KW)** （**80% braking**） | **Minimum baking resistor** （Ω） |
|---|---|---|---|---|---|---|
| 0.75G-S2 | Built-In | 192 | 0.11 | 0.56 | 0.90 | 42 |
| 1.5G-S2 | | 96 | 0.23 | 1.10 | 1.18 | 30 |
| 2.2G-S2 | | 65 | 0.33 | 1.7 | 2.64 | 21 |
| 0.75G-T4 | | 635 | 0.1 | 0.6 | 0.9 | 240 |
| 1.5G-T4 | | 326 | 0.23 | 1.1 | 1.8 | 170 |
| 2.2G-T4 | | 222 | 0.33 | 1.7 | 2.6 | 130 |
| 3.7G-T4 | | 122 | 0.6 | 3 | 4.8 | 80 |

**NOTICE**: Please select the resistance and power of the braking resistor according to the data provided by us. A braking resistor increases the braking torque of the inverter. The above table list the resistance power on the conditions of 100% braking torque, 10% braking utilization rate, 50% % Braking utilization rate, 80% braking utilization rate, users can choose their braking system according to their specific working requirements.

For some specific inverters, please do not use a braking resistor whose resistance value is smaller than the specified minimum value. Those inverters cannot provide enough protection against overcurrent caused by small resistance.

For occasions that require frequent braking, or the braking utilization rate exceeds 10%, the power of the braking resistor needs to more than the value provided in the above table according to the actual working conditions.

## C.6.2.Install braking resistor

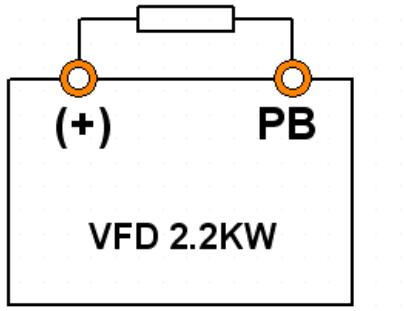
To connect a braking resistor, use shielded cables.

All resistors shall be installed in a well-cooled place.

Material around the braking resistor must be flame-retardant. The surface temperature of the resistor is very high. The temperature of the air flowing from the resistor can be as high as several hundred degrees Celsius. Must prevent any material or object from contacting the resistor.

VFD 2.2KW only needs an external braking resistor. PB and (+) are the wire ends of the braking resistor. The installation of the braking resistor is as follows:

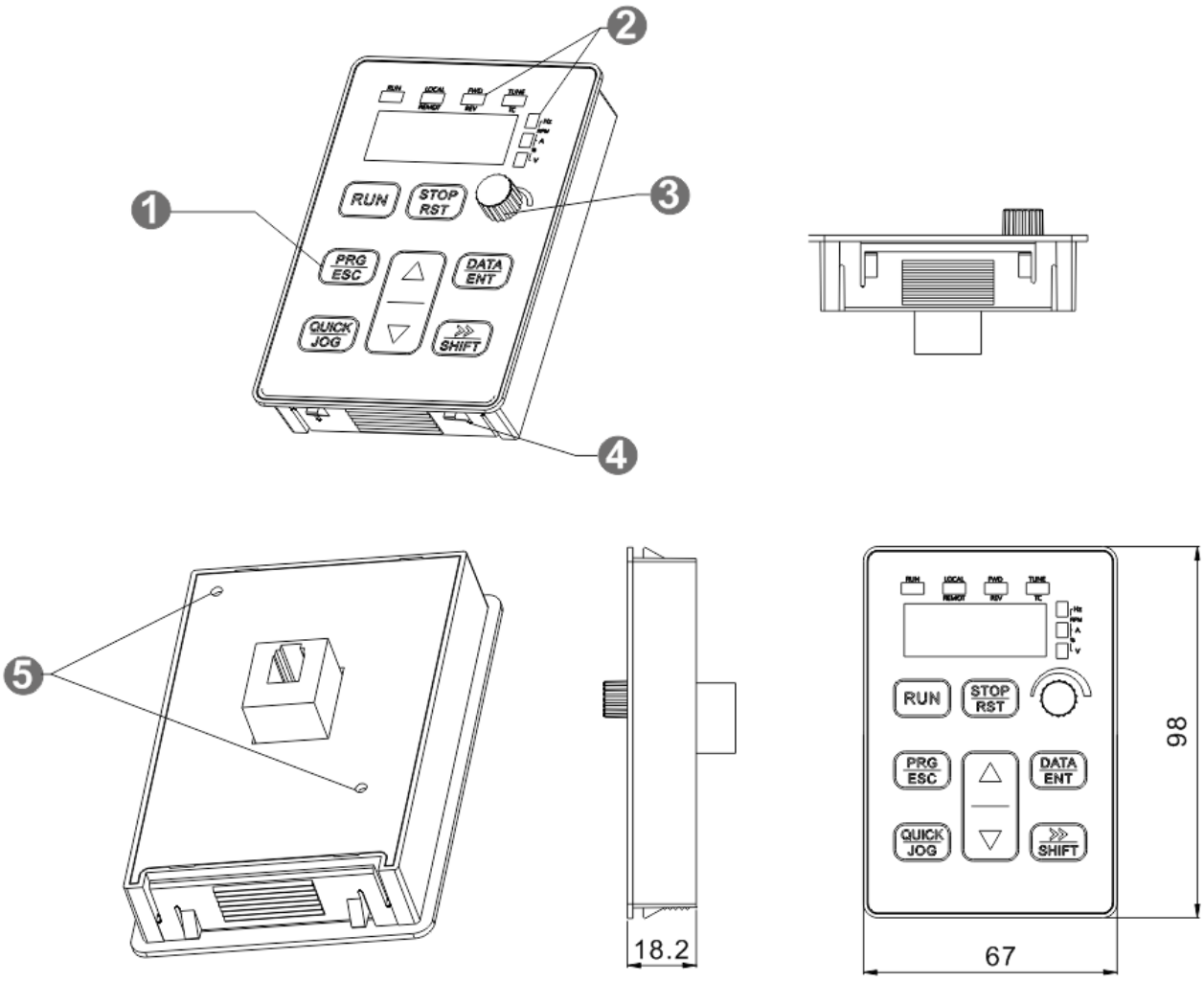
**External Brake Resistance**



## C.7. Dimensions

### C.7.1. External keyboard

This chapter describes the dimension drawing of the inverter. The unit of the dimension is millimeters.




1. Button
2. LED indicator
3. Knob
4. Embedded mounting buckles
5. Mounting hole

NOTICE: This external keyboard is optional.