GD350-RAETTS Series Inverter Unit
Quick Start Guide

Contents

1. Safety Precautions

1.1. What this chapter contains

Read the manual carefully before moving, installing, running and servicing the product, and follow all safety precautions contained. Otherwise, device damage or personal injury or even death can result.

We are not liable or responsible for any device damage or personal injury or death caused by you or your customers due to your ignorance of the safety precautions.

1.2. Safety definition

Danger: Severe personal injury or even death can result if related requirements are not followed.

Warning: Personal injury or device damage can result if related requirements are not followed.

Note: Actions taken to ensure proper running.

Qualified electricians: People working on the device must have received professional electrical and safety training and obtained the certificates, and must be familiar with all steps and requirements of device installing, commissioning, running and maintaining and capable to prevent any emergencies.

1.3. Warning symbols

Warnings caution you about conditions that can result in severe injury or death and/or device damage and advice on how to prevent dangers. The following table lists the warning symbols in this manual.

Symbol	Name	Description	Abbreviation
 Danger	Danger	Severe personal injury or even death can result if related requirements are not followed.	
 Warning	Warning	Personal injury or device damage can result if related requirements are not followed.	
 Do not	Electrostatic sensitive	PCBA board damage can result if related requirements are not followed.	
 Hot sides	Hot sides	The device base may be hot. Do not touch.	
	Electric shock	High voltage may be present in bus capacitors after power off. To prevent electric shock, wait at least 5 or 15 or 25 minutes (depending on the device warning symbol) before operating the device that is just powered off.	
	Read manual	Read the manual before operating.	
Note	Note	Actions to ensure proper running.	**Note**

1.4. Safety guidelines

✧ Only trained and qualified electricians can operate on the device.

✧ Do not perform any wiring, inspection, or component changing when power is applied. Ensure all input power supplies are disconnected before wiring or checking, and always wait at least the time designated on the device or until the DC bus voltage is less than 36V. The following table lists the waiting time.

Product model		Minimum waiting time
220V	4kW, 11kW	5 minutes
380V	7.5kW, 22kW	5 minutes

✧ Do not refit the device unless authorized; otherwise, fire, electric shock or other injuries may result.

✧ The heat sink base may become hot during running. Do not touch it; otherwise, burns may result.

✧ The electronic components inside the device are electrostatic sensitive. Take measurements to avoid electrostatic discharge during related operation.

1.4.1. Delivery and installation

✧ Do not run a damaged or incomplete device.

✧ Do not touch the device with wet items or body parts; otherwise, electric shock may result.

Note:

- Select appropriate tools for delivery and installation to ensure proper device running and prevent accidents. To ensure physical safety, take mechanical protective measures such as wearing safety shoes and working uniforms.
- Prevent the device from physical shock or vibration during the delivery and installation.
- Do not touch the PCB of the device during the delivery to prevent PCB damage.
- Note that the device cannot meet the low voltage protection requirements in IEC61800-5-1 if the installation site altitude exceeds 2000 meters.
- Use the device in a proper environment (for details, see "Installation environment".)
- As the leakage current during device running may exceed 3.5mA, apply reliable grounding and ensure the ground resistance is less than 10Ω. The PE ground conductor and phase conductor have equal conductivity capability.
- R, S, and T are the power input terminals, while U, V, and W are output terminals for motors. Connect the input power cables and motor cables properly; otherwise, device damage to may result.

1.4.2. Commissioning and running

✧ **Before running the inverter unit with a load, you must have installed the inverter unit in the high-speed integrated blower machine. Otherwise, the internal power components of the inverter unit may be damaged**

	due to overheat. ✧ Disconnect all power sources applied to the device before terminal wiring, and wait for at least the time specified in "Safety precautions" after disconnecting the power sources. ✧ High voltage presents inside the device during running. Do not carry out any operation on the device during running except for keypad settings. ✧ The device may start up by itself when P01.21 (restart after power down) is set to 1. Do not get close to the device and motor. ✧ The device cannot be used as "Emergency-stop device". ✧ The device cannot act as an emergency brake for the motor; it is a must to install a mechanical brake device. ✧ **When the device is used for driving a permanent magnetic synchronous motor, in addition to the preceding items, the following work must be done before installation and maintenance:** - Disconnect all the input power sources including main power and control power. - Ensure the permanent magnetic synchronous motor has been stopped and the measured output voltage of the device is lower than 36V. - After the permanent magnetic synchronous motor is stopped, wait at least the time specified in "Safety precautions", and ensure the voltage between "+" and "-" is lower than 36V. - During operation, it is a must to ensure the permanent magnetic synchronous motor cannot run again by the action of external load; it is recommended to install an effective external brake device or disconnect the direct electrical connection between permanent magnetic synchronous motor and the device.

Note:

- Do not switch on or switch off input power sources of the device frequently.
- If the device has not been used with a long period of storage, set the capacitance and carry out inspection and pilot run on the device before use.
- Before the device is powered on, the device must have been installed in the integrated blower machine; otherwise, electric shock may occur.

1.4.3. Maintenance and component replacement

	✧ Only well-trained and qualified professionals are allowed to perform maintenance, inspection, and component replacement on the device. ✧ Disconnect all the power sources applied to the device before terminal wiring, and wait for at least the time specified in "Safety precautions" after disconnecting the power sources. ✧ Take measures to prevent screws, cables and other conductive matters from falling into the integrated blower machine during maintenance and

	component replacement.

Note:

- Use proper torque to tighten the screws.
- Keep the device and its parts and components away from combustible materials during maintenance and component replacement.
- Do not carry out insulation voltage-endurance test on the device, or measure the control circuits of the device with megameter.
- Take proper anti-static measures on the device and its internal parts during maintenance and component replacement.

1.4.4. Device disposal

	✧ The device contains heavy metal. Dispose of a scrap device as industrial waste.
	✧ A scrap device must be collected separately and treated specially.

2. Product overview

2.1. Basic principle

GD350-RAETTS series inverter unit is used to control asynchronous AC induction motors and permanent magnetic synchronous motors. The inverter unit must be installed in the integrated blower machine to meet the heat dissipation requirement of the main power components of the inverter unit. The following figure shows the main circuit of the inverter unit. The rectifier converts 3PH AC voltage into DC voltage, and the capacitor bank of intermediate circuit stabilizes the DC voltage. The inverter unit converts DC voltage into the AC voltage used by an AC motor.

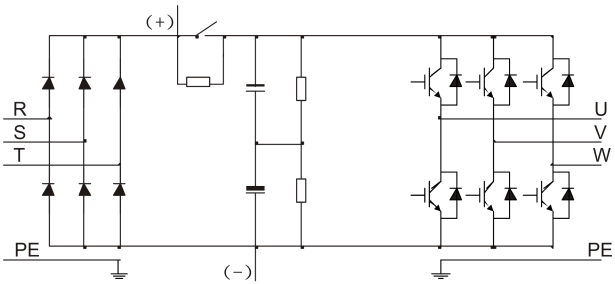


Figure 2.1 Main circuit of the inverter unit

Note: The heat dissipation requirement of the main power components of the inverter unit can be met only after the inverter unit has been installed in the integrated blower machine.

2.2. Product specifications

Function		Specifications
Power input	Input voltage (V)	AC 3PH 380V(-15%)–440V(+10%) Rated voltage: 380V
	Input current (A)	See "Product ratings".
	Input frequency (Hz)	50Hz or 60Hz, allowable range: 47–63Hz
Power output	Output voltage (V)	0–Input voltage
	Output current (A)	See "Product ratings".
	Output power (kW)	See "Product ratings".
	Output frequency (Hz)	0 – 800Hz
Technical control performance	Control mode	SVPWM control and SVC
	Motor type	Asynchronous motor (AM) and permanent magnetic synchronous motor (SM)
	Speed control accuracy	±0.2% (SVC)
	Speed fluctuation	± 0.3% (SVC)
	Torque response	<20ms (SVC)
	Torque control	10% (SVC)

Function		Specifications
	accuracy	
	Starting torque	For AMs: 0.25Hz/150% (SVC) For SMs: 2.5 Hz/150% (SVC)
	Overload capacity	150% for 1 minute, 180% for 10 seconds, and 200% for 1 second
Running control performance	Frequency setting method	Settings can be implemented through digital, analog, pulse frequency, multi-step speed running, simple PLC, PID, MODBUS communication, PROFIBUS communication and so on. Settings can be combined and the setting channels can be switched.
	Automatic voltage regulation	The output voltage can be kept constant although the grid voltage changes.
	Fault protection	More than 30 protection functions, such as protection against overcurrent, overvoltage, undervoltage, overtemperature, phase loss, and overload.
	Restart after rotational speed tracking	Used to implement non-impact smooth startup for the motor that is rotating.
Peripheral interface	Terminal analog input resolution	No more than 20mV
	Terminal digital input resolution	No more than 2ms
	Analog input	AI1: 0–10V/0–20mA; AI2: -10–10V
	Analog output	AO1: 0–10V/0–20mA
	Digital input	For common input, max. frequency: 1kHz; internal impedance: 3.3kΩ For high-speed input, max. frequency: 50kHz; supports quadrature encoder input; with speed measurement function
	Digital output	High-speed pulse output, max. frequency: 50kHz Y terminal open collector output
	Relay output	Programmable relay output RO1A is NO, RO1B is NC, and RO1C is a common terminal RO2A is NO, RO2B is NC, and RO2C is a common terminal

Function		Specifications
		Contact capacity: 3A/AC250V, 1A/DC30V
	Extension interface	One extension interface Supporting the PG card, I/O card, communication card, and programmable card
Other	Temperature of operating environment	-10–50°C, derating is required if the ambient temperature exceeds 40°C
	Ingress protection (IP) rating	IP00 (inverter unit) IP55 (that the keypad can meet after the inverter unit is installed in the integrated blower machine)
	EMC filter	Able to meet IEC61800-3 C3 requirements

2.3. Product nameplate

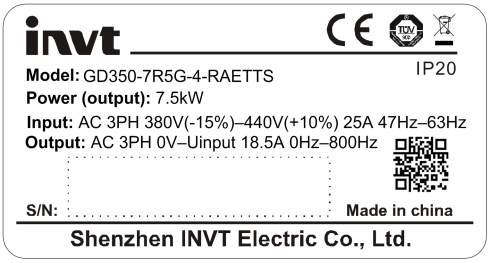


Figure 2.2 Product nameplate

Note:

- This is a nameplate example for a standard GD350-RAETTS product model. The mark such as CE/TUV/IP20 will be applied according to the actual certification situation.
- You can scan the QR code to download INVT mobile APP and product manual.

2.4. Model designation code

A model designation code contains product information. You can find the model designation code on the product nameplate and simplified nameplate.

GD350 – 7R5G – 4 – RAETTS

① ② ③ ④

Figure 2.3 Model designation code

Field	No.	Description	Example
Abbreviation of product series	①	Abbreviation of product series	GD350: short for Goodrive350

Field	No.	Description	Example
Rated power	②	Power range + Load type	7R5: 7.5kW G: Constant torque load
Voltage class	③	Voltage class	4: AC 3PH 380V (-15%) – 440V (+10%) Rated voltage: 380V
Special code	④	Customer code	RAETTS

2.5. Product ratings

Product model	Output power (kW)	Input current (A)	Output current (A)
GD350-7R5G-4-RAETTS	7.5	25	18.5
GD350-022G-4-RAETTS	22	51	45

Note:

- The input current is measured in cases where the input voltage is 380V and the rated output current is met without connection to an external reactor.
- The rated output current is the output current corresponding to 380V output voltage.
- Within the allowable input voltage range, the output current and power cannot exceed the rated output current and power.
- The ratings can be reached only when the product has been installed in the integrated blower machine.

2.6. Structural diagram

The inverter unit structure is shown in the following figure.

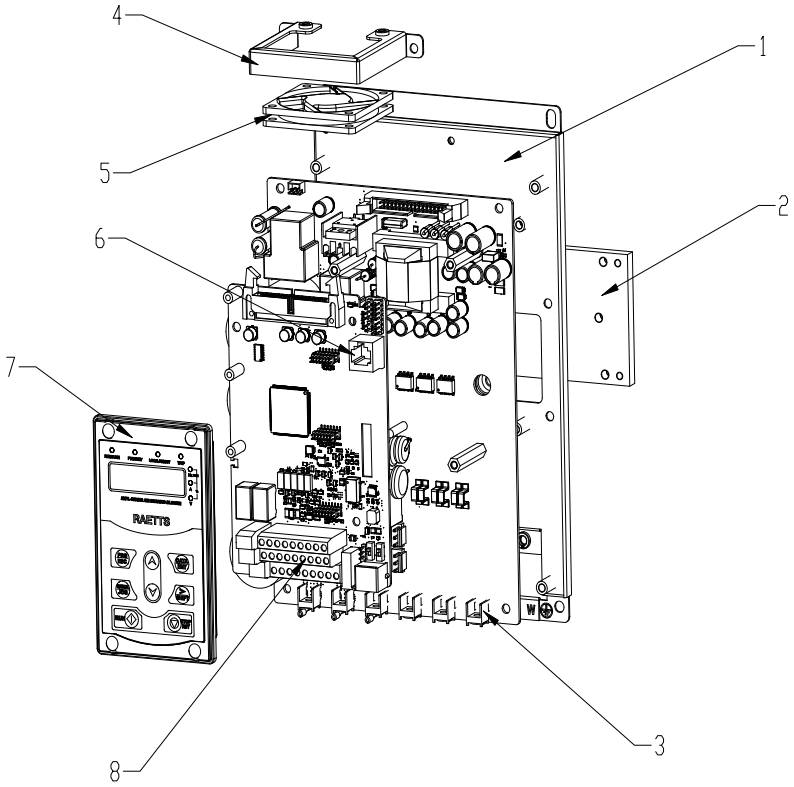


Figure 2.4 Product structure

No.	Item	Description
1	Drive board bracket	Used to protect the PCB and other components.
2	Heat dissipation substrate	Heat dissipation and conduction component (heat dissipation requirement can be met only after installation in the integrated blower machine).
3	Main circuit terminals	For details, see "Installing".
4	Fan bracket	Used to protect the fan.
5	Cooling fan	Used to achieve constant temperature.
6	Keypad interface	Used to connect the keypad.
7	Keypad	For details, see "Operations on the keypad".
8	Control circuit terminals	For details, see "Installing".

3. Installing

3.1. What this chapter contains

	✧ Only trained and qualified professionals are allowed to carry out the operations mentioned in this chapter. Perform operations following the instructions presented in "Safety precautions". Ignoring the safety precautions may result in device damage or injury or even death. ✧ Ensure the inverter unit power is disconnected before installation. If the inverter unit has been powered on, disconnect the inverter unit from the power, wait at least the time specified in "Safety precautions", and ensure the POWER indicator is off. It is recommended that a multimeter be used to check and ensure the inverter unit DC bus voltage is lower than 36V.

3.2. How to install

3.2.1. Installation environment

The installation environment is essential for the inverter unit to run with best performance in long period of time. Install the inverter unit in an environment compliant with the following requirements.

Environment	Requirement
Installation site	Application site
Ambient temperature	✧ -10 – +50°C ✧ When the ambient temperature exceeds 40°C, derate by 1% for every temperature increase of 1°C. ✧ It is not recommended that the inverter unit be used when the ambient temperature exceeds 50°C. ✧ In order to ensure reliability, do not use the inverter unit in cases where the temperature changes rapidly. ✧ When the inverter unit is used in closed space, use the cooling fan or air conditioner to prevent the internal temperature from exceeding the allowed temperature. ✧ When the temperature is too low, install an external heating device before running the inverter unit that has been powered off for a long time, which eliminates the freeze inside the inverter unit. Otherwise, the device may be damaged.
Humidity	✧ The relative humidity (RH) of the air is less than 90%. ✧ Condensation is not allowed. ✧ The max. RH cannot exceed 60% in the environment with corrosive gases.
Storage temperature	-30 – +60°C
Operating environment	The installation site must be: ✧ Away from electromagnetic radiation sources.

Environment	Requirement
	✧ Away from oil mist, corrosive gases, and combustible gases. ✧ Protective from foreign materials such as metal powder, dust, oil, and water so that the foreign materials will not fall into the inverter unit. ✧ Away from radioactive substances and combustible objects. ✧ Away from harmful gases and liquids.
Altitude	✧ Lower than 1000m. ✧ When the altitude exceeds 1000m, derate by 1% for every increase of 100m. ✧ When the altitude exceeds 2000m, configure an isolation transformer at the device input end. It is not recommended that the device be used at the altitude higher than 5000m.
Vibration	The max. vibration amplitude cannot exceed 10m/s^2 (1.0g).

3.2.2. Installation methods

⚠	✧ The ratings can be reached only when the product has been installed in the integrated blower machine. Otherwise, the power components inside the product may be damaged due to overheat. ✧ Follow "Assembly procedure" in the quick installation guide to install the product to the integrated blower machine.

Note:

- Subsidiary materials for the installation must be RoHS compliant.
- If possible, use thermally conductive silicone grease of recommended brands and models. Note that the thermal conductivity cannot be less than 1.5W/m.K when you use thermally conductive silicone grease of other brands or models. Otherwise, the product performance may be affected due to overheat protection.
- Thermally conductive silicone grease must be coated evenly, with the thickness within 0.08–0.12mm. Otherwise, the heat dissipation effect will be affected.
- The assembly workshop must meet the ESD protection requirements since some electronic components in the inverter unit are electrostatic sensitive.
- Prevent collision in the process of unpacking, transport, and installation so as to prevent damage.

3.3. Main circuit wiring

Main circuit terminals

Terminal sign	Terminal name	Terminal function
R, S, T	Main circuit power input	3PH AC input terminals, connected to the grid

Terminal sign	Terminal name	Terminal function
U, V, W	Inverter output	3PH AC output terminals, connected to the motor
PE	PE terminal	Grounding terminal for safe protection; each machine must carry two PE terminals and proper grounding is required, with the grounding resistance less than 10ohm.

Note:

- Do not use an asymmetrical motor cable. If there is a symmetrical grounding conductor in the motor cable besides the conductive shielded layer, ground the grounding conductor on the inverter end and motor end.
- Route the motor cable, input power cable and control cable separately.

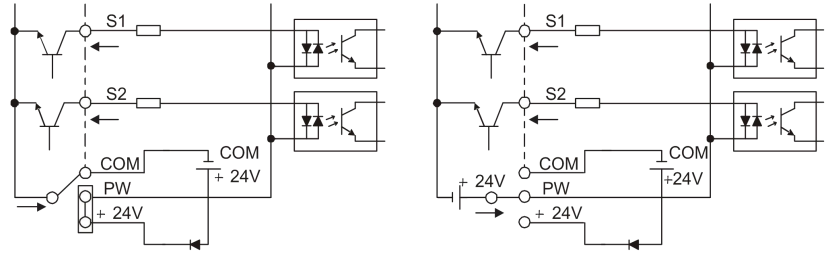
3.4. Control circuit wiring

Control circuit terminals

Terminal	Description
+10V	+10.5V power source locally provided
AI1/AI2	Analog input Range: For AI1, 0–10V/0–20mA; For AI2, -10V–+10V Input impedance: 20kΩ during voltage input; 250Ω during current input Whether AI1 uses voltage or current input is set by P05.50 Resolution ratio: When 10V corresponds to 50Hz, the min. resolution ratio is 5mV At 25°C, the input is 5V/10mA or above, deviation is ±0.5%
GND	+10.5V reference zero potential
AO1	Analog output Output range: 0–10V, 0–20mA Whether AO1 uses voltage or current output is set through the dial switch SW2 At 25°C, the output is 5V/10mA or above, deviation is ±0.5%
COM	Common terminal of +24V
CME	Common terminal of open collector output, short connected to COM by default
PW	Used to provide the working power supply for input digital from the external Voltage range: 12–24V
+24V	Used to provide the power supply for the user. Max. output current: 200mA
S1/S2/S3/S4	Digital input Internal impedance: 3.3kΩ 12–30V voltage input is acceptable Bi-direction input terminals, supporting both NPN and PNP connection methods Max. input frequency: 1kHz

Terminal	Description
	All are programmable digital input terminals, you can set terminal functions through function codes
HDIA/HDIB	High-frequency pulse input (also able to function as low-speed S terminals) Max. input frequency: 50kHz Duty ratio: 30%–70% Supporting quadrature encoder input; equipped with speed-measurement function
HDO	High-speed pulse output Switch capacity: 200mA/30V Range of output frequency: 0–50kHz Duty ratio: 50%
Y1	Digital output Switch capacity: 200mA/30V Range of output frequency: 0–1kHz
RO1/RO2	Relay output RO1A: NO; RO1B: NC; RO1C: common terminal Contact capacity: 3A/AC250V, 1A/DC30V
485+/485-	RS485 communication port, and RS485 differential signal port. A standard RS485 communication interface must use the shielded twisted pair; the 120ohm resistor for RS485 communication can be connected by the switch SW3.
PE	Grounding terminal

Please use the U-type short-contact tag to set the NPN mode or PNP mode and select the internal or external power supply. The default setting is the NPN internal mode. If the input signal comes from NPN transistor, set the U-type short-contact tag between +24V and PW according to the used power supply.

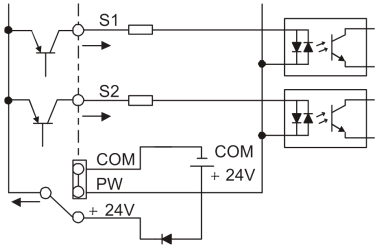


ernal power supply (NPN mode) External power supply (NPN mode)

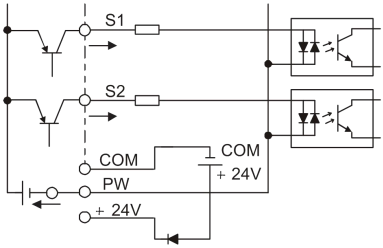
Figure 3.1 NPN mode

If the input signal comes from PNP transistor, set the U-type short-contact tag according to the used

power supply.



Internal power supply (PNP mode)



External power supply (PNP mode)

Figure 3.2 PNP mode

4. Operating

4.1. What this chapter contains

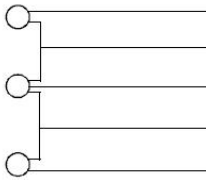
This chapter describes how to commission and control the inverter unit by using the keypad.

4.2. Keypad introduction

The product contains a LED keypad, through which you can control the startup and stop of the inverter unit, read the status data, and set the parameters.

Figure 4.1 Keypad

No.	Item	Description	
1	Status indicator	RUN/TUNE	Inverter unit running status indicator. LED off: The inverter unit is stopped. LED blinking: The inverter unit is autotuning parameters. LED on: The inverter unit is running.
		FWD/REV	Forward or reverse running indicator. LED off: The inverter unit is running forward. LED on: The inverter unit is running reversely.
		LOCAL/REMOT	Indicates whether the inverter unit is controlled through the keypad, terminals, or communication. LED off: The inverter unit is controlled through the keypad.

<table>
<tr><th>No.</th><th>Item</th><th colspan="4">Description</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td colspan="3"></td><td>LED blinking: The inverter unit is controlled through terminals.
LED on: The inverter unit is controlled through remote communication.</td></tr>
<tr><td colspan="3">TRIP</td><td>Fault indicator.
LED on: in fault state
LED off: in normal state
LED blinking: in pre-alarm state</td></tr>
<tr><td rowspan="6">2</td><td rowspan="6">Unit indicator</td><td colspan="4">Unit displayed currently</td></tr>
<tr><td colspan="2" rowspan="5">  </td><td>Hz</td><td>Frequency unit</td></tr>
<tr><td>RPM</td><td>Rotational speed unit</td></tr>
<tr><td>A</td><td>Current unit</td></tr>
<tr><td>%</td><td>Percentage</td></tr>
<tr><td>V</td><td>Voltage unit</td></tr>
<tr><td>3</td><td>Digital display zone</td><td colspan="4">Five-digit LED displays various monitoring data and alarm codes such as the set frequency and output frequency.
<table>
<tr><th>Display</th><th>Means</th><th>Display</th><th>Means</th><th>Display</th><th>Means</th></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>2</td><td>2</td></tr>
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<tr><td>6</td><td>6</td><td>7</td><td>7</td><td>8</td><td>8</td></tr>
<tr><td>9</td><td>9</td><td>A</td><td>A</td><td>B</td><td>B</td></tr>
<tr><td>C</td><td>C</td><td>d</td><td>d</td><td>E</td><td>E</td></tr>
<tr><td>F</td><td>F</td><td>H</td><td>H</td><td>I</td><td>I</td></tr>
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<tr><td>S</td><td>S</td><td>t</td><td>t</td><td>U</td><td>U</td></tr>
<tr><td>v</td><td>v</td><td>.</td><td>.</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Keys</td><td>  </td><td>Programming key</td><td colspan="2">Press it to enter or exit level-1 menus or delete a parameter.</td></tr>
<tr><td>  </td><td>Confirmation key</td><td colspan="2">Press it to enter menus in cascading mode or confirm the setting of a parameter.</td></tr>
<tr><td>  </td><td>UP key</td><td colspan="2">Press it to increase data or move upward.</td></tr>
<tr><td>  </td><td>DOWN key</td><td colspan="2">Press it to decrease data or move downward.</td></tr>
</table>

No.	Item	Description		
			Right-shifting key	Press it to select display parameters rightward in the interface for the device in stopped or running state or to select digits to change during parameter setting.
			Run key	Press it to run the device when using the keypad for control.
			Stop/Reset	Press it to stop the device that is running. The function of this key is restricted by P07.04. In fault alarm state, this key can be used for reset in any control modes.
			Multifunction shortcut key	The function is determined by P07.02.

4.3. Keypad display

The keypad provided by the product can display the stopped-state parameters, running-state parameters, function parameter editing status, and fault alarm status.

4.3.1. Displaying stopped-state parameters

When the inverter unit is in stopped state, the keypad displays stopped-state parameters.

In the stopped state, various kinds of parameters can be displayed. You can determine which parameters are displayed by setting the binary bits of P07.07. For definitions of the bits, see the description of P07.07.

In stopped state, there are 15 parameters that can be selected for display, including set frequency, bus voltage, input terminal status, output terminal status, PID reference value, PID feedback value, torque setting, AI1, AI2, AI3, HDI frequency, PLC and the current step of multi-step speed, pulse counting value, length value, and frequency upper limit (Hz on). You can press >>/SHIFT to shift selected parameters from left to right or press QUICK/JOG (P07.02=2) to shift selected parameters from right to left.

4.3.2. Displaying running-state parameters

After receiving a valid running command, the inverter unit enters the running state, and the keypad display running-state parameters, with the RUN/TUNE indicator on. The on/off state of the FWD/REV indicator is determined by the current running direction.

In running state, there are 25 parameters that can be selected for display, including running frequency, set frequency, bus voltage, output voltage, output current, running speed, output power, output torque, PID reference value, PID feedback value, input terminal status, output terminal status, torque setting, length value, PLC and the current step of multi-step speed, AI1, AI2, AI3, HDI frequency, motor overload percentage, inverter unit overload percentage, ramp reference value, linear speed, AC input current, and frequency upper limit (Hz on). You can determine which parameters are displayed by setting the binary bits of P07.05 and P07.06. You can press >>/SHIFT to shift selected parameters from left to right or press QUICK/JOG (P07.02=2) to shift selected parameters from right to left.

4.3.3. Displaying fault information

After detecting a fault signal, the inverter unit enters the fault alarm state immediately, the fault code blinks on the keypad, and the TRIP indicator is on. You can perform fault reset by using the STOP/RST key, control terminals, or communication commands.

If the fault persists, the fault code is continuously displayed.

4.3.4. Editing function codes

You can press the PRG/ESC key to enter the editing mode in stopped, running, or fault alarm state (if a user password is used, see the description of P07.00). The editing mode contains two levels of menus in the following sequence: Function code group or function code number → Function parameter. You can press the DATA/ENT key to enter the function parameter display interface. On the function parameter display interface, you can press the DATA/ENT key to save parameter settings or press the PRG/ESC key to exit the parameter display interface.

4.4. Operations on the keypad

You can perform various operations on the inverter unit by using the keypad. For details about the structure of the function codes, see the function code list.

4.4.1. How to modify function codes

The inverter unit provides three levels of menus, including:

- Function code group number (level-1 menu)
- Function code number (level-2 menu)
- Function code setting (level-3 menu)

Note: When performing operations on the level-3 menu, you can press the PRG/ESC or DATA/ENT key to return to the level-2 menu. If you press the DATA/ENT key, the set value of the parameter is saved to the control board first, and then the level-2 menu is returned, displaying the next function code. If you press the PRG/ESC key, the level-2 menu is returned directly, without saving the set value of the parameter, and the current function code is displayed.

If you enter the level-3 menu but the parameter does not have a digit blinking, the parameter cannot be modified due to either of the following reasons:

- It is read only. Read-only parameters include actual detection parameters and running record parameters.
- It cannot be modified in running state and can be modified only in stopped state.

Example: Change the value of P00.01 from 0 to 1.

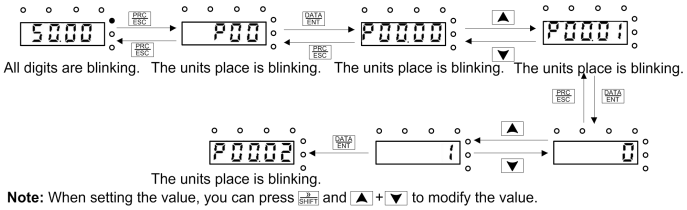


Figure 4.2 Modifying a parameter

4.4.2. How to set the user password

The product provides the user password protection function. When you set P07.00 set to a non-zero value in the function code editing interface, the value is the user password, and the password protection mechanism is enabled immediately after you exit the function code editing interface. "0.0.0.0.0" is displayed when you press the PRG/ESC key again to enter the function code editing interface. You need to enter the correct user password to enter the interface.

If you exit the function code editing interface after setting function codes, the password protection mechanism is enabled within 1 minute. "0.0.0.0.0" is displayed when you press the PRG/ESC key again to enter the function code editing interface. You need to enter the correct user password to enter the interface. To disable the password protection function, you only need to set P07.00 to 0.

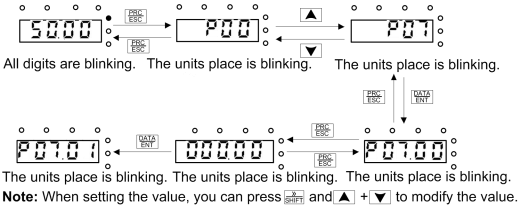


Figure 4.3 Setting the user password

4.4.3. How to view the inverter unit status

The product provides group P17 for status viewing. You can enter group P17 for viewing.

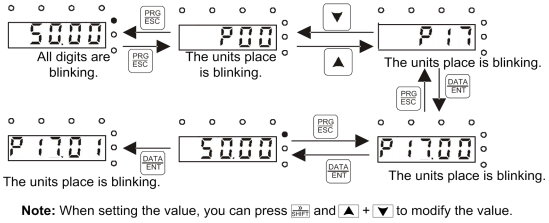


Figure 4.4 Viewing parameter setting

4.5. Basic operation instructions

4.5.1. Commissioning

The common operation procedure (taking the 7.5kW model for example) is as follows:

Step 1 Connect the power and motor cables. After the connection is correct, power on.

Step 2 Check whether the setting of P07.18 is consistent with the power on the nameplate.

Step 3 Set P00.18 to 1 to restore to default settings.

Step 4 Set the control mode, frequency, and ACC/DEC time.

Function code	Setting	Function code	Setting	Function code	Setting
P00.00	2	P00.03	610.0Hz	P00.11	40.0s
P00.01	0	P00.04	610.0Hz	P00.12	40.0s

Step 5 Set the motor ratings.

Function code	Setting	Function code	Setting	Function code	Setting
P02.00	1	P02.17	2	P02.23	300V
P02.15	7.5kW	P02.18	380V		
P02.16	610.0Hz	P02.19	18.0A		

Step 6 Set P00.15 to 2 and press the Run key to perform full static parameter autotuning. Check the autotuning result.

The following table is the lab test data for the 7.5kW model. The data of each motor may differ.

Function code	Setting	Function code	Setting	Function code	Setting
P02.20	0.137	P02.21	1.19	P02.22	2.38

Step 7 Perform low-speed running and check whether the motor rotational direction is correct. If the direction is reverse, swap the motor phase wires.

Step 8 Check whether the output voltage and current are normal by setting the reference frequency from a lower value to a higher value.

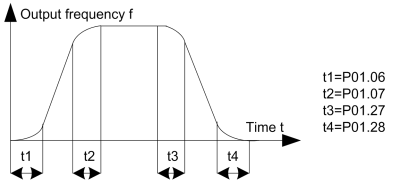
Step 9 Set P00.01, P00.06, frequency upper and lower limits, and other parameters.

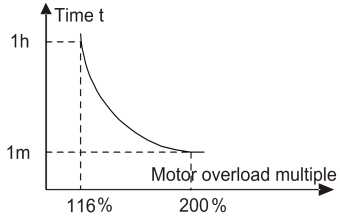
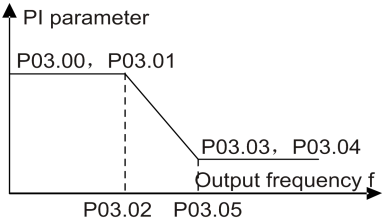
If exceptions occur during commissioning, contact technical support.

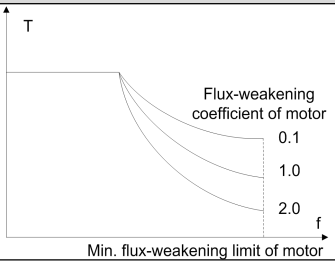
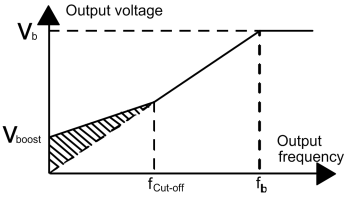
4.5.2. Common function codes

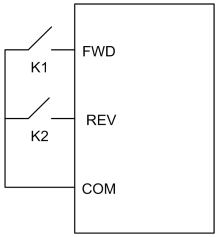
Function code	Function name	Description	Default
P00.00	Speed control mode	0: SVC mode 0 2: SVPWM	2
P00.01	Running command channel	0: Keypad 1: Terminal 2: Communication	0
P00.02	Communication running command	0: MODBUS 1-5: Other communication channels (supported	0

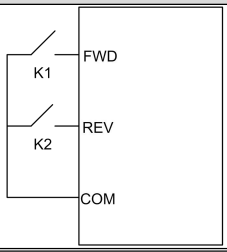
Function code	Function name	Description	Default
	channel	only after corresponding extension cards are installed)	
P00.03	Max. output frequency	P00.04–1200.0Hz	50.0Hz
P00.04	Upper limit of running frequency	P00.05–P00.03	50.0Hz
P00.05	Lower limit of running frequency	0.0Hz–P00.04	0.00Hz
P00.06	A frequency command selection	0: Set through keypad 8: Set through MODBUS communication	0
P00.10	Frequency set through keypad	0.0Hz–P00.03 Note: When P00.06=1, the value is the initial value of frequency setting.	50.0Hz
P00.11	ACC time 1	0.0–3600.0s	Model depended
P00.12	DEC time 1	0.0–3600.0s	Model depended
P00.13	Running direction	0: Run in default direction 1: Run in reverse direction 2: Reverse running is prohibited	0
P00.14	Carrier frequency setting	1.0–15.0kHz	Model depended
P00.15	Motor parameter autotuning	0: No operation 1: Rotary autotuning 2: Static autotuning 1 (comprehensive autotuning) 3: Static autotuning 2 (partial autotuning)	0
P00.16	AVR function	0: Invalid 1: Valid during the whole process	1
P00.18	Function parameter restoration	0: No operation 1: Restore to default values 2: Clear fault history Note: After the selected function operations are done, this function code will be restored to 0 automatically. Use this function with caution. since restoration to default values will clear the user password.	0
P01.00	Running mode of start	0: Direct start	0

Function code	Function name	Description	Default
		1: Start after DC brake 2: Start after speed-tracking 1	
P01.05	ACC/DEC mode	0: Straight line 1: S curve Note: When the function code is set to 1, P01.06, P01.07, P01.27 and P01.28 must be set accordingly.	0
P01.06	Time of starting section of ACC S curve	The curvature of S curve is determined by ACC range and ACC and DEC time.  Setting range: 0.0–50.0s	0.1s
P01.07	Time of ending section of ACC S curve		0.1s
P01.27	Time of starting section of DEC S curve		0.1s
P01.28	Time of ending section of DEC S curve		0.1s
P01.08	Stop mode	0: Decelerate to stop 1: Coast to stop	0
P02.00	Type of motor 1	0: Asynchronous motor (AM) 1: Synchronous motor (SM)	0
P02.15	Rated power of SM 1	0.1–3000.0kW	Model depended
P02.16	Rated frequency of SM 1	0.1Hz–P00.03	50.0Hz
P02.17	Number of pole pairs of SM 1	1–128	2
P02.18	Rated voltage of SM 1	0–1200V	Model depended
P02.19	Rated current of SM 1	0.8–6000.0A	Model depended
P02.20	Stator resistance of SM 1	0.001–65.535Ω	Model depended
P02.21	Direct-axis inductance of SM 1	0.01–655.35mH	Model depended
P02.22	Quadrature-axis inductance of SM 1	0.01–655.35mH	Model depended
P02.23	Counter-emf constant of SM 1	0–10000	300
P02.26	Overload protection of motor 1	0: No protection 1: Common motor (with low-speed compensation) 2: Frequency-variable motor (without low speed compensation)	2

Function code	Function name	Description	Default
P02.27	Overload protection coefficient of motor 1	Setting range: 20.0% – 120.0% Motor overload multiples M=Iout/(In*K) In: motor rated current; Iout: output current; K: protection coefficient 	100.0%
P03.00	Speed loop proportional gain 1	0.0–200.0 	20.0
P03.01	Speed loop integral time 1	0.000–10.000s	0.200s
P03.02	Switching low point frequency	0.00Hz–P03.05	5.0Hz
P03.03	Speed loop proportional gain 2	0.0–200.0	20.0
P03.04	Speed loop integral time 2	0.000–10.000s	0.200s
P03.05	Switching high point frequency	P03.02–P00.03	10.0Hz
P03.06	Speed loop output filter	0–8 (corresponding to 0–2^8/10ms)	0
P03.09	Current loop proportional coefficient P	0–65535 The value of this function code will be updated automatically after parameter autotuning of SM is done.	1000
P03.10	Current loop integral coefficient I	0–65535 The value of this function code will be updated automatically after parameter autotuning of SM is done.	1000
P03.20	Set upper limit of the torque when motoring via keypad	0.0–300.0% (motor rated current)	180.0%
P03.21	Set upper limit of brake torque via keypad	0.0–300.0% (motor rated current)	180.0%
P03.22	Flux-weakening coefficient of constant-power zone	0.1–2.0 Used when AM is in flux-weakening control.	0.3

Function code	Function name	Description	Default
			
P03.23	Min. flux-weakening point of constant-power zone	10%–100%	20%
P03.24	Max. voltage limit	0.0–120.0%	100.0%
P03.25	Pre-exciting time	0.000–10.000s	0.300s
P03.26	Flux-weakening proportional gain	0–8000	1000
P03.37	High-frequency current loop proportional coefficient	0 – 20000	1000
P03.38	High-frequency current loop integral coefficient	0 – 20000	1000
P03.39	Current loop high-frequency switch-over point	0.0–100.0% (relative to max. frequency)	100.0%
P04.01	Torque boost of motor 1	0.0% (automatic)–10.0% (rated voltage of motor 1) The value 0.0% indicates automatic torque boost. 	0.0%
P04.02	Torque boost cut-off of motor 1	0.0%–50.0% (rated frequency of motor 1)	20.0%
P04.10	Low-frequency oscillation control factor of motor 1	0–100	10
P04.11	High-frequency oscillation control factor of motor 1	0–100	10
P04.12	Oscillation control threshold of motor 1	0.0Hz–P00.03	30.0Hz
P04.33	Flux-weakening coefficient in the constant power	1.00–1.30	1.00

Function code	Function name	Description	Default
	zone		
P04.34	Input current 1 in SM VF control	-100.0%–100.0% (motor rated current)	20.0%
P04.35	Input current 2 in SM VF control	-100.0%–100.0% (motor rated current)	20.0%
P04.36	Frequency threshold for input current switching in SM VF control	0.0Hz–P00.03 (Max. output frequency)	50.0Hz
P04.37	Reactive current closed-loop proportional coefficient in SM VF	0–3000	50
P04.38	Reactive current closed-loop integral time in SM VF control	0–3000	30
P04.39	Reactive current closed-loop output limit in SM VF control	0–16000	8000
P05.01	Function of terminal S1	0: No function 1: Forward running 2: Reverse running 6: Coast to stop 7: Fault reset 9: External fault input 21: ACC/DEC time selection 1 22: ACC/DEC time selection 2 42: Switch torque upper limit setting source to keypad 56: Emergency stop 57: Motor over-temperature fault input	1
P05.02	Function of terminal S2		4
P05.03	Function of terminal S3		7
P05.04	Function of terminal S4		0
P05.11	Wire control mode	0: 2-Wire control mode 1  FWD / REV / Running command: OFF / OFF / Stop; ON / OFF / Forward running; OFF / ON / Reverse running; ON / ON / Hold 1: 2-Wire control mode 2	0

Function code	Function name	Description	Default
		 FWD REV Running command OFF OFF Stop ON OFF Forward running OFF ON Stop ON ON Reverse running	
P06.03	RO1 output selection	0: Invalid	1
P06.04	RO2 output selection	1: In running 2: In forward running 3: In reverse running 4: In jogging 5: Inverter fault 6: Frequency level detection FDT1 7: Frequency level detection FDT2 8: Frequency reached 9: Running in zero speed 10: Reach upper limit frequency 11: Reach lower limit frequency 12: Ready to run 13: In pre-exciting 14: Overload pre-alarm 15: Underload pre-alarm 20: External fault is valid 22: Reach running time 23: Virtual terminal output of MODBUS communication	5
P07.00	User password	0–65535	0
P07.27	Type of present fault	0: No fault 4: Overcurrent during acceleration (OC1) 5: Overcurrent during deceleration (OC2) 6: Overcurrent during constant speed (OC3)	
P07.28	Type of last fault		
P07.29	Type of 2nd-last fault		
P07.30	Type of 3rd-last fault		

Function code	Function name	Description	Default
P07.31	Type of 4th-last fault	7: Overvoltage during acceleration (OV1)	
P07.32	Type of 5th-last fault	8: Overvoltage during deceleration (OV2) 9: Overvoltage during constant speed (OV3) 10: Bus undervoltage fault (UV) 11: Motor overload (OL1) 12: Inverter overload (OL2) 13: Phase loss on input side (SPI) 14: Phase loss on output side (SPO) 15: Rectifier module overheat (OH1) 16: Inverter module overheat (OH2) 17: External fault (EF) 18: 485 communication fault (CE) 19: Current detection fault (ItE) 20: Motor autotuning fault (tE) 21: EEPROM operation fault (EEP) 24: Running time reached (END) 25: Electronic overload (OL3) 26: Keypad communication error (PCE) 27: Parameter upload error (UPE) 28: Parameter download error (DNE) 32: To-ground short-circuit fault 1 (ETH1) 33: To-ground short-circuit fault 2 (ETH2) 34: Speed deviation fault (dEu) 35: Mal-adjustment fault (STo) 36: Underload fault (LL) 59: Motor over-temperature fault (OT)	
P13.01	Initial pole detection mode	0: Invalid 1: Reserved 2: Pulse detection mode	0
P13.02	Input current 1	0.0%–100.0% (motor rated current)	20.0%
P13.03	Input current 2	0.0%–100.0% (motor rated current)	10.0%

Function code	Function name	Description	Default
P13.04	Switch-over frequency of input current	0.0Hz–P00.03	10.0Hz
P13.09	Control parameter 2	0–6553.5	2.0
P13.11	Maladjustment detection time	0.0–10.0s	0.5s
P14.00	Local communication address	1–247 Note: The slave address cannot be set to 0.	1
P14.01	Communication baud rate setting	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS 6: 57600BPS 7: 115200BPS	4
P14.02	Data bit check setup	0: No parity check (N, 8, 1) for RTU 1: Even parity (E, 8, 1) for RTU 2: Odd parity (O, 8, 1) for RTU 3: No parity check (N, 8, 2) for RTU 4: Even parity (E, 8, 2) for RTU 5: Odd parity (O, 8, 2) for RTU	1
P14.04	Communication timeout fault	0.0 (Invalid)–60.0s	0.0s
P14.05	Transmission error processing	0: Alarm and coast to stop 1: Do not alarm and continue running 2: Do not alarm and stop as per the stop mode (under communication control mode only) 3: Do not alarm and stop as per the stop mode (under all control modes)	0

5. Troubleshooting

5.1. Fault reset

You can reset the inverter through the STOP/RST key, digital inputs, turning off the inverter power indicator on the keypad. After faults are removed, the motor can be start again.

5.2. Fault history

P07.27–P07.32 record the six latest fault types; P07.33–P07.40, P07.41–P07.48, and P07.49–P07.56 record the running data of the inverter when the latest three faults occurred.

5.3. Inverter faults and solutions

When a fault occurred, handle the fault as follows:

1. When the inverter fault occurred, confirm whether keypad display is improper? If yes, contact INVT.
2. If keypad works properly, check the function codes in P07 group to confirm the corresponding fault record parameters, and determine the real state when current fault occurred through parameters.
3. Check the table below to see whether corresponding exception states exist based on the corresponding corrective measures.
4. Rule out the faults or ask for help from professionals.

After confirming the fault is removed, reset the fault and start running.

5.3.1. Faults and solutions

Fault code	Fault type	Possible cause	Corrective measures
OV1	Over-voltage during acceleration	Exception occurred to input voltage; Large energy feedback; Lack of brake units; Dynamic brake is not enabled	Check input power; Check whether load deceleration time is too short; or the motor starts during rotating; Install dynamic brake units; Check the setup of related function codes
OV2	Over-voltage during deceleration		
OV3	Over-voltage during constant speed running		
OC1	Over-current during acceleration	Acceleration is too fast; Grid voltage is too low; Inverter power is too small; Load transient or exception occurred; To-ground short circuit or	Increase acceleration /deceleration time; Check input power; Select the inverter with larger power; Check if the load is short circuited (to-ground short circuit
OC2	Over-current during deceleration		
OC3	Over-current during constant speed		

Fault code	Fault type	Possible cause	Corrective measures
	running	output phase loss occur; Strong external interference sources; Overvoltage stall protection is not enabled	or line-to-line short circuit) or the rotation is not smooth; Check the output wiring; Check if there is strong interference; Check the setup of related function codes.
UV	Bus undervoltage fault	Grid voltage is too low; Overvoltage stall protection is not enabled	Check grid input power; Check the setup of related function codes
OL1	Motor overload	Grid voltage is too low; Rated motor current is set improperly; Motor stall or load jumps violently	Check grid voltage; Reset rated motor current; Check the load and adjust torque boost
OL2	Inverter overload	Acceleration is too fast; The motor in rotating is restarted; Grid voltage is too low; Load is too large; Power is too small;	Increase acceleration time; Avoid restart after stop; Check grid voltage; Select the inverter with larger power; Select proper motor
SPI	Phase loss on input side	Phase loss or violent fluctuation occurred to R, S and T input	Check the input power; Check installation wiring
SPO	Phase loss on output side	Phase loss occurred to U, V, W output (or the three phases of motor is asymmetrical)	Check the output wiring; Check the motor and cable
OH1	Overheat of rectifier module	Air duct is blocked or fan is damaged; Ambient temperature is too high;	Ventilate the air duct or replace the fan; Lower the ambient temperature
OH2	Overheat of inverter module		

Fault code	Fault type	Possible cause	Corrective measures
		Long-time overload running	
EF	External fault	SI external fault input terminal acts	Check external device input
CE	485 communication fault	Baud rate is set improperly; Communication line fault; Communication address error; Communication suffers from strong interference	Set proper baud rate; Check the wiring of communication interfaces; Set proper communication address; Replace or change the wiring to enhance anti-interference capacity
ItE	Current detection fault	Poor contact of the connector of control board; Hall component is damaged; Exception occurred to amplification circuit	Check the connector and re-plug; Replace the hall component; Replace the main control board
tE	Motor autotuning fault	Motor capacity does not match with the inverter capacity, this fault may occur easily if the difference between them is exceeds five power classes; Motor parameter is set improperly; The parameters gained from autotuning deviate sharply from the standard parameters; Autotuning timeout	Change the inverter model, or adopt V/F mode for control; Set proper motor type and nameplate parameters; Empty the motor load and carry out autotuning again; Check motor wiring and parameter setup; Check whether upper limit frequency is larger than 2/3 of the rated frequency
EEP	EEPROM fault	R/W error occurred to the control parameters; EEPROM is damaged	Press STOP/RST to reset; Replace the main control board

Fault code	Fault type	Possible cause	Corrective measures
END	Running time is up	The actual running time of the inverter is larger than the set running time	Ask help from the supplier, adjust the set running time
OL3	Electronic overload fault	The inverter releases overload pre-alarm based on the set value	Check the load and overload pre-alarm threshold
PCE	Keypad communication fault	The keypad wire is poorly contacted or disconnected; The keypad wire is too long and suffers strong interference; Circuit fault occurred to the keypad or communication part of the main board	Check the keypad wires to confirm whether fault exists; Check the surroundings to rule out interference source; Replace the hardware and ask for maintenance service
UPE	Parameter upload error	The keypad wire is poorly contacted or disconnected; The keypad wire is too long and suffers strong interference; Circuit fault occurred to the keypad or communication part of the main board	Check the surroundings to rule out interference source; Replace the hardware and ask for maintenance service; Replace the hardware and ask for maintenance service
DNE	Parameter download error	The keypad wire is poorly contacted or disconnected; The keypad wire is too long and suffers strong interference; Data storage error occurred to the keypad	Check the surroundings to rule out interference source; Replace the hardware and ask for maintenance service; Re-backup keypad data
ETH1	To-ground short circuit fault 1	Inverter output is short connected to the ground; Current detection circuit is faulty; Actual motor power setup	Check whether motor wiring is proper; Replace the hall component; Replace the main control board;

Fault code	Fault type	Possible cause	Corrective measures
		deviates sharply from the inverter power	Reset the motor parameters properly
ETH2	To-ground short circuit fault 1	Inverter output is short connected to ground; Current detection circuit is faulty; Actual motor power setup deviates sharply from the inverter power	Check whether motor wiring is proper; Replace the hall component; Replace the main control board; Reset the motor parameters properly
dEu	Speed deviation fault	Load is too heavy, or stall occurred	Check the load to ensure it is proper, increase the detection time; Check whether control parameters are set properly
STo	Maladjustment fault	Control parameters of SM is set improperly; The parameter gained from autotuning is inaccurate; The inverter is not connected to motor	Check the load to ensure it is proper, Check whether load is proper; Check whether control parameters are set correctly; Increase maladjustment detection time
LL	Electronic underload fault	The inverter performs underload pre-alarm based on the set value	Check the load and overload pre-alarm threshold
OT	Motor over-temperature fault	Motor over-temperature input terminal is valid; Exception occurred to t temperature detection Exception occurred to resistor; Long-time overload running or exception occurred	Check the wiring of motor over-temperature input terminal (terminal function 57); Check whether temperature sensor is proper; Check the motor and perform maintenance on the motor

5.3.2. Other state

Displayed code	State type	Possible cause	Solution
PoFF	System power failure	The system is powered off or the bus voltage is too low.	Check the grid conditions.

5.4. Countermeasures on common interference

5.4.1. Interference on meter switches and sensors

Pressure, temperature, displacement, and other signals of a sensor are collected and displayed by a human-machine interaction device. The values are incorrectly displayed as follows after the inverter is started:

1. The upper or lower limit is wrongly displayed, for example, 999 or -999.
2. The display of values jumps (usually occurring on pressure transmitters).
3. The display of values is stable, but there is a large deviation, for example, the temperature is dozens of degrees higher than the common temperature (usually occurring on thermocouples).
4. A signal collected by a sensor is not displayed but functions as a drive system running feedback signal. For example, an inverter is expected to decelerate when the upper pressure limit of the compressor is reached, but in actual running, it starts to decelerate before the upper pressure limit is reached.
5. After an inverter is started, the display of all kinds of meters (such as frequency meter and current meter) that are connected to the analog output (AO) terminal of the inverter is severely affected, displaying the values incorrectly.
6. Proximity switches are used in the system. After an inverter is started, the indicator of a proximity switch flickers, and the output level flips.

Solution

1. Check and ensure that the feedback cable of the sensor is 20 cm or farther away from the motor cable.
2. Check and ensure that the ground wire of the motor is connected to the PE terminal of the inverter (if the ground wire of the motor has been connected to the ground block, you need to use a multimeter to measure and ensure that the resistance between the ground block and PE terminal is lower than 1.5 Ω).
3. Try to add a safety capacitor of 0.1 μF to the signal end of the feedback signal terminal of the sensor.
4. Try to add a safety capacitor of 0.1 μF to the power end of the sensor meter (pay attention to the voltage of the power supply and the voltage endurance of the capacitor).
5. For interference on meters connected to the AO terminal of an inverter, if AO uses current signals

of 0 to 20 mA, add a capacitor of 0.47 μF between the AO and GND terminals; and if AO uses voltage signals of 0 to 10 V, add a capacitor of 0.1 μF between the AO and GND terminals.

Note:

1. When a decoupling capacitor is required, add it to the terminal of the device connected to the sensor. For example, if a thermocouple is to transmit signals of 0 to 20 mA to a temperature meter, the capacitor needs to be added on the terminal of the temperature meter.; if an electronic ruler is to transmit signals of 0 to 30 V to a PLC signal terminal, the capacitor needs to be added on the terminal of the PLC.

1. If a large number of meters or sensors are disturbed. It is recommended that you configure an external C2 filter on the input power end of the inverter.

5.4.2. Interference on RS485 communication

The interference described in this section on RS485 communication mainly includes communication delay, out of synchronization, occasional power-off, or complete power-off that occurs after the inverter is started.

If the communication cannot be implemented properly, regardless of whether the inverter is running, the exception cause may not be interference. You can find out the cause as follows:

1. Check whether the 485 communication bus is disconnected or in poor contact.
2. Check whether lines A and B are connected reversely.
3. Check whether the communication protocol (such as the baud rate, data bits, and check bit) of the inverter is consistent with that of the upper computer.
4. If you are sure that communication exceptions are caused by interference, you can resolve the problem through the following measures:
5. Simple inspection.
6. Arrange the communication cables and motor cables in different cable trays.
7. In multi-inverter application scenarios, adopt the chrysanthemum connection mode to connect the communication cables between inverters, which can improve the anti-interference capability.
8. In multi-inverter application scenarios, check and ensure that the driving capacity of the master is sufficient.
9. In the connection of multiple inverters, you need to configure one 120 Ω terminal resistor on each end.

Solution

1. Check and ensure that the ground wire of the motor is connected to the PE terminal of the inverter (if the ground wire of the motor has been connected to the ground block, you need to use a multimeter to measure and ensure that the resistance between the ground block and PE terminal is lower than 1.5 Ω).

2. Do not connect the inverter and motor to the same ground terminal as the upper computer (such as the PLC, HMI, or touchscreen). It is recommended that you connect the inverter and motor to the power ground, and connect the upper computer separately to a ground stud.
3. Try to short the signal reference ground terminal (GND) of the inverter with that of the upper computer controller to ensure that ground potential of the communication chip on the control board of the inverter is consistent with that of the communication chip of the upper computer.
4. Try to short GND of the inverter to its ground terminal (PE).
5. Try to add a safety capacitor of 0.1 μF on the power terminal of the upper computer (PLC, HMI, or touch screen). During this process, pay attention to the voltage of the power supply and the voltage endurance capability of the capacitor. Alternatively, you can use a magnet ring (Fe-based nanocrystalline magnet rings are recommended). Put the power L/N line or +/- line of the upper computer through the magnet ring in the same direction and wind 8 coils around the magnet ring.

5.4.3. Leakage current and interference on RCD

The inverter outputs high-frequency PWM voltage to drive the motor. In this process, the distributed capacitance between the internal IGBT of the inverter and the heat sink and that between the stator and rotor of the motor may inevitably cause the inverter to generate high-frequency leakage current to the ground. A residual current operated protective device (RCD) is used to detect the power-frequency leakage current when a grounding fault occurs on a circuit. The application of the inverter may cause misoperation of a RCD.

1. Rules for selecting RCDs

(1) Inverter systems are special. In these systems, it is required that the rated residual current of common RCDs at all levels is larger than 200 mA, and the inverter is grounded reliably.

(2) For RCDs, the time limit of an action needs to be longer than that of a next action, and the time difference between two actions need to be longer than 20 ms. For example, 1s, 0.5s, and 0.2s.

(3) For circuits in inverter systems, electromagnetic RCDs are recommended. Electromagnetic RCDs have strong anti-interference capability, and thus can prevent the impact of high-frequency leakage current.

Electronic RCD	Electromagnetic RCD
Low cost, high sensitivity, small in volume, susceptible to voltage fluctuation of the grid and ambient temperature, weak anti-interference capability	Requiring highly sensitive, accurate, and stable zero-phase sequence current transformer, using permalloy high-permeability materials, complex process, high cost, not susceptible to voltage fluctuation of the power supply and ambient temperature, strong anti- interference capability

2. Solution to RCD misoperation (handling the inverter)

1. Try to remove the jumper cap at "EMC/J10" on the middle casing of the inverter.
2. Try to reduce the carrier frequency to 1.5 kHz (P00.14=1.5).
3. Try to modify the modulation mode to "3PH modulation and 2PH modulation" (P8.40=0).

3. Solution to RCD misoperation (handling the system power distribution)

(1) Check and ensure that the power cable is not soaking in water.

(2) Check and ensure that the cables are not damaged or spliced.

(3) Check and ensure that no secondary grounding is performed on the neutral wire.

(4) Check and ensure that the main power cable terminal is in good contact with the air switch or contactor (all screws are tightened).

(5) Check 1PH powered devices, and ensure that no earth lines are used as neutral wires by these devices.

(6) Do not use shielded cables as inverter power cables and motor cables.

5.4.4. Live device housing

After the inverter is started, there is sensible voltage on the housing, and you may feel an electric shock when touching the housing. The housing, however, is not live (or the voltage is far lower than the human safety voltage) when the inverter is powered on but not running.

Solution

1. If there is power distribution grounding or ground stud on the site, ground the cabinet housing of the drive system through the power ground or stud.
2. If there is no grounding on the site, you need to connect the motor housing to the ground terminal PE of the inverter, and ensure that the jumper at "EMC/J10" on the middle casing of the inverter is shorted.

Appendix A Dimensional drawing

A.1. Keypad structure and mounting dimensions

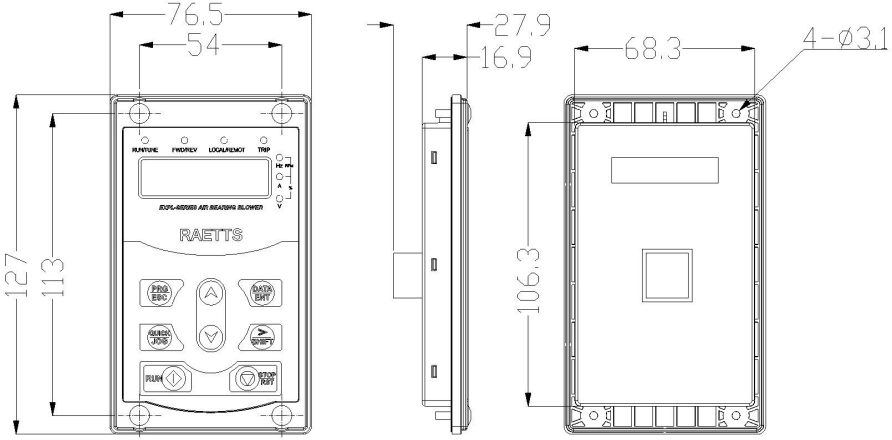


Figure A.1 Keypad structure

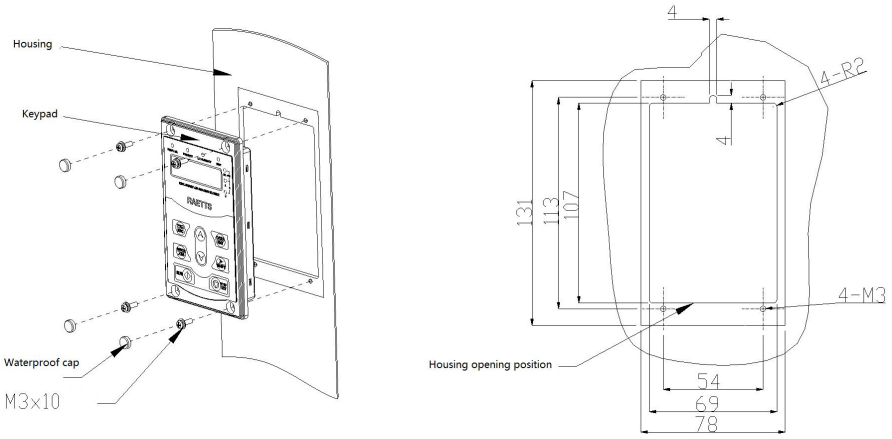


Figure A.2 Installation dimensions (unit: mm)

A.2. Inverter unit structure and installation dimensions

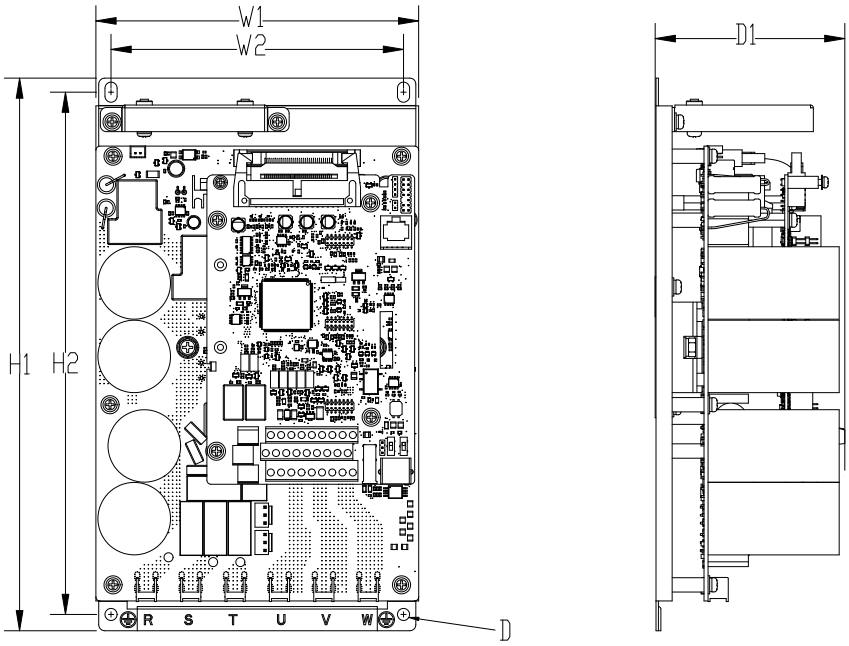


Figure A.3 7.5kW – 22kW product structure

Table A.1 Installation dimensions (unit: mm)

Product model	W1	W2	H1	H2	D1	Hole diameter
7.5kW	160	145	274.5	259.5	94	6
22kW	195	174.2	386	369	110	7

Appendix B More information

For more information such as installation and use precautions, see Goodrive350 series high-performance multifunction VFD operation manual.

You can obtain the manual in PDF format and other product files from the internet. Visit www.invt.com and choose **Service and Support** > **Data Download**.