



FD590 Series

MPPT Based Solar Pump Inverter



User Manual

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01

Safety Precautions

1.1 Contents of this chapter

This chapter describes the safety precautions required for using this product properly. Before using this product, please read this manual and correctly understand the relevant information on safety precautions. Failure to follow the safety precautions may result in death, serious injury, or equipment damage.

1.2 Safety class definition

Danger: Failure to comply with the relevant requirements can result in serious injury or even death.

Warning: Failure to comply with the relevant requirements can result in physical injury or equipment damage.

Note: Steps taken to ensure proper operation which can result in minor physical injury or damage to the equipment.

Qualified professional: refers to the personnel operating the equipment must have received professional electrical training and safety training and passed the examination and must be familiar with the steps and requirements of equipment installation, commissioning, operation and maintenance, and can avoid all kinds of emergencies.

1.3 Safety class definition

Warning indicates a situation that may cause serious injury and/or equipment damage and provides recommendations to avoid the danger. The following warning symbols are used in this manual:



Danger: Failure to comply with the relevant requirements can result in serious injury or even death.



Warning: Failure to comply with the relevant requirements can result in physical injury or equipment damage.



Electrostatic sensitivity: Failure to comply with the relevant requirements can result in damage to the PCBA board.



High temperature: The base of the inverter produces high temperature. Do not touch it.



Electric shock: To prevent electric shock due to high voltage existing in the bus capacitor after power off, wait at least 5 minutes (or 15 minutes, 25 minutes, refer to the warning symbols on the machine).



Read manual: Read the manual before operating the equipment.

Note

Note: Steps taken to ensure proper running.

1.4 Safety guidelines

Only qualified personnel are allowed to perform relevant operations.

Do not perform operations such as wiring, inspection and replacing components while the power is on. Before wiring and inspection, confirm that all input power supplies have been disconnected, and wait for not less than the time marked on the inverter or confirm that the DC bus voltage is lower than 36V. The minimum waiting time is as follows:



Inverter model	Minimum waiting time
380V 0.75kW~110kW	5 minutes
380V 132kW~315kW	15 minutes
380V 355kW above	25 minutes



Unauthorized modification of the frequency converter is strictly prohibited; otherwise, it may cause fire, electric shock or other injury.



When the machine is running, the radiator base may produce high temperature. Do not touch it to avoid burns.



The electronic components in the frequency converter are electrostatic sensitive, and anti-static measures must be taken during related operations.

1.4.1 Handling and installation

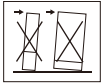


Do not install the frequency converter on flammable materials, and keep the frequency converter from contacting or adhering to flammable materials.

If the frequency converter is damaged or lacks components, do not run it.

Do not contact the frequency converter with damp objects or body parts.

Otherwise, electric shock may occur.



Do not push the frequency converter sideways during handling.

Prevent tipping to both sides during handling.

Note:

- Choose the appropriate handling and installation tools to ensure the normal and safe operation of the inverter and avoid physical injury. Installation personnel must take mechanical protective measures to ensure personal safety, such as wearing safety shoes, work clothes and so on.
- During the handling and installation, it is necessary to protect the frequency converter from physical impact and vibration.
- Do not only hold the front cover plate when handling to avoid falling off.
- The inverter must be installed in an area away from children and other members of the public.
- When the altitude exceeds 1000m, please derate by 1% for every increase of 100m.
- Use the inverter in a suitable environment (see section 4.2.1 Installation environment for details).
- Prevent screws, cables, and other conductive objects from falling into the inverter.
- When the inverter is running, the leakage current may exceed 3.5mA. Ensure reliable grounding and the grounding resistance less than 10Ω. The conductivity of the PE grounding conductor is the same as that of the phase conductor (using the same cross-sectional area).
- R, S, T are the input terminals of the power supply, and U, V, W are the output motor terminals. Please connect the input power cable and the motor cable correctly; otherwise the inverter may be damaged.

1.4.2 Commissioning and operation

Before the inverter terminal wiring, all the power supplies connected to the inverter must be cut off, and wait for not less than the time marked on the inverter after disconnecting the power supplies.

When the inverter is running, there is high voltage inside. Do not perform any operations on the inverter except keypad setting. The control terminal of the frequency converter is ELV (Extra Low Voltage) circuit. In the case of no protection isolation, direct connection between the control terminal and the accessible terminal of other devices should be avoided.

When the power off restart function is enabled, the frequency converter may restart by itself. Do not get close to the frequency converter and the motor.

This device cannot be used as an "emergency stop device".

This equipment can not be used as an emergency brake motor. A mechanical braking device must be installed.



When driving the permanent magnet synchronous motor, in addition to paying attention to the above items before installation and maintenance, the following work must be confirmed:

1. All input power supplies have been disconnected, including the main power supply and control power supply.
2. The permanent magnet synchronous motor has stopped, and the voltage on the output end of the inverter is lower than 36V.
3. Wait for not less than the time marked on the inverter after the permanent magnet synchronous motor stops, and the voltage between + and - is lower than 36V.
4. During operation, it must be ensured that the permanent magnet synchronous motor is not possible to rotate again due to the action of external load. It is recommended to install an effective external brake device or directly disconnect direct electrical connection between the permanent magnet synchronous motor and the inverter.

Note:

- Do not frequently switch on or switch off the input power supplies of the

inverter.

- If the inverter has been stored for a long time, it must be inspected, capacitive setting (see "9 Care and maintenance") and trial run before use.
- The front cover plate must be covered before the frequency converter is run; otherwise there will be a risk of electric shock.

1.4.3 Service, maintenance and component replacement

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



Before the inverter terminal wiring, all the power supplies connected to the inverter must be cut off, and wait for not less than the time marked on the inverter after disconnecting the power supplies.

In the process of service, maintenance and component replacement, measures must be taken to avoid screws, cables and other conductive objects entering inside the inverter.

Note:

- The frequency converter cannot be tested for insulation withstand voltage, and the control circuit of the frequency converter cannot be tested with a megohm meter.
- In the process of service, maintenance and component replacement, anti-static measures must be taken for the frequency converter and internal components.

1.4.4 Disposal after scrapping



The frequency converter contains heavy metals, and it must be treated as industrial waste after scrapping.



This product cannot be disposed of at will when discarded, and it must be classified, collected and treated specially.

02

Quick Use

2.1 Contents of this chapter

This chapter introduces the basic principles that need to be paid attention to during the installation and commissioning of the inverter, so as to facilitate rapid installation and commissioning of the inverter.

2.2 Unpacking inspection

Carry out the following inspection after receiving the product:

1. Is the packing box complete, damaged or damp? If yes, do not install!
 2. Is the model identification outside the packing box consistent with the model ordered? If there are any differences, do not install!
 3. After unpacking, check whether there is any abnormal phenomenon such as water stain inside the packing box. Is the shell of the machine damaged or broken? If yes, do not install!
 4. Check whether the machine nameplate is consistent with the model identification outside the packing box. If there are any problems, do not install!
 5. Check whether the accessories (including the manual, control panel and expansion card) inside the packing box are complete. If there are any problems, do not install!
-

2.3 Use confirmation

Confirm the following before use:

1. Confirm the load mechanical type driven by the frequency converter and whether the frequency converter exists overload state in actual operation.
Does the frequency converter need to amplify the power level?
 2. Confirm whether the power grid voltage is consistent with the rated voltage of the inverter.
-

-
3. Confirm whether the control accuracy required by the actual load is the same as that provided by the inverter and whether the required function needs to be equipped with an expansion card.
-

2.4 Environment confirmation

Confirm the following before actual installation and use:

1. Is the actual ambient temperature for the inverter more than 40°C? If yes, please derate by 1% for every 1°C increase. Besides, do not use the inverter when the ambient temperature exceeds 50°C.

Note: For the frequency converter installed in the cabinet, the ambient temperature is the air temperature in the cabinet.

2. Is the actual ambient temperature for the inverter lower than -10°C? If yes, it is necessary to increase heating devices.

Note: For the frequency converter installed in the cabinet, the ambient temperature is the air temperature in the cabinet.

3. Is the altitude of the actual application environment for the frequency converter more than 1000m? If yes, please derate by 1% for every 100m increase.
 4. Is the humidity of the actual application environment for the frequency converter more than 90%? Is there condensation phenomenon? If yes, take extra protection measures.
 5. Is there direct sunlight or external biological invasion in the actual application environment for the frequency converter? If yes, take extra protection measures.
 6. Is there dust, explosive and flammable gas in the actual application environment for the frequency converter? If yes, take extra protection measures.
-

2.5 Installation confirmation

Confirm the following after the installation of the inverter is completed:

1. Whether the current carrying capacity selection of the input power cable and motor cable meets the actual load requirements.
 2. Whether the selection of accessories for the frequency converter is correct and installed properly. Whether the installation cable meets the requirements of its carrying capacity, including input reactor, input filter, output reactor, output filter and DC reactor.
 3. Whether the frequency converter is installed on the flame retardant material. Whether its heating accessories (reactors, etc.) have been far away from flammable materials.
 4. Whether all control cables have been routed separately from power cables. Whether its wiring is fully considered EMC characteristics requirements.
 5. Whether all grounding systems have been properly grounded according to the requirements of the inverter.
 6. Whether the installation spacing for the frequency converter meets the requirements in the manual.
 7. Whether the installation method of the frequency converter meets the requirements in the manual. Try vertical installation.
 8. Whether the external terminal of the inverter is tight and whether the torque meets the requirements.
 9. Make sure that there are no screws, cables, and other conductive objects left inside the inverter. If so, please take it out.
-

2.6 Basic commissioning

Follow the following steps to complete the basic commissioning before use:

-
1. According to the actual motor parameters, select the motor type, set the accurate motor parameters, and select the inverter control mode.
 2. Whether autotuning is required. If possible, de-couple the inverter from the motor load and carry out dynamic parameter autotuning. If the inverter cannot be de-coupled from the load, choose static autotuning.
 3. Adjust the acceleration and deceleration time according to the actual load conditions.
 4. Perform device commissioning by means of jogging and confirm whether the motor steering is consistent with the required direction. If opposite, it is recommended to change the motor running direction by replacing any two-phase motor wiring.
 5. Set all control parameters for actual operation.
-

03

Product Overview

3.1 Model code

FD590—5R5G—4

①

②

③

Product series: FD590: FD590 series solar pump inverter

①

Rated power: 5R5G: 5.5kW

②

G: constant torque load

Voltage class: 4: AC 3PH 380V (-15%) ~ 440V (+10%)

③

2: AC 3PH 220V (-15%) ~ 240V (+10%)

S2: AC 1PH 220V (-15%) ~ 240V (+10%)

SS2: AC 1PH input/output 220V (-15%) ~ 240(+10%)

3.2 Product specifications

Model	-SS2	-S2	-2	-4
AC input voltage (V)	220 (-15%)~240 (+10%) (1PH)		220 (-15%) ~240 (+10%) (3PH)	380 (-15%)~440 (+10%) (3PH)
Maximum DC voltage (V)	440	440	440	900
Starting voltage (V)	200	200	200	300
Minimum operating voltage (V)	150	150	150	250
Recommended DC input voltage range (V)	200~400	200~400	200~400	300~800
Recommended MPP voltage (V)	330	330	330	550

3.3 Product ratings

Single phase -SS2 inverters 220V input/output (0.4 to 2.2kW)

Inverter Model	Rated Output power (kW)	Rated Input current (A)	Rated Output current (A)	Maximum DC input current (A)
FD590-0R4G-SS2	0.4	6.5	4.2	9
FD590-0R7G-SS2	0.75	9.3	7.2	9
FD590-1R5G-SS2	1.5	15.7	10.2	12
FD590-2R2G-SS2	2.2	24	14	12
Single phase -S2 inverters 220V input (0.4 to 2.2kW)				
Inverter Model	Rated Output power (kW)	Rated Input current (A)	Rated Output current (A)	Maximum DC input current (A)
FD590-0R4G-S2	0.4	6.5	2.5	9
FD590-0R7G-S2	0.75	9.3	4.2	9
FD590-1R5G-S2	1.5	15.7	7.5	12
FD590-2R2G-S2	2.2	24	10	12
Three phase -2 inverters 220V series (1.5 to 7.5kW)				
Inverter Model	Rated Output power (kW)	Rated Input current (A)	Rated Output current (A)	Maximum DC input current (A)
FD590-1R5G-2	1.5	7.7	7.5	12
FD590-2R2G-2	2.2	11	10	12
FD590-4R0G-2	4	17	16	20
FD590-5R5G-2	5.5	25	20	30
FD590-7R5G-2	7.5	33	30	40
Three phase -4 inverters 380V series (0.75 to 500kW)				
Inverter Model	Rated Output power (kW)	Rated Input current (A)	Rated Output current (A)	Maximum DC input current (A)
FD590-0R7G-4	0.75	3.4	2.5	9
FD590-1R5G-4	1.5	5.0	4.2	9
FD590-2R2G-4	2.2	5.8	5.5	12
FD590-4R0G-4	4.0	13.5	9.5	16.5

FD590-5R5G-4	5.5	19.5	14	23.9
FD590-7R5G-4	7.5	25	18.5	30.6
FD590-011G-4	11	32	25	39.2
FD590-015G-4	15	40	32	49
FD590-018G-4	18.5	47	38	50
FD590-022G-4	22	51	45	60
FD590-030G-4	30	70	60	81
FD590-037G-4	37	80	75	90
FD590-045G-4	45	98	92	130
FD590-055G-4	55	128	115	150
FD590-075G-4	75	139	150	200
FD590-090G-4	90	168	180	250
FD590-110G-4	110	201	215	300
FD590-132G-4	132	265	260	360
FD590-160G-4	160	310	305	430
FD590-185G-4	185	345	340	500
FD590-200G-4	200	385	380	550
FD590-220G-4	220	430	425	480
FD590-250G-4	250	485	480	525
FD590-280G-4	280	545	530	600
FD590-315G-4	315	610	600	690
FD590-355G-4	355	625	650	760
FD590-400G-4	400	715	720	870
FD590-450G-4	450	840	820	970
FD590-500G-4	500	890	860	1100

04

Installation Instructions

4.1 Contents of this chapter

This chapter describes the mechanical and electrical installation of the frequency converter.

Only trained and qualified professionals can perform the work described in this chapter. Follow the instructions in Safety Precautions. Ignoring these safety precautions may result in physical injury or damage to the equipment.

Ensure that the power supply of the inverter is disconnected during installation. If the frequency converter has been powered on, then after the POWER is off, and the waiting time is not shorter than the time indicated on the frequency converter, and confirm that the power light has been turned off. It is recommended to directly use a multimeter to monitor the frequency converter DC bus voltage below 36V.



The installation design of the frequency converter must comply with the relevant laws and regulations of the installation place. If the installation of the inverter breaches local laws or regulations, the company does not assume any responsibility. In addition, if the user does not follow these suggestions, then the frequency converter may have some faults that are not covered by the warranty or quality guarantee.

4.2 Mechanical Installation

4.2.1 Installation environment

The installation environment is essential for the inverter to operate with best performance in the long run. Please install the inverter in the environment shown in the following table.

Environment	Conditions
Installation site	Indoors
Ambient temperature	-10°C to +50°C. When the ambient temperature exceeds 40°C, derate the output current by 1% for every 1°C increase. We do not recommend the use of inverter in the environment above 50°C.

	In order to improve the reliability of the machine, please use the inverter in a place where the temperature does not change dramatically. When the inverter is used in a closed space such as a control cabinet, use a cooling fan or cooling air conditioner for cooling to prevent the internal temperature from exceeding the condition temperature. When the temperature is too low and the inverter has been idled for a long time, install an external heating device before the use to eliminate the freeze inside the inverter. Otherwise, the inverter may be damaged.
Humidity	The relative humidity of the air is less than 90%. No condensation is allowed. The maximum relative humidity should not exceed 60% in the environment where corrosive gases are present.
Storage temperature	-30°C ~ +60°C
Operating environmental conditions	Please install the inverter in the following places: Away from sources of electromagnetic radiation. Free of oil mist, corrosive gas, flammable gas, etc. Metal powder, dust, oil, water and other foreign objects will not enter into the inverter (please do not install the inverter on wood and other flammable materials). No radioactive substances, inflammable substances. Free of harmful gases or liquids. Low salt. No direct sunlight.
Altitude	Below 1000m. When the altitude exceeds 1000m above, derate 1% for every increase of 100m.
Vibration	Maximum acceleration no more than 5.8m/s ² (0.6g).
Mounting direction	In order not to reduce the heat dissipation effect of the inverter, it is recommended to install the inverter vertically.

4.2.2 Installation direction

The inverter can be mounted on the wall or in a cabinet.

The inverter must be mounted in a vertical direction. Please check the installation position according to the requirements below. See "Appendix B Dimensional

Drawing" for details on overall dimensions.



Figure 4-1 Installation direction (vertical installation)

4.2.3 Installation method

According to the overall size of the inverter, there are two installation methods: wall-mounted installation and floor installation (30~500kW frequency converter).

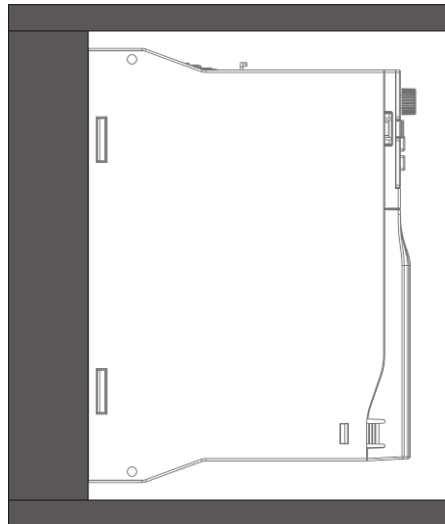


Figure 4-2 Installation method (wall-mounted installation)

The installation steps are as follows:

Step 1 Mark the location of the mounting holes. See "Appendix B Dimensional Drawing" for the location of mounting holes.

Step 2 Secure the screws or bolts to the marked positions.

Step 3 Place the frequency converter against the wall.

Step 4 Tighten the fastening screws on the wall.

4.2.4 Single mounting

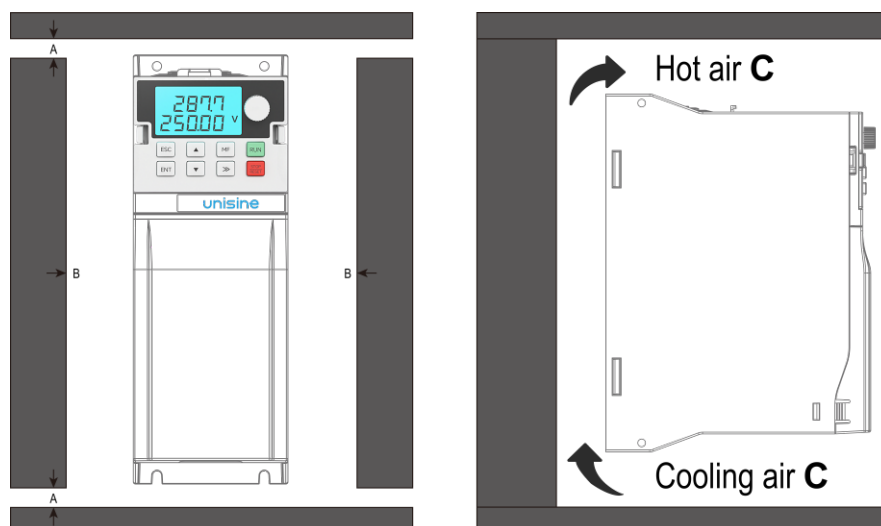


Figure 4-3 Single mounting

Note:

The minimum mounting clearance required for B and C is 100mm.

4.2.5 Multiple mounting

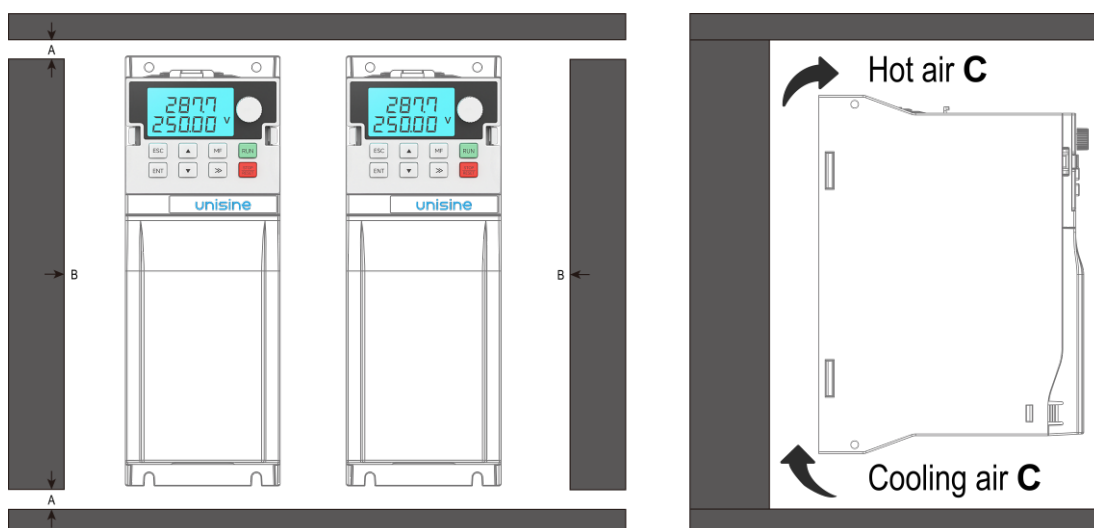
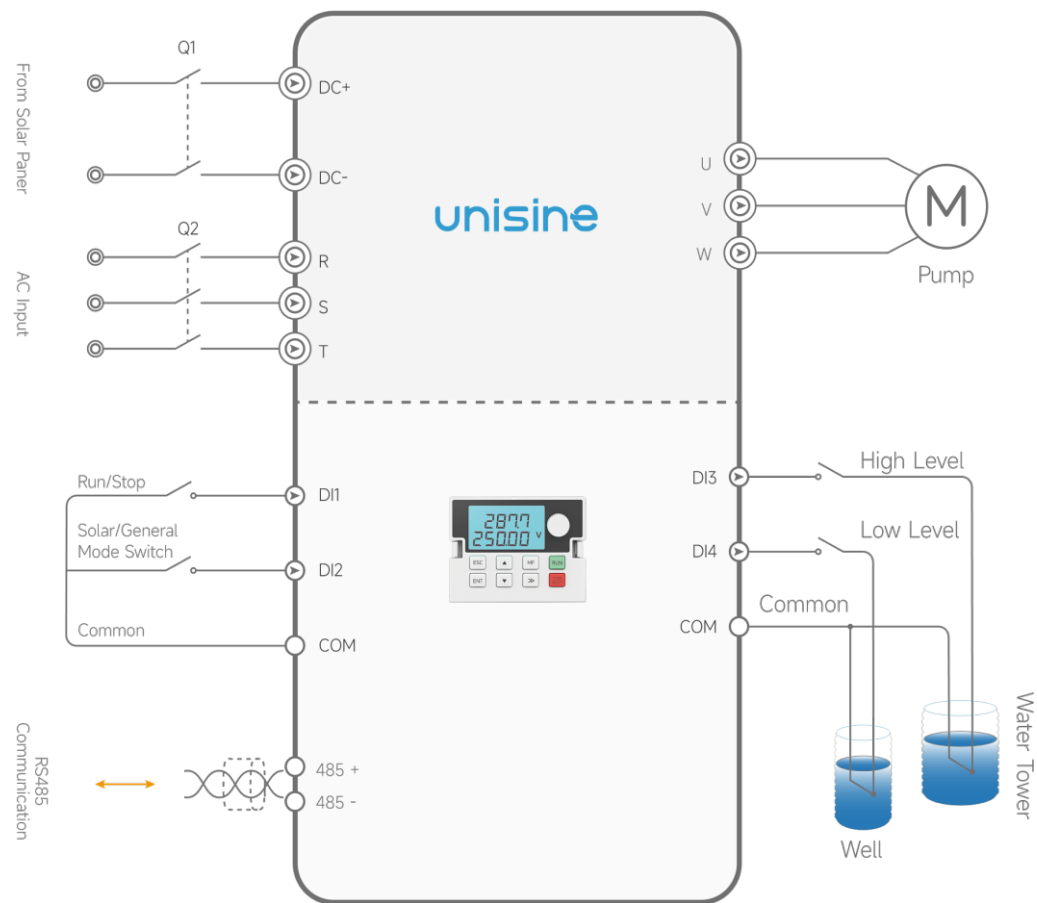


Figure 4-4 Parallel mounting

Note:

- ✧ When installing frequency converters of different sizes, align the upper part of the frequency converters before installation. This will facilitate later maintenance.
- ✧ The minimum mounting clearance required for B, and C is 100mm.

4.3 Standard wiring



4.3.1 Wiring diagram of main circuit

- ✧ The DC circuit breaker Q1 must be installed as a protection switch for the PV DC input.
- ✧ When the components are connected in parallel, the photovoltaic special bus box should be selected.
- ✧ When the distance between the photovoltaic cell module and the frequency converter exceeds 10m, the DC input end needs to be configured with Type II lightning arrester.
- ✧ If the distance between the water pump and the frequency converter exceeds 50m, it is recommended to configure an output reactor.
- ✧ The frequency converter runs automatically at power-on. If it is necessary to set parameters, strictly follow 5.9 Basic operating instructions.

Terminal symbol	Function Description
R, S, T (L, N)	Three-phase (single-phase) AC input terminals, connected to the grid. Note: The screws supplied with the inverter need to be used for wiring.

(+), (-) Photovoltaic panel input terminals

U, V, W Three-phase (single-phase) AC output terminals, generally connected to the motor of the water pump



Safety protection ground terminal, each machine must be reliably grounded

4.4 Standard wiring of control circuit

22kW and below:

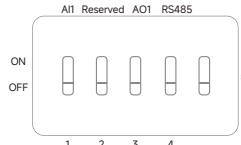
E2RW and below:									
485+		485-		DI1	DI3	HDI	T1A	T1B	T1C
	AI1	AO1	+10V	DI2	DI4	HDO	COM	PW	24V

30kw and above

+10/5V	GND	AI1	AI2	COM	DI1	DI2	DI3	DI4	DI5	DI6	DI7	DO	T1A	T1B	T1C
PE	485+	485-	GND	AO1	AO2	+24V	PW	COM	HDI	HDO	COM	CME	T2A	T2B	T2C

Description of control circuit terminals (22kW and below):

Terminal name	Instructions
+10V	+10.5V power supply provided by the machine, 10V/5V power supply can be provided for models above 22kW
AI1	1. input range: AI1 voltage and current optional 0(2) ~10V, 0(4)~20mA 2. input impedance: voltage input 20kΩ, current input 250Ω, AI1 voltage or current input by the code switch SW1 set 3. resolution: when 10V corresponds to 50Hz, the minimum resolution is 5mV 4. 25°C, input 5V or 10mA above, error ±0.5% 5. can be connected to the expansion card to increase 2 analog inputs
GND	+10.5V reference ground
AO	1. output range: 0(2) ~10V voltage or 0(4) ~20mA current 2. AO voltage or current output is set by the code switch SW1 3. 25°C, output 5V, error ±0.5% 4. can be connected to the expansion card to increase 1 analog output
T1A	1. relay output; T1A-T1B normally closed, T1A-T1C normally open
T1B	2. contact capacity: 3A/AC250V, 1A/DC30V, 3A/AC250V, 1A/DC30V
T1C	3. can be connected to the expansion card to increase 1 relay output

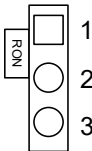
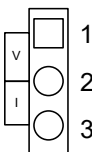
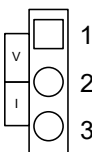
COM	+24V reference ground		
485 +	Use shielded twisted pair cable for 485 communication port, 485 differential signal port, and standard 485 communication port. 120 OHM terminal of 485 communication matching resistor is connected through SW1.		
485 -			
PE	Ground terminal		
PW	Digital external power input terminals, voltage range: 12~30V		
24V	Inverter provides user power supply, 24V(-10%~+15%), maximum output current 200mA		
DI1	Digital input 1	1. internal impedance: 3.3kΩ	
DI2	Digital input 2	2. can accept 12~30V voltage input	
DI3	Digital input 3	3. the terminal is a two-way input terminal, supporting NPN and PNP connection	
DI4	Digital input 4	4. the maximum input frequency: 1kHz	
		5. all for the programmable digital input terminal, the user can set the terminal function through the function code	
		6. can be connected to the expansion card to increase 4 digital inputs	
HDI11	In addition to the digital input function, it can also be used as a high-frequency pulse input channel Maximum input frequency: 50kHz Duty cycle: 30%~70%		
		AI1 Input voltage - current	1 dial to ON: 0mA ~ 20mA input; 1 dial to OFF: 0V ~ 10V input
		AO1 Output voltage	3 dial to ON, 4 dial to OFF: 0-10V voltage output
		AO1 Output current	3 dial to OFF, 4 dial to ON: 0-20mA current output
		RS485 Terminal resistor	5 dial to ON: RS485 connects to 120Ω terminal resistor

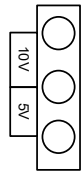
Description of control circuit terminals (30kW and above):

Type	Terminal symbol	Terminal function description	Technical specification
Digital input	+24V	+24V power supply	24V±10%, internally isolated from GND. Max load 200mA
	PW	External power input terminal (digital input terminal power supply)	Factory shorting with +24V
	DI1 ~ DI7	Digital input terminals 1 to 7	Input specifications: 24V, 5mA
	HDI	High speed pulse input or digital input	Pulse input frequency range: 0 ~ 50kHz high level voltage: 24V
	COM	+24V power supply or external power supply ground	Internal isolation from GND
Digital output	DO	Open collector output with CME at the common end	External voltage range: 0 ~ 24V
	CME	Open collector output common end	Factory shorting with COM
	HDO	High speed pulse output or open collector output with COM on the common end	Pulse output frequency range: 0 ~ 50kHz
	COM	HDO common end	Interior isolated from GND
Analog input	+10/5V	The inverter provides +10V or +5V power output	Output voltage : 10V or 5V via X13 optional. Output current range: 0 ~ 50mA (If +10V or +5V and GND indirect potentiometer, potentiometer resistance should not be less than 2kΩ)
	AI1~AI2	Analog input terminals	Input voltage and current optional Input voltage range: 0V ~ 10V Input current range: 0/4 ~ 20mA
	GND	Analog ground	Internally isolated from COM
Analog output	AO1 ~ AO2	Analog output terminal	Output voltage and current optional Output voltage range: 0V ~ 10V Output current range: 0/4 ~ 20mA
Relay output	T1A/T1B/T1C	Relay output	T1A-T1B: normally closed T1A-T1C: normally open

Type	Terminal symbol	Terminal function description	Technical specification
			Contact capacity: 250VAC/3A, 30VDC/1A
	T2A/T2B/T2C	Relay output	T2A-T2B: normally closed T2A-T2C: normally open Contact capacity: 250VAC/3A, 30VDC/1A
Communication interface	485+ /485-	RS485 communication interface	RS485 communication interface

Description of jumper and interface on control board:

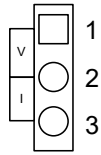
Bit number	Instructions	
RS485 terminal matches resistance settings		
X1		Short-circuit module is used to short-circuit pin 1,2 of X1; RS485 bus uses the terminal matching resistor, 120 Ω Short-circuit module is used to short-circuit pin 2,3 of X1; RS485 bus does not use the terminal matching resistor When short-circuit module is not used, RS485 bus does not use the terminal matching resistor.
Analog input 1 current voltage selection		
X2		Short-circuit module is used to short-circuit pin 1,2 of X2, analog input 1 is voltage input (0 ~ 10V), short-circuit module is used to short-circuit pin 2,3 of X2, analog input 1 is current input (0/4 ~ 20mA); When short-circuit module is not used, analog output 1 is voltage input (0 ~ 10V).
Analog input 2 current voltage select		
X3		Short-circuit module is used to short-circuit pin 1,2 of X3, analog output 2 is voltage input (0 ~ 10V), short-circuit module is used to short-circuit pin 2,3 of X3, analog input 2 is current input (0/4 ~ 20mA); When short-circuit module is not used, analog output 2 is voltage input (0 ~ 10V).
X8	10V/5V power supply voltage selection	



Short-circuit module is used to short-circuit pin 1,2 of X8, and the terminal 10V/5V provides +10V power output; short-circuit module is used to short-circuit pin 2,3 of X8, and terminal 10V/5V provides +5V power output externally.

Analog output 1 current voltage selection

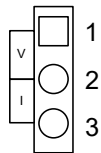
X14



Short-circuit module is used to short-circuit pin 1,2 of X14, and analog output 2 is voltage output (0 ~ 10V); short-circuit module is used to short-circuit pin 2,3 of X14, analog output 2 is current output (0/4 ~ 20mA).

Analog output 2 current voltage selection

X15



Short-circuit module is used to short-circuit pin 1,2 of X15, and analog output 2 is voltage output (0 ~ 10V); short-circuit module is used to short-circuit pin 2,3 of X15, analog output 2 is current output (0/4 ~ 20mA).

X5

Expansion card interface

J2

Control board CPU download special pin (has been set before the factory, the user does not need to change)

J9

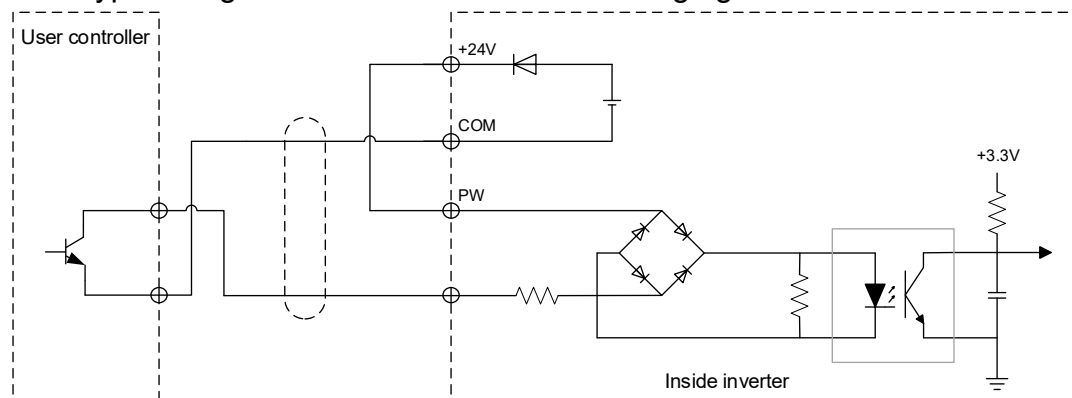
Native keypad interface

J1

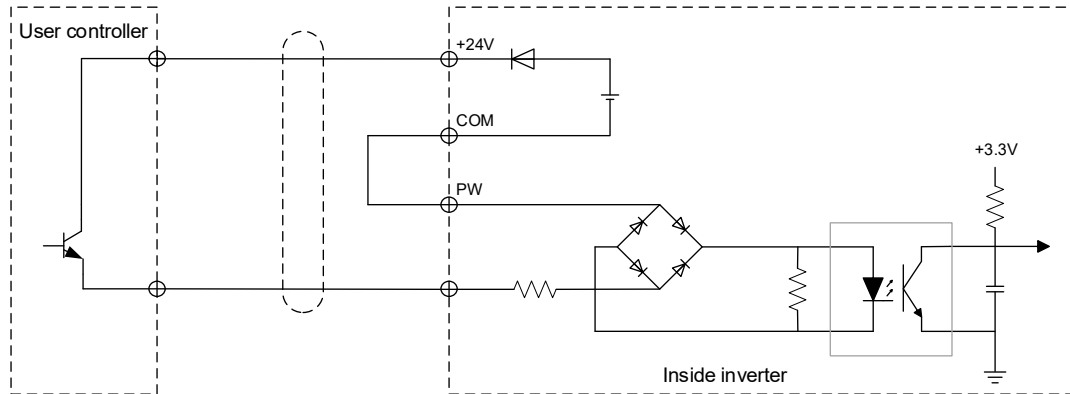
External keypad interface

4.4.1 Input/Digital signal connection diagram

Use the internal +24V power supply of the inverter, and the external controller is NPN type wiring mode as shown in the following figure:

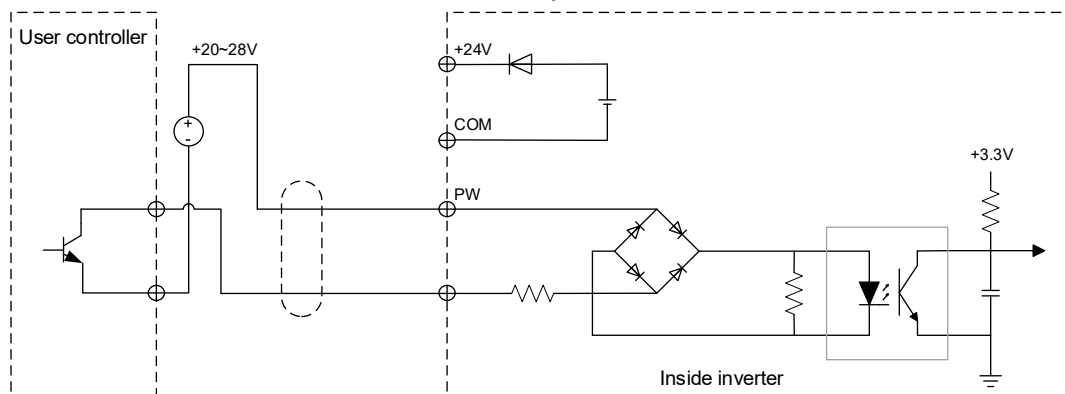


Using the internal +24V power supply of the inverter, the external controller is PNP type wiring mode as shown in the following figure:

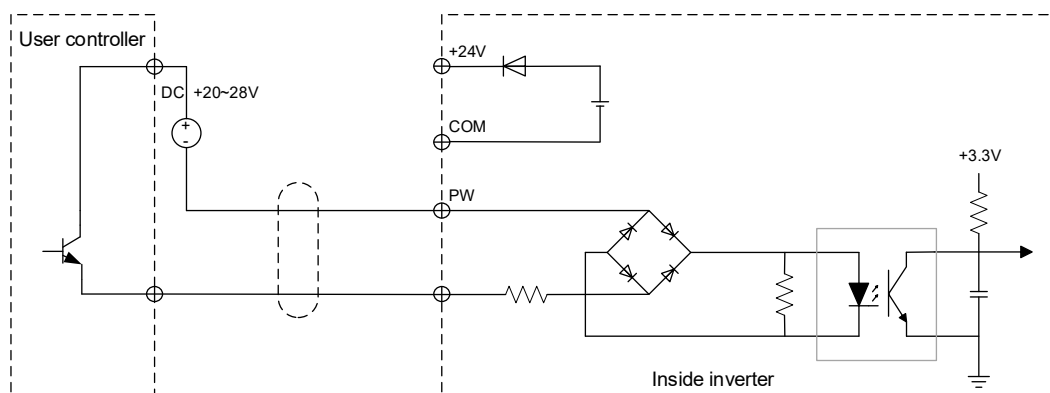
**Note:**

Be sure to remove the short circuit strip between the +24V and PW terminals and connect the short circuit strip between the PW and COM terminals.

Use an external power supply, the external controller is NPN type wiring as shown below and remove the short circuit strip between the +24V and PW terminals.



Use the external power supply, the external controller is PNP type wiring as shown in the following figure and remove the short circuit strip between the +24V and PW terminals.



05

Keypad Introduction

5.1 Keypad operation basic content

This chapter introduces the use of the frequency converter keypad and the commissioning steps of the common functions of the frequency converter.

5.2 Keypad introduction

LED keypad is standard for FD590 series solar pump inverter, it has two line display LED keypad is standard for 22kW above. You can control the frequency converter start and stop, read status data and parameter settings through the keypad. LCD keypad is optional, supports 6 lines of high-definition multi-language display, with parameter copy function. The overall size of LCD keypad is the same as that of LED keypad.

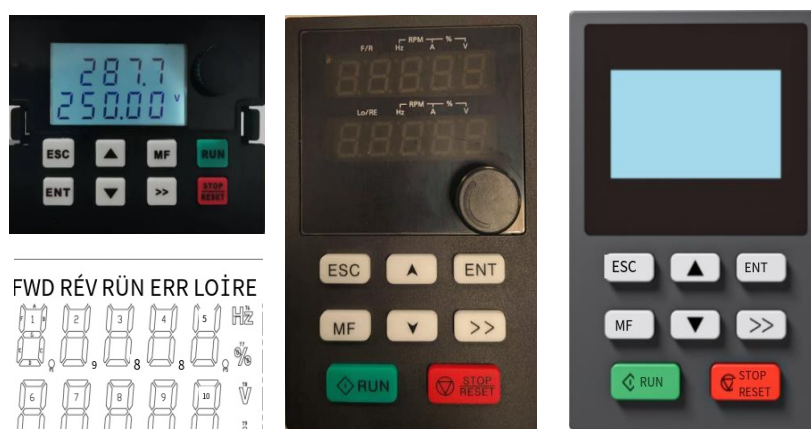


Figure 5-1 Keypad

5.3 LED keypad display and operation

The display states of FD590 frequency converter series keypad contain stop parameters, operation parameters, fault alarm state and function code editing state.

Various operations can be carried out on the inverter through the keypad. The specific function code structure description, see the function code list.

Table 5-1 Keypad description of 22kW and below

Keypad	Name	Meaning
Unit indicator	Hz	Frequency indicator The unit of the current display parameter is Hz
	A	Current indicator The unit of the current display parameter is A
	V	Voltage indicator The unit of the current display parameter is V

	%	Percentage	The unit of the current display parameter is %
Status indicator	FWD	Forward running	On: The inverter is running forward
	REV	Reverse running	Blinking: The inverter is running reversely
	RUN	Running	On: The inverter is running
	ERR	Malfunctions	On: The inverter is faulty
	LO/RE	Run command given	Off: The operation panel run command given mode Blinking: The terminal run command given mode On: The communication run command given mode

Table 5-2 Dual display keypad of 30kW and above

	Keypad	Name	Meaning
Unit indicator	Hz	Frequency indicator	The unit of the current display parameter is Hz
	A	Current indicator	The unit of the current display parameter is A
	V	Voltage indicator	The unit of the current display parameter is V
	%	Percentage	Two lights corresponding to A and V are on
	RPM	RPM	Two lights corresponding to Hz and A are on
Status indicator	F/R	Forward and reverse running status indicator	On: The inverter is running forward Blinking: The inverter is running reversely Off: The inverter is switched between forward and reverse running or stops
	LO/RE	Run command given indicator	Off: The operation panel run command given mode Blinking: The terminal run command given mode On: The communication run command given mode
	Fault	Alarm indicator	The unit and status indicators in the first row are on

Dual-row display content switching:

The dual-row display content can be selected by ENT + >> key during operation and stop. The specific switching operation is as follows:

When the frequency converter runs or stops running, press the >> key, and the changed display content is the content of the current line can be switched. If you want to change the displayed content of another line, you can press ENT key first, and then press the >> key, you can switch to another line, at this time, press the >> key to switch the displayed content of the current line.

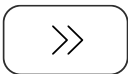
Table 5-3 Display letters

Dual-row 5-bit LED display, display setting frequency, output frequency and other monitoring data as well as alarm code.

Display letter	Correspond letter	Display letter	Correspond letter	Display letter	Correspond letter
0	0	1	1	2	2
3	3	4	4	5	5
6	6	7	7	8	8
9	9	A	A	b	b
C	C	d	d	E	E
F	F	H	H	I	I
L	L	N	N	n	n
O	O	P	P	r	r
S	S	t	t	U	U
v	v	.	.	-	-

5.4 Keypad function key description

Keypad identification	Name	Meaning
	Program/exit key	Enter or exit Level 1 menu
		Level 2 menu returns to Level 1 menu
		Level 3 menu returns to Level 2 menu
	Multi-function key	Operate according to the multifunction selection
	Run key	Used for inverter start control under the operation panel run command given mode

Keypad identification	Name	Meaning
		Used to start the inverter for parameter self-identification after setting the parameter self-identification
	Confirm key	Level 1 menu function group confirm, enter Level 2 menu Level 2 menu function code confirm, enter Level 3 menu Level 3 menu function code set value confirm, return to Level 2 menu In password verification state, password input completed.
	Shift key	Level 1 menu, function group editing step size selection Level 2 menu, function code editing step selection Level 3 menu, function code set value editing step selection Stop parameter display state, running parameter display state, fault display state, display parameter selection; Password verification state, editing digit selection.
	Stop/Reset key	Used for inverter stop control under the operation panel run command given mode Used for the inverter operation protection stop control under other running command given modes If the device is faulty and stopped, it is used as the reset button to clear the fault alarm.
	Increment key	Level 1 menu function group increments Level 2 menu function code increments Level 3 menu function code set value increments Set frequency increments
	Decrement key	Level 1 menu function group decrements Level 2 menu function code decrements Level 3 menu function code set value decrements Set frequency decrements
	Digital potentiometer	Adjustable frequency, also acts as ENT confirm key

5.5 Stop parameter display status

The frequency converter can display a variety of state parameters in the stop, fault and running state. The function code F05.10 can be used to select whether the parameter is displayed according to the bits of binary.

In the stop state, a total of 12 stop state parameters can be selected whether to display, respectively: set frequency, bus voltage, input terminal state, output terminal state, panel potentiometer value, analog input AI1 value, high speed pulse HDI frequency, PID setting, PID feedback, PLC or number of multi-step speed, torque setting value. Whether to display by the function code F05.10 bit (converted to binary) selection, press the » key to the right to switch the selected parameters, press the MF key to the left to switch the selected parameters.

5.6 Run parameter display status

In the running state, a total of 22 state parameters can be selected whether to display, respectively: running frequency, set frequency, bus voltage, output current, output voltage, running speed, linear speed, output power, output torque, input terminal state, output terminal state, PID setting, PID feedback, high-speed pulse HDI frequency, count value, PLC and the number of speed steps, torque set value, panel potentiometer value, analog input AI1 value, motor overload percentage, inverter overload percentage. Whether to display by the function code F05.08, F05.09 according to the bit (converted to binary) selection, press the » key to the right to switch the selected parameters, press MF key to the left to switch the selected parameters.

5.7 Fault alarm display status

When the frequency converter detects the fault signal, it enters the fault alarm display state. The ERR light of the keypad below 22kW is on and the fault code is displayed. The unit light and indicator of the first row of the keypad above 22kW are all on, and the fault code of the second row can be reset by the STOP/RST key, control terminal or communication command on the keypad.

5.8 How to modify the function code

Frequency converter has three levels of menus, including:

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

Steps: In the running or stop state, press ESC to enter the level-1 menu when parameter needs to be modified and F00 is displayed, $\wedge$ and $\vee$ are used to enter the group number to be modified, ENT is used to enter the level-2 menu, and $\wedge$ and $\vee$ are used to enter the function code label to be modified. Then press ENT to enter the three-level menu and modify it through $\wedge$ and $\vee$.

Note: In the three-level menu state, if the parameter does not blink bit, it indicates that the function code cannot be modified. The possible causes are as follows:

- The function code is an unmodifiable parameter, such as actual detection parameters, running record parameters, etc.
- The function code cannot be modified in the running state, and can be modified only after stopping.

5.9 Basic Operating Instructions

5.9.1 General commissioning steps

This section describes the internal function modules of the inverter.



- ✧ Before connecting terminals of the frequency converter, cut off all power supplies connected to the frequency converter. The waiting time after the power supply is cut off is not less than the time marked on the frequency converter.
- ✧ When the frequency converter is running, there is high voltage inside. Do not perform any operations on the frequency converter except keypad setting.
- ✧ The frequency converter runs automatically at power-on. If it is necessary to set parameters, strictly follow the instructions in this chapter.

5.9.2 Check before operation

Be sure to confirm the following items before switching on the power supply.

1. Check whether the frequency converter is reliably grounded;
2. Check whether the wiring is correct and reliable;
3. Check whether the solar power DC input voltage is within the allowable range of the inverter;

4. Check whether the type, voltage and power of the motor match the type, voltage and power of the inverter.

5.9.3 Trial Run

Close the DC circuit breaker, the inverter will delay about 10s after automatic operation. Observe the water output of the pump. If the water output is normal, the trial run is successful; If the water output is small, switch any two motor wires and then run.

06

List of Function Parameters

This chapter lists the general table of function codes, and gives a brief description of function codes.

6.1 List of function parameters

FD590 series frequency converter function parameters are grouped according to functions. In order to facilitate the setting of function code, when using the keypad to operate, the function group number corresponds to the first-level menu, the function code number corresponds to the second-level menu, the function parameters correspond to the three-level menu.

1. The column content of the function list is described as follows:

Column 1 "Function code": indicates the number of the function parameter group and parameter.

Column 2 "Name": is the full name of the function parameter.

Column 3 "Parameter description": is a detailed description of the function parameter.

Column 4 "Factory value": is the initial value of the function parameter set in factory.

Column 5 "Attribute": is the modified attribute of the function parameter (i.e., whether changes are allowed and conditions for changes), the description is as follows:

"○": indicates that the setting value of the parameter can be changed when the inverter is in the stop and running state.

"☆": indicates that the setting value of this parameter cannot be changed when the inverter is in operation.

"●": indicates that the value of the parameter is the actual detection parameter or running record which cannot be changed.

(The frequency converter has made automatic check constraints on the modified attribute of each parameter, which can help users to avoid incorrect modification.)

2. "Parameter decimal" is decimal (DEC). If the parameter is expressed in hexadecimal, the data of each bit is independent of each other when the parameter is edited, and the value range of some bits can be hexadecimal (0~F).
3. "Default value" indicates that when the default parameter is restored, the function parameter is refreshed and restored to the factory value; However, the

actual detection parameter or running record will not be refreshed.

4. For better parameter protection, the frequency converter provides password protection for the function code. After setting the user password (that is, the parameter of user password F05.03 is not 0), when the user presses the ESC key to enter the function code editing state, the system will enter the user password verification state first, and the display is "-----". The operator must enter the user password correctly, otherwise it cannot enter. For the parameter area set by the manufacturer, the operator must enter the correct password before entering. (Remind the user not to try to modify the parameters set by the manufacturer. If the parameters are set improperly, it will easily lead to abnormal work of the inverter or even damage.) In the password protection is not in locked state, you can change the user password at any time. The user password is based on the last entered value. If F05.03 is set to 0, the user password can be cancelled; If F05.03 is not 0 when powering on, the parameter is protected by the password.

Table 6-1 List of function parameters

Group F00 Basic function parameters	
F00-00	Description: First motor control mode
	Default: 2 ☆
0: Sensorless vector control 1: Reserved 2: V/f control	
F00-01	Description: Command source selection
	Default: 0 ○
0: Operation panel command channel (LED off) 1: Terminal command channel (LED blinking) 2: Serial port communication command channel (LED on)	
F00-02	Description: Primary frequency source X selection
	Default: 0 ☆
0: Digital setting (preset frequency F00.09, UP/DOWN modifiable, no memory after	

power failure)

1: Digital setting (preset frequency F00.09, UP/DOWN modifiable, memory after power failure)

2: AI1

3: AI2

4: Panel potentiometer AI0

5: High speed pulse setting

6: Multi-step speed

7: Simple PLC

8: PID

9: Communication given

F00-03

Description: Auxiliary frequency source Y selection

Default: 0



Same as F00.02 primary frequency source

F00-04

Description: Auxiliary frequency source Y range selection

Default: 0



0: relative to the maximum frequency

1: relative to the frequency source X

F00-05

Description: Frequency source selection

Default: 00



Units place: Frequency source selection

0: primary

1: result of primary and auxiliary operations (the operation relationship is determined by the tens place)

2: primary <--> auxiliary

3: primary <--> result of primary and auxiliary operations

4: auxiliary <--> result of primary and auxiliary operations

Tens place: frequency source primary and auxiliary operation relationship

0: primary + auxiliary

1: primary - auxiliary

2: maximum value of both

3: minimum value of both

F00-06	Description: Maximum frequency
	Default: 50.00 ☆
	50.00Hz ~ 500.00Hz
F00-07	Description: Upper limit frequency
	Default: 50.00 ○
	Lower limit frequency F00.08 ~ maximum frequency F00.06
F00-08	Description: Lower limit frequency
	Default: 0.00 ○
	0.00Hz ~ Upper frequency F00.07
F00-09	Description: Preset frequency
	Default: 50.00 ○
	0.00Hz ~ Maximum frequency F00.06
F00-10	Description: Running direction
	Default: 0 ○
	0: consistent direction 1: opposite direction
F00-11	Description: Carrier frequency
	Default: 6.0 ○
	0.5kHz ~ 16.0kHz
F00-12	Description: Carrier frequency is adjusted with temperature
	Default: 1 ○
	0: no 1: yes
F00-13	Description: Motor parameter group selection
	Default: 0 ☆
	0: Motor 1. 1: Motor 2

F00-14	Description: Acceleration time 1
	Default: 20.0 ○
	0.00s ~ 650.00s (F00.16=2) 0.0s ~ 6500.0s (F00.16=1) 0s ~ 65000s (F00.16=0)
F00-15	Description: Deceleration time 1
	Default: 20.0 ○
	0.00s ~ 650.00s (F00.16=2) 0.0s ~ 6500.0s (F00.16=1) 0s ~ 65000s (F00.16=0)
F00-16	Description: Unit of acceleration and deceleration time
	Default: 1 ☆
	0:1 second 1:0.1 seconds 2:0.01 seconds
F00-17	Description: Auxiliary frequency source Y range
	Default: 100 ○
	0% to 150%
F00-18	Description: Upper limit frequency source
	Default: 0 ☆
	0: F00.07 set 1: AI1 2: AI2 3: Reserved 4: High speed pulse set 5: Communication set
F00-19	Description: Upper limit frequency bias
	Default: 0.00 ○
	0.00Hz ~ Maximum frequency F00.06

F00-20	Description: Secondary group frequency source bias frequency when superimposed
	Default: 0.00 ○
	0.00Hz ~ Maximum frequency F00.06
F00-21	Description: Frequency command decimal point
	Default: 2 ☆
	1:0.1 Hz 2:0.01Hz
F00-22	Description: Number set frequency memory selection
	Default: 0 ○
	0: No memory 1: Memory
F00-23	Description: Acceleration and deceleration time reference frequency
	Default: 0 ☆
	0: Maximum frequency (F00.06) 1: Set frequency 2:100 Hz
F00-24	Description: Running frequency instruction UP/DOWN reference
	Default: 1 ☆
	0: Running frequency 1: Set frequency
F00-25	Description: Command source binding frequency source
	Default: 000 ○
	Units place: Operate panel command, bind frequency source selection 0: No binding 1: Number sets frequency 2: AI1 3: AI2 4: Reserved

5: High speed pulse setting

6: Multi-step command

7: Simple PLC

8: PID

9: Communication given

Tens place: terminal command binding frequency source selection

Hundreds place: communication command binding frequency source selection

F00-26

Description: Serial communication protocol selection

Default: 0

☆

0: Modbus-RTU protocol

1: Reserved

Group F01 Motor 1 parameter

F01-00

Description: G/P models

Default: 1

☆

1: Model G machine

2: Model P machine

F01-01

Description: Motor type selection

Default: 0

☆

0: ordinary asynchronous motor

1: variable frequency asynchronous motor

F01-02

Description: Rated motor power

Default: Model dependent

☆

Model dependent

F01-03

Description: Rated motor frequency

Default: 50.00

☆

0.01Hz ~ Maximum frequency F00.06

F01-04

Description: Rated motor speed

Default: 1460

☆

1rpm to 65,535rpm

F01-05

Description: Rated motor voltage**Default:** 380

1V to 2000V

F01-06

Description: Rated motor current**Default:** 9.00

0.01A~655.35A (inverter power ≤55kW)

0.1A~6553.5A (inverter power >55kW)

F01-07

Description: Stator resistance of asynchronous motor**Default:** 1.204

0.001Ω~65.535Ω (inverter power ≤55kW)

0.0001Ω~6.5535Ω (inverter power >55kW)

F01-08

Description: Asynchronous motor rotor resistance**Default:** 0.908

0.001Ω~65.535Ω (inverter power ≤55kW)

0.0001Ω~6.5535Ω (inverter power >55kW)

F01-09

Description: Asynchronous motor leakage inductive reactance**Default:** 5.28

0.01mH~655.35mH (inverter power ≤55kW)

0.001mH~65.535mH (inverter power >55kW)

F01-10

Description: Asynchronous motor mutual inductance**Default:** 158.6

0.1mH~6553.5mH (inverter power ≤55kW)

0.01mH~655.35mH (inverter >55kW)

F01-11

Description: No-load current of asynchronous motor**Default:** 4.24

0.01A~F01.06 (inverter power ≤55kW)

0.1A~F01.06 (inverter power >55kW)

F01-12	Description: Motor parameter self-identification selection
	Default: 0 ☆
	0: no operation 1: asynchronous machine no-load (dynamic) self-identification 2: asynchronous machine load (static) self-identification 1 3: asynchronous machine with load (static) self-identification 2
F01-13	Description: Number of encoder pulse lines
	Default: 1024 ☆
	1 to 65535
F01-14	Description: Encoder type
	Default: 0 ☆
	0: ABZ incremental encoder 1: UVW incremental encoder 2: rotary encoder 3: sine-cosine encoder 4: provincial line mode UVW encoder
F01-15	Description: Speed feedback PG selection
	Default: 0 ☆
	0: Local PG 1: Extended PG 2: HDI high speed pulse input
F01-16	Description: ABZ encoder AB phase sequence
	Default: 0 ☆
	0: forward 1: reverse
F01-17	Description: Encoder mounting position angle
	Default: 0.0 ☆
	0.0 to 359.9°

F01-18	Description: UVW signal phase sequence
	Default: 0 ☆
	0: Forward 1: Reverse
F01-19	Description: UVW signal zero position angle
	Default: 0.0 ☆
	0.0 to 359.9°
F01-20	Description: Rotary pole pairs
	Default: 1 ☆
	1 to 65535
F01-21	Description: Reserved
	Default: 0 ☆
	Reserved
F01-22	Description: Speed feedback PG break detection time
	Default: 0.0 ☆
	0.0: No action 0.1s to 10.0s
F01-23 ~ F01-38	Description: Reserved
	Default: 0 ●
	Reserved
Group F02 Start stop control	
F02-00	Description: Start mode
	Default: 0 ○
	0: Direct start 1: Speed tracking restart 2: Pre-excited start for asynchronous machine 3: SVC quick start

F02-01	Description: Start delay time
	Default: 0.0 ○
	0.0s to 1000.0s
F02-02	Description: Start frequency
	Default: 5.00 ○
	0.00Hz to 10.00Hz
F02-03	Description: Start frequency hold time
	Default: 2.0 ☆
	0.0s to 100.0s
F02-04	Description: Start DC braking/pre-excitation current
	Default: 0 ☆
	0% to 100%
F02-05	Description: Start DC braking/pre-excitation time
	Default: 0.0 ☆
	0.0s to 100.0s
F02-06	Description: Acceleration and deceleration mode
	Default: 0 ☆
	0: linear acceleration and deceleration 1: S curve acceleration and deceleration A 2: S curve acceleration and deceleration B
F02-07	Description: Whether the DI terminal is effectively selected during power-on
	Default: 0 ☆
	0: invalid 1: valid
F02-08	Description: Power outage restart selection
	Default: 0 ☆
	0: invalid

1: valid

F02-09	Description: Power outage restart wait time	
	Default: 0.0	☆
	0.0s to 100.0s	
F02-10	Description: Stop mode	
	Default: 0	○
	0: Decelerate to stop 1: Coast to stop	
F02-11	Description: Forward/Reverse run dead zone time	
	Default: 0.0	○
	0.0s to 3000.0s	
F02-12	Description: Stop DC braking start frequency	
	Default: 0.00	○
	0.00Hz ~ Maximum frequency F00.06	
F02-13	Description: Stop DC braking wait time	
	Default: 0.0	○
	0s to 100.0s	
F02-14	Description: Stop DC braking current	
	Default: 0	○
	0.0% to 100%	
F02-15	Description: Stop DC braking time	
	Default: 0.0	○
	0.0s ~ 100.0s	
F02-16	Description: Brake utilization rate	
	Default: 100	○
	0% to 100%	

F02-17	Description: Hibernation delay time
	Default: 0.0 ○
	0.0 to 6500.0s
F02-18	Description: Frequency run action below lower limit frequency
	Default: 0 ○
	0: Run at lower limit frequency 1: Stop 2: Run at zero speed
F02-19	Description: Wakeup delay time
	Default: 0.0 ○
	0.0s to 6500.0s
F02-20	Description: Rotation speed tracking method
	Default: 0 ☆
	0: Start with stop frequency 1: Start at power frequency 2: Start at the maximum frequency 3: Field orientation speed tracking 4: Field orientation speed tracking (static tuning required, F01.12 set to 1)
F02-21	Description: Rotation speed tracking fast or slow
	Default: 20 ○
	1 to 100
F02-22	Description: Rotation speed tracking KP
	Default: 500 ○
	0 to 1000
F02-23	Description: Rotation speed tracking KI
	Default: 800 ○
	0 to 1000

F02-24	Description: Rotation speed tracking current
	Default: 100 ☆
	30% to 200%
F02-25	Description: Rotation speed tracking lower limit
	Default: 30 ☆
	10 to 100%
F02-26	Description: Rotation speed tracking voltage rise time
	Default: 1.1 ☆
	0.5 to 3.0
F02-27	Description: Demagnetization time
	Default: 0.50 ☆
	0.00 ~ 15.00s
F02-28	Description: Time proportion of S-curve at start
	Default: 30.0 ☆
	0.0% ~ (100.0%-F06.29)
F02-29	Description: Time proportion of S-curve at end
	Default: 30.0 ☆
	0.0% ~ (100.0%-F06.28)
Group F03 V/f control parameters	
F03-00	Description: V/f curve setting
	Default: 2 ☆
	0: linear V/f curve
	1: multipoint V/f curve
	2: Square V/f curve
	3: 1.2 V/f curve
	4: 1.4 V/f curve
	6: 1.6 V/f curve

8:1.8 V/f curve

10: Complete V/f separation mode

11: Half V/f separation mode

F03-01	Description: Torque boost
	Default: Model dependent ○
	0.0%: Automatic torque boost 0.1% ~ 30.0% V/f separation is not effective
F03-02	Description: Torque boost cutoff frequency
	Default: 50.00 ☆
	0.00Hz ~ Maximum frequency F00.06
F03-03	Description: Multipoint V/f frequency point 1
	Default: 0.00 ☆
	0.00Hz to F03.05
F03-04	Description: Multipoint V/f voltage point 1
	Default: 0.0 ☆
	0.0% to 100.0%
F03-05	Description: Multipoint V/f frequency point 2
	Default: 0.00 ☆
	F03.03 ~ F03.07
F03-06	Description: Multipoint V/f voltage point 2
	Default: 0.0 ☆
	0.0% to 100.0%
F03-07	Description: Multipoint V/f frequency point 3
	Default: 0.00 ☆
	F03.05 ~ Motor rated frequency (F01.03)
F03-08	Description: Multipoint V/f voltage point 3
	Default: 0.0 ☆

	0.0% to 100.0%
F03-09	Description: Slip compensation factor
	Default: 0.0 ○
	0.0% to 200.0%
F03-10	Description: V/f overexcitation gain
	Default: 64 ○
	0 to 200
F03-11	Description: Oscillation suppression gain
	Default: 5 ○
	0 to 100
F03-12	Description: Oscillation suppression gain mode
	Default: 1 ☆
	0 to 4
F03-13	Description: V/f separation voltage source
	Default: 0 ○
	0: Digital setting (F03.14)
	1: AI1
	2: AI2
	3: Reserved
	4: HDI high speed pulse setting
	5: Multi-step speed
	6: Simple PLC
	7: PID
	8: Communication given
	100.0% corresponds to the rated voltage of the motor
F03-14	Description: V/f separation voltage source digital setting
	Default: 0 ○
	0V ~ Motor rated voltage F01.05

F03-15	Description: V/f separation voltage acceleration time
	Default: 0.0 ○
	0.0s to 1000.0s Indicates the time from 0V change to the rated voltage of the motor
F03-16	Description: V/f separation voltage deceleration time
	Default: 0.0 ○
	0.0s to 1000.0s Note: Indicates the time of 0V change to the rated voltage of the motor
F03-17	Description: V/f separation stop mode selection
	Default: 0 ☆
	0: Frequency/voltage independence is reduced to 0 1: The frequency is reduced after the voltage is reduced to 0
F03-18	Description: Overcurrent stall action current
	Default: 150 ☆
	50 ~ 200%
F03-19	Description: Overcurrent stall suppression enabled
	Default: 1 ☆
	0: invalid 1: valid
F03-20	Description: Overcurrent stall suppression gain
	Default: 20 ○
	0 to 100
F03-21	Description: Double speed overcurrent stall action current compensation coefficient
	Default: 50 ☆
	50 to 200%
F03-22	Description: Overvoltage stall action voltage
	Default: 760.0 ☆

200.0V ~ 2000.0V Model dependent

220V: 380V

380V: 760V

F03-23	Description: Overvoltage stall enabled		
	Default:	1	☆
	0: invalid 1: valid		
F03-24	Description: Overvoltage stall suppression frequency gain		
	Default:	30	○
	0 to 100		
F03-25	Description: Overvoltage stall suppression voltage gain		
	Default:	30	○
	0 to 100		
F03-26	Description: Overvoltage stall maximum rise frequency limit		
	Default:	5	☆
	0 to 50Hz		
F03-27	Description: Slip compensation time constant		
	Default:	0.5	○
	0.1 to 10.0s		
F03-28	Description: Automatic frequency boost enabled		
	Default:	0	☆
	0: invalid 1: valid		
F03-29	Description: Minimum motor torque current		
	Default:	50	☆
	10% to 100%		
F03-30	Description: Maximum motor torque current		
	Default:	20	☆

10% to 100%

F03-31

Description: Automatic frequency boost KP**Default:** 50

☆

0 ~ 100

F03-32

Description: Automatic frequency boost KI**Default:** 50

☆

0 to 100

F03-33

Description: Online torque compensation gain**Default:** 100

☆

80% to 150%

Group F04 Reserved**Group F05 Keypad and display**

F05-00

Description: Language selection for LCD keypad**Default:** 0

○

0: Chinese

1: English

F05-01

Description: Parameter initialization**Default:** 0

☆

0: No operation

01: Restore factory parameters, excluding motor parameters

02: Clear the recorded information

04: Back up user parameters

501: Restore user parameters

F05-02

Description: Parameter copy selection**Default:** 0

☆

0: No operation

1: Upload parameters to the keypad

2: Download keypad parameters to the local 1

3: Download keypad parameters to the local 2

4: Download keypad parameters to the local 3

F05-03

Description: User password

Default: 0

○

0 ~ 65535

F05-04

Description: MF key function selection

Default: 0

☆

0: Invalid

1: Switch between operation panel command channel and remote command channel

2: Forward and reverse switchover

3: Forward jog

4: Reverse jog

F05-05

Description: STOP/RESET key function

Default: 1

○

0: Only in the keypad control mode STOP/RES key stop function is effective

1: No matter in which control mode STOP/RES key stop function is effective

F05-06

Description: Load speed display coefficient

Default: 1.0000

○

0.0001 to 6.5000

F05-07

Description: Linear speed display coefficient

Default: 1.0000

○

0.0001 to 6.5000

F05-08

Description: LED run display parameter 1

Default: 0x001F

○

0000 ~ FFFF

Bit00: Running frequency (Hz)

Bit01: Set frequency (Hz)

Bit02: Bus voltage (V)

Bit03: Output voltage (V)
 Bit04: Output current (A)
 Bit05: Output power (kW)
 Bit06: Output torque (%)
 Bit07: DI input status
 Bit08: DO output status
 Bit09: AI1 voltage (V)
 Bit10: AI2 voltage (V)
 Bit11: Reserved
 Bit12: Count value
 Bit13: Length value
 Bit14: Load speed display
 Bit15: PID setting

F05-09

Description: LED run display parameter 2**Default:** 0x0000

○

0000 ~ FFFF

Bit00: PID feedback

Bit01: PLC stage

Bit02: High speed pulse input pulse frequency (kHz)

Bit03: Running frequency 2 (Hz)

Bit04: Remaining running time

 Bit05: AI1 voltage before correction Bit06: AI2 voltage before correction Bit07:
 Reserved

Bit08: Linear speed

Bit09: Current power-on time

Bit10: Current running time

Bit11: High speed pulse input pulse frequency, unit 1Hz

Bit12: Communication setting value

Bit13: Encoder feedback speed Bit14: Main frequency X display

Bit15: Auxiliary frequency Y display

F05-10

Description: LED stop display parameter**Default:** 0x0033

○

0000 ~ FFFF

Bit00: Set frequency (Hz)
 Bit01: Bus voltage (V)
 Bit02: DI input status
 Bit03: DO output status
 Bit04: AI1 voltage (V)
 Bit05: AI2 voltage (V)
 Bit06: Reserved
 Bit07: Count value
 Bit08: Length value
 Bit09: PLC stage
 Bit10: Load speed
 Bit11: PID setting
 Bit12: High speed pulse input pulse frequency (kHz)

F05-11	Description: Software version number 1
	Default: 0.00 ●
	V0.0x
F05-12	Description: Software version number 2
	Default: 0.00 ●
	V0.0x
F05-13	Description: Product number
	Default: 0 ●
	FD590
F05-14	Description: Inverter module heat sink temperature
	Default: 0 ●
	0.0°C ~ 100.0°C
F05-15	Description: Cumulative running time
	Default: 0 ●
	0h to 65535h
F05-16	Description: Number of decimal places for load speed display

	Default: 21 ○ Units place: The number of decimal places in B00.14 0:0 decimal place 1:1 decimal place 2:2 decimal places 3:3 decimal places Tens place: The number of decimal places in B00.19/B00.29 1:1 decimal place 2:2 decimal places
F05-17	Description: Total power-on time Default: 0 ● 0h to 65535h
F05-18	Description: Cumulative power consumption Default: 0 ● 0 to 65535°
F05-19	Description: Performance test version number Default: 0.00 ●
F05-20	Description: Functional test version number Default: 0.00 ●

Group F06 Input terminals

F06-00	Description: DI1 terminal function selection Default: 1 ☆ 0: No function 1: Forward running (FWD) 2: Reverse running (REV) 3: Three-wire operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Terminal UP
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- 7: Terminal DOWN
- 8: Coast to stop
- 9: Fault reset (RESET)
- 10: Running pause
- 11: External fault normally open input
- 12: Multi-step speed terminal 1
- 13: Multi-step speed terminal 2
- 14: Multi-step speed terminal 3
- 15: Multi-step speed terminal 4
- 16: Acceleration and deceleration select terminal 1
- 17: Acceleration and deceleration select terminal 2
- 18: Frequency source switch
- 19: UP/DOWN setting clear (terminal, keypad)
- 20: Run command switch terminal
- 21: Acceleration and deceleration disabled
- 22: PID pause
- 23: PLC status reset
- 24: Wobble frequency pause
- 25: Counter input
- 26: Counter reset
- 27: Length count input
- 28: Length reset
- 29: Torque control prohibited
- 30: High speed pulse frequency input
- 31: Reserved
- 32: Immediate DC braking
- 33: External fault normally closed input
- 34: Frequency setting effective terminal (if the terminal function is set, when the frequency is modified, the effective time of modification is controlled through this terminal)
- 35: PID action direction is reversed
- 36: External stop terminal 1 (keypad control, the terminal can be used to stop, equivalent to the STOP key on the keypad)
- 37: Control command switch terminal 2: switch between terminal control and communication control
- 38: PID integral pause terminal

- 39: Frequency source X switches with preset frequency
- 40: Frequency source Y switches with preset frequency
- 41: Motor select terminal 1
- 42: Reserved
- 43: PID parameter switchover terminal
- 44: User-defined fault 1
- 45: User-defined fault 2
- 46: Speed control/torque control switch
- 47: Emergency stop
- 48: External stop terminal 2 (under any control mode, the terminal can be stopped according to the deceleration time 4 to stop)
- 49: Deceleration DC braking
- 50: The running time is cleared to zero
- 51: Two-wire/Three-wire switch
- 52: Reverse is prohibited
- 53: Solar pump mode / general mode switch
- 54: Full of water in the tank
- 55: Lack of water in the well

F06-01

Description: DI2 terminal function selection**Default:** 4

Same as F06.00

F06-02

Description: DI3 terminal function selection**Default:** 9

Same as F06.00

F06-03

Description: DI4 terminal function selection**Default:** 12

Same as F06.00

F06-04

Description: DI5 terminal function selection**Default:** 13

Same as F06.00

F06-05

Description: DI6 terminal function selection

	Default: 0 ☆ Same as F06.00
F06-06	Description: DI7 terminal function selection Default: 0 ☆ Same as F06.00
F06-07	Description: HDI terminal function selection Default: 0 ☆ Same as F06.00
F06-08	Description: Reserved Default: Same as F06.00
F06-09	Description: Reserved Default: 0 ☆
F06-10	Description: DI filter time Default: 0.010 ○ 0.000s to 1.000s
F06-11	Description: Terminal command mode Default: 0 ☆ 0: Two-wire type 1 1: Two-wire style 2 2: Three-wire type 1 3: Three-wire type 2
F06-12	Description: Rate of change of terminal UP/DOWN per s Default: 1.000 ○ 0.001Hz/s to 65.535Hz/s
F06-13	Description: Curve 1 minimum input Default: 0.00 ○

0.00V ~ F06.15	
F06-14	Description: Curve 1 minimum input corresponds to setting
	Default: 0.0 ☐
-100.0% to 100.0%	
F06-15	Description: Curve 1 maximum input
	Default: 10.00 ☐
F06.13 ~ 10.00V	
F06-16	Description: Curve 1 maximum input corresponds to setting
	Default: 100.0 ☐
-100.0% ~ 100.0%	
F06-17	Description: AI1 filter time
	Default: 0.10 ☐
0.00s to 10.00s	
F06-18	Description: Curve 2 minimum input
	Default: 0.00 ☐
0.00V ~ F06.20	
F06-19	Description: Curve 2 minimum input corresponds to setting
	Default: 0.0 ☐
-100.0% ~ 100.0%	
F06-20	Description: Curve 2 maximum input
	Default: 10.00 ☐
F06.18 ~ 10.00V	
F06-21	Description: Curve 2 maximum input corresponds to setting
	Default: 100.0 ☐
-100.0% ~ 100.0%	
F06-22	Description: AI2 filter time

	Default: 0.10 ○ 0.00s to 10.00s
F06-23	Description: Curve 3 minimum input Default: 10.00 ○ -10.00V ~ F06.25
F06-24	Description: Curve 3 minimum input corresponds to setting Default: 100.0 ○ -100.0% ~ 100.0%
F06-25	Description: Curve 3 maximum input Default: 10.00 ○ F06.23 ~ 10.00V
F06-26	Description: Curve 3 maximum input corresponds to setting Default: 100.0 ○ -100.0% ~ 100.0%
F06-27	Description: Reserved Default: 0.10 ○ 0.00s to 10.00s
F06-28	Description: High speed pulse minimum input Default: 0.00 ○ 0.00kHz ~ F06.30
F06-29	Description: High speed pulse minimum input setting Default: 0.0 ○ -100.0% to 100.0%
F06-30	Description: High speed pulse Max input Default: 50.00 ○ F06.28 ~ 100.00kHz

F06-31	Description: High speed pulse maximum input setting
	Default: 100.0 ○
	-100.0% ~ 100.0%
F06-32	Description: High speed pulse filter time
	Default: 0.10 ○
	0.00s to 10.00s
F06-33	Description: AI set curve selection
	Default: 321 ○
	Units place: AI1 curve selection 1: Curve 1 (2 points, see F06.13 ~ F06.16) 2: Curve 2 (2 points, see F06.18 ~ F06.21) 3: Curve 3 (2 points, see F06.23 ~ F06.26) 4: Curve 4 (4 points, see A06.00 ~ A06.07) 5: Curve 5 (4 points, see A06.08 ~ A06.15) Tens place: AI2 curve selection, same as above Hundreds place: Reserved
F06-34	Description: AI below minimum input setting selection
	Default: 000 ○
	Units place: AI1 is below minimum input setting selection 0: The minimum input corresponds to the setting 1: 0.0% Tens place: AI2 is below minimum input setting selection, same as above Hundreds place: Reserved
F06-35	Description: DI1 Delay time
	Default: 0 ○
	0.0s ~ 3600.0s
F06-36	Description: DI2 Delay time
	Default: 0 ○
	0.0s ~ 3600.0s

F06-37	Description: DI3 Delay time
	Default: 0 ○
	0.0s ~ 3600.0s
F06-38	Description: DI1-DI5 input terminal effective mode selection
	Default: 00000 ☆
	0: High level 1: Low level Units place: DI1 Tens place: DI2 Hundreds place: DI3 Thousands place: DI4 Ten thousand place: DI5
F06-39	Description: DI6-DI8 (HDI) input terminal effective mode selection
	Default: 00000 ☆
	0: High level 1: Low level Units place: DI6 Tens place: DI7 Hundreds place: DI8 (HDI) Thousands place: reserved Ten thousand place: reserved
Group F07 Output terminals	
F07-00	Description: HDO terminal output selection
	Default: 0 ○
	0: pulse output 1: digital output
F07-01	Description: HDO digital output selection
	Default: 0 ○
	0: No output 1: The frequency converter is running

- 2: Fault output (fault stop)
- 3: Frequency level detection FDT1 output
- 4: Frequency reached
- 5: Zero speed running (no output when stopping)
- 6: Motor overload pre-warning
- 7: Inverter overload pre-warning
- 8: Set count value reached
- 9: Specified count value reached
- 10: Length reached
- 11: The PLC cycle is complete
- 12: Running time reached
- 13: Frequency limited
- 14: Torque qualified
- 15: Ready for operation
- 16: AI1>AI2
- 17: Upper limit frequency reached
- 18: Lower limit frequency reached (run related)
- 19: Undervoltage state output
- 20: Communication setting
- 21: Positioning complete (reserved)
- 22: Positioning close (reserved)
- 23: Zero speed running 2 (also output when shut down)
- 24: Power-on time reached
- 25: Frequency level detection FDT2 output
- 26: Frequency reaches 1 output
- 27: Frequency reaches 2 output
- 28: Current reaches 1 output
- 29: Current reaches 2 output
- 30: Timing reaches output
- 31: AI1 input out of limit
- 32: Load lost
- 33: Reverse running
- 34: Zero current state
- 35: Module temperature reached
- 36: Output current limit exceeded

- 37: Lower limit frequency reached (run independent)
- 38: Fault output (all faults)
- 39: Motor overtemperature pre-warning
- 40: Running time reached
- 41: Fault output (coast to stop fault and no output undervoltage)
- 42: MPPT Max. voltage limiting
- 43: Low output frequency protection
- 44: Output of full water in the tank
- 45: Output of lack water in the well

F07-02

Description: Relay 1 output function selection**Default:** 2

○

Same as F07.01

F07-03

Description: Relay 2 output function selection**Default:** 0

○

Same as F07.01

F07-04

Description: DO output function selection**Default:** 1

○

Same as F07.01

F07-05

Description: Reserved**Default:** 4

○

Reserved

F07-06

Description: HDO pulse output selection**Default:** 0

○

0: Running frequency

1: Set frequency

2: Output current

3: Output torque

4: Output power

5: Output voltage

6: High speed pulse input (100.0% corresponds to 100.0kHz)

- 7: AI1
- 8: AI2
- 9: Reserved
- 10: Length
- 11: Count value
- 12: Communication setting
- 13: Motor speed
- 14: Output current (100.0% corresponds to 1000.0A)
- 15: Output voltage (100.0% for 1000.0V)
- 16: Motor output torque (actual value, relative to the percentage of the rated motor current)
- 17: Inverter output torque (actual value, relative to the percentage of the rated current of the inverter)

F07-07	Description: AO1 output selection
	Default: 0 ○
	Same as F07.06
F07-08	Description: AO2 output selection
	Default: 1 ○
	Same as F07.06
F07-09	Description: HDO pulse output maximum frequency
	Default: 50.00 ○
	0.01kHz to 100.00kHz
F07-10	Description: AO1 zero offset coefficient
	Default: 0.0 ○
	-100.0% to 100.0%
F07-11	Description: AO1 gain
	Default: 1.00 ○
	-10.00 ~ 10.00
F07-12	Description: AO2 zero offset coefficient

	Default: 0.0 ☐ -100.0% to 100.0%
F07-13	Description: AO2 gain Default: 1.00 ☐ -10.00 ~ 10.00
F07-14	Description: HDO digital output delay time Default: 0.0 ☐ 0.0s ~ 3600.0s
F07-15	Description: Relay 1 output delay time Default: 0.0 ☐ 0.0s ~ 3600.0s
F07-16	Description: Relay 2 output delay time Default: 0.0 ☐ 0.0s ~ 3600.0s
F07-17	Description: DO output delay time Default: 0.0 ☐ 0.0s to 3600.0s
F07-18	Description: Reserved Default: Reserved
F07-19	Description: DO output terminal valid status selection Default: 00000 ☐ 0-positive logic 1-negative logic Units place: HDO Tens place: Relay 1 Hundreds place: Relay 2 Thousands place: DO

Ten thousand place: Reserved

Group F08 Faults and protection

F08-00	Description: Motor overload protection selection
	Default: 1 ☐
	0: Disable 1: Allow
F08-01	Description: Motor overload protection gain
	Default: 1.00 ☐
	0.20 ~ 10.00
F08-02	Description: Motor overload pre-warning coefficient
	Default: 80 ☐
	50% ~ 100%
F08-03	Description: Overload pre-warning detection time
	Default: 1.00 ☐
	0.20s to 10.00s
F08-04	Description: Overload pre-warning action selection
	Default: 1 ☐
	0: No detection 1: Overload pre-warning is effective in operation, and continue to run after detection 2: Overload pre-warning is effective in operation, and alarm after detection (OL3) and stop 3: Overload pre-warning is effective in constant speed operation, and continue to run after detection 4: Overload pre-warning is effective in constant speed operation, and alarm after detection (OL3) and stop
F08-05	Description: Overvoltage stall gain
	Default: 30 ☐
	0 to 100

F08-06	Description: Overvoltage stall protection voltage
	Default: 760.0 ☆
	200.0 ~ 2000.0v Model dependent 220V: 380V 380V: 760V
F08-07	Description: Overcurrent stall gain
	Default: 20 ○
	0 ~ 100
F08-08	Description: Overcurrent stall protection current
	Default: 150 ☆
	100% to 200%
F08-09	Description: Instantaneous non-stop gain Kp
	Default: 40 ○
	0 to 100
F08-10	Description: Instantaneous non-stop integral coefficient Ki
	Default: 30 ○
	0 to 100
F08-11	Description: Instantaneous non-stop action deceleration time
	Default: 20.0 ☆
	0.0 ~ 300.0s
F08-12	Description: Input phase loss
	Default: 1 ○
	0: Disable 1: Allow
F08-13	Description: Output phase loss protection selection
	Default: 01 ○
	Units place: Output phase loss protection selection during running

0: Disable 1: Allow

Tens place: Output phase loss protection selection before running

0: Disable 1: Allow

F08-14

Description: Automatic fault reset times

Default: 0



0 to 20

F08-15

Description: Automatic fault reset interval

Default: 5.0



0.1s to 100.0s

F08-16

Description: First fault type

Default: 0



0: No fault

1: Inverter unit U phase protection (E.oUt1)

2: Inverter unit V phase protection (E.oUt2)

3: Inverter unit W phase protection (E.oUt3)

4: Acceleration overcurrent (E.oC1)

5: Decelerating overcurrent (E.oC2)

6: Constant speed overcurrent (E.oC3)

7: Accelerating overvoltage (E.oU1)

8: Decelerating overvoltage (E.oU2)

9: Constant speed overvoltage (E.oU3)

10: Bus undervoltage fault (E.Lv)

11: Motor overload (E.oL1)

12: Inverter overload (E.oL2)

13: Input side phase loss (E.ILF)

14: Output side phase loss (E.oLF)

15: Rectifier module overheat (E.oH1)

16: Inverter module overheat fault (E.oH2)

17: External fault (E.EF)

18:485 Communication fault (E.485)

19: Current detection fault (E.ItE)

20: Motor parameter identification fault (E.AUt)

- 21: EEPROM operation fault (E.EEP)
- 22: PID feedback disconnected fault (E.PIdE)
- 23: Brake unit fault (E.bC)
- 24: Running time reached (E.ENd)
- 25: Electronic overload (E.oL3)
- 26: Panel communication error (E.FCE)
- 27: Parameter upload error (E.UFE)
- 28: Parameter download error (E.dNE)
- 29-31: Reserved
- 32: To-ground short-circuit fault 1 (E.EAH1)
- 33: To-ground short-circuit fault 2 (E.EAH2)
- 34: Speed deviation fault (E.dEU)
- 35: Mal-adjustment fault (E.Sto)
- 36: Underload fault (E.LL)
- 37-39: Reserved
- 40: Fast current limit fault (E.CBC)
- 41: Running time switching motor (E.CrP)
- 42: User-defined fault 1 (E.uD1)
- 43: User-defined fault 2 (E.uD2)
- 44: Power-on time reached (E.PTo)
- 45: Motor overheat (E.oH3)
- 46: Motor overspeed (E.oSP)
- 47-80: Reserved
- 81: Hibernation protection function (E.81)
- 82: Low frequency protection function (E.82)
- 83: Dry run protection function (E.83)
- 84: Overcurrent protection function (E.84)
- 85: Overcurrent protection function (E.85)
- 86: Water full protection function(E.86)

F08-17

Description: Second fault type**Default:** 0

•

Same as F08.16

F08-18

Description: Third fault (most recent) type

	Default: 0 •
	Same as F08.16
F08-19	Description: Frequency at third fault
	Default: 0.00 •
F08-20	Description: Current at third fault
	Default: 0.00 •
F08-21	Description: Bus voltage at third fault
	Default: 0.0 •
F08-22	Description: Input terminal status at third fault
	Default: 0 •
F08-23	Description: Output terminal status at third fault
	Default: 0 •
F08-24	Description: Inverter status at third fault
	Default: 0 •
F08-25	Description: Third fault time (timing from this power-on)
	Default: 0 •
F08-26	Description: Third fault time (timing from running time)
	Default: 0.0 •
F08-27	Description: Frequency at second fault
	Default: 0.00 •
F08-28	Description: Current at second fault
	Default: 0.00 •
F08-29	Description: Bus voltage at second fault
	Default: 0.0 •
F08-30	Description: Input terminal status at second fault
	Default: 0 •

F08-31	Description: Output terminal status at second fault
	Default: 0 ●
F08-32	Description: Inverter status at second fault
	Default: 0 ●
F08-33	Description: Second fault time (timing from this power-on)
	Default: 0 ●
F08-34	Description: Second fault time (timing from running time)
	Default: 0.0 ●
F08-35	Description: Frequency at first fault
	Default: 0.00 ●
F08-36	Description: Current at first fault
	Default: 0.00 ●
F08-37	Description: Bus voltage at first fault
	Default: 0.0 ●
F08-38	Description: Input terminal status at first fault
	Default: 0 ●
F08-39	Description: Output terminal status at first fault
	Default: 0 ●
F08-40	Description: Inverter status at first fault
	Default: 0 ●
F08-41	Description: Time at first fault (timing from this power-on)
	Default: 0 ●
F08-42	Description: Time at first fault (timing from running time)
	Default: 0.0 ●
F08-43	Description: Power-on to-ground short-circuit protection selection
	Default: 01 ○

Units place: To-ground short-circuit protection selection during power-on

0: invalid

1: valid

Tens place: To-ground short-circuit protection selection before running

0: invalid

1: valid

F08-44

Description: Braking start voltage

Default: 690.0

○

200.0 ~ 2000.0v Model dependent

220V: 360V

380V: 690V

F08-45

Description: Fault DO action selection during automatic fault reset

Default: 0

○

0: No action

1: Action

F08-46

Description: Fault protection action selection 1

Default: 00000

○

Units place: Motor overload (E.oL1)

0: Coast to stop

1: Stop according to the stop mode

2: Continue running

Tens place: Input phase loss(E.ILF)

Hundreds place: Output phase loss (E.oLF)

Thousands place: External fault (E.EF)

Ten thousands place: Abnormal communication (E.485)

F08-47

Description: Fault protection action selection 2

Default: 00000

○

Units place: Encoder fault (E.PGL)

0: Coast to stop

Tens place: EEPROM operation fault (E.EEP)

0: Coast to stop
 1: Stop according to the stop mode
 Hundreds place: reserved
 Thousands place: Motor overheat (E.oH3)
 0: Coast to stop
 1: Stop according to the stop mode
 2: Continue running
 Ten thousands place: running time reached (E.END)

F08-48

Description: Fault protection action selection 3**Default:** 00000

Units place: User-defined fault 1 (E.uD1)
 0: Coast to stop
 1: Stop according to the stop mode
 2: Continue running
 Tens place: User-defined fault 2 (E.uD2)
 0: Coast to stop
 1: Stop according to the stop mode
 2: Continue running
 Hundreds place: Power-on time reached (E.PTo)
 0: Coast to stop
 1: Stop according to the stop mode
 2: Continue running
 Thousands place: Underload fault (E.LL)
 0: Coast to stop
 1: Decelerate to stop
 2: Decelerate to 7% of the rated frequency of the motor and continue to run, and automatically restore to the set frequency when the load is not dropped
 Ten thousands place: PID feedback disconnected fault (E.PIdE)
 0: Coast to stop
 1: Stop according to the stop mode
 2: Continue running

F08-49

Description: Fault protection action selection 4**Default:** 20000

Units place: Excessive speed deviation (E.dEU)

0: Coast to stop

1: Stop according to the stop mode

2: Continue running

Tens place: Motor overspeed (E.oSP)

Hundreds place: Reserved

Thousands: Reserved

Thousands: Panel communication error (E.FCE)

0: Coast to stop

1: Stop according to the stop mode

2: Continue running

F08-50	Description: Reserved
	Default: Reserved
F08-51	Description: Continue running frequency selection in fault
	Default: 0 ○
F08-52	Description: Abnormal standby frequency setting
	Default: 100 ○ 0.0% to 100.0% (current target frequency)
F08-53	Description: Motor temperature sensor type
	Default: 0 ○ 0: No temperature sensor 1: PT100 2: PT1000
F08-54	Description: Motor overheat protection threshold

	Default: 110 ○ 0°C ~ 200°C
F08-55	Description: Motor overheat pre-warning threshold Default: 90 ○ 0°C ~ 200°C
F08-56	Description: Instantaneous stop non-stop action selection Default: 0 ☆ 0: Invalid 1: Decelerate 2: Decelerate to stop
F08-57	Description: Instantaneous stop action pause judgment voltage Default: 85.0 ☆ 80.0% ~ 100.0%
F08-58	Description: Instantaneous stop non-stop voltage rise judgment time Default: 0.5 ☆ 0.0s to 100.0s
F08-59	Description: Instantaneous stop non-stop action judgment voltage Default: 80.0 ○ 60.0% ~ 100.0% (standard bus voltage)
F08-60	Description: Load lost protection option Default: 0 ○ 0: Invalid 1: Valid
F08-61	Description: Load lost detection level Default: 10.0 ○ 0.0 to 100.0%
F08-62	Description: Load lost detection time

	Default: 1.0 ○ 0.0 ~ 60.0s
F08-63	Description: Reserved Default: 0 ● 0 to 65536
F08-64	Description: Overspeed detection value Default: 20.0 ○ 0.0% to 50.0% (maximum frequency)
F08-65	Description: Overspeed detection time Default: 1.0 ○ 0.0s: No detection 0.1 to 60.0s
F08-66	Description: Excessive speed deviation detection value Default: 20.0 ○ 0.0% ~ 50.0% (maximum frequency)
F08-67	Description: Excessive speed deviation detection time Default: 5.0 ○ 0.0s: No detection 0.1 to 60.0s
Group F09 PID function	
F09-00	Description: PID reference source Default: 0 ○ 0: Function code F09.01 set 1: AI1 2: AI2 3: Reserved 4: High speed pulse setting 5: Communication set

6: Multi-step speed given

7: Pressure setting

F09-01

Description: PID reference value**Default:** 50.0

○

0.0% to 100.0%

F09-02

Description: PID feedback source**Default:** 0

○

0: AI1

1: AI2

2: Reserved

3: AI1-AI2

4: High speed pulse setting

5: Communication set

6: AI1+AI2

7: Max. (|AI1|, |AI2|)

8: Min. (|AI1|, |AI2|)

F09-03

Description: Direction of PID action**Default:** 0

○

0: positive action 1: negative action

F09-04

Description: PID reference feedback range**Default:** 1000

○

0 to 65535

F09-05

Description: PID inversion cutoff frequency**Default:** 0.00

○

0.00Hz ~ Maximum frequency F00.06

F09-06

Description: Proportional Gain P1**Default:** 20.0

○

0.0 to 100.0

F09-07	Description: Integral time I1
	Default: 2.00 ○
	0.01s to 10.00s
F09-08	Description: Differential time D1
	Default: 0.000 ○
	0.000s to 10.000s
F09-09	Description: Reserved
	Default: 0 ●
	0 ~ 65535
F09-10	Description: PID deviation limit
	Default: 0.0 ○
	0.0% to 100.0%
F09-11	Description: PID feedback loss detection value
	Default: 0.0 ○
	0.0%: Feedback loss is not judged 0.1% to 100.0%
F09-12	Description: PID feedback lost detection time
	Default: 0.0 ○
	0.0s to 20.0s
F09-13	Description: PID differential limit
	Default: 0.10 ○
	0.00% ~ 100.00%
F09-14	Description: PID reference change time
	Default: 0.00 ○
	0.00 ~ 650.00s
F09-15	Description: PID feedback filter time

	Default: 0.00 ○ 0.00 ~ 60.00s
F09-16	Description: PID output filter time Default: 0.00 ○ 0.00 ~ 60.00s
F09-17	Description: Proportional gain P2 Default: 20.0 ○ 0.0 to 100.0
F09-18	Description: Integral time I2 Default: 2.00 ○ 0.01s to 10.00s
F09-19	Description: Differential time D2 Default: 0.000 ○ 0.000s to 10.000s
F09-20	Description: PID parameter switchover condition Default: 0 ○ 0: No switchover 1: DI terminal 2: Automatic switchover based on deviation 3: Automatic switchover based on running frequency
F09-21	Description: PID parameter switchover deviation 1 Default: 20.0 ○ 0.0% ~ F10.22
F09-22	Description: PID parameter switchover deviation 2 Default: 80.0 ○ F10.21 ~ 100.0%
F09-23	Description: PID initial value

	Default: 0.0 ○ 0.0% to 100.0%
F09-24	Description: PID initial hold time Default: 0.00 ○ 0.00 to 650.00
F09-25	Description: Positive maximum of two output deviations Default: 1.00 ○ 0.00 ~ 100.00%
F09-26	Description: Reverse maximum of two output deviations Default: 1.00 ○ 0.00% ~ 100.00%
F09-27	Description: PID integral attribute Default: 00 ○ Units place integral separation 0- invalid. 1- valid Tens place: Output to limit value, whether to stop integrating 0- continue integrating; 1- stop integrating
F09-28	Description: PID stop operation Default: 0 ○ 0: No operation during stop 1: Operation during stop
Group F10 Reserved	
Group F11 Multi-step speed, simple PLC control	
F11-00	Description: Multi-step speed 0 Default: 0 ○ -100.0% to 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-01

Description: Multi-step speed 1

Default: 0

○

-100.0% to 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-02

Description: Multi-step speed 2

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-03

Description: Multi-step speed 3

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-04

Description: Multi-step speed 4

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-05

Description: Multi-step speed 5

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-06

Description: Multi-step speed 6

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-07

Description: Multi-step speed 7

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-08

Description: Multi-step speed 8

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-09

Description: Multi-step speed 9

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-10

Description: Multi-step speed 10

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-11

Description: Multi-step speed 11

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-12

Description: Multi-step speed 12

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-13

Description: Multi-step speed 13

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-14

Description: Multi-step speed 14

Default: 0

○

-100.0% to 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-15

Description: Multi-step speed 15

Default: 0

○

-100.0% ~ 100.0%

(100.0% corresponds to maximum frequency F00.06)

F11-16

Description: Simple PLC operation mode

Default: 0

○

0: Stop at the end of a single run

1: End of a single run

2: Keep cycling

F11-17

Description: Simple PLC power failure memory selection

Default: 0

○

Units place:

0: No memory at power failure

1: Memory at power failure

Tens place:

0: Stop without memory

1: Stop memory

F11-18

Description: Running time of step 0

Default: 0

○

0.0s (h) ~ 6553.5s (h)

F11-19

Description: PLC ACC and DEC time selection of step 0

Default: 0

○

0 to 3

F11-20

Description: Running time of step 1

Default: 0

○

0.0s (h) ~ 6553.5s (h)

F11-21

Description: PLC ACC and DEC time selection of step 1

	Default: 0 ○ 0 to 3
F11-22	Description: Running time of step 2 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-23	Description: PLC ACC and DEC time selection of step 2 Default: 0 ○ 0 to 3
F11-24	Description: Running time of step 3 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-25	Description: PLC ACC and DEC time selection of step 3 Default: 0 ○ 0 to 3
F11-26	Description: Running time of step 4 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-27	Description: PLC ACC and DEC time selection of step 4 Default: 0 ○ 0 to 3
F11-28	Description: Running time of step 5 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-29	Description: PLC ACC and DEC time selection of step 5 Default: 0 ○ 0 to 3

F11-30	Description: Running time of step 6
	Default: 0 ○
	0.0s (h) ~ 6553.5s (h)
F11-31	Description: PLC ACC and DEC time selection of step 6
	Default: 0 ○
	0 to 3
F11-32	Description: Running time of step 7
	Default: 0 ○
	0.0s (h) ~ 6553.5s (h)
F11-33	Description: PLC ACC and DEC time selection of step 7
	Default: 0 ○
	0 to 3
F11-34	Description: Running time of step 8
	Default: 0 ○
	0.0s (h) ~ 6553.5s (h)
F11-35	Description: PLC ACC and DEC time selection of step 8
	Default: 0 ○
	0 to 3
F11-36	Description: Running time of step 9
	Default: 0 ○
	0.0s (h) ~ 6553.5s (h)
F11-37	Description: PLC ACC and DEC time selection of step 9
	Default: 0 ○
	0 to 3
F11-38	Description: Running time of step 10
	Default: 0 ○

	0.0s (h) ~ 6553.5s (h)
F11-39	Description: PLC ACC and DEC time selection of step 10 Default: 0 ○ 0 to 3
F11-40	Description: Running time of step 11 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-41	Description: PLC ACC and DEC time selection of step 11 Default: 0 ○ 0 to 3
F11-42	Description: Running time of step 12 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-43	Description: PLC ACC and DEC time selection of step 12 Default: 0 ○ 0 to 3
F11-44	Description: Running time of step 13 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-45	Description: PLC ACC and DEC time selection of step 13 Default: 0 ○ 0 to 3
F11-46	Description: Running time of step 14 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-47	Description: PLC ACC and DEC time selection of step 14

	Default: 0 ○ 0 to 3
F11-48	Description: Running time of step 15 Default: 0 ○ 0.0s (h) ~ 6553.5s (h)
F11-49	Description: PLC ACC and DEC time selection of step 15 Default: 0 ○ 0 to 3
F11-50	Description: PLC running time unit Default: 0 ○ 0: s (seconds) 1: h (hours)
F11-51	Description: Multi-step speed 0 given mode Default: 0 ○ 0: Function code F11.00 is given 1: AI1 2: AI2 3: Reserved 4: High speed pulse 5: PID 6: Preset frequency (F00.09) given, UP/DOWN modifiable
Group F12 Communication parameters	
F12-00	Description: Local address Default: 1 ○ 1 to 247,0 broadcast address
F12-01	Description: Baud rate Default: 5006 ○ Units place: MODBUS 0:300BPS

1:600BPS
 2:1,200BPS
 3:2,400BPS
 4:48,000BPS
 5:9,600BPS
 6:19,200BPS
 7:38,400BPS
 8:57,600BPS
 9:115,200BPS
 Tens place: reserved
 Hundreds place: reserved
 Thousands place: reserved

F12-02

Description: Data format**Default:** 1

0: No check (8-N-2)
 1: Even parity check (8-E-1)
 2: Odd parity check (8-O-1)
 3: 8-N-1

F12-03

Description: Response delay**Default:** 2

0ms to 20ms

F12-04

Description: Communication timeout**Default:** 0.0

0.0 (invalid), 0.1s to 60.0s

F12-05

Description: Data transmission format selection**Default:** 31

Units place: MODBUS-RTU protocol
 0: Non-standard MODBUS protocol
 1: Standard MODBUS protocol
 Tens place: Reserved

F12-06	Description: Communication read current resolution	
	Default:	0 ○
	0:0.01A	
	1:0.1A	
F12-07	Description: Reserved	
	Default:	
	Reserved	
F12-08	Description: Expansion card communication interruption detection time	
	Default:	0.0 ○
	0.0s: Invalid, 0.1~60.0s	
F12-09	Description: Slave address	
	Default:	1 ○
	0 ~ 512	
Group F13 Auxiliary functions		
F13-00	Description: Jog running frequency	
	Default:	2.00 ○
	0.00Hz ~ Maximum frequency F00.06	
F13-01	Description: Jog acceleration time	
	Default:	20.0 ○
	0.0s ~ 6500.0s	
F13-02	Description: Jog deceleration time	
	Default:	20.0 ○
	0.0s to 6500.0s	
F13-03	Description: Acceleration Time 2	
	Default:	20.0 ○
	0.0s ~ 6500.0s	

F13-04	Description: Deceleration Time 2
	Default: 20.0 ☐
	0.0s to 6500.0s
F13-05	Description: Acceleration time 3
	Default: 20.0 ☐
	0.0s ~ 6500.0s
F13-06	Description: Deceleration time 3
	Default: 20.0 ☐
	0.0s to 6500.0s
F13-07	Description: Acceleration time 4
	Default: 0.0 ☐
	0.0s ~ 6500.0s
F13-08	Description: Deceleration time 4
	Default: 0.0 ☐
	0.0s to 6500.0s
F13-09	Description: Jump frequency 1
	Default: 0.00 ☐
	0.00Hz to maximum frequency F00.06
F13-10	Description: Jump Frequency 2
	Default: 0.00 ☐
	0.00Hz ~ Maximum frequency F00.06
F13-11	Description: Jump frequency amplitude
	Default: 0.00 ☐
	0.00Hz ~ Maximum frequency F00.06
F13-12	Description: Reverse control
	Default: 0 ☐

0: Inversion allowed

1: Inversion disabled

F13-13	Description: Droop control
	Default: 0.00 ☐
	Torque current equal to the slip at rated motor current 0.00Hz to 10.00Hz
F13-14	Description: Set power-on arrival time
	Default: 0 ☐
	0h ~ 65535h
F13-15	Description: Set run arrival time
	Default: 0 ☐
	0h ~ 65535h
F13-16	Description: Start protection selection
	Default: 0 ☐
	0: No protection 1: Protection
F13-17	Description: Frequency detection value (FDT1)
	Default: 50.00 ☐
	0.00Hz ~ Maximum frequency F00.06
F13-18	Description: Frequency detection hysteresis value (FDT1)
	Default: 5.0 ☐
	0.0% to 100.0% (FDT1 level)
F13-19	Description: Frequency arrival detection width
	Default: 0.0 ☐
	0.0% to 100.0% (maximum frequency)
F13-20	Description: Whether jump frequency is valid during acceleration and deceleration

	Default: 0 ○ 0: invalid 1: valid
F13-21	Description: Running time arrival action selection Default: 0 ○ 0: Continue to run 1: fault prompt
F13-22	Description: Power-on time arrival action selection Default: 0 ○ 0: Continue running 1: fault information
F13-23	Description: Acceleration time 1/2 switch frequency point Default: 0.00 ○ 0.00Hz ~ Maximum frequency F00.06
F13-24	Description: Deceleration time 1/2 switch frequency point Default: 0.00 ○ 0.00Hz ~ Maximum frequency F00.06
F13-25	Description: Terminal jogging priority Default: 0 ○ 0: invalid 1: valid
F13-26	Description: Frequency detection value (FDT2) Default: 50.00 ○ 0.00Hz ~ Maximum frequency F00.06
F13-27	Description: Frequency detection hysteresis value (FDT2) Default: 5.0 ○ 0.0% to 100.0% (FDT2 level)

F13-28	Description: Arbitrary arrival frequency detection value 1
	Default: 50.00 ○
	0.00Hz ~ Maximum frequency F00.06
F13-29	Description: Arbitrary arrival frequency detection amplitude 1
	Default: 0.0 ○
	0.0% to 100.0% (maximum frequency)
F13-30	Description: Arbitrary arrival frequency detection value 2
	Default: 50.00 ○
	0.00Hz to maximum frequency F00.06
F13-31	Description: Arbitrary arrival frequency detection amplitude 2
	Default: 0.0 ○
	0.0% to 100.0% (maximum frequency)
F13-32	Description: Zero current detection level
	Default: 5.0 ○
	0.0% to 300.0%
	100.0% corresponds to the rated motor current, and is not output at stop
F13-33	Description: Zero current detection delay time
	Default: 0.10 ○
	0.01s to 600.00s
F13-34	Description: Output current limit exceeded
	Default: 200.0 ○
	0.0% (not detected)
	0.1% ~ 300.0% (rated motor current)
F13-35	Description: Detection delay time of output current limit exceeded
	Default: 0.00 ○
	0.00s ~ 600.00s

F13-36	Description: Arbitrary arrival current 1
	Default: 100.0 ○
	0.0% ~ 300.0% (rated motor current)
F13-37	Description: Arbitrary arrival current 1 width
	Default: 0.0 ○
	0.0% to 300.0% (rated motor current)
F13-38	Description: Any arrival current 2
	Default: 100.0 ○
	0.0% to 300.0% (rated motor current)
F13-39	Description: Arbitrary arrival current 2 width
	Default: 0.0 ○
	0.0% to 300.0% (rated motor current)
F13-40	Description: Timing function selection
	Default: 0 ☆
	0: Invalid 1: Valid
F13-41	Description: Timer running time selection
	Default: 0 ☆
	0: F13.42 setting 1: AI1 2: AI2 3: Reserved Analog input ranges correspond to F13.42
F13-42	Description: Timing running time
	Default: 0.0 ☆
	0.0min to 6500.0min
F13-43	Description: Lower limit of AI1 input voltage protection

	Default: 3.10 ○ 0.00V to F13.44
F13-44	Description: Upper limit of AI1 input voltage protection Default: 6.80 ○ F13.43 ~ 11.00V
F13-45	Description: Module temperature reached Default: 75 ○ 0°C ~ 100°C
F13-46	Description: Cooling fan control Default: 0 ○ 0: Fan operation during operation 1: The cooling fan is always running
F13-47	Description: Wakeup frequency Default: 0.00 ○ Hibernation frequency (F13.48) ~ Maximum frequency (F00.06)
F13-48	Description: Hibernation frequency Default: 0.00 ○ 0.00Hz ~ Wakeup frequency (F13.47)
F13-49	Description: Current running arrival time Default: 0.0 ○ 0.0s ~ 6500.0min
F13-50	Description: Output power correction factor Default: 100.0 ○ 0.0 to 200.0%

Group F14 User-defined function codes

Group F15 Manufacturer parameters

Group F16 User group

F16-00	Description: Function parameter group display selection
	Default: 11 ☐
Units place: B00 group display selection 0: No display 1: Display Tens place: A00-A15 group display selection 0: No display 1: Display	
F16-01	Description: Personality parameter group display selection
	Default: 00 ☐
Units place: User customized parameter group display selection 0: No display 1: Display Tens place: User change parameter group display selection 0: No display 1: Display	
F16-02	Description: Function code read-only control
	Default: 0 ☐
0: modifiable 1: cannot be modified	

Group A00 Reserved

Group A01 Reserved

Group A02 Motor 2 parameters

A02-00	Description: Motor type selection
	Default: 0 ☆
0: Ordinary asynchronous motor 1: Variable frequency asynchronous motor	
A02-01	Description: Motor rating

	Default: 4.0 ☆ 0.1kW~1000.0kW Model dependent
A02-02	Description: Rated frequency of motor Default: 50.00 ☆ 0.01Hz~ Maximum frequency F00.06
A02-03	Description: Rated motor speed Default: 1460 ☆ 1rpm~65535rpm
A02-04	Description: Motor rated voltage Default: 380 ☆ 1V~2000V
A02-05	Description: Motor current rating Default: 9.00 ☆ 0.01A~655.35A (inverter power <=55kW) 0.1A~6553.5A (inverter power >55kW)
A02-06	Description: Stator resistance of asynchronous motor Default: 1.204 ☆ 0.001Ω~65.535Ω (inverter power <=55kW) 0.0001Ω~6.5535Ω (inverter power >55kW)
A02-07	Description: Asynchronous motor rotor resistance Default: 0.908 ☆ 0.001Ω~65.535Ω (inverter power <=55kW) 0.0001Ω~6.5535Ω (inverter power >55kW)
A02-08	Description: Induction motor leakage inductive reactance Default: 5.28 ☆ 0.01mH~655.35mH (inverter power <=55kW) 0.001mH~65.535mH (inverter power >55kW)

A02-09	Description: Asynchronous motor mutual inductance
	Default: 158.6 ☆
0.1mH~6553.5mH (inverter power ≤55kW) 0.01mH~655.35mH (inverter >55kW)	
A02-10	Description: No-load current of asynchronous motor
	Default: 4.24 ☆
0.01A~A02.03 (inverter power ≤55kW) 0.1A~A02.03 (inverter power >55kW)	
A02-11	Description: Motor parameter self-identification selection
	Default: 0 ☆
0: no operation 1: asynchronous machine no-load (dynamic) self-identification 2: asynchronous machine with load (static) self-identification 1 3: asynchronous machine with load (static) self-identification 2	
A02-12	Description: Number of encoder pulses
	Default: 1024 ☆
1-65535	
A02-13	Description: Encoder Type
	Default: 0 ☆
0: ABZ incremental encoder 1: UVW incremental encoder 2: Rotary encoder 3: sine-cosine encoder 4: Provincial line mode UVW encoder	
A02-14	Description: Speed feedback PG selection
	Default: 0 ☆
0: Local PG 1: Extended PG 2: HDI high speed pulse input	

A02-15	Description: ABZ encoder AB phase sequence
	Default: 0 ☆
	0: forward 1: reverse
A02-16	Description: Encoder mounting position Angle
	Default: 0.0 ☆
	0.0 ~ 359.9°
A02-17	Description: UVW signal phase sequence
	Default: 0 ☆
	0: forward 1: reverse
A02-18	Description: UVW signal zero position Angle
	Default: 0.0 ☆
	0.0 ~ 359.9°
A02-19	Description: Rotary pole pairs
	Default: 1 ☆
	1-65535
A02-20	Description: Reserved
	Default: ●
	Reserved
A02-21	Description: Speed feedback PG break detection time
	Default: 0.0 ☆
	0.0: No action 0.1s to 10.0s
A02-22	Description: Speed loop proportional gain 1
	Default: 30 ○
	1-100

A02-23	Description: Speed loop integral time 1
	Default: 0.50 ○
	0.01s to 10.00s
A02-24	Description: Switching frequency 1
	Default: 5.00 ○
	0.00 ~ A02.27
A02-25	Description: Speed loop proportional gain 2
	Default: 20 ○
	1-100
A02-26	Description: Speed loop integral time 2
	Default: 1.00 ○
	0.01 s to 10.00 s
A02-27	Description: Switching frequency 2
	Default: 10.00 ○
	A02.24~ Max frequency F00.06
A02-28	Description: Slip compensation factor
	Default: 100 ○
	50% ~ 200%
A02-29	Description: SVC speed feedback filter time
	Default: 0.015 ○
	0.000s to 0.100s
A02-30	Description: Vector control overexcitation gain
	Default: 64 ○
	0 ~ 200
A02-31	Description: Speed control (drive) torque upper limit digital setting
	Default: 150.0 ○

0.0% ~ 200.0%

A02-32

Description: Speed control (drive) torque upper limit source**Default:** 0

○

0: Set by function code A02.31

1: AI1

2: AI2

3: Reserved

4: HDI high speed pulse setting

5: Communication given

6: MIN (AI1, AI2)

7: MAX (AI1, AI2)

The full scale of options 1 to 7 corresponds to A02.31

A02-33

Description: Speed control (braking) torque upper limit source**Default:** 0

●

0: Function code A02.34 set

1: AI1

2: AI2

3: Reserved

4: HDI high speed pulse setting

5: Communication set

6: MIN (AI1, AI2)

7: MAX (AI1, AI2)

8: Function code A02.32 setting (does not distinguish drive and brake)

The full scale of options 1 to 7 corresponds to A02.34

A02-34

Description: Speed control (braking) torque upper limit digital setting**Default:** 150.0

●

0.0% ~ 200.0%

A02-35

Description: M-axis current loop proportional gain**Default:** 2000

○

0 ~ 60000

A02-36	Description: M-axis current loop integral gain
	Default: 1300 ○
	0 ~ 60000
A02-37	Description: T-axis current loop proportional gain
	Default: 2000 ○
	0 ~ 60000
A02-38	Description: T-axis current loop integral gain
	Default: 1300 ○
	0 ~ 60000
A02-39	Description: Speed loop integral properties
	Default: 0 ○
	Units place: integral separation 0: Speed loop integral is always valid 1: Speed loop integral separation
A02-40	Description: Synchro weak magnetic mode
	Default: 0 ○
	0: Not weak magnetic 1: Direct calculation 2: Automatic adjustment
A02-41	Description: Overmodulation Enable Select
	Default: 0 ○
	0: Disable 1: Enable
A02-42	Description: Maximum output voltage coefficient
	Default: 105 ☆
	100% ~ 110%
A02-43	Description: Maximum torque coefficient in weak field

	Default: 100 ○ 50% ~ 200%
A02-44	Description: Power generation (braking) torque enable selection under speed model Default: 0 ○ 0: Disable 1: Enable
A02-45	Description: Upper limit of generating power Default: Model dependent ○ 0.0% ~ 200.0%
A02-46	Description: Motor control mode Default: 2 ☆ 0: Sensorless vector control (SVC) 1: Reserved 2: V/f control
A02-47	Description: Acceleration and deceleration time selection Default: 0 ○ 0: same as the first motor 1: Acceleration and deceleration time 1 2: acceleration and deceleration time 2 3: acceleration and deceleration time 3 4: acceleration and deceleration time 4
A02-48	Description: Motor torque boost Default: Model dependent ○ 0.0%: Automatic torque boost 0.1%~30.0%
A02-49	Description: Reserved Default: 0 ● Reserved

A02-50	Description:	Oscillation suppression gain	
	Default:	40	○
0 ~ 100			

Group A03 Solar water pump special function code

A03-00	Description:	Operating status	
	Default:	Read Only	●
0: Stopping 1: Running 2: Hibernating 3: Low frequency protection 4: Dry run protection 5: Overcurrent protection 6: Minimum power protection			
A03-01	Description:	VOC voltage	
	Default:	Read Only	●
0.0V ~ 999.9V			
A03-02	Description:	Solar pumping mode	
	Default:	2	★
0: Variable frequency speed regulation mode 1: CVT mode 2: MPPT mode			
A03-03	Description:	CVT target voltage	
	Default:	85.0%	☆
30.0% ~ 102.4%			
A03-04	Description:	CVT integral gain	
	Default:	2000	☆
0 ~ 65535			
A03-05	Description:	CVT proportional gain	

	Default: 20 ☆ 0 ~ 65535
A03-06	Description: CVT transition frequency Default: 10.00Hz ☆ 0.00 ~ 50.00Hz
A03-07	Description: Upper limit of CVT voltage Default: 1000.0V ★ 0.0V ~ 1000.0V
A03-08	Description: Lower limit of CVT voltage Default: 0.0V ★ 0.0V ~ 1000.0V
A03-09	Description: MPPT search starting voltage Default: 95.0% ☆ 30.0% ~ 102.4%
A03-10	Description: MPPT search cycle Default: 2.00s ☆ 0.01s ~ 60.00s
A03-11	Description: MPPT search step size Default: 0.50s ☆ 0.01s ~ 60.00s
A03-12	Description: Frequency rise adjusts step size Default: 2.00 Hz/s ☆ 0.00Hz/s ~ 300.00 Hz/s
A03-13	Description: Frequency drop adjusts step size Default: 10.00 Hz/s ☆ 0.00Hz/s ~ 300.00 Hz/s

A03-14 ~ A03-18	Reserved
A03-19	Description: Power on terminal protection Default: 1 ★ 0: The power-on terminal command is invalid 1: The power on terminal command is valid
A03-20	Description: Power failure restart enabled Default: 1 ☆ 0: Invalid 1: Power-off restart
A03-21	Description: Power failure restart delay time Default: 10.0 s ★ 0.0 ~ 6000.0 s
A03-22 ~ A03-23	Reserved
A03-24	Description: Customized detection current for overcurrent protection Default: 0.00A ★ 0.00A ~ 600.00A
A03-25	Description: Customized detection time for overcurrent protection Default: 10.0s ★ 0.0s ~ 6000.0s
A03-26	Description: Customized automatic recovery time for overcurrent protection Default: 20.0s ★ 0.0s ~ 6000.0s
A03-27	Description: Customized minimum power protection value

	Default: 0.0kW ★ 0.0kW ~ 1000.0kW
A03-28	Description: Customized detection time for minimum power protection Default: 10.0s ★ 0.0s ~ 6000.0s
A03-29	Description: Customized automatic recovery time for minimum power protection Default: 10.0s ★ 0.0s ~ 6000.0s
A03-30	Description: Customized detection current for dry protection Default: 0.00A ★ 0.00 ~ 600.00A
A03-31	Description: Customized detection time for dry protection Default: 10.0s ★ 0.0 ~ 6000.0s
A03-32	Description: Customized automatic recovery time for dry protection Default: 20.0s ★ 0.0 ~ 6000.0s
A03-33	Description: Customized hibernation voltage threshold Default: 0V ★ 0 ~ 1000V
A03-34	Description: Customized hibernation recovery voltage Default: 400V ★ 0 ~ 1000V
A03-35	Description: Customized hibernation stop waiting time Default: 20.0s ★

	0.0 ~ 6000.0s
A03-36	Description: Customized detection frequency for low frequency protection
	Default: 0.00Hz ☆
	0.00 ~ 300.00Hz
A03-37	Description: Customized detection time for low frequency protection
	Default: 10.0s ★
	0.0 ~ 6000.0s
A03-38	Description: Customized automatic recovery time for low frequency protection
	Default: 20.0s ★
	0.0 ~ 6000.0s
A03-39	Description: Detection time for water full protection
	Default: 10.0s ★
	0.0s ~ 6000.0s
A03-40	Description: Exit time for water full protection
	Default: 10.0s ★
	0.0s ~ 6000.0s
A03-41	Description: Alarm recovery mode
	Default: H.0000
	0: Auto recovery 1: Manual recovery Units place: Low frequency protection Tens place: Dry protection Hundreds place: Overcurrent and overload protection Thousands place: Minimum power protection
A03-42	Reserved
A03-43	Description: Power curve 0
	Default: 0.50kW ★

0.00kW ~ 100.00kW		
A03-44	Description:	Power curve 1
	Default:	1.00kW ★
0.00kW ~ 100.00kW		
A03-45	Description:	Power curve 2
	Default:	1.50kW ★
0.00kW ~ 100.00kW		
A03-46	Description:	Power curve 3
	Default:	2.00kW ★
0.00kW ~ 100.00kW		
A03-47	Description:	Power curve 4
	Default:	2.50kW ★
0.00kW ~ 100.00kW		
A03-48	Description:	Flow curve 0
	Default:	0.0m ³ /h ★
0.0m ³ /h ~ 1000.0m ³ /h		
A03-49	Description:	Flow curve 1
	Default:	5.0m ³ /h ★
0.0m ³ /h ~ 1000.0m ³ /h		
A03-50	Description:	Flow curve 2
	Default:	10.0m ³ /h ★
0.0m ³ /h ~ 1000.0m ³ /h		
A03-51	Description:	Flow curve 3
	Default:	15.0m ³ /h ★
0.0m ³ /h ~ 1000.0m ³ /h		
A03-52	Description:	Flow curve 4

	Default: 20.0m ³ /h ★ 0.0m ³ /h ~ 1000.0m ³ /h
A03-53 ~ A03-54	Reserved
A03-55	Description: Daily flow/daily power zero clearing period Default: 7.0h ★ 0.0h ~ 24.0h
A03-56	Reserved
A03-57	Description: Number of automatic reset times Default: 000 ☆ 0 ~ 100
Groups A04 Reserved	
Group A05 Control optimization parameters	
A05-00	Description: DPWM switching upper limit frequency Default: 8.00 ○ 5.00Hz ~ Maximum frequency F00.06
A05-01	Description: PWM modulation mode Default: 0 ○ 0: asynchronous modulation 1: synchronous modulation
A05-02	Description: Dead zone compensation mode selection Default: 1 ○ 0: No compensation 1: Compensation mode 1
A05-03	Description: Random PWM Default: 0 ○

0: Not selected

1 to 10: random depth selection

A05-04	Description:	Phase-by-phase current limit enabled	
	Default:	1	○
0: disabled 1: enabled			
A05-05	Description:	Voltage overmodulation factor	
	Default:	105	○
100 ~ 110			
A05-06	Description:	Undervoltage point setting	
	Default:	350.0	○
200.0v ~ 2000.0v Model dependent 220v: 200v 380v: 350v 480v: 350v 690v: 650v 1140v: 1100v			
A05-07	Description:	Reserved	
	Default:	2	☆
Reserved			
A05-08	Description:	Dead zone time adjustment	
	Default:	150	☆
100% to 200%			
A05-09	Description:	Overvoltage point setting	
	Default:	810.0	☆
200.0v ~ 2200.0v Model dependent 220v: 400v 380v: 810v			

Group A06 ~ A8 Reserved

Group A09 Power consumption record

A09-08	Description:	Accumulated power consumption of AC input	
	Default:		•
A09-09	Description:	Accumulated power consumption of DC input	
	Default:		•

Groups A10 to A15 Reserved

Group B00 Display

B00-00	Description:	Running frequency	
	Default:	0.01	•
	Unit: Hz		
B00-01	Description:	Set frequency	
	Default:	0.01	•
	Unit: Hz		
B00-02	Description:	Bus voltage	
	Default:	0.1	•
	Unit: V		
B00-03	Description:	Output voltage	
	Default:	1	•
	Unit: V		
B00-04	Description:	Output current	
	Default:	0.01	•
	Unit: A		
B00-05	Description:	Output power	
	Default:	0.1	•
	Unit: kW		

B00-06	Description:	Output torque	
	Default:	0.1	•
	Unit: %		
B00-07	Description:	DI input status	
	Default:	0x0000	•
	DI input status		
B00-08	Description:	DO output status	
	Default:	0x0000	•
	DO output status		
B00-09	Description:	AI1 voltage/current	
	Default:	0.01	•
	Unit: V/mA		
B00-10	Description:	AI2 voltage/current	
	Default:	0.01	•
	Unit: V/mA		
B00-11	Description:	Reserved	
	Default:	0.01	•
	Reserved		
B00-12	Description:	Count value	
	Default:	1	•
B00-13	Description:	Length value	
	Default:	1	•
B00-14	Description:	Load speed display	
	Default:	1	•
B00-15	Description:	PID settings	
	Default:	1	•

Unit: %

B00-16

Description: PID feedback**Default:** 1

•

Unit: %

B00-17

Description: PLC stage**Default:** 1

•

B00-18

Description: Input pulse frequency**Default:** 0.01

•

Unit: kHz

B00-19

Description: Feedback speed**Default:** 0.01

•

Unit: Hz

B00-20

Description: Remaining running time**Default:** 0.1

•

Unit: min

B00-21

Description: AI1 voltage/current before correction**Default:** 0.001

•

Unit: V/mA

B00-22

Description: AI2 voltage/current before correction**Default:** 0.001

•

Unit: V/mA

B00-23

Description: Reserved**Default:** 0.001

•

B00-24

Description: Linear speed**Default:** 1

•

Unit: m/min

B00-25	Description:	Current power-on time	
	Default:	1	•
	Unit: min		
B00-26	Description:	Current running time	
	Default:	0.1	•
	Unit: min		
B00-27	Description:	Input pulse frequency	
	Default:	1	•
	Unit: kHz		
B00-28	Description:	Communication setting value	
	Default:	0.01	•
	Unit: Hz		
B00-29	Description:	Encoder feedback speed	
	Default:	0	•
	Unit: Hz		
B00-30	Description:	Master frequency X display	
	Default:	0.01	•
	Unit: Hz		
B00-31	Description:	Auxiliary frequency Y display	
	Default:	0.01	•
	Unit: Hz		
B00-32	Description:	View any memory address value	
	Default:	1	•
B00-33	Description:	Synchro rotor position	
	Default:	0.1	•
	Unit: °		

B00-34	Description:	Reserved	
	Default:	1	•
B00-35	Description:	Target torque	
	Default:	0.1	•
	Unit: %		
B00-36	Description:	Reserved	
	Default:	1	•
B00-37	Description:	Power factor angle	
	Default:	0.1	•
	Unit: °		
B00-38	Description:	Reserved	
	Default:	1	•
B00-39	Description:	V/f separation target voltage	
	Default:	1	•
	Unit: V		
B00-40	Description:	V/f separation output voltage	
	Default:	1	•
	Unit: V		
B00-41	Description:	DI input status visual display	
	Default:	1	•
B00-42	Description:	DO output status visual display	
	Default:	1	•
B00-43	Description:	DI function status visual display 1 (Function 01 ~ Function 40)	
	Default:	1	•
B00-44	Description:	DI function status visual display 2 (Function 41 ~ Function 80)	

	Default: 1 •
B00-45	Description: Fault information
	Default: 1 •
B00-59	Description: Set frequency
	Default: 0.01 •
	Unit: %
B00-60	Description: Running frequency
	Default: 0.01 •
	Unit: %
B00-61	Description: Frequency converter state
	Default: 1 •
B00-62	Description: Current fault code
	Default: 1 •
B00-65	Description: Torque upper limit
	Default: 0.1 •
	Unit: %
B00-73	Description: Motor serial number
	Default: 0 •
	0: Motor 1 1: Motor 2
B00-74	Description: Inverter output torque
	Default: 0.1 •
	Unit: %
B00-75	Description: Device code
	Default: 1 •
B00-76	Description: Running RPM

Default:	1	•
-----------------	---	---

Unit: RPM

07

Fault Tracking

This chapter describes how to reset a fault and view the fault history. This chapter also lists all alarm and fault information, as well as possible causes and corrective measures.



Only trained and qualified professionals should perform the operations described in this chapter. Follow the instructions in "1 Safety Precautions."

7.1 Alarm and fault indications

Faults are indicated by indicators. See "5.3 LED keypad display and operation". At that time, the alarm or fault code displayed on the keypad indicated that the frequency converter was in an abnormal state. Using the information given in this chapter, it is possible to find out the causes of most alarms or faults and their corrective measures. If you cannot find out the causes of the alarms or faults, contact your local office.

7.2 Fault reset

The frequency converter can be reset by the STOP/RST key on the keypad, digital input, or cutting off the inverter power. When the fault has been removed, the motor can be restarted.

7.3 Fault history

Function codes F08.16 to F08.18 record the last three fault types. Function codes F08.19~F08.40 record the operation data of the frequency converter when the last three faults occurred.

7.4 Faults and countermeasures

After a fault, the processing steps are as follows:

Step 1 When the frequency converter fails, check whether the keypad display is abnormal. If yes, consult the office.

Step 2 If no exception exists, check the function codes in Group F08 to check the corresponding fault record parameters to determine the actual status when the latest fault occurred.

Step 3 See the following table and check whether there is corresponding abnormal state according to the specific countermeasure.

Step 4 Rectify the fault or ask relevant personnel for help.

Step 5 After confirming that the fault is rectified, reset the fault and start running.

7.4.1 Faults and countermeasures

Fault Name: Overcurrent during ACC	Display: E.oC1
Fault Name: Overcurrent during DEC	Display: E.Oc2
Fault Name: Run overcurrent at constant speed	Display: E.oC3

Possible Causes:

- 1 ACC or DEC too fast
- 2 The grid voltage is low
- 3 The inverter power is small
- 4 Load transient or abnormal
- 5 Short circuit to the ground, output phase loss
- 6 There is strong external interference source
- 7 Overcurrent stall protection is not enabled

Countermeasure:

- 1) Increase the acceleration and deceleration time
- 2) Check the input power supply
- 3) Choose the inverter with larger power
- 4) Check whether there is a short circuit in the load
- 5) (Short circuit to the ground or short circuit between lines) or blocked rotation phenomenon. Check the output wiring
- 6) Check whether there is strong interference
- 7) Check the setting of the relevant function code

Fault Name: Overvoltage during ACC	Display: E.oU1
---	-----------------------

Possible Causes:

- 1 Abnormal input voltage
- 2 After instantaneous power failure, restart the rotating motor
- 3 Acceleration time is too fast

Countermeasure:

- 1) Check input power
- 2) Avoid restart after stop

3) Increase acceleration time

Fault Name: Overvoltage during DEC**Display:** E.oU2**Possible Causes:**

- 1 Deceleration too fast
- 2 Large load inertia
- 3 Abnormal input voltage
- 4 Missing energy consumption brake assembly
- 5 Energy consumption brake function is not enabled

Countermeasure:

- 1) Increased deceleration time
- 2) Increase energy consumption brake assembly
- 3) Check input power
- 4) Add energy consumption brake assembly
- 5) Check the settings for the relevant function codes

Fault Name: Overvoltage during constant speed running**Display:** E.oU3**Possible Causes:**

- 1 The input voltage changes abnormally
- 2 The load inertia is large

Countermeasure:

- 1) Install the input reactor
- 2) Add suitable energy consumption brake assembly

Fault Name: Bus undervoltage**Display:** E.Lv**Possible Causes:**

- 1 Low grid voltage
- 2 Overvoltage stall protection is not on

Countermeasure:

- 1) Check the grid input power supply
- 2) Check the settings for the relevant function codes

Fault Name: Inverter Unit U phase fault	Display: E.oUt1
Fault Name: Inverter Unit V phase fault	Display: E.oUt2
Fault Name: Inverter Unit W phase fault	Display: E.oUt3

Possible Causes:

1. Acceleration too fast
2. Internal damage to the phase IGBT
3. Interference causes mis-operation
4. Whether grounding is good
5. Whether to-ground short circuit occurred

Countermeasure:

- 1) Increase acceleration time
- 2) Ask for help
- 3) Check that the peripherals have no strong interference sources
- 4) Check the grounding
- 5) Check that the output is not short-circuited to the ground, well-connected

Fault Name: Motor overload	Display: E.oL1
-----------------------------------	-----------------------

Possible Causes:

1. The power grid voltage is too low
2. The rated motor current is set incorrectly
3. Motor stall or excessive load transient
4. Motor load capacity exceeds the actual load

Countermeasure:

- 1) Check the grid voltage
- 2) Reset the rated motor current
- 3) Check the load and adjust the torque boost
- 4) Choose the right motor

Fault Name: Inverter overload	Display: E.oL2
--------------------------------------	-----------------------

Possible Causes:

1. Acceleration too fast
2. Restart the rotating motor
3. The grid voltage is too low
4. Load is too large

Countermeasure:

- 1) Reduce acceleration
- 2) Avoid restart after stop
- 3) Check the grid voltage
- 4) Choose an inverter with larger power

Fault Name: Overload pre-warning**Display:** E.oL3**Possible Causes:**

1. Load is too large
2. The motor parameters are not correct
3. The grid voltage is low

Countermeasure:

- 1) Choose an inverter with larger power
- 2) Check motor rotation parameter identification
- 3) Check the grid voltage

Fault Name: Rectifier module overheat**Display:** E.oH1**Fault Name:** Inverter module overheat**Display:** E.oH2**Possible Causes:**

1. The inverter overcurrent instantaneously
2. The output three phase has an interphase or ground short circuit
3. Blocked air duct or damaged fan
4. Excessive ambient temperature
5. The cable connection to the control board or plug-in is loose
6. The auxiliary power supply is damaged and the drive voltage is undervoltage
7. Power module bridge shoot-through

8. Abnormal control board

Countermeasure:

- 1) See overcurrent countermeasures
 - 2) Rewiring
 - 3) Ventilate the air duct or replace the fan
 - 4) Reduce ambient temperature
 - 5) Check and reconnect
 - 6) Seek service
 - 7) Seek service
 - 8) Seek service
-

Fault Name: Phase loss on input side
Display: E.ILF**Possible Causes:**

1. R,S,T input phase loss or fluctuation
-

Countermeasure:

- 1) Check the input power supply
 - 2) Check the installation wiring
-

Fault Name: Phase loss on output side
Display: E.OLF**Possible Causes:**

1. U, V, W output phase loss
 2. The three phases of the load are seriously asymmetrical
-

Countermeasure:

- 1) Check the output wiring
 - 2) Check the motor and cables
-

Fault Name: Brake unit fault
Display: E.bC**Possible Causes:**

1. Faulty brake line or damaged brake tube
 2. The resistance value of the external brake resistor is low
-

Countermeasure:

- 1) Check the brake unit and replace it with a new brake tube
- 2) Increase brake resistance

Fault Name: Motor parameter identification fault
Display: E.AUt**Possible Causes:**

1. The motor capacity does not match the frequency converter capacity
 2. The rated parameters of the motor are set improperly
 3. The deviation between the identified parameters and the standard parameters is too large
 4. Parameter identification times out
-

Countermeasure:

- 1) Replace the inverter model
 - 2) Set the rated parameters according to the motor nameplate
 - 3) Make the motor no-load, re-identify
 - 4) Check motor wiring and parameter setting
-

Fault Name: PID feedback disconnection fault
Display: E.PIDE**Possible Causes:**

1. The PID feedback is disconnected
 2. The PID feedback source disappears
-

Countermeasure:

- 1) Check the PID feedback signal cable
 - 2) Check the PID feedback source
-

Fault Name: Communication Fault
Display: E.485**Possible Causes:**

1. The baud rate is set improperly
 2. Communication error using serial communication
 3. Communication has been interrupted for a long time
-

Countermeasure:

- 1) Set the appropriate baud rate
- 2) Press the STOP/RESET key to reset and seek service
- 3) Check the wiring of the communication port

Fault Name: External fault

Display: E.EF

Possible Causes:

1. SI external fault input terminal action
-

Countermeasure:

- 1) Check the external device input
-

Fault Name: EEPROM read write fault

Display: E.EEP

Possible Causes:

1. Control parameter reading/writing error
 2. The EEPROM is damaged
-

Countermeasure:

- 1) Press the STOP/RESET key to reset the EEPROM
 - 2) Seek service
-

Fault Name: Running time reached

Display: E.END

Possible Causes:

1. User trial time arrives
-

Countermeasure:

- 1) Ask the manufacturer for service
-

Fault Name: Current detection circuit fault

Display: E.ItE

Possible Causes:

1. Control board connector is in poor contact
 2. Auxiliary power supply damaged
 3. Hall device damage
 4. Abnormal amplification circuit
-

Countermeasure:

- 1) Check the connector and re-plug the cable
- 2) Seek service
- 3) Seek service
- 4) Seek service

7.4.2 Other faults**Fault Name:** Hibernation protection function**Display:** E.81**Possible Causes:**

When the solar panel provides DC voltage below A03.33 (hibernation voltage threshold), the inverter will go to sleep, and the keypad warns "E.81". When the DC voltage of the solar panel rises back to A03.34 (hibernation recovery voltage), the timing starts. After A03.35 (hibernation stop waiting time), the frequency converter starts to run.

Fault Name: Low frequency protection function**Display:** E.82**Possible Causes:**

When the output frequency is lower than A03.36 (detection frequency for low frequency protection), and continues A03.37(detection time for low frequency protection), enter the protection standby state, and the keypad warns "E.82". After A03.38 (automatic recovery time for low frequency protection), the operation will automatically resume.

Fault Name: Dry protection function**Display:** E.83**Possible Causes:**

When the output current is lower than A03.30 (detection current for dry protection), and continues A03.31 (detection time for dry protection), enter the protection standby state, and the keypad warns "E.83". After A03.32 (automatic recovery time for dry protection), the operation will automatically resume.

Fault Name: Overcurrent protection function
Display: E.84**Possible Causes:**

When the output current is larger than A03.24 (detection current for overcurrent protection), and continues A03.25 (detection time for overcurrent protection), enter the protection standby state, and the keypad warns "E.84". After A03.26 (automatic recovery time for overcurrent protection), the operation will automatically resume.

Fault Name: Minimum power protection function
Display: E.85**Possible Causes:**

When the output power is lower than A03.27 (minimum power protection value), and continues A03.28 (detection time for minimum power protection), enter the protection standby state, and the keypad warns "E.85". After A03.29 (automatic recovery time for minimum power protection), the operation will automatically resume.

Fault Name: Water full protection function
Display: E.86**Possible Causes:**

The DI3 terminal detects the full water level and low water level to achieve automatic water level control. A03.39 is the detection time for water full protection, A03.40 is the exit time for water full protection, and DI3 terminal is the input signal of photovoltaic full water detection alarm, and the keypad warns "E.86".

Alarm recovery mode: 0: automatic recovery; 1: manual recovery

This option is for low frequency protection function, dry protection function, overcurrent protection function and minimum power function. The alarm recovery mode can be selected through A03.41. When the selection is 0 (automatic recovery), during the fault warning display, you can also press the "STOP" key to stop the operation. When the selection is 1 (manual recovery), during the fault warning display, you can manually clear by pressing the "STOP" key to achieve

the stop operation.

PQ curve function: this model provides a customized PQ curve, which can be used for users to set 5 groups of PQ corresponding points according to the pump situation to achieve real-time flow speed, daily flow, cumulative flow, daily power generation and cumulative power consumption calculation. By default, the daily flow and daily power generation are calculated in 7h for one day.

Status view: when the photovoltaic pump enters the operating state, you can confirm the current operating status by viewing A03.00.

A

Technical Data

A.1 Content of this chapter

This chapter introduces the technical data of the inverter, and the situation of compliance with CE and other quality certification systems.

A.2 Derating the frequency converter

A.2.1 Capacity

Determine the specifications of the inverter based on rated motor current and power. In order to achieve the motor power rating given in the table, the rated output current of the inverter must be greater than or equal to the rated motor current. The rated power of the inverter must also be greater than or equal to the rated power of the motor.

Note:

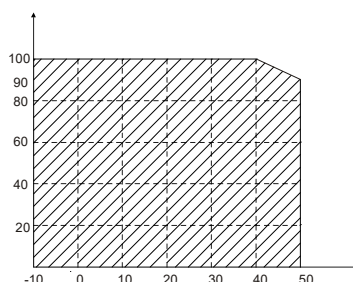
- ✧ The rated capacity is the capacity at an ambient temperature of 40 °C.
- ✧ It must be checked and confirmed that the power flowing through the common DC connection must not exceed the rated motor power in a common DC system.

A.2.2 Derate

If the ambient temperature of the installation site exceeds 40°C, the altitude exceeds 1000m, the heat dissipation hole cover plate or the carrier frequency is greater than the recommended frequency in the manual, derate by 10% for every 1k increase in the carrier frequency.

A.2.2.1 Temperature derating

The temperature range is from +40°C to +50°C the rated output current is derated by 1% for each increased 1°C. Refer to the table below for actual derating.



Note:

It is not recommended to use the frequency converter above 50°C; otherwise, the

resulting consequences are the responsibility of the customer.

A.2.2.2 Altitude derating

The frequency converter installed at an altitude of 1000m below can output rated power. When the altitude exceeds 1000m, please derate by 1% for every 100m increase.

A.3 Grid specifications

Grid voltage	AC 3PH 380V~480V
Short circuit capacity	The maximum allowable short-circuit current at the inlet end is 100kA as defined in IEC 61439-1. The frequency converter is suitable for the application where the RMS of the circuit transmission current is not more than 100kA at the maximum rated voltage.
Frequency	50/60Hz±5% with a maximum change rate of 20%/s

A.4 Motor connection data

Motor type	Asynchronous induction motor or synchronous permanent magnet motor
Voltage	0 to U1 (rated voltage of motor), three-phase symmetry, voltage at weak magnetic point is Umax (rated voltage of inverter)
Short circuit protection	Short circuit protection for motor output complies with IEC 61800-5-1
Frequency	0~400Hz
Frequency resolution	0.01Hz
Power limit values	1.1 times of the rated motor power
Weak magnetic point	10~400Hz
Carrier frequency	2, 4, 8, 12 or 15kHz

A.4.1 EMC compatibility and motor cable length

To meet the requirements of IEC/EN 61800-3 Class II (C3) and Class I (C2) electromagnetic environments, the FD590 series offers both built-in and external filter solutions. Measured according to 4K carrier frequency, the motor cable length

that can be achieved is shown in the following table:

FD590 power range	Length of motor cable supported (unit: m)			
	Built-in		External	
	Second class environment C3	First class environment C2	Second class environment C3	First class environment C2
1.5~22kW	20	20	1	/
30~500kW	30	No built-in solutions available	30	/

For an explanation of the electromagnetic environment (C3/C2), see "A.6 EMC specifications".

A.5 Application standards

Frequency converters follow the following standards:

EN/ISO 13849-1	Safety of machinery - Safety-related control system components - Part 1: General principles for design
IEC/EN 60204-1	Safety of machinery. Electrical equipment for machinery. Part 1: General requirements
IEC/EN 62061	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems
IEC/EN 61800-3	Speed-controlled electrical drive systems. Part 3: Electromagnetic Compatibility (EMC) Electromagnetic compatibility standards and specific test methods for speed regulating electrical drive system products
IEC/EN 61800-5-1	Variable speed electrical drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy

A.5.1 CE marking

The CE marking on our nameplate indicates that this inverter has passed the CE certification, in accordance with the European Low Voltage Directive (2014/35/EU) and Electromagnetic Compatibility Directive (2014/30/EU).

A.5.2 Comply with the EMC specification declaration

The European Union stipulates that the electronic and electrical equipment sold in

Europe must meet the requirements of not producing more than the electromagnetic disturbance emission limit specified in the relevant standards and have the electromagnetic immunity ability to work normally in a certain electromagnetic environment. The EMC Product Standard (EN 61800-3) details the electromagnetic compatibility standards and specific test methods for speed-controlled electrical drive system products. Our products strictly follow these specifications.

A.6 EMC specifications

The EMC Product Standard (EN 61800-3) specifies the EMC requirements for inverter products. Application environment classification:

The first type of environment: civil environment. Includes those application environments that are directly connected to the low-voltage power supply grid for civilian power supply without passing through an intermediate transformer.

The second type of environment: all applications other than those that are directly connected to the low-voltage power supply grid for civilian power supply. Four categories of frequency converters:

C1 frequency converter: Rated voltage is less than 1000V, and is used in the first type of environment frequency converter.

Class C2 frequency converters: rated voltage below 1000V, non-plug, socket or mobile devices; A power drive system that must be installed and operated by a professional when applied to a Class I environment.

Note: The EMC standard IEC/EN 61800-3 no longer restricts inverter power distribution, but defines use, installation and commissioning. A professional or organization needs to have the necessary skills to install and/or commission an electrical drive train, including EMC related knowledge.

Class C3 drives: Rated below 1000V for Class II environments and not for Class I environments.

C4 frequency converter: Rated voltage is higher than 1000V, or rated current $\geq 400\text{A}$, and used in complex systems in the second class environment.

B

Dimension Drawings

B.1 Content of this chapter

This chapter provides the dimension drawings of FD590 series frequency converter. The unit in the dimension drawings is millimeters (mm).

B.2 Keypad structure

B.2.1 Keypad appearance and dimensions

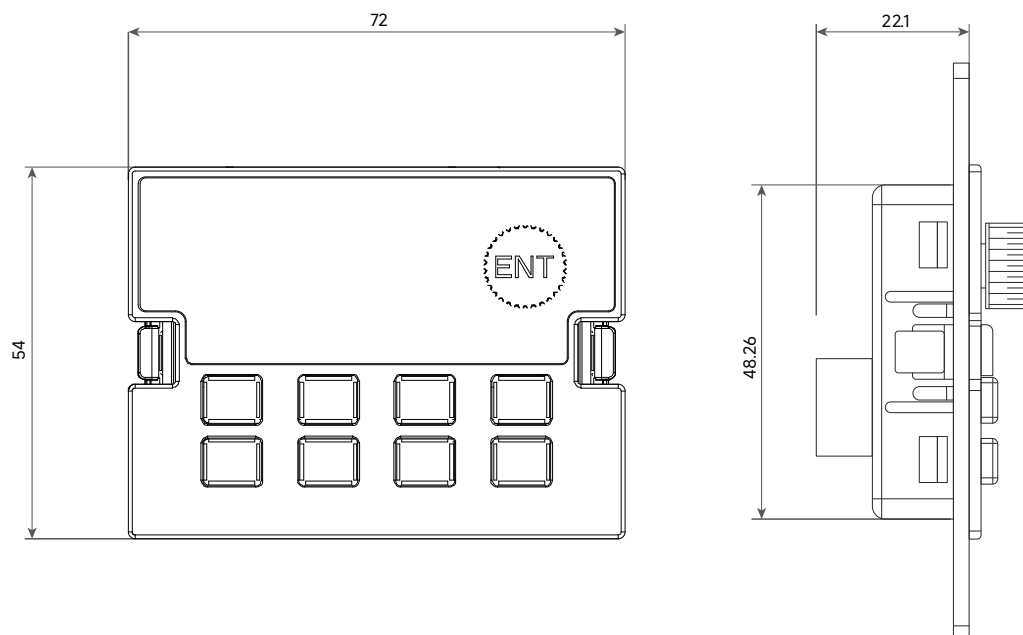


Figure B-1 Keypad appearance and dimensions of 380V/22kW (220V/11kW) and below (unit: mm)

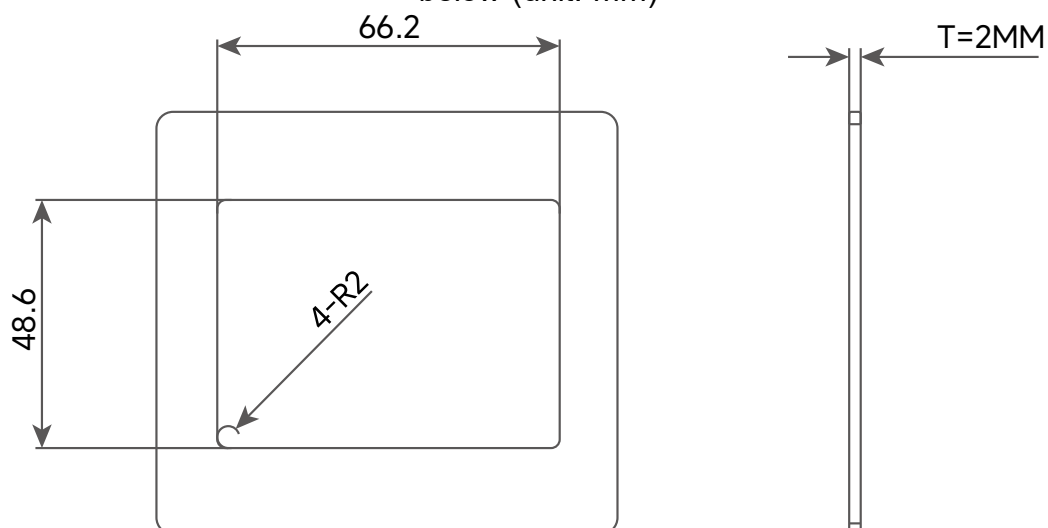


Figure B-2 Dimensions of installation hole for keypad of 380V/22kW (220V/11kW) and below (unit: mm)

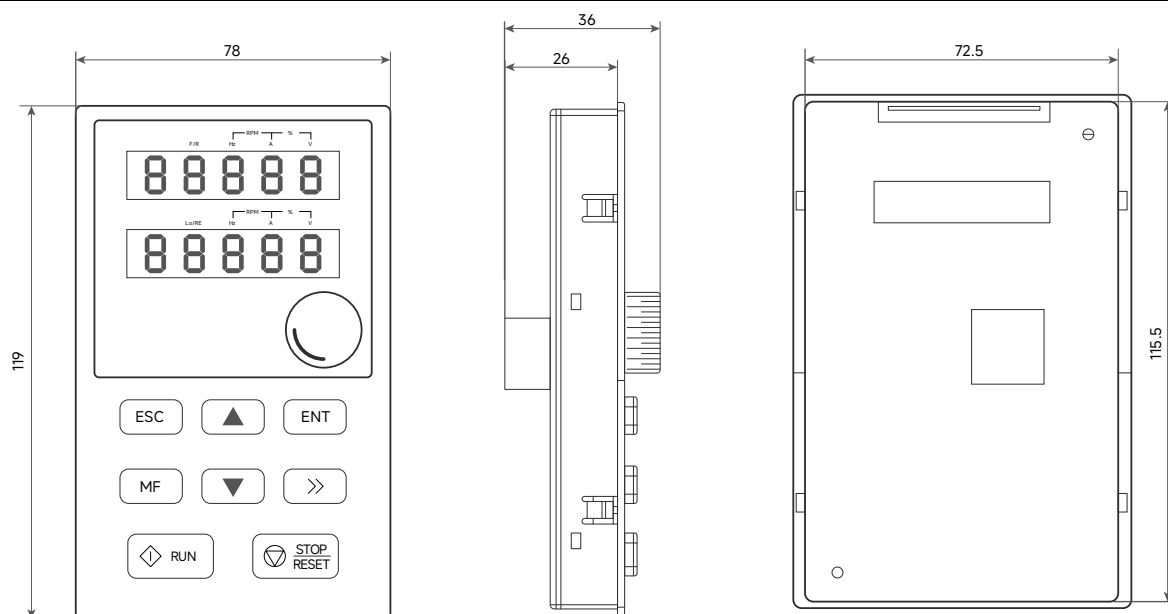


Figure B-3 Appearance and dimensions of a keypad of 380V/30kW (220V/15kW) and above (unit: mm)

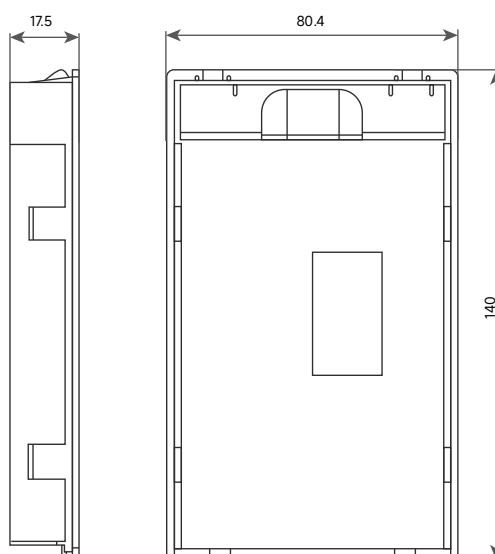


Figure B-4 Dimensions of the external keypad bracket of 380V/30kW (220V/15kW) and above (unit: mm)

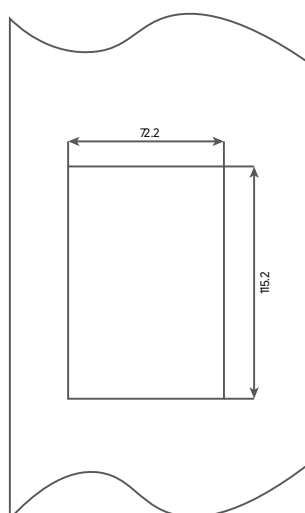


Figure B-5 Dimensions of opening holes on the operation panel (keypad)

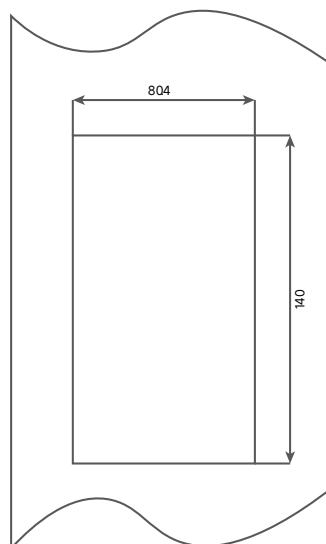


Figure B-6 Dimensions of opening holes on the operation panel support (keypad tray)

B.2.2 Frequency converter appearance and dimensions

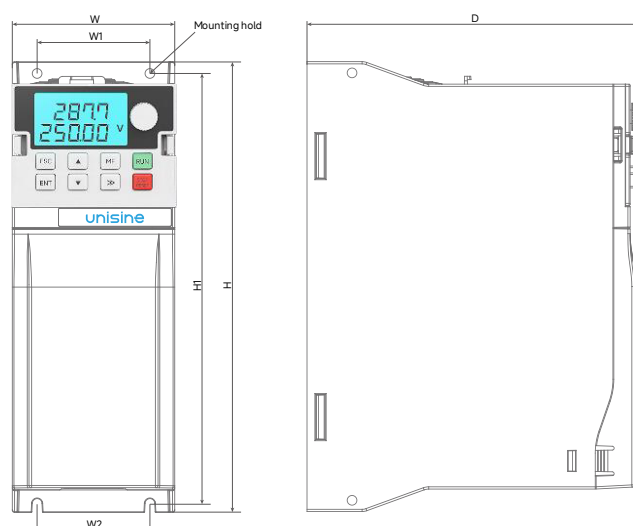


Figure B-7 Appearance of 1.5 to 22kW wall mounting

Inverter specifications	Overall dimensions (mm)			Mounting hole position (mm)			Mounting aperture	Set screws
	W	H	D	H1	W1	W2		
0.4~2.2kW/380V	72	200	150.5	190.8	50	50	ø 4	M4
0.4~2.2kW/220V								
4~5.5kW/220V	100	240	160.5	230.8	70	70	ø 4	M4
4~7.5kW/380V								
5.5~7.5kW/220V	120	330	172.5	321.5	111	107	ø 4	M4
11~15kW/380V								

18.5~22kW/380V	142	383	227.5	373.5	120	129	ø4	M4
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Table B-1 Dimensions of 380V/0.75~22kW (220V/0.75~11kW) wall mounting

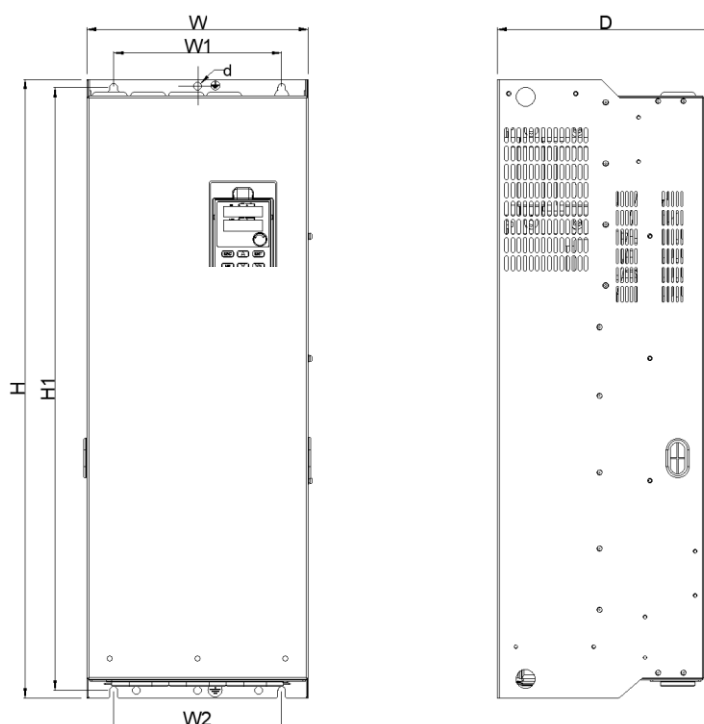


Figure B-8 Appearance of 30kW to 500kW wall mounting

Inverter specifications	Mounting dimensions without base (mm)						Mounting aperture	Set screws
	W	H	D	W1	W2	H1		
30-37kW/380V	172	430	230	140	140	412	Φ 7	M6
45-55kW/380V	210	500	270	150	150	480	Φ 10	M10
75-110kW/380V	290	810	285	220	220	790	Φ 10	M10
132-160kW/380V	315	970	310	250	250	940	Φ 12	M12
185-220kW/380V	360	995	480	180	180	953	Φ 18	M18
250-315kW/380V	370	1194	550	200	200	1164	Φ 18	M18
355-500kW/380V	410	1500	550	200	200	1470	Φ 18	M18

Table B-2 Dimensions of 30KW to 500kW wall mounting

B.2.3 Floor mounting dimensions

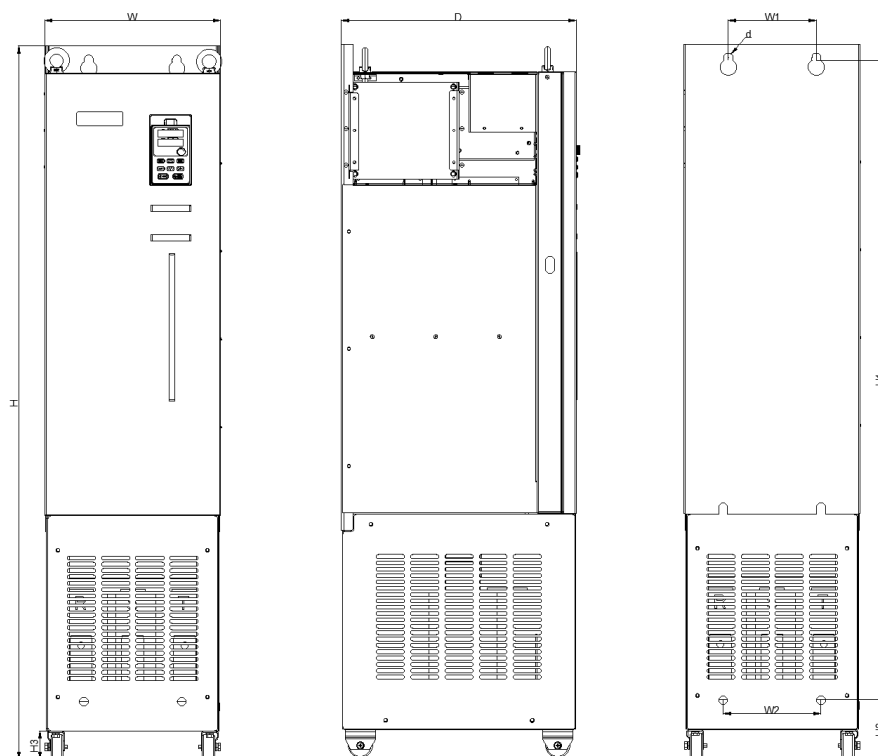


Figure B-9 Appearance of 380V 75KW~500kW floor mounting

Inverter specifications	Mounting dimensions without base (mm)								Mounting aperture
	W	H	D	W1	W2	H1	H2	H3	
75kW~110kW	290	1248	285	220	220	815	422	53	Φ 10
132kW~160kW	315	1408	310	250	250	970	422	53	Φ 12
185kW~220kW	360	1460	480	180	180	1315	118	57	Φ 18
250kW~315kW	370	1665	550	200	200	1520	123	57	Φ 18
355kW~500KW	410	2075	550	200	200	1942	112	57	Φ 18

Table B-3 Dimensions of 380V 75~500kW floor mounting

C

Optional Peripheral Accessories

C.1 Content of this chapter

This chapter describes how to select optional accessories for the FD590 series. The sizes of input power cables and motor cables should be in accordance with local regulations.

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

C.1.1 Control cable

For relay cables, use a cable with a metal braided shield.

The keypad must be connected with a network cable. For a complex electromagnetic environment, it is recommended to use a shielded network cable. Shielded twisted pair cables are recommended for communication cables.

Note: Analog signals and digital signals are routed separately by using different cables.

Note: Before connecting the input power cable of the inverter, check the insulation of the input power cable according to local regulations. Recommended cable selection table for standard models:

Inverter model	Recommended cable size (mm ²)		Specifications for terminal screws	Tightening torque (Nm)
	(+)/(-), R/S/T, U/V/W	PE		
FD590-0R4G-S2	1.5	1.5	M4	0.8
FD590-0R7G-S2	1.5	1.5	M4	0.8
FD590-0R7G-4	1.5	1.5	M4	0.8
FD590-1R5G-4	1.5	1.5	M4	0.8
FD590-2R2G-4	1.5	1.5	M4	0.8
FD590-1R5G-S2	2.5	2.5	M4	0.8
FD590-2R2G-S2	2.5	2.5	M4	0.8
FD590-2R2G-SS2	2.5	2.5	M4	0.8
FD590-004G-4	2.5	2.5	M4	1.2~1.5
FD590-5R5G-4	2.5	2.5	M4	1.2~1.5
FD590-1R5G-2	2.5	2.5	M4	1.2~1.5

FD590-2R2G-2	2.5	2.5	M4	1.2~1.5
FD590-7R5G-4	4	4	M5	2~2.5
FD590-004G-2	4	4	M5	2~2.5
FD590-011G-4	6	6	M5	2~2.5
FD590-5R5G-2	6	6	M5	2~2.5
FD590-015G-4	10	10	M5	2~2.5
FD590-7R5G-2	10	10	M5	2~2.5
FD590-018G-4	16	16	M5	2~2.5
FD590-022G-4	25	16	M5	2~2.5
FD590-030G-4	25	16	M6	4~6
FD590-037G-4	35	16	M6	4~6
FD590-045G-4	35	16	M8	10
FD590-055G-4	50	25	M8	10
FD590-075G-4	70	35	M8	10
FD590-090G-4	95	50	M12	31~40
FD590-110G-4	120	70	M12	31~40
FD590-132G-4	185	95	M12	31~40
FD590-160G-4	240	95	M12	31~40
FD590-185G-4	120*2P	150	M12	31~40
FD590-200G-4	120*2P	150	M12	31~40
FD590-220G-4	95*2P	95	M12	31~40
FD590-250G-4	95*2P	95	M12	31~40
FD590-280G-4	150*2P	150	M12	31~40
FD590-315G-4	150*2P	150	M12	31~40
FD590-355G-4	185*2P	185	M12	31~40
FD590-400G-4	150*3P	120*2P	M12	31~40
FD590-450G-4	185*3P	120*2P	M12	31~40
FD590-500G-4	185*3P	120*2P	M12	31~40

C.1.2 Solar power components are recommended for the solar water pump frequency converter

For relay cables, use a cable with a metal braided shield.

The keypad must be connected with a network cable. For a complex electromagnetic environment, it is recommended to use a shielded network cable.

Shielded twisted pair cables are recommended for communication cables.

Solar pump inverter model	Solar module open circuit voltage class			
	37±1V		45±1V	
	Component power±5Wp	Number of components per string*number of strings	Component power±5Wp	Number of components per string*number of strings
FD590-0R4G-SS2	250	11*1	300	9*1
FD590-0R7G-SS2	250	11*1	300	9*1
FD590-1R5G-SS2	250	11*1	300	9*1
FD590-2R2G-SS2	250	11*1	300	9*1
FD590-0R4G-S2	250	11*1	300	9*1
FD590-0R7G-S2	250	11*1	300	9*1
FD590-1R5G-S2	250	11*1	300	9*1
FD590-2R2G-S2	250	11*1	300	9*1
FD590-1R5G-2	250	11*1	300	9*1
FD590-2R2G-2	250	11*1	300	9*1
FD590-004G-2	250	11*2	300	9*2
FD590-5R5G-2	250	11*3	300	9*3
FD590-7R5G-2	250	11*4	300	9*4
FD590-0R7G-4	250	18*1	300	15*1
FD590-1R5G-4	250	18*1	300	15*1
FD590-2R2G-4	250	18*1	300	15*1
FD590-004G-4	250	20*1	300	16*1
FD590-5R5G-4	250	18*2	300	15*2
FD590-7R5G-4	250	18*2	300	15*2

FD590-011G-4	250	18*3	300	15*3
FD590-015G-4	250	18*4	300	15*4
FD590-018G-4	250	18*5	300	15*5
FD590-022G-4	250	18*6	300	15*6
FD590-030G-4	250	18*8	300	15*8
FD590-037G-4	250	18*9	300	15*9
FD590-045G-4	250	18*11	300	15*11
FD590-055G-4	250	18*14	300	15*14
FD590-075G-4	250	18*19	300	15*19
FD590-090G-4	250	18*22	300	15*22
FD590-110G-4	250	18*27	300	15*27
FD590-132G-4	250	18*38	300	15*38
FD590-160G-4	250	18*46	300	15*46
FD590-185G-4	250	18*53	300	15*53
FD590-200G-4	250	18*57	300	15*57
FD590-220G-4	250	18*63	300	15*
FD590-250G-4	250	18*	300	15*
FD590-280G-4	250	18*	300	15*
FD590-315G-4	250	18*	300	15*
FD590-355G-4	250	18*	300	15*
FD590-400G-4	250	18*	300	15*
FD590-450G-4	250	18*	300	15*
FD590-500G-4	250	18*	300	15*
