Operation Manual

F590 Series Solar Pump Inverter

Revision History

No.	Revision Abstract	Version	Revision Date
1	Initial release.	V1.0	1/2024

Contents

1. 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 Warning symbols

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:

Symbol	Name	Description	Abbreviation
 Danger	Danger	Failure to comply with the relevant requirements can result in serious injury or even death.	
 Warning	Warning	Failure to comply with the relevant requirements can result in physical injury or equipment damage.	
 Prohibit	Electrostatic sensitivity	Failure to comply with the relevant requirements can result in damage to the PCBA board.	
 High temperature	High temperature	The base of the inverter produces high temperature. Do not touch it.	
	Electric	To prevent electric shock due to high voltage existing in the bus capacitor after power off, wait	

Symbol	Name	Description	Abbreviation
	shock	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.	**Note**

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 sidewards 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 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 terninals. 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 voltabe 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 can not be disposed of at will when discarded, and it must be classified,collected and treated specially.

2. 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 cannnot 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.

3. Product Overview

3.1 Product nameplate

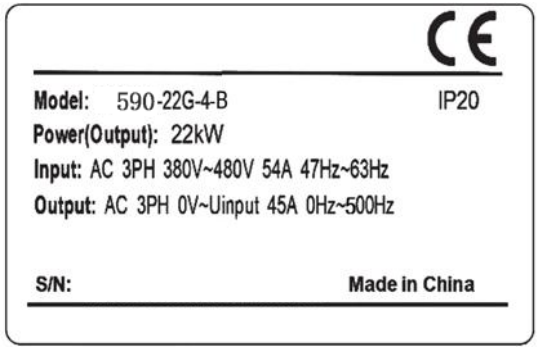


Figure 3-1 Product nameplate

Note: This is an example of the F590standard product nameplate format, and CE/IP20 will be marked according to the actual certification of the product.

3.2 Model code

F590- 5R5G-4
① ② ③

Figure 3-2 Model description

Field	Identification	Sign instruction	Specific content
Product series abbreviation	①	Product series abbreviation	F590: F590series solar pump inverter
Rated power	②	Power range + load type	5R5G: 5.5kW G: constant torque load
Voltage class	③	Voltage class	4: AC 3PH 380V(-15%)~440(+10%) 2: AC 3PH 220V(-15%)~240(+10%) S2: AC 1PH 220V(-15%)~240(+10%) SS2: AC 1PH input/output 220V(-15%)~240(+10%)

3.3 Product specifications

Model	-SS2 inverters	-S2 inverters	-2 inverters	-4 inverters
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	800
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	300~750
Recommended MPP voltage (V)	330	330	330	550

3.4 Product ratings

Series	Model	Rated output power (kW)	Rated input current (A)	Rated output current (A)	Maximum DC input current (A)
Single phase -SS2 inverters 220V input/output (0.4 to 2.2kW)	F590-0R4G-SS2	0.4	6.5	4.2	9
	F590-0R7G-SS2	0.75	9.3	7.2	9
	F590-1R5G-SS2	1.5	15.7	10.2	12
	F590-2R2G-SS2	2.2	24	14	12
Single phase -S2 inverters 220V input (0.4 to 2.2kW)	F590-0R4G-S2	0.4	6.5	2.5	9
	F590-0R7G-S2	0.75	9.3	4.2	9
	F590-1R5G-S2	1.5	15.7	7.5	12
	F590-2R2G-S2	2.2	24	10	12
Three phase -2 inverters 220V series (1.5 to 7.5kW)	F590-1R5G-2	1.5	7.7	7.5	12
	F590-2R2G-2	2.2	11	10	12
	F590-004G-2	4	17	16	20
	F590-5R5G-2	5.5	25	20	30
	F590-7R5G-2	7.5	33	30	40

Series	Model	Rated output power (kW)	Rated input current (A)	Rated output current (A)	Maximum DC input current (A)
Three phase -4 inverters 380V series (0.75 to 500kW)	F590-0R7G-4	0.75	3.4	2.5	9
	F590-1R5G-4	1.5	5.0	4.2	9
	F590-2R2G-4	2.2	5.8	5.5	12
	F590-004G-4	4.0	13.5	9.5	16.5
	F590-5R5G-4	5.5	19.5	14	23.9
	F590-7R5G-4	7.5	25	18.5	30.6
	F590-011G-4	11	32	25	39.2
	F590-015G-4	15	40	32	49
	F590-018G-4	18.5	47	38	50
	F590-022G-4	22	51	45	60
	F590-030G-4	30	70	60	81
	F590-037G-4	37	80	75	90
	F590-045G-4	45	98	92	130
	F590-055G-4	55	128	115	150
	F590-075G-4	75	139	150	200
	F590-090G-4	90	168	180	250
	F590-110G-4	110	201	215	300
	F590-132G-4	132	265	260	360
	F590-160G-4	160	310	305	430
	F590-185G-4	185	345	340	500
	F590-200G-4	200	385	380	550
	F590-220G-4	220	430	425	480
	F590-250G-4	250	485	480	525
	F590-280G-4	280	545	530	600
	F590-315G-4	315	610	600	690
	F590-355G-4	355	625	650	760

Series	Model	Rated output power (kW)	Rated input current (A)	Rated output current (A)	Maximum DC input current (A)
	F590-400G-4	400	715	720	870
	F590-450G-4	450	840	820	970
	F590-500G-4	500	890	860	1100

4. 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 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

Environment	Conditions
	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.

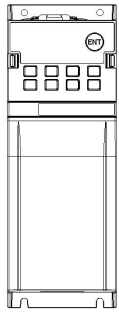


Figure 4-1 Installation direction (vertical installation)

4.2.3 Installation method

According to the overall size of the inverter, there are two installation methods: wall-mounted installation and floor installation (55~500kW frequency converter).

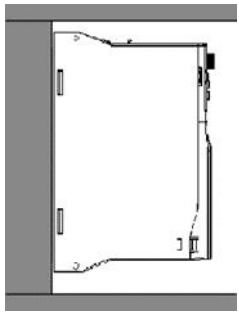


Figure 4-2 Installation method (wall-mounted installation)

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

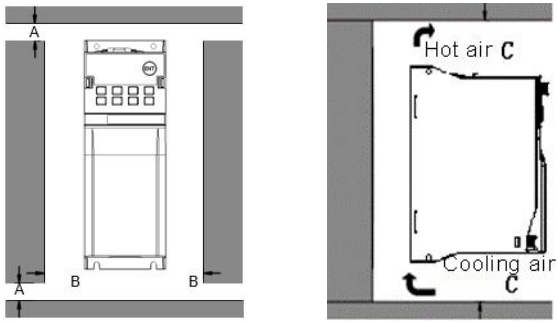


Figure 4-3 Single mounting

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

4.2.5 Multiple mounting

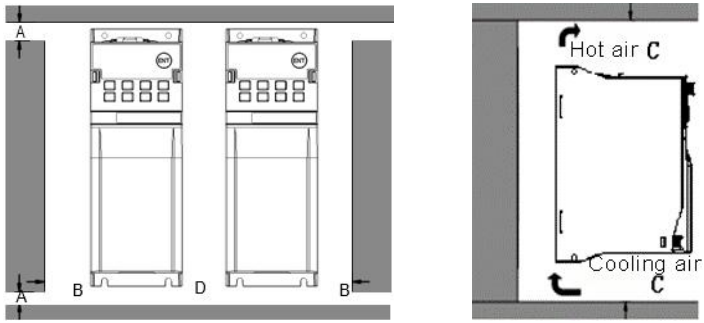
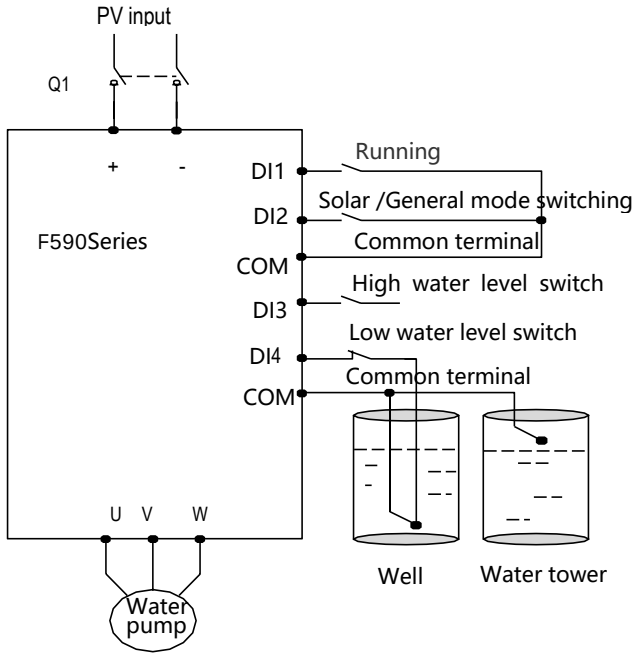


Figure 4-4 Parallel mounting

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, D and C is 100mm.

4.3 Standard wiring



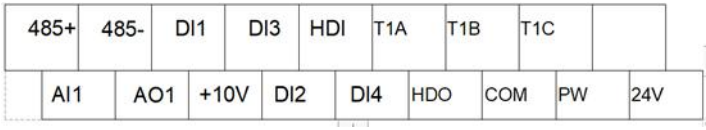
4.3.1 Instructions of main circuit terminals

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

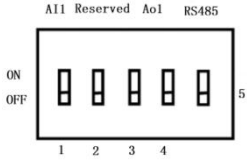
Terminal symbol	Terminal name	Function description
		wiring.
(+), (-)	PV DC input	Photovoltaic panel input terminals
U, V, W	Inverter output	Three-phase (single-phase) AC output terminals, generally connected to the motor of the water pump
⏚	Safety protection grounding	Safety protection ground terminal, each machine must be reliably grounded

4.4 Instructions of control circuit terminals



Description of control circuit terminals at and below 22kW:

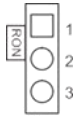
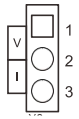
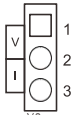
Terminal name	Instructions
+10V	+10.5V power supply provided by the machine, 10V/5V power supply can be provided for models above 22kW
AI1	1. input range: AI1 voltage and current optional 0(2)~10V, 0(4)~20mA 2. input impedance: voltage input 20kΩ, current input 250Ω, AI1 voltage or current input by the 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 2. contact capacity: 3A/AC250V, 1A/DC30V, 3A/AC250V, 1A/DC30V 3. can be connected to the expansion card to increase 1 relay output
T1B	
T1C	

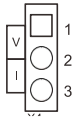
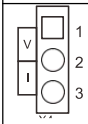
Terminal name	Instructions	
COM	+24V reference ground	
485 +	Use shielded twisted pair cable for 485 communication port, 485 differential signal port, and standard 485 communication port. 120 OHM terminal of 485 communication matching resistor is connected through SW1.	
485 -		
PE	Ground terminal	
PW	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 2. can accept 12~30V voltage input 3. the terminal is a two-way input terminal, supporting NPN and PNP connection 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
DI2	Digital input 2	
DI3	Digital input 3	
DI4	Digital input 4	
HDI	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 terminals on the main control circuit above 22kW:

Types	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

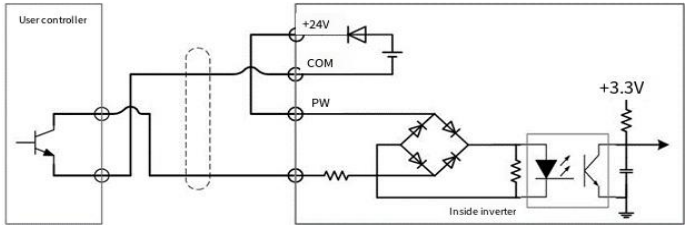
Types	Terminal symbol	Terminal function description	Technical specification
			Output current range: 0/4 ~ 20mA
Relay output	T1A/TIB/TIC	Relay output	T1A-T1B: normally closed T1A-T1C: normally open Contact capacity: 250VAC/3A, 30VDC/1A
	T2A/T2B/T2C	Relay output	T2A-T2B: normally closed T2A-T2C: normally open Contact capacity: 250VAC/3A, 30VDC/1A
Communication interface	485+ /485-	RS485 communication interface	RS485 communication interface

Bit number	Instructions	
X1	RS485 terminal matches resistance settings	
		Short-circuit module is used to short-circuit pin 1,2 of X1; RS485 bus uses the terminal matching resistor, 120Ω 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.
X2	Analog input 1 current voltage selection	
		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).
X3	Analog input 2 current voltage select	
		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	

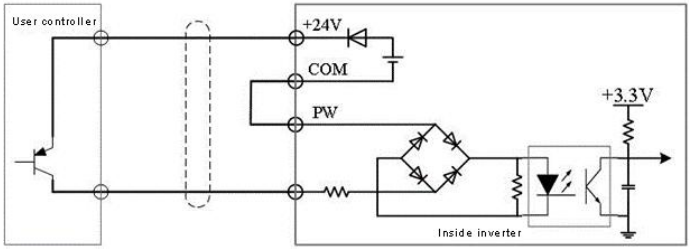
Bit number	Instructions	
		Short-circuit module is used to short-circuit pin 1,2 of X8, and the terminal 10V/5V provides +10V power output; short-circuit module is used to short-circuit pin 2,3 of X8, and terminal 10V/5V provides +5V power output externally.
X14	Analog output 1 current voltage selection	
		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).
X15	Analog output 2 current voltage selection	
		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:

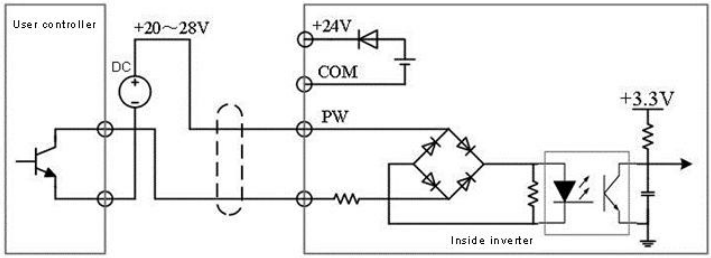


Using the internal +24V power supply of the inverter, the external controller is PNP type wiring mode as shown in the following figure:

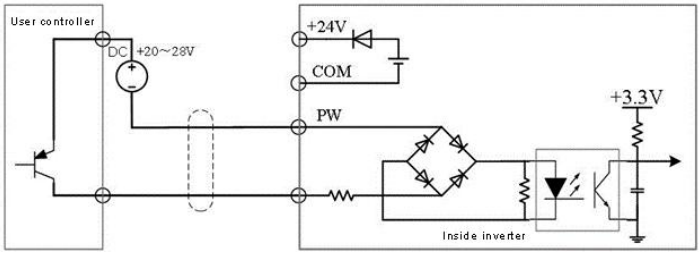


Note: Be sure to remove the short circuit strip between the +24V and PW terminals and connect the short circuit strip between the PW and COM terminals.

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.



5. 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

LCD keypad is standard for F590series solar pump inverter at or below 22kW and dual 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 Optional LCD keypad

5.3 LED keypad display and operation

The display states of F590frequency 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.

Keypad identification		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 5-1 Keypad description of 22kW or below

Table 5-2 Dual display keypad of 22kW above

Keypad identification		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

Keypad identification		Name	Meaning
			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

Digital display area	Dual-row 5-bit LED display, display setting frequency, output frequency and other monitoring data as well as alarm code.						
	Display letter	**Corresponding letter**	**Display letter**	**Corresponding letter**	**Display letter**	**Corresponding 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

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 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

Keypad identification	Name	Meaning
		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)

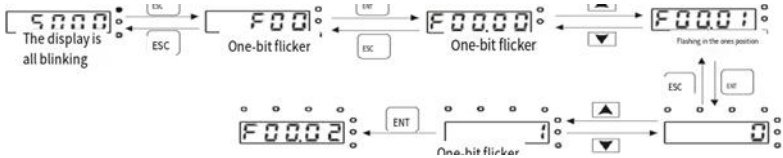
Steps: In the running or stop state, press ESC to enter the level-1 menu when parameter needs to be modified and F00 is displayed, ∧ and ∨ are used to enter the group number to be modified, ENT is used to enter the level-2 menu, and ∧ and ∨ are used to enter the function code label to be modified. Then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

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.

Example of changing the function code F00.01 from 0 to 1.



5.9 Basic operating instructions

5.9.1 General commissioning steps

⚠	✧ 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 selection of AC and DC circuit breaker is correct;
4. Check whether the photovoltaic DC input voltage is within the allowable range of the inverter;
5. 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.

6. 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

F590series 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

Function code	Name	Parameter description	Factory value	Attribute
Group F00 Basic function group				
F00.00	First motor control mode	0: Sensorless vector control 1: Reserved 2: V/F control	2	☆
F00.01	Command source selection	0: Operation panel command channel (LED off) 1: Terminal command channel (LED blinking) 2: Serial port communication command channel (LED on)	0	○
F00.02	Primary frequency source X selection	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 command 7: Simple PLC 8: PID 9: Communication given	0	☆
F00.03	Auxiliary frequency source Y selection	Same as F00.02 primary frequency source	0	☆
F00.04	Auxiliary frequency source	0: relative to the maximum frequency	0	○

Function code	Name	Parameter description	Factory value	Attribute
	Y range selection	1: relative to the frequency source X		
F00.05	Frequency source selection	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	00	○
F00.06	Maximum frequency	50.00Hz to 500.00Hz	50.00	☆
F00.07	Upper limit frequency	Lower limit frequency F00.08 to maximum frequency F00.06	50.00	○
F00.08	Lower limit frequency	0.00Hz ~ Upper frequency F00.07	0.00	○
F00.09	Preset frequency	0.00Hz ~ Maximum frequency F00.06	50.00	○
F00.10	Running direction	0: consistent direction 1: opposite direction	0	○
F00.11	Carrier frequency	0.5kHz to 16.0kHz	6.0	○
F00.12	Carrier frequency is adjusted with temperature	0: no 1: yes	1	○
F00.13	Motor parameter	0: Motor 1	0	☆

Function code	Name	Parameter description	Factory value	Attribute
	group selection	1: Motor 2		
F00.14	Acceleration time 1	0.00s ~ 650.00s (F00.16=2) 0.0s ~ 6500.0s (F00.16=1) 0s ~ 65000s (F00.16=0)	20.0	○
F00.15	Deceleration time 1	0.00s ~ 650.00s (F00.16=2) 0.0s ~ 6500.0s (F00.16=1) 0s ~ 65000s (F00.16=0)	20.0	○
F00.16	Unit of acceleration and deceleration time	0:1 second 1:0.1 seconds 2:0.01 seconds	1	☆
F00.17	Auxiliary frequency source Y range	0% to 150%	100	○
F00.18	Upper limit frequency source	0: F00.07 set 1: AI1 2: AI2 3: Reserved 4: High speed pulse set 5: Communication set	0	☆
F00.19	Upper limit frequency bias	0.00Hz ~ Maximum frequency F00.06	0.00	○
F00.20	Secondary group frequency source bias frequency when superimposed	0.00Hz ~ Maximum frequency F00.06	0.00	○
F00.21	Frequency command decimal point	1:0.1 Hz 2:0.01Hz	2	☆
F00.22	Number set frequency memory	0: No memory 1: Memory	0	○

Function code	Name	Parameter description	Factory value	Attribute
	selection			
F00.23	Acceleration and deceleration time reference frequency	0: Maximum frequency (F00.06) 1: Set frequency 2:100 Hz	0	☆
F00.24	Running frequency instruction UP/DOWN reference	0: Running frequency 1: Set frequency	1	☆
F00.25	Command source binding frequency source	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	000	○
F00.26	Serial communication protocol selection	0: Modbus-RTU protocol 1: Reserved	0	☆
Group F01 Motor 1 parameter group				
F01.00	G/P models	1: Model G machine 2: Model P machine	1	☆

Function code	Name	Parameter description	Factory value	Attribute
F01.01	Motor type selection	0: ordinary asynchronous motor 1: variable frequency asynchronous motor	0	☆
F01.02	Rated motor power	Model dependent		☆
F01.03	Rated motor frequency	0.01Hz ~ Maximum frequency F00.06	50.00	☆
F01.04	Rated motor speed	1rpm to 65,535rpm	1460	☆
F01.05	Rated motor voltage	1V to 2000V	380	☆
F01.06	Rated motor current	0.01A~655.35A(inverter power <=55kW) 0.1A~6553.5A (inverter power >55kW)	9.00	☆
F01.07	Stator resistance of asynchronous motor	0.001Ω~65.53Ω (inverter power<=55kW) 0.0001EUR~6.5535EUR(inverter power >55kW)	1.204	☆
F01.08	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (inverter power <=55kW) 0.0001EUR~6.5535EUR(inverter power >55kW)	0.908	☆
F01.09	Asynchronous motor leakage inductive reactance	0.01mH~655.35mH(inverter power<=55kW) 0.001mH~65.535mH(inverter power >55kW)	5.28	☆
F01.10	Asynchronous motor mutual inductance	0.1mH~6553.5mH(inverter power <=55kW) 0.01mH~655.35mH (inverter >55kW)	158.6	☆
F01.11	No-load current of asynchronous motor	0.01A~F01.06 (inverter power <=55kW) 0.1A~F01.06 (inverter power >55kW)	4.24	☆
F01.12	Motor parameter self-identification	0: no operation 1: asynchronous machine no-load	0	☆

Function code	Name	Parameter description	Factory value	Attribute
	selection	(dynamic) self-identification 2: asynchronous machine load (static) self-identification 1 3: asynchronous machine with load (static) self-identification 2		
F01.13	Number of encoder pulse lines	1 to 65535	1024	☆
F01.14	Encoder type	0: ABZ incremental encoder 1: UVW incremental encoder 2: rotary encoder 3: sine-cosine encoder 4: provincial line mode UVW encoder	0	☆
F01.15	Speed feedback PG selection	0: Local PG 1: Extended PG 2: HDI high speed pulse input	0	☆
F01.16	ABZ encoder AB phase sequence	0: forward 1: reverse	0	☆
F01.17	Encoder mounting position angle	0.0 to 359.9°	0.0	☆
F01.18	UVW signal phase sequence	0: Forward 1: Reverse	0	☆
F01.19	UVW signal zero position angle	0.0 to 359.9°	0.0	☆
F01.20	Rotary pole pairs	1 to 65535	1	☆
F01.21	Reserved	Reserved	0	☆
F01.22	Speed feedback PG break detection time	0.0: No action 0.1s to 10.0s	0.0	☆
F01.23 ~ F01.38	Reserved	Reserved	0	●

Function code	Name	Parameter description	Factory value	Attribute
Group F02 Start stop control				
F02.00	Start mode	0: Direct start 1: Speed tracking restart 2: Pre-excited start for asynchronous machine 3: SVC quick start	0	○
F02.01	Start delay time	0.0s to 1000.0s	0.0	○
F02.02	Start frequency	0.00Hz to 10.00Hz	5.00	○
F02.03	Start frequency hold time	0.0s to 100.0s	2.0	☆
F02.04	Start DC braking/pre-excitation current	0% to 100%	0	☆
F02.05	Start DC braking/pre-excitation time	0.0s to 100.0s	0.0	☆
F02.06	Acceleration and deceleration mode	0: linear acceleration and deceleration 1: S curve acceleration and deceleration A 2: S curve acceleration and deceleration B	0	☆
F02.07	Whether the DI terminal is effectively selected during power-on	0: invalid 1: valid	0	☆
F02.08	Power outage restart selection	0: invalid 1: valid	0	☆
F02.09	Power outage restart waiting time	0.0s to 100.0s	0.0	☆

Function code	Name	Parameter description	Factory value	Attribute
F02.10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	○
F02.11	Forward/Reverse run dead zone time	0.0s to 3000.0s	0.0	○
F02.12	Stop DC braking start frequency	0.00Hz ~ Maximum frequency F00.06	0.00	○
F02.13	Stop DC braking waiting time	0s to 100.0s	0.0	○
F02.14	Stop DC braking current	0.0% to 100%	0	○
F02.15	Stop DC braking time	0.0s ~ 100.0s	0.0	○
F02.16	Brake utilization rate	0% to 100%	100	○
F02.17	Hibernation delay time	0.0 to 6500.0s	0.0	○
F02.18	Frequency run action below lower limit frequency	0: Run at lower limit frequency 1: Stop 2: Run at zero speed	0	○
F02.19	Wakeup delay time	0.0s to 6500.0s	0.0	○
F02.20	Rotation speed tracking method	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)	0	☆
F02.21	Rotation speed tracking fast or slow	1 to 100	20	○

Function code	Name	Parameter description	Factory value	Attribute
F02.22	Rotation speed tracking KP	0 to 1000	500	○
F02.23	Rotation speed tracking KI	0 to 1000	800	○
F02.24	Rotation speed tracking current	30% to 200%	100	☆
F02.25	Rotation speed tracking lower limit	10 to 100%	30	☆
F02.26	Rotation speed tracking voltage rise time	0.5 to 3.0	1.1	☆
F02.27	Demagnetization time	0.00 ~ 15.00s	0.50	☆
F02.28	Time proportion of S-curve at start	0.0% ~ (100.0%-F06.29)	30.0	☆
F02.29	Time proportion of S-curve at end	0.0% ~ (100.0%-F06.28)	30.0	☆
Group F03 V/F control parameters				
F03.00	V/F curve setting	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	2	☆
F03.01	Torque boost	0.0%: Automatic torque boost 0.1% ~ 30.0% V/F separation is not effective	Model dependent	○
F03.02	Torque boost	0.00Hz ~ Maximum frequency F00.06	50.00	☆

Function code	Name	Parameter description	Factory value	Attribute
	cutoff frequency			
F03.03	Multipoint V/F frequency point 1	0.00Hz to F03.05	0.00	☆
F03.04	Multipoint V/F voltage point 1	0.0% to 100.0%	0.0	☆
F03.05	Multipoint V/F frequency point 2	F03.03 ~ F03.07	0.00	☆
F03.06	Multipoint V/F voltage point 2	0.0% to 100.0%	0.0	☆
F03.07	Multipoint V/F frequency point 3	F03.05 ~ Motor rated frequency (F01.03)	0.00	☆
F03.08	Multipoint V/F voltage point 3	0.0% to 100.0%	0.0	☆
F03.09	Slip compensation factor	0.0% to 200.0%	0.0	○
F03.10	V/F overexcitation gain	0 to 200	64	○
F03.11	Oscillation suppression gain	0 to 100	5	○
F03.12	Oscillation suppression gain mode	0 to 4	1	☆
F03.13	V/F separation voltage source	0: Digital setting (F03.14) 1: AI1 2: AI2 3: Reserved 4: HDI high speed pulse setting 5: Multi-step command 6: Simple PLC 7: PID 8: Communication given	0	○

Function code	Name	Parameter description	Factory value	Attribute
		100.0% corresponds to the rated voltage of the motor		
F03.14	V/F separation voltage source digital setting	0V ~ Motor rated voltage F01.05	0	○
F03.15	V/F separation voltage acceleration time	0.0s to 1000.0s Indicates the time from 0V change to the rated voltage of the motor	0.0	○
F03.16	V/F separation voltage deceleration time	0.0s to 1000.0s Note: Indicates the time of 0V change to the rated voltage of the motor	0.0	○
F03.17	V/F separation stop mode selection	0: Frequency/voltage independence is reduced to 0 1: The frequency is reduced after the voltage is reduced to 0	0	☆
F03.18	Overcurrent stall action current	50 ~ 200%	150	☆
F03.19	Overcurrent stall suppression enabled	0: invalid 1: valid	1	☆
F03.20	Overcurrent stall suppression gain	0 to 100	20	○
F03.21	Double speed overcurrent stall action current compensation coefficient	50 to 200%	50	☆
F03.22	Overvoltage stall action voltage	200.0V ~ 2000.0V Model dependent 220V: 380V 380V: 760V	760.0	☆
F03.23	Overvoltage stall enabled	0: invalid 1: valid	1	☆

Function code	Name	Parameter description	Factory value	Attribute
F03.24	Overvoltage stall suppression frequency gain	0 to 100	30	○
F03.25	Overvoltage stall suppression voltage gain	0 to 100	30	○
F03.26	Overvoltage stall maximum rise frequency limit	0 to 50Hz	5	☆
F03.27	Slip compensation time constant	0.1 to 10.0s	0.5	○
F03.28	Automatic frequency boost enabled	0: invalid 1: valid	0	☆
F03.29	Minimum motor torque current	10% to 100%	50	☆
F03.30	Maximum motor torque current	10% to 100%	20	☆
F03.31	Automatic frequency boost KP	0 ~ 100	50	☆
F03.32	Automatic frequency boost KI	0 to 100	50	☆
F03.33	Online torque compensation gain	80% to 150%	100	☆
Group F04 Reserved				
Group F05 Keypad and display				
F05.00	Language selection	0：Chinese 1：English	0	●
F05.01	Parameter	0: No operation	0	☆

Function code	Name	Parameter description	Factory value	Attribute
	initialization	01: Restore factory parameters, excluding motor parameters 02: Clear the recorded information 04: Back up user parameters 501: Restore user parameters		
F05.02	Parameter copy selection	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	0	●
F05.03	User password	0 ~ 65535	0	○
F05.04	MF key function selection	0: Invalid 1: Switch between operation panel command channel and remote command channel 2: Forward and reverse switchover 3: Forward jog 4: Reverse jog	0	☆
F05.05	STOP/RESET key function	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	1	○
F05.06	Load speed display coefficient	0.0001 to 6.5000	1.0000	○
F05.07	Linear speed display coefficient	0.0001 to 6.5000	1.0000	○
F05.08	LED run display parameter 1	0000 ~ FFFF Bit00: Running frequency (Hz) Bit01: Set frequency (Hz)	0x001F	○

Function code	Name	Parameter description	Factory value	Attribute
		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	LED run display parameter 2	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	0x0000	○

Function code	Name	Parameter description	Factory value	Attribute
F05.10	LED stop display parameter	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)	0x0033	○
F05.11	Software version number 1	V0.0x	0.00	●
F05.12	Software version number 2	V0.0x	0.00	●
F05.13	Product number	CD501	0	●
F05.14	Inverter module heat sink temperature	0.0℃ ~ 100.0℃	0	●
F05.15	Cumulative running time	0h to 65535h	0	●
F05.16	Number of decimal places for load speed display	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	21	○

Function code	Name	Parameter description	Factory value	Attribute
		places in B00.19/B00.29 1:1 decimal place 2:2 decimal places		
F05.17	Total power-on time	0h to 65535h	0	●
F05.18	Cumulative power consumption	0 to 65535°	0	●
F05.19	Performance test version number		0.00	●
F05.20	Functional test version number		0.00	●
Group F06 Input terminals				
F06.00	DI1 terminal function selection	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 7: Terminal DOWN 8: Coast to stop 9: Fault reset (RESET) 10: Running pause 11: External fault normally open input 12: Multi-step command terminal 1 13: Multi-step command terminal 2 14: Multi-step command terminal 3 15: Multi-step command terminal 4 16: Acceleration and deceleration select terminal 1 17: Acceleration and deceleration select	1	☆
F06.01	DI2 terminal function selection		53	☆
F06.02	DI3 terminal function selection		54	☆
F06.03	DI4 terminal function selection		55	☆
F06.04	DI5 terminal function selection		0	☆
F06.05	DI6 terminal function selection		0	☆
F06.06	DI7 terminal function selection		0	☆
F06.07	HDI terminal function selection		0	☆
F06.08	Reserved			

Function code	Name	Parameter description	Factory value	Attribute
		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		

Function code	Name	Parameter description	Factory value	Attribute
		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: Motor overheat pre-warning 54: Motor overheat fault 55: Water dry signal		
F06.09	Reserved		0	☆
F06.10	DI filter time	0.000s to 1.000s	0.010	○
F06.11	Terminal command mode	0: Two-wire type 1 1: Two-wire style 2 2: Three-wire type 1 3: Three-wire type 2	0	☆
F06.12	Rate of change of terminal UP/DOWN per s	0.001Hz/s to 65.535Hz/s	1.000	○
F06.13	Curve 1 minimum	0.00V ~ F06.15	0.00	○

Function code	Name	Parameter description	Factory value	Attribute
	input			
F06.14	Curve 1 minimum input corresponds to setting	-100.0% to 100.0%	0.0	○
F06.15	Curve 1 maximum input	F06.13 ~ 10.00V	10.00	○
F06.16	Curve 1 maximum input corresponds to setting	-100.0% ~ 100.0%	100.0	○
F06.17	AI1 filter time	0.00s to 10.00s	0.10	○
F06.18	Curve 2 minimum input	0.00V ~ F06.20	0.00	○
F06.19	Curve 2 minimum input corresponds to setting	-100.0% ~ 100.0%	0.0	○
F06.20	Curve 2 maximum input	F06.18 ~ 10.00V	10.00	○
F06.21	Curve 2 maximum input corresponds to setting	-100.0% ~ 100.0%	100.0	○
F06.22	AI2 filter time	0.00s to 10.00s	0.10	○
F06.23	Curve 3 minimum input	-10,00V ~ F06.25	10.00	○
F06.24	Curve 3 minimum input corresponds to setting	-100.0% ~ 100.0%	100.0	○
F06.25	Curve 3 maximum input	F06.23 ~ 10.00V	10.00	○
F06.26	Curve 3 maximum input corresponds to setting	-100.0% ~ 100.0%	100.0	○

Function code	Name	Parameter description	Factory value	Attribute
F06.27	Reserved	0.00s ~ 10.00s	0.10	○
F06.28	High speed pulse minimum input	0.00kHz ~ F06.30	0.00	○
F06.29	High speed pulse minimum input setting	-100.0% to 100.0%	0.0	○
F06.30	High speed pulse Max input	F06.28 ~ 100.00kHz	50.00	○
F06.31	High speed pulse maximum input setting	-100.0% ~ 100.0%	100.0	○
F06.32	High speed pulse filter time	0.00s to 10.00s	0.10	○
F06.33	AI set curve selection	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	321	○
F06.34	AI below minimum input setting selection	Units place: AI1 is below minimum input setting selection 0: The minimum input corresponds to the setting 1:0.0%	000	○

Function code	Name	Parameter description	Factory value	Attribute
		Tens place: AI2 is below minimum input setting selection, same as above Hundreds place: Reserved		
F06.35	DI1 Delay time	0.0s ~ 3600.0s	0	○
F06.36	DI2 Delay time	0.0s ~ 3600.0s	0	○
F06.37	DI3 Delay time	0.0s ~ 3600.0s	0	○
F06.38	DI1-DI5 input terminal effective mode selection	0: High level 1: Low level Units place: DI1 Tens place: DI2 Hundreds place: DI3 Thousands place: DI4 Ten thousands place: DI5	00000	☆
F06.39	DI6-DI8 (HDI) input terminal effective mode selection	0: High level 1: Low level Units place: DI6 Tens place: DI7 Hundreds place: DI8 (HDI) Thousands place: reserved Ten thousands place: reserved	00000	☆
Group F07 Output terminals				
F07.00	HDO terminal output selection	0: pulse output 1: digital output	0	○
F07.01	HDO digital output selection	0: No output 1: The frequency converter is running 2: Fault output (fault stop) 3: Frequency level detection FDT1 output 4: Frequency reached	0	○
F07.02	Relay 1 output function selection		2	○
F07.03	Relay 2 output function selection		0	○

Function code	Name	Parameter description	Factory value	Attribute
F07.04	DO output function selection	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	1	○

Function code	Name	Parameter description	Factory value	Attribute
		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		
F07.05	Reserved	Reserved	4	○
F07.06	HDO pulse output selection	0: Running frequency 1: Set frequency	0	○
F07.07	AO1 output selection	2: Output current 3: Output torque	0	○
F07.08	AO2 output selection	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	1	○

Function code	Name	Parameter description	Factory value	Attribute
		motor current) 17: Inverter output torque (actual value, relative to the percentage of the rated current of the inverter)		
F07.09	HDO pulse output maximum frequency	0.01kHz to 100.00kHz	50.00	○
F07.10	AO1 zero offset coefficient	-100.0% to 100.0%	0.0	○
F07.11	AO1 gain	-10.00 ~ 10.00	1.00	○
F07.12	AO2 zero offset coefficient	-100.0% to 100.0%	0.0	○
F07.13	AO2 gain	-10.00 ~ 10.00	1.00	○
F07.14	HDO digital output delay time	0.0s ~ 3600.0s	0.0	○
F07.15	Relay 1 output delay time	0.0s ~ 3600.0s	0.0	○
F07.16	Relay 2 output delay time	0.0s ~ 3600.0s	0.0	○
F07.17	DO output delay time	0.0s to 3600.0s	0.0	○
F07.18	Reserved			
F07.19	DO output terminal valid status selection	0-positive logic 1-negative logic Units place: HDO Tens place: Relay 1 Hundreds place: Relay 2 Thousands place: DO Ten thousands place: Reserved	00000	○
Group F08 Faults and protection				

Function code	Name	Parameter description	Factory value	Attribute
F08.00	Motor overload protection selection	0: Disable 1: Allow	1	○
F08.01	Motor overload protection gain	0.20 ~ 10.00	1.00	○
F08.02	Motor overload pre-warning coefficient	50% ~ 100%	80	○
F08.03	Overload pre-warning detection time	0.20s to 10.00s	1.00	○
F08.04	Overload pre-warning action selection	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	1	○
F08.05	Overvoltage stall gain	0 to 100	30	○
F08.06	Overvoltage stall protection voltage	200.0 ~ 2000.0v Model dependent 220V: 380V 380V: 760V	760.0	☆
F08.07	Overcurrent stall gain	0 ~ 100	20	○
F08.08	Overcurrent stall protection current	100% to 200%	150	☆

Function code	Name	Parameter description	Factory value	Attribute
F08.09	Instantaneous non-stop gain Kp	0 to 100	40	○
F08.10	Instantaneous non-stop integral coefficient Ki	0 to 100	30	○
F08.11	Instantaneous non-stop action deceleration time	0.0 ~ 300.0s	20.0	☆
F08.12	Input phase loss	0: Disable 1: Allow	1	○
F08.13	Output phase loss protection selection	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	01	○
F08.14	Automatic fault reset times	0 to 20	0	○
F08.15	Automatic fault reset interval	0.1s to 100.0s	5.0	○
F08.16	First fault type	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)	0	●
F08.17	Second fault type		0	●
F08.18	Third fault (most recent) type		0	●

Function code	Name	Parameter description	Factory value	Attribute
		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: EEFROM 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		

Function code	Name	Parameter description	Factory value	Attribute
		(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) 47-48: Reserved 49: Motor overheat pre-warning(E.oH4)		
F08.19	Frequency at third fault		0.00	●
F08.20	Current at third fault		0.00	●
F08.21	Bus voltage at third fault		0.0	●
F08.22	Input terminal status at third fault		0	●
F08.23	Output terminal status at third fault		0	●
F08.24	Inverter status at third fault		0	●
F08.25	Third fault time (timing from this power-on)		0	●
F08.26	Third fault time (timing from running time)		0.0	●
F08.27	Frequency at second fault		0.00	●
F08.28	Current at second fault		0.00	●
F08.29	Bus voltage at second fault		0.0	●

Function code	Name	Parameter description	Factory value	Attribute
F08.30	Input terminal status at second fault		0	●
F08.31	Output terminal status at second fault		0	●
F08.32	Inverter status at second fault		0	●
F08.33	Second fault time (timing from this power-on)		0	●
F08.34	second fault (timing from running time)		0.0	●
F08.35	Frequency at first fault		0.00	●
F08.36	Current at first fault		0.00	●
F08.37	Bus voltage at first fault		0.0	●
F08.38	Input terminal status at first fault		0	●
F08.39	Output terminal state at first fault		0	●
F08.40	Inverter status at first fault		0	●
F08.41	Time at first fault (timing from this power-on)		0	●
F08.42	Time at first fault (timing from running time)		0.0	●

Function code	Name	Parameter description	Factory value	Attribute
F08.43	Power-on to-ground short-circuit protection selection	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	01	○
F08.44	Braking start voltage	200.0 ~ 2000.0v Model dependent 220V: 360V 380V: 690V	690.0	○
F08.45	Fault DO action selection during automatic fault reset	0: No action 1: Action	0	○
F08.46	Fault protection action selection 1	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)	00000	○
F08.47	Fault protection action selection 2	Units place: Encoder fault (E.PGL) 0: Coast to stop Tens place: EEFROM operation fault (E.EEP) 0: Coast to stop 1: Stop according to the stop mode Hundreds place: reserved	00000	○

Function code	Name	Parameter description	Factory value	Attribute
		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	Fault protection action selection 3	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	00000	○

Function code	Name	Parameter description	Factory value	Attribute
F08.49	Fault protection action selection 4	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	20000	○
F08.50	Reserved			
F08.51	Continue running frequency selection in fault	0: Run at the current running frequency 1: Run at the set frequency 2: Run at the upper limit frequency 3: Run at the lower limit frequency 4: Run at the standby frequency upon exceptions	0	○
F08.52	Abnormal standby frequency setting	0.0% to 100.0% (current target frequency)	100	○
F08.53	Motor temperature sensor type	0: No temperature sensor 1: PT100 2: PT1000	0	○
F08.54	Motor overheat protection threshold	0℃ ~ 200℃	110	○
F08.55	Motor overheat pre-warning threshold	0℃ ~ 200℃	90	○

Function code	Name	Parameter description	Factory value	Attribute
F08.56	Instantaneous stop non-stop action selection	0: Invalid 1: Decelerate 2: Decelerate to stop	0	☆
F08.57	Instantaneous stop action pause judgment voltage	80.0% ~ 100.0%	85.0	☆
F08.58	Instantaneous stop non-stop voltage rise judgment time	0.0s to 100.0s	0.5	☆
F08.59	Instantaneous stop non-stop action judgment voltage	60.0% ~ 100.0% (standard bus voltage)	80.0	○
F08.60	Load lost protection option	0: Invalid 1: Valid	0	○
F08.61	Load lost detection level	0.0 to 100.0%	10.0	○
F08.62	Load lost detection time	0.0 ~ 60.0s	1.0	○
F08.63	Reserved	0 to 65536	0	●
F08.64	Overspeed detection value	0.0% to 50.0% (maximum frequency)	20.0	○
F08.65	Overspeed detection time	0.0s: No detection 0.1 to 60.0s	1.0	○
F08.66	Excessive speed deviation detection value	0.0% ~ 50.0% (maximum frequency)	20.0	○
F08.67	Excessive speed deviation detection time	0.0s: No detection 0.1 to 60.0s	5.0	○

Function code	Name	Parameter description	Factory value	Attribute
Group F09 PID function				
F09.00	PID reference source	0: Function code F09.01 set 1: AI1 2: AI2 3: Reserved 4: High speed pulse setting 5: Communication set 6: Multi-step command given 7: Pressure setting	0	○
F09.01	PID reference value	0.0% to 100.0%	50.0	○
F09.02	PID feedback source	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|)	0	○
F09.03	Direction of PID action	0: positive action 1: negative action	0	○
F09.04	PID reference feedback range	0 to 65535	1000	○
F09.05	PID inversion cutoff frequency	0.00Hz ~ Maximum frequency F00.06	0.00	○
F09.06	Proportional Gain P1	0.0 to 100.0	20.0	○
F09.07	Integral time I1	0.01s to 10.00s	2.00	○
F09.08	Differential time	0.000s to 10.000s	0.000	○

Function code	Name	Parameter description	Factory value	Attribute
	D1			
F09.09	Reserved	0 ~ 65535	0	●
F09.10	PID deviation limit	0.0% to 100.0%	0.0	○
F09.11	PID feedback loss detection value	0.0% : Feedback loss is not judged 0.1% to 100.0%	0.0	○
F09.12	PID feedback lost detection time	0.0s to 20.0s	0.0	○
F09.13	PID differential limit	0.00% ~ 100.00%	0.10	○
F09.14	PID reference change time	0.00 ~ 650.00s	0.00	○
F09.15	PID feedback filter time	0.00 ~ 60.00s	0.00	○
F09.16	PID output filter time	0.00 ~ 60.00s	0.00	○
F09.17	Proportional gain P2	0.0 to 100.0	20.0	○
F09.18	Integral time I2	0.01s to 10.00s	2.00	○
F09.19	Differential time D2	0.000s to 10.000s	0.000	○
F09.20	PID parameter switchover condition	0: No switchover 1: DI terminal 2: Automatic switchover based on deviation 3: Automatic switchover based on running frequency	0	○
F09.21	PID parameter switchover deviation 1	0.0% ~ F10.22	20.0	○

Function code	Name	Parameter description	Factory value	Attribute
F09.22	PID parameter switchover deviation 2	F10.21 ~ 100.0%	80.0	○
F09.23	PID initial value	0.0% to 100.0%	0.0	○
F09.24	PID initial hold time	0.00 to 650.00	0.00	○
F09.25	Positive maximum of two output deviations	0.00 ~ 100.00%	1.00	○
F09.26	Reverse maximum of two output deviations	0.00% ~ 100.00%	1.00	○
F09.27	PID integral attribute	Units place: integral separation 0- invalid; 1- valid Tens place: Output to limit value, whether to stop integrating 0- continue integrating; 1- stop integrating	00	○
F09.28	PID stop operation	0: No operation during stop 1: Operation during stop	0	○
Group F10 Reserved				
Group F11 Multi-step command, simple PLC				
F11.00	Multi-step command 0	-100.0% to 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.01	Multi-step command 1	-100.0% to 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.02	Multi-step command 2	-100.0% ~ 100.0% (100.0% corresponds to maximum	0	○

Function code	Name	Parameter description	Factory value	Attribute
		frequency F00.06)		
F11.03	Multi-step command 3	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.04	Multi-step command 4	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.05	Multi-step command 5	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.06	Multi-step command 6	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.07	Multi-step command 7	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.08	Multi-step command 8	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.09	Multi-step command 9	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.10	Multi-step command 10	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.11	Multi-step command 11	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.12	Multi-step command 12	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○

Function code	Name	Parameter description	Factory value	Attribute
F11.13	Multi-step command 13	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.14	Multi-step command 14	-100.0% to 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.15	Multi-step command 15	-100.0% ~ 100.0% (100.0% corresponds to maximum frequency F00.06)	0	○
F11.16	Simple PLC operation mode	0: Stop at the end of a single run 1: End of a single run 2: Keep cycling	0	○
F11.17	Simple PLC power failure memory selection	Units place: 0: No memory at power failure 1: Memory at power failure Tens place: 0: Stop without memory 1: Stop memory	0	○
F11.18	Running time of step 0	0.0s (h) ~ 6553.5s (h)	0	○
F11.19	PLC ACC and DEC time selection of step 0	0 to 3	0	○
F11.20	Running time of step 1	0.0s (h) ~ 6553.5s (h)	0	○
F11.21	PLC ACC and DEC time selection of step 1	0 to 3	0	○
F11.22	Running time of step 2	0.0s (h) ~ 6553.5s (h)	0	○
F11.23	PLC ACC and DEC time	0 to 3	0	○

Function code	Name	Parameter description	Factory value	Attribute
	selection of step 2			
F11.24	Running time of step 3	0.0s (h) ~ 6553.5s (h)	0	○
F11.25	PLC ACC and DEC time selection of step 3	0 to 3	0	○
F11.26	Running time of step 4	0.0s (h) ~ 6553.5s (h)	0	○
F11.27	PLC ACC and DEC time selection of step 4	0 to 3	0	○
F11.28	Running time of step 5	0.0s (h) ~ 6553.5s (h)	0	○
F11.29	PLC ACC and DEC time selection of step 5	0 to 3	0	○
F11.30	Running time of step 6	0.0s (h) ~ 6553.5s (h)	0	○
F11.31	PLC ACC and DEC time selection of step 6	0 to 3	0	○
F11.32	Running time of step 7	0.0s (h) ~ 6553.5s (h)	0	○
F11.33	PLC ACC and DEC time selection of step 7	0 to 3	0	○
F11.34	Running time of step 8	0.0s (h) ~ 6553.5s (h)	0	○
F11.35	PLC ACC and DEC time selection of step 8	0 to 3	0	○

Function code	Name	Parameter description	Factory value	Attribute
F11.36	Running time of step 9	0.0s (h) ~ 6553.5s (h)	0	○
F11.37	PLC ACC and DEC time selection of step 9	0 to 3	0	○
F11.38	Running time of step 10	0.0s (h) ~ 6553.5s (h)	0	○
F11.39	PLC ACC and DEC time selection of step 10	0 to 3	0	○
F11.40	Running time of step 11	0.0s (h) ~ 6553.5s (h)	0	○
F11.41	PLC ACC and DEC time selection of step 11	0 to 3	0	○
F11.42	Running time of step 12	0.0s (h) ~ 6553.5s (h)	0	○
F11.43	PLC ACC and DEC time selection of step 12	0 to 3	0	○
F11.44	Running time of step 13	0.0s (h) ~ 6553.5s (h)	0	○
F11.45	PLC ACC and DEC time selection of step 13	0 to 3	0	○
F11.46	Running time of step 14	0.0s (h) ~ 6553.5s (h)	0	○
F11.47	PLC ACC and DEC time	0 to 3	0	○

Function code	Name	Parameter description	Factory value	Attribute
	selection of step 14			
F11.48	Running time of step 15	0.0s (h) ~ 6553.5s (h)	0	○
F11.49	PLC ACC and DEC time selection of step 15	0 to 3	0	○
F11.50	PLC running time unit	0: s (seconds) 1: h (hours)	0	○
F11.51	Multi-step command 0 given mode	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	0	○
Group F12 Communication parameters				
F12.00	Local address	1 to 247,0 broadcast address	1	○
F12.01	Baud rate	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	5006	○

Function code	Name	Parameter description	Factory value	Attribute
		Tens place: reserved Hundreds place: reserved Thousands place: reserved		
F12.02	Data format	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: 8-N-1	1	○
F12.03	Response delay	0ms to 20ms	2	○
F12.04	Communication timeout	0.0 (invalid), 0.1s to 60.0s	0.0	○
F12.05	Data transmission format selection	Units place: Non-standard MODBUS-RTU protocol 0: Non-standard MODBUS protocol 1: Standard MODBUS protocol Tens place: Reserved	31	○
F12.06	Communication read current resolution	0:0.01a 1:0.1a	0	○
F12.07	Reserved			
F12.08	Expansion card communication interruption detection time	0.0s: Invalid, 0.1~60.0s	0.0	○
F12.09	Slave address	0 ~ 512	1	○
Group F13 Auxiliary functions				
F13.00	Jog running frequency	0.00Hz ~ Maximum frequency F00.06	2.00	○
F13.01	Jog acceleration time	0.0s ~ 6500.0s	20.0	○

Function code	Name	Parameter description	Factory value	Attribute
F13.02	Jog deceleration time	0.0s to 6500.0s	20.0	○
F13.03	Acceleration Time 2	0.0s ~ 6500.0s	20.0	○
F13.04	Deceleration Time 2	0.0s to 6500.0s	20.0	○
F13.05	Acceleration time 3	0.0s ~ 6500.0s	20.0	○
F13.06	Deceleration time 3	0.0s to 6500.0s	20.0	○
F13.07	Acceleration time 4	0.0s ~ 6500.0s	0.0	○
F13.08	Deceleration time 4	0.0s to 6500.0s	0.0	○
F13.09	Jump frequency 1	0.00Hz to maximum frequency F00.06	0.00	○
F13.10	Jump Frequency 2	0.00Hz ~ Maximum frequency F00.06	0.00	○
F13.11	Jump frequency amplitude	0.00Hz ~ Maximum frequency F00.06	0.00	○
F13.12	Reverse control	0: Inversion allowed 1: Inversion disabled	0	○
F13.13	Droop control	Torque current equal to the slip at rated motor current 0.00Hz to 10.00Hz	0.00	○
F13.14	Set power-on arrival time	0h ~ 65535h	0	○
F13.15	Set run arrival time	0h ~ 65535h	0	○
F13.16	Start protection selection	0: No protection 1: Protection	0	○
F13.17	Frequency detection value	0.00Hz ~ Maximum frequency F00.06	50.00	○

Function code	Name	Parameter description	Factory value	Attribute
	(FDT1)			
F13.18	Frequency detection hysteresis value (FDT1)	0.0% to 100.0% (FDT1 level)	5.0	○
F13.19	Frequency arrival detection width	0.0% to 100.0% (maximum frequency)	0.0	○
F13.20	Whether jump frequency is valid during acceleration and deceleration	0: invalid 1: valid	0	○
F13.21	Running time arrival action selection	0:Continue to run 1: fault prompt	0	○
F13.22	Power-on time arrival action selection	0: Continue running 1: fault information	0	○
F13.23	Acceleration time 1/2 switch frequency point	0.00Hz ~ Maximum frequency F00.06	0.00	○
F13.24	Deceleration time 1/2 switch frequency point	0.00Hz ~ Maximum frequency F00.06	0.00	○
F13.25	Terminal jogging priority	0: invalid 1: valid	0	○
F13.26	Frequency detection value (FDT2)	0.00Hz ~ Maximum frequency F00.06	50.00	○
F13.27	Frequency detection hysteresis value (FDT2)	0.0% to 100.0% (FDT2 level)	5.0	○

Function code	Name	Parameter description	Factory value	Attribute
F13.28	Arbitrary arrival frequency detection value 1	0.00Hz ~ Maximum frequency F00.06	50.00	○
F13.29	Arbitrary arrival frequency detection amplitude 1	0.0% to 100.0% (maximum frequency)	0.0	○
F13.30	Arbitrary arrival frequency detection value 2	0.00Hz to maximum frequency F00.06	50.00	○
F13.31	Arbitrary arrival frequency detection amplitude 2	0.0% to 100.0% (maximum frequency)	0.0	○
F13.32	Zero current detection level	0.0% to 300.0% 100.0% corresponds to the rated motor current, and is not output at stop	5.0	○
F13.33	Zero current detection delay time	0.01s to 600.00s	0.10	○
F13.34	Output current limit exceeded	0.0% (not detected) 0.1% ~ 300.0% (rated motor current)	200.0	○
F13.35	Detection delay time of output current limit exceeded	0.00s ~ 600.00s	0.00	○
F13.36	Arbitrary arrival current 1	0.0% ~ 300.0% (rated motor current)	100.0	○
F13.37	Arbitrary arrival current 1 width	0.0% to 300.0% (rated motor current)	0.0	○
F13.38	Any arrival current 2	0.0% to 300.0% (rated motor current)	100.0	○

Function code	Name	Parameter description	Factory value	Attribute
F13.39	Arbitrary arrival current 2 width	0.0% to 300.0% (rated motor current)	0.0	○
F13.40	Timing function selection	0: Invalid 1: Valid	0	☆
F13.41	Timer running time selection	0: F13.42 setting 1: AI1 2: AI2 3: Reserved Analog input ranges correspond to F13.42	0	☆
F13.42	Timing running time	0.0min to 6500.0min	0.0	☆
F13.43	Lower limit of AI1 input voltage protection	0.00V to F13.44	3.10	○
F13.44	Upper limit of AI1 input voltage protection	F13.43 ~ 11.00V	6.80	○
F13.45	Module temperature reached	0℃ ~ 100℃	75	○
F13.46	Cooling fan control	0: Fan operation during operation 1: The cooling fan is always running	0	○
F13.47	Wakeup frequency	Hibernation frequency (F13.48) ~ Maximum frequency (F00.06)	0.00	○
F13.48	Hibernation frequency	0.00Hz ~ Wakeup frequency (F13.47)	0.00	○
F13.49	Current running arrival time	0.0s ~ 6500.0min	0.0	○
F13.50	Output power correction factor	0.0 to 200.0%	100.0	○

Function code	Name	Parameter description	Factory value	Attribute
Group F14 User-defined function codes				
Group F15 Manufacturer parameters				
Group F16 User group				
F16.00	Function parameter group display selection	Units place: B00 group display selection 0: No display 1: Display Tens place: A00-A15 group display selection 0: No display 1: Display	11	○
F16.01	Personality parameter group display selection	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	00	○
F16.02	Function code read-only control	0: modifiable 1: cannot be modified	0	○
Group A00 Reserved				
Group A01 Reserved				
Group A02 Motor 2 parameters				
A02.00	Motor type selection	0: Ordinary asynchronous motor 1: Variable frequency asynchronous motor	0	☆
A02.01	Motor rating	0.1kW~1000.0kW Model dependent	4.0	☆
A02.02	Rated frequency of motor	0.01Hz~ Maximum frequency F00.06	50.00	☆

Function code	Name	Parameter description	Factory value	Attribute
A02.03	Rated motor speed	1rpm~65535rpm	1460	☆
A02.04	Motor rated voltage	1V~2000V	380	☆
A02.05	Motor current rating	0.01A~655.35A (inverter power <=55kW) 0.1A~6553.5A (inverter power >55kW)	9.00	☆
A02.06	Stator resistance of asynchronous motor	0.001Ω~65.535Ω (inverter power <=55kW) 0.0001 EUR ~6.5535 EUR (inverter power >55kW)	1.204	☆
A02.07	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (inverter power <=55kW) 0.0001 EUR ~6.5535 EUR (inverter power >55kW)	0.908	☆
A02.08	Induction motor leakage inductive reactance	0.01mH~655.35mH (inverter power <=55kW) 0.001mH~65.535mH (inverter power >55kW)	5.28	☆
A02.09	Asynchronous motor mutual inductance	0.1mH~6553.5mH (inverter power <=55kW) 0.01mH~655.35mH (inverter >55kW)	158.6	☆
A02.10	No-load current of asynchronous motor	0.01A~A02.03 (inverter power <=55kW) 0.1A~A02.03 (inverter power >55kW)	4.24	☆
A02.11	Motor parameter self-identification selection	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	0	☆

Function code	Name	Parameter description	Factory value	Attribute
A02.12	Number of encoder pulses	1-65535	1024	☆
A02.13	Encoder Type	0: ABZ incremental encoder 1: UVW incremental encoder 2: Rotary encoder 3: sine-cosine encoder 4: Provincial line mode UVW encoder	0	☆
A02.14	Speed feedback PG selection	0: Local PG 1: Extended PG 2: HDI high speed pulse input	0	☆
A02.15	ABZ encoder AB phase sequence	0: forward 1: reverse	0	☆
A02.16	Encoder mounting position Angle	0.0 ~ 359.9°	0.0	☆
A02.17	UVW signal phase sequence	0: forward 1: reverse	0	☆
A02.18	UVW signal zero position Angle	0.0 ~ 359.9°	0.0	☆
A02.19	Rotary pole pairs	1-65535	1	☆
A02.20	Reserved			●
A02.21	Speed feedback PG break detection time	0.0: No action 0.1s to 10.0s	0.0	☆
A02.22	Speed loop proportional gain 1	1-100	30	○
A02.23	Speed loop integral time 1	0.01s to 10.00s	0.50	○
A02.24	Switching frequency 1	0.00 ~ A02.27	5.00	○
A02.25	Speed loop	1-100	20	○

Function code	Name	Parameter description	Factory value	Attribute
	proportional gain 2			
A02.26	Speed loop integral time 2	0.01 s to 10.00 s	1.00	○
A02.27	Switching frequency 2	A02.24~ Max frequency F00.06	10.00	○
A02.28	Slip compensation factor	50% ~ 200%	100	○
A02.29	SVC speed feedback filter time	0.000s to 0.100s	0.015	○
A02.30	Vector control overexcitation gain	0 ~ 200	64	○
A02.31	Speed control (drive) torque upper limit digital setting	0.0% ~ 200.0%	150.0	○
A02.32	Speed control (drive) torque upper limit source	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	0	○
A02.33	Speed control (braking) torque upper limit source	0: Function code A02.34 set 1: AI1 2: AI2 3: Reserved 4: HDI high speed pulse setting	0	●

Function code	Name	Parameter description	Factory value	Attribute
		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	Speed control (braking) torque upper limit digital setting	0.0% ~ 200.0%	150.0	●
A02.35	M-axis current loop proportional gain	0 ~ 60000	2000	○
A02.36	M-axis current loop integral gain	0 ~ 60000	1300	○
A02.37	T-axis current loop proportional gain	0 ~ 60000	2000	○
A02.38	T-axis current loop integral gain	0 ~ 60000	1300	○
A02.39	Speed loop integral properties	Units place: integral separation 0: Speed loop integral is always valid 1: Speed loop integral separation	0	○
A02.40	Synchro weak magnetic mode	0: Not weak magnetic 1: Direct calculation 2: Automatic adjustment	0	○
A02.41	Overmodulation Enable Select	0: Disable 1: Enable	0	○
A02.42	Maximum output voltage coefficient	100% ~ 110%	105	☆
A02.43	Maximum torque coefficient in weak	50% ~ 200%	100	○

Function code	Name	Parameter description	Factory value	Attribute
	field			
A02.44	Power generation (braking) torque enable selection under speed model	0: Disable 1: Enable	0	○
A02.45	Upper limit of generating power	0.0% ~ 200.0%	Model dependent	○
A02.46	Motor control mode	0: Sensorless vector control (SVC) 1: Reserved 2: V/F control	2	☆
A02.47	Acceleration and deceleration time selection	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	0	○
A02.48	Motor torque boost	0.0%: Automatic torque boost 0.1%~30.0%	Model dependent	○
A02.49	Reserved	Reserved	0	●
A02.50	Oscillation suppression gain	0 ~ 100	40	○
Group A03 Photovoltaic water pump special function code				
A03.00	Operating status	0: Stopping 1: Running 2: Hibernating 3: Low frequency protection 4: Dry protection 5: Overcurrent protection 6: Minimum power protection	Read Only	●

Function code	Name	Parameter description	Factory value	Attribute
A03.01	VOC voltage	0.0V to 999.9V	Read Only	●
A03.02	PV pump mode	0: Variable frequency speed regulation mode 1: CVT mode 2: MPPT mode	2	★
A03.03	CVT target voltage	30.0% to 102.4%	85.0%	☆
A03.04	CVT integral gain	0 to 65535	2000	☆
A03.05	CVT proportional gain	0 to 65535	20	☆
A03.06	CVT transition frequency	0.00 to 50.00Hz	10.00Hz	☆
A03.07	Upper limit of CVT voltage	0.0V to 1000.0V	1000.0V	★
A03.08	Lower limit of CVT voltage	0.0V to 1000.0V	0.0V	★
A03.09	MPPT search starting voltage	30.0% to 102.4%	95.0%	☆
A03.10	MPPT search cycle	0.01s to 60.00s	2.00s	☆
A03.11	MPPT search step size	0.01s to 60.00s	0.50s	☆
A03.12	Frequency rise adjust step size	0.00Hz/s - 300.00 Hz/s	2.00 Hz/s	☆
A03.13	Frequency drop adjust step size	0.00Hz/s - 300.00 Hz/s	10.00 Hz/s	☆
A03.14-A 03.18	Reserved			
A03.19	Power on terminal protection	0: The power-on terminal command is invalid 1: The power on terminal command is	1	★

Function code	Name	Parameter description	Factory value	Attribute
		valid		
A03.20	Power failure restart enabled	0: Invalid 1: Power-off restart	1	☆
A03.21	Power failure restart delay time	0.0 to 6000.0 s	10.0 s	★
A03.22-A 03.23	Reserved			
A03.24	Customized detection current for overcurrent protection	0.00A to 600.00A	0.00A	★
A03.25	Customized detection time for overcurrent protection	0.0s to 6000.0s	10.0s	★
A03.26	Customized automatic recovery time for overcurrent protection	0.0s to 6000.0s	20.0s	★
A03.27	Customized minimum power protection value	0.0kW to 1000.0kW	0.0kW	★
A03.28	Customized detection time for minimum power protection	0.0s to 6000.0s	10.0s	★
A03.29	Customized automatic recovery time for minimum power protection	0.0s to 6000.0s	10.0s	★

Function code	Name	Parameter description	Factory value	Attribute
A03.30	Customized detection current for dry protection	0.00 to 600.00A	0.00A	★
A03.31	Customized detection time for dry protection	0.0 to 6000.0s	10.0s	★
A03.32	Customized automatic recovery time for dry protection	0.0 to 6000.0s	20.0s	★
A03.33	Customized hibernation voltage threshold	0 to 1000V	0V	★
A03.34	Customized hibernation recovery voltage	0 to 1000V	400V	★
A03.35	Customized hibernation stop waiting time	0.0 to 6000.0s	20.0s	★
A03.36	Customized detection frequency for low frequency protection	0.00 to 300.00Hz	0.00Hz	☆
A03.37	Customized detection time for low frequency protection	0.0 to 6000.0s	10.0s	★
A03.38	Customized automatic recovery time for low frequency protection	0.0 to 6000.0s	20.0s	★

Function code	Name	Parameter description	Factory value	Attribute
A03.39	Detection time for water full protection	0.0s to 6000.0s	10.0s	★
A03.40	Exit time for water full protection	0.0s to 6000.0s	10.0s	★
A03.41	Alarm recovery mode	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	H.0000	
A03.42	Reserved			
A03.43	Power curve 0	0.00kW to 100.00kW	0.50kW	★
A03.44	Power curve 1	0.00kW to 100.00kW	1.00kW	★
A03.45	Power curve 2	0.00kW to 100.00kW	1.50kW	★
A03.46	Power curve 3	0.00kW to 100.00kW	2.00kW	★
A03.47	Power curve 4	0.00kW to 100.00kW	2.50kW	★
A03.48	Flow curve 0	0.0m^3/h to 1000.0m^3/h	0.0m^3/h	★
A03.49	Flow curve 1	0.0m^3/h to 1000.0m^3/h	5.0m^3/h	★
A03.50	Flow curve 2	0.0m^3/h to 1000.0m^3/h	10.0m^3/h	★
A03.51	Flow curve 3	0.0m^3/h to 1000.0m^3/h	15.0m^3/h	★
A03.52	Flow curve 4	0.0m^3/h to 1000.0m^3/h	20.0m^3/h	★
A03.53-A 03.54	Reserved			

Function code	Name	Parameter description	Factory value	Attribute
A03.55	Daily flow/daily power zero clearing period	0.0h to 24.0h	7.0h	★
A03.56	Reserved			
A03.57	Number of automatic reset times	0 to 100	000	☆
Groups A04 to A15 Reserved				
Group b00 Display				
b00.00	Running frequency	Unit: Hz	0.01	●
b00.01	Set frequency	Unit: Hz	0.01	●
b00.02	Bus voltage	Unit: V	0.1	●
b00.03	Output voltage	Unit: V	1	●
b00.04	Output current	Unit: A	0.01	●
b00.05	Output power	Unit: kW	0.1	●
b00.06	Output torque	Unit: %	0.1	●
b00.07	DI input status		0x0000	●
b00.08	DO output status		0x0000	●
b00.09	AI1 voltage/current	Unit: V/mA	0.01	●
b00.10	AI2 voltage/current	Unit: V/mA	0.01	●
b00.11	Reserved	Reserved	0.01	●
b00.12	Count value		1	●

Function code	Name	Parameter description	Factory value	Attribute
b00.13	Length value		1	●
b00.14	Load speed display		1	●
b00.15	PID settings	Unit: %	1	●
b00.16	PID feedback	Unit: %	1	●
b00.17	PLC stage		1	●
b00.18	Input pulse frequency	Unit: kHz	0.01	●
b00.19	Feedback speed	Unit: Hz	0.01	●
b00.20	Remaining running time	Unit: min	0.1	●
b00.21	AI1 voltage/current before correction	Unit: V/mA	0.001	●
b00.22	AI2 voltage/current before correction	Unit: V/mA	0.001	●
b00.23	Reserved		0.001	●
b00.24	Linear speed	Unit: m/min	1	●
b00.25	Current power-on time	Unit: min	1	●
b00.26	Current running time	Unit: min	0.1	●
b00.27	Input pulse frequency	Unit: kHz	1	●
b00.28	Communication setting value	Unit: Hz	0.01	●
b00.29	Encoder feedback speed			
b00.30	Master frequency X display	Unit: Hz	0.01	●

Function code	Name	Parameter description	Factory value	Attribute
b00.31	Auxiliary frequency Y display	Unit: Hz	0.01	●
b00.32	View any memory address value		1	●
b00.33	Synchro rotor position	Unit: °	0.1	●
b00.34	Reserved		1	●
b00.35	Target torque	Unit: %	0.1	●
b00.36	Reserved		1	●
b00.37	Power factor angle	Unit: °	0.1	●
b00.38	Reserved		1	●
b00.39	V/F separation target voltage	Unit: V	1	●
b00.40	V/F separation output voltage	Unit: V	1	●
b00.41	DI input status visual display		1	●
b00.42	DO output status visual display		1	●
b00.43	DI function status visual display 1 (Function 01 ~ Function 40)		1	●
b00.44	DI function status visual display 2(Function 41 ~ Function 80)		1	●
b00.45	Fault information		1	●

Function code	Name	Parameter description	Factory value	Attribute
b00.59	Set frequency	Unit: %	0.01	●
b00.60	Running frequency	Unit: %	0.01	●
b00.61	Frequency converter state		1	●
b00.62	Current fault code		1	●
b00.65	Torque upper limit	Unit: %	0.1	●
b00.73	Motor serial number	0: Motor 1 1: Motor 2	0	●
b00.74	Inverter output torque	Unit: %	0.1	●
b00.75	Device code		1	●
b00.76	Running RPM	Unit: RPM	1	●

7. 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 code	Fault type	Possible cause	Countermeasure

Fault code	Fault type	Possible cause	Countermeasure
E.oC1	Overcurrent during ACC	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	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
E.oC2	Overcurrent during DEC		
E.oC3	Run overcurrent at constant speed		
E.oU1	Overvoltage during ACC	1. Abnormal input voltage 2. After instantaneous power failure, restart the rotating motor 3. Acceleration time is too fast	1. Check input power 2. Avoid restart after stop 3. Increase acceleration time
E.oU2	Overvoltage during DEC	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	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
E.oU3	Overvoltage during constant speed running	1. The input voltage changes abnormally 2. The load inertia is large	1. Install the input reactor 2. Add suitable energy consumption brake assembly
E.Lv	Bus undervoltage	1. Low grid voltage 2. Overvoltage stall protection is not on	1. Check the grid input power supply 2. Check the settings for the

Fault code	Fault type	Possible cause	Countermeasure
			relevant function codes
E.oUt1	Inverter Unit U phase fault	1. Acceleration too fast 2. Internal damage to the phase IGBT 3. Interference causes misoperation 4. Whether grounding is good 5. Whether to-ground short circuit occurred	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
E.oUt2	Inverter Unit V phase fault		
E.oUt3	Inverter Unit W phase fault		
E.oL1	Motor overload	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	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
E.oL2	Inverter overload	1. Acceleration too fast 2. Restart the rotating motor 3. The grid voltage is too low 4. Load is too large	1. Reduce acceleration 2. Avoid restart after stop 3. Check the grid voltage 4. Choose an inverter with larger power
E.oL3	Overload pre-warning	1. Load is too large 2. The motor parameters are not correct 3. The grid voltage is low	1. Choose an inverter with larger power 2. Check motor rotation parameter identification 3. Check the grid voltage
E.oH1	Rectifier module overheat	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	1. See overcurrent countermeasures 2. Rewiring 3. Ventilate the air duct or replace the fan 4. Reduce ambient temperature
E.oH2	Inverter module overheat		

Fault code	Fault type	Possible cause	Countermeasure
		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	5. Check and reconnect 6. Seek service 7. Seek service 8. Seek service
E.ILF	Phase loss on input side	R,S,T input phase loss or fluctuation	1. Check the input power supply 2. Check the installation wiring
E.OLF	Phase loss on output side	1. U, V, W output phase loss 2. The three phases of the load are seriously asymmetrical	1. Check the output wiring 2. Check the motor and cables
E.bC	Brake unit fault	1. Faulty brake line or damaged brake tube 2. The resistance value of the external brake resistor is low	1. Check the brake unit and replace it with a new brake tube 2. Increase brake resistance
E.AUt	Motor parameter identification fault	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	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
E.PIDE	PID feedback disconnection fault	1. The PID feedback is disconnected 2. The PID feedback source disappears	1. Check the PID feedback signal cable 2. Check the PID feedback source
E.485	Communication fault	1. The baud rate is set improperly 2. Communication error using	1. Set the appropriate baud rate 2. Press the STOP/RESET key to

Fault code	Fault type	Possible cause	Countermeasure
		serial communication 3. Communication has been interrupted for a long time	reset and seek service 3. Check the wiring of the communication port
E.EF	External fault	1. SI external fault input terminal action	1. Check the external device input
E.EEP	EEPROM read write fault	1. Control parameter reading/writing error 2. The EEPROM is damaged	1. Press the STOP/RESET key to reset the EEPROM 2. Seek service
E.END	Running time reached	1. User trial time arrives	1. Ask the manufacturer for service
E.ItE	Current detection circuit fault	1. Control board connector is in poor contact 2. Auxiliary power supply damaged 3. Hall device damage 4. Abnormal amplification circuit	1. Check the connector and re-plug the cable 2. Seek service 3. Seek service 4. Seek service

7.4.2 Other faults

Special protection functions for solar pump inverter		
Fault code	Fault type	Possible cause
E.81	Hibernation protection function	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.
E.82	Low frequency protection function	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.

Special protection functions for solar pump inverter		
E.83	Dry protection function	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.
E.84	Overcurrent protection function	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.
E.85	Minimum power protection function	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.
E.86	Water full protection function	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.

Appendix 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:

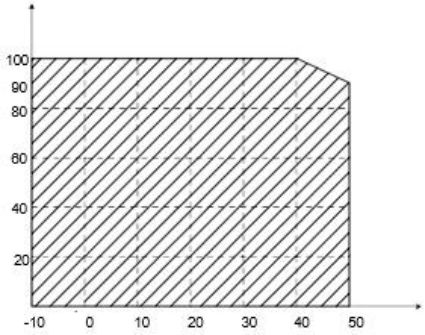
- ✧ The rated capacity is the capacity at an ambient temperature of 40 °C.
- ✧ It must be checked and confirmed that the power flowing through the common DC connection must not exceed the rated motor power in a common DC system.

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
Current	See 3.6 Product ratings
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 F590series 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:

F590 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 ≧ 400A, and used in complex systems in the second class environment.

Appendix B Dimension Drawings

B.1 Content of this chapter

This chapter provides the dimension drawings of F590series frequency converter. The unit in the dimension drawings is millimetres (mm).

B.2 Keypad structure

B.2.1 Keypad appearance and dimensions

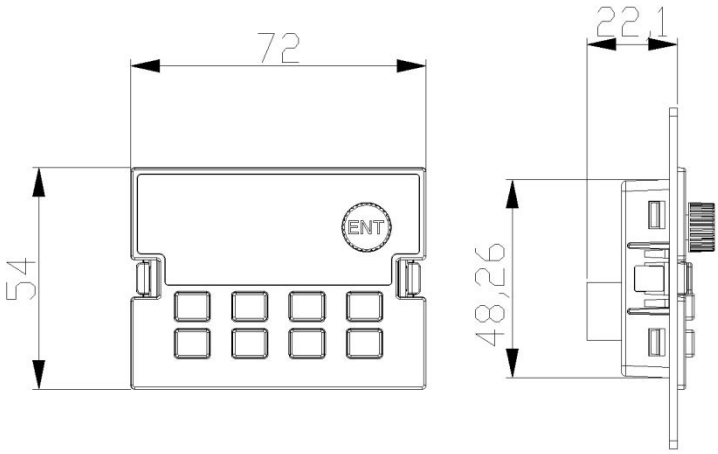


Figure B-1 Keypad appearance and dimensions of 22kW and below (unit: mm)

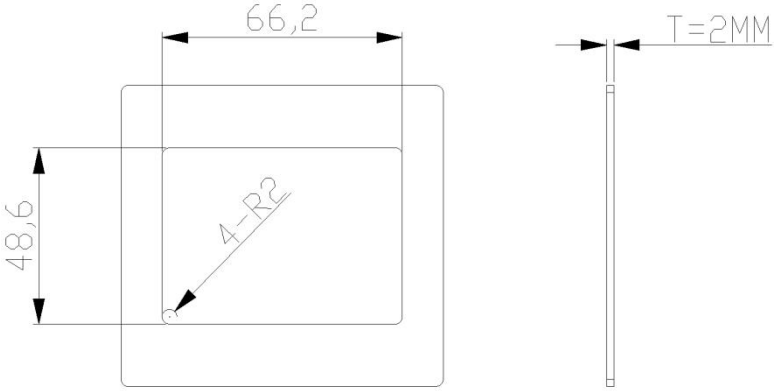


Figure B-2 Dimensions of an external opening hole for a keypad of 22kW and below (unit: mm)

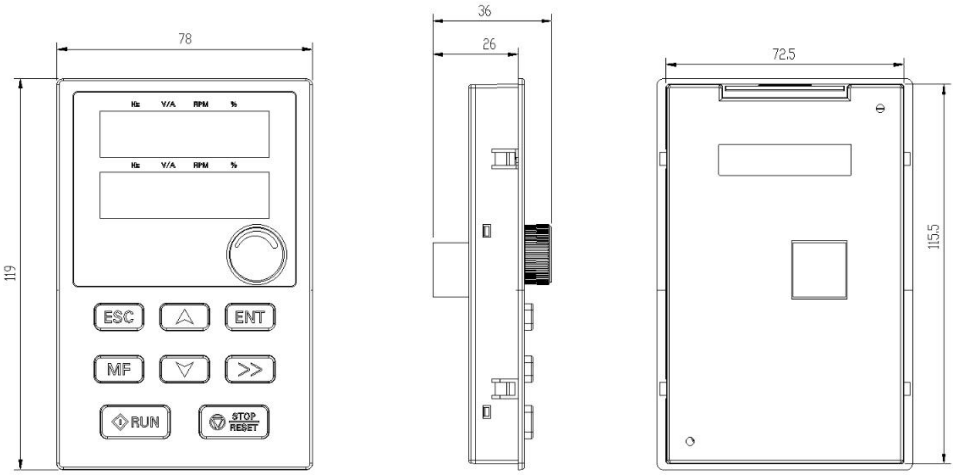


Figure B-3 Appearance and dimensions of a keypad of 22kW above (unit: mm)

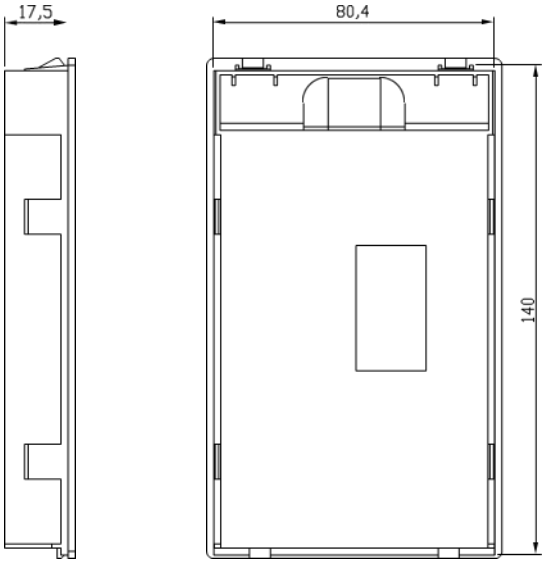


Figure B-4 Dimensions of the external keypad bracket of 22kW above (unit: mm)

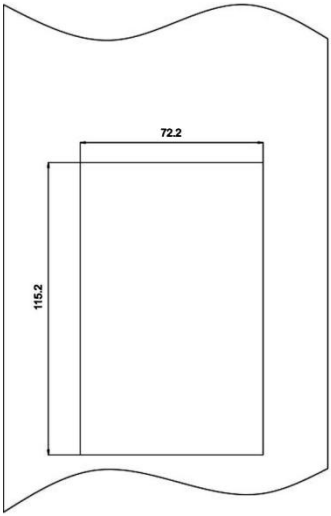


Figure B-5 Dimensions of opening holes on the operation panel (keypad)

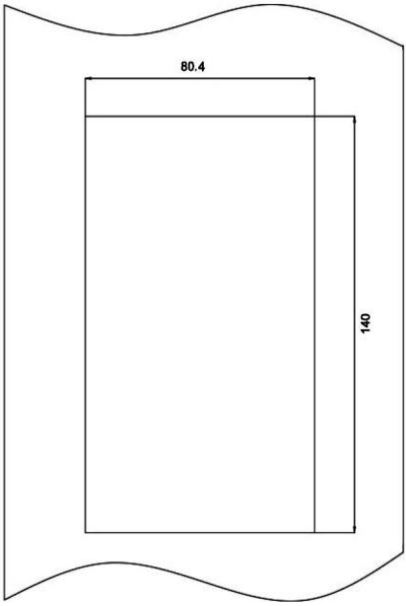


Figure B-6 Dimensions of opening holes on the operation panel support (keypad tray)

B.2.2 Frequency converter appearance and dimensions

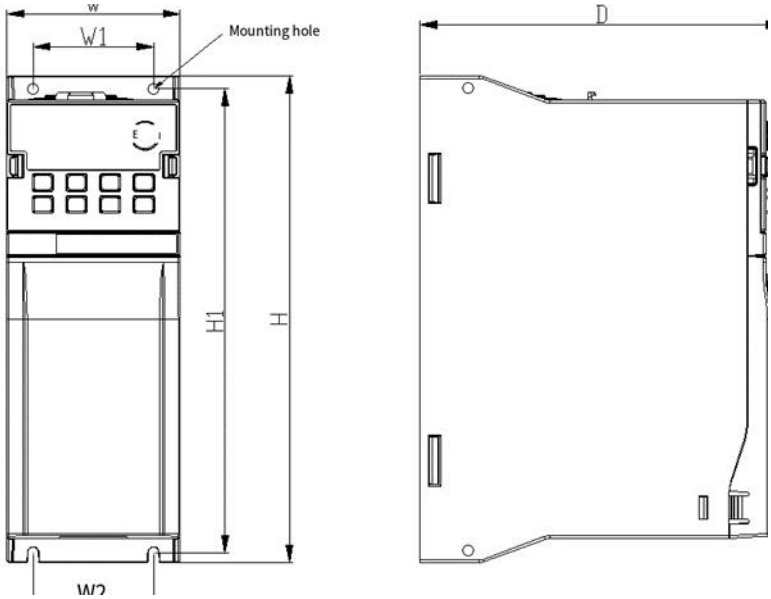


Figure B-7 Appearance of 1.5 to 22kW wall mounting

Inverter specifications	Overall dimensions (mm)			Mounting hole position (mm)			Mounting aperture	Set screws
	W	H	D	H1	W1	W2		
0.4~2.2kW/380V/220V	72	200	150.5	190.8	50	50	ø 4	M4
4~5.5kW/220V	100	240	160.5	230.8	70	70	ø 4	M4
4~7.5kW/380V	100	240	160.5	230.8	70	70	ø 4	M4
7.5kW/220V	120	330	172.5	321.5	111	107	ø 4	M4
11~15kW/380V	120	330	172.5	321.5	111	107	ø 4	M4
18.5~22kW/380V	142	383	227.5	373.5	120	129	ø 4	M4

Table B-1 Dimensions of 0.4 to 22kW wall mounting

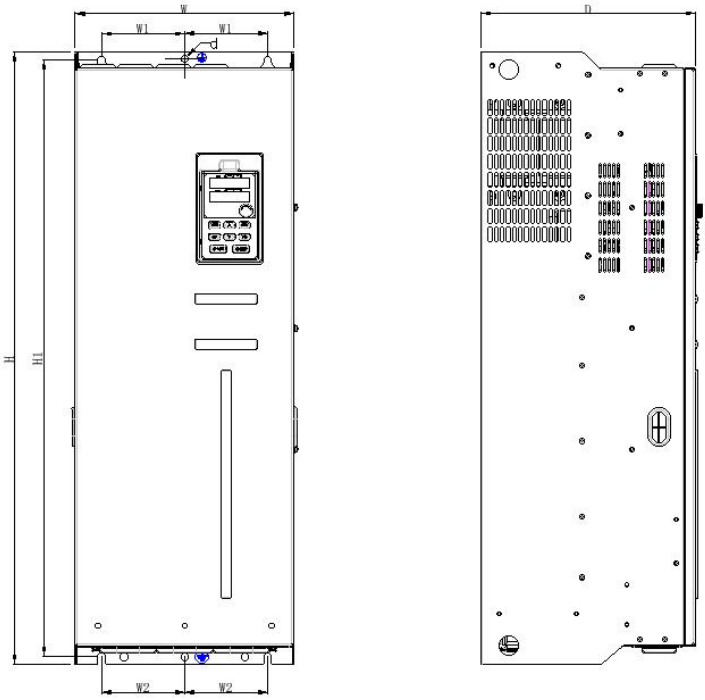


Figure B-8 Appearance of 37kW to 500kW wall mounting

Inverter specifications	Mounting dimensions without base (mm)						Mounting aperture	Set screw
	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	110	110	790	Φ 10	M10
132-160kW380V	315	970	310	125	125	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	460	1500	550	200	200	1470	Φ 18	M18

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

B.2.3 Floor mounting dimensions

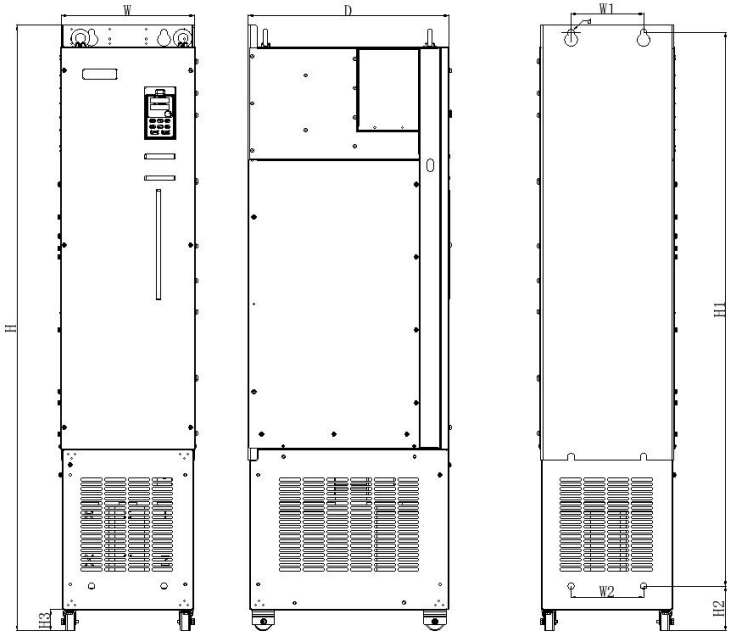


Figure B-9 Appearance of 380V 75~500kW floor mounting

Inverter specifications	Mounting dimensions with optional base (mm)								Mounting aperture
	W	H	D	W1	W2	H1	H2	H3	
75kW~110kW	290	1248	285	110	110	815	422	53	Φ 10
132kW~160kW	315	1408	310	125	125	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

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

Appendix C Optional Peripheral Accessories

C.1 Content of this chapter

This chapter describes how to select optional accessories for the F590series.

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		
F590-0R4G-S2	1.5	1.5	M4	0.8
F590-0R7G-S2	1.5	1.5	M4	0.8
F590-0R7G-4	1.5	1.5	M4	0.8
F590-1R5G-4	1.5	1.5	M4	0.8
F590-2R2G-4	1.5	1.5	M4	0.8
F590-1R5G-S2	2.5	2.5	M4	0.8
F590-2R2G-S2	2.5	2.5	M4	0.8
F590-2R2G-SS2	2.5	2.5	M4	0.8
F590-004G-4	2.5	2.5	M4	1.2~1.5
F590-5R5G-4	2.5	2.5	M4	1.2~1.5
F590-1R5G-2	2.5	2.5	M4	1.2~1.5
F590-2R2G-2	2.5	2.5	M4	1.2~1.5
F590-7R5G-4	4	4	M5	2~2.5
F590-004G-2	4	4	M5	2~2.5

Inverter model	Recommended cable size (mm^2)		Specifications	Tightening
F590-011G-4	6	6	M5	2~2.5
F590-5R5G-2	6	6	M5	2~2.5
F590-015G-4	10	10	M5	2~2.5
F590-7R5G-2	10	10	M5	2~2.5
F590-018G-4	16	16	M5	2~2.5
F590-022G-4	25	16	M5	2~2.5
F590-030G-4	25	16	M6	4~6
F590-037G-4	35	16	M6	4~6
F590-045G-4	35	16	M8	10
F590-055G-4	50	25	M8	10
F590-075G-4	70	35	M8	10
F590-090G-4	95	50	M12	31~40
F590-110G-4	120	70	M12	31~40
F590-132G-4	185	95	M12	31~40
F590-160G-4	240	95	M12	31~40
F590-185G-4	120*2P	150	M12	31~40
F590-200G-4	120*2P	150	M12	31~40
F590-220G-4	95*2P	95	M12	31~40
F590-250G-4	95*2P	95	M12	31~40
F590-280G-4	150*2P	150	M12	31~40
F590-315G-4	150*2P	150	M12	31~40
F590-355G-4	185*2P	185	M12	31~40
F590-400G-4	150*3P	120*2P	M12	31~40
F590-450G-4	185*3P	120*2P	M12	31~40
F590-500G-4	185*3P	120*2P	M12	31~40

C.1.2 Battery components are recommended for the PV water pump frequency converter

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
F590-0R4G-SS2	250	11*1	300	9*1
F590-0R7G-SS2	250	11*1	300	9*1
F590-1R5G-SS2	250	11*1	300	9*1
F590-2R2G-SS2	250	11*1	300	9*1
F590-0R4G-S2	250	11*1	300	9*1
F590-0R7G-S2	250	11*1	300	9*1
F590-1R5G-S2	250	11*1	300	9*1
F590-2R2G-S2	250	11*1	300	9*1
F590-1R5G-2	250	11*1	300	9*1
F590-2R2G-2	250	11*1	300	9*1
F590-004G-2	250	11*2	300	9*2
F590-5R5G-2	250	11*3	300	9*3
F590-7R5G-2	250	11*4	300	9*4
F590-0R7G-4	250	18*1	300	15*1
F590-1R5G-4	250	18*1	300	15*1
F590-2R2G-4	250	18*1	300	15*1
F590-004G-4	250	20*1	300	16*1
F590-5R5G-4	250	18*2	300	15*2
F590-7R5G-4	250	18*2	300	15*2
F590-011G-4	250	18*3	300	15*3
F590-015G-4	250	18*4	300	15*4
F590-018G-4	250	18*5	300	15*5

Solar pump	Solar module open circuit voltage class			
CD590-022G-4	250	18*6	300	15*6
F590-030G-4	250	18*8	300	15*8
F590-037G-4	250	18*9	300	15*9
F590-045G-4	250	18*11	300	15*11
F590-055G-4	250	18*14	300	15*14
F590-075G-4	250	18*19	300	15*19
F590-090G-4	250	18*22	300	15*22
F590-110G-4	250	18*27	300	15*27
F590-132G-4	250	18*38	300	15*38
F590-160G-4	250	18*46	300	15*46
F590-185G-4	250	18*53	300	15*53
F590-200G-4	250	18*57	300	15*57
F590-220G-4	250	18*63	300	15*
F590-250G-4	250	18*	300	15*
F590-280G-4	250	18*	300	15*
F590-315G-4	250	18*	300	15*
F590-355G-4	250	18*	300	15*
F590-400G-4	250	18*	300	15*
F590-450G-4	250	18*	300	15*
F590-500G-4	250	18*	300	15*