

Chapter 1 Safety and Precautions

Safety definition:

In this manual, safety precautions are classified as follows:



Danger: Operations which are not performed according to requirements may cause serious equipment loss or personnel injury.





Caution: Operations which are not performed according to requirements may cause medium hurt or light hurt or material loss.



During the installation, commissioning and maintenance of the system, please make sure to follow the safety and precautions of this chapter. In case of a result of illegal operations, caused any harm and losses is nothing to do with the company.

1.1 Safety Precautions



1.1.1 Before Installation:

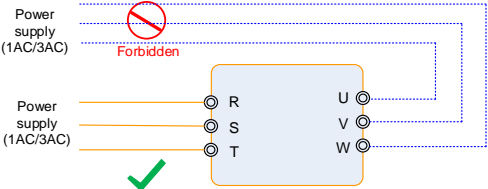
 Danger	<ul style="list-style-type: none">● Do not use the water-logged inverter, damaged inverter or inverter with missing parts. Otherwise, there may be risk of injury.● Use the motor with Class B or above insulation. Otherwise, there may be risk of electric shock.
 Caution	<ul style="list-style-type: none">● Carefully handled when loading, otherwise it may damage the inverter.● Please don't use the damaged driver or inverter with missing parts, there may be risk of injury.● Do not touch the electronic parts and components; otherwise it will cause static electricity.

1.1.2 During Installation:



 Danger	<ul style="list-style-type: none">● Install the inverter on incombustible surface such as metal, and keep away from flammable substances. Otherwise it may cause fire.● Do not loose the set screw of the equipment, especially the screws marked in RED.
 Caution	<ul style="list-style-type: none">● Do not drop the cable residual or screw in the inverter. Otherwise it may damage the inverter.● Please install the driver in the place where there is no direct sunlight or less vibratory.● When more than two inverters are to be installed in one cabinet, due attention should be paid to the installation locations (refer to Chapter 3 Mechanical and Electrical Installation) to ensure the heat sinking effect.

1.1.3 During Wiring:



 Danger	<ul style="list-style-type: none">● Operation should be performed by the professional engineering technician. Otherwise there will be danger of electric shock!● There should be circuit breaker between the inverter and power supply. Otherwise, there may cause fire!● Make sure the power is disconnected prior to the connection. Otherwise there will be danger of electric shock!● The ground terminal should be earthed reliably. Otherwise there may be danger of electric shock.
 Caution	<ul style="list-style-type: none">● Never connect AC power to output U, V, W terminals. Please note the remark of the wiring terminals, connect them correctly. Otherwise it will cause inverter be damaged.

	 <ul style="list-style-type: none"> ● Ensure the wiring circuit can meet the requirement of EMC and the area safety standard. Please follow the instructions in the manual before wiring. Otherwise may cause injury or electric shock. ● Never connect the braking resistor between DC bus (+), (-) terminals. Otherwise may cause fire. ● Encoder must be used together with shielded wire, and ensure the single terminal of the shielded lay is connected with ground well.
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1.1.4 Before Power-on:

 Danger	<ul style="list-style-type: none"> ● Please confirm whether the power voltage class is consistent with the rated voltage of the inverter and whether the I/O cable connecting positions are correct, and check whether the external circuit is short circuited and whether the connecting line is firm. Otherwise it may damage the inverter. The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused. ● The inverter is free from dielectric test because this test is performed prior to the delivery. Otherwise accident may occur.
 Caution	<ul style="list-style-type: none"> ● The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused! ● Whether all the external fittings are connected correctly in accordance with the circuit provided in this manual. Otherwise accident may occur!

1.1.5 After Power-on:

 Danger	<ul style="list-style-type: none">● Do not open the cover of the inverter upon power-on. Otherwise there will be danger of electric shock!● Do not touch the inverter and its surrounding circuit with wet hand. Otherwise there will be danger of electric shock!● Do not touch the inverter terminals (including control terminal). Otherwise there will be danger of electric shock!● At power-on, the inverter will perform the security check of the external heavy-current circuit automatically. Thus, at the moment please do not touch the terminals U, V and W, or the terminals of motor, otherwise there will be danger of electric shock.
 Caution	<ul style="list-style-type: none">● If parameter identification is required, due attention should be paid to the danger of injury arising from the rotating motor. Otherwise accident may occur!● Do not change the factory settings at will. Otherwise it may damage the equipment!

1.1.6 During Operation:

 Danger	<ul style="list-style-type: none">● Do not touch the fan or discharge resistor to sense the temperature. Otherwise, you may get burnt!● Detection of signals during the operation should only be conducted by qualified technician. Otherwise, personal injury or equipment damage may be caused!
 Caution	<ul style="list-style-type: none">● During the operation of the inverter, keep items from falling into the equipment. Otherwise, it may damage the equipment!● Do not start and shut down the inverter by connecting and disconnecting the contactor. Otherwise, it may damage the equipment!

1.1.7 During Maintain:



- Do not repair and maintain the equipment with power connection. Otherwise there will be danger of electric shock!
- Be sure to conduct repair and maintenance after the charge LED indicator of the inverter is OFF. Otherwise, the residual charge on the capacitor may cause personal injury!
- The inverter should be repaired and maintained only by the qualified person who has received professional training. Otherwise, it may cause personal injury or equipment damage!
- Carry out parameter setting after replacing the inverter, all the plug-ins must be plug and play when power outage.

Chapter 2 Product Information

2.1 Product Inspection

Checking the following items when receiving the inverter

Confirmation Items	Method
Confirm if the inverter is what you ordered	Check name plate
Damaged or not	Inspect the entire exterior of the inverter to see if there are any scratches or other damage resulting from shipping
Confirm if the fastening parts (screws, etc.) are loose or not	Check with a screw driver if necessary
User's manual, certification and other spares	User's manual and the relative spares

Please contact the local agent or our company directly if there is any damage on the inverter.

2.4 Selection Guide

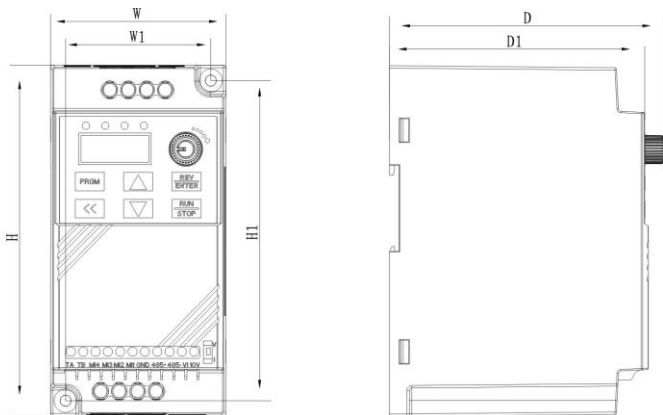
Inverter Model	Motor		Rated Input Current (A)	Rated Output Current (A)
	kW	HP		
1AC 220V ±15%				
0.4kW	0.4	0.5	5.4	2.3
0.75kW	0.75	1	8.2	4
1.5kW	1.5	2	14	7
3AC 380V ±15%				
0.75kW	0.75	1	3.4	2.1
1.5kW	1.5	2	5.0	3.8
2.2kW	2.2	3	5.8	5.1

2.5 Technical Specifications

Item	Technical Index	Specification
Input	Input voltage	1AC 220V±15%, 3AC 380V±15%
	Input frequency	50/60Hz±5%
Output	Output voltage	0~rated input voltage
	Output frequency	0~600Hz
Control Features	Control mode	V/f control
	Operation command mode	Keypad control Terminal control Serial communication control (Modbus)
	Overload capacity	150% / 60s, 180% / 10s, 200% / 1s.
	Torque boost	Automatically torque boost; manually torque boost: 0.1%~30.0%
	V/f curve	Three types: linear, multiple point and square type (1.2 power, 1.4 power, 1.6 power, 1.8 power, square)
	DC braking	DC braking when starting and stopping DC braking frequency: 0.0Hz~maximum frequency, braking time: 0.0s~25.0s
	Jog operation	Jog operation frequency: 0.0Hz~maximum frequency Jog acceleration/deceleration time: 0.1s~3600.0s
	Simple PLC & multi-step speed operation	It can realize a maximum of 16 multi-step speeds running via the built-in PLC or control terminals.
	Built-in PID	Built-in PID control to easily realize the close loop control of the process parameters (such as pressure, temperature, flow, etc.)

Control Function	Wobble frequency control	Multiple triangular-wave frequency control, special for textile
	Timing/length/counting control	Timing/length/counting control function
	Over-voltage & over-current stall control	Limit current & voltage automatically during the running process, prevent frequent over-current & over-voltage tripping
Input/output terminals	Input terminals	Programmable digital input: 4 multifunctional inputs 1 programmable analog input: VI: 0~10V / 0/(4)~20Ma
	Output terminals	1 normal open relay output
	Communication terminals	Offer RS485 communication interface, support MODBUS-RTU communication protocol
Environment	Ambient temperature	-10°C~40°C, without direct sunshine.
	Humidity	90%RH or less (non-condensing)
	Altitude	≤1000M: output rated power, >1000M: output derated
	Storage temperature	-20°C~60°C

2.6 External dimensions

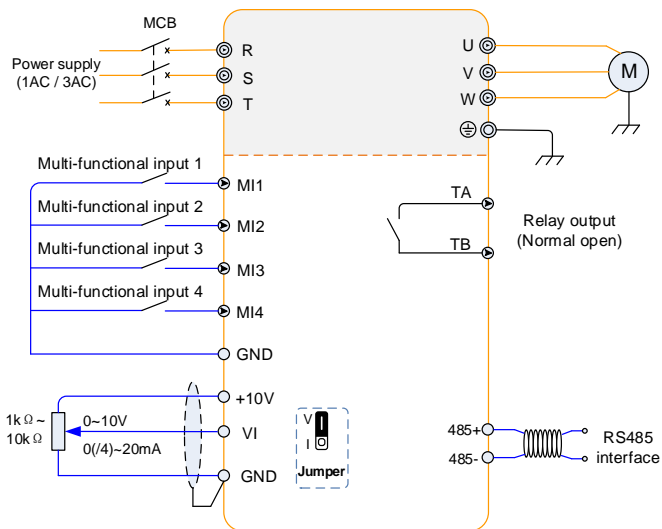


Dimensions (mm)

W	H	D	W1	H1	D1	Aperture
72.5	142.5	113.8	60	130	107	Ø4.5

Chapter 3 Installation and wiring

3.1 Wiring diagram



Note:

Terminal © refers to the main circuit terminal, terminal O refers to the control circuit terminal.

3.2 Main circuit terminals and connections



Danger

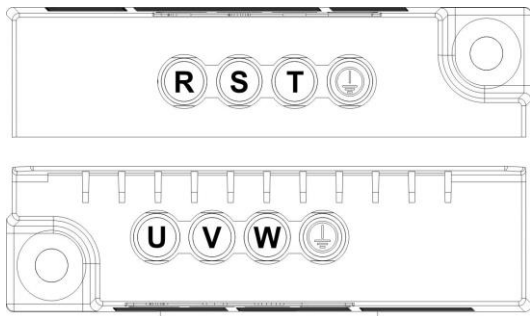
- Make sure that the power switch is at OFF status prior to perform wiring connection. Otherwise there may be danger of electric shock!
- Only the qualified and trained personnel can perform wiring connection. Otherwise it may cause equipment and human injuries!
- It should be earthed reliably. Otherwise there may be danger of electric shock or fire!




Caution

- Make sure that the rated value of the input power supply is consistent with that of the inverter. Otherwise it may damage the inverter!
- Make sure that the motor matches the inverter. Otherwise it may damage the motor or generate inverter protection!
- Do not connect the power supply to the terminals of U, V and W. Otherwise it may damage the inverter!

Layout of main circuit terminals

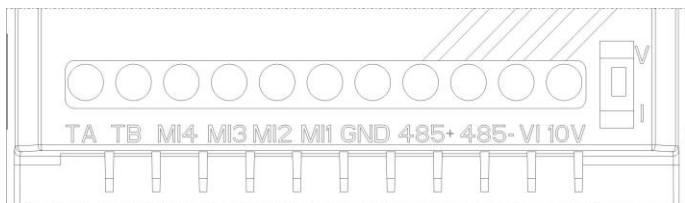


Instructions of main circuit terminals

Terminal	Description
R, T	Connect to single phase AC power
R, S, T	Connect to three-phase AC power
U, V, W	Connect to three phase motor
	Ground connection terminal

3.3 Control terminals and connections

Layout of the control circuit terminals



Description of jumpers on control board

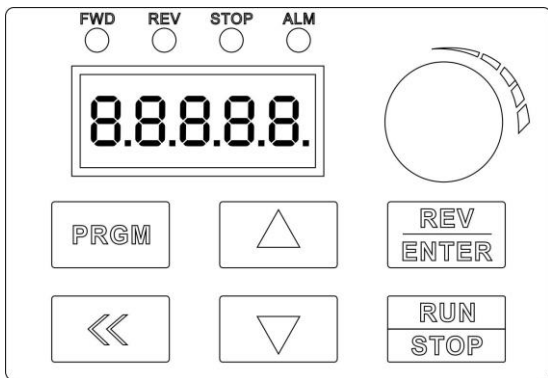
Jumper	position	Description
VI input signal type selection	V	0~10V signal
	i	0(/4)~20Ma signal

Description of Control Terminal Function

Type	Terminal Symbol	Terminal Name	Function Description
Power Supply	+10V~GND	External +10V power	Provide +10V power supply for external units, and the maximum output current is 50Ma. It is generally used as the operating power supply for the external potentiometer. The potentiometer resistance range is 1K ω ~10K ω .
Analog Input	VI~GND	Analog input terminal	1. Input range: 0~10V, input impedance: 6.8K ω . 2. Input range: 0(/4) ~ 20Ma, input impedance: 500 Ω .
Digital Input	MI1	Digital input 1	1. Optical coupling isolation. 2. Input impedance: 10K ω 3. Voltage range for level input: 9V~30V
	MI2	Digital input 2	
	MI3	Digital input 3	
	MI4	Digital input 4	
Relay Output	TA-TB	Normally open	Driving capacity: AC 250V/3A, DC 30V/1A
RS485	485+	RS485+	Communication interface of Modbus, it is suggested to use twisted-pair cable or shielded cable.
	485-	RS485-	

Chapter 4 Operation and Display

4.1 Keypad Description



1) Function keys description

Functional indicator	Description
FWD	Indication of inverter forward running
REV	Indication of inverter reverse running
STOP	Inverter is stopping
ALM	Inverter with fault

2) Keypad push-button description

Button	Name	Function
PRGM	Programming key	Entry and exit of primary menu

REV/ ENTER	Reverse/ Confirmation key	Under monitoring status, it is use the change the running direction (set by F7-01) Under parameter setting status, it is used to confirm the parameters setting.
▲	Increment key	Progressively increase of data or function codes
▼	Decrement key	Progressively decrease of data or function codes
>>	Shift key	Select the modification bit of parameters when modifying parameters.
RUN/ STOP	Running key	1, Start the inverter at stop mode; 2, Stop the inverter at running mode; 3, Reset the inverter at fault status.

4.2 Fault Protection

In fault status, inverter will display fault code & record output current, output voltage, etc. For details, please refer to FA (fault and protection) parameter group. Fault can be reset via RUN/STOP key or external terminals.

4.3 Password Setting

The inverter provides user password protection function. When F7-00 is set to non-zero value, it indicates the user password, and the password protection turns valid after 1 minute of setting the password. When pressing **PRGM** key again, "00000" will be displayed, and common menu cannot be entered until user password is input correctly.

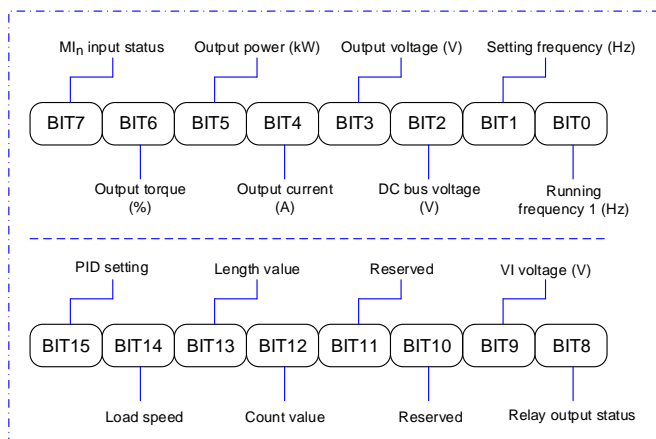
To cancel the password protection function, enter with password and set F7-00 to "0".

4.4 Display setting for F7-03

If F7-03 parameters need to be displayed when running, **set the corresponding position to 1, and combine every four bits of binary numbers into one hexadecimal number, and then enter the four**

hexadecimal numbers into F7-03.

Running status display 1:



For example, if user wants to display output voltage, DC bus voltage, setting frequency, running frequency, output current, output torque, VI voltage, output terminal status, the value of each bit is as the following table:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	0	1	1	1	1	1	1
3				F			
BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
0	0	0	0	0	0	1	1
0				3			

The value of F7-03 is **033F**.



※The setting of F7-04 and F7-05 are similar as F7-03.

Chapter 5 Examples of Operation

5.1 Keypad start, stop, speed adjust by up, down button

Parameters setting: F0-02=0, F0-03=0, F0-23=1 (Digital setting frequency storage when stop);

Start, stop: press “RUN/STOP” button to make inverter run forward, press “REV/ENTER” to make inverter run reverse, press “RUN/STOP” to stop the inverter

Speed adjusts: press  button to increase the frequency, press  button to decrease the frequency.

5.2 Keypad start, stop, speed adjust by keypad potentiometer

Parameters setting: factory default;

Start, stop: press “RUN/START” button to make inverter run forward, press “REV/ENTER” to make inverter run reverse, press “RUN/STOP” to stop the inverter

Speed adjusts: turn the keypad potentiometer

5.3 Inverter start/stop by external signal, speed adjust by external potentiometer

Parameters setting: F0-02=1, F0-03=2, F5-01=02

Start, stop: “MI1-GND” close, inverter runs forward; “MI2-GND” close, inverter runs reverse, MI1, MI2 disconnect with GND, inverter stops.

Speed adjusts: turn the external potentiometer (10V, VI, GND, jumper at V side)

5.4 Inverter start/stop by external signal, speed adjust by external 0~10V signal

Parameters setting: F0-02=1, F0-03=2, F5-01=02

Start, stop: “MI1-GND” close, inverter run forward; “MI2-GND” close,

inverter run reverse, MI1, MI2 disconnect with GND, inverter stop.

Speed adjusts: by changing the value of external voltage signal (VI, GND, jumper at V side)

5.5 Inverter start/stop by external signal, speed adjust by external 4~20Ma signal

Parameters setting: F0-02=1, F0-03=3, F5-01=02, F5-13=2V (means 4Ma)

Start, stop: “MI1–GND” close, inverter run forward; “MI2–GND” close, inverter run reverse, MI1, MI2 disconnect with GND, inverter stop.

Speed adjusts: by changing the value of external current signal (VI, GND, jumper at I side)

5.6 Increase or decrease the frequency by external digital input

(1) start/stop by keypad

Parameters setting: F0-02=0, F0-03=0, F5-00=06, F5-01=07

Start, stop: press “RUN/STOP” button to make inverter run forward, press “REV/ENTER” to make inverter run reverse, press “RUN/STOP” to stop inverter.

Speed adjusts: “MI1–GND” close, frequency increase; “MI2–GND” close, frequency decrease.

(2) start/stop by external digital signal

Parameters setting: F0-02=1, F0-03=0, F5-00=06, F5-01=07, F5-02=01, F5-03=02

Start, stop: “MI3–GND” close, inverter run forward; “MI4–GND” close, inverter run reverse.

Speed adjusts: “MI1–GND” close, frequency increase; “MI2–GND” close, frequency decrease.

Note:

If the changed frequency needs to be stored after power off, please set F0-23=1.

5.7 Multi-step speed function

(1) start/stop by keypad

Parameters setting: F0-02=0, F0-03=6, F5-00=12, F5-01=13, F5-01=14
(FD-00~FD-15, 16 steps speed can be set)

Start, stop: press “RUN/STOP” button to make inverter run forward, press “REV/ENTER” to make inverter run reverse, press “RUN/STOP” to stop inverter.

Speed adjusts: by different combinations of MI input (shown as below list).

Parameters setting: F5-00=12, F5-01=13, F5-02=14, F5-03=15
(FD-00~FD-15, 16 steps speed can be set)

※ **Different combination means different speeds:**

MI4	MI3	MI2	MI1	Command setting	Corresponding parameter
OFF	OFF	OFF	OFF	Multi-step command 0	FD-00
OFF	OFF	OFF	ON	Multi-step command 1	FD-01
OFF	OFF	ON	OFF	Multi-step command 2	FD-02
OFF	OFF	ON	ON	Multi-step command 3	FD-03
OFF	ON	OFF	OFF	Multi-step command 4	FD-04
OFF	ON	OFF	ON	Multi-step command 5	FD-05
OFF	ON	ON	OFF	Multi-step command 6	FD-06
OFF	ON	ON	ON	Multi-step command 7	FD-07
ON	OFF	OFF	OFF	Multi-step command 8	FD-08
ON	OFF	OFF	ON	Multi-step command 9	FD-09
ON	OFF	ON	OFF	Multi-step command 10	FD-10
ON	OFF	ON	ON	Multi-step command 11	FD-11
ON	ON	OFF	OFF	Multi-step command 12	FD-12

ON	ON	OFF	ON	Multi-step command 13	FD-13
ON	ON	ON	OFF	Multi-step command 14	FD-14
ON	ON	ON	ON	Multi-step command 15	FD-15

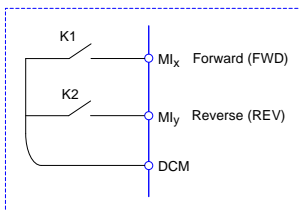
5.8 Terminal command mode

F5-11=0: Two-line running mode 1:

This is the most common mode. The forward/reverse rotation of the motor is decided by the commands of FWD and REV terminals.

Terminal	Setting value	Description
Mlx	1	Forward running (FWD)
Mly	2	Reverse running (REV)

K1	K2	Run command
OFF	OFF	Stop
OFF	ON	Reverse
ON	OFF	Forward
ON	ON	Stop

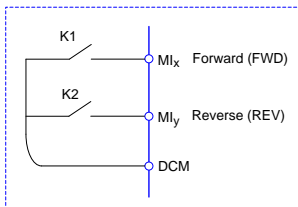


F5-11=1: Two-line running mode 2:

When this mode is adopted, REV is enabled terminal. The direction is determined by the status of FWD.

Terminal	Terminal	Description
Mlx	1	Run enable
Mly	2	Forward / Reverse run control

K1	K2	Run command
OFF	OFF	Stop
OFF	ON	Stop
ON	OFF	Forward
ON	ON	Reverse



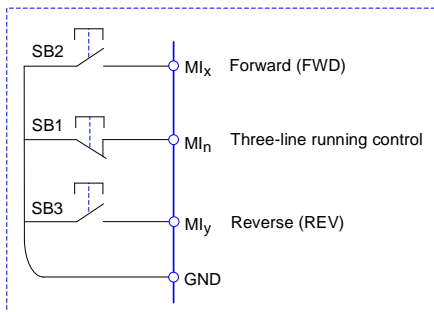
F5-11=2: Three-line running mode 1:

In this mode, MI_n is enabled terminal, and the direction is controlled by FWD and REV respectively. However, the pulse is enabled through disconnecting the signal of MI_n terminal when the inverter stops.

Terminal	Setting value	Description
MI_x	1	Forward running (FWD)
MI_y	2	Reverse running (REV)
MI_n	3	Three-line running control

To make the inverter run, users must close MI_n terminal firstly. It can achieve the motor forward or reverse control via pulse rising of MI_x or MI_y .

It can achieve the inverter stop via cutting off MI_n terminal signal. MI_x , MI_y , MI_n are $MI1 \sim MI4$, the valid input of MI_x (MI_y) is pulses signal, and the valid input of MI_n is level signal.



SB1: Stop button

SB2: Forward rotation button

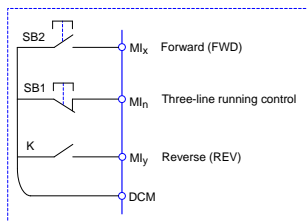
SB3: Reverse rotation button

F5-11=3: Three-line running mode 2:

In this mode, MI_N is enabled terminal, and the running command is given by FWD, while the direction is determined by the status of REV. Stop command is performed through disconnecting the MI_N signal.

Terminal	Setting value	Description
MI _x	1	Run enable
MI _y	2	Forward / Reverse run control
MI _n	3	Three-line running control

K	Running direction
OFF	Forward
ON	Reverse



Chapter 6 Function Parameter List

The detailed functional parameters are listed in below table.

The instruction of the symbols in function parameter list is as following:

“○” Means the parameter can be modified at stop and running status.

“◎” Means the parameter cannot be modified at the running status.

“●” Means the parameter is the real detection value which cannot be modified.

6.1 Basic Function Parameters List

Code	Name	Detailed instruction	Default	Modify
F0 Group: Basic Function				
F0-00	Inverter model	1: G model (constant torque load model) 2: P model (fan and pump load model)	1	●
F0-01	Control mode	2: V/f control	2	◎
F0-02	Running command source	0: Keypad 1: Terminal 2: Communication	0	◎
F0-03	Main frequency source A selection	0: Keypad (F0-08, UP and DOWN Adjustable, non-recorded after power off) 1: Keypad potentiometer 2: VI (0~10V) 3~5: Reserved 6: Multi-step speed 7: Simple PLC 8: PID 9: Communication	1	◎

Code	Name	Detailed instruction	Default	Modify
		(Modbus)		
F0-04	Auxiliary frequency source B selection	Same as F0-03	0	<input checked="" type="radio"/>
F0-05	Reference of Frequency source B	0: Relative to maximum frequency 1: Relative to frequency source A	0	<input type="radio"/>
F0-06	Range of Auxiliary Frequency source B	0%~150%	100%	<input type="radio"/>
F0-07	Frequency source selection	Units place: frequency source selection 0: Main frequency source A 1: Calculation result of frequency A and B (determined by tens place) 2: Switching between A and B 3: Switching between A and calculation result 4: Switching between B and calculation result Tens place: calculation relationship between frequency A and B 0: A + B 1: A – B 2: Max (A, B) 3: Min (A, B)	00	<input type="radio"/>
F0-08	Keypad reference frequency	0.00Hz ~ maximum frequency (F0-10)	50.00 Hz	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
F0-09	Running direction selection	0: Same direction 1: Reverse direction	0	<input type="radio"/>
F0-10	Maximum frequency	50.00Hz ~ 600.00Hz	50.00 Hz	<input checked="" type="radio"/>
F0-11	Frequency source of upper limit	0: Set by F0-12 1: VI 5: Communication	0	<input checked="" type="radio"/>
F0-12	Frequency upper limit	F0-14 (frequency lower limit) ~ F0-10 (max. frequency)	50.00 Hz	<input type="radio"/>
F0-13	Frequency upper limit offset	0.00Hz ~ F0-10 (max. frequency)	0.00 Hz	<input type="radio"/>
F0-14	Frequency lower limit	0.00Hz ~ F0-12 (frequency upper limit)	0.00 Hz	<input type="radio"/>
F0-15	Carrier frequency	0.5kHz ~ 16.0kHz	Model depend	<input type="radio"/>
F0-16	Carrier frequency adjusting according to temperature	0: No 1: Yes	1	<input type="radio"/>
F0-17	Acceleration time 1	0.00s ~ 65000s	Model depend	<input type="radio"/>
F0-18	Deceleration time 1	0.00s ~ 65000s	Model depend	<input type="radio"/>
F0-19	ACC/DEC time unit	0: 1s 1: 0.1s 2: 0.01s	1	<input checked="" type="radio"/>
F0-20	Reserved			
F0-21	Auxiliary frequency source offset frequency when	0.00Hz ~ F0-10 (max. frequency)	0.00 Hz	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
	combination			
F0-22	Frequency command resolution	1: 0.1Hz 2: 0.01Hz	2	☉
F0-23	Digital setting frequency storage selection when stop	0: Not store 1: store	1	○
F0-24	ACC/DEC time reference frequency	0: F0-10 (max. frequency) 1: Setting frequency 2: 100Hz	0	☉
F0-25	Running frequency command UP/DOWN reference	0: Running frequency 1: Setting frequency	0	☉
F0-26	Command source combination with frequency source	<p>Units place: Operation keypad command combine with frequency source 0: No combination 1: Keypad Potentiometer 2: VI 6: Multi-step speed 7: Simple PLC 8: PID 9: Communication</p> <p>Tens place: Terminal command combine with frequency source</p> <p>Hundreds place: Communication command combine with frequency source</p> <p>Thousands place: Auto</p>	0000	○

Code	Name	Detailed instruction	Default	Modify
		running combine with frequency source		
F0-27	Parameters initialization	0: No action 1: Initialize basic parameters (F0 and F1 groups) 2: Clear the record 3: Initialized completely	0	⊙
F1 Group: Start and Stop control				
F1-00	Start mode	0: Direct start 2: Pre-excitation start	0	○
F1-01	Reserved			
F1-02	Reserved			
F1-03	Start frequency	0.00Hz ~ 10.00Hz	0.00 Hz	○
F1-04	Start frequency holding time	0.0s ~ 100.0s	0.0s	⊙
F1-05	DC braking current before start/pre-excitation current	0% ~ 100%	0%	⊙
F1-06	DC braking time before start/pre-excitation time	0.0s ~ 100.0s	0.0s	⊙
F1-07	ACC/DEC mode	0: Linear ACC/DEC 1: S-curve ACC/DEC A (Applications which require start & stop smoothly, such as elevator and conveyor belt.) 2: S-curve ACC/DEC B (Suitable for the applications that the	0	⊙

Code	Name	Detailed instruction	Default	Modify
		high speed area above rated frequency needs fast ACC/DEC.)		
F1-08	Time of S curve's start part	0.0% ~ (100.0% ~ F1-09)	30.0%	☉
F1-09	Time of S curve's end part	0.0% ~ (100.0% ~ F1-08)	30.0%	☉
F1-10	Stop mode	0: Deceleration to stop 1: Coast to stop	0	○
F1-11	DC braking start frequency while stopping	0.00Hz ~ F0-10 (max. frequency)	0.00 Hz	○
F1-12	DC braking delay time while stopping	0.0s ~ 100.0s	0.0s	○
F1-13	DC braking current while stopping	0% ~ 100%	0%	○
F1-14	DC braking time while stopping	0.0s ~ 100.0s	0.0s	○
F1-15	Braking usage ratio	0% ~ 100%	100%	○
F2 Group: Motor Parameters				
F2-00	Motor type	0: Common asynchronous motor	0	☉
F2-01	Motor rated power	0.1Kw ~ 1000.0Kw	Model depend	☉
F2-02	Motor rated voltage	1V ~ 2000V	Model depend	☉
F2-03	Motor rated current	0.01A ~ 655.35A	Model depend	☉
F2-04	Motor rated frequency	0.00Hz ~ F0-10 (max. frequency)	Model depend	☉

Code	Name	Detailed instruction	Default	Modify
F2-05	Motor rated speed	1 ~ 65535RPM	Model depend	☉
F2-06~ F2-11	Reserved			
F4 Group: V/f Control Parameters				
F4-00	V/f curve setting	0: Linear 1: Multiple-points 2: Square 3: 1.2th power 4: 1.4th power 6: 1.6th power 8: 1.8th power 9: Reserved 10: V/f separate completely 11: V/f separate partially	0	☉
F4-01	Torque boost	0.0: auto 0.1% ~ 30.0%	Model depend	○
F4-02	Torque boost cutoff frequency	0.00Hz ~ F0-10 (max. frequency)	50.00 Hz	☉
F4-03	V/f frequency point 1	0.00Hz ~ F4-05	0.00 Hz	☉
F4-04	V/f voltage point 1	0.0% ~ 100.0%	0.0%	☉
F4-05	V/f frequency point 2	F4-03 ~ F4-07	0.00 Hz	☉
F4-06	V/f voltage point 2	0.0% ~ 100.0%	0.0%	☉
F4-07	V/f frequency point 3	F4-05 ~ F2-04 (motor rated frequency)	0.00 Hz	☉
F4-08	V/f voltage point 3	0.0% ~ 100.0%	0.0%	☉
F4-09	V/f slip compensation	0.0% ~ 200.0%	0.0%	○

Code	Name	Detailed instruction	Default	Modify
	gain			
F4-10	V/f over excitation gain	0 ~ 200	64	○
F4-11	V/f oscillation suppression gain	0 ~ 100	Model depend	○
F4-12	Reserved			
F4-13	Voltage source of V/f separation	0: Digital setting (F4-14) 1: VI 5: Multi-step speed 6: Simple PLC 7: PID 8: Communication Note: 100% corresponds to motor rated voltage	0	○
F4-14	Digital setting of V/f separation	0V~F2-02 (Motor rated voltage)	0V	○
F4-15	Voltage rise up time of V/f separation	0.0s~1000.0s Note: means voltage rise up time from 0 to motor rated voltage	0.0s	○
F5 Group: Input Terminals				
F5-00	MI1 terminal function	0: No function 1: Forward (FWD) 2: Reverse (REV) 3: Three-line running control 4: Forward Jog (FJOG) 5: Reverse Jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Coast to stop 9: Fault reset (RESET) 10: Pause running 11: External fault (normal	1	◎
F5-01	MI2 terminal function		2	◎
F5-02	MI3 terminal function		0	◎
F5-03	MI4 terminal function		0	◎
			0	◎
			0	◎
		0	◎	

Code	Name	Detailed instruction	Default	Modify
		open) input 12: Multi-step speed terminal 1 13: Multi-step speed terminal 2 14: Multi-step speed terminal 3 15: Multi-step speed terminal 4 16: ACC/DEC selection terminal 1 17: ACC/DEC selection terminal 2 18: Main frequency source switching 19: UP and DOWN setting clear (terminal and keypad) 20: Running command switching terminal 21: ACC/DEC invalid 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 invalid 30~31: Reserved 32: DC braking command 33: External fault (normal closed) input 34: Frequency modification enabled		

Code	Name	Detailed instruction	Default	Modify
		35: PID action direction reverse 36: External stop terminal 1 37: Control command switching terminal 2 38: PID integration stop 39: Switch frequency source A to preset frequency 40: Switch frequency source B to preset frequency 41~42: Reserved 43: PID parameter switching 44~45: Reserved 46: Speed control / torque control switching 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: The running time reset		
F5-04 ~ F5-09	Reserved			
F5-10	MI terminals filter time	0.000s ~ 1.000s	0.010s	○
F5-11	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0	◎

Code	Name	Detailed instruction	Default	Modify
F5-12	UP/DOWN change rate	0.001Hz/s ~ 65.535Hz/s	1.00 Hz/s	<input type="radio"/>
F5-13	VI minimum input	0.00V ~ 10.00V	0.00V	<input type="radio"/>
F5-14	VI minimum input corresponding setting	-100.0% ~ +100.0%	0.0%	<input type="radio"/>
F5-15	VI maximum input	0.00 ~ 10.00V	10.00 V	<input type="radio"/>
F5-16	VI maximum input corresponding setting	-100.0% ~ +100.0%	100.0 %	<input type="radio"/>
F5-17	VI input filter time	0.00s ~ 10.00s	0.10s	<input type="radio"/>
F5-18 ~ F5-56	Reserved			
F5-57	MI1 delay time	0.0s ~ 3600.0s	0.0s	<input checked="" type="radio"/>
F5-58	MI2 delay time	0.0s ~ 3600.0s	0.0s	<input checked="" type="radio"/>
F5-59	MI3 delay time	0.0s ~ 3600.0s	0.0s	<input checked="" type="radio"/>
F5-60	MI terminals valid mode selection	0: Active-high level signal 1: Active-low level signal Units place: MI1 Tens place: MI2 Hundreds place: MI3 Thousands place: MI4 Ten thousands place: Reserved	00000	<input checked="" type="radio"/>
F5-61	Reserved			
F6 Group: Output Terminal				
F6-00 ~	Reserved			

Code	Name	Detailed instruction	Default	Modify
F6-01				
F6-02	Relay output function selection (TA, TB)	0: No output	0	○
		1: Inverter is running		
		2: Fault output (fault stop)	2	○
		3: FDT1 output		
		4: Frequency arrival		
		5: Zero-speed running (no output when stop)		
		6: Motor overload pre-alarm	0	
		7: Inverter overload pre-alarm		
		8: Setting count value arrival		
		9: Designated count value arrival	0	
		10: Length arrival		
		11: Simple PLC circulate running completed		
		12: Accumulated running time arrival		
		13: Frequency limiting		
		14: Torque limiting		
		15: Ready for running		
		16: Reserved		
		17: Frequency upper limit arrival	0	
		18: Frequency lower limit arrival		
		19: Under voltage status output		
		20: Communication setting		
		21: Position fixed (reserved)		
		22: Position approach		

Code	Name	Detailed instruction	Default	Modify
		(reserved) 23: Zero-speed running 2 (output when stop) 24: Accumulated power-on time arrival 25: FDT2 output 26: Frequency 1 arrival output 27: Frequency 2 arrival output 28: Current 1 arrival output 29: Current 2 arrival output 30: Timing arrival output 31: VI input over limit 32: Off load 33: Reverse running 34: Zero-current status 35: Module temperature arrival 36: Output current over limit 37: Lower limit frequency arrival (output when stop) 38: Warning output (keep running) 39: Motor over temperature pre-alarm 40: This running time arrival		
		0: Running frequency		
		1: Setting frequency		
		2: Output current	0	○

Code	Name	Detailed instruction	Default	Modify
		3: Output torque 4: Output power 5: Output voltage 6: Reserved 7: VI 8: Reserved 9: Reserved 10: Length 11: Count value 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0A) 15: Output voltage (100.0% corresponds to 1000.0V) 16: Reserved	1	
F6-03 ~ F6-17	Reserved			
F6-18	Relay output delay time	0.0s ~ 3600.0s	0.0s	○
F6-19 ~ F6-20	Reserved			
F6-22	Relay output valid status selection	0: Positive logic 1: Negative logic Units place: Reserved Tens place: Relay	00	○
F7 Group: Keypad and Display				
F7-00	User password	0 ~ 65535	0	○
F7-01	REV/JOG function selection	0: Reverse run 1: Switching between keypad command and	0	◎

Code	Name	Detailed instruction	Default	Modify
		remote command (terminal command or communication command) 2: FDW/REV Switching 3: Forward Jog 4: Reverse Jog		
F7-02	STOP/RESET function selection	0: Valid when keypad control 1: Always valid	1	<input type="radio"/>
F7-03	Running status display 1	0000 ~ FFFF Bit00: Running frequency 1 (Hz) Bit01: Setting frequency (Hz) Bit02: DC Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (%) Bit07: MI input status Bit08: MO output status Bit09: VI voltage (V) Bit10: Reserved Bit11: Reserved Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	401F	<input type="radio"/>
F7-04	Running status display 2	0000 ~ FFFF Bit00: PID feedback Bit01: PLC step Bit02: Reserved Bit03: Running frequency 2 (Hz) Bit04: Remain running time	0000	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
		Bit05: VI voltage before calibration (V) Bit06: Reserved Bit07: Reserved Bit08: Linear speed Bit09: Current power-on time (Hour) Bit10: Current running time (Min) Bit11: Reserved Bit12: Communication setting value Bit13: Reserved Bit14: Main frequency A display (Hz) Bit15: Auxiliary frequency B display (Hz)		
F7-05	Stop status display	0000 ~ FFFF Bit00: Setting frequency (Hz) Bit01: DC Bus voltage (V) Bit02: MI input status Bit03: MO output status Bit04: VI voltage(V) Bit05: Reserved Bit06: Reserved Bit07: Count value Bit08: Length value Bit09: PLC step Bit10: Load speed Bit11: PID setting Bit12: Reserved	0003	○
F7-06	Load speed display coefficient	0.0001 ~ 6.5000 Example: if load speed display factor (F7-06) is 2.000, load speed decimal	3.0000	○

Code	Name	Detailed instruction	Default	Modify
		place (F7-12) is 2 (2 decimal places), when the running frequency is 40.00Hz, load speed is: $40.00 \times 2.000 = 80.00$		
F7-07	IGBT module temperature	0.0°C ~ 100.0°C	-	●
F7-08	Reserved			
F7-09	Accumulated running time	0h ~ 65535h	-	●
F7-10	Model No.	-	-	●
F7-11	Software version No.	-	-	●
F7-12	Load speed display decimal place	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1	○
F7-13	Accumulated Power-on time	0h ~ 65535h	-	●
F7-14	Accumulated power consumption	0kWh ~ 65535kWh	-	●
F7-15	Function codes modification authority	0: Enable 1: Disable	0	○
F8 Group: Enhanced Functions				
F8-00	Jog running frequency	0.00Hz ~ F0-10 (max. frequency)	2.00 Hz	○
F8-01	Jog acceleration time	0.0s ~ 6500.0s	20.0s	○
F8-02	Jog deceleration time	0.0s ~ 6500.0s	20.0s	○

Code	Name	Detailed instruction	Default	Modify
F8-03	Acceleration time 2	0.0s ~ 6500.0s	Model depend	<input type="radio"/>
F8-04	Deceleration time 2	0.0s ~ 6500.0s	Model depend	<input type="radio"/>
F8-05	Acceleration time 3	0.0s ~ 6500.0s	Model depend	<input type="radio"/>
F8-06	Deceleration time 3	0.0s ~ 6500.0s	Model depend	<input type="radio"/>
F8-07	Acceleration time 4	0.0s ~ 6500.0s	Model depend	<input type="radio"/>
F8-08	Deceleration time 4	0.0s ~ 6500.0s	Model depend	<input type="radio"/>
F8-09	Jump frequency 1	0.00Hz ~ F0-10 (maximum frequency)	0.00 Hz	<input type="radio"/>
F8-10	Jump frequency 2	0.00Hz ~ F0-10 (maximum frequency)	0.00 Hz	<input type="radio"/>
F8-11	Jump frequency amplitude	0.00Hz ~ F0-10 (maximum frequency)	0.01 Hz	<input type="radio"/>
F8-12	FWD/REV dead time	0.0s ~ 3000.0s	0.0s	<input type="radio"/>
F8-13	Reverse control	0: Enable 1: Disable	0	<input type="radio"/>
F8-14	Action when setting frequency lower than frequency lower limit	0: Running at frequency lower limit (F0-14) 1: Stop 2: Zero-speed running	0	<input type="radio"/>
F8-15	Droop control	0.00Hz ~ 10.00Hz	0.00 Hz	<input type="radio"/>
F8-16	Accumulated power-on arrival time	0h ~ 65000h	0h	<input type="radio"/>
F8-17	Accumulated running arrival time	0h ~ 65000h	0h	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
F8-18	Auto restart selection after power recovering	0: Auto restart 1: No action ※ This function is only valid under terminal control mode (F0-02=1).	0	<input type="radio"/>
F8-19	Frequency detection value (FDT1)	0.00Hz ~ F0-10 (maximum frequency)	50.00 Hz	<input type="radio"/>
F8-20	Frequency detection lagging value (FDT1)	0.0% ~ 100.0% (F8-19)	5.0%	<input type="radio"/>
F8-21	Frequency arrival detection amplitude	0.0% ~ 100.0% (maximum frequency)	0.0%	<input type="radio"/>
F8-22	Jump frequency control during ACC/DEC	0: Invalid 1: Valid	0	<input type="radio"/>
F8-25	Acceleration time 1 and acceleration time 2 switching frequency point	0.00Hz ~ F0-10 (maximum frequency)	0.00 Hz	<input type="radio"/>
F8-26	Deceleration time 1 and deceleration time 2 switching frequency point	0.00Hz ~ F0-10 (maximum frequency)	0.00 Hz	<input type="radio"/>
F8-27	Terminal jog priority	0: Invalid 1: Valid	0	<input type="radio"/>
F8-28	Frequency detection value (FDT2)	0.00Hz ~ F0-10 (maximum frequency)	50.00 Hz	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
F8-29	Frequency detection lagging value (FDT2)	0.0% ~ 100.0% (F8-28)	5.0%	<input type="radio"/>
F8-30	Any arrival frequency detection value 1	0.00Hz ~ F0-10 (maximum frequency)	50.00 Hz	<input type="radio"/>
F8-31	Any arrival frequency detection amplitude 1	0.0% ~ 100.0% (maximum frequency)	0.0%	<input type="radio"/>
F8-32	Any arrival frequency detection value 2	0.00Hz ~ F0-10 (maximum frequency)	50.00 Hz	<input type="radio"/>
F8-33	Any arrival frequency detection amplitude 2	0.0% ~ 100.0% (maximum frequency)	0.0%	<input type="radio"/>
F8-34	Zero-current detection level	0.0% ~ 300.0% 100.0% corresponds to motor rated current	5.0%	<input type="radio"/>
F8-35	Zero-current detection delay time	0.01s ~ 600.00s	0.10s	<input type="radio"/>
F8-36	Output current over limit value	0.0% (No detection) 0.1% ~ 300.0% (motor rated current)	200.0 %	<input type="radio"/>
F8-37	Output current over limit detection delay time	0.00s ~ 600.00s	0.00s	<input type="radio"/>
F8-38	Any arrival current 1	0.0% ~ 300.0% (motor rated current)	100.0 %	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
F8-39	Any arrival current 1 amplitude	0.0% ~ 300.0% (motor rated current)	0.0%	<input type="radio"/>
F8-40	Any arrival current 2	0.0% ~ 300.0% (motor rated current)	100.0 %	<input type="radio"/>
F8-41	Any arrival current 2 amplitude	0.0% ~ 300.0% (motor rated current)	0.0%	<input type="radio"/>
F8-42	Timing function selection	0: Invalid 1: Valid	0	<input type="radio"/>
F8-43	Timing running duration source selection	0: F8-44 1: VI Analog input scale corresponds to F8-44	0	<input type="radio"/>
F8-44	Timing running duration	0.0Min ~ 6500.0Min	0.0Min	<input type="radio"/>
F8-45	VI input voltage protection lower limit	0.00V ~ F8-46	3.10V	<input type="radio"/>
F8-46	VI input voltage protection upper limit	F8-45 ~ 10.00V	6.80V	<input type="radio"/>
F8-47	Module temperature arrival	0°C ~ 100°C	75°C	<input type="radio"/>
F8-48	Cooling fan control	0: Start the cooling fan while start the frequency inverter 1: Start the cooling fan while switch on the power supply	0	<input type="radio"/>
F8-49	Wake up frequency	F8-51 (Dormancy frequency) ~ F0-10 (max. frequency)	0.00 Hz	<input type="radio"/>
F8-50	Wake up delay time	0.0s ~ 6500.0s	0.0s	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
F8-51	Dormancy frequency	0.00Hz ~ F8-49 (Wake up frequency)	0.00 Hz	<input type="radio"/>
F8-52	Dormancy delay time	0.0s ~ 6500.0s	0.0s	<input type="radio"/>
F8-53	Running arrival time setting	0.0Min ~ 6500.0Min	0.0Min	<input type="radio"/>
F9 Group: PID Function				
F9-00	PID given source	0: F9-01 1: VI 2: Reserved 3: Reserved 4: Reserved 5: Communication 6: Multi-step command	0	<input type="radio"/>
F9-01	PID given through keypad	0.0%~100% (percentage of sensor measure range)	50.0%	<input type="radio"/>
F9-02	PID feedback source	0: VI 1~4: Reserved 5: Communication 6~8: Reserved	0	<input type="radio"/>
F9-03	PID action direction	0: Positive 1: Negative	0	<input type="radio"/>
F9-04	PID given feedback range	0~65535	1000	<input type="radio"/>
F9-05	Proportional gain Kp1	0.0 ~ 100.0	20.0	<input type="radio"/>
F9-06	Integration time Ti1	0.01s ~ 10.00s	2.00s	<input type="radio"/>
F9-07	Differential time Td1	0.000s ~ 10.000s	0.000s	<input type="radio"/>
F9-08	Cutoff frequency of PID reverse	0.00 ~ F0-10 (maximum frequency)	0.00 Hz	<input type="radio"/>
F9-09	PID deviation	0.0% ~ 100.0%	0.0%	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
	limit			
F9-10	PID differential amplitude	0.00% ~ 100.00%	0.10%	○
F9-11	PID given filter time	0.00 ~ 650.00s	0.00s	○
F9-12	PID feedback filter time	0.00 ~ 60.00s	0.00s	○
F9-13	PID output filter time	0.00 ~ 60.00s	0.00s	○
F9-14	Reserved			
F9-15	Proportional gain Kp2	0.0 ~ 100.0	20.0	○
F9-16	Integration time Ti2	0.01s ~ 10.00s	2.00s	○
F9-17	Differential time Td2	0.000s ~ 10.000s	0.000s	○
F9-18	PID parameter switching condition	0: No switching 1: Switching via MIn terminals 2: Automatic switching according to the deviation	0	○
F9-19	PID parameter switching deviation 1	0.0% ~F9-20	20.0%	○
F9-20	PID parameter switching deviation 2	F9-19 ~ 100.0%	80.0%	○
F9-21	PID initial value	0.0% ~ 100.0%	0.0%	○
F9-22	PID initial value holding time	0.00 ~ 650.00s	0.00s	○
F9-23	Forward maximum value between two output deviation	0.00% ~ 100.00%	1.00%	○

Code	Name	Detailed instruction	Default	Modify
F9-24	Reverse maximum value between two output deviation	0.00% ~ 100.00%	1.00%	<input type="radio"/>
F9-25	PID integration attribute	Units place: Integration separate 0: Invalid 1: Valid Tens place: Stop integrating or not after output reach limit 0: Keep integrating 1: Stop integrating	00	<input type="radio"/>
F9-26	PID feedback lost detection value	0.0%: No judgment for feedback lost 0.1% ~ 100.0%	0.0%	<input type="radio"/>
F9-27	PID feedback lost detection time	0.0s ~ 20.0s	0.0s	<input type="radio"/>
F9-28	PID stop calculation	0: No calculation when stop 1: Calculation when stop	0	<input type="radio"/>
FA Group: Fault and Protection				
FA-00	Motor overload protection selection	0: Disable 1: Enable	1	<input type="radio"/>
FA-01	Motor overload protection gain	0.20 ~ 10.00	1.00	<input type="radio"/>
FA-02	Motor overload pre-alarm coefficient	50% ~ 100%	80%	<input type="radio"/>
FA-03	Stall over-voltage gain	0 ~ 100	20	<input type="radio"/>
FA-04	Stall over-voltage	120% ~ 150%	135%	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
	point / Braking threshold			
FA-05	Stall over current gain	0 ~ 100	20	○
FA-06	Stall over-current point	100% ~ 200%	170%	○
FA-07	Short-circuit to ground protection selection when power-on	0: Invalid 1: Valid	1	○
FA-08	Over current restrain function	0: Disable 1: Enable	0	○
FA-09	Fault auto-reset times	0 ~ 20	0	○
FA-10	Relay output selection during fault auto-reset	0: No action 1: Action	0	○
FA-11	Fault auto-reset interval	0.1s ~ 100.0s	1.0s	○
FA-12	Reserved			
FA-13	Output phase failure protection selection	0: Disable 1: Enable	1	○
FA-14	The first fault type	0: No fault 1: Reserved	—	●
FA-15	The second fault type	2: Acc over current 3: Dec over current	—	●
FA-16	The third (latest) fault type	4: Over current in constant speed 5: Over voltage in Acc process	—	●

Code	Name	Detailed instruction	Default	Modify
		6: Over voltage in Dec process 7: Over voltage in constant speed 8: Buffer resistor overload 9: Under voltage 10: Inverter overload 11: Motor overload 12: Input side phase failure 13: Output side phase failure 14: IGBT Module overheat 15: External fault 16: Communication fault 17: Contactor fault 1 8: Current detection fault 19: Reserved 20: Reserved 21: Parameter R/W fault 2 2: Inverter hardware fault 23: Motor short circuit to ground fault 24: Reserved 25: Reserved 26: Running time arrival 27: Reserved 28: Reserved 29: Power-on time arrival 30: Off load 31: PID feedback lost when running 40: Fast current limiting		

Code	Name	Detailed instruction	Default	Modify
		over time 41: Switch the motor during running 42 ~ 51: Reserved		
FA-17	Frequency at the third (latest) fault	—	—	●
FA-18	Current at the third (latest) fault	—	—	●
FA-19	Bus voltage at the third (latest) fault	—	—	●
FA-20	Input terminal's status at the third (latest) fault	—	—	●
FA-21	Output terminal's status at the third (latest) fault	—	—	●
FA-22	Inverter status at the third (latest) fault	—	—	●
FA-23	Power-on time at the third (latest) fault	—	—	●
FA-24	Running time at the third (latest) fault	—	—	●
FA -25 ~ FA-26	Reserved			
FA-27	Frequency at the second fault	—	—	●

Code	Name	Detailed instruction	Default	Modify
FA-28	Current at the second fault	—	—	●
FA-29	Bus voltage at the second fault	—	—	●
FA-30	Input terminal's status at the second fault	—	—	●
FA-31	Output terminal's status at the second fault	—	—	●
FA-32	Inverter status at the second fault	—	—	●
FA-33	Power-on time at the second fault	—	—	●
FA-34	Running time at the second fault	—	—	●
FA -35 ~ FA-36	Reserved			
FA-37	Frequency at the first fault	—	—	●
FA-38	Current at the first fault	—	—	●
FA-39	DC bus voltage at the first fault	—	—	●
FA-40	Input terminal's status at the first fault	—	—	●
FA-41	Output terminal's status at the first fault	—	—	●

Code	Name	Detailed instruction	Default	Modify
FA-42	Inverter status at the first fault	—	—	●
FA-43	Power-on time at the first fault	—	—	●
FA-44	Running time at the first fault	—	—	●
FA-45 ~ FA-70	Reserved			
FB Group: Wobble Frequency, Fixed Length, Counting				
FB-00	Wobble frequency setting mode	0: Relative to center frequency 1: Relative to maximum frequency	0	○
FB-01	Wobble frequency amplitude	0.0% ~ 100.0%	0.0%	○
FB-02	Sudden Jump frequency amplitude	0.0% ~ 50.0%	0.0%	○
FB-03	Wobble frequency cycle	0.1s ~ 3000.0s	10.0s	○
FB-04	Triangular wave rise time coefficient	0.1% ~ 100.0%	50.0%	○
FB-05	Setting length	0m ~ 65535m	1000m	○
FB-06	Actual length	0m ~ 65535m	0m	○
FB-07	Number of pulses per meter	0.0 ~ 6553.5	100.0	○
FB-08	Setting count value	1 ~ 65535	1000	○
FB-09	Designated count value	1 ~ 65535	1000	○

Code	Name	Detailed instruction	Default	Modify
FC Group: Communication Parameters				
FC-00	Baud rate	0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	5	<input type="radio"/>
FC-01	Data format	0: No parity check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No parity check (8-N-1)	0	<input type="radio"/>
FC-02	Inverter address	1 ~ 249, 0 is broadcast address	1	<input type="radio"/>
FC-03	Communication delay time	0ms ~ 20ms	2ms	<input type="radio"/>
FC-04	Communication timeout time	0.0 (invalid) 0.1s ~ 60.0s	0.0	<input type="radio"/>
FC-05	Communication protocol selection	Modbus 0: Non-standard MODBUS protocol 1: Standard MODBUS protocol	1	<input type="radio"/>
FC-06	Communication read current resolution	0: 0.01A 1: 0.1A	0	<input type="radio"/>
FD Group: Multi-step Command and Simple PLC				
FD-00	Multi-step speed 0	-100.0% ~ 100.0%	0.0%	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
FD-01	Multi-step speed 1	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-02	Multi-step speed 2	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-03	Multi-step speed 3	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-04	Multi-step speed 4	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-05	Multi-step speed 5	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-06	Multi-step speed 6	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-07	Multi-step speed 7	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-08	Multi-step speed 8	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-09	Multi-step speed 9	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-10	Multi-step speed 10	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-11	Multi-step speed 11	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-12	Multi-step speed 12	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-13	Multi-step speed 13	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-14	Multi-step speed 14	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-15	Multi-step speed 15	-100.0% ~ 100.0%	0.0%	<input type="radio"/>
FD-16	Simple PLC running mode	0: Stop after one cycle 1: Keep last frequency after one cycle 2: Circular running	0	<input type="radio"/>
FD-17	Simple PLC status memory	Units place: Memory selection when	00	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
	selection	power-off 0: Not memory 1: Memory Tens place: Memory selection when stop 0: Not memory 1: Memory		
FD-18	0 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-19	0 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-20	1 st step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-21	1 st step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-22	2 nd step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-23	2 nd step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-24	3 rd step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-25	3 rd step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-26	4 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-27	4 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-28	5 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
FD-29	5 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-30	6 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-31	6 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-32	7 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-33	7 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-34	8 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-35	8 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-36	9 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-37	9 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-38	10 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-39	10 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-40	11 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-41	11 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-42	12 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
FD-43	12 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-44	13 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-45	13 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-46	14 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-47	14 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-48	15 th step running time	0.0s (h) ~ 6500.0s (h)	0.0 s (h)	<input type="radio"/>
FD-49	15 th step ACC/DEC time selection	0 ~ 3	0	<input type="radio"/>
FD-50	Timing unit (Simple PLC mode)	0: s (second) 1: h (hour)	0	<input type="radio"/>
FD-51	Multi-step speed 0 given channel	0: FD-00 1: VI 2: Reserved 3: Keypad potentiometer 4: Reserved 5: PID control 6: Keypad setting frequency (F0-08), can be modified via UP/DN	0	<input type="radio"/>
FD-52	Multi-step speed 3 given channel	0: FD-00 1: VI 2: Reserved 3: Keypad potentiometer 4: Reserved 5: PID control	0	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
		6: Keypad setting frequency (F0-08), can be modified via UP/DN		
FD-53	Multi-step speed 6 given channel	0: FD-00 1: VI 2: Reserved 3: Keypad potentiometer 4: Reserved 5: PID control 6: Keypad setting frequency (F0-08), can be modified via UP/DN	0	<input type="radio"/>
FD-54	Multi-step speed 9 given channel	0: FD-00 1: VI 2: Reserved 3: Keypad potentiometer 4: Reserved 5: PID control 6: Keypad setting frequency (F0-08), can be modified via UP/DN	0	<input type="radio"/>
FD-55	Multi-step speed 12 given channel	0: FD-00 1: VI 2: Reserved 3: Keypad potentiometer 4: Reserved 5: PID control 6: Keypad setting frequency (F0-08), can be modified via UP/DN	0	<input type="radio"/>
FE Group: Torque Control & Optimized Parameters				
FE-00 ~ FE-14	Reserved			
FE-15	DPWM switching upper	0.00Hz ~ 15.00Hz	12.00 Hz	<input type="radio"/>

Code	Name	Detailed instruction	Default	Modify
	limit frequency			
FE-16	PWM regulation mode	0: Asynchronous mode 1: Synchronous mode	0	<input type="radio"/>
FE-17	Dead zone compensation mode selection	0: no compensation 1: compensation mode 1 2: compensation mode 2	1	<input type="radio"/>
FE-18	Depth of random PWM	0: Random PWM invalid 1~10: depth of random PWM	0	<input type="radio"/>
FE-19	Fast current limitation enable	0: Disable 1: Enable	1	<input type="radio"/>
FE-20	Current detection compensation	0~100	5	<input type="radio"/>
FE-21	Reserved			
FE-22	Under voltage level setting	60% ~ 140%	80%	<input type="radio"/>

6.2 Monitoring Parameter Table (U0 group)

Function code	Name	Minimum unit
U0-00	Running frequency (Hz)	0.01Hz
U0-01	Setting frequency (Hz)	0.01Hz
U0-02	DC bus voltage (V)	0.1V
U0-03	Output voltage (V)	1V
U0-04	Output current (A)	0.01A
U0-05	Output power (kW)	0.1kW
U0-06	Output torque (%)	0.10%

Function code	Name	Minimum unit
U0-07	MI input status	1
U0-08	Relay output status	1
U0-09	VI voltage (V)	0.01V
U0-10~ U0-11	Reserved	
U0-12	Count value	1
U0-13	Length value	1
U0-14	Load speed	1
U0-15	PID setting	1
U0-16	PID feedback	1
U0-17	PLC step	1
U0-18~ U0-19	Reserved	
U0-20	Remain running time	0.1Min
U0-21	VI voltage before calibration	0.001V
U0-22~U0-24	Reserved	
U0-25	Current power-on time	1Min
U0-26	Current running time	0.1Min
U0-27	Reserved	
U0-28	Communication setting value	0.01%
U0-29	Reserved	
U0-30	Main frequency A display	0.01Hz
U0-31	Auxiliary frequency B display	0.01Hz

Chapter 7 Trouble Shooting

7.1 Fault and Trouble Shooting

Fault Name	Converter short circuit protection
Fault Code	Err01
Reason	<ol style="list-style-type: none">1. Short-circuit or ground fault occurred at inverter output side2. The cable connecting the motor with the inverter is too long3. The module is over-heat4. The cable connections inside the inverter are loosen5. The control board is abnormal6. The power board is abnormal
Solution	<ol style="list-style-type: none">1. Inspect whether motor damaged, insulation worn or cable damaged2. Install a reactor or output filter3. Check if the air duct is blocked and if the fan is in normal status, and resolve the existing problems4. Make sure the cables are connected well5, 6, 7. Ask for technical support

Fault Name	Over current when acceleration
Fault Code	Err02
Reason	<ol style="list-style-type: none">1. Short-circuit or ground fault occurred at inverter output side2. The acceleration time is too short3. The manual torque boost or V/f curve is not proper4. The voltage is too low5. Start the running motor6. Load is added suddenly during the acceleration7. Power selection of inverter is too small

Solution	<ol style="list-style-type: none"> 1. Inspect whether motor damaged, insulation worn or cable damaged 2. Increase the acceleration time 3. Adjust the manual torque boost or V/F curve 4. Make the voltage in the normal range 5. Select speed tracking start or start the motor till it stops 6. Cancel the sudden added load 7. Select bigger power inverter
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Fault Name	Over-current when deceleration
Fault Code	Err03
Reason	<ol style="list-style-type: none"> 1. Short-circuit or ground fault occurred at inverter output side 2. The deceleration time is too short 3. The voltage is too low 4. Load is added suddenly during the deceleration 5. Have not installed braking unit and braking resistor
Solution	<ol style="list-style-type: none"> 1. Inspect whether motor damaged, insulation worn or cable damaged 2. Increase the deceleration time 3. Make the voltage in the normal range 4. Cancel the sudden added load 5. Install braking unit and braking resistor

Fault Name	Over-current when constant speed running
Fault Code	Err04
Reason	<ol style="list-style-type: none"> 1. Short-circuit or ground fault occurred at inverter output 2. The voltage is too low 3. Load is added suddenly during running 4. Power selection of inverter is too small
Solution	<ol style="list-style-type: none"> 1. Inspect whether motor damaged, insulation worn or cable damaged 2. Make the voltage in the normal range 3. Cancel the sudden added load 4. Select bigger power inverter

Fault Name	Over-voltage when acceleration
Fault Code	Err05
Reason	<ol style="list-style-type: none"> 1. The input voltage is too high 2. There is external force driving the motor to run during acceleration 3. The acceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	<ol style="list-style-type: none"> 1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the acceleration time 4. Install braking unit and braking resistor

Fault Name	Over-voltage when deceleration
Fault Code	Err06
Reason	<ol style="list-style-type: none"> 1. The input voltage is too high 2. There is external force driving the motor to run during deceleration 3. The deceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	<ol style="list-style-type: none"> 1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the deceleration time 4. Install braking unit and braking resistor

Fault Name	Over-voltage when constant speed running
Fault Code	Err07
Reason	<ol style="list-style-type: none"> 1. The input voltage is too high 2. There is external force driving the motor to run during the inverter running
Solution	<ol style="list-style-type: none"> 1. Make the voltage in the normal range 2. Cancel the external force or install braking resistor

Fault Name	Power-supply fault
Fault Code	Err08
Reason	<ol style="list-style-type: none"> 1. The input voltage is out of range
Solution	<ol style="list-style-type: none"> 1. Make the voltage in the normal range

Fault Name	Under-voltage
Fault Code	Err09
Reason	<ol style="list-style-type: none"> 1. Instantaneous power-off 2. The input voltage is out of range 3. DC Bus voltage is abnormal 4. The rectifier bridge and buffer resistor are abnormal 5. The power board is abnormal 6. The control board is abnormal
Solution	<ol style="list-style-type: none"> 1. Fault Reset 2, 3. Make the voltage in the normal range 4, 5, 6. ask for technical support

Fault Name	Inverter over load
Fault Code	Err10
Reason	<ol style="list-style-type: none"> 1. The load is too heavy or motor blockage occurs 2. Power selection of inverter is too small
Solution	<ol style="list-style-type: none"> 1. Reduce the load, check the status of motor & machinery 2. Select bigger power inverter

Fault Name	Motor over load
Fault Code	Err11
Reason	<ol style="list-style-type: none"> 1. FA-00 and PA-01 is set improperly 2. The load is too heavy or motor blockage occurs 3. Power selection of inverter is too small
Solution	<ol style="list-style-type: none"> 1. Set FA-00 and PA-01 properly 2. Reduce the load, check the status of motor & machinery 3. Select bigger power inverter

Fault Name	Output phase failure
Fault Code	Err13F
Reason	<ol style="list-style-type: none"> 1. The connection between inverter and motor is abnormal 2. Output voltage unbalance during the motor running 3. The power board is abnormal 4. The IGBT module is abnormal
Solution	<ol style="list-style-type: none"> 1. Inspect whether motor damaged, insulation worn or cable damaged 2. Make sure the motor three phase winding is normal 3, 4. Ask for technical support

Fault Name	IGBT module over-heat
Fault Code	Err14
Reason	<ol style="list-style-type: none"> 1. Ambient temperature is too high 2. Air duct is blocked 3. Cooling fans are broken 4. Thermal resistor(temperature sensor) of the module is broken 5. IGBT module is broken
Solution	<ol style="list-style-type: none"> 1. Reduce the ambient temperature 2. Clear the air duct 3. Replace cooling fans 4, 5. Ask for technical support

Fault Name	External device fault
Fault Code	Err15
Reason	MI terminal receives an external fault signal generated by peripheral device
Solution	Find out the fault source, solve it and reset the inverter

Fault Name	Communication fault
Fault Code	Err16
Reason	<ol style="list-style-type: none"> 1. Master computer works abnormal 2. Communication cable is abnormal 3. FC group parameters are set improperly
Solution	<ol style="list-style-type: none"> 1. Check the connection of master computer 2. Check the communication connection 3. Set FC group parameters properly

Fault Name	DC contactor fault
Fault Code	Err17
Reason	<ol style="list-style-type: none"> 1. Power board or power supply board are abnormal 2. DC contactor is abnormal
Solution	<ol style="list-style-type: none"> 1. Replace power board or power supply board 2. Replace DC contactor

Fault Name	Current detection fault
Fault Code	Err18
Reason	<ol style="list-style-type: none"> 1. Hall sensor is abnormal 2. The power board is abnormal
Solution	<ol style="list-style-type: none"> 1. Check hall sensor and connection 2. Replace the power board

Fault Name	EEPROM read/write fault
Fault Code	Err21
Reason	1. EEPROM chip is broken
Solution	1. Replace the control board

Fault Name	Inverter hardware fault
Fault Code	Err22
Reason	1. Over voltage 2. Over current
Solution	1. Handle as over voltage fault 2. Handle as over current fault

Fault Name	Motor short-circuit to ground
Fault Code	Err23
Reason	1. The motor is short-circuit to ground
Solution	1. Replace cables or motor

Fault Name	Accumulated running time arrival
Fault Code	Err26
Reason	1. The accumulated running time reaches the setting value
Solution	1. Clear the record information via parameter initialization function

Fault Name	Accumulated power-on time arrival
Fault Code	Err29
Reason	1. The accumulated power-on time reaches the setting value
Solution	1. Clear the record information via parameter initialization function

Fault Name	Off-load fault
Fault Code	Err30
Reason	1. The inverter running current is smaller than FA-64
Solution	1. Confirm if the load breaks away and FA-64 & FA-65 are set properly

Fault Name	PID feedback lost when running
Fault Code	Err31
Reason	1. PID feedback is smaller than F9-26
Solution	1. Check PID feedback signal or set F9-26 properly

Fault Name	Current-limiting fault
Fault Code	Err40
Reason	1. Whether the load is heavy or the motor is blocked 2. Power selection of inverter is too small.
Solution	1. Reduce the load and detect the motor & machinery condition 2. Select bigger power inverter

7.2 Common Faults and Solutions

Fault	Reason	Solution
<p>No display when power-on</p>	<ol style="list-style-type: none"> 1, The input voltage is 0 or too low. 2, The switching power supply on the drive board is broken. 3, Rectifier bridge is broken. 4, Buffer resistors are broken. 5, The control board or keypad is broken. 6, Cables are loose connection 	<ol style="list-style-type: none"> 1, Check the input power-supply. 2, Check the DC bus voltage 3, Reconnect the cables 4, Ask for technical support
<p>Display HC when power-on</p>	<ol style="list-style-type: none"> 1, Loose connection of the control board and power board. 2, Control board is broken. 3, Motor or motor cables short-circuited with ground. 4, Hall sensor is broken. 5, Input voltage is too low 	<ol style="list-style-type: none"> 1, Check the mentioned reasons one by one. 2, Ask for technical support
<p>Display HC when starting the inverter, and inverter stops immediately</p>	<ol style="list-style-type: none"> 1, Fans are broken or air duct is blocked. 2, The control cables are short-circuited. 	<ol style="list-style-type: none"> 1, Measure the insulation of control cables with magneto-ohmmeter. 2, Ask for technical support

<p>Err23 is displayed when power-on</p>	<ol style="list-style-type: none"> 1, The motor or the output line is short-circuited to the ground. 2, The inverter is damaged. 	<ol style="list-style-type: none"> 1, Measure the insulation of the motor and output line with magneto-ohmmeter. 2, Ask for technical support
<p>Err14 happens frequently</p>	<ol style="list-style-type: none"> 1, Carrier frequency setting is too high. 2, Fans are broken or air duct is blocked. 3, The inverter inside components is broken (such as thermocouple). 	<ol style="list-style-type: none"> 1, Reduce the carrier frequency (F0-15). 2, Replace fans, clear the air duct. 3, Ask for technical support
<p>Motor does not run after starting the inverter</p>	<ol style="list-style-type: none"> 1, Motor and motor cables are abnormal. 2, The inverter parameters are set improperly (motor parameters). 3, The connection of the cables of the driver board and control board are not good. 4, The driver board is broken 	<ol style="list-style-type: none"> 1, Make sure the connection of the inverter and motor is very well. 2, Replace the motor or clear the mechanical failure. 3, Check & reset the motor parameters. 4, Ask for technical support.
<p>Digital input (MIX) terminal is invalid</p>	<ol style="list-style-type: none"> 1, The parameter is set improperly. 2, The external signal is wrong. 3, The control board is broken. 	<ol style="list-style-type: none"> 1, Check & reset F5 group parameters. 2, Reconnect the external signal cable. 3, Ask for technical support.

<p>Over voltage and over current fault happens frequently</p>	<p>1, Motor parameters are set improperly. 2, The ACC/DEC time is improper. 3, The load has big fluctuation.</p>	<p>1, Reset motor parameters. 2, Set proper ACC/DEC time. 3, check the load condition.</p>
<p>Power on display 8.8.8.8.8</p>	<p>1, The control board is broken. 2, Loose connection of control board and power board.</p>	<p>1, Replace the control board. 2, Reconnect the cable between control board and power board</p>

Chapter 9 MODBUS Communication Protocol

KD100M series inverter provides RS485 communication interface, and adopts MODBUS communication protocol. User can realize centralized monitoring through PC/PLC, host computer, and also can set inverter's operating commands, modify or read function parameters, read operating status and fault information, etc.

9.1 About Protocol

This serial communication protocol defines the transmission information and use format in the series communication. It includes the formats of master-polling, broadcast and slave response frame, and master coding method with the content including slave address (or broadcast address), command, transmitting data and error checking. The response of slave adopts the same structure, including action confirmation, returning the data and error checking etc. If slave takes place the error while it is receiving the information or cannot finish the action demanded by master, it will send one fault signal to master as a response.

9.2 Application Method

The inverter could be connected into a "Single-master & Multi-slaves" PC/PLC control network with RS485 bus.

9.3 Bus Structure

(1) Interface mode

RS485

(2) Transmission mode

There provide asynchronous series and half-duplex transmission mode.

At the same time, just one can send the data and the other only receives the data between master and slave. In the series asynchronous communication, the data is sent out frame by frame in the form of message.

(3) Topological structure

In Single-master Multi-slave system, the setup range of slave address is 0 to 247. 0 refers to broadcast communication address. The address of slave must be exclusive in the network. That is basic condition of MODBUS communication.

9.4 Protocol Description

KD100M series inverter communication protocol is a kind of asynchronous serial master-slave communication protocol. In the network, only one equipment (master) can build a protocol (Named as "Inquiry/Command"). Other equipment (slave) response "Inquiry/Command" of master only by providing the data, or doing the action according to the master's "Inquiry/Command". Here, master is Personnel Computer, Industrial control equipment or Programmable logical controller, and the slave is inverter or other communication equipment with the same communication protocol. Master not only can visit some slave separately for communication, but also sends the broadcast information to all the slaves. For the single "Inquiry/Command" of master, all of slaves will return a signal that is a response; for the broadcast information provided by master, slave needs not feedback a response to master.

9.5 Communication Data Structure

MODBUS protocol communication data format of KD100 & KD200 series inverters are shown as below:

In RTU mode, the Modbus minimum idle time between frames should be no less than 3.5 bytes. The checksum adopts CRC-16 method. All data except

checksum itself sent will be counted into the calculation. Please refer to section: CRC Check for more information. Note that at least 3.5 bytes of Modbus idle time should be kept and the start and end idle time need not be summed up to it.

The entire message frame must be transmitted as a continuous data stream. If a idle time is more than 1.5 bytes before completion of the frame, the receiving device flushes the incomplete message and assumes that the next byte will be the address field of a new message. Similarly, if a new message begins earlier than 3.5 bytes interval following a previous message, the receiving device will consider it as a continuation of the previous message. Because of the frame's confusion, at last the CRC value is incorrect and communication fault will occur.

RTU frame format:

START	Transmission time of 3.5 bytes
Slave Address	Communication address : 0 to 249
Command Code	03H: Read slave parameters 06H: Write slave parameters
DATA (N-1)	Data: Function code parameter address, the number of function code parameter, Function code parameter, etc.
DATA (N-2)	
.....	
DATA 0	
CRC Low byte	Detection Value: CRC value
CRC High byte	
END	Transmission time of 3.5 bytes

9.6 Command Code and Communication Data Description

9.6.1 Command code: 03H, reads N words. (There are 12 characters can be read at the most.)

For example: The inverter start address F002 of the slave 01 continuously reads two consecutive values.

Master command information

Address	01H
Command Code	03H
Start Address High byte	F0H
Start Address Low byte	02H
Register Number High byte	00H
Register Number Low byte	02H
CRC Low byte	56H
CRC High byte	CBH

Slave responding information

Address	01H
Command Code	03H
Byte Number	04H
Data F002H High byte	00H
Data F002H Low byte	00H
Data F003H High byte	00H
Data F003H Low byte	01H

CRC Low byte	3BH
CRC High byte	F3H

9.6.2 Command code: 06H, write a word

For example: Write 5000(1388H) into address F00AH, slave address 02H.

Master command information

Address	02H
Command Code	06H
Data Address High byte	F0H
Data Address Low byte	0AH
Data Content High byte	13H
Data Content Low byte	88H
CRC Low byte	97H
CRC High byte	ADH

Slave responding information

Address	02H
Command Code	06H
Data Address High byte	F0H
Data Address Low byte	0AH
Data Content High byte	13H
Data Content Low byte	88H
CRC Low byte	97H
CRC High byte	ADH

9.6.3 CRC checking

In RTU mode, messages include an error-checking field that is based on a CRC method. The CRC field checks the contents of the entire message. The CRC field is two bytes, containing a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value received in the CRC field. If the two values are not equal, an error results.

The CRC is started by 0xFFFF. Then a process begins of applying successive eight-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

During generation of the CRC, each eight-bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low byte is appended first, followed by the high byte. The following are C language source code for CRC-16.

```
unsigned int crc_cal_value(unsigned char *data_value, unsigned char
data_length)
{
```

```

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

```

9.6.4 Address definition of communication parameter

Here is about address definition of communication parameter. It's used to control the inverter operation, status and related parameter setting.

The mark rules of function code parameters address:

The group number and mark of function code is the parameter address for indicating the rules.

(1) F0~FF group parameter address:

High byte: F0 ~ FF(F group),

Low byte: 00 to FF

(2) U0 group parameter address:

High byte: 70H,

Low byte: 00 to FF

For example:

F3-12, address indicates to 0xF30C

FC-05, address indicates to 0xFC05

U0-03, address indicates to 0x7003

Note:

1. Group FF: Either the parameter cannot be read, nor be changed.
2. Group U0: Only for reading parameter, cannot be changed parameters.
3. Some parameters cannot be changed during operation; some parameters regardless of what kind of status the inverter in, the parameters cannot be changed. Change the function code parameters, pay attention to the scope of the parameters, units, and relative instructions.

Besides, due to EEPROM be frequently stored, it will reduce the lifetime of EEPROM. So in the communication mode, some function codes needn't be stored, only change the RAM value.

For F group parameters, to achieve this function, just change high bit F of the function code into 0..

Corresponding function code addresses are indicated below:

(1) F0~FF group parameter address:

High byte: 00 to FF,

Low byte: 00 to FF

(2) U0 group parameter address:

High byte: 70H,

Low byte: 00 to FF

For example:

F3-12, address indicates to 030C

FC-05, address indicates to 0C05

These addresses can only act writing RAM, it cannot act reading. When act reading, it is an invalid address.

(2) Stop/start parameter address

Parameter Address	Parameter Description
1000H	* Communication setting value (-10000 to 10000) (Decimal)
1001H	Running frequency
1002H	Bus voltage
1003H	Output voltage
1004H	Output current
1005H	Output power
1006H	Output torque
1007H	Running speed
1008H	MI input status
1009H	FM, AM output status
100AH	VI voltage
100BH	Reserved
100CH	Reserved
100DH	Counting value input
100EH	Length value input
100FH	Load speed
1010H	PID setting

Parameter Address	Parameter Description
1011H	PID feedback
1012H	Simple PLC running step
1013H	Reserved
1014H	Feedback speed, unit is 0.1Hz
1015H	Remain running time
1016H	VI voltage before calibration
1017H	Reserved
1018H	Reserved
1019H	Linear speed
101AH	Current power on time
101BH	Current running time
101CH	Reserved
101DH	Communication setting value
101EH	Actual feedback speed
101FH	Main frequency A display
1020H	Auxiliary frequency B display

Note:

Communication setting value is the percentage of relative value, and 10,000 corresponds to 100.00%, -10000 corresponds to -100.00%.

To the data of frequency, the percentage is the percentage of relative maximum frequency (F0-10).

To the data of torque, the percentage is F2-10 (torque upper limit).

(3) Control command input to inverter (write only)

Command Word Address	Command Function
2000H	0001: Forward running
	0002: Reverse running
	0003: Forward jog
	0004: Reverse jog
	0005: Coast to stop
	0006: Deceleration to stop
	0007: Fault reset

(4) Read inverter status: (read only)

Status Word Address	Status Word Function
3000H	0001: Forward running
	0002: Reverse running
	0003: Stop

(5) Parameters locking password check: (If the return is 8888H, it means the password check passes.)

Password Address	Content of Input password
1F00H	*****

(6) Digital output terminal control: (write only)

Command Address	Command Content
2001H	BIT0: MO1 output control

	BIT1: MO2 output control
	BIT2: RELAY1 output control
	BIT3: RELAY2 output control
	BIT4 ~ BIT9: Reserved

(7) Analog output AM control: (write only)

Command Address	Command Content
2002H	0~7FFF refers to 0%~100%

(8) Analog output FM control: (write only)

Command Address	Command Content
2003H	0~7FFF refers to 0%~100%

(9) Pulse output control: (write only)

Command Address	Command Content
2004H	0~7FFF refers to 0% ~100%

(10) Inverter fault code description:

Inverter Fault Address	Inverter Fault Information
8000H	0000: No fault
	0001: Reserved
	0002: Over current when acceleration
	0003: Over current when deceleration
	0004: Over current when constant speed running

0005: Over voltage when acceleration
0006: Over voltage when deceleration
0007: Over voltage when constant speed running
0008: Buffer resistor overload
0009: Under voltage fault
000A: Inverter overload
000B: Motor overload
000C: Reserved
000D: Output phase failure
000E: Module overheat
000F: External fault
0010: Communication fault
0011: Contactor fault
0012: Current detection fault
0013: Reserved
0014: Reserved
0015: Parameter R/W fault
0016: Inverter hardware fault
0017: Motor short circuit to ground
0018: Reserved
0019: Reserved
001A: Running time arrival
001B: Customized fault 1

	001C: Customized fault 2
	001D: Power on time arrival
	001E: Off load
	001F: PID feedback lost when running
	0028: Fast current limiting over time fault
	0029: Reserved
	002A: Speed deviation oversize
	002B: Motor over speed

9.7 FC Group Communication Parameter Description

	Baud Rate	Factory Setting	5
FC-00	Setting range	0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	

This parameter is used to set the data transmission rate between host computer and the inverter. Please note that baud rate of the host computer and inverter must be the same. Otherwise, the communication is impossible. The bigger baud rate is, the faster communication is.

FC-01	Data Format	Factory Setting	0
	Setting range	0: No check: Data format <8-N-2> 1: Even parity Check :data format <8-E-1> 2: Odd Parity Check : data format <8-O-1> 3: No check: Data format <8-N-1>	

The setting data format of host computer and inverter must be the same; otherwise, the communication is impossible.

FC-02	Local Address	Factory Setting	1
	Setting range	1~249, 0 is broadcast address	

When the local address is set to be 0, that is broadcast address, it can realize the broadcast function of host computer.

Local address must be unique (except broadcast address). This is the base of point-to-point communication between host computer and inverter.

FC-03	Response Delay	Factory Setting	2ms
	Setting range	0~20ms	

Response delay: It refers to the interval time from the inverter finishes receiving data to sending data to the host computer. If the response delay is less than system processing time, then the response delay is based on the system processing time. If the response delay is more than system processing time, after the system processing the data, it should be delayed to wait until the response delay time arrives, then sending data to host computer.

FC-04	Communication Timeout	Factory Setting	0.0s
	Setting range	0.0s (invalid) 0.1~60.0s	

When the function code set to be 0.0 s, the communication timeout parameter is invalid.

When the function code set to be valid value, if the interval time between the communication and the next communication is beyond the communication timeout, the system will report communication failure error (Err16). At normal circumstances, it is set to be invalid. If in the continuous communication system, set the parameter, you can monitor the communication status.

FC-05	Communication Protocol selection	Factory Setting	1
	Setting range	Modbus 0: Nonstandard Modbus protocol 1: Standard Modbus protocol	

FC-05=1: Select standard MODBUS protocol

FC-05=0: When reading the command, the slave return is one byte than the standard MODBUS protocol's, for details refer to communications Data Structure of this protocol.

FC-06	Communication Read Current Resolution	Factory Setting	0
	Setting range	0: 0.01A 1: 0.1A	

It is used to confirm the output current unit when communication reads output current.