SPARK SOLUTION

Outstanding quality makes outstanding achievements

Economic Variable frequency drive VFD

User manual

Model : PS-2

Preface

Thank you for purchasing our frequency VFD.

This manual describes how to use VFD properly. Please read it carefully before installation, operation, maintenance and inspection. Besides, please use the product after understanding the safety precautions.

Precautions
● In order to describe the product's details, the drawings presented in this instruction are sometimes shown without covers or protective guards. When using the product, please make sure to install the cover or protective guard as specified firstly, and operate the products in accordance with the instructions. ● Since the drawings in this manual are represented examples, some are subject to differ from delivered products. ● This manual may be modified when necessary because of improvement of the product, modification or changes in specifications. Such modifications are denoted by a revised manual No. ● If you want to order the manual due to loss or damage, please contact our company agents in each region or our company customer service center directly. ● If there is still any problem during using the products, please contact our company customer service center directly.

Chapter 1 Product Information

1.1 Product Inspection

Checking the following items when receiving the VFD

Confirmation Items	Method
Confirm if the VFD is what you ordered	Check name plate
Damaged or not	Inspect the entire exterior of the VFD 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 VFD.

1.2 Selection Guide

Power of VFD (kW)	Suitable motor		Rated Input Current (A)	Rated Output Current (A)
	kW	HP		
1AC 220V ±15%				
0.4	0.4	0.5	5.4	2.3
0.75	0.75	1	8.2	4
1.5	1.5	2	14	7
2.2	2.2	3	24	9.6
3AC 380V±15%				
0.75	0.75	1	3.4	2.5
1.5	1.5	2	5.0	4.2
2.2	2.2	3	6.5	5.8
4	4	5	11	10
5.5	5.5	7.5	15	13
7.5	7.5	10	20	17

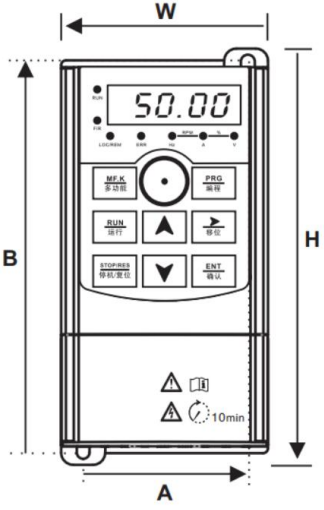
1.3 Technical Specifications

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	0.00~400.00Hz
Control Features	Control mode	V/f control Sensorless vector control Torque control
	Operation command mode	Keypad control Terminal control Serial communication control (Modbus)
	Frequency setting mode	Digital setting, analog setting, pulse frequency setting, serial communication setting, multi-step speed setting & simple PLC, PID setting, etc. These frequency settings can be combined & switched in various modes.
	Overload capacity	150% / 60s, 180% / 10s, 200% / 1s.
	Starting torque	0.25Hz/150% (SVC); 0.5Hz/150% (V/f)
	Speed control precision	±0.5% (V/f) , ±0.2% (SVC) ,
	Carrier frequency	1~15kHz, automatically adjusted according to temperature and load characteristics
	Frequency accuracy	Digital setting: 0.01Hz Analog setting: maximum frequency ×0.05%
	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)
	Acceleration/deceleration mode	Straight line/S curve; four kinds of acceleration/deceleration time, range: 0.0s~3600.0s
	Braking unit	Standard build-in
	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 terminal.

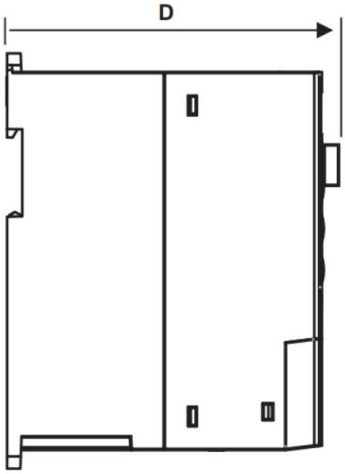
	Built-in PID	Built-in PID control to easily realize the close loop control of the process parameters (such as pressure, temperature, flow, etc.)
	Automatic voltage regulation	Keep output voltage constant automatically when input voltage fluctuating
Control Function	Torque control	Torque control without PG
	Torque limit	“Rooter” characteristics, limit the torque automatically and prevent frequent over-current tripping during the running process
	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
	Fault protection function	Comprehensive protections include over-current, over-voltage, under-voltage, overheating, default phase, overload, shortcut, etc., can record the detailed running status during failure & has fault automatic reset function
Input/out put terminals	Input terminals	5 multifunctional programmable digital input; 2 programmable analog input; AI1: 0～10V AI2: 0~10V / 4～20mA
	Output terminals	Refer to typical wiring for details
	Communication terminals	Offer RS485 communication interface, support MODBUS-RTU communication protocol
Human machine interface	LED display	Display frequency setting, output frequency, output voltage, output current, etc. Two lines display
	Multifunction key	QUICK/JOG key, can be used as multifunction key
Environ-ment	Ambient temperature	-10℃～50℃, without direct sunshine.
	Humidity	90%RH or less (non-condensing)
	Altitude	≤1000M: output rated power, ＞1000M: output derated
	Storage temperature	-20℃～60℃

1.4 External and keypad dimensions

(1) VFD outlook dimensions:



Front view

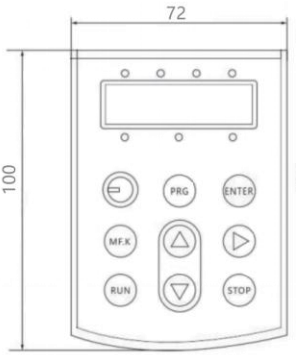


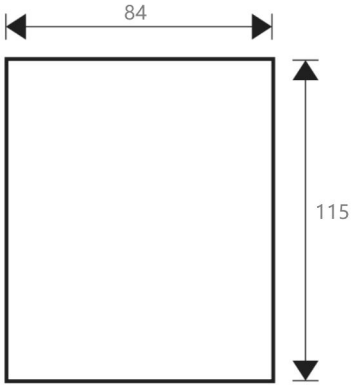
Side view

Power (kW)	Installation dimensions (mm)		Outlook dimensions (mm)				Installing hole diameter
	A	B	H	H1	D	D	
1AC 220V±15%							
0.4	67.5	157	155	170	85	140	Φ5
0.75							
1.5							
2.2							
4	106	235	234	245	125	170	Φ5
5.5							
3AC 380V±15%							
0.75	67.5	157	155	170	85	140	Φ5
1.5							
2.2							
4	86	185	182	194	95	150	Φ5
5.5							
7.5	106	235	234	245	125	170	Φ5

(2) VFD keypad and installation dimensions;

Unit (mm)

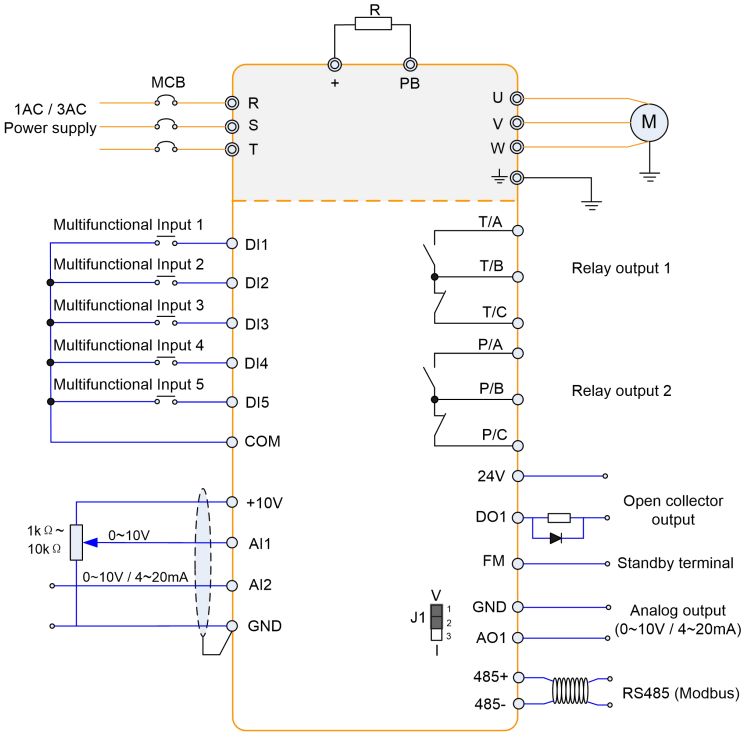




Keypad dimensions

Keypad bracket installation hole dimensions

1.5 Wiring diagram



Note:

1. Terminal ◎ refers to the main circuit terminal, terminal O refers to the control circuit terminal.
2. Built-in braking unit for all the models.

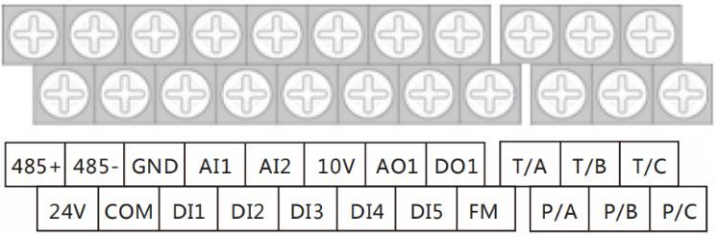
1.5.1 Main circuit terminals and connections

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 VFD. Otherwise it may damage the VFD! ● Make sure that the motor matches the VFD. Otherwise it may damage the motor or generate VFD protection! ● Do not connect the power supply to the terminals of U, V and W. Otherwise it may damage the VFD! ● Do not directly connect the brake resistor between the DC bus terminals (+) and (-). Otherwise it may cause fire!

Instructions of main circuit terminals

Terminal	Description
R, S	Connect to single phase AC power
R, S, T	Connect to three-phase AC power
+, PB	Reserved terminals for braking resistor
U, V, W	Connect to three phase motor
⏚	Ground connection terminal

1.5.2 Control terminals and connections



1.5.3 Description of jumpers on control board

Jumper	connection	Description
J1	Short connect 1 & 2	AO1 outputs 0~10V signal
	Short connect 2 & 3	AO1 outputs 0~20mA signal

1.5.4 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 1kΩ~10kΩ.
	24V~ GND	External +24V power	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminals and the external sensor. The maximum output current is 100mA.
Analog Input	AI1~GND	Analog input terminal 1	1. Input range: DC 0~10V/0~20mA, determined by J8 jumper on the control board. 2. Current Input impedance: 20kΩ. 3. Voltage Input impedance: 510Ω.
	AI2~GND	Analog input terminal 2	
Digital Input	DI1	Digital input 1	1. Optical coupling isolation 2. 2. Input impedance: 3.3kΩ 3. Voltage range for level input: 9V～30V
	DI2	Digital input 2	
	DI3	Digital input 3	
	DI4	Digital input 4	
	DI5	Digital input 5	

	AO1~GND	Analog output	Output voltage range: 0~10V / 4~20mA. Signal
Digital Output	DO1-COM	Open collector output	Correspond common terminal is COM External connection voltage range: 0~24V Output current range: 0mA~50mA
	FM	Standby terminal	
Relay Output 1	T/B-T/C	Normally close terminal	Driving capacity: AC 250V/3A, DC 30V/1A
	T/B-T/A	Normally open terminal	
Relay Output 2	P/B-P/C	Normally close terminal	
	P/B-P/A	Normally open terminal	
RS485	485+	RS485+	Communication interface of Modbus, it is suggested to use twisted-pair cable or shielded cable.
	485-	RS485-	

Chapter 2 Operation and Display

2.1 Keypad outlook

1) Functional indicators description

Functional indicator	Description
RUN	Light-on: VFD is running
F/R	Forward / Reverse run indication
LOC / REM	Local / Remote control indication
ERR	VFD with fault

2) Keypad push-button description

Button	Name	Function
PRG	Programming key	Entry and exit of primary menu
ENT	Confirmation key	Progressively enter menu, and confirm parameters
▲	Increment key	Progressively increase of data or function codes

	Decrement key	Progressively decrease of data or function codes
	Shift key	Select the displayed parameters in turn on the stop display interface and running display interface, and select the modification bit of parameters when modifying parameters.
RUN	Running key	Start to run VFD under keyboard control mode
STOP	Stop / Reset	Stop VFD in running status and reset operation in fault alarm status.
MF.K	Multi-function selection key	The corresponding functions are defined by F7-01.

2.2 Password Setting

The VFD provides user password protection function. When 08-00 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 **PRG** 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 08-00 to “0”.

2.3 Motor Parameters Auto-tuning

To select the vector control running mode, it must input the nameplate parameter of the motor accurately prior to the running of the VFD. The VFD will select standard motor parameters matching the nameplate parameter. Since the vector control mode relies highly on the motor parameters, it must acquire the accurate parameters of the controlled motor to ensure the good control performance.

The procedures for the automatic tuning of motor parameters are described below:

First, select the command source (00-02 as the command channel of the operation keypad. Second, input the following parameters in accordance with the actual motor parameters:
01-02: Rated motor power
01-03: Rated motor frequency
01-04: Rated motor rotation speed of motor
01-05: Rated motor voltage
01-06: Rated motor current

If the motor is completely disconnected from the load, set 01-01 to “1” (complete tuning, and press **RUN** key on the keypad, it will display “RUN”, motor will rotate, and it will stop automatically while auto-tuning finish, the keypad will display “END”. After auto-tuning the following parameters will be updated:
01-07: Stator resistance
01-08: Rotor resistance
01-09: Leakage inductance
01-10: Mutual inductance
01-11: Current without load

Finally, complete the automatic tuning of motor parameters.

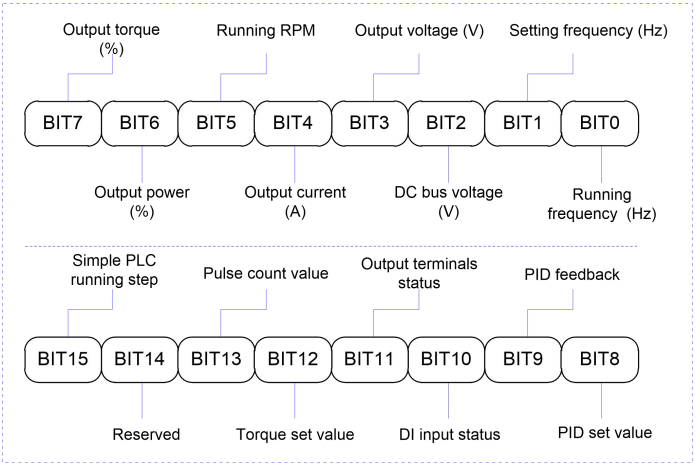
If the motor cannot be completely disconnected with the load, set 01-11 to “2” (static tuning), and then press **RUN** key on the keyboard panel, wait until the auto-tuning finish.

The following motor parameters will be updated automatically:
01-07: Stator resistance
01-08: Rotor resistance
01-09: Leakage inductive reactance

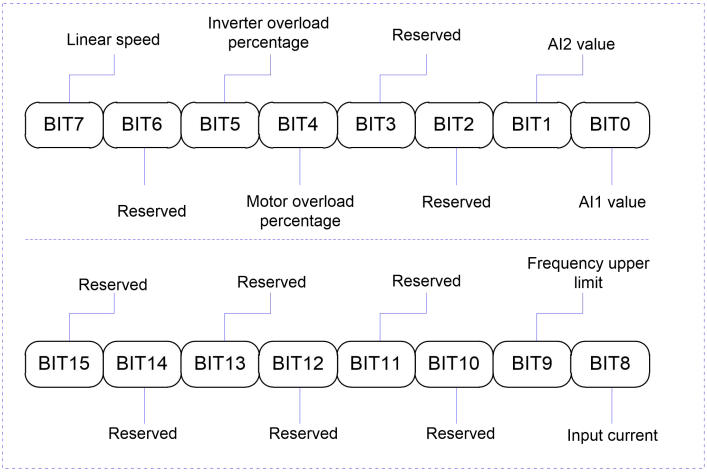
2.4 Display setting for 08-09 and 08-10

If 08-09 and 08-10 parameters need to be displayed when running, **set the corresponding position to 1**, **and change every four bits of binary numbers into one hexadecimal number**, **and then enter the four hexadecimal numbers into 08-09 and 08-10.**

Running status display 1:



Running status display 2:



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

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
1	0	0	1	1	1	0	1
9				**D**			
BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
0	0	0	0	1	0	0	1
0				**5**			

The value of 08-03 is **059D**.

Chapter 3 Examples of Operation

3.1 Keypad start, stop, speed adjust by UP, DOWN button

Parameters setting: 00-02=0, 00-03=0.

Start, stop: press “RUN” button to make VFD run forward, press “STOP/RESET” to stop the VFD

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

3.2 Keypad start, stop, speed adjust by keypad potentiometer

Parameters setting: 00-02=0, 00-03=9.

Start, stop: press “RUN” button to make VFD run forward, press “STOP/RESET” to stop the VFD **Speed adjusts**: turn the keypad potentiometer

3.3 VFD start/stop by external signal, speed adjust by external potentiometer

Parameters setting: 00-02=1, 00-03=1, 06-01=1, 06-02=2

Start, stop: “DI1--COM” close, VFD run forward; “DI2--COM” close, VFD run reverse, DI1, DI2 disconnect with COM, VFD stop.

Speed adjusts: turn the external potentiometer (10V, AI1, GND)

3.4 VFD start/stop by external signal, speed adjust by external 0~10V signal

Parameters setting: 00-02=1, 00-03=1, 06-01=1, 06-02=2

Start, stop: “DI1--COM” close, VFD run forward; “DI2--COM” close, VFD run reverse, DI1, DI2 disconnect with COM, VFD stop.

Speed adjusts: by changing the value of external voltage signal (AI1, GND)

3.5 VFD start/stop by external signal, speed adjust by external 4~20mA signal

Parameters setting: 00-02=1, 00-03=2, 06-01=1, 06-02=2, 06-59=10

Start, stop: “DI1--COM” close, VFD run forward; “DI2--COM” close, VFD run reverse, DI1, DI2 disconnect with COM, VFD stop.

Speed adjusts: by changing the value of external current signal (AI2, GND

3.6 Increase or decrease the frequency by external digital input

(1) start/stop by keypad

Parameters setting: 00-02=0, 00-03=0, 06-03=10, 06-04=11

Start, stop: press “RUN” button to make VFD run forward, press “STOP/RESET” to stop VFD.

Speed adjusts: “DI3--COM” close, frequency increase; “DI4--COM” close, frequency decrease.

(2) start/stop by external digital signal

Parameters setting: 00-02=1, 00-03=0, 06-01=1, 06-02=2, 06-03=10, 06-04=11

Start, stop: “DI1--COM” close, VFD run forward; “DI2--COM” close, VFD run reverse. **Speed adjusts**: “DI3--COM” close, frequency increase; “DI4--COM” close, frequency decrease.

3.7 Multi-step speed function

(1) start/stop by keypad

Parameters setting: 00-02=0, 00-03=5, 06-01=16, 06-02=17, 06-03=18 (13-00~13-15, 16 steps speed can be set)

Start, stop: press “RUN” button to make VFD run forward, press “STOP/RESET” to stop VFD. **Speed adjusts**: by different combinations of DI input (shown as below list).

(2) start/stop by external digital signal

Parameters setting: 00-02=1, 00-03=5,06-01=1, 06-02=2, 06-03=16, 06-04=17, 06-05=18 (13-00~13-15, 16 steps speed can be set), **Start, stop**: “DI1--COM” close, VFD run forward; “DI2--COM” close, VFD run reverse.

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

※ **Different combination means different speeds:**

K4	K3	K2	K1	Command setting	Corresponding parameter
OFF	OFF	OFF	OFF	Multi-step command 0	13-00
OFF	OFF	OFF	ON	Multi-step command 1	13-01
OFF	OFF	ON	OFF	Multi-step command 2	13-02
OFF	OFF	ON	ON	Multi-step command 3	13-03
OFF	ON	OFF	OFF	Multi-step command 4	13-04
OFF	ON	OFF	ON	Multi-step command 5	13-05
OFF	ON	ON	OFF	Multi-step command 6	13-06
OFF	ON	ON	ON	Multi-step command 7	13-07
ON	OFF	OFF	OFF	Multi-step command 8	13-08
ON	OFF	OFF	ON	Multi-step command 9	13-09
ON	OFF	ON	OFF	Multi-step command 10	13-10
ON	OFF	ON	ON	Multi-step command 11	13-11
ON	ON	OFF	OFF	Multi-step command 12	13-12
ON	ON	OFF	ON	Multi-step command 13	13-13
ON	ON	ON	OFF	Multi-step command 14	13-14
ON	ON	ON	ON	Multi-step command 15	13-15

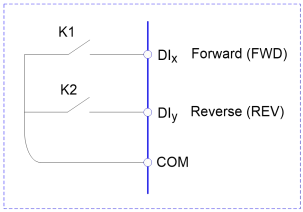
3.8 Terminal command mode

06-13=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
DI_x	1	Forward running (FWD)
DI_y	2	Reverse running (REV)

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

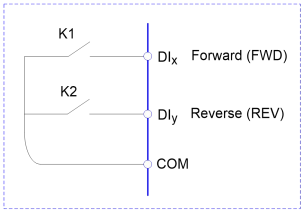


06-13=1: Two-line running mode 2:

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

Terminal	Terminal	Description
DI_x	1	Run enable
DI_y	2	Forward / Reverse run control

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



06-13=2: Three-line running mode 1:

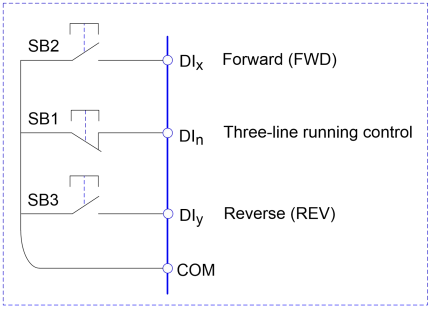
In this mode, DI_n is enabled terminal, and the direction is controlled by FWD and REV respectively. However, the pulse is enabled through disconnecting the signal of DI_n terminal when the VFD stops.

Terminal	Setting value	Description
DI_x	1	Forward running (FWD)

DI_y	2	Reverse running (REV)
DI_n	3	Three-line running control

To make the VFD run, users must close DI_n terminal firstly. It can achieve the motor forward or reverse control via pulse rising of DI_x or DI_y.

It can achieve the VFD stop via cutting off DI_n terminal signal. DI_x. DI_y. DI_n are DI1～DI6, the valid input of DI_x (DI_y) is pulses signal, and the valid input of DI_n is level signal.



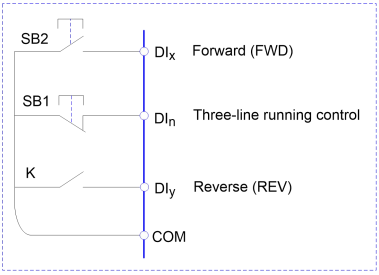
SB1: Stop button
SB2: Forward rotation button
SB3: Reverse rotation button

06-13=3: Three-line running mode 2:

In this mode, DI_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
DI_x	1	Run enable
DI_y	2	Forward / Reverse run control
DI_n	3	Three-line running control

K	Running direction
OFF	Forward
ON	Reverse



Chapter 4 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.

4.1 Basic Function Parameters List

Function code	Name	Detailed instruction	Factory default	Modify
00 Group: Basic Function				
00-00	VFD model	0: G model (constant torque load model) 1: P model (fan and pump load model)	0	●
00-01	Control mode	0: Reserved 1: Sensorless Vector Control (SVC) 2: V/f control	2	◎
00-02	Running command source	0: Keypad (L/R indicator distinguish) 1: Terminal (L/R indicator flickers) 2: Communication (L/R indicator light-on)	0	◎
00-03	Main frequency source A selection	0: Keypad (00-08, UP and DOWN Adjustable, frequency recorded after power off) 1: AI1 (0~10V) 2: AI2 (0~10V / 0~20mA) 3: Reserved 4: Reserved 5: Simple PLC 6: Multi-step speed 7: PID 8: Communication (Modbus) 9: Keypad potentiometer	0	◎
00-04	Auxiliary frequency source B selection	Same as 00-03	0	◎
00-05	Reference of Frequency source B	0: Relative to maximum frequency 1: Relative to frequency source A	0	○
00-07	Frequency source selection	0: Frequency source A 1: Frequency source B 3: A + B	0	○

Function code	Name	Detailed instruction	Factory default	Modify
		4: A - B 5: Max (A, B) 6: Min (A, B)		
00-08	Keypad reference frequency	0.00Hz ~ maximum frequency (00-10)	50.00Hz	○
00-09	Running direction selection	0: Same direction 1: Reverse direction 2: Reverse direction is forbidden	0	○
00-10	Maximum frequency	00-08 ~ 400.00Hz	50.00Hz	◎
00-12	Frequency upper limit	00-14 (frequency lower limit) ~ 00-10 (max. frequency)	50.00Hz	○
00-14	Frequency lower limit	0.00Hz ~ 00-12 (frequency upper limit)	0.00Hz	○
00-15	Carrier frequency	1.0kHz ~ 15.0kHz	Model depend	○
00-16	0 frequency output selection	0: No output 1: Still output 2: DC brake output (set by -11)	0	○
00-17	Acceleration time 1	0.00s ~ 3600.0s	Model depend	○
00-18	Deceleration time 1	0.00s ~ 3600.0s	Model depend	○
00-19	Reserved			
01 Group: Motor Parameters				
01-01	Parameters auto-tuning	0: No action 1: Rotation auto-tuning (motor without load) 2: Static auto-tuning 1 3: Static auto-tuning 2	0	◎
01-02	Motor rated power	0.1kW ~ 1000.0kW	Model depend	◎
01-03	Motor rated frequency	0.01Hz ~ 00-10 (max. frequency)	Model depend	◎
01-04	Motor rated speed	1 ~ 36000RPM	Model depend	◎
01-05	Motor rated voltage	0V ~ 2000V	Model depend	◎
01-06	Motor rated current	0.1A ~ 6553.5A	Model depend	◎
01-07	Motor stator resistance	0.001Ω ~ 65.535Ω	Motor parameter	◎
01-08	Motor rotor resistance	0.001Ω ~ 65.535Ω	Motor parameter	◎

Function code	Name	Detailed instruction	Factory default	Modify
01-09	Motor leakage inductance	0.1mH ~ 6553.5mH	Motor parameter	◎
01-10	Motor mutual inductance	0.1mH ~ 6553.5mH	Motor parameter	◎
01-11	Motor no-load current	0.1A ~ 6553.5A	Motor parameter	◎
02 Group: V/f Control Parameters				
02-00	V/f curve setting	0: Linear 1: Multiple-points 2: 1.3th power 3: 1.7th power 4: 2.0th power 5: V/f separate 6: Reserved	0	◎
02-01	Torque boost	0.0: auto 0.1% ~ 10.0%	0.0%	○
02-02	Torque boost cutoff frequency point	0.0 ~ 50.0%	20.0%	◎
02-03	V/f frequency point 3	0.00Hz ~ 01-02	0.00Hz	◎
02-04	V/f voltage point 3	0.0% ~ 110.0%	0.0%	◎
02-05	V/f frequency point 2	02-07 ~ 02-03	0.00Hz	◎
02-06	V/f voltage point 2	0.0% ~ 02-04	0.0%	◎
02-07	V/f frequency point 1	0.00Hz ~ 02-05	0.00Hz	◎
02-08	V/f voltage point 1	0.0% ~ 02-06	0.0%	◎
02-09	V/f slip compensation gain	0.0% ~ 200.0%	100.0%	○
02-10	V/f low frequency oscillation inhibition coefficient	0 ~ 100	10	○
02-11	V/f high frequency oscillation inhibition coefficient	0 ~ 100	10	○
02-12	V/f oscillation inhibition frequency switch point	0.00 ~ 00-10	30.00Hz	
02-13	AVR function (Automatic Voltage Regulation)	0: Cancel AVR function 1: Keep AVR during running 2: Reserved	1	○
02-14	Automation energy saving operation	0: No function 2: Keep energy saving operation	0	○
02-15	V/f constant power Weak magnetic	1.00 ~1.30	1.00	○

Function code	Name	Detailed instruction	Factory default	Modify
	beneficent			
02-16	Voltage source of V/f separation	0: Digital setting (02-17) 1: AI1 2: AI2 3: Reserved 4: Reserved 5: Multi-step speed 6: PID 7: Communication (Modbus) 8: Keypad potentiometer Note: 100% corresponds to motor rated voltage	0	○
02-17	Digital setting of V/f separation	0.0 ~ 100.0% (Motor rated voltage)	0.0%	○
02-18	Voltage acceleration time of V/f separation	0.0s~3600.0s	0.0s	○
02-19	Voltage deceleration time of V/f separation	0.0s~3600.0s	0.0s	○
02-20	Voltage upper limit of V/f separation	02-21 ~ 100.0%	100.0%	◎
02-21	Voltage lower limit of V/f separation	0.0 ~ 02.20	0.0%	◎
03 Group: Vector Control Parameters				
03-00	Speed loop proportional gain 1	0.0 ~ 200.0	20.0	○
03-01	Speed loop integration time 1	0.000s ~ 10.000s	0.200s	○
03-02	Speed loop proportional gain 2	0.0 ~ 200.0	20.0	○
03-03	Speed loop integration time 2	0.000s ~ 10.000s	0.200s	○
03-04	Low switching frequency	0.00Hz ~ 03-05	5.00Hz	○
03-05	High switching frequency	03-04 ~ 00-10 (max. frequency)	10.00Hz	○
03-06	Lowpass filter coefficient	0 ~ 10	0	○
03-07	Motor slip compensation coefficient	50% ~ 200%	100%	○
03-08	Brake slip compensation coefficient	50% ~ 200%	100%	○

Function code	Name	Detailed instruction	Factory default	Modify
03-09	Current loop KP	0 ~ 65535	1000	○
03-10	Current loop KI	0 ~ 65535	1000	○
03-11	Constant power weak magnetic coefficient under vector control mode	0.1 ~ 2.0	0.3	○
03-12	Constant power weak magnetic point under vector control mode	10% ~ 100%	20%	○
03-13	Weak magnetic proportional gain	0 ~ 8000	1000	○
03-14	Voltage upper limit under vector control mode	0.0 ~120.0%	100.0%	○
03-15	Pre-excitation time for motor	0.000 ~ 10.000s	0.300s	○
04 Group: Torque control				
04-00	Torque setting source selection in torque control mode	0: Speed control (torque control invalid) 1: Set by 04-01 2: AI1 3: AI2 4: Reserved 5: Reserved 6: Multi-step speed 7: Modbus 8: Keypad potentiometer	0	◎
04-01	Torque setting through keypad in torque control mode	-300.0% ~ 300.0%	50.0%	○
04-02	Torque control filter time	0.000~10.000s	0.010s	○
04-03	Positive torque upper limit frequency source	0: Set by 04-05 1: AI1 2: AI2 3: Reserved 4: Reserved 5: Multi-step speed 6: Modbus 7: Keypad potentiometer	0	○
04-04	Negative torque upper limit frequency source	0: Set by 04-06 1: AI1	0	○

Function code	Name	Detailed instruction	Factory default	Modify
		2: AI2 3: Reserved 4: Reserved 5: Multi-step speed 6: Modbus 7: Keypad potentiometer		
04-05	Positive torque upper limit frequency setting	0.00Hz ~00-10	50.00Hz	○
04-06	Negative torque upper limit frequency setting	0.00Hz ~00-10	50.00Hz	○
04-07	Torque limit channel select under normal running mode	0: Set by 04-09 1: AI1 2: AI2 3: Reserved 4: Reserved 5: Modbus 6: Keypad potentiometer	0	○
04-08	Torque limit channel select under brake running mode	0: Set by 04-10 1: AI1 2: AI2 3: Reserved 4: Reserved 5: Modbus 6: Keypad potentiometer	0	○
04-09	Torque limit setting under normal running mode	0.0 ~ 300.0%	180.0%	○
04-10	Torque limit setting under brake running mode	0.0 ~ 300.0%	180.0%	○
04-11	Low frequency torque compensation under vector control mode	0.0 ~ 100.0%	0.0%	○
04-12	High frequency torque compensation under vector control mode	0.0 ~ 100.0%	0.0%	○
05 Group: Start and Stop control				
05-00	Start mode	0: Direct start 1: Pre-excitation and then start 2: Speed tracking and restart	0	○
05-01	Start frequency	0.00Hz ~ 50.00Hz	0.50Hz	○

Function code	Name	Detailed instruction	Factory default	Modify
05-02	Start frequency holding time	0.0s ~ 50.0s	0.0s	◎
05-03	DC braking current before start	0.0% ~ 100.0%	0.0%	◎
05-04	DC braking time before start	0.00s ~ 50.00s	0.00s	◎
05-05	ACC/DEC mode	0: Linear ACC/DEC 1: S-curve ACC/DEC	0	◎
05-06	Time of S curve's start part	0.0 ~ 50.0s	0.1s	◎
05-07	Time of S curve's end part	0.0 ~ 50.0s	0.1s	◎
05-08	Stop mode	0: Deceleration to stop 1: Coast to stop	0	○
05-09	DC braking start frequency while stopping	0.00Hz ~ 00-10 (max. frequency)	0.00Hz	○
05-10	DC braking delay time while stopping	0.00s ~ 50.00s	0.00s	○
05-11	DC braking current while stopping	0.0% ~ 100.0%	0.0%	○
05-12	DC braking time while stopping	0.00s ~ 50.00s	0.00s	○
05-16	FWD/REV dead time	0.0s ~ 3000.0s	0.0s	○
05-17	FWD/REV switch mode	0: Switch from 0 frequency 1: Switch from start frequency 2: Switch from the stop frequency	0	
05-18	Stop speed	0.00 ~ 100.00Hz	0.50Hz	
05-19	Stop speed detection way	0: Detect by speed set value 1: Detect by speed feedback value	1	
05-20	Speed feedback detection time	0.00 ~ 100.00s	0.05s	
05-21	Start delay time	0.0 ~ 60.0s	0.0s	
05-22	Stop speed delay	0.0 ~ 100.0s	0.0s	
05-23	Braking unit action	0: Invalid 1: Valid	1	
05-24	Braking unit action voltage	200.0~2000.0V (220V LVD is 380V; 380V LVD is 700V)	Model depend	
05-25	Strength of braking	0 ~ 150	0	○

Function code	Name	Detailed instruction	Factory default	Modify
		0: Invalid >0: the bigger value, the better braking performance		
06 Group: Input Terminals				
06-00	Reserved			
06-01	DI1 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: Coast to stop 7: Fault reset (RESET) 8: Pause running 9: External fault (normal open) input 10: Frequency increase (UP) 11: Frequency decrease (DOWN) 12: UP and DOWN setting clear (terminal and keypad) 13: Main frequency source switching 14: Switch the frequency source between 00-07 and 00-03 15: Switch the frequency source between 00-07 and 00-04 16: Multi-step speed terminal 1 17: Multi-step speed terminal 2 18: Multi-step speed terminal 3 19: Multi-step speed terminal 4 20: Multi-step speed pause 21: ACC/DEC selection terminal 1 22: ACC/DEC selection terminal 2 23: Simple PLC stop and reset 24: Simple PLC pause 25: PID Pause 26: Wobble frequency pause (stop at present frequency) 27: Wobble frequency pause(return back to center frequency) 28: Counter reset 29: Speed control / torque control switching 30: ACC/DEC invalid 31: Counter input	1	◎
06-02	DI2 terminal function		2	◎
06-03	DI3 terminal function		0	◎
06-04	DI4 terminal function		0	◎
06-05	DI5 terminal function		0	◎

Function code	Name	Detailed instruction	Factory default	Modify
		32: Length reset 33: Reserved 34: DC braking command 35: Reserved 36: Switch the run command source to keypad 37: Switch the run command source to terminal 38: Switch the run command source to Modbus 39: Pre-excitation 40: The total consumption energy reset 41: Reserved 42: Emergency stop (fast brake, the performance is better under vector control mode) 43: External stop signal (stop under the DEC setting time)		
06-10	Reserved			
06-11	DI terminals filter time	0.000s ~ 1.000s	0.010s	○
06-12	Reserved			
06-13	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0	◎
06-14	Delay time of DI1 signal close	0.000 ~50.000s	0.000s	○
06-15	Delay time of DI1 signal open	0.000 ~50.000s	0.000s	○
06-16	Delay time of DI2 signal close	0.000 ~50.000s	0.000s	○
06-17	Delay time of DI2 signal open	0.000 ~50.000s	0.000s	○
06-18	Delay time of DI3 signal close	0.000 ~50.000s	0.000s	○
06-19	Delay time of DI3 signal open	0.000 ~50.000s	0.000s	○
06-20	Delay time of DI4 signal close	0.000 ~50.000s	0.000s	○
06-21	Delay time of DI4 signal open	0.000 ~50.000s	0.000s	○

Function code	Name	Detailed instruction	Factory default	Modify
06-30	Delay time of DI5 signal close	0.000 ~50.000s	0.000s	○
06-31	Delay time of DI5 signal open	0.000 ~50.000s	0.000s	○
06-33	Auto restart selection after switch on the power (00-02=1)	0: No action 1: Auto restart	0	○
06-34	Reserved			
06-35	UP signal change rate	0.01Hz/s ~ 50.00Hz/s	0.50Hz/s	○
06-36	DOWN signal change rate	0.01Hz/s ~ 50.00Hz/s	0.50Hz/s	○
06-37~ 06-41	Reserved			
06-42	AI1 minimum input	0.00V ~ 06-44	0.00V	○
06-43	AI1 minimum input corresponding setting	-100.0% ~ +100.0%	0.0%	○
06-44	AI1 maximum input	06-42 ~ 10.00V	10.00V	○
06-45	AI1 maximum input corresponding setting	-100.0% ~ +100.0%	100.0%	○
06-46	AI1 input filter time	0.000s ~ 10.000s	0.100s	○
06-47	AI2 minimum input	0.00V ~ 06-49	0.00V	○
06-48	AI2 minimum input corresponding setting	-100.0% ~ +100.0%	0.0%	○
06-49	AI2 maximum input	06-47~ 10.00V	10.00V	○
06-50	AI2 maximum input corresponding setting	-100.0% ~ +100.0%	100.0%	○
06-51	AI2 input filter time	0.000s ~ 10.000s	0.10s	○
06-52 ~ 06-58	Reserved			
06-59	AI input signal selection	Unit bit: AI1 Tens bit: AI2 0: AI terminal 0 ~ 10V signal input 0: AI terminal 0 ~ 20mA signal input	10	◎
07 Group: Output Terminal				
07-00	Reserved			
07-01	DO1 output function selection (open collector output)	0: No output 1: VFD is running	0	○

Function code	Name	Detailed instruction	Factory default	Modify
07-02	Reserved	2: Forward running 3: Reverse running 4: Jog running 5: Fault output (VFD fault) 6: FDT1 output 7: FDT2 output 8: Frequency arrival 9: Zero-speed running 10: Frequency upper limit arrival 11: Frequency lower limit arrival 12: Ready for running 13: Pre-excitation 14: Alarm for overload 15: Alarm for underload 16: Simple PLC step running completed 17: Simple PLC circulate running completed 18: Setting count value arrival 19: Designated count value arrival 20: Fault output (external fault 21: Running time arrival 22: Length arrival 23: Reserved	2	○
07-03	Relay 1 output selection (T/A, T/B, T/C)		0	
07-04	Relay 2 output selection (P/A, P/B, P/C)		0	
			0	
07-05	AO1 output function selection	0: Running frequency 1: Set frequency 2: Reserved 3: Running RPM value 4: Output current (2 times rated current of VFD) 5: Output current (2 times rated current of motor 6: Output voltage 7: Output power 8: Set torque 9: Output torque 10: AI1 11: AI2 12~13: Reserved 14: Modbus set frequency 15: Reserved 14: Torque current (3 times rated current of motor		
			0	○
07-07	Reserved		1	

Function code	Name	Detailed instruction	Factory default	Modify
07-08	AO1 minimum output	-100.0% ~ 07-10	0.0%	○
07-09	AO1 minimum output corresponding setting	0.00 ~ 10.00V	0.00V	○
07-10	AO1 maximum output	07-08 ~ 100.0%	100.0%	○
07-11	AO1 maximum output corresponding setting	0.00 ~ 10.00V	10.00V	○
07-12	AO1 output filter time	0.000s~10.000s	0.000s	○
07-18 ~ 07-22	Reserved			
07-23	Output delay time of DO1 signal close	0.000s ~ 50.000s	0.000s	○
07-24	Output delay time of DO1 signal open	0.000s ~ 50.000s	0.000s	○
07-25 ~ 07-26	Reserved			
07-27	Output delay time of relay 1 signal close	0.000s ~ 50.000s	0.000s	○
07-28	Output delay time of relay 1 signal open	0.000s ~ 50.000s	0.000s	○
07-29	Output delay time of relay 2 signal close	0.000s ~ 50.000s	0.000s	○
07-30	Output delay time of relay 2 signal open	0.000s ~ 50.000s	0.000s	○
07-31	Output terminal valid status selection	0: Positive logic 1: Negative logic Units place: MO1 Tens place: reserved Hundreds place: relay 1 Thousands place: relay 2	0000	○
08 Group: Keypad and Display				
08-00	User password	0 ~ 65535 (00000: no password)	0	○
08-01	MF.K function selection	0: No function 1: Jog run 2: SHIFT button 3: FDW/REV Switching 4: UP/DOWN set reset 5: Coast to stop 6: Sequence of run command source switch	0	◎

Function code	Name	Detailed instruction	Factory default	Modify
08-02	MF.K run command source switch	0: Keypad→terminal→Modbus 1: Keypad←→terminal 2: Keypad←→Modbus 3: Terminal←→Modbus		
08-03	STOP/RESET function selection	0: Valid for keypad control 2: Valid for keypad and terminal control 3: Valid for keypad and Modbus control 4: Always valid	0	○
08-04	Parameters initialization	0: No action 1: Initialize parameters 2: Clear the fault record 3: Lock the keypad	0	◎
08-05	Reserved			
08-06	Keypad potentiometer and UP/DOWN button adjust data bit select	1: Unit bit: 2: Tens bit: 3: Hundred bit: 4: Thousand bit:	2	○
08-07	Frequency memory selection when power off	Unit bit: Keypad potentiometer Tens bit: Modbus 0: Frequency memorized while power off 1: Frequency reset while power off	00	○
08-08	Parameters download and upload	0: No action 1: Parameters upload to keypad 2: Parameters download from keypad to VFD (includes motor parameters) 3: Parameters download from keypad to VFD (not includes motor parameters) 4: Parameters download from keypad to VFD (only the motor parameters)	0	○
08-09	Running status display 1	0000 ~ FFFF Bit00: Running frequency (Hz indicator on) Bit01: Setting frequency (Hz indicator flickers) Bit02: DC Bus voltage (V indicator on) Bit03: Output voltage (V indicator on) Bit04: Output current (A indicator on) Bit05: Running RPM (RPM indicator on) Bit06: Output power (% indicator on)	033F	○

Function code	Name	Detailed instruction	Factory default	Modify
		Bit07: Output torque (% indicator on) Bit08: PID set value (% indicator flickers) Bit09: PID feedback (% indicator on) Bit10: DI input status Bit11: Output terminals status Bit12: Torque set value (% indicator on) Bit13: Pulse count value Bit15: Simple PLC running present step		
08-10	Running status display 2	0000 ~ FFFF Bit00: AI1 value (V indicator on Bit01: AI2 value (V indicator on Bit02: Reserved Bit03: Reserved Bit04: Motor overload percentage (% indicator on) Bit05: VFD overload percentage (% indicator on) Bit06: Reserved Bit07: Linear speed Bit08: Input current Bit09: Frequency upper limit	0000	○
08-11	Stop status display	0000 ~ FFFF Bit00: Setting frequency (Hz indicator on) Bit01: DC Bus voltage (V indicator on) Bit02: DI input status Bit03: Output terminals status Bit04: PID set value (% indicator flickers) Bit05: PID feedback value (% indicator on) Bit06: Torque set value (% indicator on) Bit07: AI1 value (V indicator on) Bit08: AI2 value (V indicator on) Bit09: Reserved Bit10: Reserved Bit11: Simple PLC and multi-step speed running present step Bit12: Pulse count value Bit14: Frequency upper limit	038B	○
08-12	Software version No.	-	-	●

Function code	Name	Detailed instruction	Factory default	Modify
08-13	Temperature of rectifier	0.0~120.0℃	-	●
08-14	Temperature of VFD	0.0~120.0℃	-	●
08-15	Frequency display adjust coefficient	0.01 ~10.00	1.00	○
08-16	RPM display adjust coefficient	0.1 ~999.9%	97.3%	○
08-17	Liner speed display adjust coefficient	0.1 ~999.9%	1.0%	○
08-18	Reserved			
08--19	Accumulated running time	0h ~ 65535h	-	●
08-20	Monitoring accumulated consumption power high point	Accumulated consumption power = (08-20)*1000-(08-21)	0kWh	●
08-21	Monitoring accumulated consumption power low point		0.0kWh	●
08-22	Set consumption power high point initial value	Consumption power initial value = (08-22)*1000-(08-23)	0kWh	●
08-23	Set consumption power low point initial value		0.0kWh	●
08-24 ~ 08-29	Reserved			
08-30	Motor power display adjust coefficient	0.00 ~ 3.00	1.00	○
09 Group: Fault record parameters				
09-00	The first fault type	0: No fault 1: Reserved 2: Over current in ACC process 3: Over current in DEC process 4: Over current in constant speed 5: Over voltage in ACC process 6: Over voltage in DEC process 7: Over voltage in constant speed 8: Reserved 9: DC BUS under voltage 10: VFD overload 11: Motor overload 12: Input side phase failure 13: Output side phase failure	—	●

Function code	Name	Detailed instruction	Factory default	Modify
		14: IGBT Module overheat 15: External fault 16: Communication fault 17: Reserved 18: Current detection fault 19: Motor auto-tuning fault 20: Reserved 21: EEPROM fault 22: Reserved 23: Motor short circuit to ground fault 24: Reserved 25: Reserved 26: Running time arrival 27: Reserved 28: Reserved 29: Reserved 30: Off load 31: PID feedback lost when running 40: Fast current limiting over time 41 ~ 51: Reserved		
09-01	The fist fault type		—	●
09-02	The second fault type		—	●
09-03	The third fault type		—	●
09-04	The forth fault type		—	●
09-05	The fifth fault type		—	●
09-06	Running frequency at the latest fault	—	—	●
09-07	Reserved	—	—	●
09-08	Output voltage at the latest fault	—	—	●
09-09	Output current at the latest fault	—	—	●
09-10	DC bus voltage at the latest fault	—	—	●
09-11	IGBT temperature at the latest fault	—	—	●
09-12	Input terminal's status at the latest fault	—	—	●
09-13	Output terminal's status	—	—	●

Function code	Name	Detailed instruction	Factory default	Modify
	at the latest fault			
09-14	Running frequency at the second fault	—	—	●
09-15	Reserved	—	—	●
09-16	Output voltage at the second fault	—	—	●
09-17	Output current at the second fault	—	—	●
09-18	DC bus voltage at the second fault	—	—	●
09-19	IGBT temperature at the second fault	—	—	●
09-20	Input terminal's status at the second fault	—	—	●
09-21	Output terminal's status at the second fault	—	—	●
09-22	Running frequency at the third fault	—	—	●
09-23	Reserved	—	—	●
09-24	Output voltage at the third fault	—	—	●
09-25	Output current at the third fault	—	—	●
09-26	DC bus voltage at the second fault	—	—	●
09-27	IGBT temperature at the third fault	—	—	●
09-28	Input terminal's status at the third fault	—	—	●
09-29	Output terminal's status at the third fault	—	—	●
10 Group: Protection parameters				
10-00	Motor overload protection selection	0: Disable 1: Enable 2: Reserved	1	●
10-01	Motor overload protection coefficient	20.0% ~ 120.0%	100.0%	○
10-02	Stall over-voltage protection enable selection	0: Invalid 1: Valid	1	○

Function code	Name	Detailed instruction	Factory default	Modify
10-03	Stall over-voltage point	220V VFD: 120% ~ 150%	120%	○
		380V VFD: 120% ~ 150%	140%	
10-04	Over current protection selection	**Unit bit:** software stall over-current protection select 0: Invalid 1: Valid **Tens bit**: hardware current limitation protection select 0: Invalid 1: Valid **Hundred bit**: Convert part over current fault unblocking selection 0: Can be unblocked 1: Can be unblocked after 60s blocking 2: Keep blocked, only be unblocked after reset the power supply	101	
10-05	Stall over-current protection point	50.0 ~ 200.0%	Model depend	●
10-06	Stall over-current voltage drop ratio	0.00 ~ 50.00Hz/s	10.00 Hz/s	○
10-07	Input and output phase failure protection selection	Unit bit: input phase failure protection Tens bit: Output phase failure protection 0: Invalid 1: Valid	11	○
10-08	Overload / under load protection selection	**Unit bit**: overload/ under load pre-alarm selection 0: Pre-alarm for under load 1: Pre-alarm for over load **Tens bit:** VFD reaction selection While overload / under load happens 0: VFD gives pre-alarm and keep running while overload / under load happens 1: VFD gives pre-alarm for under load and stops while overload happen; 2: VFD gives pre-alarm for overload and stops while under load happen; 3: VFD stops while under load	000	○

Function code	Name	Detailed instruction	Factory default	Modify
		happen; **Hundred bit**: Overload / under load protection enable 0: Always valid 1: Only valid during constant speed running		
10-09	Overload detect point	10-11 ~ 200%	Model depend	○
10-10	Overload detect time	0.1 ~ 3600.0s	1.0s	○
10-11	Under load detect point	0 ~ 10-09	50%	○
10-12	Under load detect time	0.1 ~ 3600.0s	1.0s	○
10-13	Fault auto-reset times	0 ~ 10	0	○
10-14	Fault auto-reset interval	0.1s ~ 100.0s	1.0s	○
10-15	Over voltage threshold set	0~2500.0V	Model depend	○
10-16	Under voltage threshold set	0~2500.0V	Model depend	○
10-17	Special functions selection	**Unit** bit: Frequency drops automatically if the voltage is unstable; **Tens** bit: Switch to ACC/DEC time 2 while the frequency is arrival 0: Invalid 1: Valid	00	○
10-18	Output terminals fault reaction selection	Unit bit: Under voltage reaction Tens bit: Reaction during auto-reset 0: Valid 1: Invalid	00	○
10-19	Operation selection while instantaneous power off	0: Stop 1: Keep running	0	○
10-20	Waiting time for operation when instantaneous power off	0.0 ~3600.0s	1.0s	○
10-21	Voltage drops selection while instantaneous power off	0: Invalid 1: Valid	0	○
10-22	Frequency drops ratio while instantaneous	0.00Hz ~ 00-10 (Hz/s)	10.00 Hz/s	○

Function code	Name	Detailed instruction	Factory default	Modify
	power off			
10.23 ~ 10.24	Reserved			
11 Group: Enhanced Functions				
11-00	Jog running frequency	0.00Hz ~ 00-10 (max. frequency)	5.00Hz	○
11-01	Jog acceleration time	0.0s ~ 3600.0s	Model depend	○
11-02	Jog deceleration time	0.0s ~ 3600.0s	Model depend	○
11-03	Acceleration time 2	0.0s ~ 6500.0s	Model depend	○
11-04	Deceleration time 2	0.0s ~ 3600.0s	Model depend	○
11-05	Acceleration time 3	0.0s ~ 3600.0s	Model depend	○
11-06	Deceleration time 3	0.0s ~ 3600.0s	Model depend	○
11-07	Acceleration time 4	0.0s ~ 3600.0s	Model depend	○
11-08	Deceleration time 4	0.0s ~ 3600.0s	Model depend	○
11-09	Action when setting frequency lower than frequency lower limit	0: Running at frequency lower limit (00-14) 1: Stop 2: Dormancy	0	○
11-10	Dormancy recover time	0.0s ~ 3600.0s	0.0s	○
11-11	Droop frequency	0.00Hz ~ 10.00Hz	0.00Hz	○
11-12	Cooling fan control	0: Start the cooling fan while start the frequency VFD 1: Start the cooling fan while switch on the power supply	0	○
11-19	Setting count value	11-20 ~ 65535	0	○
11-20	Designated count value	1 ~ 11-09	0	○
11-21	Timing running duration	0Min ~ 65535Min	0Min	○
11-22	Jump frequency 1	0.00Hz ~ 00-10 (maximum frequency)	0.00Hz	○
11-23	Jump frequency amplitude 1	0.00Hz ~ 00-10 (maximum frequency)	0.01Hz	○

Function code	Name	Detailed instruction	Factory default	Modify
11-24	Jump frequency 2	0.00Hz ~ 00-10 (maximum frequency)	0.00Hz	○
11-25	Jump frequency amplitude 2	0.00Hz ~ 00-10 (maximum frequency)	0.01Hz	○
11-26	Jump frequency 3	0.00Hz ~ 00-10 (maximum frequency)	0.00Hz	○
11-27	Jump frequency amplitude 3	0.00Hz ~ 00-10 (maximum frequency)	0.01Hz	○
11-28	Wobble frequency amplitude	0.0% ~ 100.0% (correspond to setting frequency)	0.0%	○
11-29	Sudden Jump frequency amplitude	0.0% ~ 50.0% (11-28)	0.0%	○
11-30	Wobble frequency rise time	0.1 ~3600.0s	5.0s	○
11-31	Wobble frequency fall time	0.1 ~3600.0s	5.0s	○
11-32	Frequency detection value (FDT1)	0.00Hz ~ 00-10 (maximum frequency)	50.00Hz	○
11-33	Frequency detection lagging value (FDT1)	0.0% ~ 100.0% (11-32)	5.0%	○
11-34	Frequency detection value (FDT2)	0.00Hz ~ 00-10 (maximum frequency)	50.00Hz	○
11-35	Frequency detection lagging value (FDT2)	0.0% ~ 100.0% (11-34)	5.0%	○
11-36	Frequency arrival detection value	0.00 ~ 00-10 (maximum frequency)	0.00Hz	○
11-37	Over-modulation selection	**Unit bit:** Enable of over-modulation 0: Invalid 1: Valid **Tens bit**: Strength of over-modulation selection 0: Light 1: Heavy		
11-38	Reserved			
12 Group: PID Function				
12-00	PID given source	0: 12-01 1: AI1 2: AI2 3: Reserved 4: Reserved 5: Multi-step command	0	○

Function code	Name	Detailed instruction	Factory default	Modify
		6: Modbus 7: Keypad potentiometer		
12-01	PID set through keypad	-100.0%~100% (percentage of sensor measure range)	0.0%	○
12-02	PID feedback source	0: AI1 1: AI2 2: Reserved 3: Reserved 4: Modbus 5: Keypad potentiometer	0	○
12-03	PID action direction	0: Positive 1: Negative	0	○
12-04	Proportional gain Kp1	0.0 ~ 100.0	10.0	○
12-05	Integration time Ti1	0.01s ~ 10.00s	1.00s	○
12-06	Differential time Td1	0.000s ~ 10.000s	0.000s	○
12-07	PID feedback filter time	0.000 ~ 10.000s	0.100s	○
12-08	PID parameter switching deviation 1	0.0% ~100.0%	0.0%	○
12-09	PID output upper limit	12-10 ~ 100.0%	100.0%	○
12-10	PID output lower limit	-100.0% ~ 12-09	0.0%	○
12-11	PID output ACC/DEC time	0.0 ~1000.0s	0.0s	○
12-12	PID output filter time	0.00 ~ 60.00s	0.00s	○
12-13	Lowe frequency proportional gain	0.00 ~ 100.0	1.00	○
12-14	PID feedback lost detection value	0.0%: No judgment for feedback lost 0.1% ~ 100.0%	0.0%	○
12-15	PID feedback lost detection time	0.0s ~ 20.0s	0.0s	○
12-16	PID regulation function	**Units bit:** 0: Keep Integral adjustment when the frequency reaches upper / lower limit 1: Stop Integral adjustment when the frequency reaches upper / lower limit **Tens bit:** 0: The direction is same as set direction 1: Reverse direction **Hundreds bit:**	0001	○

Function code	Name	Detailed instruction	Factory default	Modify
		0: Reference maximum frequency limitation 1: Reference frequency source A limitation **Thousands bit:** Reserved		
13 Group: Multi-step Command and Simple PLC				
13-00	Multi-step speed 0	-100.0% ~ 100.0%	0.0%	○
13-01	Multi-step speed 1	-100.0% ~ 100.0%	0.0%	○
13-02	Multi-step speed 2	-100.0% ~ 100.0%	0.0%	○
13-03	Multi-step speed 3	-100.0% ~ 100.0%	0.0%	○
13-04	Multi-step speed 4	-100.0% ~ 100.0%	0.0%	○
13-05	Multi-step speed 5	-100.0% ~ 100.0%	0.0%	○
13-06	Multi-step speed 6	-100.0% ~ 100.0%	0.0%	○
13-07	Multi-step speed 7	-100.0% ~ 100.0%	0.0%	○
13-08	Multi-step speed 8	-100.0% ~ 100.0%	0.0%	○
13-09	Multi-step speed 9	-100.0% ~ 100.0%	0.0%	○
13-10	Multi-step speed 10	-100.0% ~ 100.0%	0.0%	○
13-11	Multi-step speed 11	-100.0% ~ 100.0%	0.0%	○
13-12	Multi-step speed 12	-100.0% ~ 100.0%	0.0%	○
13-13	Multi-step speed 13	-100.0% ~ 100.0%	0.0%	○
13-14	Multi-step speed 14	-100.0% ~ 100.0%	0.0%	○
13-15	Multi-step speed 15	-100.0% ~ 100.0%	0.0%	○
13-16	0^{th} step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-17	1^{st} step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-18	2^{nd} step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-19	3^{rd} step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-20	4^{th} step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-21	5^{th} step running time	0.0s (min) ~ 6553.5s (min)	0.0	○

Function code	Name	Detailed instruction	Factory default	Modify
13-22	6th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-23	7th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-24	8th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-25	9th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-26	10th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-27	11th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-28	12th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-29	13th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-30	14th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-31	15th step running time	0.0s (min) ~ 6553.5s (min)	0.0	○
13-32	Reserved			
13-33	Reserved			
13-34	Timing unit (Simple PLC mode)	0: s (second) 1: min (minute)	0	○
13-35	Simple PLC running mode	0: Stop after one cycle 1: Keep last frequency after one cycle 2: Circular running	0	○
13-36	Simple PLC status memory selection after power off	0: Not memory 1: Memory	0	○
13-37	Simple PLC status memory selection after stop	0: Restart from 0th step 1: Keep running from the step which is before stopping	0	○
13-38	Multi-step speed 0 given channel	0: 13-00 1: AI1 2: AI2 3: Reserved 4: Reserved 5: PID control 6: Keypad potentiometer 7: Keypad set frequency (00-08), can be modified via UP/DOWN button	0	○
13-39	Multi-step speed 1 given channel	0: 13-01 1: AI1 2: AI2	0	○

Function code	Name	Detailed instruction	Factory default	Modify
		3: Reserved 4: Reserved 5: PID control 6: Keypad potentiometer 7: Keypad set frequency (00-08), can be modified via UP/DOWN button		
14 Group: Communication Parameters				
14-00	VFD address	1 ~ 247, 0 is broadcast address	1	○
14-01	Baud rate	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS 6: 57600BPS	3	○
14-02	Data format	0: No parity check (N-8-1) for RTU 1: Even parity check (E-8-1) for RTU 2: Odd parity check (O-8-1) for RTU 3: No parity check (N-8-2) for RTU 4: Even parity check (E-8-2) for RTU 5: Odd parity check (O-8-2) for RTU	3	○
14-03	Communication delay time	0ms ~ 200ms	5ms	○
14-04	Communication timeout time	0.0 (invalid) 0.1s ~ 60.0s	0.0s	○
14-05	VFD reaction while communication error happens	0: Give alarm and then stop 1: No alarm and keep running 2: No alarm and stop as the set stop mode (only valid under communication mode) 3: No alarm and stop as the set stop mode (valid for all the control mode)		
14-06	Communication action selection	Unit bit: 1: Response for write operation 2: No response for write operation	0	○
14-07	Communication protocol selection	0: Reserved 1: Standard Modbus communication	0	○

4.2 Monitoring Parameter Table (30 group)

Function code	Name	Minimum unit	Communication address (HEX)	Communication address (DEC)
30-00	Running frequency (Hz)	0.01Hz	0x7000	28672
30-01	Set frequency (Hz)	0.01Hz	0x7001	28673
30-02	DC bus voltage (V)	0.1V	0x7002	28674
30-03	Output voltage (V)	1V	0x7003	28675
30-04	Output current (A)	0.01A	0x7004	28676
30-05	Output power (kW)	0.1kW	0x7005	28677
30-06	Output torque (%)	0.10%	0x7006	28678
30-07	DI input status	1	0x7007	28679
30-08	Output terminals status	1	0x7008	28680
30-09	AI1 input voltage (V)	0.01V	0x7009	28681
30-10	AI2 input voltage (V)	0.01V	0x700A	28682
30-11	Reserved			
30-12	Count value	1	0x700C	28684
30-13	Length value	1	0x700D	28685
30-14	Motor speed	1RPM	0x700E	28686
30-15	PID set value	0.1%	0x700F	28687
30-16	PID feedback	0.1%	0x7010	28688
30-17	Simple PLC present running step	1	0x7011	28689
30-18 ~ 30-23	Reserved			
30-24	linear speed	1m/Min	0x7018	28696
30-25	Current running time	1Min	0x7019	28697
30-26	Reserved			
30-27	Torque set value	0.1%	0x701B	28699
30-28	Output torque	0.1Nm	0x701C	28700
30-29	Reserved			
30-32	Motor power factor	0.01	0x7020	28704
30-33	Estimated motor frequency	0.01Hz	0x7021	28705

Function code	Name	Minimum unit	Communication address (HEX)	Communication address (DEC)
30-34	AC input current	0.1A	0x7022	28706
30-35	Reserved			

Chapter 5 Trouble Shooting

Fault and Trouble Shooting

Fault Name	VFD short circuit protection
Fault Code	**Err01**
Reason	1. Short-circuit or ground fault occurred at VFD output side 2. The cable connecting the motor with the VFD is too long 3. The module is over-heat 4. The cable connections inside the VFD are loosen 5. The control board is abnormal 6. The power board is abnormal 7. The IGBT module is abnormal
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Install a reactor or output filter 3. Check if the air duct is blocked and if the fan is in normal status, and resolve the existing problems 4. Make sure the cables are connected well 5, 6, 7. Ask for technical support

Fault Name	Over current when acceleration
Fault Code	**Err02**
Reason	1. Short-circuit or ground fault occurred at VFD output side 2. Control mode is vector control but don't perform auto-tuning 3. The acceleration time is too short 4. The manual torque boost or V/f curve is not proper 5. The voltage is too low 6. Start the running motor 7. Load is added suddenly during the acceleration 8. Power selection of VFD is too small

Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the acceleration time 4. Adjust the manual torque boost or V/F curve 5. Make the voltage in the normal range 6. Select speed tracking start or start the motor till it stops 7. Cancel the sudden added load 8. Select bigger power VFD

Fault Name	Over-current when deceleration
Fault Code	**Err03**
Reason	1. Short-circuit or ground fault occurred at VFD output side 2. Control mode is vector control but don't perform auto-tuning 3. The deceleration time is too short 4. The voltage is too low 5. Load is added suddenly during the deceleration 6. Have not installed braking unit and braking resistor
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the deceleration time 4. Make the voltage in the normal range 5. Cancel the sudden added load 6. Install braking unit and braking resistor

Fault Name	Over-current when constant speed running
Fault Code	**Err04**
Reason	1. Short-circuit or ground fault occurred at VFD output 2. Control mode is vector control but don't perform auto-tuning 3. The voltage is too low 4. Load is added suddenly during running 5. Power selection of VFD is too small
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Make the voltage in the normal range 4. Cancel the sudden added load 5. Select bigger power VFD

Fault Name	Over-voltage when acceleration
Fault Code	**Err05**
Reason	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	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	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	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	1. The input voltage is too high 2. There is external force driving the motor to run during the VFD running

Solution	1. Make the voltage in the normal range 2. Cancel the external force or install braking resistor

Fault Name	Under-voltage
Fault Code	**Err09**
Reason	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	1. Fault Reset 2, 3. Make the voltage in the normal range 4, 5, 6. ask for technical support

Fault Name	VFD over load
Fault Code	**Err10**
Reason	1. The load is too heavy or motor blockage occurs 2. Power selection of VFD is too small
Solution	1. Reduce the load, check the status of motor & machinery 2. Select bigger power VFD

Fault Name	Motor over load
Fault Code	**Err11**
Reason	1. FA-00 and PA-01 is set improperly 2. The load is too heavy or motor blockage occurs 3. Power selection of VFD is too small
Solution	1. Set FA-00 and PA-01 properly 2. Reduce the load, check the status of motor & machinery 3. Select bigger power VFD

Fault Name	Input phase failure
Fault Code	**Err12**
Reason	1. The input power supply is abnormal 2. The power board is abnormal 3. The control board is abnormal
Solution	1. Check the power supply and eliminate the troubles 2, 3: ask for technical support

Fault Name	Output phase failure
Fault Code	**Err13**
Reason	1. The connection between VFD 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	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	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	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	DI terminal receives an external fault signal generated by peripheral device
Solution	Find out the fault source, solve it and reset the VFD

Fault Name	Communication (Modbus) fault
Fault Code	**Err16**
Reason	1. Master computer works abnormal 2. Communication cable is abnormal 3. FC group parameters are set improperly
Solution	1. Check the connection of master computer 2. Check the communication connection 3. Set FC group parameters properly

Fault Name	Current detection fault
Fault Code	**Err18**
Reason	1. Hall sensor is abnormal 2. The power board is abnormal
Solution	1. Check hall sensor and connection 2. Replace the power board

Fault Name	Auto-tuning fault
Fault Code	**Err19**
Reason	1. Motor parameters are set improperly 2. Parameter identification process is delayed
Solution	1. Set parameters according to the motor nameplate 2. Check the cables connecting VFD with motor

Fault Name	EEPROM read/write fault
Fault Code	**Err21**

Reason	1. EEPROM chip is broken
Solution	1. Replace the control board

Fault Name	Motor short-circuit to ground
Fault Code	**Err23**
Reason	1. The motor is short-circuit to ground 2. VFD IGBT module damage
Solution	1. Replace cables or motor 2. Replace IGBT or power board

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	Off-load fault
Fault Code	**Err30**
Reason	1. The VFD 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 12-26
Solution	1. Check PID feedback signal or set 12-26 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 VFD is too small.
Solution	1. Reduce the load and detect the motor & machinery condition 2. Select bigger power VFD

Fault Name	Power supply under voltage
Fault Code	**P-lu**
Reason	1. The power supply is under voltage 2. The VFD internal switch power supply or DC bus voltage detection fault 3: The VFD is mismatch with the power supply
Solution	1. Check the power supply of the VFD 2. Check the VFD internal power board and DC bus circuit 3: Check the rated voltage of VFD whether matches with the power supply.

Constant pressure water supply parameter setting case

一、 Description of water supply function:

A. To provide customers with the most concise and easy to understand constant pressure water supply parameters, we only need to face a few parameters and immediately solve the water supply pressure problem on site. Debugging personnel do not need to understand what is PID, gain, or integral, all of which have nothing to do with us!

B. The following menu functions are controlled by default in Bar pressure units. The keyboard displays the pressure feedback value in real-time. When adjusting the UP/DOWN key or encoder UP/DOWN, the pressure target value setting interface will automatically switch. When manually adjusting the pressure value is stopped, the pressure feedback value interface will be delayed to switch back to achieve the goal of real-time monitoring of force and pressure on site (the monitoring content can be switched by pressing the shift key).

C. 00-19=(consult the manufacturer for the constant pressure setting value). After setting this value correctly, the special parameter group 20 for constant pressure water supply will only open. When 00-19=0, the group 20 will automatically close and hide.

D. Preset pressure value from 20-01

The maximum values of all pressure parameters correspond to the range of the 20-00 sensor (two decimal places).

E. 00-19=(consult the manufacturer for this value), some key parameters will be automatically set by default

(Note that when 08-04=1, the following parameters will be restored to general machine parameters)

The following automatically set parameters are relative to the resistive output mode of the pressure gauge

00-02=1, terminal operation mode

00-03=7, frequency source X is a PID function

06-59=00, AI1AI2 input is voltage (0-10V)

06-60=1, set the supply voltage of the pressure sensor to 10V

07-05=4, AO1 output current indication

07-07=0, HDO output frequency indication

08-06=1, UP/DWON adjustment resolution

08-09=0x00ld

08-11=0xc003

12-00=0, PID given source is given numerically

12-02=0, PID feedback source is AI1 (feedback channel can be modified, see instructions)

二、 Water supply function parameter group

Function code	Name	Numeric Range	Factory value	Mail address	Notes
00-19	Industry applications	0-65535	00000	0013H	Consult the manufacturer
20-00	Pressure sensor range	0-100.00Bar	10.00	1400H	Range value of on-site pressure gauge
20-01	Digital pre-set pressure	0-100.00Bar	5.00	1401H	According to on-site pressure requirements
20-02	Sleep pressure	0-100.00Bar	5.00	1403H	Feedback pressure ≥ sleep pressure
20-03	Wake up pressure	0-100.00Bar	4.7	1405H	Feedback pressure<sleep pressure
20-04	Stable pressure deviation	0-100.00Bar	0.05	1402H	Used to overcome pressure fluctuations
20-05	Sleep delay	0-655.35S	60.0	1404H	Delayed arrival entering sleep
20-06	Wake up delay	0-655.35S	0.00	1406H	Delayed arrival start wake-up

1. Some pressure gauges have a unit of Mpa, such as a pressure gauge with a maximum range of 1Mpa, which corresponds to a sensor range of 10Bar and is a 10 fold relationship

2. When the pressure gauge has a 4-20mA current output, please modify the AI input IV type corresponding to 06-59 to select current input type. And modify the AIx input lower limit values 06-42 or 06-47 to 2.00V corresponding to 4mA, 06-60=0 (voltage terminal output+10.6V).

☆ Wiring method: The current source usually requires two 24V power supply lines. The 24V terminal of the frequency VFD is connected to the positive pole of the current type pressure gauge, and the negative pole of the pressure gauge is connected to the AI1 or AI2 terminal. COM and GND are short circuited with wires to form a current sampling circuit that is correctly sampled by the AI terminal