

GK3000 SINGLE PHASE VFD

User Manual



1. Product confirmation



GK3000 single phase VFDs is mainly positioned as a high-end market for OEM customers and the specific requirements of fan and pump load applications, its flexible design, both embedded SVC and VF control in one, can be widely used for speed control accuracy, torque response speed, low-frequency output characteristics and other situations with higher requirements.

This user manual supplies a detailed description of GK3000 single phase VFDs includes product characterization, structural features, parameter setting, operation and commissioning, inspection maintenance and other contents. Be sure to carefully read through the safety precautions before use, and use this product on the premise that personnel and equipment safety is ensured.






IMPORTANT NOTES







- To illustrate the details of the products, pictures in this manual based on products with outer casing or safety cover being removed. When using this product, please be sure to well install outer casing or covering by the rules, and operating in accordance with the manual contents;
- The illustrations this manual for illustration only and may vary with different products you have ordered;
- The company is committed to continuous improvement of products, product features will continue to upgrade, and the information provided is subject to change without notice.




Safety signs in this manual

 DANGER	indicates the situation in which the failure to follow operating requirements may result in fire or serious personal injury or even death.
 CAUTION	indicates the situation in which the failure to follow operating requirements may cause moderate or slight injury and damage to equipment.

2. Safety Precautions

Use Stage	Safety Grade	Precautions
Before Installation	 DANGER	<ul style="list-style-type: none"> ◇ Do not install the product if the package is with water, or component is missing or broken; ◇ Do not install the product if the label on the package is not identical to that on the VFD.
	 CAUTION	<ul style="list-style-type: none"> ◇ Be careful of carrying or transportation. Risk of devices damage; ◇ Do not use damaged product or the VFDs missing component .Risk of injury; ◇ Do not touch the parts of control system with bare hands. Risk of ESD hazard.
Installation	 DANGER	<ul style="list-style-type: none"> ◇ Installation base shall be metal or other non-flammable material. Risk of fire; ◇ Do not install VFD in an environment containing explosive gases, otherwise there is danger of explosion; ◇ Do not unscrew the fixing bolts, especially the bolts with red mark.
	 DANGER	<ul style="list-style-type: none"> ◇ Do not leave cable strips or screws in the VFD. Risk of VFD damage; ◇ Install the product at the place with less vibration and no direct sunlight; ◇ Consider the installation space for cooling purpose when two or more VFDs are placed in the same cabinet.
Wiring	 DANGER	<ul style="list-style-type: none"> ◇ Wiring must be performed by authorized and qualified personnel. Risk of danger; ◇ Circuit-breaker should be installed between VFD and the mains. Risk of fire; ◇ Make sure the input power supply has been completely disconnected before wiring. Failure to comply may result in personnel injury and/or equipment damage; ◇ Since overall leakage current of this equipment may be bigger than 3.5mA, for safety's sake, this equipment and its associated motor must be well grounded so as to avoid risk of electric shock;

Use Stage	Safety Grade	Precautions
Wiring	 DANGER	<ul style="list-style-type: none"> ◇ Never connect the power cables to the output terminals (U,V,W) of the VFD. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the VFD; ◇ Install braking resistors at terminals (P+)and (P- or PB) only. Failure to comply may result in equipment damage.
	 CAUTION	<ul style="list-style-type: none"> ◇ Since all adjustable frequency VFDs from Gozuk have been subjected to hi-pot test before delivery, users are prohibited from implementing such a test on this equipment. Failure to comply may result in equipment damage. ◇ Signal wires should to the best of the possibility be away from main power lines. If this cannot be ensured, vertical cross-arrangement shall be implemented, otherwise interference noise to control signal may occur. ◇ If motor cables are longer than 100m, it is recommended output AC reactor be used. Failure to comply may result in faults.
Before Power-on	 DANGER	<ul style="list-style-type: none"> ◇ VFD shall be power-on only after the front cover is assembled. Risk of electrical hazard.
	 CAUTION	<ul style="list-style-type: none"> ◇ Verify that the input voltage is identical to the rated voltage of product, correct wiring of input terminals R,S, T or L1, L2 and output terminals U, V, and W, wiring of VFD and its peripheral circuits, and all wires should be in good connection. Risk of VFD damage.
After Power-on	 DANGER	<ul style="list-style-type: none"> ◇ Do not open the cover after power. Rick of electrical hazard; ◇ Do not touches any input/output terminals of VFD with bare hands. Rick of electrical hazard.
	 CAUTION	<ul style="list-style-type: none"> ◇ If auto tuning is required, be careful of personal injury when motor is running. Risk of accident; ◇ Do not change the defaults of parameters. Risk of devices damage.

Use Stage	Safety Grade	Precautions
During Operation		<ul style="list-style-type: none"> ◇ Non-professionals shall not detect signals during operation. Risk of personal injury or device damage; ◇ Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt.
		<ul style="list-style-type: none"> ◇ Prevent any foreign items from being left in the devices during operation. Risk of device damage; ◇ Do not control start/stop of VFD by ON/OFF of contactor. Risk of device damage.
Maintenance		<ul style="list-style-type: none"> ◇ Maintenance and inspection can only be performed by professionals. Risk of personal injury; ◇ Maintain and inspect devices after power is off. Risk of electric hazard; ◇ Repair or maintain the VFD only ten minutes after the VFD is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury; ◇ All pluggable components can be inserted or pulled out only when power has been turned off; ◇ Set and check the parameters again after the VFD is replaced.

3. Safety Precautions

3.1 Installation Environment

- Please mount inside a well-ventilated location. The ambient temperature is required to be within the range of -10~40°C. If the temperature is higher than 40 °C, the VFD should be de-rated, at the same time the ventilation and heat dissipation should be enhanced.
- Be away from the location full of dust or metal powder, and mount in the location free of direct sunlight.
- Mount in the location free of corrosive gas or combustible gas.
- Humidity should be lower than 90% with no dew condensation.
- Mount in the location where vibration is less than 5.9m/s² (0.6G) .
- Please try to keep the VFD away from EMI source and other electronic devices which are sensitive to EMI.

3.2 Mounting Space and Direction

- Generally in vertical way.
- For the requirements on mounting space and distance, refer to Fig.3-1.
- When several VFDs are installed in one cabinet, they should be mounted in parallel with special incoming and out coming ventilation and special fans. When two VFDs are mounted up and down, an air flow diverting plate should be fixed as shown in Fig.3-2 to ensure good heat dissipation.

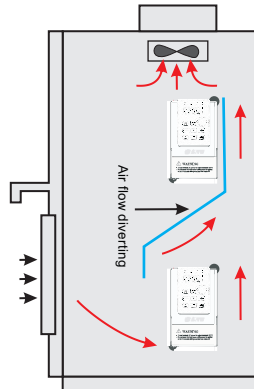
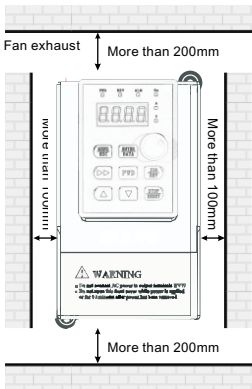


Figure 3-1 Mounting space and distance Figure 3-2 Mounting of multiple VFDs

4. Standard Wiring

4.1 Main circuit wiring diagram

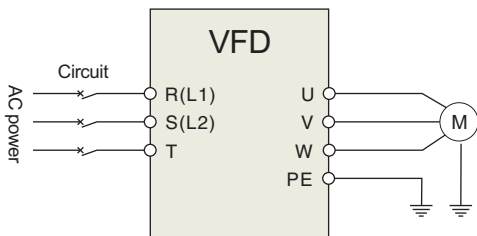


Figure 4-1 Main circuit wiring

4.2 Main Circuit Terminals Diagram

Apply to	Main circuit terminal	Terminal name	Function
220V 1-phase 0.4KW~5.5KW		L1, L2	220V 1-phase Input terminals
		U, V, W	220V 1/3-phase Output terminals
		E	Earthing
220V 1-phase 7.5KW~15KW		R, S, T	220V 1-phase Input terminals
		U, V, W	220V 1/3-phase Output terminals
		P+, PB	Braking resistor wiring terminals
220V 1-phase 18.5KW~75KW		R, S, T	220V 1-phase Input terminals
		U, V, W	220V 1/3-phase Output terminals
		P+, P-	Braking resistor wiring terminals

Table 4-1 Description of Main Circuit input/output terminals

4.2 Basic Wiring Diagram

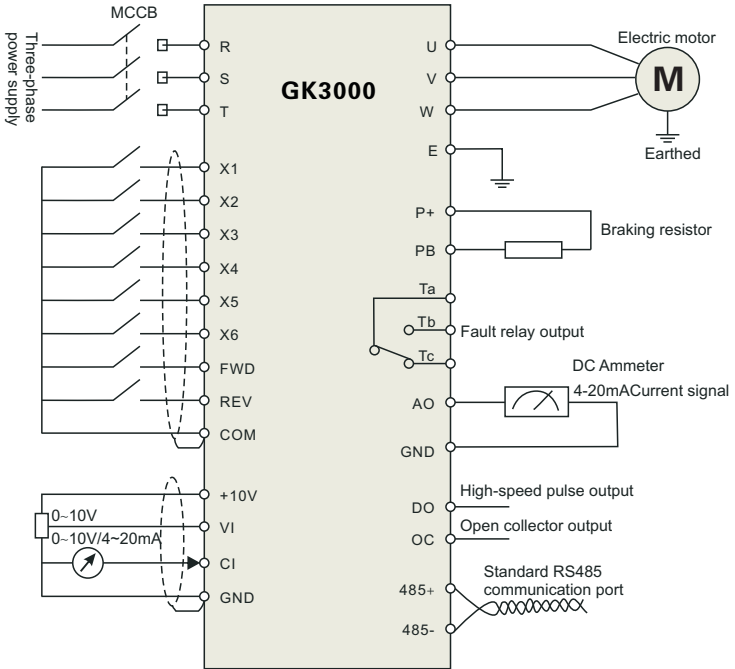


Figure 4-2 Basic Wiring Diagram

4.3 Wiring With Single phase motor

4.3.1 Single phase motor introduction

Single phase motor generally means asynchronous single phase motor powered by single phase AC 220V, there're two phase winding in motor stator and motor rotor is common squirrel cage. The distribution of two phase winding and different power supply will lead to different starting characteristics and operating characteristics

Usually single phase motor is with single capacitor or double capacitor, photos of motor are as below:

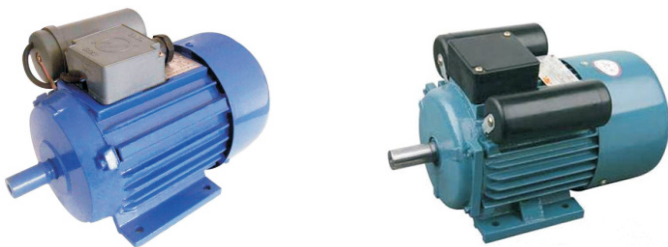


Figure 4-3 Motor with single capacitor and double capacitor

Single phase motor is consisted of main winding, secondary winding, capacitor and centrifugal switch, internal wiring of single phase motor with single capacitor is as below:

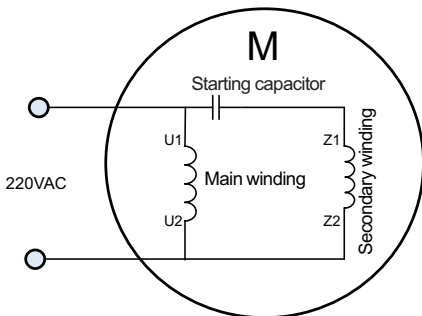


Figure 4-4 Operation mode: Internal wiring of motor with single capacitor

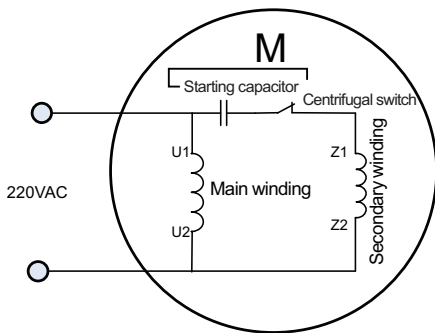


Figure 4-5 Starting mode: Internal wiring of motor with single capacitor

Internal wiring of single phase motor with double capacitors is as below:

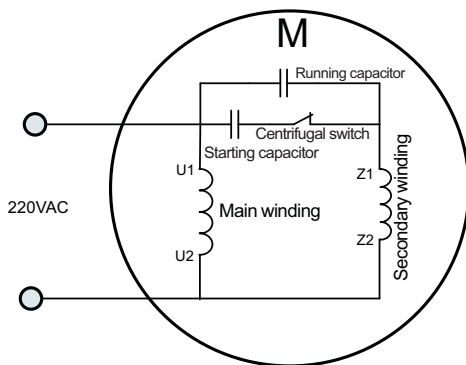


Figure 4-6 Internal wiring of motor with double capacitors

Resistor starting mode single phase motor, and internal wiring is as below:

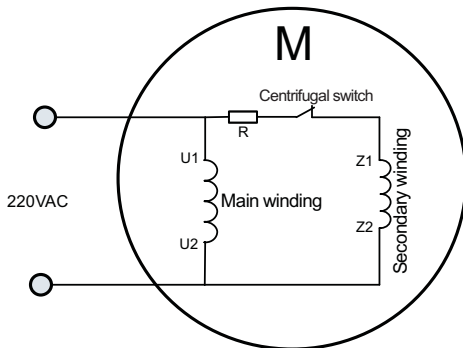


Figure 4-7 Resistor starting mode: Internal wiring of motor

After removing the capacitors from above motors, remain 4 main and secondary winding terminals as below:

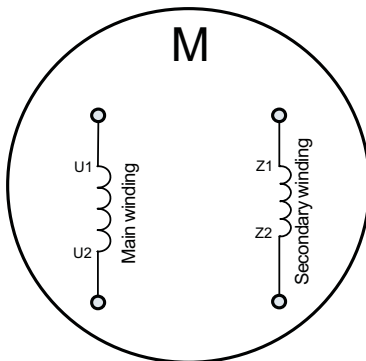


Figure 4-8 Main and secondary winding of motor (After removing the capacitors)

4.3.2 Wiring between VFD and motor (Capacitor removable)

Connect main and secondary winding of motor to VFD UVW, then VFD can work. But due to the motor winding difference, motor forward wiring must be as below, if not cause motor too heat.

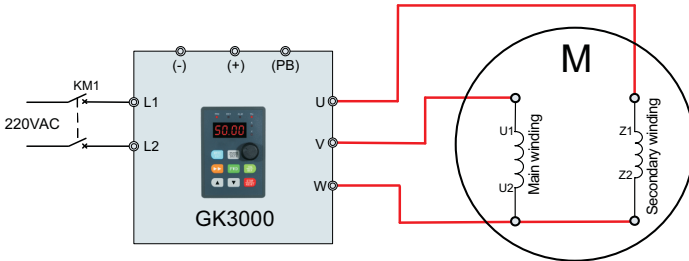


Figure 4-9 Forward wiring between GK3000 ($\leq 0.75\text{Kw}$) and motor

Motor reverse can't be completed through parameter setting of VFD or change any two phase wirings, motor reverse wiring must be as below:

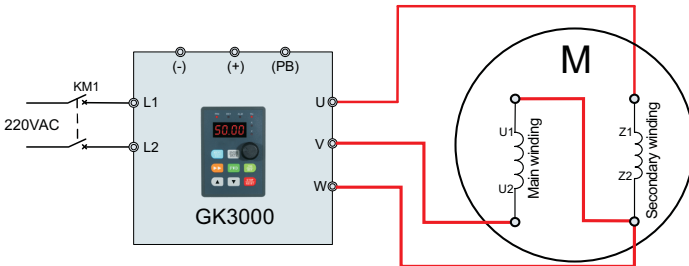


Figure 4-10 Reverse wiring between GK3000 ($\leq 0.75\text{Kw}$) and motor

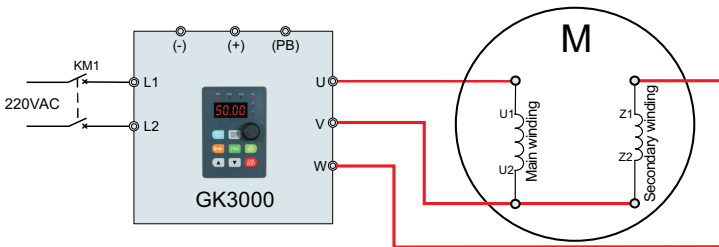


Figure 4-11 Forward wiring between GK3000 (> 0.75kW) and motor

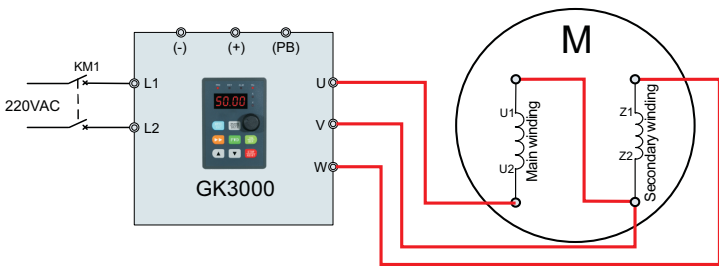


Figure 4-12 Reverse wiring between GK3000 (> 0.75kW) and motor

Note: After wiring completed, need to set P9.13=1(Thousand's digit).

4.3.3 Wiring between VFD and motor (Non-removable capacitor)

If the capacitor in motor is Non-removable, the wiring is as below. The forward and reverse is determined by VW wiring sequence.

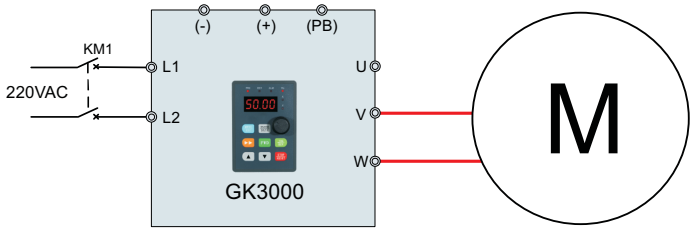


Figure 4-13 Wiring between GK3000 (<=0.75Kw) and motor

The forward and reverse is determined by UV wiring sequence.

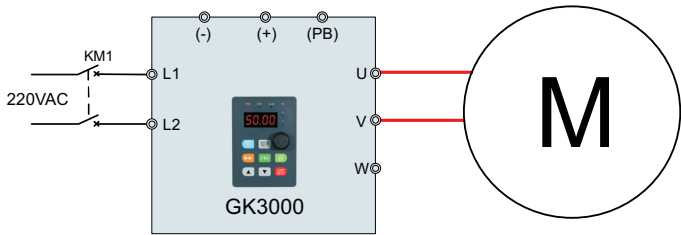


Figure 4-14 Wiring between GK3000 (<=0.75Kw) and motor

Note: After wiring completed, need to set P9.13=2(Thousand's digit)

5. Keyboard












Figure 5-1 Control panel diagram

5.1 Keyboard indicator

Item		Function description		
Display function	Digital display	Display VFD's running state parameters and setting parameters		
	State indicator	A、Hz、V	The physical units correspond to presently digital display parameters (current is ampere A, voltage is volt V, frequency is Hertz Hz) .	
		MOD	In the non-monitoring state, the indicator is on. If there is no press for one minute, the indicator is off and returns to the monitoring state.	
		ALM	The alarm indicator, indicates that the VFD is currently in an overcurrent or overvoltage state or a fault alarm state.	
		FWD	Forward indicator, indicates that the VFD outputs positive phase sequence. When the motor is connected, the motor rotates forward.	If the FWD and REV indicators are on at the same time, it indicates that the VFD is working in DC braking state.
		REV	Reverse indicator, indicates that the VFD output reverse phase sequence, when the motor is connected, the motor is reversed.	

5.2 Keyboard function

Key	Item	Function description
	MENU/ESC key	Enter or exit programming state
	Shift/monitor	In the editing state, the modification bit of the setting data can be selected; in other states, the display state monitoring parameter can be switched
	Shift/monitor	Enter the submenu or data confirmation
	Reserve/Jog key	In the operation keyboard mode, press this key to reverse or jog according to the one-bit setting of parameter P3.46.
	Forward key	In the operation keyboard mode, press this key to run the VFD in forward
	Stop/reset key	When the VFD is in normal running state, if the running command channel of the VFD is set to the keypad stop effective mode, press this button, the VFD will stop according to the set mode. When the VFD is in the fault state, press this button to reset the VFD and return to the normal shutdown state
	Analog potentiometer	For frequency given; when P0.01=0, the analog potentiometer is set to frequency given
	UP key	Increment of data or function code (increasing the incremental speed when pressed continuously)
	DOWN key	Decrement of data or function code (increasing decrement speed when pressed continuously)

6. Function Code Table

“○”: means that the parameter can be modified during running state.

“×”: means that the parameter can not be modified during running state.

“*”: means read-only parameter which can not be modified.

Func Code	Name	Range	Min Unit	Factory Default	Modify
P0 Group: Basic running function parameter					
P0.00	Control mode selection	0 : V/F Control 1 : Senseless vector control	1	0	○
P0.01	Freq control channel selection	0 : Analog potentiometer on control panel(single display valid) 1 : ▲、▼key on control panel(single display valid) Panel digital potentiometer+▲、▼key on control panel(double display valid) 2 : Digital setting 1,control panel given 3 : Digital setting 2, UP/DOWN terminal given 4 : Digital setting 3, serial port given 5 : VI analog given (VI-GND) 6 : CI analog given(CI-GND) 7 : Pulse terminal given(PULSE) 8 : Combination given (refer to P3.00)	1	0	○
P0.02	Running frequency set	P0.19lower limit freq.~P0.20upper limit freq.	0.01HZ	50.00HZ	○
P0.03	Running command mode selection	0 : Control panel mode 1 : Terminal control mode 2 : Serial port control mode	1	0	○
P0.04	Running direction setting	Unit's digit: 0: Forward 1:Reverse Ten's digit: 0:REV allowed 1:REV prohibited	1	10	○
P0.05	FWD/REV dead time	0.0~120.0s	0.1s	0.1s	○

Func Code	Name	Range	Min Unit	Factory Default	Modify
P0.06	Max output freq.	50.00Hz~500.00Hz	0.01HZ	50.00HZ	×
P0.07	Basic running freq	1.00Hz~500.00Hz	0.01HZ	50.00HZ	×
P0.08	Max output voltage	1~480V	1V	VFD rated voltage	×
P0.09	Torque boost	0.0%~30.0%	0.1%	2.0%	×
P0.10	Torque boost cut-off freq.	0.00Hz~Basic running freq.P0.07	0.00	50.00Hz	○
P0.11	Torque boost mode	0: Manual 1: Auto	1	0	○
P0.12	Carrier freq	1.0K~14.0K	0.1K	8.0K	×
P0.13	Acc/Dec mode selection	0: Linear Acc/Dec 1: Curve Acc/Dec	1	0	×
P0.14	Time of S curve start stage	10.0%~50.0% (Acc/Dec time) P0.14+P0.15 < 90%	0.1%	20.0%	○
P0.15	Time of S curve ascent stage	10.0%~80.0% (Acc/Dec time) P0.14+P0.15 < 90%	0.1%	60.0%	○
P0.16	Acc/Dec time unit	0: Second 1: Minute	0	0	×
P0.17	Acc time 1	0.1~6000.0	0.1	20.0	○
P0.18	Dec time 1	0.1~6000.0	0.1	20.0	○
P0.19	Upper limit freq.	Lower limit freq. ~Max output freq.P0.06	0.01Hz	50.00Hz	×
P0.20	Lower limit freq.	0.00Hz~Upper limit freq.	0.01Hz	0.00Hz	×
P0.21	Lower limit freq. Running mode	0: Running at lower limit freq 1: Stopping	1	0	×
P0.22	V/F curve setting	0: Constant torque curve 1: Reduced torque curve 1 (1.2 times the power) 2: Reduced torque curve 2 (1.7 times the power) 3: Reduced torque curve 3 (2.0 times the power) 4: Customized V/F curve	1	0	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P0.23	V/F Freq.valueP3	P0.25~P0.07 Basic running freq.	0.01Hz	0.00Hz	×
P0.24	V/F Volt.valueV3	P0.26~100.0%	0.1%	0.0%	×
P0.25	V/F Freq.valueP2	P0.27~P0.23	0.01Hz	0.00Hz	×
P0.26	V/F Volt.valueV2	P0.28~P0.24	0.1%	0.0%	×
P0.27	V/F Freq.valueP1	0.00~P0.25	0.01Hz	0.00Hz	×
P0.28	V/F Volt.valueV1	0~P0.26	0.1%	0.0%	×
P1 Group: Basic running function parameter					
P1.00	Analog filtering time constant	0.01~30.00s	0.01s	0.20s	○
P1.01	VI channel gains	0.01~9.99	0.01	1.00	○
P1.02	VI min given	0.00~P1.04	0.01Hz	0.00V	○
P1.03	Corresponding freq. to VI min given	0.00~Upper limit freq.	0.01Hz	0.00Hz	○
P1.04	VI max given	P1.04~10.00V	0.01V	10.00V	○
P1.05	Corresponding freq. to VI max given	0.00~Upper limit freq.	0.01Hz	50.00Hz	○
P1.06	CI channel gains	0.01~9.99	0.01	1.00	○
P1.07	CI min given	0.00~P1.09	0.01V	0.00V	○
P1.08	Corresponding freq. to CI min given	0.00~Upper limit freq	0.01Hz	0.00Hz	○
P1.09	CI max given	P1.07~10.00V	0.01V	10.00V	○
P1.10	Corresponding freq. to CI max given	0.00~Upper limit freq	0.01Hz	50.00Hz	○
P1.11	Max input pulse freq	0.1~20.0K	0.1K	10.0K	○
P1.12	Pulse min given	0.0~P1.14(Pulse max given)	0.1K	0.0K	○
P1.13	Corresponding freq. to pulse min given	0.00~Upper limit freq	0.01Hz	0.00Hz	○
P1.14	Pulse max given	P1.12(Pulse min given)~P1.11(Max input pulse freq.)	0.1K	0.1K	○
P1.15	Corresponding freq. to pulse max given	0.00~Upper limit freq	0.01Hz	50.00Hz	○

Func Code	Name	Range	Min Unit	Factory Default	Modify
P2 Group: Start/Brake function parameter					
P2.00	Start running mode	0: Start from start freq. 1: Brake first, then start from start freq. 2: Track speed, then start.	1	0	×
P2.01	Start freq.	0.40~20.00Hz	0.01Hz	0.50Hz	○
P2.02	Start freq. running duration	0.0~30.0s	0.1s	0.0s	○
P2.03	DC brake current as start	0~15%	1%	0%	○
P2.04	DC brake time as start	0.0~60.0s	0.1s	0.0s	○
P2.05	Stop mode	0: Dec 1: Free Stop 2: Dec+ DC brake	1	0	×
P2.06	Start freq. of DC brake as stop	0.0~15.00Hz	0.0Hz	3.00Hz	○
P2.07	DC brake time as stop	0.0~60.0s	0.1s	0.0s	○
P2.08	DC brake current as stop	0~15%	1%	0%	○
P3 Group :Auxiliary running parameter					
P3.00	Freq. control channel combination	0: VI+CI 1: VI-CI 2: External pulse given+VI+ control panel▲、▼key given 3: External pulse given-VI-control panel▲、▼key given 4: External pulse given+CI 5: External pulse given-CI 6: RS485 given+VI+ control panel▲、▼key given 7: RS485 given-VI-control panel▲、▼key given 8: RS485 given+CI+ control panel▲、▼key given	1	0	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P3.00	Freq. control channel combination	9: RS485 given – CI – control panel▲、▼key given 10: RS485 given + CI + External pulse given 11: RS485 given – CI – External pulse given 12: RS485 given + VI + External pulse given 13: RS485 given – VI – External pulse given 14: VI + CI + control panel▲、▼key given + digital given (P0.02) 15: VI + CI – control panel▲、▼key given + digital given (P0.02) 16: MAX (VI, CI) 17: MIN (VI, CI) 18: MAX (VI, CI, PULSE) 19: MIN (VI, CI, PULSE) 20: VI, CI(Availability except 0,VI prior) 21: VI+ Terminal UP/DOWN 22: CI+ Terminal UP/DOWN	1	0	×
P3.01	Parameter initialization setting	LED unit's digit: 0: All parameters are allowed to be modified. 1: All parameters are not allowed to be modified except this parameter itself. 2: All parameters are not allowed to be modified except P0.02 parameter and this parameter itself LED ten's digit: 0: Inaction 1: Factory default reset 2: Clear history fault record	1	0	×
P3.02	Parameter copy	0: Inaction 1: Parameter upload 2: Parameter download Note: only valid in remote control mode	1	0	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P3.03	Auto energy save running	0: Inaction 1: Action	1	0	×
P3.04	AVR function	0: Inaction 1: Always action 2: Inaction only in Dec	1	0	×
P3.05	Slip freq. compensation	0~150%	1%	0%	×
P3.06	JOG running freq.	0.10~50.00Hz	0.01Hz	5.00Hz	○
P3.07	JOG Acc time	0.1~60.0s	0.1s	20.0s	○
P3.08	JOG Dec time	0.1~60.0s	0.1s	20.0s	○
P3.09	Communication configuration	LED unit's place: baud rate selection 0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS LED ten's place: data format 0: 1-7-2 Format, without check 1: 1-7-1 Format, odd parity check 2: 1-7-1 Format, even parity check 3: 1-8-2 Format, without check 4: 1-8-1 Format, odd parity check 5: 1-8-1 Format, even parity check 6: 1-8-1 Format, without check LED hundred's place: communication mode 0: MODBUS, ASCII Mode 1: MODBUS, RTU Mode	1	005	×
P3.10	Local address	0~248 0: Broadcast address 248: Host address	1	1	×
P3.11	Communication overtime detection time	0.0~1000.0s 0.0: Function invalid	0.1s	0.0s	×
P3.12	Local response delay	0~1000ms	1s	5ms	×
P3.13	Multi-running proportion	0.01~1.00	0.01	1.00	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P3.14	Acc time2	0.1~6000.0	0.1	20.0	○
P3.15	Dec time2	0.1~6000.0	0.1	20.0	○
P3.16	Acc time3	0.1~6000.0	0.1	20.0	○
P3.17	Dec time3	0.1~6000.0	0.1	20.0	○
P3.18	Acc time4	0.1~6000.0	0.1	20.0	○
P3.19	Dec time4	0.1~6000.0	0.1	20.0	○
P3.20	Acc time5	0.1~6000.0	0.1	20.0	○
P3.21	Dec time5	0.1~6000.0	0.1	20.0	○
P3.22	Acc time6	0.1~6000.0	0.1	20.0	○
P3.23	Dec time6	0.1~6000.0	0.1	20.0	○
P3.24	Acc time7	0.1~6000.0	0.1	20.0	○
P3.25	Dec time7	0.1~6000.0	0.1	20.0	○
P3.26	Multi-stage freq.1	Multi-stage freq.1	0.01Hz	5.00Hz	○
P3.27	Multi-stage freq.2	Multi-stage freq.2	0.01Hz	10.00Hz	○
P3.28	Multi-stage freq.3	Multi-stage freq.3	0.01Hz	20.00Hz	○
P3.29	Multi-stage freq.4	Multi-stage freq.4	0.01Hz	30.00Hz	○
P3.30	Multi-stage freq.5	Multi-stage freq.5	0.01Hz	40.00Hz	○
P3.31	Multi-stage freq.6	Multi-stage freq.6	0.01Hz	45.00Hz	○
P3.32	Multi-stage freq.7	Multi-stage freq.7	0.01Hz	50.00Hz	○
P3.33	Jump freq.1	0.00~500.00Hz	0.01Hz	0.00Hz	×
P3.34	Jump freq.1range	0.00~30.00Hz	0.01Hz	0.00Hz	×
P3.35	Jump freq.2	0.00~500.00Hz	0.01Hz	0.00Hz	×
P3.36	Jump freq.2range	0.00~30.00Hz	0.01Hz	0.00Hz	×
P3.37	Reserved	0000~9999	1	0000	×
P3.38	Zero frequency DC braking voltage	0.0%~15.0%	0.1%	0.0%	×
P3.39	Set running time	0~65.535K hour	0.001K	0.000K	○

Func Code	Name	Range	Min Unit	Factory Default	Modify
P3.40	Total running	0~65.535K hour	0.001K	0.000K	○
P3.41	Inspection speed start wait time	00.0~60.0	0.1s	2.0 s	○
P3.42	Inspection speed and start the	00.0~150.0%	0.1%	100.0 %	○
P3.43	Running display parameter selection1	00~15	1	00	○
P3.44	Stop display parameter selection 2	00~15	1	00	○
P3.45	No unit display coefficient	0.1~60.0	0.1	29.0	○
P3.46	JOG/REV Switching control	0: Select the JOG point operation 1: Select the REV reverse operation	1	0	×
P4 Group: Terminal control function parameter					
P4.00	Input terminal X1 function selection	0: Idle terminal 1: Multi-stage speed control terminal 1 2: Multi-stage speed control terminal 2 3: Multi-stage speed control terminal 3 4: External FWD JOG control input 5: External REV JOG control input 6: Acc/Dec time terminal 1 7: Acc/Dec time terminal 2 8: Acc/Dec time terminal 3 9: 3-wire control 10: Free stop input (FRS) 11: External stop command 12: Stopping DC brake input command DB 13: VFD running prohibited 14: Freq. increase command(UP) 15: Freq. decrease command(DOWN) 16: Acc/Dec prohibited command 17: External reset input (clear fault) 18: Peripheral equipment fault input (normally open) 19: Freq. control channel selection 1 20: Freq. control channel selection 2 21: Freq. control channel selection 3 22: Command switched to terminal 23: Running command control mode selection 1	1	0	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P4.00	Input terminal X1 function selection	24: Running command control mode selection 2 25: Swing frequency selection 26: Swing frequency running reset 27: Close loop invalid 28: Simple PLC pause running command 29: PLC invalid 30: PLC Reset in stopping state 31: Freq. switch to CI 32: Counter trig signal input 33: Counter clear input 34: External interrupt input 35: Pulse freq. input (only valid for X6) 36: Fire mode	0.1	20.0	○
P4.01	Input terminal X2 function selection	Ditto	1	0	×
P4.02	Input terminal X3 function selection	Ditto	1	0	×
P4.03	Input terminal X4 function selection	Ditto	1	0	×
P4.04	Input terminal X5 function selection	Ditto	1	0	×
P4.05	Input terminal X6 function selection	Ditto	1	0	×
P4.06	Input terminal X7 function selection	Ditto	1	0	×
P4.07	Input terminal X8 function selection	Ditto	1	0	×
P4.08	FWD/REV running mode selection	0: 2-wire control mode 1 1: 2-wire control mode 2 2: 3-wire control mode 1 3: 3-wire control mode 2	1	0	×
P4.09	UP/DN Rate	0.01-99.99Hz/s	0.01	1.00 Hz/s	○

Func Code	Name	Range	Min Unit	Factory Default	Modify
P4.10	2-way open collector output terminal OC1 output selection	0: VFD in running(RUN) 1: Freq. arrival signal(FAR) 2: Freq. level detected signal(FDT1) 3: Reserved 4: Overload pre-alarm signal(OL) 5: Under voltage locking(LU) 6: External fault stopping (EXT) 7: Output freq. upper limit(FH) 8: Output freq. lower limit(FL) 9: VFD in zero speed running 10: Simple PLC stage running finish 11: A PLC running cycle finish 12: Set counts arrival 13: Specified counts arrival 14: VFD ready for running(RDY) 15: VFD fault 16: Start freq. running time 17: DC brake time when start 18: DC brake time when stop 19: Swing freq. upper/lower limit 20: Set running time arrival 21: Upper limit of pressure alarm signal 22: Lower pressure alarm signal	1	0	×
P4.11	2-way open collector output terminal OC2 output selection	Ditto	1	0	×
P4.12	Relay TA/TB/TC output selection	Ditto	1	15	×
P4.13	Relay RA/RB/RC output selection	Ditto	1	0	×
P4.14	Freq. arrival detection range	0.00~400.00Hz	0.01Hz	5.00Hz	×
P4.15	FDT1(freq. level)	0.00~Upper limit freq	0.01Hz	10.00Hz	×

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Func Code	Name	Range	Min Unit	Factory Default	Modify
P4.16	FDT1 lag	0.00 ~ 50.00Hz	0.01Hz	1.00Hz	○
P4.17	Analog output (Ao1) selection	unit's place: Output freq.(0 ~ upper limit freq.) 1: Output current(0 ~ 2 times motor rated current) 2: Output voltage(0 ~ 1.2 times VFD rated voltage) 3: Bus bar voltage 4: PID given 5: PID feedback 6: VI (0 ~ 10V) 7: CI(0 ~ 10V/4 ~ 20mA) ten's place: 0: 0 ~ 10V 1: 0 ~ 20mA 2: 4 ~ 20mA	01	00	○
P4.18	Analog	Analog output (AO1) gain	0.01	1.00	○
P4.19	Analog output (AO2) selection	unit's place: Output freq.(0 ~ upper limit freq.) 1: Output current(0 ~ 2 times motor rated current) 2: Output voltage(0 ~ 1.2 times VFD rated voltage) 3: Bus bar voltage 4: PID given 5: PID feedback 6: Vi (0 ~ 10V) 7: CI(0 ~ 10V/4 ~ 20mA) ten's place: 0: 0 ~ 10V 1: 0 ~ 20mA 2: 4 ~ 20mA	01	00	○
P4.20	Analog output (AO2) gain	0.50 ~ 2.00	0.01	1.00	○
P4.21	DO output terminal	unit's place: 0: Output freq.(0 ~ upper limit freq.) 1: Output current(0 ~ 2 times motor rated current) 2: Output voltage(0 ~ 1.2 times VFD rated voltage)	1	0	○

Func Code	Name	Range	Min Unit	Factory Default	Modify
P4.21	DO output terminal	3: Bus bar voltage (0~800V) 4: PID given 5: PID feedback 6: VI (0~10V) 7: CI(0~10V/4~20mA)	1	0	○
P4.22	DO max pulse output freq.	0.1K~20.0K (max 20KHz)	0.1KHz	10.0KHz	○
P4.23	Set counts given	F4.20~9999	1	0	○
P4.24	Specified counts given	0~F4.19	1	0	○
P4.25	Overload pre-alarm detection level	20%~200%	1	130%	○
P4.26	Overload pre-alarm delay time	0.0~20.0s	0.1s	5.0s	○
P5 Group: Protection function parameter					
P5.00	Motor overload protection mode selection	0 : Stop outputting 1 : Inaction	1	0	×
P5.01	Motor overload protection coefficient	20~120%	1	100%	×
P5.02	Overvoltage stall Selection	0 : Prohibited 1 : Allowed	1	1	×
P5.03	Overvoltage stall point	380V : 120 ~ 150% 220V : 110 ~ 130%	1%	140% 120%	○
P5.04	Auto current limit level	110%~200%	1%	150%	×
P5.05	Freq. drop rate during current limit	0.00~99.99Hz/s	0.01Hz /s	10.00Hz /s	○
P5.06	Auto current limit mode selection	0 : Constant speed invalid 1 : Constant speed valid Note: Acc/Dec valid	1	1	×
P5.07	Restart setting after power failure	0 : Inaction 1 : Action	1	0	×
P5.08	Restart waiting time after power failure	0.0~10.0s	0.1s	0.5s	×
P5.09	Fault self-recovery times	0~10 0 : Self-recovery invalid Note : Self-recovery invalid in overload or overheat	1	0	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P5.10	Self-recovery interval time	0.5 ~ 20.0s	0.1s	5.0s	×
P5.11	Input missing phase protection	0 : Inaction 1 : Action	1	0	○
P6 Group: Fault record function parameter					
P6.00	Previous failure record	Previous failure record	1	0	*
P6.01	Output frequency at the previous fault	Output frequency at the previous fault	0.01Hz	0	*
P6.02	Set frequency at the previous fault	Set frequency at the previous fault	0.01Hz	0	*
P6.03	Output current at the previous fault	Output current at the previous fault	0.1A	0	*
P6.04	Output voltage at the previous fault	Output voltage at the previous fault	1V	0	*
P6.05	DC bus voltage at the previous fault	DC bus voltage at the previous fault	1V	0	*
P6.06	Module temperature at the previous fault	Module temperature at the previous fault	10C	0	*
P6.07	Previous secondary fault record	Previous secondary fault record	1	0	*
P6.08	Previous third failure records	Previous third failure records	1	0	*
P6.09	Previous fourth failure record	Previous fourth failure record	1	0	*
P6.10	Previous fifth failure record	Previous fifth failure record	1	0	*
P6.11	Previous sixth failure record	Previous sixth failure record	1	0	*
P7 Group: Close loop running control function parameter					
P7.00	Close loop running control selection	0: Invalid 1: Valid	1	0	×
P7.01	Close loop given channel selection	0: P7.05 Digital given + panel ▲、▼Fine tuning 1: VI analog 0~10V voltage given 2: CI analog 0~10V given 3: Panel analog potentiometer given 4: RS485 communication given 5: Pulse input given 6: CI simulation4~20mA Current setting	1	0	×
P7.02	Feedback channel selection	0: VI analog 0~10V input voltage 1: CI analog input (0~10V/0~20mA) 2: VI+CI 3: VI-CI	1	0	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P7.02	Feedback channel selection	4: Min { VI , CI } 5: Max { VI , CI } 6: CI analog input (4~20mA)	1	0	×
P7.03	Given channel filtering time constant	0.01~50.00s	0.01s	0.50s	○
P7.04	Feedback channel filtering time constant	0.01~50.00s	0.01s	0.50s	○
P7.05	Given value digital setting	0.001~20.000Mpa	0.001 Mpa	0.000Mpa	×
P7.06	Close loop adjustment characteristics	0: Positive effect 1: Negative effect	1	0	○
P7.07	Feedback channel gain	0.01~10.00	0.01	1.00	○
P7.08	Lower pressure limit	0.001~P7.09	0.001	0.001	○
P7.09	Upper pressure limit	P7.08~P7.27	0.001	1.000	○
P7.10	PID Controller structure	0: Proportional control 1: Integral control 2: Proportional integral control 3: Proportional, integral and differential control	1	1	×
P7.11	Proportional gain KP	0.00~5.00	0.01	0.50	○
P7.12	Integral time constant	0.1~100.0s	0.1	10.0s	○
P7.13	Differential gain	0.0~5.0	0.1	0.0	×
P7.14	Sampling period	0.01~1.00s	0.01	0.10	○
P7.15	Tolerance limit	0.0~20.0%	0.1%	0.0%	○
P7.16	PID Feedback disconnected detection threshold	0~Upper limit freq	0.01Hz	0.00Hz	○
P7.17	PID Feedback disconnected action selection	0~3	1	0	○
P7.18	PID Feedback disconnected operation delay time	0.01~5.00s	0.01s	1.00s	○

Func Code	Name	Range	Min Unit	Factory Default	Modify
P7.19	Pressure level.	0.001 ~ P7.20	0.001 Mpa	0.001Mpa	○
P7.20	Hibernation pressure level	P7.19 ~ P7.27	01	00	○
P7.21	Hibernation level continuous time	0 ~ 250s	1s	10s	○
P7.22	Hibernation frequency	0.00 ~ 400.0Hz	0.01Hz	20.00Hz	○
P7.23	Hibernation frequency continuous time	0 ~ 250s	1s	10s	○
P7.24	Low alarm limit pressure	0.001 ~ P7.25	0.001 Mpa	0.001Mpa	○
P7.25	The alarm limit pressure	P7.24 ~ P7.27	0.001 Mpa	0.001Mpa	○
P7.26	Constant pressure water supply mode	0: Non-constant pressure water supply mode 1: One pump constant pressure water supply mode 2: Two pumps constant pressure water supply mode 3: Three pumps constant pressure water supply mode 4: Four pumps constant pressure water supply mode	1	0	×
P7.27	Remote pressure gauge range	0.001 ~ 20.000Mpa	0.001 Mpa	1.000Mpa	○
P7.28	Multi pump operation mode	0: Fixed sequence switch 1: Timing of the rotation	1	0	○
P7.29	Rotation in timed intervals	0.5 ~ 100.0H	0.1H	5.0H	○
P7.30	Pump switching judgment time	0.1 ~ 1000.0s	0.1s	300.0s	○
P7.31	Electromagnetic switching delay time	0.1 ~ 10.0s	0.1s	0.5s	×
P7.32	PID Control of positive and negative role and feedback pressure error polarity	Unit's digit: 0: PID forward action; 1: PID reverse action. Ten's digit : 0: The feedback pressure is greater than the actual pressure;	1	00	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P7.32	PID Control of positive and negative role and feedback pressure error polarity	1: feedback pressure is less than actual pressure. Hundreds' digit: 0: wake up sleep pressure is actual pressure; 1: wake up sleep pressure is set pressure. Thousands' digit: 0: Press to view the monitoring parameters, and the B group monitoring parameters are viewed in order; 1: Press to view the monitoring parameters. The monitoring parameters of group B only view the three parameters of set pressure, output current and output frequency.	1	00	×
P7.33	Feedback error of pressure adjustment coefficient	0.001~20.000Mpa	0.001 Mpa	0.000M pa	×
P7.34	Closed loop of preset frequency	Range: 0~Upper limit freq	0.00Hz	0.00Hz	×
P7.35	Closed loop of preset frequency holding time	Range: 0.0~200.0s	0.1s	0.0s	×
P8 Group PLC running parameter					
P8.00	PLC running mode selection	0000~1113 LED unit 's place: mode selection 0: Inaction 1: Stop after single cycle 2: Running at final freq after single cycle 3: Continuous cycle LED ten's place: restart mode selection 0: Restart from the first stage 1: Restart from the freq. of break stage 2: Restart from the running. of break stage LED hundred's place: parameter save mode selection	1	0000	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
P8.00	PLC running mode selection	0: No save 1: Save LED thousand's place: running time unit 0: Second 1: minute	1	0000	×
P8.01	Stage 1 setting	000~621 LED unit 's place: freq setting 0: Multi-stage freq i (i = 1 ~ 7) 1: Freq. defined by P0.01 function code LED ten's place: direction selection 0: Forward 1: Reverse 2: Controlled by running command LED hundred's place: Acc/Dec time selection 0: Acc/Dec time 1 1: Acc/Dec time 2 2: Acc/Dec time 3 3: Acc/Dec time 4 4: Acc/Dec time 5 5: Acc/Dec time 6 6: Acc/Dec time 7	1	000	○
P8.02	Stage 1 running time	0.1~6000.0	0.1	10.0	○
P8.03	Stage 2 setting	000~621	1	000	○
P8.04	Stage 2 running time	0.1~6000.0	0.1	10.0	○
P8.05	Stage 3 setting	000~621	1	000	○
P8.06	Stage 3 running time	0.1~6000.0	0.1	10.0	○
P8.07	Stage 4 setting	000~621	1	000	○
P8.08	Stage 4 running time	0.1~6000.0	0.1	10.0	○
P8.09	Stage 5 setting	000~621	1	000	○
P8.10	Stage 5 running time	0.1~6000.0	0.1	10.0	○
P8.11	Stage 6 setting	000~621	1	000	○
P8.12	Stage 6 running time	0.1~6000.0	0.1	10.0	○

Func Code	Name	Range	Min Unit	Factory Default	Modify
P8.13	Stage 7 setting	000~621	1	000	○
P8.14	Stage 7 running time	0.1~6000.0	0.1	10.0	○
P9 Group Swing frequency function parameter					
P9.00	Swing freq. selection	0: Inaction 1: Action	1	0	×
P9.01	Swing freq. running mode	0000~11 LED unit's place: start mode 0: Auto start 1: Manual start by terminal LED ten's place: swing amplitude control 0: Variable swing amplitude 1: Fixed swing amplitude	1	00	×
P9.02	Preset swing freq.	0.00~500.00Hz	0.01Hz 0.1s	0.00Hz	○
P9.03	Preset swing freq. waiting time	0.0~3600.0s	0.1s	0.0s	○
P9.04	Swing amplitude	0.0~50.0%	0.1%	0.0%	○
P9.05	Kick freq.	0.0~50.0%	0.1%	0.0%	○
P9.06	Swing freq. cycle	0.1~999.9s	0.1s	10.0s	○
P9.07	delta wave ascent time	0.0~98.0%	0.1%	50.0%	○
P9.08	Terminal UP/DOWN and Fan control selection	unit's digit: 0: fan running when the VFD is running 1: The fan is running when power is on 2: The fan does not run at zero-frequency ten's digit: 0: Keep the frequency parameter setting after it stops working or the power is off. 1: Release the frequency parameter settings after it stops working or the power is off. hundred's digit: 0: The terminal run command is valid when the power is on 1: The terminal run command is invalid when power is on	1	0	○

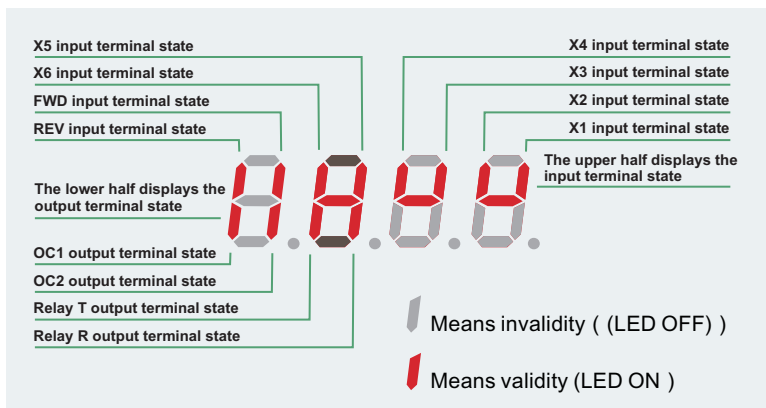
Func Code	Name	Range	Min Unit	Factory Default	Modify
P9.09	Muti-function terminal filtering time	Range : 0~4	1	1	○
P9.10	Braking unit use rate	0~100.0%	0.1%	30.0%	○
P9.11	Overpressure threshold value	0~780V	1V	780V	○
P9.12	Energy consumption braking bus bar voltage	0~780V	1V	640V Or 358V	○
P9.13	G/P type setting and single-phase motor type selection	Unit's digit: 0: G type 1:P type Ten's digit: reserved Hundred's digit: reserved Thousand's digit: Single-phase motor type: 0: ordinary three-phase asynchronous motor(220V) 1: single-phase asynchronous motor (removing capacitor) 2: Single-phase asynchronous motor (without removing the capacitor)	0000	0000	○
P9.14	User password	1~9999	1	0	○
PA Group: Vector control parameter					
PA.00	Motor parameter Auto tuning function	0 : Inaction 1 : Static auto tuning	1	0	×
PA.01	Motor rated voltage	0~400V	1	depends on model type	×
PA.02	Motor rated current	0.01~500.00A	0.01A	depends on model type	×
PA.03	Motor rated frequency	1~500Hz	1Hz	depends on model type	×
PA.04	Motor rated rotating speed	1~9999 r/min	1r/min	depends on model type	×
PA.05	Motor poles number	2~16	1	depends on model type	×
PA.06	Motor stator inductance	0.1~5000.0mH	0.1mH	depends on model type	×

Func Code	Name	Range	Min Unit	Factory Default	Modify
PA.07	Motor rotor inductance	0.1 ~ 5000.0mH	0.1mH	depends on model type	×
PA.08	Motor stator and rotor mutual inductance	0.1 ~ 5000.0mH	0.1mH	depends on model type	×
PA.09	Motor stator resistance	0.001 ~ 50.000Ω	0.001Ω	depends on model type	×
PA.10	Motor rotor resistance	0.001 ~ 50.000Ω	0.001Ω	depends on model type	×
PA.11	Over current protection coefficient of torque current	0 ~ 15	1	15	×
PA.12	Proportion adjustment coefficient of speed deviation	50 ~ 120	1	85	×
PA.13	Integral adjustment coefficient F speed deviation	100 ~ 500	1	360	×
PA.14	Vector torque boost	100 ~ 150	1	100	×
PA.15	Reserved	0	0	0	×
PA.16	Reserved	1 ~ 5	1	4	×
PA.17	Reserved	100 ~ 150	1	150	×
PA.18	Reserved	150	1	150	×
PA.19	Reserved	0 ~ 2	1	0	×
PF Group: Factory function parameter					
PF.00 ~ PF.10	Reserved	---	---	---	---
B-Monitoring: function parameter					
b-00	Output freq	Present output freq	0.01Hz	----	*
b-01	Set freq.	Present set freq.	0.01Hz	----	*
b-02	Output voltage	Effective value of present output voltage	1V	----	*
b-03	Output current	Effective value of present output current	0.1A	----	*
b-04	Bus bar voltage	Present DC bus bar voltage	1V	----	*

Func Code	Name	Range	Min Unit	Factory Default	Modify
b-05	Module temperature	IGBT heat sink temperature	10C	----	*
b-06	Motor speed	Present motor speed	1r/min	----	*
b-07	Running time	One continuous running time	1H	----	*
b-08	Input/output terminal state	Input/output terminal state	----	----	*
b-09	Analog input VI	Analog input VI value	0.01V	----	*
b-10	Analog input CI	Analog input CI value	0.01V	----	*
b-11	External pulse input	External pulse width input value	1ms	----	*
b-12	VFD rated current	VFD rated current	0.1A	----	*
b-13	VFD rated voltage	VFD rated voltage	1V	----	*
b-14	Set pressure	Water supply control when the set pressure of the pipeline	0.001 Mpa	----	*
b-15	Feedback pressure	Water supply control feedback pipeline pressure	0.001 Mpa	----	*
b-16	No unit display	No unit display	1	----	*

Note :

Monitoring parameter input/output terminal state displayed as follow:









7. Troubleshooting

7.1 Fault Alarm and Troubleshooting

When the VFD is abnormal, protection function acts: LED displays fault code and the content, fault relay acts, the VFD stops output and the motor coasts to stop. GK3000 series VFD's fault contents and troubleshooting is shown in Table 7-1. After fault alarm occurs, fault phenomenon should be recorded in detail, the fault should be processed according to Table 7-1. When in need of technical assistance, please contact your supplier.

Fault code	Type of faults	Possible fault reasons	Troubleshooting
E-01	Acc over current	Acc time is too short	Adjust acc time
		V/F curve setup is not suitable	Adjust V/F curve
		Restart the motor in running	Setup start mode as speed tracking restart
		Torque boost setup is too big	Adjust torque boost or set as auto mode
		VFD capacity is too low	Select VFD with proper capacity
E-02	Dec over current	Dec time is too short	Adjust Dec time
		Potential load or load inertia is too big	Add suitable braking device
		VFD capacity is too low	Select VFD with proper capacity
E-03	Over current at constant speed running	Load mutation	Check load
		Acc or Dec time is too short	Adjust Acc or Dec time
		Input voltage abnormal	Check input power supply
		Load abnormal	check load
		VFD capacity is too low	Select VFD with proper capacity
E-04	Acc overvoltage	Input voltage abnormal	Check input power supply
		Acc time is too short	Adjust Acc time
		Restart the motor in running	Setup start mode as speed tracking restart
E-05	Dec overvoltage	Dec time is too short	Adjust the Dec time
		Potential load or load inertia is too big	Add suitable braking device
E-06	Overvoltage at constant speed running	Input voltage abnormal	Check input power supply
		Acc or Dec time is too short	Adjust the Acc or Dec time
		Abnormal change of input voltage	Mount input reactor


Fault code	Type of faults	Possible fault reasons	Troubleshooting
E-06		Load inertia is too big	Add suitable braking device
E-07	Overvoltage of control power supply	Input voltage abnormal	Check input power supply
E-08	VFD overheat	Air duct obstruction	Clean air duct
		Environment temperature is too high	Improve the ventilation or decrease the carrier frequency
		Fan damaged	Replace a new fan
		VFD module abnormal	Contact supplier
E-09	VFD overload	Acc time is too short	Adjust Acc time
		DC braking value is too high	Decrease DC braking current and increase braking time
		V/F curve setup is not suitable	Adjust V/F curve
		Restart the motor in running	Setup start mode as speed tracking restart
		Mains voltage is too low	Check mains voltage
		Too heavy load	Select VFD with proper capacity
E-10	Motor overload	V/F curve setup is not suitable	Adjust V/F curve
		Mains voltage is too low	Check mains voltage
		General motor runs at low speed with heavy load for long term	Use a special motor for long term running
		Wrong setting of motor overload protection factor	Set the factor right
		Motor chocked or sudden change of load	Check load
E-11	Under voltage in running	Mains voltage is too low	Check mains voltage
E-12	VFD module protection	VFD over current	Refer to over current troubleshooting
		Output 3-phase fault or ground short	Re-wiring
		Air duct obstruction or fan damaged	Clean air duct or replace a new fan

Fault code	Type of faults	Possible fault reasons	Troubleshooting
E-12	VFD module protection	Environment temperature too high	Decrease environment temperature
		Control board connecting wire or plug-in unit loose	Check and re-wiring
		Current waveform abnormal due to output missing phase, etc.	Check wiring
		Auxiliary power damaged, or driving voltage under voltage	Contact supplier
		Control board abnormality	Contact supplier
E-13	Peripheral fault	Close external fault terminals	Check the reason
E-14	Current detecting circuit fault	Loose wiring or terminal connections	Check and re-wiring
		Auxiliary power source damaged	Contact supplier
		Hall component damaged	Contact supplier
		Abnormal amplifier circuit	Contact supplier
E-15	RS232/485 Communication fault	Wrong baud rate setting	Set baud rate properly
		Serial port communication fault	Press  Key to reset or contact supplier
		Improper fault alarm parameter setting	Revise function code P3.09~P3.12
		Upper computer doesn't work	Check upper computer and connecting cable
E-16	System interference	Serious interference	Press  key to reset or install input power source filter
		DSP read/write error	Reset or contact supplier
E-17	EP ² PPROM error	Read/write error of control parameter	press  key to reset or install input power source filter
E-18	Motor parameter over current fault	Power range of Motor and VFD do not match	Contact supplier press  key to reset
E-19	Input phase loss protection	One of R, S, T port has no voltage	Press  key to reset check voltage of R, S, T
E-20	over current fault when restart	Over current when VFD restart and check speed	press  key to reset adjust relevant parameters

7.2 Fault Record Search

This series VFD record the fault codes occurred in the last 6times and VFD running parameter when last fault occurred. The fault information is saved in P6 group.

7.3 Fault Reset

- When fault occurred, please select the following methods to recover:
- When fault code is displayed, after ensure it can be reset, press  key to reset.
- Set any one of X1~X8 terminal as external RESET input (P4.00~P4.07=17).
- Cut off power.



ATTENTION

- Reset the VFD after thoroughly investigating the cause of fault and clearing, otherwise, the VFD may be damaged;
- If it can't be reseted or fault occurs again after reset, please check the cause of fault, continuous reset may damage VFD;
- Reset the VFD after waiting for 5min when overload or overheat protection occurs.

8. Serial Port Communication Protocol of RS485

8.1 Communication overview

Our series of VFDs provide users with a common industrial control RS485 communication interface, in which The MODBUS standard protocol is used for communication. The VFDs can be used as slave connected to the host (such as PLC controller, PC), both of which have the same communication interface and protocol, for the purpose of centralized monitoring of the VFDs. Or one VFD can be used as host and other VFDs as slaves, all connected with RS485 communication interface, to achieve multi-machine interaction of the VFDs. And with this communication interface, a Keyboard can also be connected to VFDs for remote operation.

The MODBUS communication protocol of the VFD supports two transmitting ways: RTU mode and ASCII, and either can be choose. The following is a detailed description of the communication protocol of the VFD.

8.2 Communication protocol specification

8.2.1 Communications networking methods

(1) networking methods with VFD as slave:

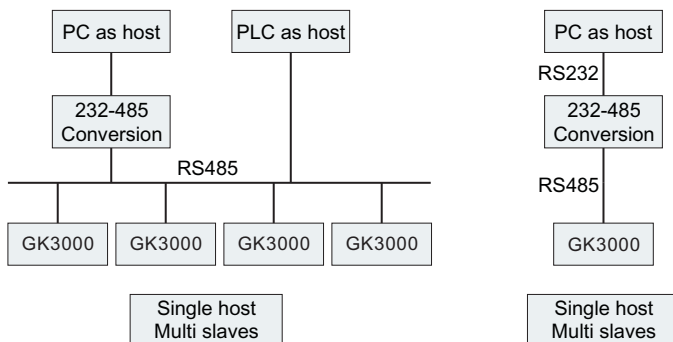


Fig.8-1 networking of slaves

(2) networking methods with VFD as slave:

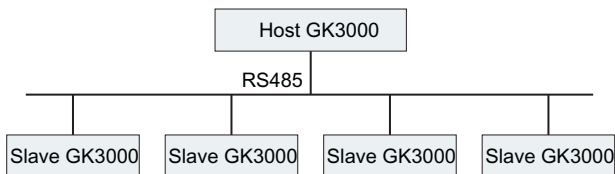


Fig9-2 The networking of multi-machine interaction

8.2.2 Communication protocol

The VFD can either used as a host or slave in RS485 network. It can be used for controlling our other VFDs as host to achieve multi-level linkage, or controlled by host (PC or PLC) as a slave. The specific communication mode as follows:

- VFD is used as slave, in point-to-point communication of master-slave mode. Host sends commands from broadcast address, while slave doesn't answer;
- VFD is used as host, sending commands from broadcast address, while slave doesn't answer;
- The address, baud rate and data format of the VFD can be setup by using the keyboard or the serial communication;
- message of error is reported by slave, in the recent response frame against host polling.

8.2.3 Communication Interface

The communication is using RS485 interface, with asynchronous serial and half-duplex transmission. The default communication protocol is in ASCII mode.

The default data format: 1 start bit, 7 data bits, 2 stop bits.

The default rate is 9600bps. Communication parameter settings reference P3.09 ~ P3.12 function code.

8.3 The ASCII Communication Protocol

Character structure:

10 characters box (For ASCII)

(1-7-2 format, no parity)

Start bit	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	Stop bit	Stop bit
-----------	-------	-------	-------	-------	-------	-------	-------	-------	----------	----------

(1-7-1 format, odd parity)

Start bit	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	Parity bit	Stop bit
-----------	-------	-------	-------	-------	-------	-------	-------	-------	------------	----------

(1-7-1 format, even parity)

Start bit	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	Parity bit	Stop bit
-----------	-------	-------	-------	-------	-------	-------	-------	-------	------------	----------

11 characters box (For RTU)

(1-8-2 format, no parity)

Start bit	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	Stop bit	Stop bit
-----------	-------	-------	-------	-------	-------	-------	-------	-------	----------	----------

(1-8-1 format, odd parity)

Start bit	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	Parity bit	Stop bit
-----------	-------	-------	-------	-------	-------	-------	-------	-------	------------	----------

(1-8-1 format, even parity)

Start bit	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	Even parity	Stop bit
-----------	-------	-------	-------	-------	-------	-------	-------	-------	-------------	----------

Communications data structures**ASCII mode**

Frame header	Start character=" : " (3AH)
Address Hi	Address : 8-bit address combined with two ASCII code
Address Lo	
Function Hi	Function code :
Function Lo	8-bit address combined with two ASCII code
DATA (n - 1)	Data content :
.....	n * 8-bit data content combined with 2 * n ASCII code, in which high in front and low in post, n <= 4, 8 ASCII code as maximum
DATA 0	
LRC CHK Hi	LRC Check code :
LRC CHK Lo	8 check code combined with two ASCII code
END Hi	End character :
END	END Hi = CR(0DH), END Lo = CR(0AH)

RTU mode:

START	Maintaining no input signal for more than or equal to 10ms
Address	address : 8-bit Binary address
Function	Function code : 8-bit Binary address
DATA (n - 1)	Data content : N*8-bit data , N<=8 , less than 8 bytes
.....	
DATA 0	
CRC CHK Low	CRC Check code
CRC CHK High	16-bit CRC check code is combined with 2 8-bit Binary code
END	Maintaining no input signal for more than or equal to 10ms

Address:

00H : All broadcast from VFDs

01H : Communication with VFD of 01 address

0FH : Communication with VFD of 15 address

10H : Communication with VFD of 15 address, and so on, maximum to 254 (FEH) 。

Function and DATA code:

03H : Read data from a register

06H : Write data to the register.

08H : Loop detection.

Function code 03H : Read data from a register :

For example : read data from the address 2104H of register (Output current)

ASCII mode:

Asking for information string format		Answering information string format	
Header	“: ” ---3AH	Header	“: ” ---3AH
Address	“0”---30H	Address	“0”---30H
	“1”---31H		“1”---31H
Function code	“0”---30H	Function code	“0”---30H
	“3”---33H		“3”---33H

Asking for information string format		Answering information string format	
content	"2"---32H	Information number	"0"---30H
	"1"---31H		"2"---32H
	"0"---30H		
	"4"---34H	Content of address 2104H	"0"---30H
	"0"---30H		
	"0"---30H		
	"0"---30H		
LRC CHECK	LRC CHECK "D" ---44H	LRC CHECK	"D" ---44H
	"7" ---37H		"7" ---37H
END	END CR ---0DH	END	CR ---0DH
	LF ---0AH		LF ---0AH

RTU mode:

Asking for information string format		Answering information string format	
Address	01H	Address	01H
Function code	03H	Function code	03H
content	21H	Information number	02H
CRC CHECK Low	04H	content	00H
	E8H	CRC CHECK Low	00H
	0EH		
CRC CHECK High	4BH	CRC CHECK High	37H

Function code 06H : Write to register

For example : writing function code P0.02=50.00HZ to VFD address 01H.

ASCII mode:

Asking for information string format		Answering information string format	
Header	" : "---3AH	Header	" : "---3AH
Address	"0"---30H	Address	"0"---30H
	"1"---31H		"1"---31H

Asking for information string format		Answering information string format	
Function code	"0"---30H	Function code	"0"---30H
	"6"---36H		"6"---36H
content	"0"---30H	content	"0"---30H
	"0"---30H		"0"---30H
	"0"---30H		"0"---30H
	"2"---32H		"2"---32H
	"1"---31H	Data of address 2104H	"1"---31H
	"3"---33H		"3"---33H
	"8"---38H		"8"---38H
LRC CHECK	"5" ---35H	LRC CHECK	"5" ---35H
	"C" ---43H		"C" ---43H
END	CR ---0DH	END	CR ---0DH
	LF ---0AH		LF ---0AH

RTU mode:

Asking for information string format		Answering information string format	
Address	00H	Address	01H
Function code	06H	Function code	06H
content	00H	content	00H
	02H		02H
	13H		13H
	88H		88H
CRC CHECK Low	25H	CRC CHECK Low	25H
CRC CHECK High	5CH	CRC CHECK High	5CH

Function code : 08H Communication loop test

This command is used to test the communication between main control equipment and VFD. VFD receives and sends back the message to the main control equipment.

ASCII mode:

Asking for information string format		Answering information string format	
Header	“ : ”---3AH	Header	“ : ”---3AH
Address	“0”---30H	Address	“0”---30H
	“1”---31H		“1”---31H
Function code	“0”---30H	Function code	“0”---30H
	“8”---38H		“8”---38H
content	“0”---30H	content	“0”---30H
	“1”---31H		“1”---31H
	“0”---30H		“0”---30H
	“2”---32H		“2”---32H
	“0”---30H	Data of address 2104H	“0”---30H
	“3”---33H		“3”---33H
	“0”---30H		“0”---30H
	“4”---34H		“4”---34H
LRC CHECK	“E” ---45H	LRC CHECK	“E” ---45H
	“D” ---44H		“D” ---44H
END	CR ---0DH	END	CR ---0DH
	LF ---0AH		LF ---0AH

RTU mode:

Asking for information string format		Answering information string format	
Address	01H	Address	01H
Function code	08H	Function code	08H
content	01H	content	01H
	02H		02H
	03H		03H
	04H		04H
CRC CHECK Low	41H	CRC CHECK Low	41H
CRC CHECK High	04H	CRC CHECK High	04H

Check code:

ASCII mode : Double byte ASCII code

Calculation method:

For message sending end, the calculation of LRC is the method of continuous accumulation the byte from "slave address" to "running data" which is not converted to ASCII code, discarding carry-over, reversing the 8 bit data, then plus 1 (converting to complement), finally converted to ASCII code, putting into the checkout area, high byte in front, low byte in post. For The message receiving end, the same LRC method is used to calculating checksum of received data, and comparing it with the received checksum. If they are equal, the message received is correct. If not equal, the received message is wrong. If error, the message frame is discarded with no answering, while the end continuing to receive the next frame data.

RTU mode : two bytes of 16 hex

The CRC domain is two bytes, including a binary value of 16 bits. It is calculated and added to the message by the sending end; while low byte added in front, and high byte added in post then, so the high byte of CRC is the last of the message. The receiving device re-calculates the CRC of the message, and compares it with the CRC in receiving domain, if the two values are different, it means there is error in received message, and the message frame is discarded, while there is no responding but waiting for the next frame data. CRC checksum calculation method reference to MODBUS protocol specification.

Communication protocol parameter definition:

definition	Parameter address	Function description
Commands to VFD (06H)	2000H	0001H : RUN
		0002H : FWD
		0003H : REV
		0004H : JOG
		0005H : FWD JOG
		0006H : REV JOG
		0007H : DEC and STOP
		0008H : STOP
		0009H : JOG STOP
		000AH : RESET
	2001H	Freq. setting


definition	Parameter address	Function description
Monitoring VFD (03H)	2100H	Read ERROR code
	2101H	State of VFD
		BIT0 : STOP sign , 0 : STOP ; 1 : RUN
		BIT1: Under voltage sign,1: Under voltage ; 0 : Normal
		BIT2:FWD REV sign,1 : REV ; 0 : FWD
		BIT3:JOG sign,1 : JOG ; 0 : NON JOG
		BIT4:Close loop control , 1 : Close ; 0 : Non close
		BIT5: swing freq. sign , 1 : swing ; 0 : non swing
		BIT6:PLC run sign , 1 : PLC run , 0 : non PLC
		BIT7:terminal multi-stage speed , 1 : multi-stage 0 : non multi-stage
		BIT8:normal running , 1 : normal ; 0 : non
		BIT9:Freq. from comm. , 1 : yes ; 0 : no.
		BIT10:Freq. from analog input , 1 : yes ; 0 : no.
BIT11:run commands from comm. , 1 : yes ; 0 : no.		
BIT12: parameter password protection , 1 : yes ; 0 : no.		
	2102H	Read Freq. setting
	2103H	Read output Freq.
	2104H	Read output current
	2105H	Read bus voltage
	2106H	Read output voltage
	2107H	Read motor speed
	2108H	Read module temp.
	2109H	Read VI analog input
	210AH	Read CI analog input
	210BH	Read software version
	210CH	Read VFD terminal status
	210DH	Read set pressure
	210EH	Read feedback pressure

Definition	Parameter address	Function description
Read function code (03H)	GGnnH (Gg : function code number. nn :function code number)	Responding function code
Read function code (06H)	GGnnH (GG : function code number. nn :function code number)	Function code writing into VFD

Error code:

Error code	Description
01H	Function code error. it can not be identified : 03H , 06H , 08H
02H	Address error. it can not be identified
03H	Data error. Data overrun

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