ALPHA

ALPHA6000/6100 Series Inverter

User Manual

SHENZHEN ALPHA INVERTER CO.,LTD.

Preface

Thank you for buying ALPHA6000/6100 series inverter made by Shenzhen ALPHA Inverter Co., Ltd.

To satisfy the high performance needs, ALPHA6000/6100 series inverters use magnetic flux vector control method to achieve high torque at low speed and low-noise at steady running. The inner PID operation can perform PID close loop control easily. ALPHA6000/6100 proprietary features include the advanced automatic torque compensation, multiple controlling methods, up to 36 fault protections and warning functions. Online watching and changing parameters, Integrated RS485 Interface, and operation flexibility. In addition, energy saving running can furthest improves the motor power factor and efficiency.

ALPHA6000/6100 series are suitable for almost all motor driving applications like paper process, textile machines, food process, cement, spinning weaving and dyeing, metallurgy, iron and steel, and other machinery.

The inverter has wide speed-adjusting range, stable operation, high accuracy and reliable performance. It can be widely used in application of electrical power energy saving.

If you have some problems that can't be solved in operation, please contact the nearest local agents or service center, or contact our company directly.

To ensure the perfect use of this product and the safety of user, please read the user manual carefully before the operation of inverter and keep the manual in proper place for future reference.

The information contained in this manual is subject to change without notice.

Before mounting, wiring and commissioning the inverter, to ensure the safety of user and extending the life of this equipment, it strongly suggests that we must read the safety rules warnings listed in this book and cautions marked on the inverter.

When in operation, we must pay attention to the situation of driven load and all notes that related on safety.

	Danger!
	This system contains voltages that may be as high as 400 volts! Electric shock can cause serious or fatal injury. Only qualified personnel shall wire the drive.
	Please cut off the power before wiring and inspecting. It is not permissible to touch PCB or interior components before battery control lamp goes off or until 5 minutes after the power has been removed. It is necessary to use meters to confirm the charging capacitance has discharged off. Otherwise, a risk of electric shock may happen.
	Don't contact AC power source to the output terminals U, V, W of the inverter. When using the inverter, the earthling terminal of the inverter must be grounded correctly and reliably according to IEC536 Class 1, NEC and other applicable standards.
	Warning!
	Unauthorized change of inboard wiring and using accessories, which sold or recommended by blame manufacturer may cause fire, electric shock and injury.
	Since body static electricity may cause serious damage to MOS field-effect transistor and other sensitive elements, please don’t touch the interior devices, such as PCB, IGBT module etc. before any measure taken to prevent static electricity.
	Caution!
	Keep all marks and labels clear to read. Replace the lost or worn mark at any moment.
	Please keep the user manual near the inverter that can be reached easily and give this manual to the users who use the product.

If you have any questions and problems about the use of our products, please contact our agents or us.
Any improved suggestions are welcome.

Contents

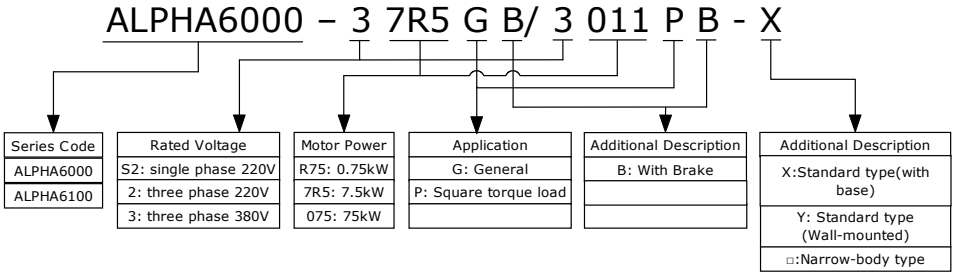
Chapter 1 Purchase Inspection

1.1 Unpacking Inspection

All inverters have passed the strict test before delivery. After unpacking, please check if the product was damaged by careless transport, the product specification, model is complied with the order, and if it has a quality check passed mark. If there is any problem, please contact the supplier.

1.2 Naming Rule

The naming rule of the product is as following:

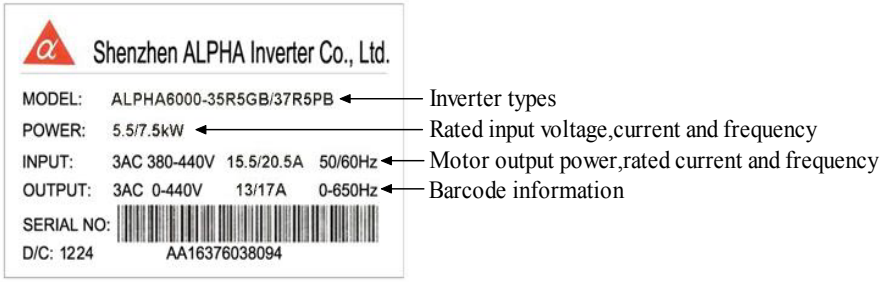


Note: 1. If the user has special needs, please specify the technical requirements in the order.

2. X rule applies to 160-500kW models.

1.3 Nameplate of Inverter

On the right side of the bottom plate of inverter, there is a nameplate, which marks the model and rated values of inverter. See the following figure:



Nameplate of Inverter

Chapter 2 Installation and Wiring

2.1 Exterior Size and Mounting Size (See Appendix 1)

2.2 Mounting Place Requirement and Management

 Attention
· Don't carry the inverter by its cover. The cover cannot support the weight of the inverter and may drop. · Please install the inverter on a strong support, failing which the inverter may fall off. · Don't install the inverter in places where water pipes may leak onto it. · Don't allow screws, washers and other metal foreign matters to fall inside the inverter, otherwise there is a danger of fire or damage. · Don't operate the inverter if parts are not complete, otherwise there is a danger of fire or human injury. · Don't install the inverter under direct sunshine; otherwise, it may be damaged. · Don't short circuit PB, + and -, otherwise there is a danger of fire or the inverter may be damaged. · Cable lugs must be connected to main terminals firmly. · Don't apply supply voltage (AC 220V or higher) to control terminals except terminals TA, TB, TC.

Please mount the inverter as following application occasions and maintain appropriate condition.

2.2.1 Installation Location

The installation location should meet the following conditions:

- Good indoor ventilation.
- Ambient temperature: -10 ℃ ~ 40 ℃. If the temperature is higher than 40 ℃, the inverter should be derating used and forced ventilation is required.
- Humidity should be lower than 95%, no condensing.
- Do not mount the inverter on the timber or other combustible matters.
- Avoid direct sunlight.
- Mount in the location free of dust, metal powder, corrosive gas or combustible gas.
- The installation foundation should be solid and free of vibration.
- No electromagnetic interference, away from source of interference.
- Derating use must be considered when the inverter is installed at high altitude, greater than 1000 m. This is because the cooling effect of inverter is deteriorated because of the thin air. Derating 6% per 1000 m higher of the altitude.

2.2.2 The Ambient Temperature

In order to enhance operating reliability of the inverter, be sure where the inverter mounted has a good ventilation; when the inverter is used in a closed case, cooling fans or an air-conditioning must be installed to keep the ambient temperature below 40℃.

2.2.3 Preventive Measures

Installing the inverter, please set a shield to prevent metal debris falling into it, and remove the shield after installing.
Please remove the protection membrane when the ambient temperature is over 40℃ or the internal temperature is too high due to other reasons. Please pay attention to avoid small parts falling into the inverter.

2.3 Installation Direction and Space

Inverters of this series are all equipped fans for forced cooling. In order to be an effective cooling cycle, the inverter must be mounted in the vertical direction, up, down, left and right away from adjacent articles or baffle (wall) maintain adequate space, as Figure 2-1

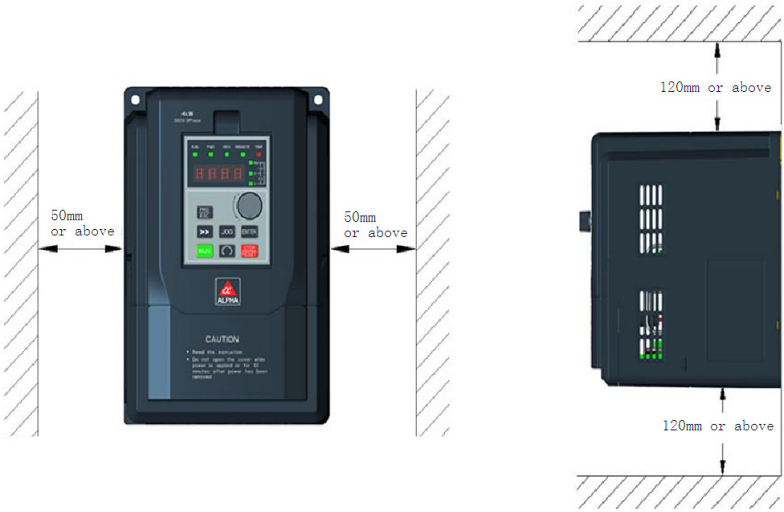


Fig 2-1 Installation Direction and Space

2.4 Main Circuit Wiring

2.4.1 The Main Circuit Terminals Arrangement and Wiring

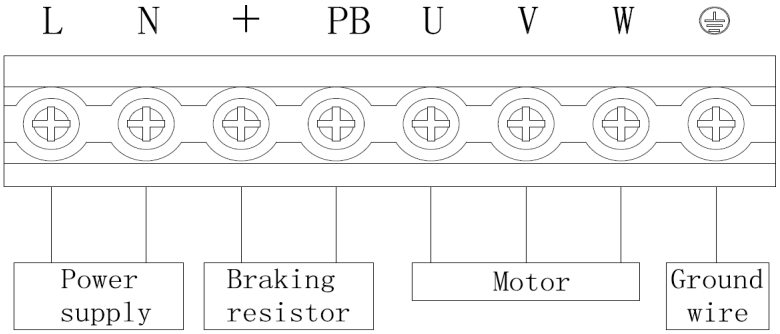


Fig 2-2 S2R4GB~S2R75GB Main Circuit Wiring

Table2-1 S2R4GB~S2R75GB main circuit terminals function

Terminal Symbol	Terminal name and function
L, N	Single-phase 220V AC supply input terminals
+, PB	Reserved terminals for braking resistor
U, V, W	Three-phase AC output terminals
PE	Earth terminal

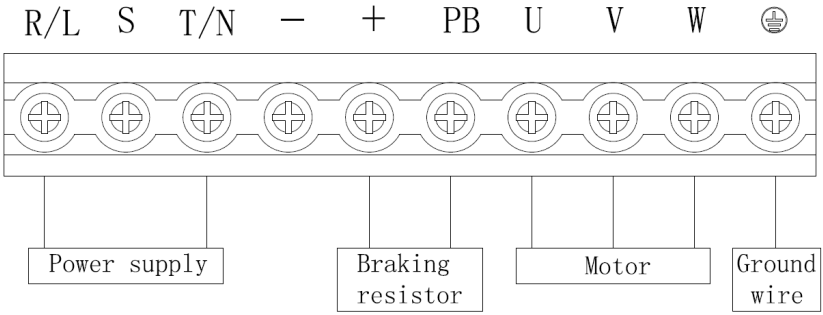


Fig 2-3 S21R5GB~S22R2GB Main Circuit Wiring

Table2-2 S21R5GB~S22R2GB main circuit terminals function

Terminal Symbol	Terminal name and function
L, N	Single-phase 220V AC supply input terminals
+, PB	Reserved terminals for braking resistor
-	DC negative bus output terminal
U,V,W	Three-phase AC output terminals
PE	Earth terminal

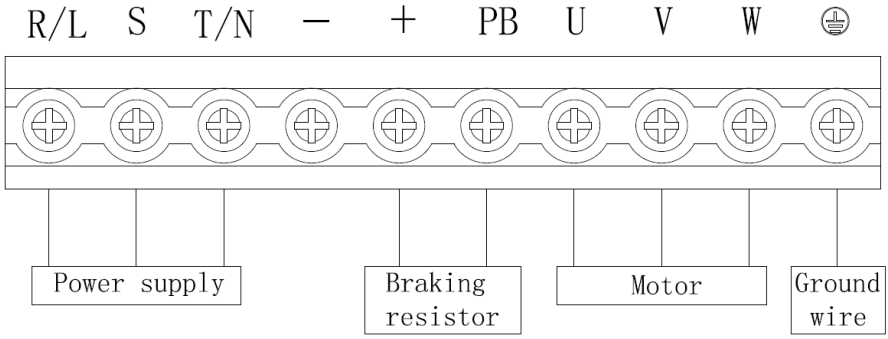


Fig. 2-4 3R75GB/31R5PB~3004GB/35R5PB Main Circuit Wiring

Table2-2 3R75GB/31R5PB~3004GB/35R5PB main circuit terminals function

Terminal Symbol	Terminal name and function
L, N	Three-phase 220V AC supply input terminals
+, PB	Reserved terminals for braking resistor
-	DC negative bus output terminal
U, V, W	Three-phase AC output terminals
PE	Earth terminal

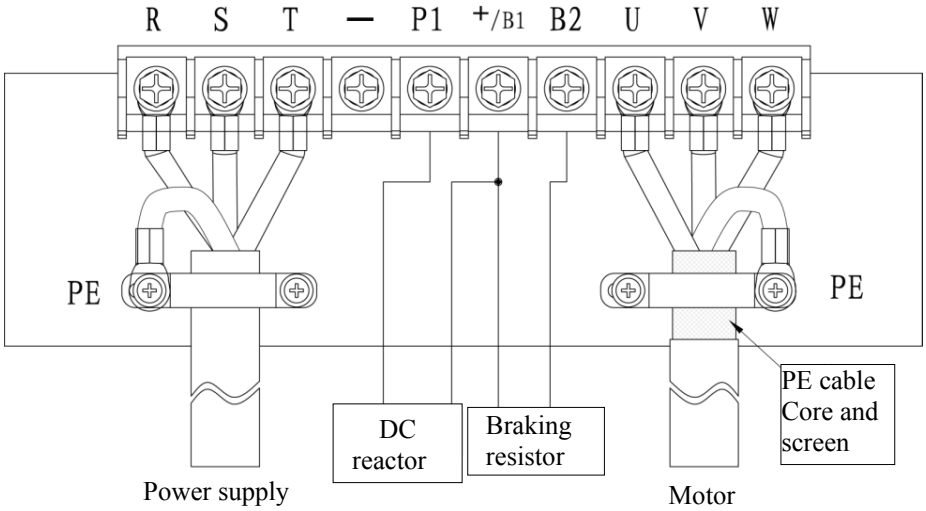


Fig. 2-5 35R5GB/37R5PB~3015GB/3018PB Main Circuit Wiring

Table 2-4 35R5GB/37R5PB~3015GB/3018PB main circuit terminals function

Terminal Symbol	Terminal name and function
R, S ,T	Three-phase 380V AC supply input terminals
P1,+/B1	Terminals for an external DC reactor
+/B1, B2	Terminals for an external braking resistor
-	DC negative bus output terminals
U,V,W	Three-phase AC output terminals
PE	Earth terminal

Attention: When DC reactor is not connected, please short “P1”and “+/B1”with supplied copper bar.

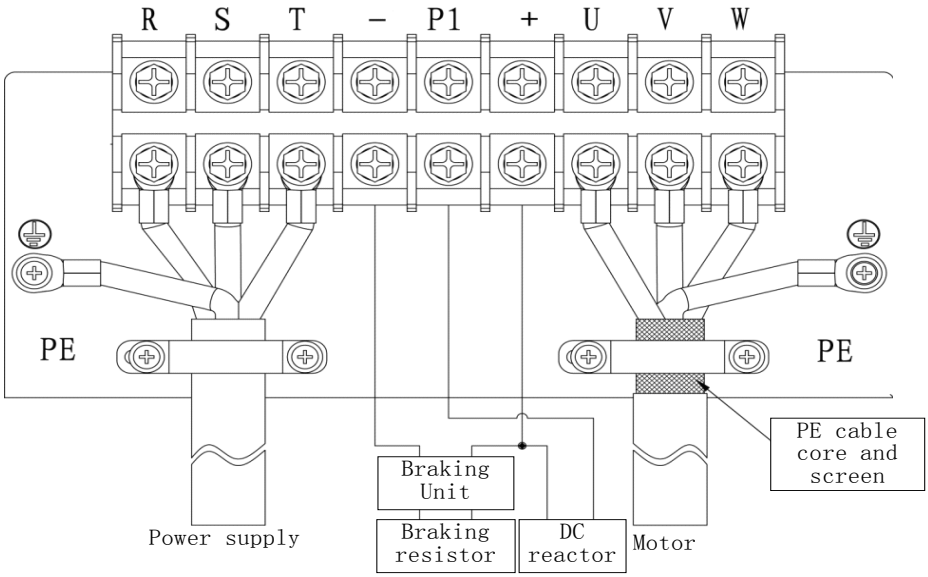


Fig. 2-6 3018G/3022P~3055G/3075P Main Circuit Wiring

Table 2-5 3018G/3022P~3055G/3075P main circuit terminals function

Terminal	Function
R, S, T	Three-phase 380V AC supply input terminals
P1,+	Terminals for an external DC reactor
-	Terminal for an external DC negative bus
U, V, W	Three-phase AC output terminals
PE	Earth terminal

Attention: When DC reactor is not connected, please short "P1" and "+/B1" with supplied copper bar.

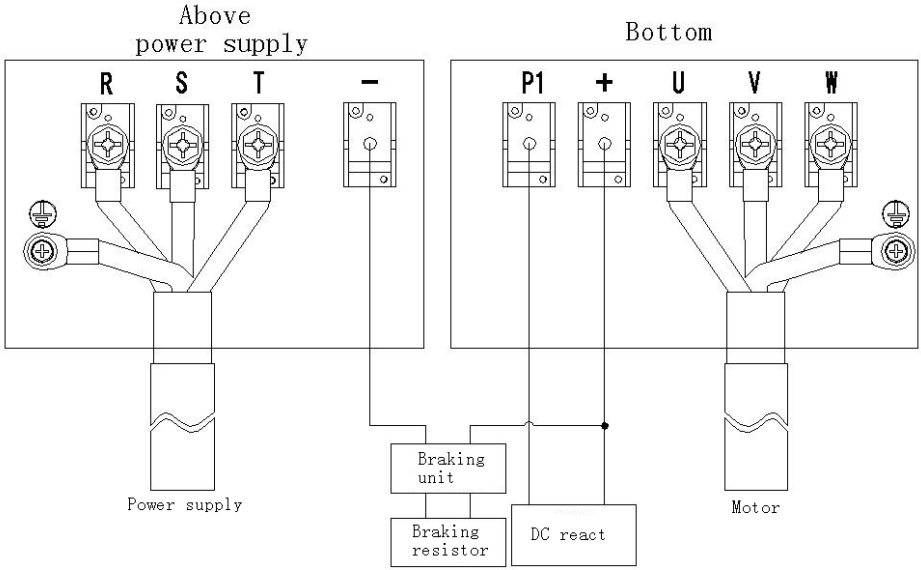


Fig. 2-7 3160G/3185P~3355G/3400P Main Circuit Wiring

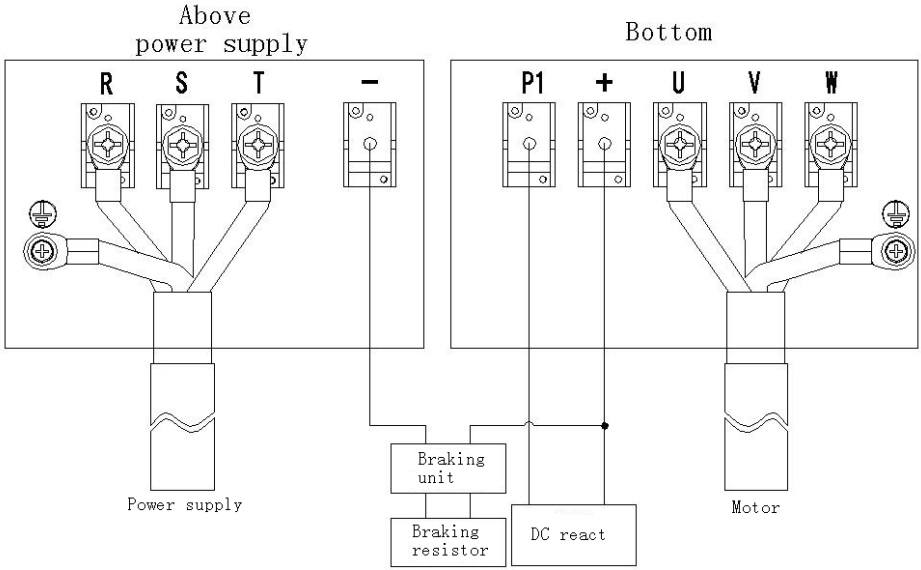


Fig. 2-8 3400G~3500G Main Circuit Wiring

Table 2-6 3160G/3185P~3500G main circuit terminals function

Terminal	Function
R, S, T	Three-phase 380V AC supply input terminals
P1,+	Terminals for an external DC reactor
-	DC negative bus output terminals
U, V ,W	Three-phase AC output terminals
PE	Earth terminal

Attention: When DC reactor is not connected, please short “P1” and “+/B1” with supplied copper bar.

2.4.2 Main Circuit Wiring Operation

When the motor is running, please make sure if it is in positive rotation while the motor receives positive rotation command. If the motor is in reverse rotation, the rotation direction of the motor can be changed by exchanging any two wires of output terminals (U, V, and W) of the inverter. The rotation direction can also be changed by modifying the function code P2.33 to change the phase sequence of the motor.

Do not mistakenly connect the input power cable to the output terminal; otherwise the components in the inverter will be damaged. Output terminals are prohibited to be grounded. The lines should not be collided with the enclosure, or short connected; otherwise the inverter will be damaged. Be sure Earth terminal "PE" is connected to earth. The earthing resistance of 380V-class should be below 10Ω. Be sure the earthing not be shared with electric welding machines or other high-current electrical equipments. Use ground wiring as mentioned in "Appendix 3 Main Circuit Output Cable Selection" and keep the length as short as possible.

When two or more inverters are used at the same time, do not loop the wires. The right and wrong earthling connection methods are shown as Figure 2-9.

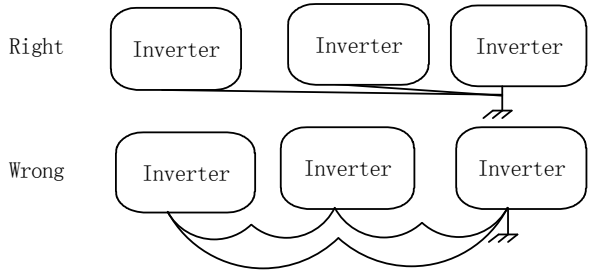


Fig. 2-9 Earthing Connection Method

Attention: The neutral point of motor using Y connection can't be connected to earth.

Since the inverter output PWM wave, if a capacitance for improving power factor or a lightning varistor is installed on the output side, which would cause tripping or damage to parts, be sure to remove it.

If a contactor or other on-off part is needed to be installed between the output and the motor, be sure the on-off operation is done when the inverter has no output, otherwise the inverter would be damaged.

Countermeasures to conduction interference: To inhibit conduction interference of the output, besides installing noise filter and using shielded motor cables, leading all the output cables to earthing metal tube is also a method. Make the distance between the

output cables and the control signal cables greater than 30 cm, the effect of conduction interference will obviously decrease too.

Countermeasures to RFI: The input cables, output cables and the inverter itself would produce RFI. Placing noise filters both at input and output sides, and shielded with metal shell would reduce RFI.. The cables between the inverter and the motor should be as short as possible. Measure to reduce RFI is shown as Figure 2-10.

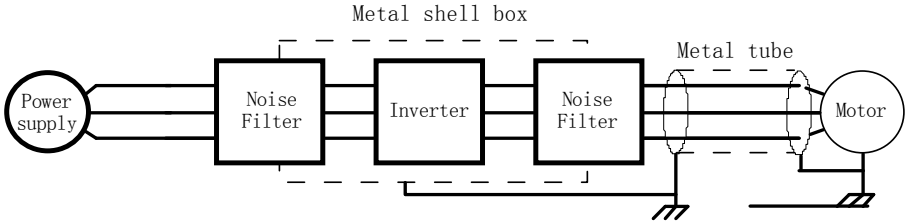


Fig. 2-10 Method to Restrain RFI

Distance between the inverter and the motor.

The longer the distance between the inverter and the motor, the higher the carrier frequency would be, and the greater the high harmonic leakage current of the cables would be. Leakage current has a negative impact to inverters and equipments nearby, so reduce leakage current as little as possible.

The relationship of the distance between the inverter and the motor and carrier frequency is shown as Table 2-7.

Table 2-7 Distance between the inverter and the motor and carrier frequency.

Distance between inverter and motor	Below 50m	Below 100m	Above 100m
Carrier frequency	Below 8 kHz	Below 4 kHz	Below 2 kHz

2.5 Control Circuit Connection

2.5.1 Function of Control Circuit Terminals

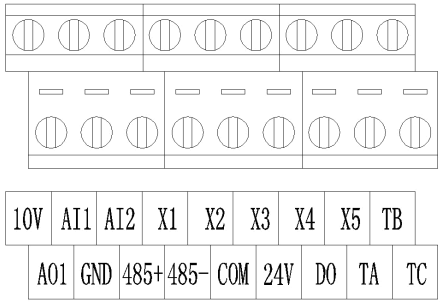


Fig. 2-11 S2R4GB~S2R75GB Arrangement of Control Circuit Terminals

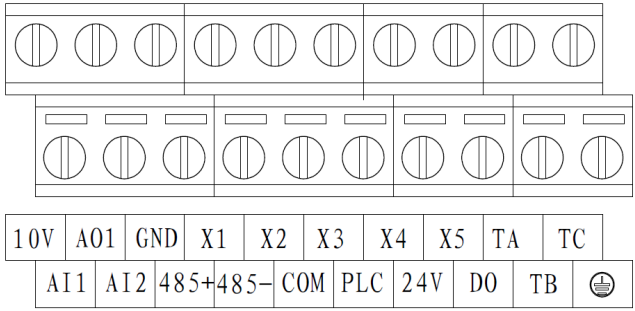


Fig. 2-12 S21R5GB~3004GB/35R5PB Arrangement of Control Circuit Terminals

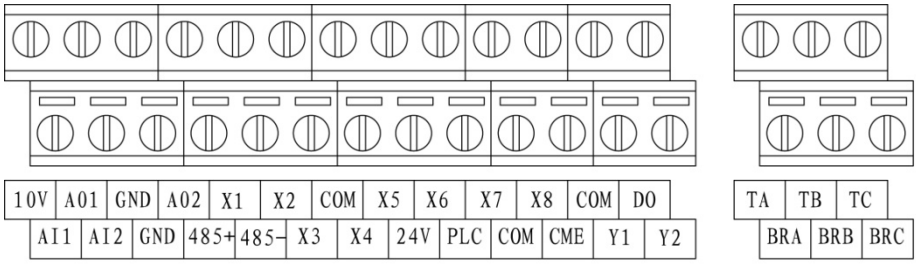


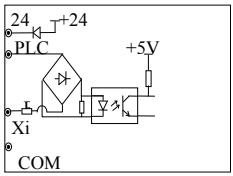
Fig. 2-13 35R5GB/37R5PB~3500GB Arrangement of Control Circuit Terminals

In order to reduce interference and attenuation of control signal, the length of control cables should be limited in 50m and away from power cables for more than 30cm. Avoid control wire and power wire being parallel. Try to use STP (Shielded Twisted Pair) to connect analog input and output signal.

- Function of Control Circuit Terminals

Table 2-8 Function of control circuit terminals

Category	Terminal	Name	Functions	Specification
Analog input	AI1	Analog input1	Receive voltage/current input. Voltage or current input mode are selectable by data-chosen-switch SW1. Voltage input mode is the default mode, refer to P4.00~P4.10 to set the range.(The reference ground is GND)	Input voltage range: 0~10 V (Input resistance: 100 kΩ) Input current range: 0~20 mA (Input resistance: 500Ω)
	AI2	Analog input2		
Analog output	AO1	Analog output1	Provide analog voltage /current output(total 12 kinds of signals). Voltage or current output mode are selectable by switch SW2. Voltage output mode is the default mode. Refer to P4.17 for details. (The reference ground is GND)	Output current range: 0/4~20 mA Output voltage range: 0/2~10 V
	AO2	Analog output2 (only 35R5GB/37R5PB~3500G)	Provide analog voltage /current output (total 12 kinds of signals). Voltage or current output mode are selectable by switch SW3. Voltage output mode is the default mode. Refer to P4.18 for details. (The reference ground is GND)	

Category	Terminal	Name	Functions	Specification
Communication	485+	RS485 communication interface	RS485+	Standard RS-485 communication interface Not isolated with GND Please use twisted-pair or shielded cable
	485-		RS485-	
Multi-function input terminal	X1	Multi-function input terminal 1	It can be defined as multi- function on-off input terminal. See section 5.4 (Group P3), Chapter 5 for the function of input terminals (The common terminal is PLC)	Optical-isolator input Input resistance: R=3.9 kΩ Maximum input frequency: 400 Hz Input voltage range: 0~30V 
	X2	Multi-function input terminal 2		
	X3	Multi-function input terminal 3		
	X4	Multi-function input terminal 4	In S2R4GB~3004GB/35R5PB, terminals X4 and X5 can be used as common multi-function terminals, they can also be used as high frequency pulse input. In 35R5GB/37R5 PB~3500G, they only be used as common multi-function terminals See section 5.4, Chapter 5 for details. (The common terminal is PLC)	In S2R4GB~3004GB/35R5PB Maximum input frequency: 50 Hz Input voltage range: 0~30V In 35R5GB/37R5PB ~3500G: Optical-isolator input Input resistance: R=3.9 kΩ Maximum input frequency: 400 Hz Input voltage range: 0~30V
	X5	Multi-function input terminal 5		

Category	Terminal	Name	Functions	Specification
Multi-function input terminal	X6	Multi-function input terminal 6 (only 35R5GB/37R5PB~3500G)	It can be defined as multi-function on- off input terminal. See section 5.4, Chapter 5 for details. (The common terminal is PLC)	Optical-isolator input Input resistance: R=3.9 kΩ Maximum input frequency: 400 Hz Input voltage range: 0~30V
	X7	Multi-function input terminal 7 (only 35R5GB/37R5PB~3500G)	Terminals X7 and X8 can be used as common multi-function terminals. They can also be used as high frequency pulse input. See section 5.4, Chapter 5 for details. (The common terminal is PLC)	Max input frequency: 50 KHz Input voltage range: 0~30 V
	X8	Multi-function input terminal 8 (only 35R5GB/37R5PB~3500G)		
Multi-function output terminal	DO	Open collector output terminal	It can be defined as multi-function pulse output terminal.. See section 5.4, Chapter 5 for details. (The reference ground is COM)	Optical-isolator input Collector open circuit output operating voltage range: 0V~26V The max put current is 50mA Output frequency range: 0~50 KHz
	Y1	Bi-direction open collector output Y1 (only 35R5GB/37R5PB~3500G)	It can be defined as multi-function on-off output terminal. See section 5.4, Chapter 5 for details. (The common terminal is CME)	Optical-isolator output Operating voltage range: 0 V~26 V Max output current: 50 mA Refer to the description of P3.14~P3.15 for the using methods.
	Y2	Bi-direction open collector output Y2 (only 35R5GB/37R5PB~3500G)		

Category	Terminal	Name	Functions	Specification
Relay output terminals	TA	Programmable relay output	It can be defined as multi-function output terminal of relay. See section 5.4, Chapter 5 for details.	TA-TB: Normally close; TA-TC: Normally open. Capacity of contacts: 250 VAC/2 A (COSΦ=1) 250 VAC/1 A (COSΦ=0.4) 30 VDC/1 A
	TB			
	TC			
Relay output terminals	BRA	Programmable relay output (only 35R5GB/37R5PB~3500G)	It can be defined as multi-function output terminal of relay. See section 5.4 Chapter 5 for details.	BRA-BRB: Normally close; BRA-BRC: Normally open. Capacity of contacts: 250 VAC/2 A (COSΦ=1) 250 VAC/1 A (COSΦ=0.4) 30 VDC/1 A
	BRB			
	BRC			
Power supply	10V	+10V power supply	Provide ＋10V reference power supply for external equipment. (The reference ground is GND)	Max output current: 30 mA, Max voltage when open is 12V
	24V	+24V power supply	Provide ＋24V power supply for external equipment. (The reference ground is COM)	Max output current is 200 mA

Category	Terminal	Name	Functions	Specification
Power supply	PLC	Common terminal of multi-function input terminal	Common terminal of multi-function input	Be shorted to 24V before delivery PLC is internal isolated with 24V. Notes: S2R4GB, S2R75GB model don't have this function To use PLC for following models, JP1 jumpers on the left of control terminals must be cut off. S21R5GB S22R2GB 3R75GB/31R5PB 31R5GB/32R2PB 32R2GB/3004PB 3004GB/35R5PB
	GND	Reference ground of +10V power supply	Reference ground of analog signal and＋10V power supply	Internal isolated with COM, Common terminal of +10V,AI1,AI2,AO1(or AO1,AO2)
	COM	Common terminal of +24V power supply	Be used in conjunction with other terminals.	COM is internal isolated with GND.
	CME	Common terminal of Y1, Y2(only 35R5GB/37R5PB~3500G)	Common terminal of multi-function Y1 and Y2 output (Be shorted to COM before delivery)	Be shorted to COM before delivery CME is internal isolated with COM, GND
	PE	Shielding ground	It is used for grounding of shielding layer. The shielding layer of analog signal lines, communication line 485 and motor cable can be connected to this port.	It is connected to the terminal PE in main circuit. (S2R4GB, S2R75GB model without the function)

2.5.2 Control Circuit Wiring

●Wiring Analog Input Terminal

AI1/AI2 terminals can accept analog signal input, operate Data-chosen-switch SW1 to select input voltage (0~10V) or input current (0~20mA). The wiring is shown as Figure 2-14:

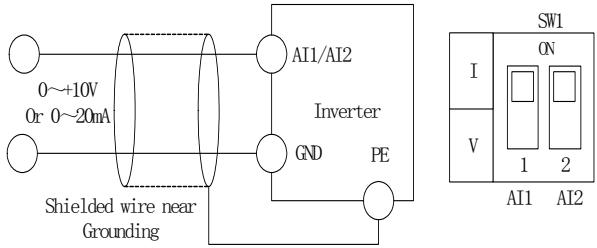


Fig. 2-14 Analogy input terminal wiring diagram

- Wiring Analog Output Terminal

In S2R4GB~3004GB/35R5PB, if the analog output terminal AO1 is connected to analog meters, the various kinds of physical values can be indicated. Operate wiper switch SW2 to select output voltage (0/2~10V) or output current (0/4~20 mA). The wiring is shown as Figure 2-15:

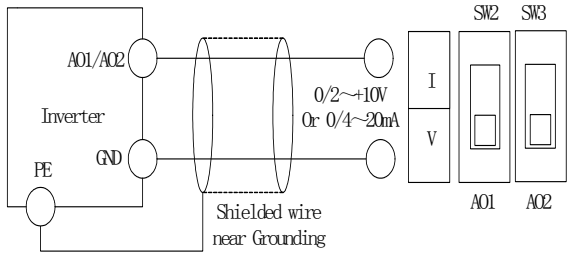


Fig. 2-15 S2R4GB~3004GB/35R5PB Analog output terminal wiring diagram

To indicate different kinds of physical values, for models of 35R5GB/37R5PB~3500G, analog meters can be connected to the analog output terminals of AO1 and AO2. Switch SW2 and SW3 on and off to select output voltage (0/2~10 V) or current (0/4~20 mA). The wiring is shown as Figure 2-16:

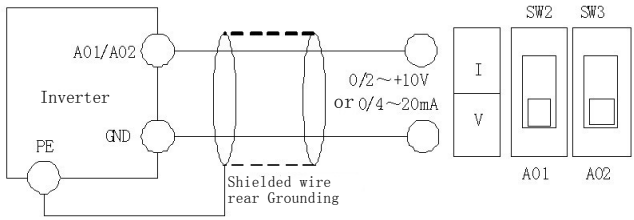


Fig 2-16 35R5GB/37R5PB~3500G Analog output terminal wiring diagram

🕮 *Notes:*

1) Dialing SW1, SW2, SW3 to "I" represents current, dialing to "V" represents voltage.
2)Analog input and output signals are easily disturbed by exterior environment, so shielded cables must be used for wiring and the length of the cables should be as short as possible.
3)When an analog output equipment is connected to the inverter, sometimes because of error act because of interference caused by the analog output equipment or the inverter, when which happens, a 0.01~0.1uF/50V capacitance or a ferrite bead (enwind 3 laps) could be connected to the analog output equipment.

- Wiring of Serial Communication Interface

The inverter of this series provides standard RS485 serial communication interface for users, which can be composed as master and slave network. By using a host PC or PLC, the inverter in the network can be monitored in real time and controlled remotely and automatically, thus more complicated operation control can be realized.

Connection between the inverter and the host PC:

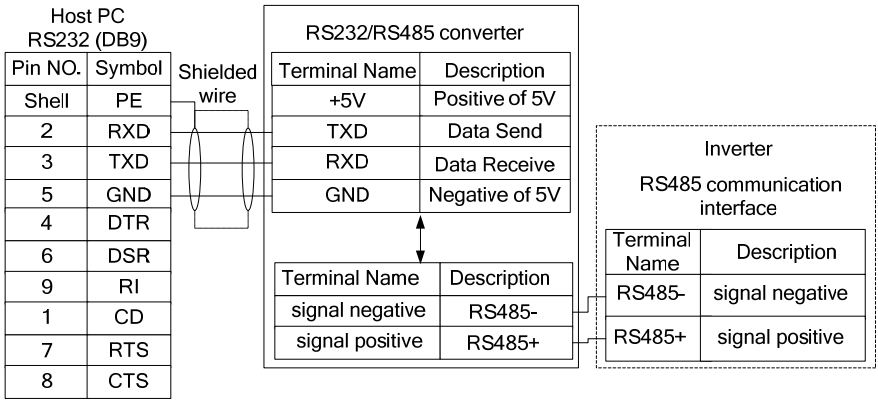


Fig. 2-17 Connection between the inverter and the host PC

If several inverters (Max 31) are connected in the network by RS485, wiring is especially important because the disturbance to the communication system increases, STP (Shielded Twisted Pair) must be used for communication BUS, you can connect the cables as follows:

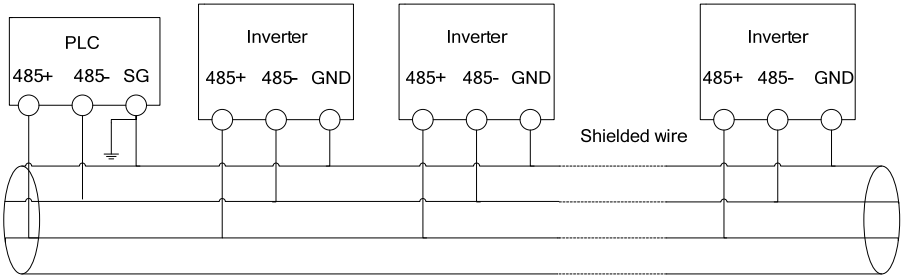


Fig. 2-18 Communication between PLC and the Inverter

(The Inverter and Motor are grounded well)

The master can be a host PC or a PLC, the slaves are inverters of this series. An RS232/RS485 converter should be installed between the master and the bus when a PC is used. Connect homonymy terminals of the master and slave if the master is PLC.

When several inverters of S2R4GB~3004GB/35R5PB formed the RS485 network, you should customize the matching resistor of the inverters on those control panels which are on both ends of the farthest of the bus according to the use.

When several inverters of 35R5GB/37R5PB~3500G formed RS485 network, you should dial SW4 (double switches) of the farthest inverter to "ON", as Figure 2-19.

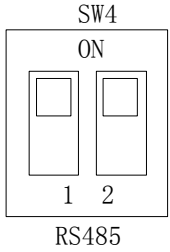


Fig. 2-19 Switches of SW4

If the communication still can't work, then the following actions can be taken:

1)Feed a separate AC supply to PLC (or host PC) and isolate the AC supply;

2)If RS232/RS485 converter is used and the module should be powered by a separate power supply, converter with optical-isolator is recommended;

3)Mount a toroid to the communication cable, or reduce the carrier frequency if the local conditions permit .

- Wire Multi-Function Input Terminals

Multi-function input terminals of the inverter use a full-bridge rectifying circuit. PLC is the common terminal of terminals X1~X8(in 3R75GB/31R5PB~3004GB/35R5PB only X1~X5). The current flows through terminal PLC can be pulling current, and feeding current. Wiring X1~X8 are flexible and the typical wiring is shown below:

Method 1 of connections (Dry contacts)

1)If internal 24V power supply is used, the wiring is shown in Figure2-20(Attention: PLC and 24V must be firmly connected).

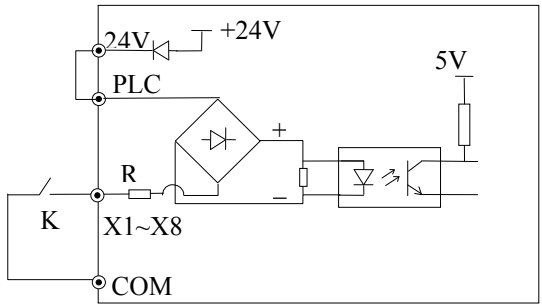


Fig. 2-20 Using Internal 24V Power Supply(in 3R75GB/31R5PB~3004GB/35R5PB only X1~X5)

2)If an external power supply is used, then use the Wiring shown in Figure 2-21 (Attention: be sure to disconnect the cable JP1 between PLC and 24V for models of 3R75GB/31R5PB~3004GB/35R5PB; and disconnect the wiring cable between PLC and 24V for models of 35R5GB/37R5PB~3500G).

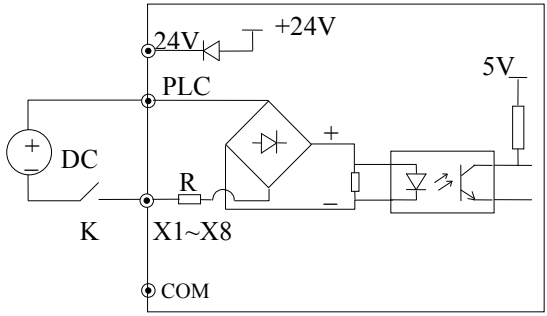


Fig. 2-21 Use an external supply(in 3R75GB/31R5PB~3004GB/35R5PB only X1~X5)

- Method 2 of Connections

1)Inverter's internal +24V power supply is used and the external controller uses NPN transistors whose common emitters are connected, as shown in Figure 2-22.

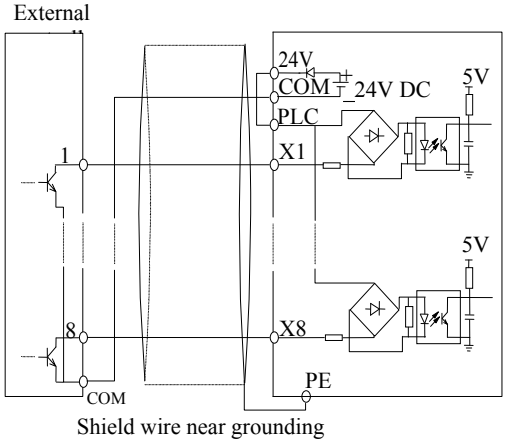


Fig. 2-22 Source connection method by using inverter's internal +24 V power supply (in 3R75GB/31R5PB~3004GB/35R5PB only X1~X5)

2)Inverter's internal +24 V power supply is used and the external controller uses NPN transistors whose common emitters are connected, as shown in Figure 2-23 (Attention: be sure to disconnect the cable JP1 between PLC and 24V for models of 3R75GB~3004GB, and disconnect the wiring cable between PLC and 24V for models of 35R5GB/37R5PB~3500G, short circuit terminal PLC and COM).

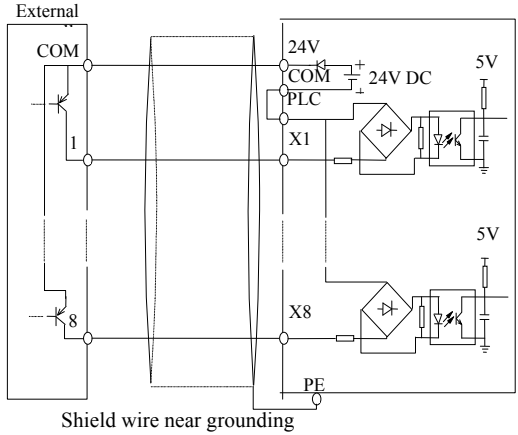


Fig. 2-23 Drain connection method by using inverter's internal +24 V power supply (in 3R75GB/31R5PB~3004GB/35R5PB only X1~X5)

3)Use external power supply by source connection method (Attention: be sure to disconnect the cable JP1 between PLC and 24V for models of 3R75GB~3004GB; and disconnect the wiring cable between PLC and 24V for models of 35R5GB/37R5PB~3500G):

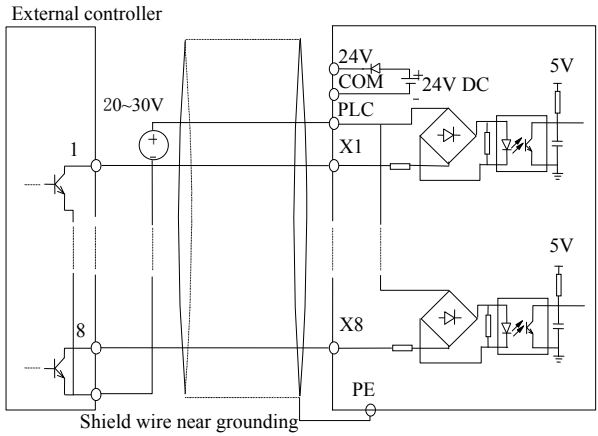


Fig. 2-24 Source connection method by using external power supply (in 3R75GB/31R5PB~3004GB/35R5PB only X1~X5)

4)Use external power supply by drain connection method (Attention: be sure to disconnect the cable JP1 between PLC and 24V for models of 3R75GB~3004GB; and disconnect the wiring cable between PLC and 24V for models of 35R5GB/37R5PB~3500G).

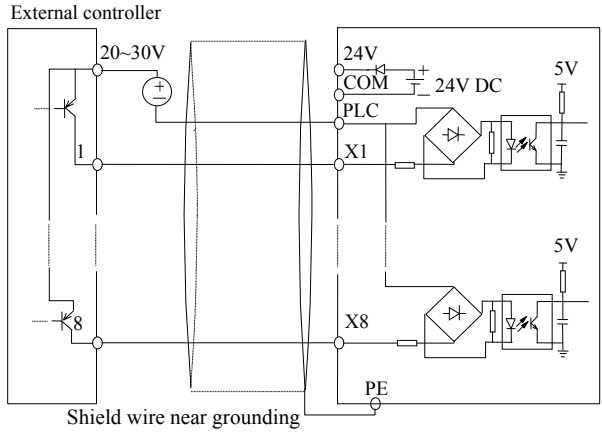


Fig. 2-25 Drain Connection Method(in 3R75GB/31R5PB~3004GB/35R5PB only X1~X5)

- Wire Multi-Function Output Terminals

1)Multi-function output terminals D0 as switching output can use the internal 24V power supply of inverter and the wiring method is shown in Figure 2-26.

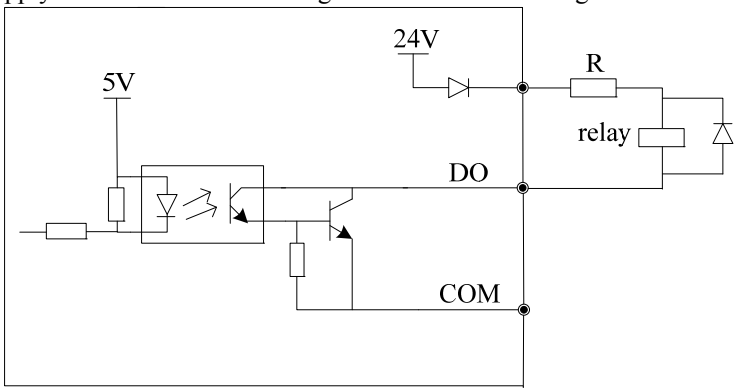


Fig. 2-26 Wiring method 1 of DO as switching output

2)Multi-function output terminals D0 as switching output can also use the external 9~30V power supply and the wiring method is shown in Figure 2-27.

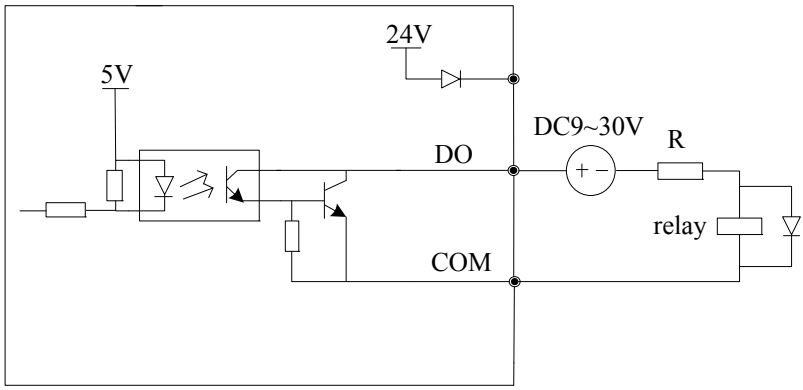


Fig. 2-27 Wiring method 2 of DO as switching output

3)Multi-function output terminals / Pulse output terminal DO as pulse output can use the internal 24V power supply and the wiring is shown in Figure 2-28.

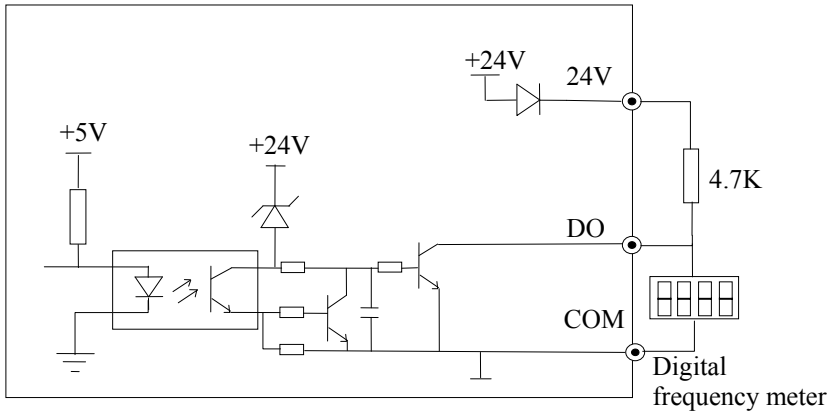


Fig. 2-28 Wiring method 1 of DO as pulse output

4)Multi-function output terminals / Pulse output terminal DO as Pulse output can also use the external 9~30V power supply and the wiring is shown in Figure 2-29.

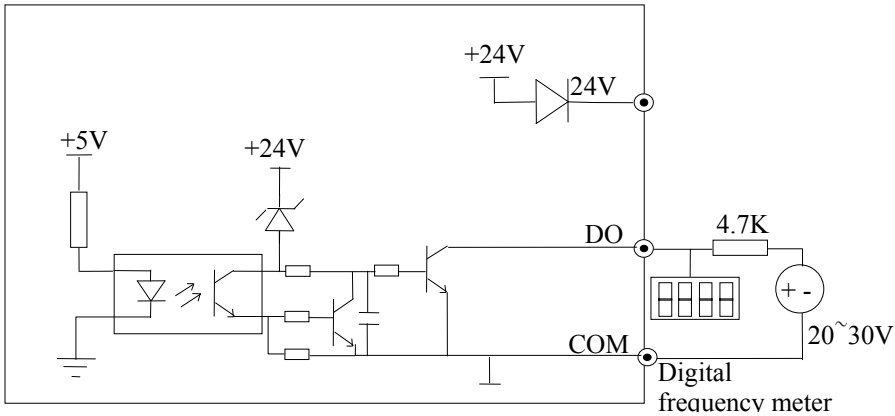


Fig. 2-29 Wiring method 2 of DO as pulse output

5)Multi-function output terminals Y1 and Y2 can use the internal 24V power supply of inverter and the wiring method is shown in Figure 2-30.

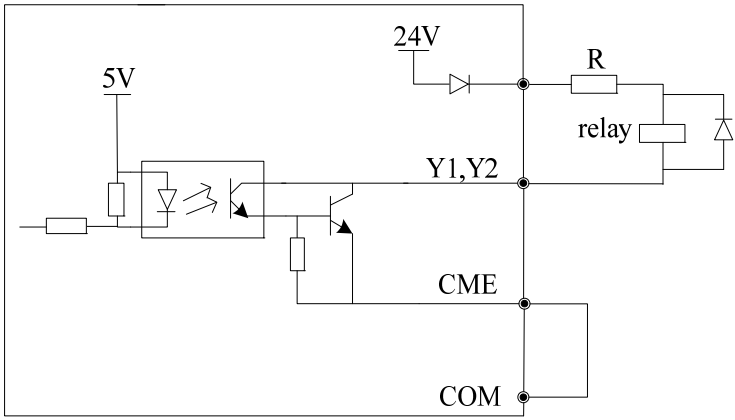


Fig. 2-30 Wiring method 1 of multi-function output terminal

(only 35R5GB/37R5PB~3500G)

6)Multi-function output terminals Y1 and Y2 can also use the external 9~30V power supply and the wiring method is shown in Figure 2-31.

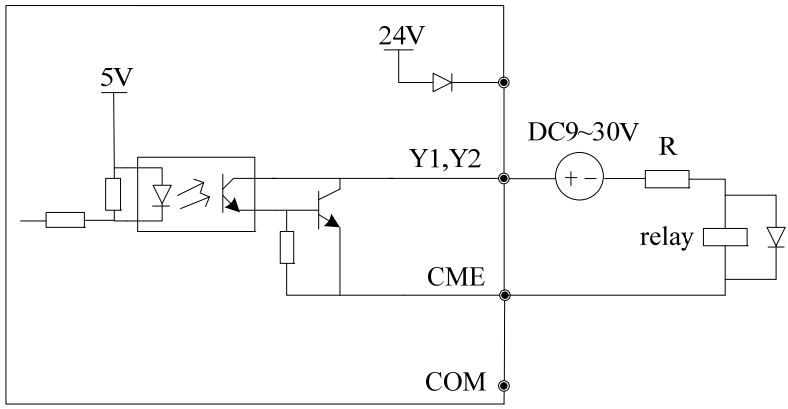


Fig. 2-31 Wiring method 2 of multi-function output terminal

(only 35R5GB/37R5PB~3500G)

- Wiring of Relay Output Terminals TA, TB, TC and BRA, BRB, BRC (BRA, BRB, BRC is provided only in 35R5GB/37R5PB~3500G)

If the inverter drives an inductive load (such as relay or contactor), then a surge suppressing circuit should be added, such as RC snub circuit, lightning varistor or a flywheel diode (used in the DC electric-magnetic circuit and pay attention to the polarity during installation). Snubbing components should be as close to the coils of relay or contactor as possible.

🕮 *Notes:*

Don't short circuit terminals 24V and COM, otherwise the control board may be damaged.
Please use multi-core shielded cable or multi-stranded cable (above 1 mm) to connect the control terminals.
When using a shielded cable, the shielded lay's end that is nearer to the inverter should be connected to PE.
The control cables should be as far away(at least 30 cm) from the main circuit and high-voltage cables as possible (including power supply cables, motor cables, relay cables and cables of contactor). The cables should be vertical to each other to reduce the disturbance to minimum.

- Keyboard Interface

Keyboard Interface of CN2 on the control board uses standard 8PIN interface, which is shown in Figure 2-32. Users can order the extended keyboard cable or make it by themselves according to actual need. Be sure that the extension cable of the keyboard is

no longer than 15 meters, otherwise it wouldn't work properly. (Remove the original keyboard of models of S2R4GB~3004GB/35R5PB, or the exterior can not work properly)

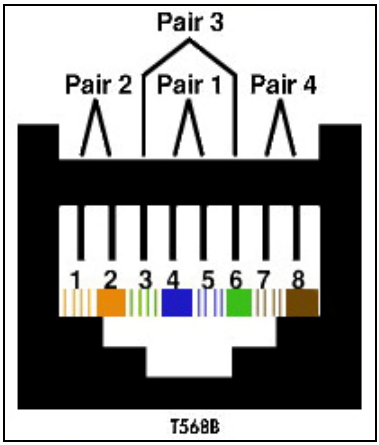


Fig 2-32 Keyboard Interface CN2 on control board

Table 2-9 T568B standard connection

Number	Corresponding Color
1	White/Orange
2	Orange
3	White/Green
4	Blue
5	White/Blue
6	Green
7	White/Brown
8	Brown

The cables connecting keyboard and control board use standard super-five-class network cable. RJ-45 Interface uses through-line method, namely both sides are connected according to EIA/TIA568B standard. You can make the cable by yourself if you need.

🕮 *Notes:*

1. Both sides of keyboard cable should be connected refer to Table 2-9. Otherwise, the cable couldn't work properly or even the keyboard would be damaged.
2. When the keyboard extension cable is longer than 1 m, which must use shielded twist-pair network cable, RJ-45 interfaces of both sides of the cable should use crystal with shielded metal shell, connect shielded metal shell to shielded layer. Otherwise, it is likely to cause error action because of disturbance.
3. Be sure the extension cable of the keyboard is no longer than 15 meters, otherwise it wouldn't work properly.

2.6 Wiring of Inverter for Basic Operation

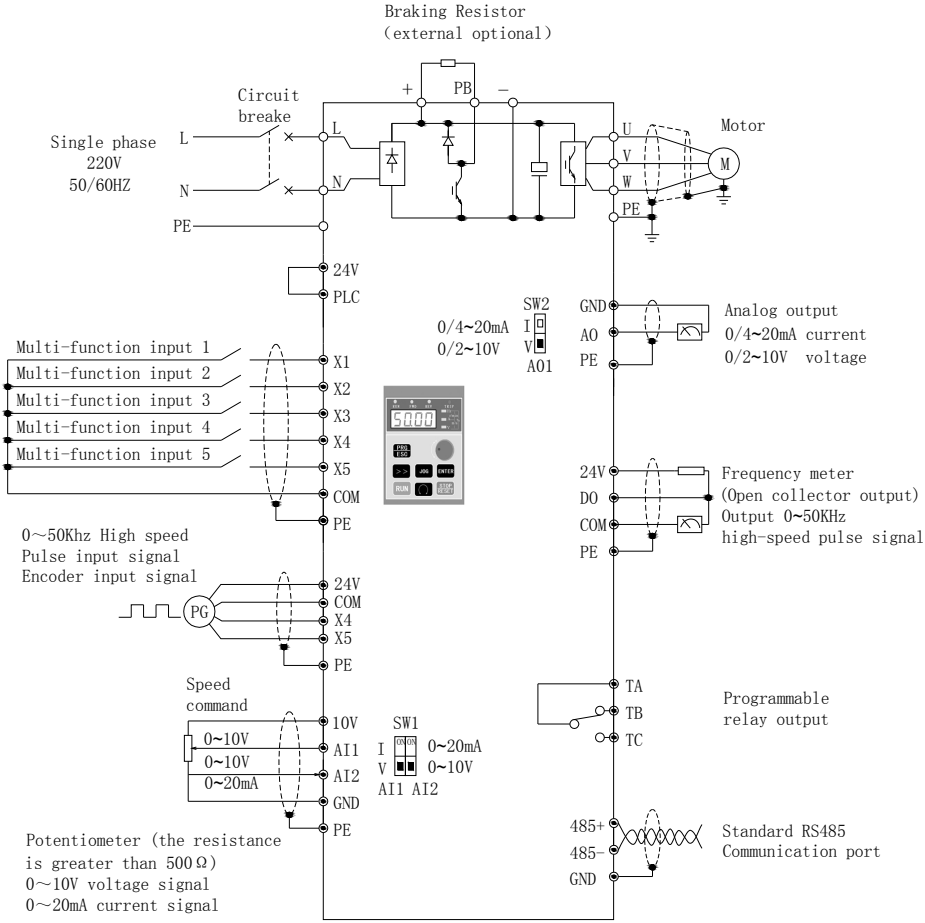


Fig. 2-33 S2R4GB~S22R2GB Wiring diagram (S2R4GB or S2R75GB does not have PLC)

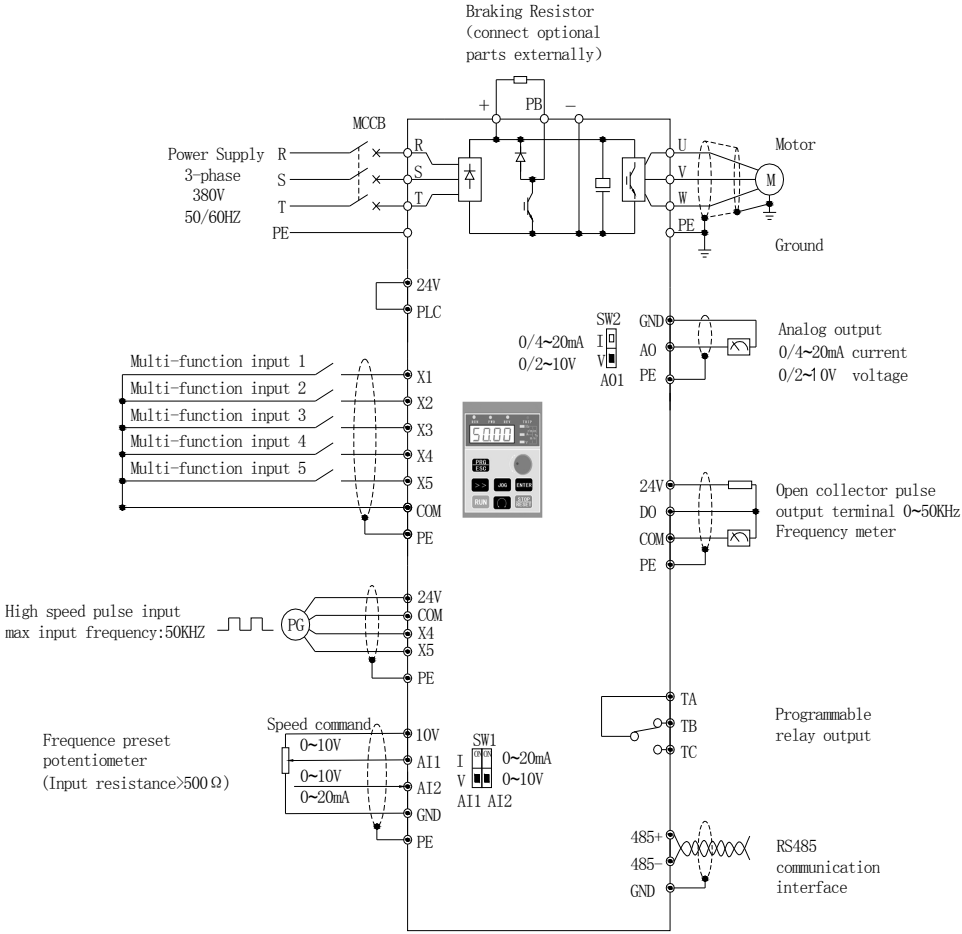


Fig. 2-34 3R75GB/31R5PB~3004GB/35R5PB Wiring diagram

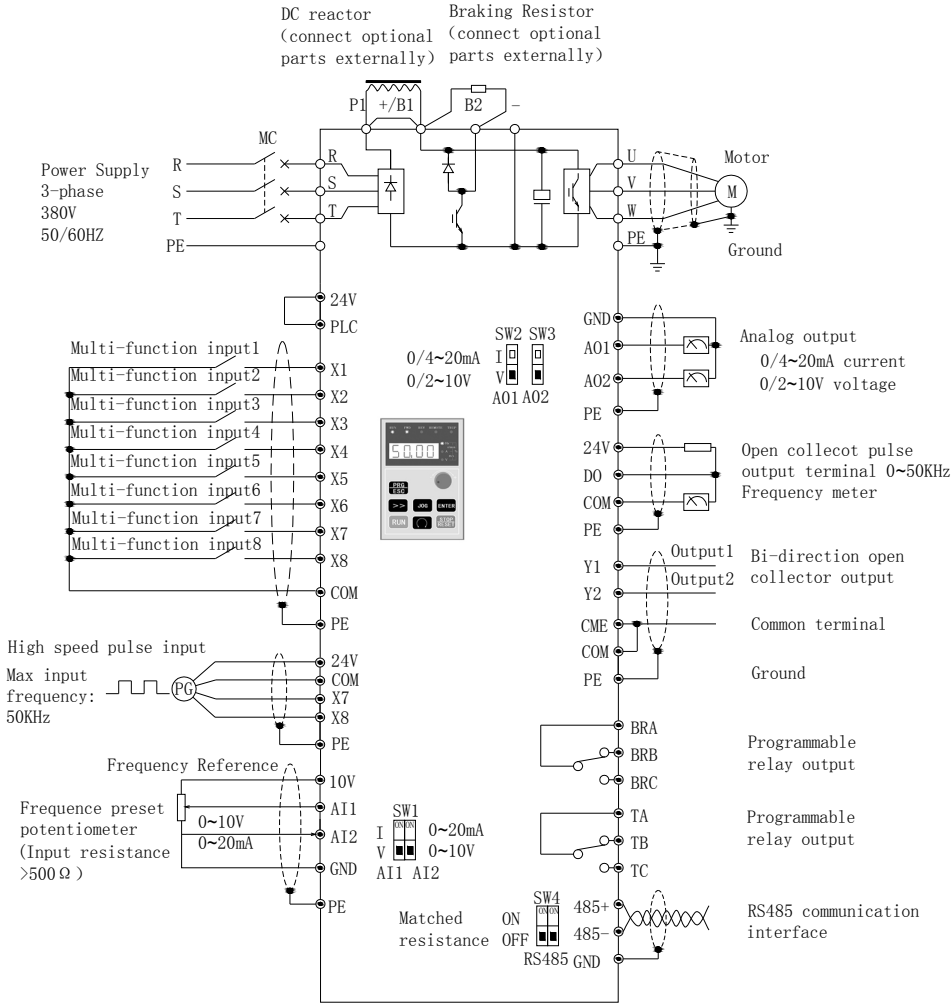


Fig. 2-35 35R5GB/37R5PB~3015GB/3018PB Wiring diagram

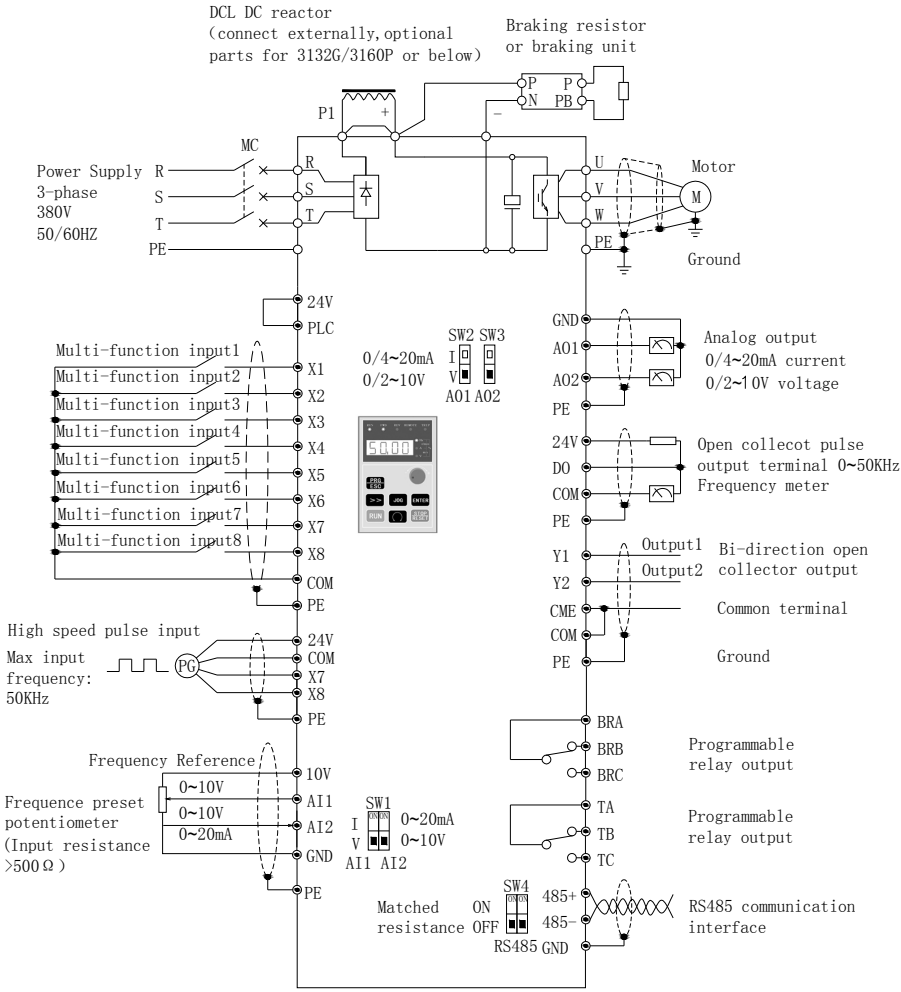


Fig. 2-36 3018G/3022P~3500G Wiring diagram

Notes:

1. Analog signal input to AI1/AI2 (voltage or current) can be selected by Data-chosen-switch, the default is voltage input. You can refer P4.00~P4.10 to set the range.
2. Max output current of control circuit terminal 10 V is 30 mA.
3. The short circuit copper bar between PLC and 24V terminals should be connected firmly (3R75GB/31R5PB~3004GB/35R5PB connect by JP1; 35R5GB/37R5PB~3500G connect by the short circuit copper bar between PLC and 24V), otherwise input X-terminals couldn't work properly.

2.7 Wiring Attention

- Be sure the input power supply of the inverter is cut off then you can remove or replace the motor.
- Be sure the inverter has stopped output then you can switch the motor or the power supply.
- If a peripheral (brake unit, reactor, filter) is added, test the insulation resistance of the peripheral to earth first and be sure the value not below 4 MΩ.
- Besides shielding the input signal cable and the cable of frequency meter, the cables should be disposed solely, not parallel with the main circuit cable, and far away from it as possible.
- In order to avoid error action caused by molestation, the control circuit cable should use stranding shielded cables, and the wiring distance should be less than 50 meters.
- Be sure the shielded layers of shielded cables are not touching other signal cables or shell of equipment, you can use insulating tape to enswathe the bare shielding layer.
- The withstand voltage of all the cables should match the voltage class of the inverter.
- In order to prevent accident, be sure that the control circuit terminal ”PE” and the main circuit terminal “PE” are connected to earth, and the earthing cable can’t be shared with other equipment. The size of main circuit earthing cable should be more than one and a half of the main circuit cable. After completion of wiring, please check whether a cable, a bolt or a connection end etc., left in the inverter, whether the bolts are fastened firmly, whether the bare cable of terminals are shorted to other terminals.

Chapter 3 Operation

DANGER 	1. Only turn on the input power supply after replacing the front cover. Do not remove the cover while the inverter is powered up. 2. When the retry function is selected, do not approach the inverter or the load, since it may restart suddenly after being stopped.
CAUTION 	1. Since the stop key can be disabled by a function setting, install a separate emergency stop switch. 2. Since it is very easy to change operation speed from low to high speed, verify the safe working range of the motor and machine before operation. 3. Do not check signals during operation. 4. All inverter parameters have been preset at the factory. Do not change the settings unless it is required. Failure to observe these precautions may result in equipment damage, serious personal injury or death.

3.1 Function of Keyboard

The keyboards of the inverter may have different exterior dimensions. However, all of them have the same array of keystrokes and LED display. Moreover, operation and function of them are all the same. Every keyboard has four digitals seven segments LED monitor, nine operation keystrokes, a digital encoder, and eight LED indicators (five for status indication and three for unit indication). User can perform function setting, inverter running, stop, and status monitoring with the keyboard.

3.1.1 Overview of Keyboard

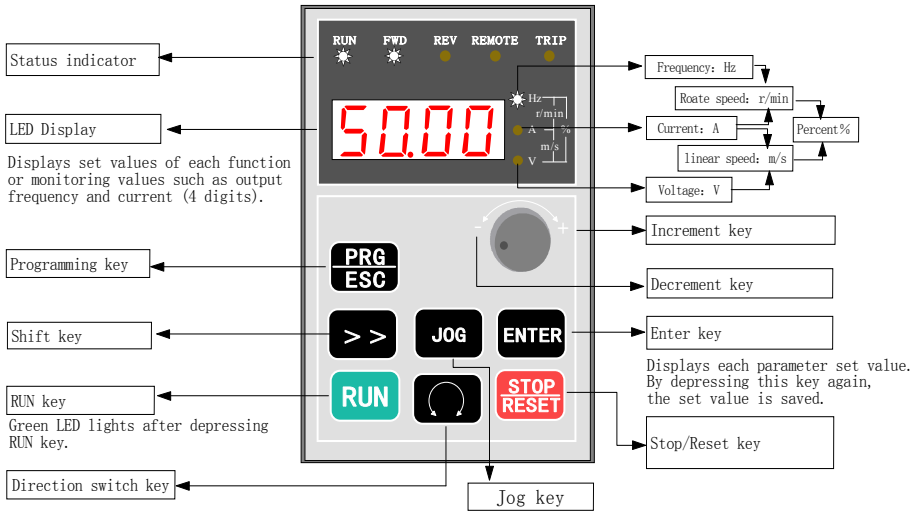


Figure 3-1 Layout and function of Keyboard

Above the keyboard are five status indicators: RUN, FWD, REV, REMOTE and TRIP. The indicator RUN will be lit up if the inverter is running; the indicator FWD will be lit up if it runs forward and the indicator REV will be lit up if it runs reverse. The indicator REMOTE will be lit up if the inverter is not controlled by keyboard. The indictor TRIP will be lit up if fault occurs. To see the details, see Chapter 3-3 description.

In monitoring status, the LED will display the content of current monitoring object. At abnormal state it will display the fault code when the inverter falls to run and show the warn code when the inverter is warning. At normal state, it will display the object selected by parameter group PC. See table 3-1 description for details.

In programming status, the LED has three menus to program the inverter: The function group menu, the function code menu and the function parameter menu. In the function group menu, the LED will display the function group such as “-P0-”, in the function code menu, it will display the function code such as “P0.00”, in the function parameter menu, and it will display the value of the function parameter, such as “50.00”.

Table 3-1 The LED monitoring objects

Set value	Monitoring object(Unit)	Permission of Modify in running state
PC.01=1	Output frequency before compensation (Hz)	
PC.02=1	Actual output frequency (Hz)	
PC.03=1	Output current (A)	
PC.04=1	Setting frequency (Hz blink)	permission
PC.05=1	Motor rotate speed (r/min)	
PC.06=1	Setting speed (r/min blink)	permission
PC.07=1	Running linear speed (m/s)	
PC.08=1	Setting linear speed (m/s blink)	
PC.09=1	Output power (no unit)	
PC.10=1	Output torque(%)	
PC.11=1	Output voltage (V)	
PC.12=1	Bus voltage (V)	
PC.13=1	AI1 (V)	
PC.14=1	AI2 (V)	
PC.15=1	Analogy PID feedback (no unit)	
PC.16=1	Analogy PID feed (no unit)	permission
PC.17=1	Extern count value (no unit)	
PC.18=1	State of terminal (no unit)	
PC.19=1	Actual length(m)	

3.1.2 Description of Keystroke Function

On the inverter keyboard, there are nine keystrokes. In addition, the function of each keystroke is defined as table 3-2.

Table 3-2 Description of keystroke function

key	Name of key	Key functions
PRG ESC	Programming key/Exit key	Enter or exit programming state. In monitoring state, press the PRG/ESC key to programming state. The first, enter function group menu, and press the “ENTER” key to enter function code and function parameter progressively; press the “PRG/ESC” key, the keyboard will switch to the function code menu, then function group menu, then monitoring state. In case of an inverter failure, press the “PRG/ESC” key, the keyboard will switch to the function group menu. The same function for warning state.
ENTER	Enter key	Enter the sub-menu in programming state. Save the parameter set value when in the function parameter menu.
Digital Encoder 	Up (clockwise) 	In programming state, it can increase the function code group number, and function code number or function code value. In parameter setting state, LED nixie tube blinking displays modified bit, rotate the knob to increase the number. In monitoring state, if the keypad is set to be effective, digital frequency setting, speed PID setting and analog PID setting can be increased by rotating the knob.
	Down (counterclockwise) 	The same function as Up key, but the number will decrease instead of increase.
> >	Shift key	In programming state, the modified bit of the set data can be selected; In monitoring state, monitoring object such as output frequency and output current can be selected (4 digits).
JOG	Jog key	In keypad mode, press this key to enter inching running mode
RUN	Run key	In keypad control mode, the inverter will start running and a running command will be given by pressing this key.

key	Name of key	Key functions
	Direction switch key	Press this button to change the direction of rotation. See P0.05 function description for details.
	Stop/Reset key	In keypad control mode, this key is used to stop the inverter. Clear the failure and return to normal state when there is a failure.

3.1.3 Description of LED Digitals and Indicators

On the inverter keyboard there are four digitals seven segments LEDs, 3 unit indicators, 5 status indicators. The four digitals can display the monitoring object, the function parameter values and the fault code, the warning code. The three unit indicators have eight combinations, and each combination corresponds to one-unit. The combinations and their corresponding units are as the following:

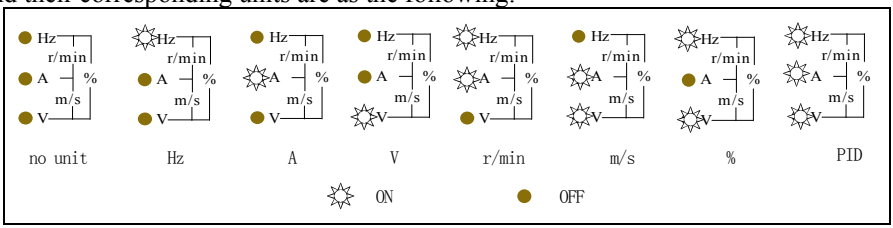


Figure 3-2 Combinations of unit indicator and their means

The five status indicators are just above the four digitals and the mean of each indicator is shown in table 3-3.

Table 3-3 Description of state indicators

Indicator	Display state	Mean: Indicator the state of inverter
RUN running state indicator	OFF	Stop
	ON	Running
	Flicker	Zero frequency operation
FWD Forward running direction indicator	OFF	Reverse running or stop
	ON	Stable forward running
	Quick flicker	Acceleration or deceleration of forward rotation
	Slow flicker	Stop, the direction is forward
REV Reverse running direction indicator	OFF	Reverse running or stop
	ON	Stable reverse running
	Quick flicker	Acceleration or deceleration of reverse running
	Slow flicker	Indicate that the inverter is at stop state and the setting direction is forward

Indicator	Display state	Mean: Indicator the state of inverter
TRIP failure indicator	OFF	Normal
	Slow flicker	Failure
REMOTE command mode indicator	OFF	Keypad control state
	ON	Terminal control state
	Slow flicker	Serial communication state

3.1.4 Display State of Keyboard

The working state of this series inverter includes two states: stop state and running state.

Stop State: If there is no running command input after the inverter is power on and initialized, or the inverter has received a stop command input, the inverter will come into stop state.

Running state: The inverter has received a running command and then comes into running state.

Therefore, the display states of keyboard include display of stop state, display of running state and display of programming state and display of fault and warning state.

- Display of stop state

If the inverter is in stop state, the four digitals of keyboard will display the parameters value of stop state: For example, the output frequency. See figure-3-2, and the unit indicator will indicate the unit of the parameter. Press >> key, the keyboard will cycling display the value of different monitoring objects (selected by the parameter group PC).

- Display of running state

If the inverter gets an effective running command, it will come into running state. Then the four digitals of keyboard will display the parameters value of running state. See example of figure 3-3-3. and the unit indicator will indicate the unit of the parameter.

Press >> key, the keyboard will cycling display the value of different monitoring objects (selected by the parameter group PC).

- Fault and warning state

If the inverter has checked out a warning signal, it will come into warning state and show the warning code flickeringly. See example of figure 3-3-5. If the warning signal disappears, the warning code will automatically disappear.

If the inverter has checked out an error, it will come into fault state and show the fault code steadily. Moreover, the indicator TRIP will light up, see example of figure 3-3-6.

By pressing the >> key, user can view the parameters value of stop state. If you want to see the details of fault information, press the PRG ESC key, the keyboard will go to programming state, to see the details, please see the parameter values of group PE.

To reset the inverter, press the STOP RESET key or control terminals or serial communication. If the fault signal still exists, the keyboard will keep the fault code displaying and the indicator TRIP lighting.

3-3-1 Display of power on.
Output frequency is 0.00Hz

3-3-2 Display of stop state.
RUN is off, FWD blink slowly

3-3-3 Display of running state
RUN is on, FWD blink fast when speed up

3-3-4 Display of running state
RUN is on, the inverter run to the setting frequence and FWD is ON at steady state.

3-3-5 Display of warning state.
The warning code is flickering

3-3-6 Display of fault state.
The fault code is shown and TRIP is on

Figure 3-3 Display of initialization, stop, running, warning and stop of inverter

- Programming state

In stop, running fault or warning state, press the PRG/ESC key PRG ESC, the inverter will come into programming state.(If the user has set the user password, please see chapter 5.16, description of PF.00). In programming state, there are three display menus, see figure 3-4. They are function group menu, function parameter number menu, and function parameter value menu, press the "ENTER" key ENTER, the display menu will be changed gradually. In function parameter value menu, press the "ENTER" key ENTER to save the value of the parameter, press the "PRG/ESC" key PRG ESC to exit from one menu to another.

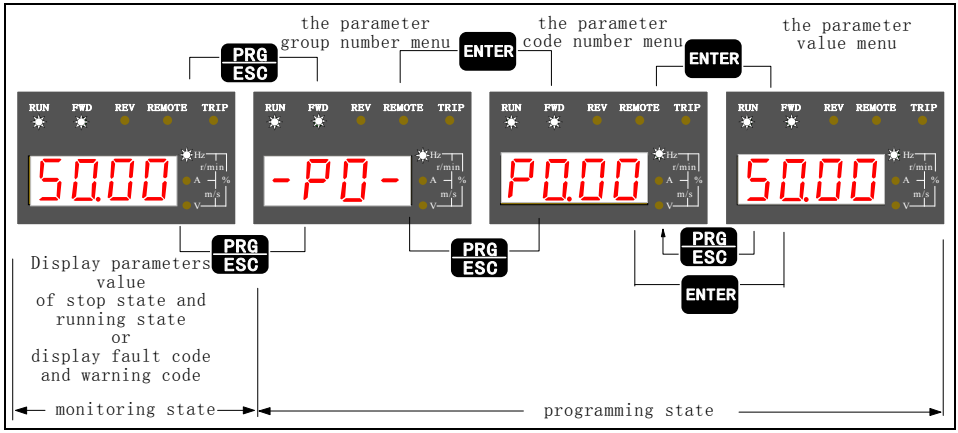


Figure 3-4 Display menus of programming state

3.1.5 Operation Method of Keyboard

Here are some examples of how to run the inverter by the keyboard:

Monitoring object switching:

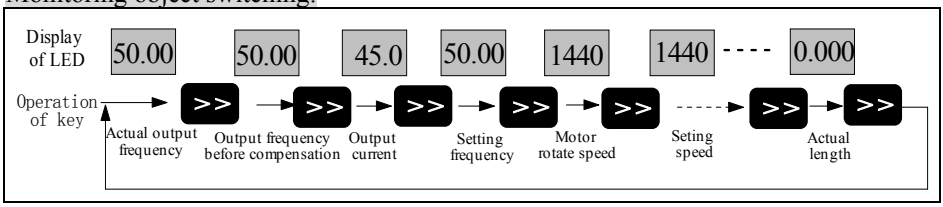


Figure 3-5 Flow chart of monitoring object switching

Frequency adjustment at common running: (Example: change the setting frequency from 50.00 Hz to 40.00 Hz).

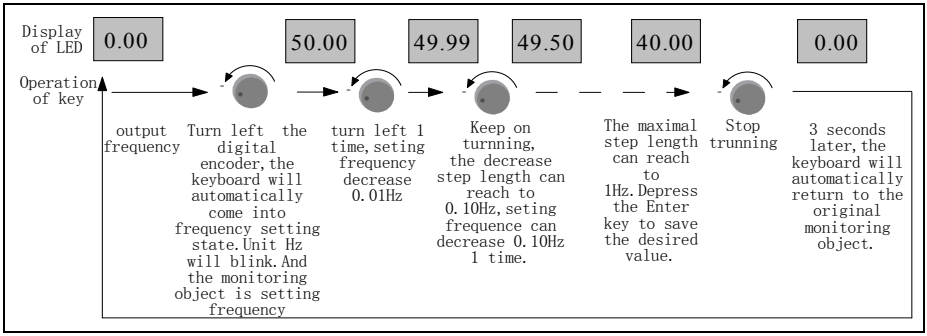


Figure 3-6 Flow chart of frequency setting

Note:

The above method is adapted to the initial state of display for any state parameter of a given frequency regulation.

If in the monitoring state, and the monitoring object is PID rotate speed or analog PID feed, turn the digital encoder right or left , it can automatically change the value as the change of the frequency setting.

Setting the parameters value: (Example: change jog accelerate time from 6.0 second to 3.2 second)

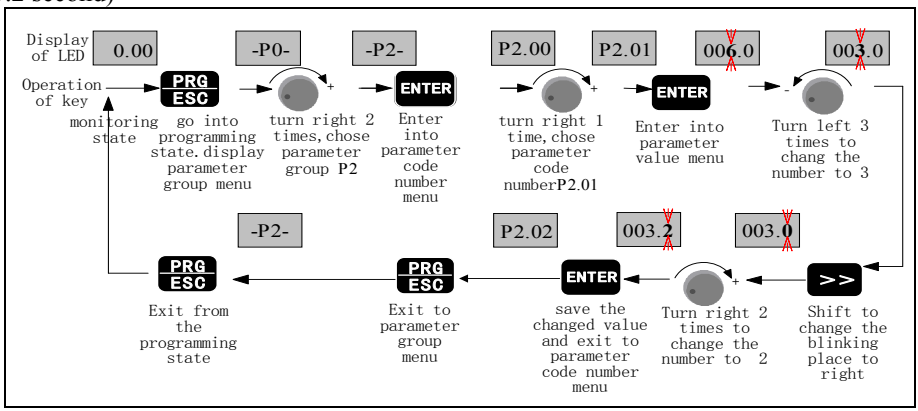


Figure 3-7 Flow chart of parameter setting

Note:

In the function parameter menu, no flicker bit for a parameter indicates that the function code can't be modified, and the possible reasons include:

- Modifying the value is forbidden because the parameter is actual measure value, or running record value or fixed value.
- The function parameter cannot be changed when the inverter is at running state. However, it can be changed at stop state. So stop the inverter and then change the

parameter value.

- The inverter parameters are protected. If function parameter value PF.01=1 or 2, the parameters are forbidden to be changed. This parameter protection function is to avoid operation mistake. To change the protection parameters, change value of function code PF.01 to zero, then all the parameters can be changed.

3.2 Run Command Mode Select

The run command modes determine the methods of the inverter running and stop. The inverter has three run command modes:

- Run command from the keyboard: press the key RUN , STOP RESET , to control the inverter.
- Run command from the control circuit terminals: by using the terminal defined as FWD, REV, COM(2-wire control mode): FWD, REV, Xi(3-wire control mode) to control the inverter.
- Run command from serial communication: Use a PC or PLC to control the inverter to run or stop.

Change P0.04 to select serial communication mode. The default setting is Keyboard control mode (The default value P0.04 is 0). If terminal control mode is needed, please change the value to 1 or 2. If we want to keep the “STOP/RESET” key STOP RESET active in terminal control mode, we must set the value to 2.

If we need to control the inverter by PC or PLC serial communication, we should set P0.04 to 3 or 4.

If the indicator REMOTE is off, it means that the inverter is controlled by the keyboard. If the indicator REMOTE is on, it means that the inverter is controlled by the terminals. In addition, if the indicator is flickering, it means that the inverter is controlled by serial communication.

3.3 Trial Operation

3.3.1 Operation Mode of Inverter

This series of inverter have five operation modes: JOG operation, PID closed loop operation, Wobble frequency operation, PLC programmed operation and common operation.

- JOG operation: If the inverter received a jog operation command(for example, press JOG key) at a stop state, the inverter will jog running at the jog frequency reference set by function code P2.00~P2.02.

- PID closed loop operation: If PID close loop operation is selected by P0.01 (set the value to 9), the inverter will choose PID closed loop operation mode. In other word, it will come into PID adjustment as the PID feed and PID feedback. (see parameter group P7).
- Wobble frequency operation: If Wobble frequency operation mode is active (set value of parameter code P0.01 to 10), the inverter will come into Wobble frequency operation. The Wobble frequency running parameters can be modified in parameter group P6. By selecting a multi-function terminal and setting the value to 46, connecting the terminal to terminal "COM", Wobble frequency operation state can be reset (Refer to chapter 4, see details P3 description)
- PLC programmed operation: If PLC programmed operation mode is selected by P0.01 (set the value to 8), the inverter will chose PLC programmed operation: every steps can be pre-defined (see parameter group P5 description). By selecting a multi-function terminal and setting the value to 43, connecting the defined multi-function terminal to "COM", PLC programmed operation state can be stopped. If the value of a multi-function terminal is 44, connect the defined multi-function terminal to "COM", PLC programmed operation state will be reset(see parameter group P3 description).
- Common operation modes: in these modes, the inverter will run at open loop mode. Common operation modes include 7 operation modes, they are keyboard, terminal AI1, terminal AI2, pulse input, serial communication, multi-speed and terminal UP/DOWN operation.

3.3.2 Checkpoints Before Operation

- To ensure safety, prior to initial operation, disconnect the machine coupling so that the motor is isolated from the machine. If initial operation must be performed while the motor is still coupled to the machine, use great care to avoid potentially hazardous conditions. Check the following items before a trial run:
- Wiring and terminal connections are proper.
- Wire clippings and other debris removed from the unit.
- Screws are securely tightened.
- Motor is securely mounted.
- All items are correctly grounded.
- Keyboard Display at Power-Up.

3.3.3 Operation Checkpoints

- Motor rotates smoothly.
- Motor rotates in the correct direction.
- Motor has neither abnormal vibration nor noise.
- Acceleration and deceleration are smooth.
- Unit is not overloaded.
- Status indicator and keyboard display are correct.

Switch of operation modes of this series inverter are as figure 3-8 description:

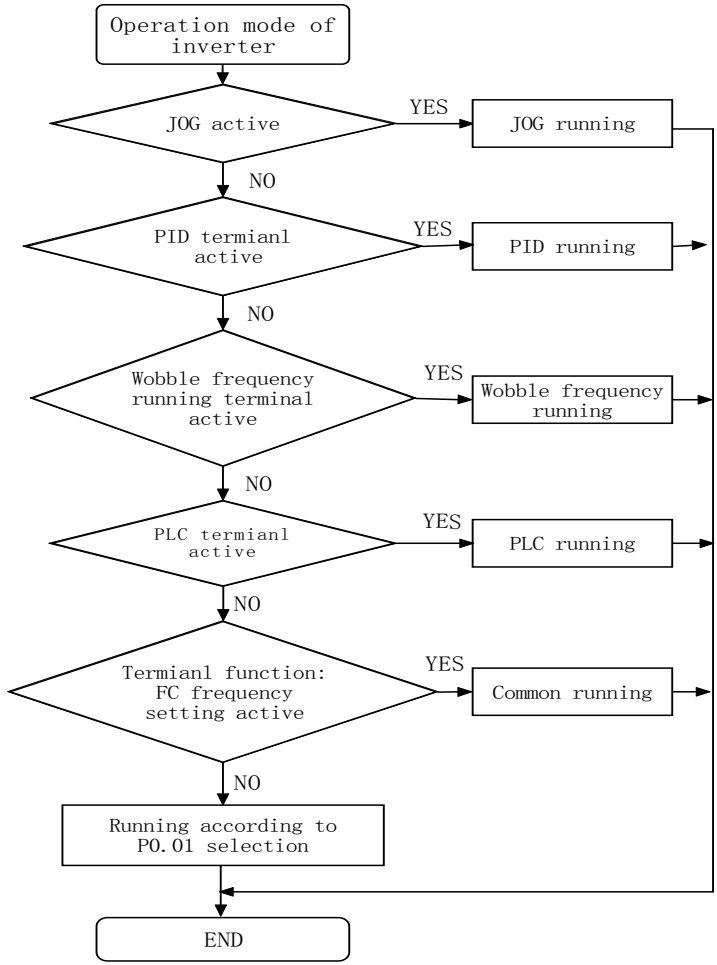


Figure 3-8 Operation modes switching of inverter

3.3.4 A Trial Run

Please wire the main circuit and control circuit strictly according to the technology requirement provided by the user manual when the inverter is ready for operation, turn ON the power supply. Verify that the inverter powers up properly. If any problems are detected, turn OFF the power supply immediately.

When the keyboard displays the output frequency, the inverter is initialized. If the keyboard is not connected right, the keyboard will display the fault code “CCF2” after 5 seconds. Please connect the keyboard again.

Operation process of power up the inverter is as the following:

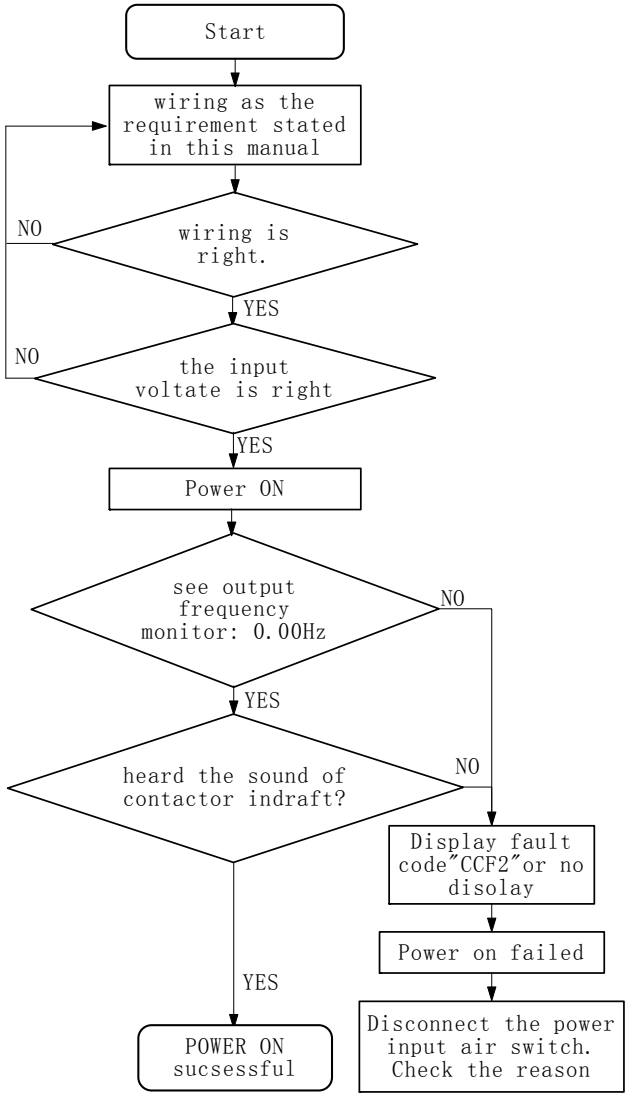


Figure 3-9 Flow chart of the inverter initialization

3.4 Commissioning of Keyboard

Assume that the inverter need to run forward at 30.00 Hz at first, then run reverse at the same frequency,

Using the keyboard can take the following steps to realize the task:
A typical operation pattern using the keyboard:

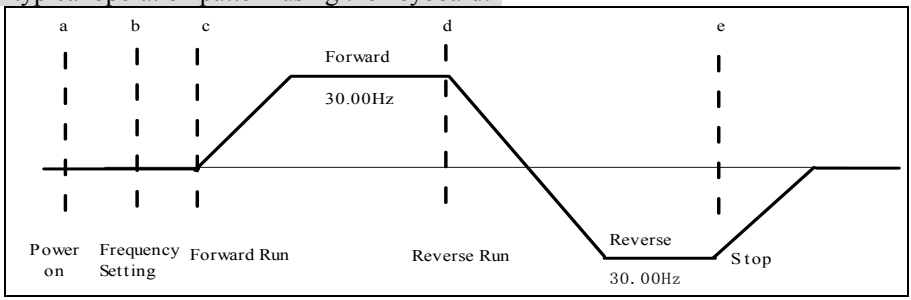


Figure 3-10 Operation sequence by keyboard

Running and stop operation:

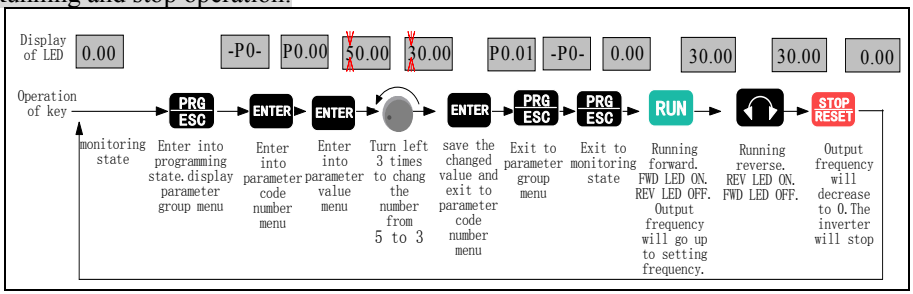


Figure 3-11 Flow chart of running and stop operation

Jog running operation: (Assume that the current run command mode is keyboard and the inverter is at stop state)

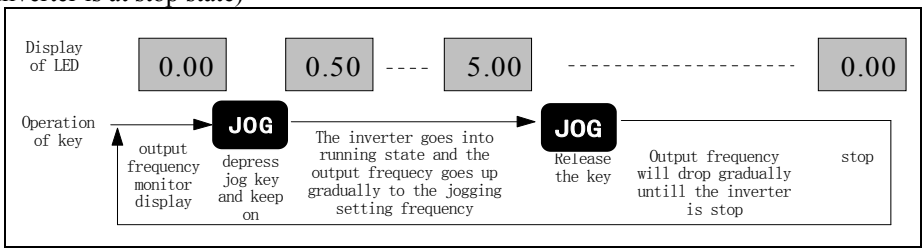


Figure 3-12 Example of Jog running

3.5 Operation of Control Circuit Terminal

Assume that the inverter needs to run forward at 30.00 Hz at first, and then stop by terminal, using the keyboard can take the following steps to realize the task:
Sequence of terminal operation:

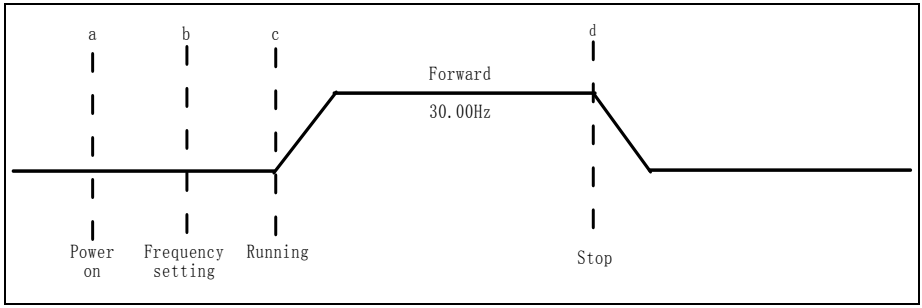


Figure 3-13 Sequence of terminal operation

Operation steps:

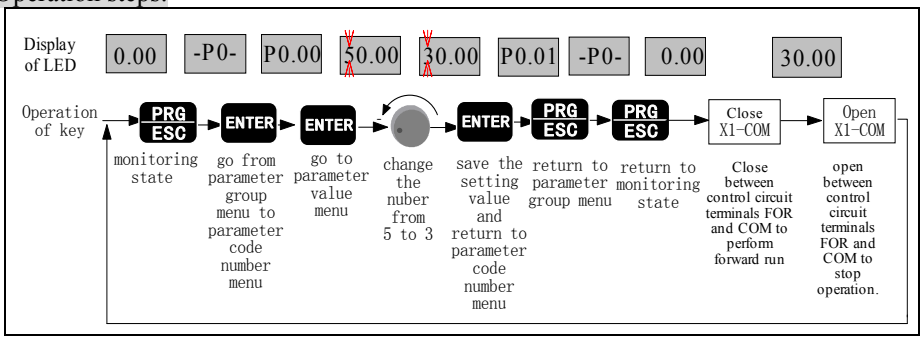


Figure 3-14 Flow chart of running and stop operation by terminal

Chapter 4 Parameter Index

Attention:
"○"means that the parameters can be changed during inverter running and stop state;
"×"means that the parameters cannot be changed during running;
"*" means that the actually measured value or fixed parameters cannot be changed;
"-" means that the parameters can be only set by the manufacturer and cannot be changed by the user.

P0: Basic function

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P0.00	Reference frequency	0 ~ Maximum frequency	0.00Hz	○	0100
P0.01	Frequency setting 1	0: NULL 1: Set by keyboard digital encoder 2: Terminal AI1 3: Terminal AI2 4: Pulse input 5: Serial communication 6: MS (Multi-step) Speed 7: Terminal UP/DOWN 8: PLC 9: PID 10: Wobble frequency operating	1	×	0101
P0.02	Frequency setting 2	Ibid, 0~6	0	×	0102
P0.03	Frequency setting selection	0: Frequency setting 1 1: Terminal Selection 2: Frequency setting 1+ Frequency setting 2 3: | Frequency setting 1- Frequency setting 2 | 4: Min (Frequency setting 1, Frequency setting 2) 5: Max (Frequency setting 1, Frequency setting 2)	0	×	0103
P0.04	Run command mode selection	0: Keyboard control 1: Terminal control 1(STOP invalid) 2: Terminal control 2(STOP valid) 3: Serial communication 1(STOP invalid) 4: Serial communication 2(STOP valid) 5: Terminal control 3 (STOP and JOG invalid)	0	×	0104

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P0.05	Keyboard direction setting	0: Forward 1: Reverse	0	○	0105
P0.06	Basic Frequency	S2R4GB~3004GB/35R5PB : 0.10~650.0Hz 35R5GB/37R5PB or above: 0.10~400.0Hz	50.00Hz	×	0106
P0.07	Maximum output frequency	S2R4GB~3004GB/35R5PB : MAX [50.00Hz, Upper limit frequency, Reference frequency] ~650.0Hz 35R5GB/37R5PB or above: MAX[50.00Hz, Upper limit frequency, Reference frequency] ~400.0Hz	50.00Hz	×	0107
P0.08	Upper limit frequency	MAX[Lower limit frequency]~ Max frequency	50.00Hz	×	0108
P0.09	Lower limit frequency	0.00 ~ Upper limit frequency	0.00Hz	×	0109
P0.10	Maximum output voltage	110~480V	Rated inverter	×	010A
P0.11	Step length of digital encoder regulation	0: Digital encoder integral regulation 1~250* (0.01Hz|1rpm): Step length of digital encoder regulation	0	×	010B
P0.12	V/F curves setting	0: Constant torque curve 1: Torque-reducing curve1(2.0) 2: Torque-reducing curve2(1.5) 3: Torque-reducing curve3(1.2) 4: V/f Custom (According to function code P0.13~P0.18)	0	×	010C
P0.13	V/F frequency value F1	0.0~P0.15	10.00Hz	×	010D
P0.14	V/F voltage value V1	0.0~100.0%	20.0%	×	010E
P0.15	V/F frequency value F2	P0.13~P0.17	25.00Hz	×	010F
P0.16	V/F voltage value V2	0.0~100.0%	50.0%	×	0110
P0.17	V/F frequency value F3	P0.15~P0.06	40.00Hz	×	0111
P0.18	V/F voltage value V3	0~100.0%	80.0%	×	0112

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P0.19	Control mode	0.0: Magnetic flux vector control 0.1~30.0%: Manual torque boost	3004GB/35R5PB or below: 4.0% 35R5GB/37R5PB or above: 0.0%	○	0113
P0.20	Cut-off point used for manual torque boost	0.00~50.00Hz	16.67Hz	○	0114
P0.21	Acc time1	3132G/3160P or below: 0.1~3600s 3160G/3185P or above : 1.0~3600s	3022G/3030P or below:6.0s; 3030G/3037P or above : 20.0s	○	0115
P0.22	Dec time1			○	0116

P1: Start/Stop Control

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P1.00	Starting mode	0: Start directly 1: Brake first and then start at start frequency 2: Start after speed tracking (the mode is only valid for the motor of 35R5GB/37R5PB or above) Note: the startup includes power on, power recovery after an instantaneous off, external fault reset, and restart after coast to stop.	0	○	0200
P1.01	Starting frequency	0.10~60.00Hz	0.50Hz	○	0201
P1.02	Starting frequency holding time	0.0~10.0s	0.0s	○	0202
P1.03	DC injection braking current at start	Type G: 0.0~100.0% of inverter rated current Type P: 0.0~80.0% of inverter rated current	0.0%	○	0203
P1.04	DC injection braking time at start	0.0~30.0s	0.0s	○	0204
P1.05	Acc/Dec mode	0: Linearity 1: S-curve 2: (Reserved) 3: (Reserved)	0	○	0205
P1.06	Time of S-curve initial	10.0~50.0% (Acc/Dec Time) P1.06+P1.07≤90%	20.0%	○	0206

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P1.07	Time of S-curve rising	10.0~80.0% (Acc/Dec Time) P1.06+P1.07≤90%	60.0%	○	0207
P1.08	Stop mode	0: Deceleration to stop 1: Coast to stop 2: Dec +DC braking	0	×	0208
P1.09	DC injection braking frequency at stop	0.00~MIN(50.00Hz, Frequency upper limit)	0.00Hz	○	0209
P1.10	DC injection braking waiting time at stop	0.00~10.00s	0.00s	○	020A
P1.11	DC braking current at stop	This value depends on the inverter model Type G: 0.0~100.0% (inverter rated current) Type P: 0.0~80.0% (inverter rated current)	0.0%	○	020B
P1.12	DC braking time at stop	0.0~30.0s	0.0s	○	020C
P1.13	Dynamic braking selection	0: Dynamic braking is disabled 1: Dynamic braking is enabled 2：Magnetic flux braking enabled 3：Both enabled	1	×	020D
P1.14	Brake voltage level setting (3004GB /35R5PB or below)	360~750V	1AC: 380V 3AC: 700V	×	020E
	Brake utility rate (35R5GB/37R5PB or above)	0.0~100.0% Note: Build-in is active only for the model of inverter of 15kW or below of this series, Dynamic braking takes effect automatically during deceleration	100.0%		
P1.15	Trip-free treatment	0: once trip-free, report Uu1 fault 1: In trip-free time give Uu alarm, otherwise report Uu1 fault 2: once trip-free, give Uu alarm	0	×	020B
P1.16	Trip-free time	0.5~10.0s	This value depends on the inverter model.	×	0210

P2: Auxiliary Operation

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P2.00	Jog frequency	0.10~Upper limit frequency	5.00Hz	○	0300
P2.01	Acc time of Jog	3132G/3160P or below: 0.1~3600s 3160G/3185P or above: 1.0~3600s	3022G/3030P or below: 6.0s 3030G/3037P or above: 20.0s	○	0301
P2.02	Dec time of Jog	3132G/3160P or below: 0.0(Free stopping)~3600s 3160G/3185P or above: 0(Free stopping), 1.0~3600s		○	0302
P2.03	Switching time between run forward and reverse	0.0~3600s	0.0s	○	0303
P2.04	Frequency lower limit deal mode	0: Running at frequency Lower limit 1: Zero-speed running	0	×	0304
P2.05	Frequency departure setting	0.00-2.50Hz	0.00Hz	○	0305
P2.06	Carrier frequency	This value depends on the inverter model	This value depends on the inverter model	×	0306
P2.07	Jump frequency 1	0.00~Max frequency	0.00Hz	×	0307
P2.08	Jump frequency 2	0.00~Max frequency	0.00Hz	×	0308
P2.09	Jump frequency 3	0.00~Max frequency	0.00Hz	×	0309
P2.10	Jump frequency bandwidth	0.00~15.00Hz	0.00Hz	×	030A
P2.11	Multi-step frequency 1	0.00~Maximum frequency	5.00 Hz	○	030B
P2.12	Multi-step frequency 2		0.00Hz		030C
P2.13	Multi-step frequency 3				030D
P2.14	Multi-step frequency 4				030E
P2.15	Multi-step frequency 5				030F
P2.16	Multi-step frequency 6				0310
P2.17	Multi-step frequency 7				0311
P2.18	Multi-step frequency 8				0312
P2.19	Multi-step frequency 9				0313

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P2.20	Multi-step frequency 10	0.00~Maximum frequency	0.00Hz	○	0314
P2.21	Multi-step frequency 11				0315
P2.22	Multi-step frequency 12				0316
P2.23	Multi-step frequency 13				0317
P2.24	Multi-step frequency 14				0318
P2.25	Multi-step frequency 15				0319
P2.26	Acc time 2	3132G/3160P or below: 0.1~3600s 3160G/3185P or above: 1.0~3600s	3022G/3030P or below: 6.0s 3030G/3037P or above: 20.0s	○	031A
P2.27	Dec time2				031B
P2.28	Acc time3				031C
P2.29	Dec time3				031D
P2.30	Acc time4				031E
P2.31	Dec time4				031F
P2.32	Fan control mode	0: Automatic mode 1: Run always in power.	0	×	0320
P2.33	Wiring direction of motor	0: Positive sequence 1: Inverted sequence	0	×	0321
P2.34	Prohibit reverse operation	0: Reverse operation enabled 1: Reverse operation disabled	0	×	0322

P3: I/O Terminal control

This page only for 3004GB/35R5PB and below

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P3.00	Terminal function mode	0: Close valid 1: Open valid (Normally open /close is not limited.)	0	×	0400
P3.01	Multi-function input selection Terminal X1	0: NULL, No defined 1: FWD: Running Forward 2: REV: Running Reverse 3: RUN 4: F/R running direction 5: HLD self-hold selection 6: RST reset 7: FC Setting frequency selection 8: FJOG(JOG FWD) 9: RJOG(JOG REV) 10: UP 11: DOWN 12: UP/DOWN Reset 13: FRE Coast-to-stop 14: Forced outage (According to Dec time4) 15: DC injection braking 16: Acc/Dec prohibit 17: Inverter running prohibit 18: S1 Multi-step Speed 1 19: S2 Multi-step Speed 2 20: S3 Multi-step Speed 3 21: S4 Multi-stepSpeed 4 22: S5 Multi-step Speed 5 23: S6 Multi-step Speed6 24: S7 Multi-step Speed7 25: Command channel switch to Terminal control 2 26: SS1 Multi-step Speed 27: SS2 Multi-step Speed 28: SS3 Multi-step Speed 29: SS4 Multi-step Speed 30: T1 Acc/Dec time1 31: T2 Acc/Dec time2 32: T3 Acc/Dec time3 33: T4 Acc/Dec time4 34: TT1 Acc/Dec time1 35: TT2 Acc/Dec time1 36: Force stop normally close 37: EH0: External fault signal normally open 38: EH1: External fault signal normally close 39: EI0: External interrupt signal normally open 40: EI1: External interrupt signal normally close	1	×	0401
P3.02	Multi-function input selection Terminal X2		2	×	0402

This page only for 3004GB/35R5PB and below

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P3.03	Multi-function input selection Terminal X3	0~40: Ibid 41: Command channel switch to Keyboard control 42: Start PLC operation 43: Pause the PLC operating 44: Reset PLC stop status 45: Start Wobble frequency operating 46: Reset the Wobble frequency operating status 47: Start PID operation 48: Reserved 49: Timing drive input 50: Counter trig signal input 51: Counter clear 52: Actual Length clear 53: Timing units chose 54:EH2 External fault rising edge valid 55: EH3 External fault falling edge valid 56~65: Reserved	37	×	0403
P3.04	Multi-function input selection Terminal X4	0~65: Ibid 66: PUL: Pulse input (If have 2 signals input, follow X4) 67: Single-phase speed measuring input (If have 2 signals input, follow X4) 68: Speed measuring input SM1(only for X4) 69: Speed measuring input SM2(only for X5)	26	×	0404
P3.05	Multi-function input selection Terminal X5		27	×	0405
P3.06	Reserved	Reserved	0	×	0406
P3.07	Reserved	Reserved	0	×	0407
P3.08	Reserved	Reserved	0	×	0408
P3.09	Operation mode setup	0: 2-wire control mode1 1: 2-wire control mode 2 2: 3-wire control mode 1-self-hold function (added any terminal of X1-X5) 3: 3-wire control mode 2-self-hold function (added any terminal of X1-X5)	0	×	0409

This page only for 35R5GB/37R5PB and above

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P3.00	Terminal function mode	0: Close valid 1: Open valid (Normally open /close is not limited.)	0	×	0400
P3.01	Multi-function input selection Terminal X1	0:NULL, No defined 1: FWD: Running Forward 2: REV: Running Reverse 3: RUN 4: F/R running direction 5: HLD self-hold selection 6: RST reset 7: FC Setting frequency selection 8: FJOG(JOG FWD) 9: RJOG(JOG REV) 10: UP 11: DOWN 12: UP/DOWN Reset 13: FRE Coast-to-stop 14: Forced outage (According to Dec time4) 15: DC injection braking 16: Acc/Dec prohibit 17: Inverter running prohibit 18: S1 Multi-step Speed 1 19: S2 Multi-step Speed 2 20: S3 Multi-step Speed 3 21: S4 Multi-step Speed 4 22: S5 Multi-step Speed 5 23: S6 Multi-step Speed6 24: S7 Multi-step Speed7 25: Command channel switch to Terminal control 2 26: SS1 Multi-step Speed 27: SS2 Multi-step Speed 28: SS3 Multi-step Speed 29: SS4 Multi-step Speed 30: T1 Acc/Dec time 1 31: T2 Acc/Dec time 2 32: T3 Acc/Dec time 3 33: T4 Acc/Dec time 4 34: TT1 Acc/Dec time 35: TT2 Acc/Dec time 36: Forced outage normally close 37: EH0: External fault signal normally open 38: EH1: External fault signal normally close 39: EI0: External interrupt signal normally open 40: EI1: External interrupt signal normally close	1	×	0401
P3.02	Multi-function input selection Terminal X2		2	×	0402
P3.03	Multi-function input selection Terminal X3		37	×	0403

This page only for 35R5GB/37R5PB and above

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P3.04	Multi-function input selection Terminal X4	0~40: Ibid 41: Command channel switch to Keyboard control 42: Start PLC operation 43: Pause the PLC operating 44: Reset PLC stop status 45: Start Wobble frequency operating 46: Reset the Wobble frequency operating status 47: Start PID operation 48:Reserved 49: Timing drive input 50: Counter trig signal input 51: Counter clear 52: Actual Length clear 53: Timing units chose 54:EH2 External fault rising edge valid 55: EH3 External fault falling edge valid 56~65: Reserved	26	×	0404
P3.05	Multi-function input selection Terminal X5		27	×	0405
P3.06	Multi-function input selection Terminal X6		28	×	0406
P3.07	Multi-function input selection Terminal X7	0~65: Ibid 66: PUL: Pulse input (If have 2 signals input, follow X7) 67: Single-phase speed measuring input (If have 2 signals input, follow X7) 68: Speed measuring input SM1(only for X7) 69: Speed measuring input SM2(only for X8)	0	×	0407
P3.08	Multi-function input selection Terminal X8		0	×	0408
P3.09	Operation mode setup	0: 2-wire control mode1 1: 2-wire control mode 2 2: 3-wire control mode 1-self-hold function (added any terminal of X1-X8) 3: 3-wire control mode 2-self-hold function (added any terminal of X1-X8)	0	×	0409

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P3.10	Terminal UP/DN rate	0.01~99.99Hz/s	1.00Hz /s	○	040A
P3.11	UP/DN reference amplitude	0.00~Frequency upper limit	10.00Hz	×	040B
P3.12	Digital frequency UP/DOWN save selection	0: Receive STOP, UP/DN reference reset to zero 1: Receive STOP, UP/DN reference not reset to zero, and not save when power loss 2: Receive STOP, UP/DN reference not reset to zero, and save when power loss; If P0.01is set to 1, P0.00 will be saved when power loss.	2	×	040C
P3.13	Define Functions of terminal DO	0: NULL 1: RUN 2: FAR: Frequency arriving 3: FDT: Frequency detection threshold 4: FDTH: Frequency upper limit arriving 5: FDTL: Frequency lower limit arriving 6: Upper and lower limits of Wobble frequency 7: Zero-speed running 8: Completion of simple PLC operation 9: PLC cycle completion indication 10: Inverter ready (RDY) 11: Coast-to-stop 12: Auto restart 13: Timing Arriving 14: Counting value arriving output 15: Preset operating time arriving out 16: Torque arriving detection threshold 17: CL: Current Limit 18: Over-voltage stall 19: Inverter fails 20: External fault stop (EXT) 21: Uu1: Under voltage lock-up 22: Reserved 23: OLP: Overload signal 24: Analog signals 1 abnormal 25: Analog signals 2 abnormal 26: STEP: Programming Running steps (only active to DO\Y1\Y2, and need to set P3.13, P3.14, P3.15 the same value as 26) 27: Fault type output (Only active to DO\Y1\Y2, and need to set P3.13, P3.14, P3.15 the same value as 27)	0	×	040D
P3.14	Reserved(3004GB /35R5PB or below)		0	-	040E
	Terminal Y1 function definition(35R5GB/37R5PB or above)		1	×	

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P3.15	Reserved (3004GB/35R5PB or below)	0~27: Ibid 28: Fixed-length arrived, output a high level signals 29: Standby 30: Zero-speed running Note: Function code P3.14 and P3.15 can't be set, and the output functions of 26 are reserved	0	-	040F
	Terminal Y2 function definition (35R5GB/37R5PB or above)		2	×	
P3.16	Output functions selection of relay 1 (TA/TB/TC)		19	×	0410
P3.17	Fixed length reaches the terminal output hold time (3004GB/35R5PB or below)	0.0~3.0s	1.0s	×	0411
	Output functions selection of relay 2 (BRA/BRB/BRC) (35R5GB/37R5PB or above)	0~30:the same as P3.16	0		
P3.18	FAR detection width	0.00~10.00Hz	2.50Hz	○	0412
P3.19	Frequency detection threshold (FDT level)	3004GB/35R5PB or below : 0.00~650.0Hz 35R5GB/37R5PB or above: 0.00~400.0Hz	50.00Hz	○	0413
P3.20	Frequency detection hysteresis values (FDT lag)	0.00~10.00Hz	1.00Hz	○	0414
P3.21	Frequency upper limit arriving output delay time	0.0~100.0s	0.0s	○	0415
P3.22	Frequency lower limit arriving output delay time	0.0~100.0s	0.0s	○	0416
P3.23	Torque detection reference	0.0~200.0%	100.0%	○	0417
P3.24	Preset Count value	0~9999	0	○	0418
P3.25	Preset Timing arriving	0.0~6553.0s	0.0s	○	0419
P3.26	Preset operating time	0~65530h	65530h	×	041A

P4: Analog and Pulse Function

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P4.00	Analog Nonlinear Selection	0:None 1:AI1 2:AI2 3: Pulse	0	×	0500
P4.01	Min analog value Input 1 (AI1 Terminal)	0.00~P4.03	0.10V	○	0501
P4.02	Physical value 1 corresponding to Min analog value Input	0.0~100.0%	0.0%	○	0502
P4.03	Max analog value Input 1 (AI1 Terminal)	P4.01~10.00V	10.00V	○	0503
P4.04	Physical value 1 corresponding to Max analog value Input	0.0~100.0%	100.0%	○	0504
P4.05	Analog input filter time constant 1 (AI1 Terminal)	0.01~50.00s	0.05s	○	0505
P4.06	Min analog value Input 2 (AI2 Terminal)	0.00~P4.08	0.10V	○	0506
P4.07	Physical value 2 corresponding to Min analog value Input	0.0~100.0%	0.0%	○	0507
P4.08	Max analog value Input 2 (AI2)	P4.06~10.00V	10.00V	○	0508
P4.09	Physical value 2 corresponding to Max analog value Input	0.0~100.0%	100.0%	○	0509
P4.10	Analog input filter time constant 2 (AI2 Terminal)	0.01~50.00s	0.05s	○	050A
P4.11	Min pulse value Input 3 (pulse input Terminal)	0.00~P4.13	0.00k	○	050B
P4.12	Physical value 3 corresponding to Min pulse value Input	0.0~100.0%	0.0%	○	050C
P4.13	Max pulse value Input 3 (pulse Input Terminal)	P4.11~50.00k	50.00k	○	050D

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P4.14	Physical value 3 corresponding to Max pulse value Input	0.0~100.0%	100.0%	○	050E
P4.15	Pulse input filter time constant 3 (pulse Input Terminal)	0.01~50.00s	0.05s	○	050F
P4.16	PG Pulse Range	1~9999	1024	○	0510
P4.17	AO1 function definition	0: Output frequency before compensation (0~ Maximum Frequency) 1: Output current (0~2* inverter rated current) 2: Output voltage (0~Maximum Voltage) 3: PID feed (0~10V) 4: PID feedback (0~10V) 5: Adjust signals (5V) 6: Output torque (0~2*inverter rated torque) 7: Output power (0~2*Inverter rated power) 8: Bus voltage (0~1000V) 9: AI1 (0~10V) 10: AI2 (0~10V/0~20mA) 11: Output frequency after compensation (0~Maximum Frequency) 12~14: Reserved 15: NULL	0	×	0511
P4.18	Reserved (3004GB/35R5PB or below)		0	-	0512
	AO2 function definition (35R5GB/37R5PB and above)		1	×	
P4.19	DO output		15	×	0513
P4.20	AO1 output range selection	0: 0~10V/0~20mA 1: 2~10V/4~20mA	0	○	0514
P4.21	Reserved (3004GB/ 35R5PB or below)	Reserved	0	-	0515
	AO2 output range selection(35R5GB /37R5PB and above)	0: 0~10V/0~20mA 1: 2~10V/4~20mA	0	○	
P4.22	Gain of AO1	1~200%	100%	○	0516
P4.23	Reserved (3004GB/ 35R5PB or below)	Reserved	0	-	0517
	Gain of AO2 (35R5GB/37R5PB and above)	1~200%	100%	○	
P4.24	Max output impulse frequency of DO	Min Pulse frequency output of DO~50.00kHz	10.00kHz	○	0518

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P4.25	Min output impulse frequency of DO	0.00~ Max Pulse frequency output of DO	0.00kHz	○	0519

P5: PLC Operating

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P5.00	PLC Operating mode	0: Single cycle 1 1: Single cycle 2 (holding final value) 2: Continuous operation	2	×	0600
P5.01	PLC restarting mode selection	0: Restart from first step 1: Continue from the step where the inverter stops 2: Continue to operate at the frequency when the inverter stops	0	×	0601
P5.02	Saving PLC status when power off	0: Not save 1: Save	0	×	0602
P5.03	Unit of step time	0: Second 1: Minute	0	×	0603
P5.04	Program Operating Timing T1	0.1~3600	10.0	○	0604
P5.05	Program Operating Timing T2	0.0~3600	10.0	○	0605
P5.06	Program Operating Timing T3		10.0	○	0606
P5.07	Program Operating Timing T4		10.0	○	0607
P5.08	Program Operating Timing T5		10.0	○	0608
P5.09	Program Operating Timing T6		10.0	○	0609
P5.10	Program Operating Timing T7		10.0	○	060A
P5.11	Program Operating Timing T8		10.0	○	060B
P5.12	Program Operating Timing T9		10.0	○	060C
P5.13	Program Operating Timing T10		10.0	○	060D
P5.14	Program Operating Timing T11		10.0	○	060E
P5.15	Program Operating Timing T12		10.0	○	060F

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P5.16	Program Operating Timing T13	0.0~3600	10.0	○	0610
P5.17	Program Operating Timing T14		10.0	○	0611
P5.18	Program Operating Timing T15		10.0	○	0612
P5.19	Step T1 Program Operating Setting	1 F/r~4 F/r	1F	○	0613
P5.20	Step T2 Program Operating Setting		1F	○	0614
P5.21	Step T3 Program Operating Setting		1F	○	0615
P5.22	Step T4 Program Operating Setting		1F	○	0616
P5.23	Step T5 Program Operating Setting		1F	○	0617
P5.24	Step T6 Program Operating Setting		1F	○	0618
P5.25	Step T7 Program Operating Setting		1F	○	0619
P5.26	Step T8 Program Operating Setting		1F	○	061A
P5.27	Step T9 Program Operating Setting		1F	○	061B
P5.28	Step T10 Program Operating Setting		1F	○	061C
P5.29	Step T11 Program Operating Setting		1F	○	061D
P5.30	Step T12 Program Operating Setting		1F	○	061E
P5.31	Step T13 Program Operating Setting		1F	○	061F
P5.32	Step T14 Program Operating Setting		1F	○	0620
P5.33	Step T15 Program Operating Setting		1F	○	0621
P5.34	Program record clear	0: Not zero-clearing 1: zero-clearing (After zero-clearing this function code reset to 0)	0	×	0622

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P5.35	Record of Program steps	0~15	0	*	0623
P5.36	Program operating Time	0.0~3600	0.0	*	0624

P6: Wobble Frequency Operating

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P6.00	Wobble frequency operation restart mode	0: Restart at the freq. and direction before stop 1: Restart	0	×	0700
P6.01	Save wobble frequency running parameters when power loss	0: not save 1: save	0	×	0701
P6.02	Preset of wobble frequency	3004GB/35R5PB or below: 0.00~650.0Hz 35R5GB/37R5PB or above: 0.00~400.0Hz	0.00Hz	○	0702
P6.03	Holding time before wobble frequency operating	0.0~3600s	0.0s	○	0703
P6.04	Wobble frequency amplitude	0.0~50.0% (Related to P0.00)	0.0%	○	0704
P6.05	Skip frequency	0.0~50.0% (Related to P6.04)	0.0%	○	0705
P6.06	Skip Time	5~50ms	5ms	○	0706
P6.07	Wobble frequency operating cycle	0.1~999.9s	10.0s	○	0707
P6.08	Wobble ratio	0.1~10.0	1.0	○	0708
P6.09	Random wobble selection	0: Random invalid 1: Random valid	0	○	0709
P6.10	MAX ratio of random Wobble	0.1~10.0	10.0	○	070A
P6.11	MIN ratio of random Wobble	0.1~10.0	0.1	○	070B

P7: PID Control

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P7.00	PID feed selection	0: PID digital input 1: AI1 terminal 2: AI2 terminal 3: Pulse frequency 4: Serial communication	1	×	0800

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P7.01	PID feedback selection	0: AI1 terminal 1: AI2 terminal 2: Serial communication 3: Pulse feedback 4: |AI1-AI2| 5: Reserved 6: AI1+AI2 7: MIN (AI1, AI2) 8: MAX (AI1, AI2) 9: PG or single-phase speed measuring input	1	×	0801
P7.02	Analog PID digital feed	0.0~P7.14	0.0	○	0802
P7.03	Speed PID feed	0~24000rpm	0rpm	○	0803
P7.04	PID direction alteration permission	0:Not allowed 1:Allowed	0	×	0804
P7.05	PID proportional gain (KP)	0.1~9.9	1.0	○	0805
P7.06	PID integration time	0.00~100.0s	10.00s	○	0806
P7.07	PID differential time	0.00~1.00s	0.00s	○	0807
P7.08	PID delay time constant	0.00~25.00s	0.00s	○	0808
P7.09	Residual margin	0.0~999.9	0.2	○	0809
P7.10	PID adjust characteristic	0: Positive 1: Negative	0	×	080A
P7.11	Integration adjust selection	0: Stop Integration Adjust when frequency arrive at limit; 1: Continue Integration Adjust when frequency arrive at limit	0	×	080B
P7.12	PID preset frequency	3004GB/35R5PB or below: 0.00~650.0Hz 35R5GB/37R5PB or above: 0.00~400.0Hz	0.00Hz	○	080C
P7.13	Hold time of PID preset frequency	0.0~3600s	0.0s	×	080D
P7.14	Analog closed loop measuring range	Max[P7.02,1.0]~999.9	100.0	○	080E
P7.15	Enable dormancy	0: Disable 1: Enable	0	×	080F
P7.16	Dormancy delay	0~999s	120s	○	0810
P7.17	Dormancy threshold	0~Frequency upper limit	20.00Hz	○	0811
P7.18	Awakening threshold	0.0~999.9	3.0	○	0812
P7.19	PID amplitude modulation coefficient	0:1*(P2.11) 1:(Frequency setting 2 / P0.07)*(P2.11)	0	×	0813

P8: Fixed-length Function

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P8.00	Preset length	Max[0.000,P8.06]~65.53 m	0.000m	○	0900
P8.01	Actual length	0.000~65.53m (Save when power loss)	0.000m	*	0901
P8.02	Rate of length	0.001~30.00	1.000	○	0902
P8.03	Correction Coefficient of length	0.001~1.000	1.000	○	0903
P8.04	Shaft perimeter	0.10~100.0cm	10.00cm	○	0904
P8.05	Deceleration point	50~100 %	90 %	×	0905
P8.06	Deviation value	Max[-200.0,P8.00]~200.0 mm	0 mm	×	0906

P9: Advanced Control

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
P9.00	Slip frequency compensation	0.0~250.0% (Based on rated slip)	0.0%	○	0A00
P9.01	Slip compensation time const	0.01~2.55s	0.20s	○	0A01
P9.02	Energy saving control selection	0: Disabled 1: Enabled	0	×	0A02
P9.03	Energy saving gain coefficient	0.00~655.3	This value depends on the inverter model.	×	0A03
P9.04	Energy saving's lower voltage limit (50Hz)	0~120%	50%	×	0A04
P9.05	Energy saving's lower voltage limit (5Hz)	0~25%	12%	×	0A05
P9.06	Time of average power	1~200*(25ms)	5	×	0A06
P9.07	AVR Function	0: Disabled 1: Enabled always. 2: Disabled only in deceleration	2	×	0A07
P9.08	Over modulation enable	3004GB/35R5PB or below: 0 35R5GB/37R5PB or above: 1	0	×	0A08
P9.09	Drop control (load distribution)	0.00~10.00Hz	0.00Hz	○	0A09

PA: Motor's Parameters

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PA.00	Motor polarity number	2~56	4	×	0B00
PA.01	Rated power	0.4~999.9kW	This value depends on the inverter model.	×	0B01
PA.02	Rated current	0.1~999.9A	This value depends on the inverter model.	×	0B02

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PA.03	No-load current I0	0.1~999.9A	This value depends on the inverter model.	×	0B03
PA.04	Resistance of stator %R1	0.00%~50.00%	This value depends on the inverter model.	○	0B04
PA.05	Leakage inductance %X	0.00%~50.00%	This value depends on the inverter model.	○	0B05
PA.06	Resistance of rotor %R2	0.00%~50.00%	This value depends on the inverter model.	○	0B06
PA.07	Mutual inductance %Xm	0.0%~200.0%	This value depends on the inverter model.	○	0B07
PA.08	Rated Speed	0~24000 rpm	This value depends on the inverter model.	○	0B08
PA.09	Reserved	Reserved	0	-	0B09

Pb: MODBUS Communication

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
Pb.00	MODBUS Baud rate selection	0: 1200 1: 2400 2: 4800 3: 9600 4: 19200 5: 38400	3	×	0C00
Pb.01	MODBUS slave address	1~31	1	×	0C01
Pb.02	MODBUS parity selection	0: Even parity 1: Odd parity 2: No parity	0	×	0C02
Pb.03	MODBUS time over detection	0.0~100.0s 0: No time-out Setting Others: Time-out detection time	0.0s	○	0C03
Pb.04	Response delay time	0~500ms	5ms	×	0C04
Pb.05	MODBUS frequency reference unit	0: 0.01Hz 1: 0.1Hz	0	×	0C05
Pb.06	Selection of MODBUS data storage	0: Not save to EEPROM 1: Directly save to EEPROM	0	×	0C06
Pb.07	CCF6 Fault Handling	0: Not generate fault and keep on running 1: Generate fault and stop	0	×	0C07
Pb.08	Reserved	Reserved	0	-	0C08

PC: Display Control

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PC.00	LCD Language selection	0: Chinese (Display Chinese prompt in LCD screen) 1: English (Display English prompt in LCD screen)	0	○	0D00

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PC.01	Output frequency (Hz) (before compensation)	0: No display 1: Display	1	○	0D01
PC.02	Output frequency (Hz) (Actual)	0: No display 1: Display	0	○	0D02
PC.03	Output current(A)	0:No display; 1:Display	1	○	0D03
PC.04	Reference frequency (Hz, flashes)	0:No display 1:Display	1	○	0D04
PC.05	Rotate speed (r/min)	0:No display 1:Display	0	○	0D05
PC.06	Reference speed (r/min flashes)	0:No display 1:Display	0	○	0D06
PC.07	Linear speed (m/s)	0:No display 1:Display	0	○	0D07
PC.08	Reference line s peed (m/s, flashes)	0:No display 1:Display	0	○	0D08
PC.09	Output power (kW)	0:No display; 1:Display	0	○	0D09
PC.10	Output torque (%)	0:No display; 1:Display	0	○	0D0A
PC.11	Output voltage (V)	0:No display 1:Display	1	○	0D0B
PC.12	Bus voltage (V)	0:No display 1:Display	0	○	0D0C
PC.13	AI1(V)	0:No display 1: Display	0	○	0D0D
PC.14	AI2(V)	0: No display 1: Display	0	○	0D0E
PC.15	Analog PID feedback	0: No display 1: Display	0	○	0D0F
PC.16	Analog PID feed	0: No display 1: Display	0	○	0D10
PC.17	External count value (no unit)	0: No display 1: Display	0	○	0D11
PC.18	Terminal status (no unit)	0:No display 1:Display	0	○	0D12
PC.19	Actual length	0: No display 1: Display	0	○	0D13
PC.20	Boot display choice	0~19	1	○	0D14
PC.21	Rotating speed display coefficient	0.1~999.9% Rotate speed = actual rotate speed*PC.21(PG) Rotate speed= 120*Operating Frequency/PA.00*PC.21(non PG) Reference speed =PID reference speed*PC.21(PG) Reference speed= 120*reference frequency/PA.00*PC.21(non PG) Note: This setting has no influence to actual speed	100.0%	○	0D15

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PC.22	Linear speed display coefficient	0.1~999.9% Linear speed = Running frequency *PC.22 (no PG)) Linear speed = Rotate speed*PC.22 (PG) Reference linear speed = reference frequency* PC.22 (no PG) Reference linear speed=reference speed*PC.22 (PG) Note: This setting has no influence to actual speed	100.0%	○	0D16

Pd: Protection and Fault Parameters

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
Pd.00	Motor above load protection mode selection	0: Disabled 1: Common motor (with low speed compensation) 2: Variable frequency motor (without low speed compensation)	1	×	0E00
Pd.01	Electro thermal protective value	20~110%	100%	○	0E01
Pd.02	Pre-overload detection Level	20.0~200.0%	160.0%	×	0E02
Pd.03	Pre-Overload detection time	0.0~60.0s	60.0s	×	0E03
Pd.04	Current amplitude limit	0: Invalid 1: Valid during Acceleration and deceleration, invalid in constant speed Operation 2: Valid 3: Over-current during acceleration or constant speed , reduce frequency	3	○	0E04
Pd.05	Current amplitude limiting level	Type G:20~180% Type P:40~140%	G:150% P:120%	○	0E05
Pd.06	Over-voltage at stall function selection	0: Disabled (The proposed option, when braking resistor is mounted) 1: Enabled	1	×	0E06
Pd.07	Over-voltage point at stall	3004GB/35R5PB or below: 110.0~150.0% (Bus voltage) 35R5GB/37R5PB or above: 120.0~150.0% (Bus voltage)	220V: 120.0% 380V: 140.0%	×	0E07
Pd.08	Input phase loss detection level (SPI) (800V corresponds to 100%)	1~100%	100%	×	0E08

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
Pd.09	Input phase loss detection delay time	2~255s	10s	×	0E09
Pd.10	Output phase loss detection level (SP0) (Motor rated current corresponds to 100%)	0~100%	2%	×	0E0A
	Reserved (S2R4GB, S2R75GB)				
Pd.11	Output phase loss detection delay time	0.0~25.0s	2.0s	×	0E0B
Pd.12	Enabling keyboard keys UP/DN	0: Invalid 1: Enabled	0	×	0E0C
Pd.13	AE1, AE2 Alarm choice	0: Not show alarm 1: Display alarm	0	×	0E0D
Pd.14	Auto reset times	0~10,"0"means “auto reset” is disabled. Only 3 faults have auto reset function	0	×	0E0E
Pd.15	Reset Interval	2.0~20.0s /per time	5.0s	×	0E0F
Pd.16	Increase and decrease of over-current counting	0 ~ 250	100	×	0E10
Pd.17	Automatic running selection after power on	0:No action 1:Run automatically	1	×	0E11
Pd.18	Running selection after power off	0:Machine shut down (through the shutdown way) 1:Don’t stop(short time)	1	×	0E12
Pd.19	Resistance coefficient to impact load	100.0~250.0%	This value depends on the inverter model	×	0E13
	Reserved(3004G/ 35R5PB or below)				

PE: Running History Record

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PE.00	Type of latest fault	0: NULL 1: Uu1: Bus under-voltage during running. 2: Uu2: Control circuit Under voltage 3: Uu3: Charging circuit in poor condition 4: OC1: Over-current in Acc process 5: OC2: Over-current in Dec process 6: OC3: Over-current in constant-speed operation 7: Ou1: Overvoltage in Acc process 8: Ou2: Overvoltage in Dec process 9: Ou3: Overvoltage in constant speed operation 10: GF: Ground fault 11: OH1: Heat-sink overheat 12: OL1: Motor overload 13: OL2: Inverter overload 14: SC: Load short-circuit 15: EF0: External fault of serial communication 16: EF1: External fault of terminal 17: SP1 Input phase failure or Unbalance 18: SP0 Output phase failure or Unbalance 19: CCF1: Control circuit fault 1, transmission between the inverter and keyboard cannot be established 5 seconds after supplying power. 20: CCF2 Control circuit fault 2: Transmission between the inverter and keyboard is established once after supplying power, but later transmission fault continues for more than 2 seconds. 21: CCF3 EEPROM Fault 22: CCF4 AD Conversion Fault 23: CCF5 RAM Fault 24: CCF6 CPU disturbance 25: PCE Parameter copy Error 26: Reserved 27: HE Hall current detection fault 28: DE Length setting fault	NULL	*	0F00
PE.01	Output frequency at last fault	0~Frequency upper limit	0.00Hz	*	0F01
PE.02	Reference frequency at last fault	0~Frequency upper limit	0.00Hz	*	0F02
PE.03	Output current at last fault	0.0~2*(rated current)	0.0A	*	0F03

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PE.04	DC bus voltage at last fault	0~1000V	0V	*	0F04
PE.05	Running status at last fault	0: StP : Stop 1: Acc: Acceleration 2: Dec: Deceleration 3: con: constant	0	*	0F05
PE.06	Fault history 1 (Last One)	The same as PE.00	NULL	*	0F06
PE.07	Fault history 2	The same as PE.00	NULL	*	0F07
PE.08	Fault history 3	The same as PE.00	NULL	*	0F08
PE.09	Total operating time	0~65530h	0h	*	0F09
PE.10	Total power on time	0~65530h	0h	*	0F0A
PE.11	Total electric-consumption (MWh)	0~9999MWh	0MWh	*	0F0B
PE.12	Total electric-consumption (KWh)	0~999KWh	0KWh	*	0F0C

PF: Protection of Parameters

Function code	Function Name	Range of settings	Default	Change	MODBUS Address
PF.00	User password	0: No password Others: Password protection	0	○	1000
PF.01	Parameter write-in protection	0: All parameters are allowed to modify 1: Only reference frequency (P0.00) and PF.01 can be modified; 2: Only PF.01 can be modified.	0	○	1001
PF.02	Parameter initialization	0: No operation 1: Clear fault history 2: Restore default (except recorded data \ user password)	0	×	1002
PF.03	Reserve (3004GB/35R5PB or below)	Reserved	0	-	1003
	Parameter copy (35R5GB/37R5PB or above)	0: No action 1: Parameters download 2: Parameters upload 3: Download parameters except motor's Note: This function is only valid for LCD keyboard.	0	×	
PF.04	G/P selection	0: Type G (Constant torque) 1: Type P (Inlet fan and pump series loads)	0	×	1004

Chapter 5 Parameter Introductions

5.1 Basic Function (Group P0)

P0.00 Reference frequency	Range: 0~Maximum frequency【0.00Hz】

Note:
P0.00 is active when P0.01 or P0.02 is 1, that is, the value can only be adjusted by keyboard digital encoder. P0.00 defines inverter's frequency setting value.

🕮 *Tips:*

The changed value of P0.00 by keyboard digital encoder will be active immediately. If press "ENTER" key, the value will be stored into the inverter's internal EEPROM and will not be lost even power-off the inverter.
When P0.01 is set to 1; if P3.12 is set to2, the changed value of P0.00 by keyboard digital encoder will be saved when power loss. Otherwise, the changed value will not be saved

.

P0.01 Frequency setting 1	Range: 0~10【1】
P0.02 Frequency setting 2	Range: 0~6【0】

0: NULL
1: keyboard digital encoder
2: Terminal AI1
3: Terminal AI2
4: Pulse input
5: Serial communication
6: Multi-step Speed
7: Terminal UP/DOWN
8: Programmable Logic Controller (PLC)
9: PID close-loop
10: Wobble frequency operating

Note:

- When P0.01 is set to use the keyboard for digital frequency settings (P0.01=1), reference frequency can be adjusted by digital encoder on the keyboard in display status.
- Terminal AI1, AI2 is for the analog input signal. Using terminal AI1, AI2, output frequency can be adjusted by 0 ~ 10V voltage signal or 0 ~ 20mA current signal. But it must be based on the type of signal to make correct choice: dial the mode switches on the right place. Please refer to section 2.5 that introduce the control circuit wiring for details.
- For details Terminal AI1 (programmable), terminal AI2 (programmable), and pulse input (programmable) refer to explanation of parameter group P4.
- Serial communication settings: Users can connect the serial communication port to PC or PLC, then through communication to control the inverter's reference frequency.
- If P0.01 set to 7, see the description of UP/DOWN in parameter group P3 for

details.

P0.03 Frequency setting selection	Range: 0~5【0】

0: Frequency setting 1

1: Terminal Selection

2: Frequency setting 1+ Frequency setting 2

3: | Frequency setting 1- Frequency setting 2 |

4: Min(Frequency setting 1, Frequency setting 2)

5: Max(Frequency setting 1, Frequency setting 2)

Note:

- Frequency settings 1: Frequency set by P0.01 (Frequency setting 1).
- Terminal Selection: If defined the "FC" function terminals (see P3.01 ~ P3.08), and the terminal function is effective, P0.02 (frequency setting 2) will be selected as the final frequency setting ; if defined this function terminal but the terminal function is not effective, P0.01 (frequency setting 1) will be selected. If undefined the "FC" function terminal, P0.01 (frequency setting 1) will be the default frequency setting. Frequency setting selection can be switched between the two different signals.
- Settings 2 to 5: The final reference frequency value will be decided by frequency setting 1 and frequency setting 2 after the corresponding arithmetic.

Additional Note:

If P0.01 is set to 7(UP / DOWN) or 10 (wobble frequency operating), setting value 3 to 5 of P0.03 (P0.03=3~5) will be invalid, and setting value 0 will be valid. See terminal UP / DOWN function definition in parameter group P3 and wobble frequency operating definition in parameter group P6 for details.

If P0.01 select 9(PID closed loop) and P0.03 is configured to combined frequency(P0.03>1), multiplexing parameter P2.11 is used to define the analog PID regulator's output frequency limit and the frequency range is -P2.11~ P2.11(Unit Hz).

P0.04 Run command mode selection	Range: 0~5【0】

0: Keyboard control

1: Terminal control 1 (STOP invalid)

2: Terminal control 2 (STOP valid)

3: Serial communication 1 (STOP invalid)

4: Serial communication 2 (STOP valid)

5: Terminal control 3 (STOP and JOG invalid)

Note 1:

- Keyboard control: Control the inverter Start and Stop by pressing the "RUN" key and "STOP/RESET " key on the keyboard.

- Terminal control: The user should define X1~X8 terminal to achieve RUN, F/R, FWD, REV, HLD and other running functions (see P3.01~P3.08) first, and then used the terminals to control the inverter Start, Stop. etc.
- Serial communication: Users connected the serial communication port to PC or PLC, then through communication to control the inverter Start, Stop, F/R and so on.

Note 2:

- If the "STOP/RESET" key is valid, users can stop inverter by pressing "STOP/RESET" key on the keyboard for emergency stop. If the "STOP/RESET" key is invalid, the user can only stop the inverter by preset control mode.
- If P0.04 is set to 5, the JOG key is invalid. If the JOG key is invalid, the user can only start Jog operation by FJOG or RJOG terminal.
- In Keyboard and Terminal control mode, communications read and write commands will be ignore.

P0.05 Keyboard direction setting	Range: 0,1【0】

0: Forward 1: Reverse

Note:

- Pressing "FWD/REV" will switch the direction, and change the value of this parameter P0.05. But the changed direction only take effect currently.
- Only by changing value of function code and pressing "ENTER" to save the value, keyboard direction setting will be saved permanently.
- Direction priority: Terminal set is the highest, second is set by communication, keyboard is the lowest. If the high one is invalid, the lower priority will take effect.

P0.06 Basic Frequency	Range: S2R4GB~3004GB/35R5PB: 0.10~650.0Hz【50.00Hz】 35R5GB/37R5PB and above: 0.10~400.0Hz【50.00Hz】
P0.07 Max output frequency	Range: S2R4GB~3004GB/35R5PB: MAX [50.00Hz, Frequency upper limit, Reference frequency] ~650.0Hz【50.00Hz】 35R5GB/37R5PB and above: MAX [50.00Hz, Frequency upper limit, Reference frequency] ~400.0Hz【50.00Hz】
P0.08 Frequency upper limit	Range: MAX[Frequency lower limit, Jog frequency, UP/DN reference amplitude ,Dormancy threshold]~Max frequency【50.00Hz】
P0.09 Frequency lower limit	Range: 0.00~Frequency upper limit【0.00Hz】

P0.10 Max output voltage	Range: 110~480V【Inverter rated】

Note:

- Basic Frequency F_{BASE}: Basic operating frequency is the Min output frequency when the output voltage of inverter is equal to rated voltage U_N. Usually, the motor rated frequency can be treated as basic frequency. The changing range of basic frequency F_{BASE} of this series inverter is from 0.10 to 400.0Hz. Normally, F_{BASE} is selected based on motor rated frequency. In some special state, F_{BASE} can be set according to application needed. But at this time, the V/F characteristics of the load and its contributed need must be considered. As shown in Fig. 5-0-1

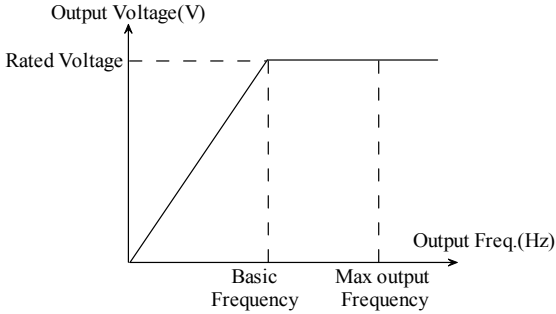


Fig. 5-0-1 V/F characteristic diagram

- Max frequency F_{MAX}: This setting is the max frequency allowed to be output of this series inverter. If reference is bigger than rated value of drive equipment, the motor and equipment may be damaged.
- Frequency upper limit f_H is the highest frequency that inverter allowed to work. In addition, frequency lower limit f_L is the lowest. Setting frequency upper limit and frequency lower limit, can automatically ensure that the output frequency is' not higher than frequency upper limit and not lower than frequency lower limit. This function usually used to guarantee motor working in allowed frequency, to avoid mistake action or mechanism or inverter backfire. It is especially useful in avoid low-speed or over-speed. See P2.04.
- Max output voltage is output voltage when the inverter runs at basic frequency. Usually it is the rated input voltage of motor, which is marked on the nameplate of motor.

P0.11 Step length of digital encoder regulation	Range: 0~250* (0.01Hz|1rpm) 【0】

Note:

This parameter is effective for reference frequency and rotate speed of surveillance state online regulating.

- If P0.11 is set to 0, digital encoder integral regulation function is enabled. That is keeping on turning digital encoder, the length of every step can rise from 1 to10 and the max 100.
- If P0.11 is set to non-zero, fixed-length regulation function is enabled. The value of P0.11 is the step length of digital encoder regulation, which means turning left/right the digital encoder one cycle, the value of reference frequency will decrease/increase ((P0.11)*30).*(0.01Hz/1rpm).
- when the adjusting object is reference frequency, the unit of P0.11 is 0.01Hz; When it is reference speed, the unit is (6/(5*PA.00))r/min under common operation mode and 1r/min under the digital PID control mode.

Example:

In the range, when P0.11 is set to 100, turn left/right the digital encoder one cycle, the reference frequency will decrease/increase 30.00Hz and the rotate speed will decrease/increase 900 turns every minute; when P0.11 is set to 10, the reference frequency will decrease/increase 3.00Hz and the rotate speed will decrease/increase 900 turns every minute

P0.12 V/F curves setting	Range: 0~4【0】
P0.13 V/F frequency value F1	Range: 0.0~P0.15 【10.00Hz】
P0.14 V/F voltage value V1	Range: 0~100.0%【20.0%】
P0.15 V/F frequency value F2	Range: P0.13~P0.17 【25.00Hz】
P0.16 V/F voltage value V2	Range: 0~100.0%【50.0%】
P0.17 V/F frequency value F3	Range: P0.15~P0.06 【40.00Hz】
P0.18 V/F voltage value V3	Range: 0~100.0%【80.0%】

Note:

The above listed parameters can define flexible V/F setting mode to meet the special load characteristics demand.

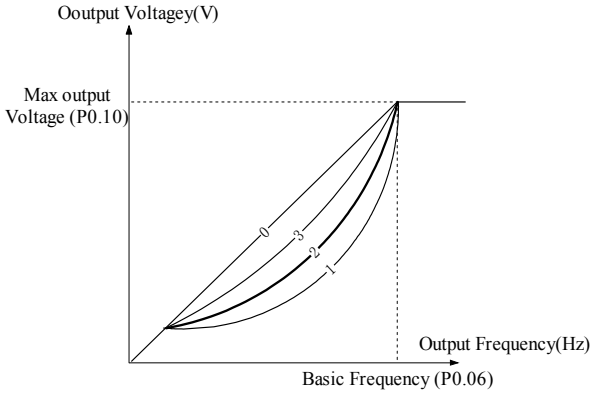


Fig. 5-0-2 Torque-reducing curve

If P0.12 is set to 4, you can define V/F curve by P0.13~P0.18, as shown in Fig. 5-0-3. The V/F curve can be defined with 4 points to meet special load characteristics demand.

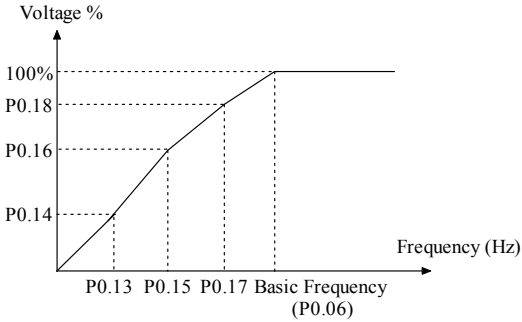


Fig. 5-0-3 V/F-curve defined by user

P0.19 Torque boost mode	Range: 0.0~3 0.0% 【S2R4GB~3004GB/35R5PB:40%; 35R5GB/37R5PB and above:0.0%】

Note:

In order to compensate the torque dropping at low frequency, the inverter can boost the voltage to boost the torque. If P0.19 is set to 0, magnetic flux vector modulation is enabled and if P0.19 is set to non-zero, manual torque boost is enabled, as shown in Fig. 5-0-4.

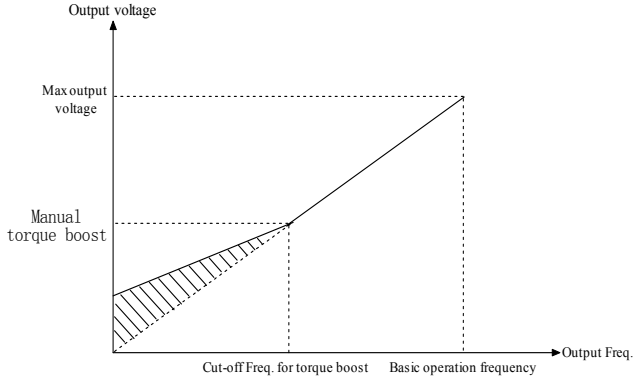


Fig. 5-0-4 Manual torque boost diagram
(shadow area is the boost value)

Tips:

1. Wrong parameter setting can cause overheat or over-current protection of the motor.
2. When the inverter drives synchronous motor, torque boost function is recommended to be used and V/F curve should be adjusted according to the motor parameters.

P0.20 Cut-off point used for manual torque boost	Range: 0.00~50.00Hz 【16.67 Hz】

Note:
P0.20 defines the cut-off frequency used for manual torque boost to the basic frequency (defined by P0.19), as shown in Fig. 5-0-4. This cut-off frequency is valid for any V/F curve defined by P0.12.

P0.21 Acc time 1	Range: 0.1~3600s【6.0s/20.0s】
P0.22 Dec time 1	Range: 0.1~3600s【6.0s/20.0s】

Note:

- Acc time: Acc time is the time taken for the inverter to accelerate from 0Hz to the maximum frequency. Dec time is the time taken for the motor to decelerate from maximum frequency.
- This series inverter has defined 4 kinds of Acc/Dec time. Here, only Acc/Dec time 1 is defined, and Acc/Dec time 2~4 can be defined in P2.18~P2.23. You can select different Acc/Dec time by external terminal according to your demand. In addition, you can select different Acc/Dec time in PLC operation.

5.2 Start/Stop Control (Group P1)

P1.00 Start mode	Range: 0~2【0】

0: Start directly

1: Brake First and then start at start frequency

2: Speed tracking restart (It is only effective for the motor of 35R5GB/37R5PB or above)

Note:

- Start directly: Speeds up from zero-speed and accelerate to the preset frequency within the preset Acc time.
- Brake first and then start: Inverter adds some DC injection braking power to load first, and then startup. As shown in Fig. 5-1-1. Starting mode 1 is suitable for small inertia load which is running forward or reverse while the inverter is in stop state, such as fan load. DC injection braking parameters refer to P1.03 and P1.04.

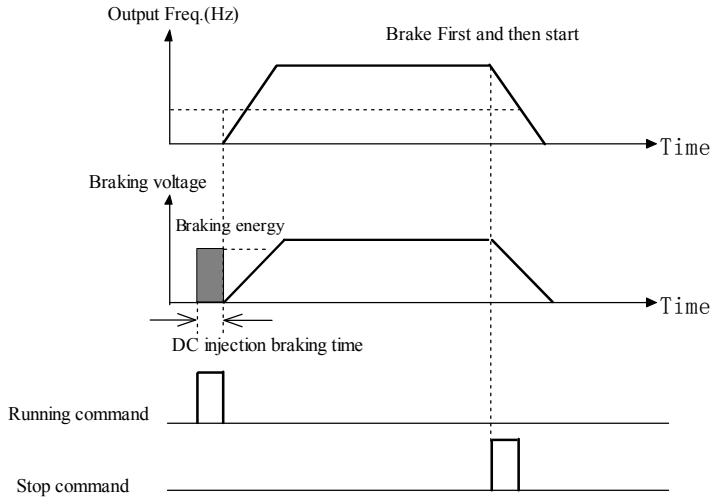


Fig. 5-1-1 Brake First and then start

- Speed tracking restart: Search and catch the motor's running direction and speed, and then start at the caught speed , running to the reference frequency within the Acc/Dec time, realize smooth start of motor, as shown in Fig. 5-1-2. This mode is suitable for the motor with big inertial load.

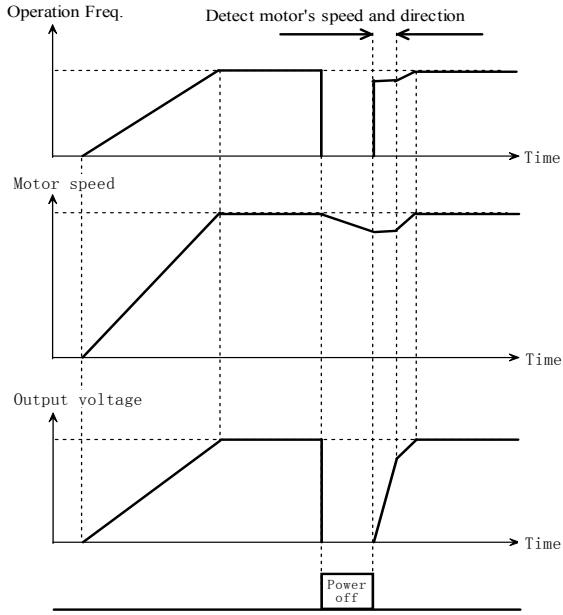


Fig. 5-1-2 Speed tracking restart diagram

- Starting process includes the start of inverter power on, power recover, external fault reset, and restart after coast-to-stop.

🕮 *Tips:*

Models of 3018G/3022P and aboves can take speed tracking function ; Models of 35R5GB/37R5PB~3015GB/3018PB need to install a matched speed tracking board if they want to take speed tracking function; Models of 3004GB/35R5PB or below have not this function.

P1.01 Start frequency	Range: 0.10~60.00Hz【0.50Hz】
P1.02 Start frequency holding time	Range: 0.0~10.0s【0.0s】

Note:

Start frequency is the initial frequency at which the inverter starts, see f_S as shown in Fig. 5-1-3 ; Holding time of starting frequency is the time during which the inverter operates at the starting frequency, see t_1 as shown in Fig. 5-1-3:

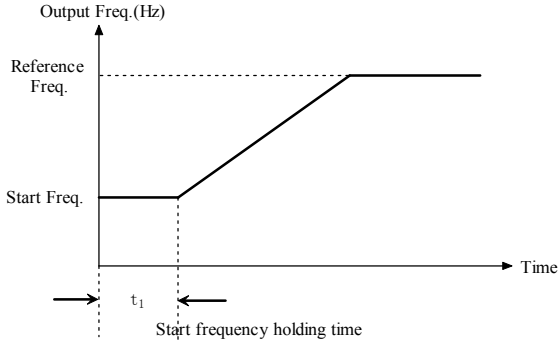


Fig. 5-1-3 Starting frequency and starting time

🕮 *Tips:*

1. Starting frequency is not restricted by the frequency lower limit.
2. If reference frequency is lower than starting frequency during acceleration, the inverter will run at zero-speed.

P1.03 DC injection braking current at start	This value depends on the inverter model【0.0%】
P1.04 DC injection braking time at start	Range: 0.0~30.0s【0.0s】

Note:

P1.03 and P1.04 are only active when P1.00 is set to 1 (start mode 1 is selected), as shown in Fig. 5-1-1.

The range of DC injection braking current and time are dependent on the inverter model, see Table 5-1-1.

DC injection braking current is a percentage value of inverter rated current. When the braking time is set to 0.0s, the DC injection braking process will not happen

Table 5-1-1 DC Injection braking function

Model	The range of current	The range of time
G	0.0~100.0%	0.0~30.0s
P	0.0~80.0%	0.0~30.0s

Note:

Refer to Fig. 5-1-1, the inverter outputs DC injection braking current at start (P1.03), during DC injection braking time at start.

🕮 *Tips:*

If the range of rated current of motor is smaller than the inverter, this parameter value is suggested to set as:
Motor rated current (A) / Inverter rated current (A) * 100%

P1.05 Acc/Dec mode	Range: 0~3【0】
0: Linearity	1: S-curve
2: Reserved	3: Reserved

Note:

◆ Linear Acc/Dec mode used for ordinary load: The output frequency increases or decreases according to a constant rate. As shown in Fig. 5-1-4.

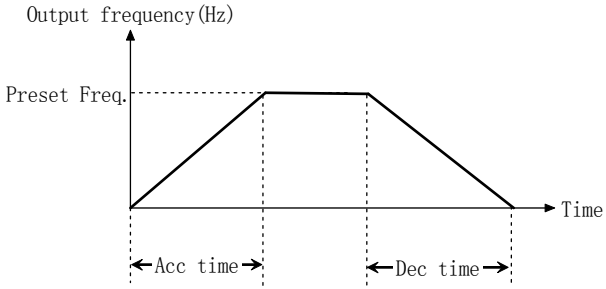


Fig. 5-1-4 Linear acceleration/deceleration

◆ Scurve change output frequency slowly at start of acceleration or end of deceleration, in order to reduce mechanism noise and shake, lash of start and stop. It is suitable for the load that needs descending torque at low frequency, and short-time acceleration at high frequency, such as conveying belt.

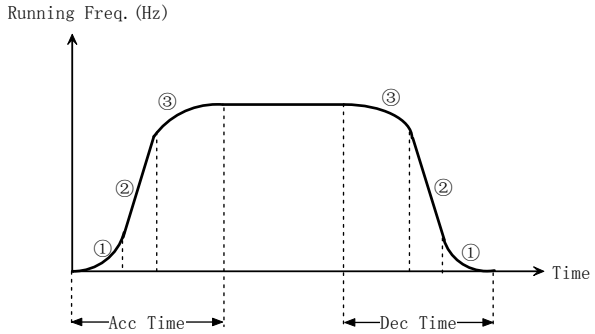


Fig. 5-1-5 S-curve acceleration/deceleration

P1.06 Time of S-curve initial	Range: 10.0~50.0%【20.0%】
P1.07 Time of S-curve rising	Range: 10.0~80.0%【60.0%】

Note:

P1.06 and P1.07 are only active when the Acc/Dec mode is S-curve mode (P1.05=1) and P1.06+P1.07≤90%.

Starting process of S-curve is shown in Fig. 5-1-5 as "①", where the changing rate of output frequency increases from 0.

Rising process of S-curve is shown in Fig. 5-1-5 as "②", where the changing rate of output frequency is constant.

Ending process of S-curve is shown in Fig. 5-1-5 as "③", where the changing rate of output frequency decreases to zero.

🕮 *Tips:*

S curve Acc/Dec mode is suitable for the conveying load such as elevator and conveying belt.

P1.08 Stop mode	Range: 0~2【0】

0: Deceleration to stop 1: Coast to stop

2: Deceleration +DC braking

Note:

- 0: Dec-to-stop
- After receiving the stop command, the inverter reduces its output frequency within the Dec time, and stops when the frequency decreases to zero.
- 1: Coast-to-stop
- After receiving the stop command, the inverter stops output immediately and the load stops under the effects of mechanical inertia.
- 2: Dec-to-stop +DC injection braking
- After receiving the stop command, the inverter reduces its output frequency according to the Dec time and starts DC injection braking when its output frequency reaches the preset frequency of braking.
- Refer to the Notes of P1.09~P1.12 for the functions of DC injection braking.

P1.09 DC injection braking frequency at stop	Range: 0~MIN (50.00, Frequency upper limit) 【0.00Hz】
P1.10 DC injection braking waiting time at stop	Range: 0.00~10.00s【0.00s】

P1.11 DC injection braking current at stop	Range: This value depends on the inverter model【0.0%】
P1.12 DC injection braking time at stop	Range: 0.0~30.0s【0.0s】

Note:

- DC injection braking is injecting DC current to motor, to let it stop quickly, and keep the spindle of motor in standstill until finished DC injection braking

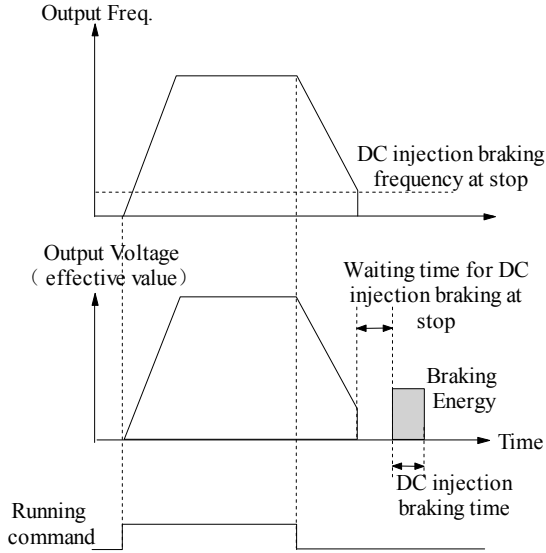


Fig. 5-1-6 DC injection braking

- DC injection braking frequency at stop is the frequency at which DC injection braking action begins when the inverter in Dec-to-stop process. In the process of constant rate deceleration, if the output frequency is at or below the "DC injection braking frequency at stop, the DC injection braking function will startup.
- DC injection braking current at stop is a relative percentage of inverter rated current. The DC injection braking function disables when the braking time is 0.0s. The setting range of Type G is 0.0~100.0%, and Type P is 0.0~80.0%.
- DC injection braking time is the DC injection braking holding time. This time cannot be set too long; otherwise, it will cause the inverter overheating. When the DC injection braking time is set to zero, the DC injection braking function disables.

🕮 *Tips:*

This function will start up after inverter receives stop command. Usually, it is used to improve the stop precision and not for deceleration braking in common running. If faster stop is required, braking energy regeneration unit should be fitted, or the inverter that has the function of brake energy regeneration should be selected.

P1.13 Dynamic braking selection	Range: 0~3【1】
0: Dynamic braking is disabled	1: Dynamic braking is enabled
2: Magnetic flux braking is enabled	3: Both are enabled

🕮 *Tips:*

If setting is 3, dynamic braking and magnetic flux braking are enabled automatically in deceleration to improve the control capability; in occasion of high moment of inertia and demand of fast shut down, the parameter can be set to 1 and choose the matched braking resistor; if setting is 2, fast deceleration can be achieved but the output current can be large.

Only valid to inverter that power is lower than 3015GB/3018PB

P1.14 Voltage of working time of braking (3004GB/35R5PB and below)	Range: 360~750【1 phase:380V Three-phases: 700V】
P1.14 Utilization ratio of working time of braking (35R5GB/37R5PB and above)	Range: 0.0~100.0%【100.0%】

Note:

- 3004GB/35R5PB and below: P1.14 is set as braking point voltage, it cannot be set too low and need consider the inverter model..
- 35R5GB/37R5PB and above: Resistance and power of the braking resistor must be taken into consideration when setting this parameter. If set to 5.0%, total DC injection braking time in effect will be equal to 5.0s; Start point of DC injection braking voltage: 710V

P1.15 Trip-free treatment	Range: 0~2【0】
0: once trip-free, report Uu1	1: In trip-free time give Uu1 alarm, otherwise report Uu1
2: once trip-free, give Uu alarm	

Note:

◆If having the speed track optional parts, P1.15 could set to 1 or 2.

P1.16 Trip-free time	Range: 0.5~10.0s【This value depends on the inverter model】

Note:

- If under voltage occurs in trip-time, the inverter will display Uu alarm only, and the motor cannot startup at this time. As shown in Fig. 5-1-7:
- If under voltage occurs in running, the inverter will display “Uu” alarm and “Uu1” fault, as shown in Fig.5-1-7. PWM output inhibits, motor runs at zero-speed. If the

voltage recovers, “Uu” alarm will disappear,

- If Uu1 fault occurs, the inverter will stop. If the voltage continues to drop to below 300V, a failure history record or a fault output will not happen. However, if the voltage restores, the system will record the Uu1 fault.

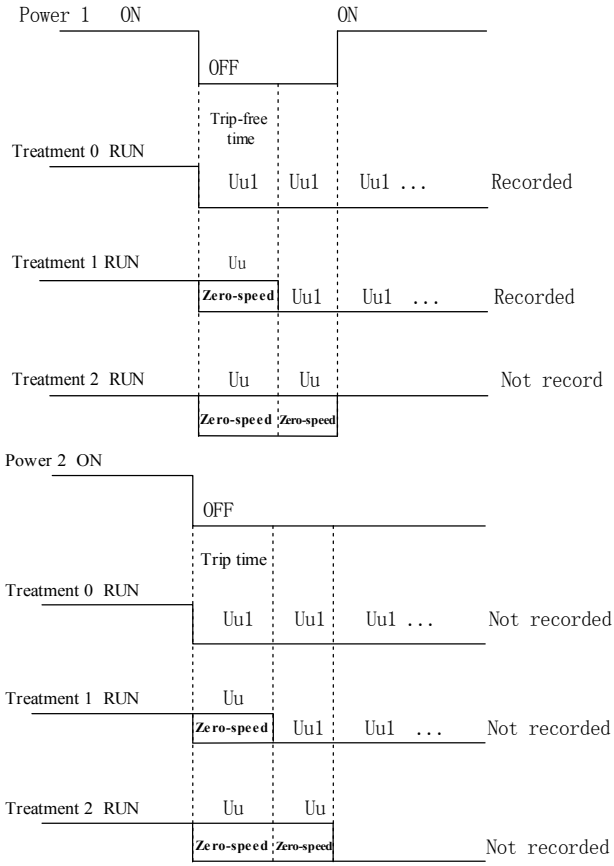


Fig. 5-1-7 Trip-free diagram

5.3 Auxiliary Operation (Group P2)

P2.00 Jog Frequency	Range: 0.10~Upper limit frequency【5.00Hz】
P2.01 Acc time of Jog	Range: 0.0~3600s【6.0/20.0s】
P2.02 Dec time of Jog	Range: 0.1~3600s【6.0/20.0s】

Note:

- P2.00~P2.02 define the related parameters of Jog.

- As shown in Fig. 5-2-1, t_1 is Acc time of Jog and t_3 is Dec time of Jog t_2 is the Jog time; P2.00 is the Jog frequency.
- Actual Acc time of JOG (t_1) can be determined by the following formula. So does the actual Dec time of JOG (t_3).
- JOG stop mode depends on the value of P2.02: If P2.02 setting is not 0, the motor will stop as stop mode 0; if P2.02 setting is 0, the motor will coast to stop.

$$t_1=\frac{P2.00\times P2.01}{P0.07}$$

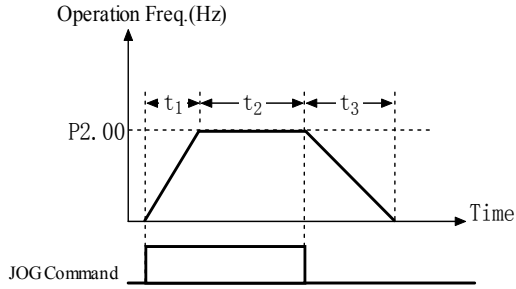


Fig. 5-2-1 JOG Running

🕮 *Tips:*

1. In Jog operation, the inverter starts according to starting mode 0. The unit of Acc/Dec time is second.
2. If deceleration time of Jog is 0: coast-to-stop, but DC injection braking terminal takes effect when stop Jog operation, the deceleration time will be P2.23 Dec time 4.
3. Jog operation can be controlled by keyboard, terminals or serial port.

P2.03 Switching time between run forward and reverse	Range: 0.0~3600s【0.0s】

Note:

The delay time is the transition time at zero frequency when the inverter switches its running direction as shown in Fig. 5-2-2 as t_1.

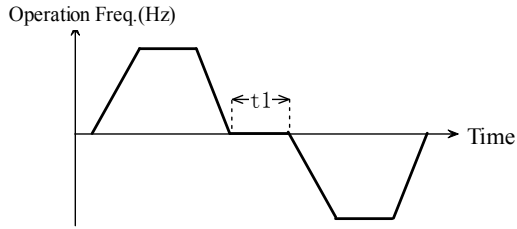


Fig. 5-2-2 FWD/REV switching time diagram

P2.04 Frequency lower limit deal mode	Range: 0,1【0】

0: Run at Frequency lower limit 1: Run at zero-speed.

Note:

◆ If setting is 0, when the reference frequency is lower than frequency lower limit, the inverter will run at frequency lower limit instead of reference frequency. As shown in Fig. 5-2-3.

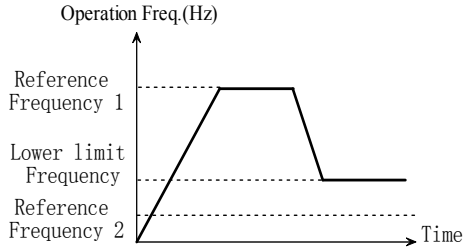


Fig. 5-2-3 Running at Frequency lower limit

◆ If setting is 1, when reference frequency is lower than frequency lower limit, the inverter will run at frequency lower limit first and last the delay time set by P3.22, then run at zero-speed. As shown in Fig.5-2-4.

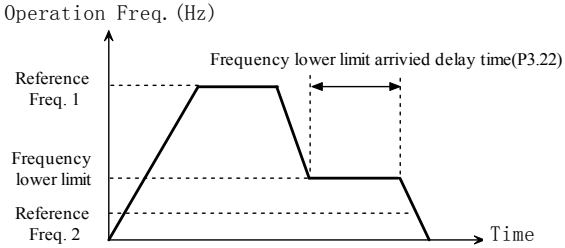


Fig. 5-2-4 Zero-speed running

◆ If standby function is enabled and the inverter is just in the standby operating mode, regardless of the value of P2.04, the inverter will run at zero-speed.

P2.05 Frequency departure setting	Range: 0.00~2.50Hz【0.00Hz】

Note:

◆ This function is used to prevent the fluctuations of analog input and reduce the influence to output frequency. The backlash is 20% of frequency departure setting.

P2.06 Carrier frequency		Range: 1~16.0kHz[This value depends on the inverter model]			
Inverter Power (kW)	S2R4GB ~3004GB/ 35R5PB	35R5GB /37R5PB	37R5GB/3011PB~3011GB/3015PB	3015GB/3018PB~ 3045G/3055P	3055G/3075P~3075G/3093P
Carrier frequency (KHz)	1.0~16.0 【6.0】	1.0~16.0 【8.0】	1.0~16.0 【6.0】	1.0~10.0 【6.0】	1.0~6.0 【3.0】

Note:

- In order to achieve better control performance, the maximum frequency should not be less than 36 times of the carrier frequency of the inverter.
- In order to reduce noise, a higher carrier frequency can be set. If absolute silence is not required during the inverter running, lower carrier frequency can be selected to reduce the wear and tear of the inverter and intensity of radiation.
- If carrier frequency is set larger than factory setting, the rated continuous working current should be decreased.

P2.07 Jump frequency 1	Range: 0.00~Max frequency 【0.00Hz】
P2.08 Jump frequency 2	Range: 0.00~Max frequency 【0.00Hz】
P2.09 Jump frequency 3	Range: 0.00~Max frequency 【0.00Hz】
P2.10 Jump frequency bandwidth	Range: 0~15.00Hz【0.00Hz】

Note:

- To avoid mechanical resonant, the inverter can skip round some running points, which is called Jump frequency. As shown in Fig. 5-2-5.

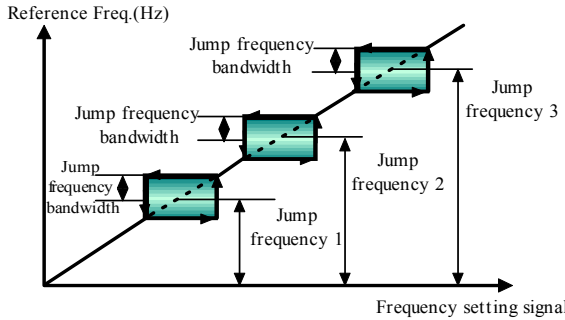


Fig. 5-2-5 Jump Frequency

- The inverter can set three jump frequency points, and the jump frequency bandwidth can overlap or nesting. If overlapped, the range broadens. When all three jump frequency set to 0.00 Hz, the jump function will be disabled.

P2.11 Multi-step frequency 1	Range: 0.00~Max frequency【5.00Hz】
P2.12 Multi-step frequency 2	Range: 0.00~Max frequency【0.00Hz】
P2.13 Multi-step frequency 3	Range: 0.00~Max frequency【0.00Hz】
P2.14 Multi-step frequency 4	Range: 0.00~Max frequency【0.00Hz】
P2.15 Multi-step frequency 5	Range: 0.00~Max frequency【0.00Hz】
P2.16 Multi-step frequency 6	Range: 0.00~Max frequency【0.00Hz】
P2.17 Multi-step frequency 7	Range: 0.00~Max frequency【0.00Hz】
P2.18 Multi-step frequency8	Range: 0.00~Max frequency【0.00Hz】
P2.19 Multi-step frequency 9	Range: 0.00~Max frequency【0.00Hz】
P2.20 Multi-step frequency10	Range: 0.00~Max frequency【0.00Hz】
P2.21 Multi-step frequency 11	Range: 0.00~Max frequency【0.00Hz】
P2.22Multi-step frequency 12	Range: 0.00~Max frequency【0.00Hz】
P2.23 Multi-step frequency 13	Range: 0.00~Max frequency【0.00Hz】
P2.24 Multi-step frequency 14	Range: 0.00~Max frequency【0.00Hz】
P2.25Multi-step frequency 15	Range: 0.00~Max frequency【0.00Hz】

Note:

- Define Multi-step frequency respectively, which can be used in Multi-step speed running and simple PLC running.
- When frequency setting type is combined frequency (P0.03>1) and frequency setting 1 is closed loop PID(P0.01=9), P2.11 is used to define the analog PID's adjustment, actual range is【-P2.11~P2.11】in Hertz.

P2.26 Acc time 2	Range: 0.1~3600s【6.0/20.0s】
P2.27 Dec time 2	Range: 0.1~3600s【6.0/20.0s】
P2.28 Acc time 3	Range: 0.1~3600s【6.0/20.0s】
P2.29 Dec time 3	Range: 0.1~3600s【6.0/20.0s】
P2.30 Acc time 4	Range: 0.1~3600s【6.0/20.0s】
P2.31 Dec time 4	Range: 0.1~3600s【6.0/20.0s】

Note:

- Define Acc/Dec time 2, 3 and 4 respectively (Acc/Dec time 1 is defined in P0.21 and P0.22). Acc/Dec time 1, 2, 3 and 4 can be selected through external terminals, set by P3.01~P3.08. If all terminals related with Acc/Dec time are invalid, the

inverter will take Acc/Dec time 1 as Acc/Dec time. However, when the inverter chooses PLC or JOG operation, Acc/Dec time will not be controlled by external terminals, but will be set by parameter of PLC or JOG.

P2.32 Fan control mode	Range: 0,1【0】

0: Auto mode 1: Always ON

Note:

- Auto stop mode

  The fan always runs when the inverter is running. After the inverter stops 3 minutes, the internal temperature detection program will be activated to stop the fan or keep the fan running according to the IGBT's temperature. If the IGBT's temperature is over 60°C, the fan will keep running. Otherwise, when the IGBT's temperature is lower than 50°C, the fan will stop.
- The fan operates continuously.

  The fan operates continuously after the inverter is switched on.

P2.33 Wiring direction of motor	Range: 0,1【0】

0: Positive sequence 1: Antitone

Note:

- The direction of the inverter output maybe different from the actual direction of motor. User can change the phase-sequence of motor or change the value of P2.25 to make them agree with each other.

P2.34 Prohibit reverse operation	Range: 0,1【0】

0: Reverse operation is enabled(factory default)

1: Reverse operation is disabled

Note:

- If P2.34 is set to 1, prohibit reverse operation is enabled, and reverse operation is disabled:
- Run at zero-speed, when running direction of keyboard is set to running reverse;
- Inverter will not run when terminal RJOG is enabled, or terminal REV is enabled.

5.4 I/O Terminal Ctrl (Group P3)

P3.00 Terminal function mode	Range: 0~1【0】

0: Close is valid 1: Open is valid

Note:

- Close is valid: Signal is enabled if the control terminal and COM terminal are short-circuit;

- Open is valid: Signal is disabled if the control terminal and COM terminal are short-circuited. Normally open and normally close are not limited.

For models which power is equal or below 3004GB/35R5PB:

P3.01 Multi-function input selection Terminal X1	Range: 0~65【1】
P3.02 Multi-function input selection Terminal X2	Range: 0~65【2】
P3.03 Multi-function input selection Terminal X3	Range: 0~65【37】
P3.04 Multi-function input selection Terminal X4	Range: 0~69【26】
P3.05 Multi-function input selection Terminal X5	Range: 0~69【27】

For models which power is equal or above 35R5GB/37R5PB:

P3.01 Multi-function input selection Terminal X1	Range: 0~65【1】
P3.02 Multi-function input selection Terminal X2	Range: 0~65【2】
P3.03 Multi-function input selection Terminal X3	Range: 0~65【37】
P3.04 Multi-function input selection Terminal X4	Range: 0~65【26】
P3.05 Multi-function input selection Terminal X5	Range: 0~65【27】
P3.06 Multi-function input selection Terminal X6	Range: 0~65【28】
P3.07 Multi-function input selection Terminal X7	Range: 0~69【0】
P3.08 Multi-function input selection Terminal X8	Range: 0~69【0】

Note:

- For models which power is equal or below 3004GB/35R5PB, only X1~X5 is valid, function code P3.06~P3.08 can not be modified; but P3.04, P3.05 (X4, X5 terminal, 3004GB/35R5PB and below) will be the same as P3.07, P3.08 (X7, X8 terminal, 35R5GB/37R5PB and above), the setting range is from 0 to 69;
- Control terminals X1~X8 are multi-function terminals. They can be defined by preset P3.01~P3.08, which are allowed function redefined. The redefined function terminal, if one of them is valid, the function is effective. For the details of settings and functions of P3.01~P3.08, refer to Table 5-3-1.

Table 5-3-1 Multifunction input selection

Setting	Function	Setting	Function
0	NULL: No defined	1	FWD: Running Forward
2	REV: Running Reverse	3	RUN
4	F/R: Running direction	5	HLD: self-hold selection

Setting	Function	Setting	Function
6	RST: reset	7	FC: Setting frequency selection
8	FJOG: JOG FWD	9	RJOG: JOG REV
10	UP	11	DOWN
12	UP/DOWN Reset	13	FRE: Coast-to-stop
14	Forced outage (according to Dec time4)	15	DC injection braking
16	Acc/Dec prohibit	17	Inverter running prohibit
18	S1 Multi-step Speed 1	19	S2 Multi-step Speed 2
20	S3 Multi-step Speed 3	21	S4 Multi-step Speed 4
22	S5 Multi-step Speed 5	23	S6 Multi-step Speed 6
24	S7 Multi-step Speed 7	25	Command channel switch to Terminal control 2
26	SS1 Multi-step Speed	27	SS2 Multi-step Speed
28	SS3 Multi-step Speed	29	SS4 Multi-step Speed
30	T1 Acc/Dec time 1	31	T2 Acc/Dec time 2
32	T3 Acc/Dec time 3	33	T4 Acc/Dec time 4
34	TT1 Acc/Dec time	35	TT2 Acc/Dec time
36	Forced outage normally close	37	EH0: External fault signal normally open
38	EH1: External fault signal normally close	39	EI0: External interrupt signal normally open
40	EI1: External interrupt signal normally close	41	Switch to keyboard control
42	Start PLC operation	43	Pause the PLC operating
44	Reset PLC stop status	45	Start wobble frequency operation
46	Reset the wobble frequency operating status	47	Start PID operation
48	Reserved	49	Timing drive input
50	Counter trig signal input	51	Counter clear
52	Actual Length clear	53	Timing scale selection
54	EH2 External fault rising edge valid	55	EH3 External fault falling edge valid
56~65	Reserved		
66	PUL: Pulse input (if two inputs appear: 3004GB/35R5PB and below is decided by X4; 35R5GB/37R5PB and above is decided by X7)	67	Single-phase speed measuring input (if two inputs appear: 3004GB/35R5PB and below is decided by X4; 35R5GB/37R5PB and above is decided by X7)

Setting	Function	Setting	Function
68	Speed measuring input SM1 (3004GB/35R5PB and below is only decided by X4; 35R5GB/37R5PB and above is only decided by X7)	69	Speed measuring input SM2 (3004GB/35R5PB and below is only decided by X5; 35R5GB/37R5PB and above is only decided by X8)

Notes to functions listed in Table 5-3-1:

0: NULL: No defined

The defined terminal is invalid. The inverter does not detect the status of the terminal nor response to the terminal. In other words, the function of terminal is forbidden. To avoid disturbance or mistaken action effectively, define the terminals that are not in use as this function

1~5: Operating modes

- Refer to P3.09 operating modes setup.

6: RST: Reset

- In fault state, the inverter can be reset by keyboard by pressing "STOP/RESET" or by terminal on or off, if the terminal has been set as RST function. In running state, it can stop the inverter according to selection of stop mode. RST function is active at the rising edge, so it must be operated as "disabled-enabled-disabled", shown in Fig. 5-3-1.

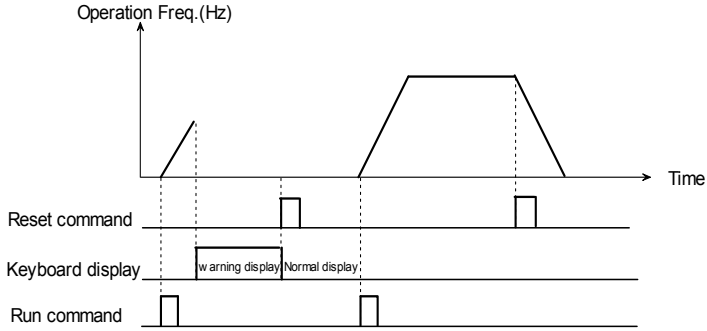


Fig. 5-3-1 Terminal reset

7: FC: Setting frequency selection

- If setting is 7: If P0.03 is set to 1, the operation frequency setting mode can be selected by FC function terminal. If FC terminal is enabled, frequency setting set will be determined by P0.02 (frequency setting 2); if FC terminal is disabled, frequency setting set will determined by P0.01 (Frequency setting 1). With FC terminal, user can switch the frequency set mode when the inverter is in running state. This function can make the output frequency control more flexible.
- 8~9:Jog operation signal (FJOG/RJOG)
- If setting is 8 or 9, this terminal can enable jog operation, when inverter doesn't start up by other running command. FJOG is for jog forward command and RJOG

is for jog reverse command, as shown in Fig.5-3-2. The defined Jog function of terminal isn't limited by run command mode selection (P0.04). When Jog frequency, and jog Acc/Dec time can be defined in P2.00~P2.02.

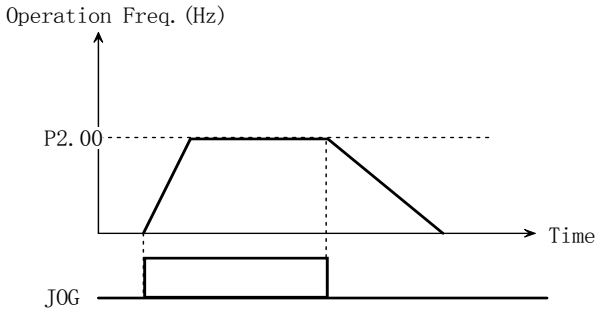


Fig. 5-3-2 JOG operation

10~12: UP/DOWN

◆ If P0.03 is set to 2, frequency setting will be the sum of frequency setting 1 and frequency setting 2.

Whether the UP/DOWN terminal is effective or not, the reference frequency will be the sum of initial value of UP/DOWN and frequency setting 2. If any UP/DOWN terminal is effective, the frequency will increase or decrease at the rate of UP/DN rate (P3.10). And the UP/DOWN frequency range will be from the sub of frequency setting 2 and P3.11 to the sum of frequency setting 2 and P3.11. If UP/DOWN function terminal is not effective, the frequency reference of UP/DOWN will keep constant. The frequency reference of UP/DOWN will be saved or not according to the UP/DN reference saving selection P3.12, if UP/DOWN function is not effective and STOP key has been pressed. But if UP/DOWN function is effective, the frequency reference of UP/DOWN will keep the initial value. As shown in Fig.5-3-3.

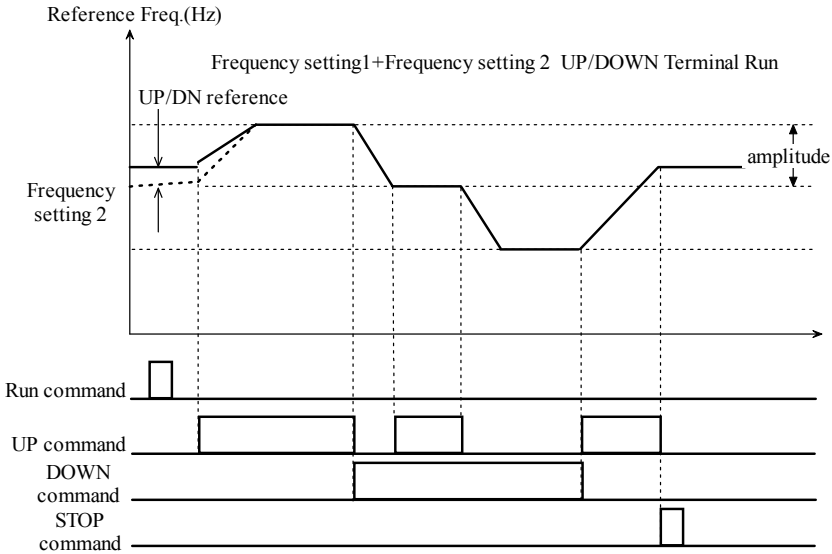


Fig. 5-3-3 UP/DOWN combination operation diagram

Note: UP/DOWN Terminal is valid only when P0.01 is set to 7 and the inverter must be in running state.

◆ If frequency setting selection (P0.03) is not 2, the frequency set mode will be frequency setting mode 1. If frequency setting mode 1 has chosen Terminal UP/DN (setting value is 7) function, whether the terminal UP/DN is effective or not, the inverter will run at initial value of UP/DN (If the UP/DN reference is lower than zero, the inverter will run at zero-speed). If any UP/DN function terminal is effective, the UP/DN reference frequency will be changed by terminal UP/DN. And the frequency is increased or decreased on currently operating frequency at the rate of Terminal UP/DN rate setting (P3.10). At this time, if UP/DN is disabled, currently running frequency will be the final UP/DN reference frequency. The frequency reference of UP/DN will be saved according to selection of saving the UP/DN reference if UP/DOWN function is not effective and "STOP/RESET" key has been pressed. The saved direction is positive. However, if UP/DOWN function is effective, the frequency reference of UP/DOWN will keep the initial value even if press "STOP/RESET" key. As shown in Fig.5-3-4.

13: FRE Coast-to-stop

◆ If the setting value is 13 and the function terminal is effective, the inverter will stop PWM output immediately, and exit from running state. Running command is only active after release of terminal FRE. No matter what selection is set to P0.04 (Run command mode selection) and what mode is set to P1.08 (stop mode), the FRE Coast-to-stop function will take effect if the terminal function has been defined and enabled.

14: Forced outage (Dec to stop within Dec time 4)
36: Forced outage normally close

◆ The inverter stops according to Dec time 4, and decided by P1.08 (stop mode).

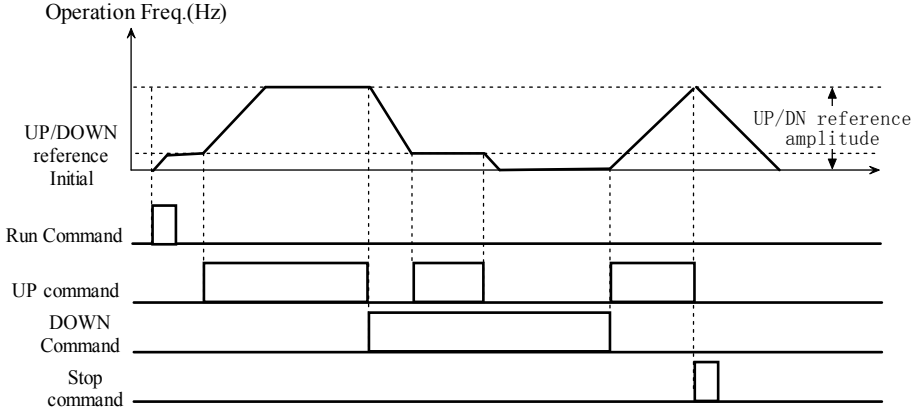


Fig. 5-3-4 UP/DOWN non-combination operation diagram

15: DC injection braking

◆ If the function of terminal is defined as set DC injection braking, the terminal can be used to perform DC injection braking. DC injection braking frequency at start, DC injection braking time at start and DC injection braking current are defined by P1.09~P1.11. Braking time is the max of P1.12 and the last time during which the DC injection braking control terminal is active. As shown in Fig. 5-3-5.

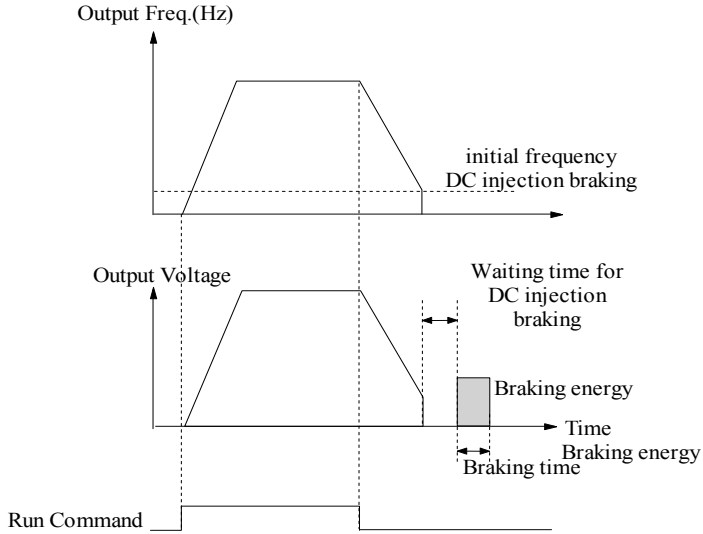


Fig. 5-3-5 DC injection braking

16: Acc/Dec prohibit

- If the setting is 16, the terminal can make the motor operate at present speed without being influenced by external signal (except STOP command).

17: Inverter running prohibits

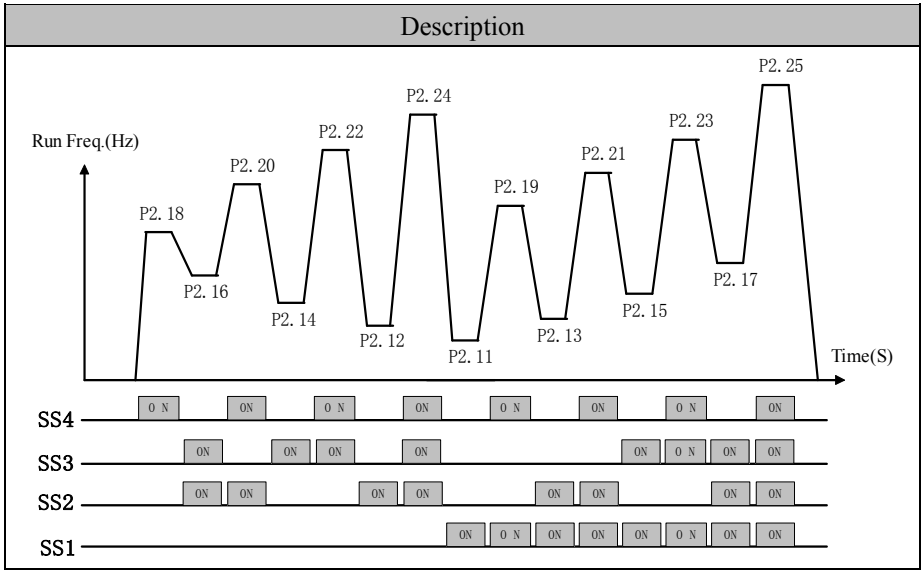
- If one terminal has been defined as this function and the terminal is valid. The running motor will coast to stop and be prohibited to restart. This function is mainly used in application with requirements of safety protection.

18~24, 26~29: Multi-step Speed

- Multi-step speed operation can Start or Stop by keyboard, terminal command, or serial communication. S1~S7: Multi-step speed command, represents Multi-step speed frequency.
- Frequency is from Multi-step frequency S1 to Multi-step frequency S7(see P2.11~P2.17 for details). If more than one Multi-step speed terminals are valid, the lower Multi-step speed will take effect
- SS1~SS4 Multi-step Speed order : setting multi-step speed (maximum to 15 steps)by combination. If SS1~SS4 is not set, it denotes off. Shown in Table 5-3-2:

Table 5-3-2 Multi-step frequency

Frequency selection				
SS4	SS3	SS3	SS3	SS3
OFF	OFF	OFF	ON	Multi-step frequency 1
OFF	OFF	ON	OFF	Multi-step frequency 2
OFF	OFF	ON	ON	Multi-step frequency 3
OFF	ON	OFF	OFF	Multi-step frequency 4
OFF	ON	OFF	ON	Multi-step frequency 5
OFF	ON	ON	OFF	Multi-step frequency 6
OFF	ON	ON	ON	Multi-step frequency 7
ON	OFF	OFF	OFF	Multi-step frequency 8
ON	OFF	OFF	ON	Multi-step frequency 9
ON	OFF	ON	OFF	Multi-step frequency 10
ON	OFF	ON	ON	Multi-step frequency 11
ON	ON	OFF	OFF	Multi-step frequency 12
ON	ON	OFF	ON	Multi-step frequency 13
ON	ON	ON	OFF	Multi-step frequency 14
ON	ON	ON	ON	Multi-step frequency 15



Description
If it has defined S1~S7 and SS1~SS4 function at the same time, S1~S7 is prior.

25: Command channel switch to Terminal control 2

- Switch the run command mode to "Terminal control 2", if this function terminal is enabled.

30~35: Acc/Dec time

- T1~T4: Preset Acc/Dec time separately. If more than one Acc/Dec time function terminals are enabled, the lower terminal function selection will be prior.
- TT1~TT2: Combinations of the two terminals to make Acc/Dec time 1~4, as shown in Table 5-3-3.
- If simultaneity defined T1~T7 and TT1~TT2, T1~T7 is prior.

Table 5-3-3

TT2	TT1	Acc/Dec time selection
OFF	OFF	Acc/Dec time 1
OFF	ON	Acc/Dec time 2
ON	OFF	Acc/Dec time 3
ON	ON	Acc/Dec time 4

37, 38：External fault normally open/normally closed; 54, 55: EH2 External fault rising edge valid/falling edge valid

EH0 External fault normally open**,** EH1External fault normally closed; EH2 External fault rising edge valid, EH3 External fault falling edge valid: External fault instruction. Fault instruction from devices associated with inverters can be input through EH0，EH1，EH2，EH3 function terminal . After inverter receives external fault instruction, PWM output will be blocked and the last fault type will be displayed.

Note: When input external fault instruction through EH0, EH1 and fault signal is valid either in high voltage level or low voltage level , the inverter cannot be reset before the external fault signal is relieved; When input external fault instruction through EH2、EH3 and only in case that fault signal is a rising edge(disconnected to closed) or falling edge(closed to disconnected), the external fault is valid and the external fault is reported with PWM output blocked and also the inverter can be reset.

When the external fault is relieved, the inverter can recover after reset.

Illustrated in 5-3-6, the definition of EH0, EH1, EH2, and EH3 is not influenced by the value of P3.00.

39 and 40: EI0 External interrupt normally open, EI1 External interrupt normally closed

During operating, the inverter stops its output and runs at zero-speed when it receives external interrupt signal. Once the signal is removed, the inverter will start and resume normal operation. Please refer to note of EH0 and EH1 above. As shown in Fig. 5-3-6.

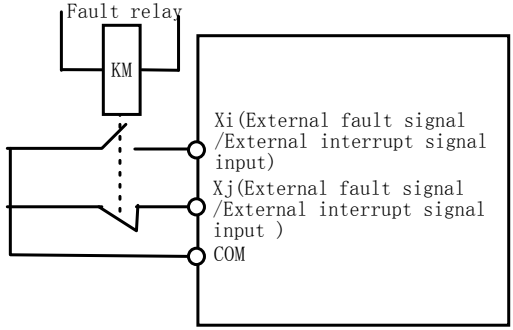


Fig. 5-3-6 Normally open / normally close

41: Command channel switch to keyboard control

- When this function valid, switch commandchannel to keyboard control.

Note: Piorioty: switch to terminal control 2 > switch to keyboard control> P0.04 (operation command control method).

42~44: Terminal PLC Control

- Start PLC operation: If the function is valid, frequency setting 1 will be selected as PLC operation. Wobble frequency operation and PID operation are similar.
- Pausing PLC operation: Timing paused.
- If the setting value is 43 and the terminal function is valid, the PLC operation will be paused and the inverter runs at zero-speed. If the pausing instruction is removed, the inverter will continue the PLC operation from the pause point. If press "STOP/RESET" while the Terminal PLC Control is valid and the inverter is in PLC running state, The PLC operation counter will be cleared. And start according to start mode next time. If inverter is not working in PLC operating mode, the pausing PLC operation function will be invalid.
- Reset PLC stop status:
- In stop state of PLC operation, the memorized PLC operating information such as the PLC operating steps, operating time, etc. will be cleared when this terminal is enabled.

45~46: Terminal wobble frequency operation

- Starts wobble frequency operation: If wobble frequency operation is enabled, frequency-setting 1 will be selected as wobble frequency operation.
- Reset the wobble frequency operating status: In stop state of wobble frequency operation, the valid terminal can clear the wobble frequency operating information memorized in stop.

47: Terminal PID operation

- Start PID operation: If PID operation terminal is enabled, frequency setting 1 will be selected as PID close-loop operation.

49/53: Timing drive input

- If the 49 terminal is valid, start the timing, else zero-clear.
- If the timing arrives at preset setting of P3.25, stop timing. As shown in Fig.5-3-7:
- When the 53 terminal is valid, the unit of P3.25(preset of timing arriving) will be minutes, or it will be second.

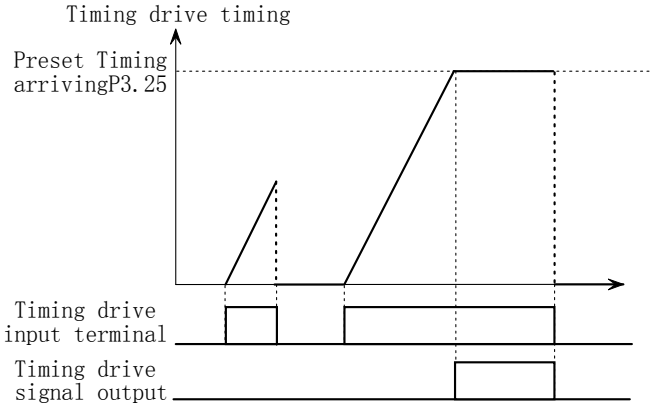


Fig. 5-3-7 Timing drive input

50: Counter's trig signal input

- This terminal is used for pulse input to the internal counter of the inverter. The highest pulse frequency is 400 Hz. The present counting value can be saved when power off.

51: Counter clear

- This terminal is used to clear the counter to zero. The terminal function is in conjunction with Counter's trig signal input.

52: Actual length clearing

- When terminal 52 is enabled, the setting of P8.01 (actual length) will be cleared to zero.

66: PUL: Pulse input

- For 3004GB/35R5PB and below models, only multi-function input terminals X4 and X5 can be defined as this function; for 35R5GB/37R5PB and above models, only multi-function input terminals X7 and X8 can be defined as this function. The input pulse frequency can be used as frequency reference. See Parameter Group P4 for the relationship between input pulse frequency and the reference frequency.

67: Single-phase speed measuring input

- Only multi-function input terminals X7 and X8 can be defined as this function. See the control circuit wiring details in section 2.5 and 2.6. The speed control accuracy is ±0.1%. Single-phase speed feedback control can be realized by using this terminal and PG.

68~69: Speed measuring input SM1/SM2

- For the inverter model of 3004GB/35R5PB and below models, only multi-function input terminals X4 and X5can be defined as this function. For the inverter model of 35R5GB/37R5PB and above models, only multi-function input terminals X7 and X8 can be defined as this function. See the control circuit wiring details in section 2.5 and 2.6. The speed control accuracy is ±0.1%. Dual-phase speed feedback control can be realized by using this terminal and PG.

P3.09 Terminal function mode setup	Range: 0~3【0】

0: 2-wire control mode 1 1: 2-wire control mode 2

2: 3-wire control mode 1-self-hold function (append any terminal of X1-X8)

3: 3-wire control mode 2-self-hold function (append any terminal of X1-X8)

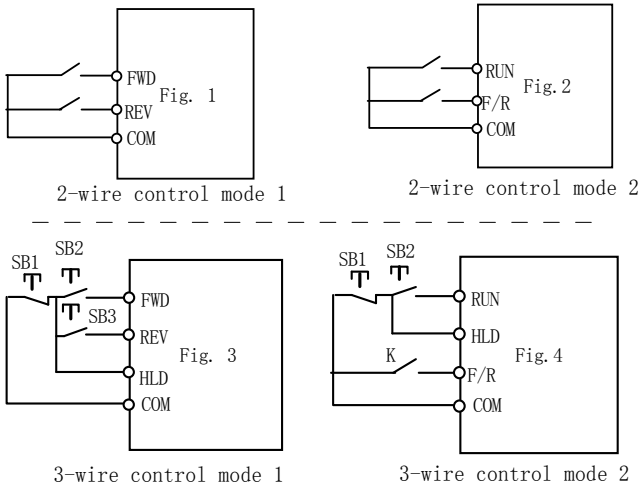
Note:

The listed functions above are only valid when P0.04 is set to 1, 2 or 5 (terminal control).

- 2-wire control mode 1
- FWD, REV: Running at preset direction. FWD means running forward, and Rev means running reverse. You can control the motor’s running direction by switch terminal FWD and REV. If FWD is valid, run forward; if REV is valid and P2.26 is set to 1 (Prohibit reverse operation enabled), The inverter will stop. If P2.26 is 0

(Prohibit reverse operation disabled), the inverter will run reverse. If FWD and REV are valid or invalid at the same time, the inverter will stop. Terminals wiring is shown in Fig.1

- 2-wire control mode 2
- In this mode, both function RUN (Run command) and F/R (Running direction) are used: If RUN is enabled, the inverter will startup. If F/R is selected but disabled, the inverter will run forward. If F/R is selected and enable, the inverter will run reverse. When F/R is not selected, the running direction is defined by function code. If RUN is disabled, the inverter will stop. Terminals wiring is show in Fig.2
- 3-wire control mode 1
- If HLD is ON, FWD and REV signal will self-hold. If HLD is OFF, the inverter will release self-holding and stop. FWD, REV: Run at preset direction. FWD means running forward, and REV means running reverse. You can control the motor's running direction by switch terminal FWD and REV. If FWD is enabled, the inverter will run forward; If REV is enabled, the inverter will run reverse. Terminals wiring is show in Fig.3
- 3-wire control mode 2
- If HLD is ON, RUN signal will self-hold. If HLD is OFF, the self-holding will be released. In this mode, both function RUN (Run command) and F/R (Running direction) are used: If RUN is enabled, the inverter will startup. If F/R is selected but disabled, the inverter will run forward. If F/R is selected and enable, the inverter will run reverse. When F/R is not selected, the running direction is defined by function code. If RUN is disabled, the inverter will stop. Terminals wiring is show in Fig.4.
- In Fig. 3, SB1 is Stop button, SB2 is running forward button. Press SB2 or SB3 to startup the inverter, and switch SB2, SB3 to change the running direction. Press SB1 to stop the inverter output.
- In Fig.4, SB1 is Stop button, SB2 is running button, and K is running direction button. Press SB2 to startup the inverter. Press switch K to change the running direction. Press SB1 to stop the inverter output.



P3.10 Terminal UP/DN rate	Range: 0.01~99.99Hz/s【1.00Hz/s】
P3.11 UP/DN reference amplitude	Range:0.00~Frequency upper limit【10.00Hz】

Note:

- Terminal UP/DN rate is used to define the change rate of reference frequency that is changed by terminal UP/DN. UP/DN reference amplitude used to define that the span of reference frequency is changed by terminal UP/DN.

P3.12 Digital frequency UP/DOWN save selection	Range: 0~2【2】

0: Receive STOP, UP/DN reference is reset to zero;

1: Receive STOP, UP/DN reference is not reset to zero, and not saved when power loss;

2: Receive STOP, UP/DN reference is not reset to zero, and saved when power loss. If P0.01 is set to 1, P0.00 will be saved when power loss

Note:

- UP/DOWN running is shown in Fig. 5-3-3 and Fig. 5-3-4.
- When P0.01is set to 1: if P3.12 is set to 2, the changed value of P0.00 by keyboard digital encoder will be saved when power loss. Otherwise, the changed value won't be saved. For details, please refer to P0.00.

P3.13 Define Functions of terminal DO	Range: 0~30【0】
P3.14 Terminal Y1 function definition	Range: 0~30【1】

P3.15 Terminal Y2 function definition	Range: 0~30【2】
P3.16 Output function of Relay 1 (TA/TB/TC)	Range: 0~30【19】
P3.17 Output function of Relay 2 (BRA/BRB/BRC)	Range: 0~30【0】

Note:

For model 3004GB/35R5PB and below, function code P3.14, P3.15 are reserved and cannot been modified. At the same time, output function No. 26 and 27 are reserved , there is no output; Function code P3.17 is used for "the terminal output hold time setting of fixed-length arriving". The details are below:

- This series inverter has 5 digital outputs (For model 3004GB/35R5PB and bellow, there are two digital outputs (DO and Relay 1)) only. The multi-function output terminals, D0, Y1, Y2, Relay 1, and Relay 2 are programmable. They can be selected to output some controlling and monitoring signal according to the application requirement. Refer to Table 5-3-5.
- If collectors are selected as PLC running steps output or fault output (only 35R5GB/37R5PB and above can be set), D0, Y1, Y2 must be selected as the same function (26, or 27) to make the combination effective.
- Fault type and running steps refer to Table 5-3-4.

Table 5-3-4 Fault Type and Running Step

TA	Y2	Y1	D0	Fault Type	Meaning	Steps
OFF	OFF	OFF	ON	OC	Over-Current	T1
OFF	OFF	ON	OFF	SC	Short Circuit	T2
OFF	OFF	ON	ON	OU	Over Voltage	T3
OFF	ON	OFF	OFF	Uu1	Under Voltage	T4
OFF	ON	OFF	ON	OH1	Overheat	T5
OFF	ON	ON	OFF	OL2	Inverter Overload	T6
OFF	ON	ON	ON	EH	External Fails	T7
ON	OFF	OFF	OFF	-	-	T8
ON	OFF	OFF	ON	-	-	T9
ON	OFF	ON	OFF	-	-	T10
ON	ON	OFF	OFF	-	-	T12
ON	ON	OFF	ON	-	-	T13
ON	ON	ON	OFF	-	-	T14
ON	ON	ON	ON	-	-	T15

Table 5-3-5 Multi-function Output

Setting	Function	Description
0	NULL	None
1	RUN	The inverter is in running state, the output of terminal is valid.
2	FAR Frequency arriving	Refer to description of parameters P3.18 (Frequency arriving signal (FAR)).
3	FDT Frequency detection	Refer to description of parameters P3.19 (FDT level) , P3.20 (FDT lag).
4	FDTH Frequency upper limit arriving	When the reference frequency is higher than upper limit of frequency, if the operating frequency reaches the frequency upper limit and delays, the output of terminal is valid.
5	FDTL Frequency lower limit arriving	If the reference frequency is below the lower limit of frequency and the operating frequency reaches the lower limit of frequency, the output of terminal is valid.
6	Upper and lower limits of wobble frequency	If wobble frequency operating function is selected and the wobble frequency is higher than upper limit of frequency (P0.08) or lower than the lower limit of frequency (P0.09). The output of terminal is valid.
7	Zero-speed running	If the output frequency is 0 and the inverter is in running state, the output of terminal is valid.
8	Completion of simple PLC operation	If the present step of PLC operation is finished, the output of terminal is valid (a pulse, 500 ms width).
9	PLC cycle completion indication	If one cycle of PLC operation is finished, the output of terminal is valid (pulse, 500 ms width).
10	Inverter ready (RDY)	When the inverter is in normal waiting state and there is no faults, no interrupts, no reset, no coast to stop, no Uu warning and no prohibition of start), the output of terminal is valid
11	Coast-to-stop	If the inverter is in coast-to-stop state, the output of terminal is valid. (a pulse, 500 ms width)
12	Auto restart	If the inverter is restart after auto reset. , the output of terminal is valid. (a pulse, 500 ms width)
13	Timing Arriving	See the description of “Timing drive input”(P3.01~P3.08)
14	Count value arriving output	The count value is bigger than the value defined in P3.24, the output of terminal is valid.

Setting	Function	Description
15	Preset operating time arriving out	When the total operating time (PE.09) reaches the preset operating time (P3.26), the output of terminal is valid.
16	Torque arriving detection threshold	If motor's torque is reach reference value (set by P3.23), the output of terminal is valid. If it is lower than 80% of reference value, the terminal is invalid.
17	CL: Current Limiting	If output current is reach current amplitude limiting level (set by Pd.05), the output of terminal is valid. If it is lower than 80%, the output of terminal is invalid.
18	Over-voltage stall	If motor's torque is reach over voltage point at stall (set by Pd.07), t the output of terminal is valid. If it is lower than 80%, the output of terminal is invalid.
19	Inverter fails	If the inverter has fault, the output of terminal is invalid.
20	External fault stop (EXT)	If the inverter halt is caused by external fault, the output of terminal is valid.
21	Uu1: Under voltage lock-up	If the DC bus voltage is lower than the voltage lower limit, the output of terminal is valid.
22	Reserved	Reserved
23	OLP2: Overload signal	If the output current is higher than the value defined by Pd.02 (Overload detection), the output of terminal is valid.
24	Analog signals 1 abnormal	If analog signal 1 level is lower than the minimum signal and lasts 500 ms, the output of terminal is valid.
25	Analog signals 2 abnormal	If analog signal 2 level is lower than the minimum signal and lasts 500 ms, the output of terminal is valid.
26	STEP: Program Running steps	Running steps of instruction program and the corresponding procedure, and outputs, refer to Table 5-3-4. , the output of terminal is valid for models 3004GB/35R5PB and below .
27	Fault type output	See Table 5-3-4 for faults that correspond to the output signal. The function of terminal is reserved for models 3004GB/35R5PB and below .
28	Fixed-length arriving	If the actual length defined by P8.01 is longer than the length defined by P8.00, the output of terminal is valid.
29	Standby	If the inverter is in standby state, the output of terminal is valid.
30	Zero-speed	If output frequency is zero, the output of terminal is valid.

P3.17 Preset operating time(3004GB/35R5PB and below)	Range: 0.0~3.0s 【1.0s】

Note:

- For model 3004GB/35R5PB and below: function code P3.17 is valid for fixed-length arriving hold time setting. For models above, P3.17 is the Output function of Relay 2.See description of P3.16 above;
- When P3.13=28 or P3.16 =28, the DO or Relay1 output is selected as "fixed-length arriving", the setting of P3.17 will be effective.
- When the P3.17 is set as 0: fixed-length arriving output terminal will hold the output level until the length is reset.
- When the P3.17 is not set as 0: the value of P3.17 will be the time during which the fixed-length arriving output terminal will keep the output level .

P3.18 FAR detection width	Range: 0.00~10.00Hz【2.50Hz】

Note:

- This function used to adjust FAR detection bandwidth, when the output frequency reaches to the reference frequency. The adjusted range is from 0 to ±10.00 Hz of reference frequency. If the inverter's output frequency is within the detection width of reference frequency, a pulse signal will be output, as shown in Fig. 5-3-8.

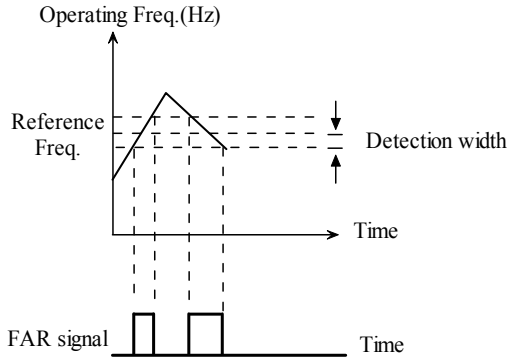


Fig. 5-3-8 FAR detection diagram

P3.19 Frequency detection threshold (FDT level)	Range: 3004GB and below: 0.00~650.0Hz 【50.00Hz】 35R5GB/37R5PB and above: 0.00~400.0Hz【50.00Hz】

P3.20 Frequency detection hysteresis values (FDT lag)	Range: 0.00~10.00Hz【1.00Hz】

Note:

- When the output frequency reaches a certain preset frequency (frequency detection threshold), Y terminal output will be valid. We called the preset frequency FDT level. In the dropping of output frequency, Y terminal output keep valid, until the output frequency drops below another certain frequency of FDT level, which is called release frequency (FDT1 level-FDT1 lag), as shown in Fig. 5-3-9.

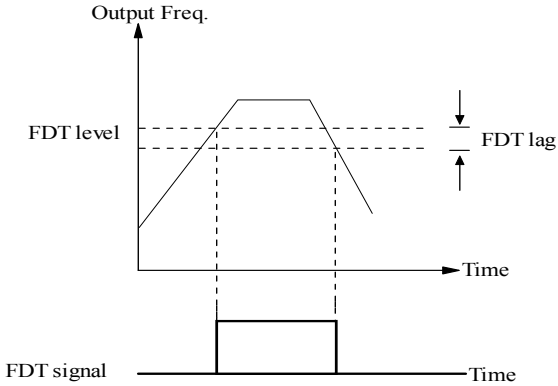


Fig. 5-3-9 FDT level and lag diagram

P3.21 Frequency upper limit arriving output delay time	Range: 0.0~100.0s【0.0s】
P3.22 Frequency lower limit arriving output delay time	Range: 0.0~100.0s【0.0s】

Note:

- For 35R5GB/37R5PB and the above models: function of P3.13 ~ P3.17 will be D0, Y1, Y2. Relay 1and relay 2 outputs have been set as 4 (FDTH: Frequency upper limit arriving) or 5 (FDTL: Frequency lower limit arriving).
- For 3004GB/35R5PB and the below models: function of P3.13 and P3.16 will be D0. Relay output has been set as 4 (FDTH: Frequency upper limit arriving) or 5 (FDTL: Frequency lower limit arriving).
- Usually, this Function is valid to avoid load wobbling and signal instability when several motors switch between commercial frequency and conversion frequency, as shown in Fig. 5-3-10.

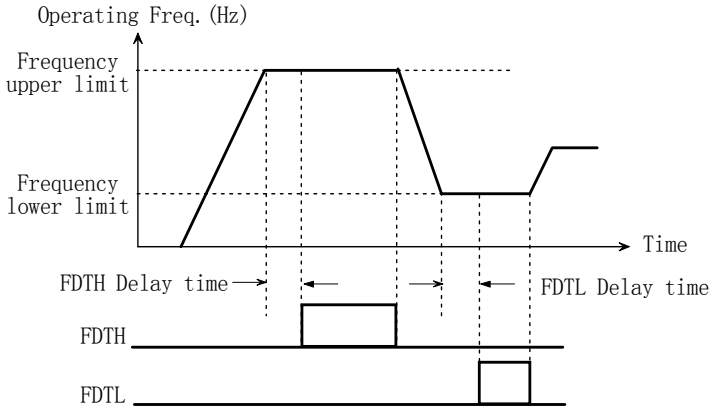


Fig. 5-3-10 FDTH/FDTL diagram

P3.23 Torque detection reference	Range: 0.0~200.0%【100.0%】

Note:

- If motor torque is equal to or more than the range of torque detection reference, the output of terminal is valid. If the motor torque is less than 80% of reference, the output of terminal is invalid, as shown in Fig. 5-3-11.

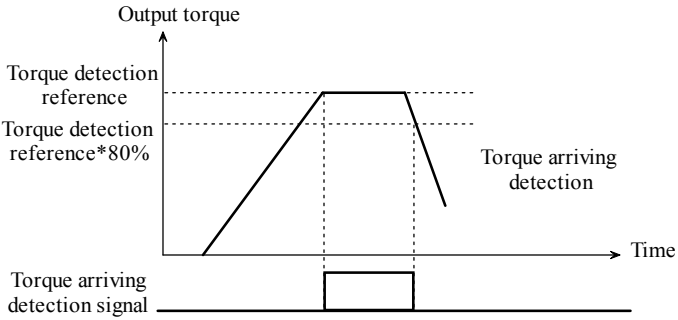


Fig. 5-3-11 Torque arriving detection threshold

P3.24 Preset Count value	Range: 0~9999【0】

Note:

- If the counting value is bigger than the value defined by P3.24, the output of terminal is valid, as shown in Fig. 5-3-12.

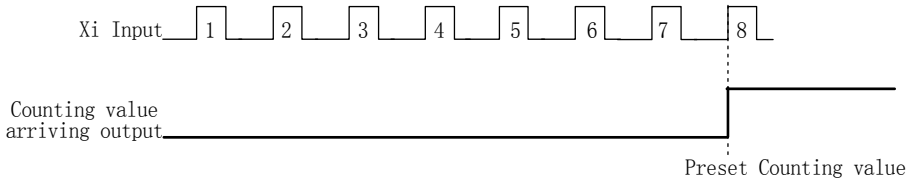


Fig. 5-3-12 Count value arriving

P3.25 Preset timing arriving	Range: 0.0~6553.5s 【0.0】

Note:

- When the timing time reaches the preset timing arriving (P3.25), the output of terminal is valid, as shown in Fig. 5-3-7.
- The unit of timing time is up to function terminal. The total timing time will be cleared to zero only when the terminal 49 is disabled, or continue accumulating.

P3.26 Preset operating time	Range: 0~65530h 【65530】

Note:

- When the total operating time reaches the preset operating time (P3.26), the output of terminal is valid.

5.5 Analog and Pulse Function (Group P4)

P4.00 Analog Nonlinear Selection	Range: 0~3【0】
0: Null	1: AI1
2: AI2	3: Pulse

Note:

- If the setting is 0, P4.01~P4.05 are used to define AI1 inputs, P4.06~P4.10 are used to define AI2 inputs, and P4.11~P4.15 are used to defined pulse inputs. They are independent and have no interference with each other.
- If the setting is not 0, it will be nonlinear selection, all the parameters from P4.01 to P4.15 are setting points for the selected channel by P4.00. The filter time according to the selected channel setting and the physical value of the others are 0.
- If the setting of P4.00 is 1 or 2, the selection will be analog input and the default values to each channel arranged from small to great are: 0.00V, 2.00V, 4.00V, 6.00V, 8.00V, 10.00V;
- If the setting is 3, the selection will be pulse input. While the default input to the channel are 0.00 kHz, 10.00 kHz, 20.00 kHz, 30.00 kHz, 40.00 kHz, and 50.00 kHz. The default physical values are linear relation.

🕮 *Tips:*

Only when the value of P4.00 is changed and saved by pressing the “ENTER” key, the input channel value can be initialized to the default value.

P4.01 Min analog value Input 1 (AI1 Terminal)	Range: 0.0~P4.03【0.10V】
P4.02 Physical value 1 corresponding to Min analog value Input	Range: 0.0~100.0%【0.0%】
P4.03 Max analog value Input 1 (AI1 Terminal)	Range: P4.01~10.00V【10.00V】
P4.04 Physical value 1 corresponding to Max analog value Input	Range: 0.0~100.0%【100.0%】
P4.05 Analog input filter time constant 1 (AI1 Terminal)	Range: 0.01~50.00s【0.05s】
P4.06 Min analog value Input 2 (AI2 Terminal)	Range: 0.00~P4.08【0.10V】
P4.07 Physical value 2 corresponding to Min analog value Input	Range: 0.0~100.0%【0.0%】
P4.08 Max analog value Input 2 (AI2)	Range: P4.06~10.00V【10.00V】
P4.09 Physical value 2 corresponding to Max analog value Input	Range: 0.0~100.0%【100.0%】
P4.10 Analog input filter time constant 2 (AI2 Terminal)	Range: 0.01~50.00s【0.05s】
P4.11 Min pulse value Input 3 (pulse input Terminal)	Range: 0.00~P4.13 【0.00K】
P4.12 Physical value 3 corresponding to Min pulse value Input	Range: 0.0~100.0%【0.0%】
P4.13 Max pulse value Input 3 (pulse input Terminal)	Range: P4.11~50.00kH【50.00k】
P4.14 Physical value 3 corresponding to Max pulse value Input	Range: 0.0~100.0%【100.0%】
P4.15 Pulse input filter time constant 3 (pulse Input Terminal)	Range: 0.01~50.00s【0.05s】

Note 1:

- Min/Max virtual value of analog input is the Min/Max virtual value of the input signals. If the actual value input is smaller than min value, the min value will be treated as the Min virtual value of analog input. If the actual value input is greater than the max value, the max value will be treated as the Max virtual value of analog input. The max virtual value of analog input must be greater than the min.
- Physical value corresponding to virtual value of analog input: The physical value can be reference frequency, rotate speed, or pressure, etc.
- The inverter offers three groups of analog input signal. They are analog input terminal AI1, AI2, and pulse. Users can define input /output curve of each channel. Totally, you can define three curves.
- The analog input of AI1 and AI2 can be voltage (0~10V) or current (0~20mA), selected by the switches on the control board. (Switching SW1 at place 1 means OFF, it corresponds to 0-10V. If SW1 is ON, it corresponds to 0-20mA.)
- Through setting P4.01~P4.04, P4.06~P4.09 and P4.11~P4.14, can defined two characteristic linear curves. The positive and negative function is shown in Fig.5-4-1.

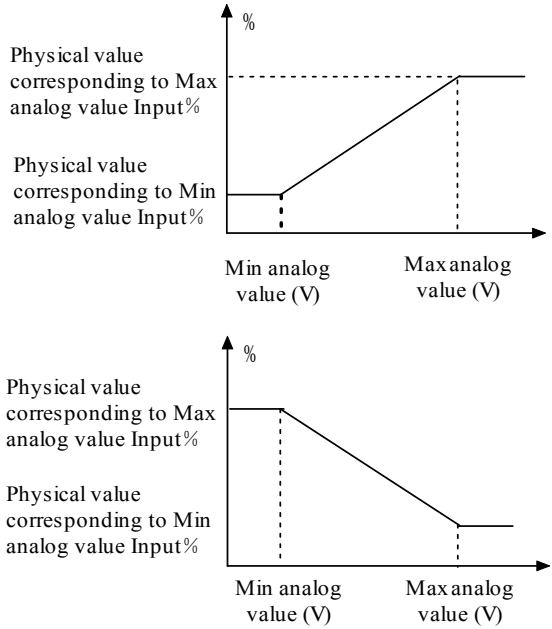


Fig. 5-4-1 Analog input linear curve

Note 2:

- When P4.00 is set to 1, 2, or 3, the function of P4.01~P4.04, P4.06~P4.09 and P4.11~P4.14 are combined for one physical value, which is different to Note 1. User can define their own nonlinear curves by setting these parameters. Six points can be set on the curve. As shown in Fig. 5-4-2. In addition, the setting value to P4.01, P4.03, P4.06, P4.08, P4.11, P4.13 must increase in order.

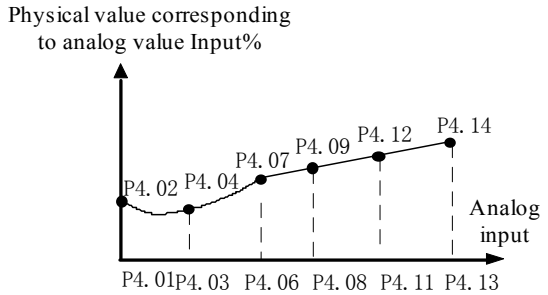


Fig. 5-4-2 Analog input non-linear curve

Note 3:

- The input filter time constant is used for digital filter of the input signal, in order to avoid interference of the system.

- The bigger the filter time constant, the higher the immunity level and the longer the response time is. On the contrary, the smaller the time constant, the shorter the response time and the lower the immunity level is. If the best setting is not clear, you can adjust setting value according to the status of control stability and response delay time.

P4.16 PG Pulse Range	Range: 1~9999【1024】

Note:

- The setting value of P4.16 (Number of pulses per revolution of PG) is determined by the characteristic parameters of PG.

P4.17 AO1 function definition	Range: 0~15【0】
P4.18 AO2 function definition	Range: 0~15【1】
P4.19 DO function definition	Range: 0~15【15】
0: Output frequency before compensation (0~Max frequency)	1: Output current (0~2 times of inverter's rated current)
2: Output voltage (0~Max Voltage)	3: PID feed (0~10V)
4: PID feedback (0~10V)	5: Adjust signals (5V)
6: Output torque (0~2 times of motor's rated torque)	7: Output power (0~2 times of Inverter's rated power)
8: Bus voltage (0~1000V)	9: AI1 (0~10V)
10: AI2 (0-10V/0~20mA)	11: Output frequency after compensation (0~maximum frequency)
12~14: Reserved	15: NULL

Note:

- The inverter has two analog outputs (3004GB/35R5PB and the below models as one signal). The output can be voltage or current. The full range of voltage is DC 10V and the current is 20mA. You can select what to output, and adjust the range according to your actual need.
- The inverter model of 3004GB/35R5PB and the below models have only one analog channel (AO1). The corresponding P4.18, P4.21and P4.23 all cannot be set.

P4.20 AO1 output range selection	Range: 0, 1【0】
P4.21 AO2 output range selection	Range: 0, 1【0】
0: 0~10V / 0~20mA	1: 2~10V / 4~20mA

P4.22 Gain of AO1	Range: 1~200%【100%】
P4.23 Gain of AO2	Range: 1~200%【100%】

Note:

- The inverter output and instrument systems are likely to produce bias, you can

adjust the output gain (AO1or AO2) for the meter calibration and the change of measuring range.

- To avoid fluctuations of output in calibrating, you can make the inverter output a standard signal (set P4.17 or P4.18 to 5 to get DC 5v. It is 50% of the full range) for AO gain calibration. For example, to calibrate AO1, select the function code P4.22 and press "ENTER" key to enter into the function parameter menu, turn encoder on the keyboard right or left to set output signal just to 5 VDC. The modification of P4.22 is valid immediately, and would be saved into P4.22 after pressing ENTER key. To calibrate AO2 is like the above.
- If the external instrument has a great bias, the instrument should connect to the inverter and carry out the actual adjustment.

P4.24 Max output frequency of DO	Range: Min Pulse value output of DO~50.00kHz【10.00kHz】
P4.25 Min output frequency of DO	Range: 0.00~Max Pulse value output of 【0.00kHz】

5.6 PLC Operating (Group P5)

P5.00 PLC Operating mode	Range: 0~2【2】
0: Single cycle 1	1: Single cycle 2 (holding the final value)
2: Continuous operation	

Note:

- Single cycle 1

The inverter stops automatically after one cycle of operation and will start when receiving RUN command again. As shown in Fig. 5-5-1.

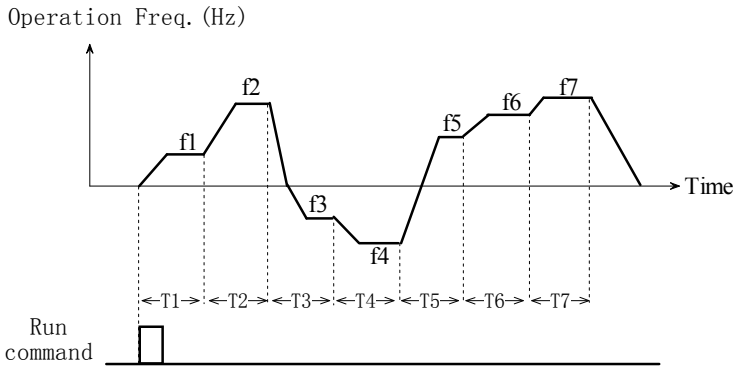


Fig. 5-5-1 Stop mode after single cycle of PLC

◆ Single cycle 2 (holding the final value)

The inverter will hold the operating frequency and direction of last step after completing one cycle of operation. As shown in Fig. 5-5-2.

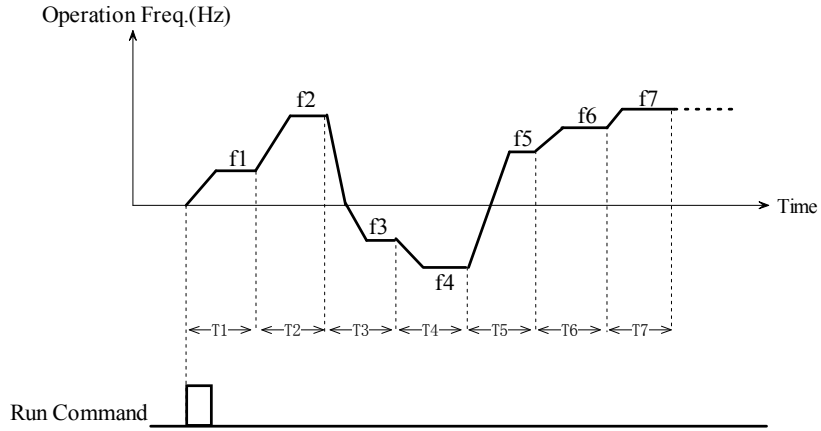


Fig. 5-5-2 Holding the frequency after single cycle

◆ Continuous operation

The inverter will start next cycle of operation automatically after completing one cycle of PLC operation until receiving stop command. As shown in Fig. 5-5-3.

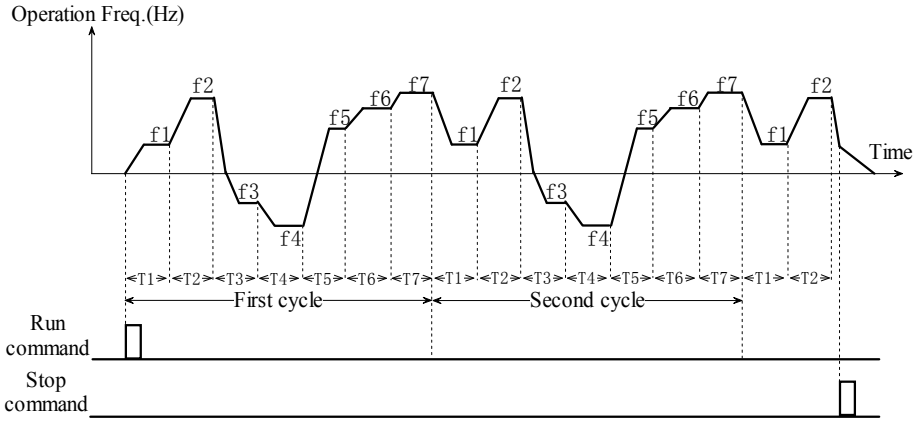


Fig. 5-5-3 Continuous operation of PLC

P5.01 PLC restarting mode selection	Range: 0~2【0】

0: Restart from first step

1: Continue from the step where the inverter stops

2: Continue to operate at the frequency when the inverter stops

Note:

- Restart from first stage
- If the inverter stops during PLC operation because of receiving stop command or fault, or power loss, it will restart from the first step after restarting.
- Continue from the step where the inverter stops
- When the inverter stops during PLC operation because of receiving stop command or fault, it will record the operating time and will continue from the step where the inverter stops, and restart at the frequency defined for this step, as shown in Fig.5-5-4.

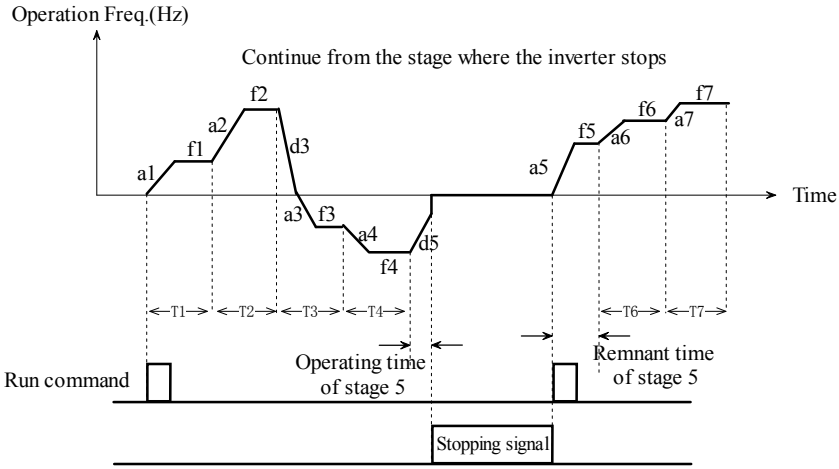


Fig. 5-5-4 PLC start mode 1

- Continue to operate at the frequency when the inverter stops
- When the inverter stops during PLC operation because of receiving STOP command or fault, it will record the operating time and the current frequency. It will continue running at the recorded frequency after restart, as shown in Fig. 5-5-5.

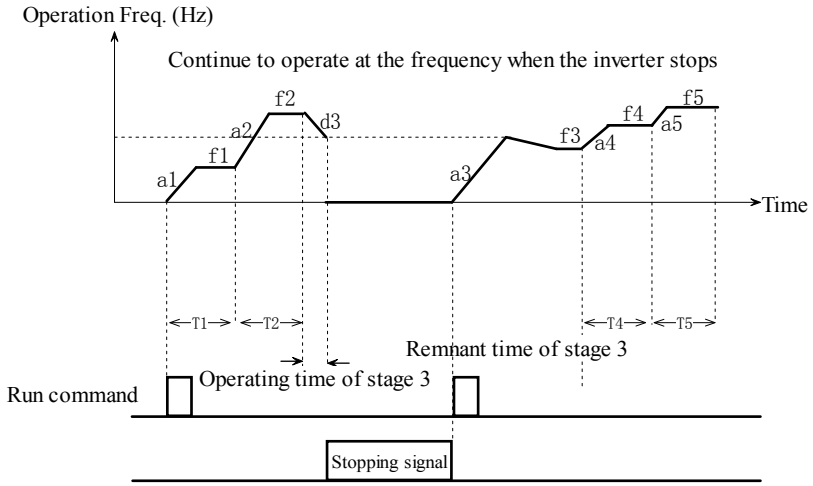


Fig. 5-5-5 PLC start mode 2

🕮 *Tips:*

The difference between mode 1 and mode 2 is that the inverter can record the operating frequency when the inverter stops and will run at the recorded frequency after restart in mode 2.

P5.02 Saving PLC status when power off	Range: 0,1【0】
0: Not save	1: Save

Note:

◆ Not save

The inverter does not save the PLC operating state when the power is off and restart from the first stage after the power is on.

◆ Save

The inverter will save the PLC operating parameters such as the PLC operating stage, PLC operating frequency, and PLC operating time when power is off. The inverter will start the PLC operation again according to the defined PLC restarting mode of P5.01.

.

P5.03 Unit of step time	Range: 0,1【0】
0: Second	1: Minute

Note:

◆ This unit is only valid for defining the PLC operating time. The unit of Acc/Dec time in PLC operation is still second.

P5.04 Operating Timing T1	Range: 0.1~3600【10.0】
P5.05 Operating Timing T2	Range: 0.0~3600【10.0】
P5.06 Operating Timing T3	Range: 0.0~3600【10.0】
P5.07 Operating Timing T4	Range: 0.0~3600【10.0】

P5.08 Operating Timing T5	Range: 0.0~3600【10.0】
P5.09 Operating Timing T6	Range: 0.0~3600【10.0】
P5.10 Operating Timing T7	Range: 0.0~3600【10.0】
P5.11 Operating Timing T8	Range: 0.0~3600【10.0】
P5.12 Operating Timing T9	Range: 0.0~3600【10.0】
P5.13 Operating Timing T10	Range: 0.0~3600【10.0】
P5.14 Operating Timing T11	Range: 0.0~3600【10.0】
P5.15 Operating Timing T12	Range: 0.0~3600【10.0】
P5.16 Operating Timing T13	Range: 0.0~3600【10.0】
P5.17 Operating Timing T14	Range: 0.0~3600【10.0】
P5.18 Operating Timing T15	Range: 0.0~3600【10.0】

Note:

- Configure the operating time of each PLC operating step. The range is 0.00~3600s (The time unit can be select by P5.03. The default time unit is second). If the operating time of the step is set to 0, the inverter will skip the step and run at the next step,

P5.19 Step T1 program operating setting	Range: 1 F~4 r【1F】
P5.20 Step T2 program operating setting	Range: 1 F~4 r【1F】
P5.21 Step T3 program operating setting	Range: 1 F~4 r【1F】
P5.22 Step T4 program operating setting	Range: 1 F~4 r【1F】
P5.23 Step T5 program operating setting	Range: 1 F~4 r【1F】
P5.24 Step T6 program operating setting	Range: 1 F~4 r【1F】
P5.25 Step T7 program operating setting	Range: 1 F~4 r【1F】
P5.26 Step T8 program operating setting	Range: 1 F~4 r【1F】
P5.27 Step T9 program operating setting	Range: 1 F~4 r【1F】
P5.28 Step T10 program operating setting	Range: 1 F~4 r【1F】
P5.29 Step T11 program operating setting	Range: 1 F~4 r【1F】
P5.30 Step T12 program operating setting	Range: 1 F~4 r【1F】
P5.31 Step T13 program operating setting	Range: 1 F~4 r【1F】
P5.32 Step T14 program operating setting	Range: 1 F~4 r【1F】
P5.33 Step T15 program operating setting	Range: 1 F~4 r【1F】

Note:

- P5.19~P5.33 are used to set the direction and Acc/Dec time of each PLC operating step. Total 8 kinds of combinations, which is shown in Table 5-5-1, could be selected.

Table 5-5-1 Settings of PLC stage

Symbol	Acc/Dec time		Direction
1F	Acc/Dec time 1	P0.21, P0.22	F: Forward
1r			r: Reverse
2F	Acc/Dec time 2	P2.26, P2.27	F: Forward
2r			r: Reverse
3F	Acc/Dec time 3	P2.28, P2.29	F: Forward
3r			r: Reverse
4F	Acc/Dec time 4	P2.30, P2.31	F: Forward
4r			r: Reverse

P5.34 PLC record clear	Range: 0,1【0】
P5.35 Record of PLC steps	Range: 0~15【0】
P5.36 Operating time of this step	Range: 0.0~3600【0.0】

Note:

- Record of PLC steps (P5.35) records the steps that the PLC currently operating at.
- Operating time of this step (P5.36) records the operating time of the step that the PLC currently operating at.
- If P5.34 is set to 1, records of PLC steps (P5.35) and operating time of this step (P5.36) will be cleared, then the value of P5.34 will recovery to 0.

🕮 *Tips:*

You can start, pause, and reset of PLC operating by setting external terminal function, which is defined in Group 3.

5.7 Wobble Frequency Operating (Group P6)

P6.00 Wobble frequency operation restart mode	Range: 0,1【0】

0: Restart at the freq. and direction before stop, as shown in Fig. 5-6-2.
1: Restart, as shown in Fig. 5-6-3

P6.01 Save wobble frequency operating parameters	Range: 0,1【0】

0: not save 1: save

Note:

- Not save: The inverter does not save the wobble frequency operating parameters when power is off and restart when power is on.
- Save: The inverter will save the wobble-frequency operation parameters such as the operating frequency, and operating direction (UP/DOWN) when power is off. The inverter will restart as the mode defined by P6.00 when power is on.

P6.02 Preset of wobble frequency	Range: 3004GB/35R5PB and below: 0.00~650.0Hz【0.00Hz】 35R5GB/37R5PB and above: 0.00~400.0Hz【0.00Hz】
P6.03 Holding time before wobble frequency operating	Range: 0.0~3600s【0.0s】
P6.04 Wobble frequency amplitude	Range: (0.0~50%) of P0.00 【0.0%】
P6.05 Skip frequency	Range: (0.0~50%) of P6.04 【0.0%】
P6.06 Skip Time	Range: 5~50ms【5ms】
P6.07 Wobble frequency operating cycle	Range:0.1~999.9s 【10.0s】
P6.08 Wobble ratio	Range: 0.1~10.0【1.0】

Note:

- P6.02 is used to define the operating frequency before entering wobble frequency operation mode.
- P6.03 is used to define the time when the inverter operates at wobble-preset frequency.
- P6.04 is used to define the range of wobble operating frequency. The actual value is P0.00×P6.04.
- P6.07 is used to define a cycle of wobble frequency operation including rising and falling processes.
- P6.08 is used to define wobble ratio, which is the ratio of UP time to DOWN time.

P6.09 Random wobble selection	Range: 0,1【0】
P6.10 MAX ratio of random wobble	Range: 0.1~10【10】
P6.11 MIN ratio of random wobble	Range: 0.1~10【0.1】

Note:

- P6.09 is used to select a fixed wobble ratio value defined by P6.08 or a random value between P6.11~P6.10.

Wobble frequency operation has two starting modes:

- Auto mode: If the setting of P0.01 is 10, the inverter will enter wobble frequency operation mode automatically when power is on.
- Manual mode: When the setting of P0.01 is not 10, the inverter first operates at other defined mode. Then if the multi-function terminal (Xi is set to 45) is valid, the inverter will enter wobble frequency operation mode.

Distinction: Compared with the auto mode, the manual mode omits the operating at preset frequency.

Wobble frequency operation process: First, the inverter speeds up to the preset of wobble frequency (P6.02) within the Acc time and then waits for a certain time (P6.03).

The inverter transits to the central frequency within Acc/Dec time, and at last the inverter operates according to the preset wobble frequency amplitude (P6.04), skip frequency (P6.05), skip time (P6.06), wobble frequency operating cycle (P6.07) and wobble ratio (P6.08) until it receives a stop command and stops within Dec time.

If the frequency setting selected the combination of frequency setting 1 and frequency setting 2, the central frequency will be the sum of P0.00 and frequency setting 2. If not, the central frequency would be the value of P0.00. The wobble frequency operation is shown in Fig.5-6-1.

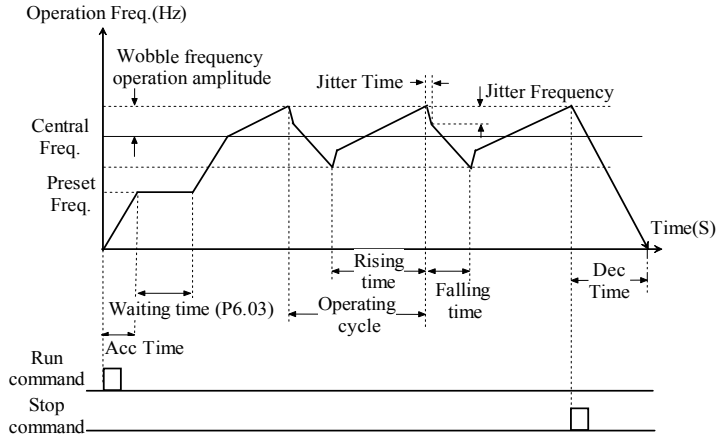


Fig. 5-6-1 Wobble frequency operation diagram

The starting process of wobble frequency is shown in Fig.5-6-2.:

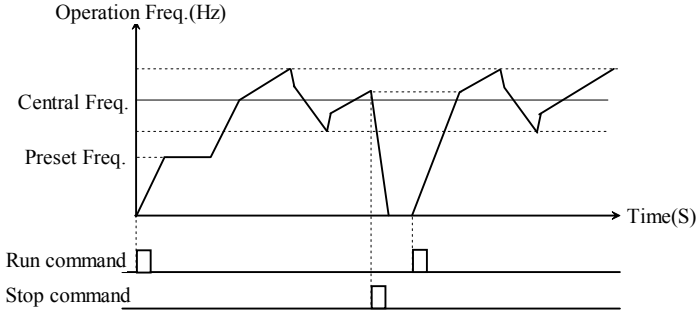


Fig. 5-6-2 Wobble frequency start: continue to operate at the frequency and direction before it stops

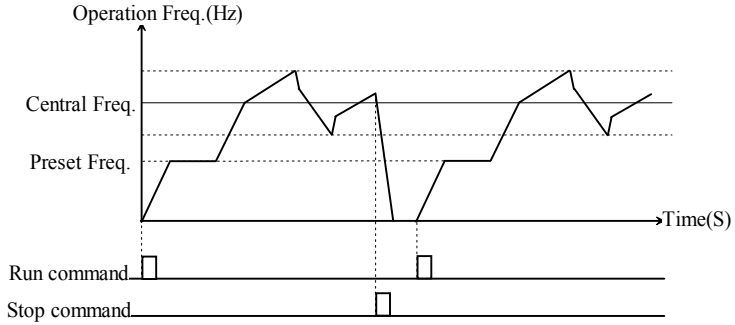


Fig. 5-6-3 Wobble frequency start: Restart

5.8 PID Control (Group P7)

P7.00 PID feed selection	Range: 0~4【1】
0: PID digital input	1: AI1 terminal
2: AI2 terminal	3: Pulse frequency
4: Serial communication	

Note:

- P7.00 is used to define the input method and channel of PID feed. It can be a digital input (0, 4). It can also be an analog input (1, 2, 3). The digital input is more accurate and stable. Analog input curve can be defined by parameter group P4.
- If P7.00 is set to 0, there are 2 kinds of sources for PID digital input: "Analog PID digital feed" (P7.02) and "speed PID feed" (P7.03). If "Feedback selection" (P7.01) is set to 9, "speed PID feed" (P7.03) will be treated as PID digital feed. Besides that, "analog PID digital feed" (P7.02) will be treated as PID digital feed.
- AI1/AI2 terminal: PID feed by analog input. Dial the voltage and current switches to select the terminal as a 0~10V or 0~20mA analog input. For details, please refer to the basic operating wiring connections in 2.6.
- Serial communication: PID feed will be set by the host PC through RS485 serial communication. If analog PID is used, the setting must be based on the percentage of the measuring range. If speed PID is used, the setting value must be based on the percentage of the largest speed.

P7.01 PID feedback selection	Range: 0~9【1】
0: AI1 terminal	1: AI2 terminal
2: Serial communication	3: Pulse feedback
4: |AI1-AI2|	5: Reserved
6: AI1+AI2	7: MIN (AI1, AI2)
8: MAX (AI1, AI2)	9: PG or single-phase speed measuring input

Note:

- P7.01 is used to define the input method of PID feedback. If P7.01 is set to 9, speed PID is selected as PID feedback. If the feed is analog input, the analog signal should be set according to full-scale of the maximum speed (The max of signal should be corresponding to the maximum frequency speed). The other setting of P7.01 means analog PID feedback selection.
- AI1/AI2, serial communication: The same description as PID feed selection (P7.00).
- PG or Single-phase speed measuring input: Uses pulse encoder (PG) as the speed PID control. At this time, terminal X7 or X8 must be set to speed measuring.
- |AI1-AI2|: Sub the PID feed analog input signal and the PID feedback input signal, the absolute value is treated as the final feedback value. This function can be used to control temperature difference, pressure difference and so on.

P7.02 Analog PID digital feed	Range: 0.0~P7.14【0.0】

Note:

- When analog feedback is used (P7.01=0~8), this function can realize digital setting of reference by keyboard. The setting must match the range of the actual physical value.

P7.03 Speed PID feed	Range: 0~24000rpm【0 rpm】

Note:

- If PG pulse feedback is used (P7.01=9), the speed reference can be set by keyboard. If the range of speed PID input over 10000, the keyboard will display as "1000.".

P7.04 PID direction alteration permission	Setting range: 0,1【0】

0: Not allowed 1: Allowed

Note:

- P7.04 is only suitable for analog PID(P7.01!=9)； Speed PID(P7.01=9) only outputs positive frequency(P7.01=9);
- When the setting is 0, switching is not allowed. If the PID output frequency is calculated by the given frequency and the feedback frequency, the final setting frequency is negative after the process of frequency setting selection P0.03, do not switch the running direction. Moreover, if the final frequency is 0, the inverter's output frequency is 0. When the frequency is not set by combination, the PID output frequency cannot be negative; when it is set by combination, the frequency is decided by the combination type and frequency 2.
- When the setting is 1, switching is allowed. If the PID output frequency is calculated by the given frequency and the feedback frequency, the final setting frequency is positive after the process of frequency setting selection P0.03, keep

the running direction set by operation control command: that is to run forward when the setting direction is forward rotation and run reversely when the setting direction is reverse; and if the final frequency is negative, the running direction will be in opposite to the direction set by operation control command: that is to run forward when the setting direction is reverse rotation and run reversely when the setting direction is forward rotation.

- When P7.04 is set to 1 in analog PID control, that is to enable PID direction switching function, and the operation direction switch command is invalid during running. The actual direction is determined by the setting direction at the start moment and the PID frequency.

P7.05 PID proportional gain (Kp)	Range: 0.1~9.9【1.0】
P7.06 PID integration time	Range: 0.00~100.0s【10.00s】
P7.07 PID differential time	Range: 0.00~1.00s【0.00s】

Note:

- The proportional gain (Kp) is the parameter that decides the sensitivity of P action in response to the deviation. The bigger the proportional gain Kp is, the more sensitive the system acts and the faster the inverter responses. However, oscillation may easily occur and regulation time extends. When Kp is too big, the system tends to instability. When Kp is too small, the system will slow, and responses lag.
- Use integration time to decide the effect of integral action. The longer the integration time, the slower the response, and the worse the ability of control external disturbance variation. The smaller the integration time is, the stronger the integral take effect. The smaller integration time can eliminate the steady state error and improve control precision, fast response. However, oscillation may easily occur, and the system stability decrease, if the integration time is too small.
- Differential time define the effect of differential action. The bigger differential time can attenuate the oscillation caused by P action more quickly when deviations occurs and short the regulation time. However, if differential time is too big, oscillation may occur. If the differential time is small, the attenuation effect will be small when deviations occur and the regulation time is longer. Only the right differential time can reduce regulation time.

P7.08 PID delay time constant	Range: 0.00~25.00s【0.00s】

Note:

- P7.08 set the output frequency delay time of PID.

P7.09 Residual margin	Range: 0.0~999.9【0.2】

Note:

- If the residual between feed and feedback value is smaller than residual margin, PID regulation will stop and the PID output maintain constant. As shown in Fig. 5-7-1.
- Setting this parameter correctly is helpful to balance the system output accuracy and stability. The residual margin reduces the regulation accuracy of the system, but improves the system stability, to avoid unnecessary fluctuations of output.
- If analog PID is selected, the setting of residual margin (P7.09) is the absolute value of physical value, and it must match the measuring range. If speed PID is selected, the setting of P7.09 is speed. As shown in Fig.5-7-1:

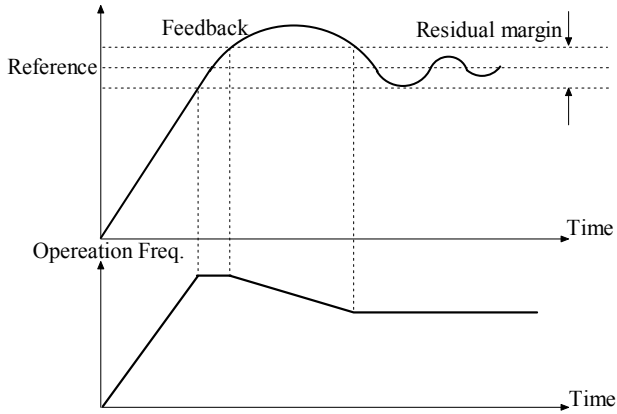


Fig. 5-7-1 Residual margin diagram

P7.10 PID adjust characteristics	Range: 0,1【0】

0: Positive 1: Negative

Note:

- Positive: When the PID output increases, the output frequency will increase and the controlled physical value will increase, such as waterworks.
- Negative: When the PID output increases, the output frequency will increase, but the controlled physical value will decrease, such as refrigeration system.

P7.11 Integration adjust selection	Range: 0,1【0】

0: Stop Integration Adjust when frequency arrive at limit;

1: Continue Integration Adjust when frequency arrive at limit

🕮 *Tips:*

For the system that needs fast response, “stop integration adjust when frequency arrives at limit” is recommended.

P7.12 PID preset frequency	Range: 3004GB/35R5PB and below: 0.00~650.0Hz【0.00Hz】 35R5GB/37R5PB and above: 0.00~400.0Hz【0.00Hz】
P7.13 Hold time of PID Preset frequency	Range: 0.0~3600s 【0.0s】

Note:

- This function can make the PID regulation enter stable state quickly.
- When the PID operation is start, the frequency will ramp up to the PID preset frequency (P7.12) within the Acc time, and then the inverter will start PID operation after operating at the PID preset frequency for a certain time (defined by P7.13).

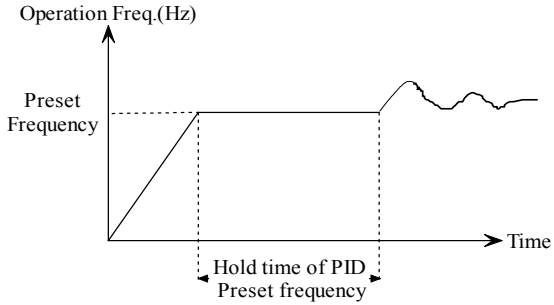


Fig. 5-7-2 PID preset frequency operation

🕮 *Tips:*

You can disable the function by setting the PID preset frequency (P7.12) to 0.

P7.14 Analog closed loop measuring range	Range: Max[P7.02,1.0]~999.9【100.0】

Note:

- This parameter is treated as a benchmark of analog PID feed and feedback. In addition, it must match the actual measuring range.

P7.15 Enable dormancy	Range: 0,1【0】
0: Disable	1: Enable

🕮 *Tips:*

There is no standby function when the speed PID feed is used.

P7.16 Dormancy delay time	Range: 0~999s【120s】
P7.17 Dormancy threshold	Range: 0~Frequency upper limit【20.00Hz】
P7.18 Awakening threshold	Range: 0.0~999.9【3.0】

Note:

- This function is used to stop the variable pump (auxiliary pumps are all down) when the flow is zero. In this case, if the frequency of variable pump were lower than the “dormancy threshold”, the dormancy delay would be start.
- If the frequency is still below the dormancy threshold (P7.17) after the dormancy delay time (P7.16), the variable pump will shutdown. As a result, the entire device is in dormancy state.
- To awake the device, the pressure feedback must be reduced to awakening threshold. Then the variable pump would startup. As shown in Fig.5-7-3.

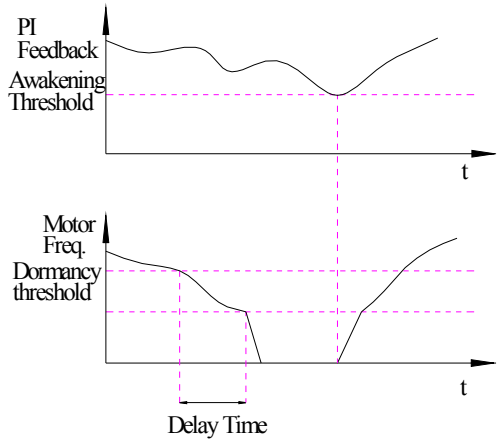


Fig. 5-7-3 Dormancy and Awakeing diagram

P7.19 PID amplitude modulation coefficient	Setting range: 0,1【0】

0:1*(P2.11) 1 :(Setting frequency 2 / P0.07)*(P2.11)

Notes:

This parameter is valid only when frequency setting method is combined frequency (P0.03>1) and frequency setting 1 is analog PID (P0.01=9, P7.01<9);

When P7.19 is set to 0, amplitude of analog PID is P2.11, When P7.19 is set to 1, the amplitude is related to setting frequency 2 , and that is((setting frequency 2/P0.07)* P2.11);

5.9 Fixed-length Function (Group P8)

P8.00 Preset length	Range: Max[0.000,P8.06]~65.53 m 【0.000m】
P8.01 Actual length	Range: 0.000~65.53 m 【0.000 m】

P8.02 Rate of length	Range: 0.001~30.00 【1.000】
P8.03 Correction Coefficient of length	Range: 0.001~1.000 【1.000】
P8.04 Shaft Diameter	Range: 0.01~100.0 cm 【10.00 cm】
P8.05 Deceleration point	Range: 50~100 % 【90 %】
P8.06 Deviation value	Range: Max[-200.0,P8.00]~200.0 mm 【0mm】

Note:

- This group of parameters is used for function of stop at fixed length.
- The inverter inputs counting pulse by terminals (35R5GB/37R5PB and above: X7 or X8 is defined as function 55, or X7 is defined as function 56 and X8 is defined as function 57; 3004GB/35R5PB and below: X4 or X5 is defined as function 55, or X4 is defined as function 56 and X5 is defined as function 58). In addition, calculates length according to PG Pulse Range (P4.16) and Shaft perimeter (P8.04).
- Calculated length＝Number of count pulses/PG Pulse Range (P4.16) * shaft perimeter (P8.04)
- The calculated length can be corrected through P8.02 (Rate of length) and P8.03 (correction coefficient of length), and the actual length is the corrected length. Actual length ＝calculated length *Rate of length/ correcting coefficient of length
- If the actual length (P8.01) is less than and nearly to the preset length (P8.00), the inverter will decelerate and run at low speed automatically. When actual length (P8.01) ≥ preset length (P8.00), the operating frequency will be zero, and the inverter will stop according to the stop mode. When the inverter restarts, it needs to clear the actual length or increase the preset length. The preset length (P8.00) must be larger than the actual length (P8.01), otherwise, the inverter will not start. As shown in Fig.5-8-1.

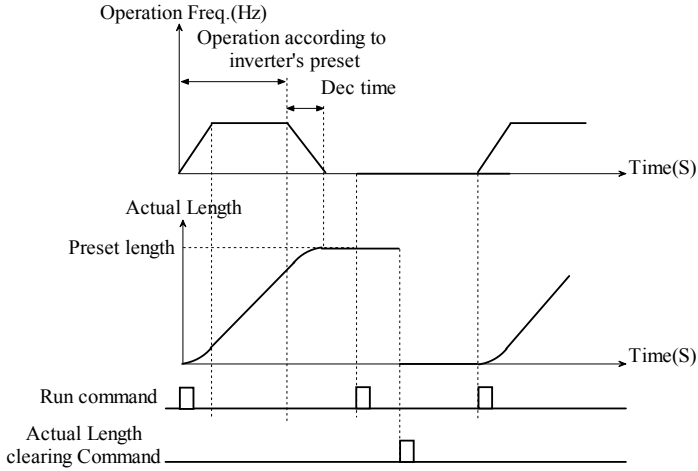


Fig. 5-8-1 Fixed length control diagram

We can adjust the initial deceleration time of the inverter through setting the deceleration point, reducing the deceleration point appropriately when the motor inertia is large, thus the motor will decelerate ahead of schedule.

At the same time by setting the slide (P0.09 lower frequency limitation) to adjust the frequency and deviation (P8.06). When the motor is overshoot, set P8.06 negative; and if it cannot reach the setting then set P8.06 positive. Now suppose that one motor is overshoot, after doing the corresponding parameter settings, the running process is as shown in Fig.5-8-2.

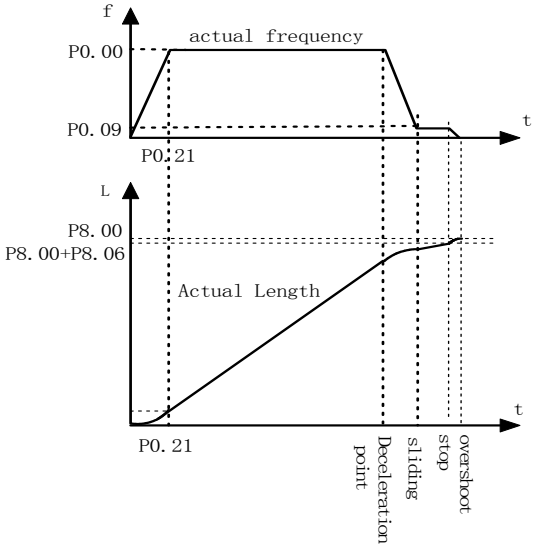


Fig. 5-8-2 Fixed length control diagram 2

🕮 *Tips:*

The actual length can be cleared by multi-function input terminal (Define terminal Xi as No.52 function). The actual length will calculate only when this terminal is disconnected.

Actual length (setting of P8.01) will be saved automatically when the power is off.

When actual length P8.01 is 0, if the operation frequency is higher than frequency lower limit but still no pulse input after running over 30 seconds, the inverter reports pulse coder fault (dE) and stop.

If P8.00 is set to 0, function of stop at fixed length is disabled, but the calculated length is still effective.

The setting value must increase 200.0mm when P8.06 is modified by MODBUS communication. The corresponding relation between communication value and actual value (displayed on the keyboard) is as follows:

Actual value (displayed on the keyboard)) = Communication value setting – 200.0mm

5.10 Advanced Control (Group P9)

P9.00 Gain of slip frequency compensation	Range: 0.0~250.0%【0.0%】
P9.01 Slip compensation time const	Range: 0.01~2.55s【0.20s】

Note:

- The motor's slip changes with the load torque, which results in the variance of motor speed. The inverter output frequency can be adjusted automatically through

slip compensation according to the load torque. Therefore, the electrical characteristics of the mechanical hardness are improved. As shown in Fig. 5-9-1.

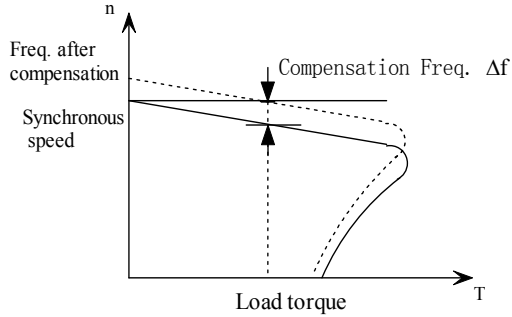


Fig. 5-9-1 Auto slip compensation diagram

- In rated torque state, the value of slip compensation is: Gain of Slip Frequency compensation (P9.00) * Rated slip (Synchronous speed- Rated speed)
- Electro motion state: Increase the gain of slip compensation (P9.00) gradually when the actual speed is lower than the reference speed.
- Generating state: Increase the gain of slip compensation (P9.00) gradually when the actual speed is higher than the reference speed.

🕮 *Tips:*

The value of automatically slip compensation is dependent on the motor's rated slip; therefore, the motor rated speed (PA.08) must be set correctly.
Slip compensation is disabled when P9.00 is set to "0".

P9.02 Energy saving control selection	Range: 0,1【0】

0: Disabled 1: Enabled

Note:

- The energy saving control parameters have been preset at the factory to the optimum values. It is not necessary to adjust them under normal operation. If your motor characteristic has great difference from those of standard induction motors, refer to the following description to adjust the parameters.

P9.03 Energy saving gain coefficient	Range: 0.00~655.3【This value depends on the inverter model】

Note:

- The energy saving gain coefficient used in the energy saving control mode is for calculation of the voltage at which motor efficiency will be the greatest, and set the voltage as the output voltage reference. The value of P9.03 is preset according to the standard induction motor before delivery. When the energy saving gain coefficient increases, the output voltage will increases.

P9.04 Energy saving voltage lower limit(50Hz)	Range: 0~120% 【50%】
P9.05 Energy saving voltage lower limit(5Hz)	Range: 0~25% 【12%】

Note:

- These parameters are used to set the lower limit of output voltage. If the voltage reference value calculated in the energy saving mode is smaller than the energy saving voltage lower limit, the energy saving voltage limit will be treated as the output voltage reference. To prevent the motor stalling at light loads, the energy saving voltage lower limit must be set. Set voltage limits at 5Hz and 50Hz; the setting value is obtained by linear interpolation if the frequency is out range of 5Hz to 50Hz. The setting value is made by the percentage of motor rated voltage.

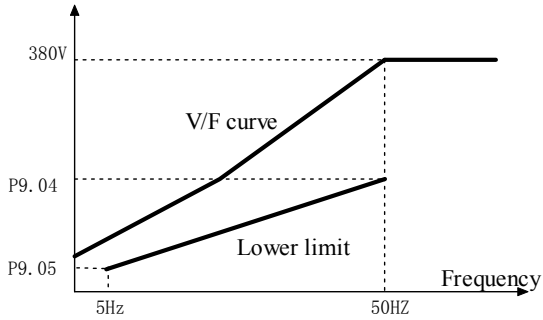


Fig. 5-9-2 Energy saving voltage lower limit

- In the energy saving control mode, the optimum voltage is calculated according to load power, and the voltage is supplied to the load. However, the set parameter may vary because of temperature variations or using various manufacturers' motors; therefore, the optimum voltage may not be supplied in some cases. Automatic fine-tuning control voltage maintains highly efficient operation.

P9.06 Time of average power	Range: 1~200*(25ms)【5】

Note:

- Preset the time of average power calculating in energy-saving control mode. The setting range of P9.06 is 25ms*(1~200).

P9.07 AVR function	Range: 0~2【2】

0: Disabled 1: Enabled always
2: Disabled in decelerating process

Note:

- AVR means automatic output voltage regulation. When AVR function is invalid, the output voltage will fluctuate when the power supply voltage fluctuates. When it is valid, the output voltage would not fluctuate as the input voltage. The output

voltage will keep constant within the inverter output capacity.

P9.08 Over modulation enable	Range: 0, 1【0】

0: Disabled

1: Enabled

Note:

- When the over modulation function is enabled, the inverter voltage output capacity can be improved. However, if the output voltage is too high, the output current harmonics will increase.

P9.09 Drop control (load distribution)	Range: 0.00~10.00Hz【0.00Hz】

Note:

- When several inverters drive one load at the same time, the function will make the inverters share the load equally.
- When the load current of one inverter is greater (>50%), this inverter will reduce its output frequency to shed part of the load according to the settings of this parameter. Once the load current is below 50% (<=50%), the inverter will stop reducing its output frequency. If the load current has been greater than 50%, the output frequency reduces until the difference between reference frequency and P9.09.

Tips:

Slip compensation and drop control cannot be used at the same time. Slip compensation has priority.

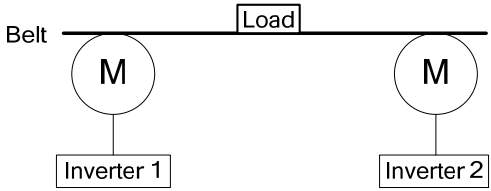


Fig. 5-9-3 Drop control

5.11 Motor Parameters (Group PA)

PA.00 Motor polarity number	Range: 2~56【4】
PA.01 Rated power	Range: 0.4~999.9kW【This value depends on the inverter model】
PA.02 Rated current	Range: 0.1~999.9A【This value depends on the inverter model】

Note:

- PA.00, PA.01 and PA.02 are used to set the motor parameters. In order to ensure the control performance, please set PA.00~PA.02 with reference to the values on the motor nameplate.

- The motor power should match that of the inverter. Generally, the motor power is allowed to be 20% lower than that of the inverter or 10% higher; otherwise, the control performance would not be ensured.

PA.03 No load current I0	Range: 0.1~999.9A【This value depends on the inverter model】
PA.04 Resistance of stator %R1	Range: 0.00%~50.00%【This value depends on the inverter model】
PA.05 Leakage inductance %X	Range: 0.00%~50.00%【This value depends on the inverter model】
PA.06 Resistance of rotor %R2	Range: 0.00%~50.00%【This value depends on the inverter model】
PA.07 Mutual inductance %Xm	Range: 0.0%~200.0%【This value depends on the inverter model】

Note:

- See Fig 5-10-1 for details.

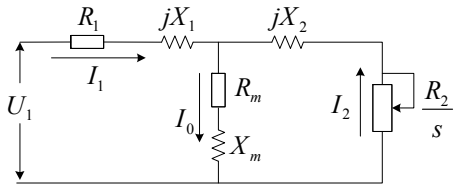


Fig. 5-10-1 Motor equivalent circuit

- In Fig. 5-10-1, R1, Xl, R2, X2, Xm, and I0 represent resistance of stator, leakage inductance of stator, resistance of rotor, leakage inductance of rotor, mutual inductance and current without load respectively. The setting of PA.05 is the sum of leakage inductance of stator and leakage inductance of rotor.
- The PA.04~PA.07 settings are all percentage values calculated by the following formulas:

V: Rated voltage;

I: Motor rated current

Formula used for calculating resistance (resistance of stator or rotor)

$$\%R = \frac{R}{V/\left(\sqrt{3}\cdot I\right)}\times 100\%$$

Formula used for calculating inductance (leakage inductance or mutual inductance):

$$\%X = \frac{X}{V/\left(\sqrt{3}\cdot I\right)}\times 100\%$$

If motor parameters are known, please set PA.04 ~PA.07 to the values calculated according to the above formulas.

After motor power (PA.01) change, the inverter will change PA.02~PA.08 according to the motor power.

PA.08 Rated Speed	Range: 0~24000 rpm【This value depends on the inverter model】

Note:

- Motor rated speed is used to calculate the value of slip compensation. About the slip compensation function, please refer to P9.00, P9.01 for details.

5.12 MODBUS Communication (Group Pb)

ALPHA6000/6100 can perform MODBUS communication with a programmable controller (PLC). The MODBUS network is composed of a master PLC and 1 to 31 (maximum) slave inverters. The master always sends message to slave and the slave responds to master.

The master can send a message to an addressed slave unit at a time. Therefore, address numbers are assigned to each slave unit in advance and the master unit specifies a number to perform signal transmission. The slave unit, which receives the command from the master unit, executes the function and returns the response to the master unit.

- Communication Specifications

  Interface: RS-485

  Synchronization: Half-duplex asynchronous.

- Transmission parameters:

  Baud rate: Selectable from 1200, 2400, 4800, 9600, 19200, 38400 BPS (parameter Pb.00)

  Data length: fixed at 8 bits

  Parity: even parity/no parity/odd parity selectable (parameter Pb.02)

  Stop bit: fixed at 1 bit

  Protocol: In accordance with MODBUS

  Maximum number of units to be connected: 31 units (when RS-485 is used.)

- Data to be sent or received by Communication

  Data to be sent or received by communication include run commands, frequency reference, fault contents, inverter status and parameter writing/reading. No need to

set parameter, you can read monitor content and write function parameter.

Select “serial communication” in parameter P0.01 (Frequency setting 1, P0.01=5) or P0.02 (Frequency setting 2, P0.02=5), and then the frequency setting command can be provided by PLC. Writing the value of frequency setting in special register (002H) can set frequency setting, which is not saved after power off. Or set P0.01(or P0.02) to 1 modify the value of P0.00 by communication to come true frequency setting.

Set the operating control method in parameter P0.04 to “Serial communication 1(STOP invalid)” (P0.04=3) or “Serial communication 2(STOP valid)” (P0.04=4). Then the operating command can be provided by PLC;

If the setting value of P7.00 is 4 (Serial communication), the PID feed can set by PLC; If the setting value of P7.01 is 2 (Serial communication), the PID feedback can set by PLC.

If serial communication is selected as the frequency setting or run command, then the commands of reading the running status of inverter, writing run command or reading/writing parameters are all valid. If frequency setting is set to “serial communication”, frequency command can be preset by communication; if run command mode is set to “serial communication”, the running command send by communication will be effective. If you want both frequency command and running command valid, you must select “serial communication” in frequency setting (1 or 2 in parameter P0.01 or P0.02) and run command mode (3 or 4 in parameter P0.04).

Pb.00 MODBUS Baud rate selection	Range: 0~5【3】
0:1200bps	1:2400 bps
2:4800 bps	3:9600 bps
4:19200 bps	5:38400 bps

Pb.01 MODBUS slave address	Range: 0~31【1】

Note:

- The slave address number is set. It is necessary to set the address number so that it will not overlap with the address numbers of other slaves in the network. To make many inverters and control PLC operate in the network, every inverter has its own address number. At most 31 inverters whose address numbers are from 1 to 31can tie to control PLC at the same time. 0 is broadcast address. The slave does not receive communication command when Pb.01 is set to 0.

Pb.02 MODBUS parity selection	Range: 0~2【0】

0: Even parity 1: Odd parity

2: No parity

Pb.03 MODBUS time over detection	Range: 0~100.0s 【0.0s】

Note:

- If Pb.03 is set to zero, this function is disabled.
- If Pb.03 is not set to zero, overtime detection is enabled. And the detecting time is the setting value of Pb.03. If in detecting time, abnormal data is be sent or received, the inverter will stop immediately and display EF0. It need to manual reset.

Tips:

If in detect time the slave just receive abnormal data, it will stop and display EF0.

Pb.04 Response delay time	Range: 0~500ms【5ms】

Note:

- It refers to the time from inverter receiving the host PC command to returning response frame to it.

Pb.05 MODBUS frequency reference unit	Range: 0,1【0】

0:0.01Hz 1:0.1Hz

Note:

- It can be used to select the frequency unit of communication command.
- The output frequency resolution of this series inverter is 0.01Hz. If the frequency reference unit is set to 0.01Hz in parameter Pb.05 (Pb.05=0), the unit of the received frequency reference will be treated as 0.01Hz. If Pb.05 is set to 1 (0.1Hz), the unit of the received frequency reference will be treated as 0.1Hz and the value will be automatic transferred to 0.01Hz internally. For example, if the frequency command is 01F4H (the hexadecimal value of 500), it will be treated as 5.00Hz when Pb.05 is set to 0. Or it will be automatic transferred to 50.0(0) Hz and treated as 50.00 Hz when Pb.05 is set to 1.

Pb.06 Selection of MODBUS data storage	Range:0,1【0】

0: Not save to EEPROM 1: Directly save to EEPROM

Note:

- This function code is used to select whether to save the MODBUS data to EEPROM or not. If pb.06 is set as 1, parameters that modified by MODBUS communication will be saved to EEPROM directly. However, if Pb.06 is set as 0, the modified parameters will not be saved to EEPROM, but stored in RAM and they will be lost when power is off. The other method to save the data to EEPROM is that write the MODBUS address corresponding to the modified parameter to 0x00FF, then the data will be saved to EEPROM which acts as the "ENTER "key to save the data.

  ⚠Write or erase EEPROM frequently will reduce the life of EEPROM. Write parameter data and save the data to EEPROM frequently in communication mode is not allowed; for writing data frequently, you must modify Pb.06 as 0.

Pb.07 CCF6 Fault Handling	Range:0,1【0】

0: Not generate fault and keep running 1: Generate fault and stop

Note:

- This function code is used to decide whether to generate communication fault or not. When the value is 1, if communication fault occurs, the keyboard will display CCF6 and the inverter stop as fault occurs; when the value is 0, it doesn't generate the fault and the inverter will keep on running.

5.13 Display Control (Group PC)

PC.00 LCD Language selection	Range: 0,1【0】

0: Chinese, display Chinese prompt in LCD screen;

1: English, display English prompt in LCD screen.

Note:

- PC.00 is effective for the panel with LCD screen, and the LED panel only displays segment code of characters and digits.
- Only 35R5GB/37R5PB and above inverter models can be equipped with the LCD keyboard.

PC.01 Output frequency (Hz) (Before compensation)	Range: 0,1【1】
PC.02 Output frequency (Hz) (Actual)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.01 is set to 1, output frequency (before compensation) will be displayed with unit "Hz" in monitoring state, and the unit indicator "Hz" will be lit up. If it is set to 0, the object will not be displayed.
- If PC.02 is set to 1, output frequency (actual) will be displayed with unit "Hz" in monitoring state, and the unit indicator "Hz" will be lit up. If it is set to 0, it will not be displayed.

PC.03 Output current (A)	Range: 0,1【1】

0: No display 1: Display

Note:

- If PC.03 is set to 1, output current will be displayed with unit "A" in monitoring state, and the unit indicator "A" will lit up. If it is set to 0, output current will not be displayed.

PC.04 Reference frequency (Hz, flashes)	Range: 0,1【1】

0: No display 1: Display

Note:

- PC.04 can be set to 1 and press shift key [>>] can switch to reference frequency monitoring in monitoring state. When switch to reference frequency monitoring,

the “Hz” unit indicator will flicker. If P0.01 is set to 1, which means the reference frequency can be changed by keyboard digital encoder, turning left/right the digital encoder will change the reference frequency. If keep on turning , the length of every step can rise from 0.01 Hz to 0.1 Hz and the max 1 Hz. With this function, the regulation can be quick. For details, please refer to P0.11 (step length of digital encoder regulation).

PC.05 Rotate speed (r/min)	Range: 0,1【0】
PC.06 Reference speed (r/min flashes)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.05 is set to 1, rotate speed will be displayed in monitoring state, and the unit indicator “r/min” (combination of unit “Hz” and” A”) will be lit up. If it is set to 0, rotate speed will not be displayed.
- If PC.06 is set to 1, reference speed will be displayed in monitoring state, and the unit indicator “r/min” (combination of unit “Hz” and “A”) will be lit up and flickered.
- If PC.06 is set to 1, when the user press shift key [>>] to switch to monitor this parameter or Rotate speed:
- In simple run mode: if P0.01 is set to 1, Reference speed can be adjusted online and saved the reference frequency value into parameter P0.00 by pressing “ENTER” key.
- In PID run mode: If P7.00 is set to 0 and P7.01 is set to 9 (PG or Single-phase speed measuring input), PID reference (reference speed) can be adjusted online and saved into parameter P7.03 by pressing “ENTER” key. If P7.01 is not set to 9, it cannot be adjusted online.

PC.07 Linear speed (m/s)	Range: 0,1【0】
PC.08 Reference linear speed (m/s flashes)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.07 is set to 1, line speed will be displayed in monitoring state, and the unit indicator “m/s” (combination of unit” A” and’ V”) will be lit up. If it is set to 0, line speed will not be displayed.
- If PC.08 is set to 1, reference line speed will be displayed in monitoring state, and the unit indicator “m/s” (combination of unit “A” and “V”) will be lit up. The reference line speed cannot be adjusted online.

PC.09 Output power (kW)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.09 is set to 1, output power will be displayed with unit “kW” in monitoring state, and all unit indicators will be off. If it is set to 0, output power will not be displayed.

PC.10 Output torque (%)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.10 is set to 1, output torque will be displayed with unit “%” in monitoring state. If PC.10 is set to 0, output torque will not be displayed.

PC.11 Output voltage (V)	Range: 0,1【0】
PC.12 Bus voltage (V)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.11 is set to 1, output voltage will be displayed in monitoring state, and the unit indicator “V” will be lit up. If it is set to 0, output voltage will not be displayed.
- If PC.12 is set to 1, bus voltage will be displayed in monitoring state, and the unit indicator “V” will be lit up. If it is set to 0, bus voltage will not be displayed.

PC.13 AI1(V)	Range: 0,1【0】
PC.14 AI2(V)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.13 is set to 1, analog input voltage AI1 will be displayed in monitoring state, and the unit indicator “V” will be lit up . If it is set to 0, analog input voltage AI1 will not be displayed.
- If PC.14 is set to 1, analog input voltage AI2 will be displayed in monitoring state, and the unit indicator “V” will be lit up. If it is set to 0, analog input voltage AI2 will not be displayed.

PC.15 Analog PID feedback (no unit)	Range: 0,1【0】
PC.16 Analog PID feed (no unit)	Range: 0,1【0】

0: No display 1: Display

Note:

- Analog PID feedback/ feed is the Product of “percentage of physical value corresponding to analog value” and “Analog closed loop measuring range”.
- If PC.15 is set to 1, analog PID feedback will be displayed in monitoring state, and all unit indicators will be lit up. If it is set to 0, analog PID feedback will not be displayed.
- If PC.16 is set to 1, analog PID feed will be displayed in monitoring state, and all unit indicators will lit up and flickered. If P7.00 is set to 0 and P7.01 is not set to 9,

when the user press shift key [>>] to monitor this object or Analog PID feedback, analog PID feed can be adjusted online and be saved into P7.02 after press "ENTER" key.

PC.17 External counting value (no unit)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.17 is set to 1, external count value will be displayed in monitoring state, and all unit indicators will be off. If it is set to 0, external count value will not be displayed.

PC.18 Terminal status (no unit)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.18 is set to 1, the terminal status will be displayed in monitoring state; If PC.18 is set to 0, the terminal status will not be displayed.
- Model of 3004GB/35R5PB and the below models: The terminal information includes status of terminal X1~X5, D0 and relay output terminal TA. The status of terminals is indicated by "on" or "off" of the segment. The segment will turn on if the terminal is valid. The segment will turn off if the terminal is invalid. The central four segments are always on for the convenience of observation. As shown in Fig.5-12-1:
- Model of 35R5GB/37R5PB and above models: The terminal information includes status of terminal X1~X8, bi-direction open-collector output terminals D0, Y1 and Y2, and relay output terminal TA and BRA. The status of terminals is indicated by "on" or "off" of the segment. The segment will turn on if the terminal is valid. The segment will turn off if the terminal is invalid. The central four segments are always on for the convenience of observation. As shown in Fig.5-12-2:

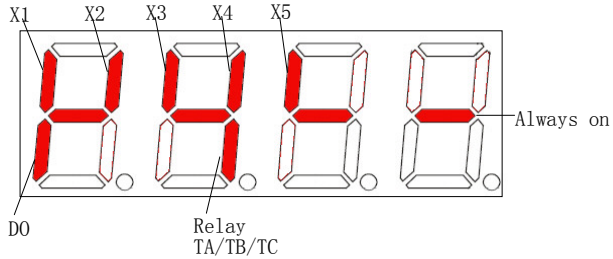


Fig. 5-12-1 Terminal status diagram of S2R4GB~3004GB/35R5PB

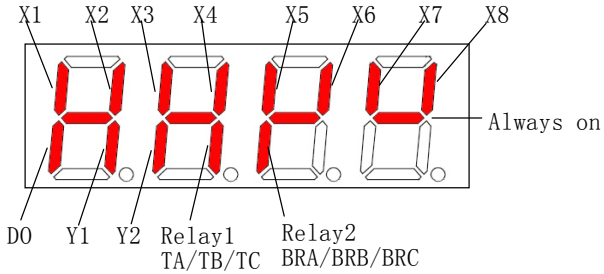


Fig. 5-12-2Terminal status diagram of 35R5GB/37R5PB~3500G

PC.19 Actual length (m)	Range: 0,1【0】

0: No display 1: Display

Note:

- If PC.19 is set to 1, the actual length will be displayed in monitoring state, and all unit indicators will be off. If it is set to 0, actual length will not be displayed.

PC.20 Power on display	Range: 1~19【1】

- PC.20 is used to set the first display parameter at power on. The setting value is from 1 to 19, corresponding to PC.01~PC.19 respectively. If the display property of the first display parameter is 0 (PC. XX=0, XX is the value of PC.20), the keyboard will search from the current settings of PC.20 (PC. XX) to the last (PC.19) and then back to go on search from 1 (PC.01) to the value of PC.20, until the setting value is 1. In addition, keep this display object as the first monitoring object.
- Power on display selection will take a priority display of PC.01 ~ PC.19 absolutely; and only takes affect at the boot time. When there is an error, an alarm or a communication CALL to be displayed, the error will display at first, then the alarm or the CALL, and the power on display selection will not work.

PC.21 Rotating speed display coefficient	Range: 0.1~999.9%【100.0%】

Note:

- PC.21 (Rotating Speed display coefficient) is used to correct the bias of displayed rotating speed and it has no influence on actual speed.
- Rotate speed = actual rotate speed × PC.21 (PG)
- Rotate speed=120 × Operating Frequency ÷ PA.00 × PC.21 (non-PG)
- Reference speed= PID reference speed × PC.21 (PG)
- Reference speed=120*reference frequency÷PA.00×PC.21 (non-PG)

PC.22 Linear speed display coefficient	Range: 0.1~999.9%【100.0%】

Note:

- PC.22 (Linear speed coefficient) is used to correct the bias of displayed line speed and it has no influence on actual speed.
- Linear speed = Running frequency × PC.22 (non PG)
- Linear speed = rotate speed × PC.22 (PG)
- Reference linear speed= reference frequency* PC.22 (non PG)

◆ Reference linear speed= reference speed × PC.22 (PG)

🕮 *Tips:*

The range of Display:

Linear speed and Reference:	0.000~65.53m/s
Output power	0~999.9 kW
Output torque	0~300.0%
Output voltage	0~999.9V
Bus voltage	0~1000V
AI1/AI2	0.00~10.00V
External counting value	0~65530
Actual length/Preset length	0.001~65.53m

5.14 Protection and Fault Parameters (Group Pd)

Pd.00 Motor overload protection mode selection	Range: 0~2【1】

0: Disabled

1: Common motor (with low speed compensation)

2: Variable frequency motor (without low speed compensation)

Note:

◆ Disabled

◆ The overload protection is disabled. Be careful to use this function because the inverter will not protect the motor when overload occurs;

◆ Common mode (with low speed compensation)

◆ Since the cooling effects of common motor deteriorates at low speed (below 30 Hz), the motor's overheat protecting threshold should be lowered, which is called low speed compensation.

◆ Variable frequency motor (without low speed compensation)

◆ The cooling effects of variable frequency motor are not affected by the motor's speed, so low speed compensation is not necessary.

Pd.01 Electro-thermal protective value	Range: 20~110%【100%】

Note:

◆ In order to apply effective overload protection to different kinds of motors, the Max output current of the inverter should be adjusted as shown in Fig.5-13-1.

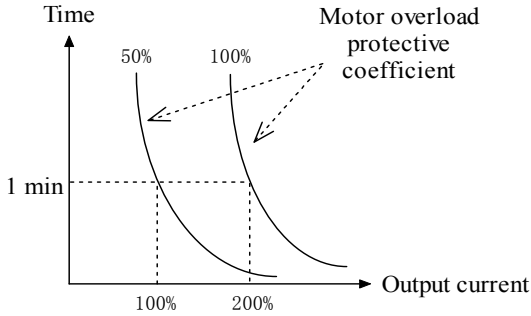


Fig. 5-13-1 Motor overload protection curve

◆ Motor overload protection coefficient calculates:

Motor overload protection coefficient=the max allowed current of load/rated output current of inverter*100%

Generally, the Max load current is the motor rated current. If the motor heat resistance is better, the value can be increased properly on the basis (for example, 10%). On the contrary, if the motor has worse heat-resistance, the value should be decreased some.

🕮 *Tips:*

If the motor rated current does not match that of the inverter, motor overload protection can be realized by setting Pd.01. If overload protection happens, the inverter will stop PWM output and display OL1.

Pd.02 Pre-overload detection level	Range: 20.0~200.0%【160.0%】
Pd.03 Pre-overload detection time	Range: 0.0~60.0s【60.0s】

Note:

◆ Pd.02 defines the current threshold for overload pre-alarm protection. The setting range is a percentage value of rated current.

◆ Pd.03 defines the time during which the inverter current exceeds Pd.02. If the pre-overload status remains after this period, the inverter will output pre-alarm signal (OLP2).

◆ Overload pre-alarm take effect means that the inverter current has exceeded Pd.02 and the Pre-overload time exceeded Pd.03.

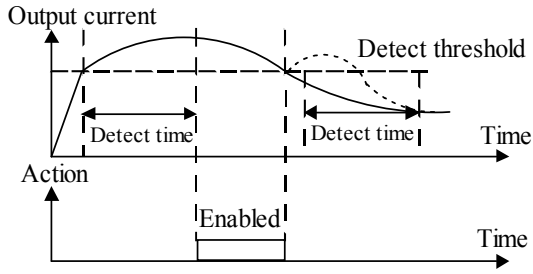


Fig. 5-13-2 Overload pre-alarm function

🕮 *Tips:*

1. Pre-overload detection threshold should be lower than the overload protection threshold.
2. During the overload detection time, if the current of inverter is less than Pd.02, the inverter will clear the record of pre-overload detection time.

Pd.04 Current amplitude limit	Range: 0~3【3】
Pd.05 Current amplitude limiting level	Range: Type G: 20~180%【150%】 Type P: 20~140%【120%】

0: Invalid

1: Valid during Acceleration and deceleration, invalid in constant speed Operation

2: Valid

3: Over-current during acceleration or constant speed, reduce frequency

Note:

- When the inverter is running at Acc/Dec or constant speed, there may be a sharp increase in the current, because of the unmatched acc time and motor inertia, or the mutation of load torque. In order to control the output current, when Pd.04 is set to 1 or 2 or 3, the inverter's output frequency may be adjusted automatically.
- In Acc or Dec process, if the output current reaches "Current amplitude limiting level" (Pd.05), the inverter's output frequency will stop changing until the current returned to normal, and then continue accelerating/decelerating. Finally, the current will be controlled not more than Pd.05.
- In constant speed operating process, if Pd.04 is set to 2 or 3, when the output current reaches "Current amplitude limiting level" (Pd.05), the inverter will reduce output frequency. When the current lower, the inverter will return to the original work state. If Pd.04 is set to 1, the output frequency will not be changed.
- When the inverter is in the status of current amplitude limit, the time last more than 1 minute or press "STOP/RESET" key directly and hold over 2s, the inverter will coast to stop.

- Over-current during acceleration or constant speed , reduce frequency: When this function is valid, if the current goes too high in acceleration and constant speed occasion, the inverter's output frequency will be reduced to avoid overload and over-current. Refer to Pd.16 for details.

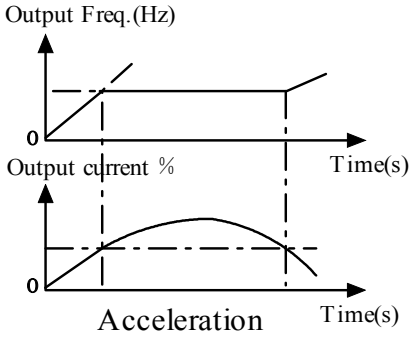


Fig. 5-13-3 Acceleration

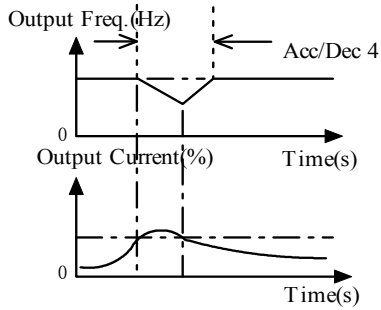


Fig. 5-13-4 constant speed Operation

Pd.06 Over-voltage at stall function selection	Range: 0,1【1】
Pd.07 Over-voltage point at stall	Range: 3004GB/35R5PB and below：110.0~150.0% DC bus voltage 35R5GB/37R5PB and above：120.0~150.0% DC bus voltage 【380V:140.0%；220V:120.0%】

0: Disabled (The proposed option, when braking resistor is mounted)

1: Enabled

Note:

- During deceleration, the motor's decelerate rate may be lower than that of inverter because of the load inertia. At this time, the motor will feed the energy back to the inverter, resulting in the voltage rise on the inverter's DC bus. If no measures taken, the inverter over voltage fault will happen.
- If Pd.06 is set to 1 and enabled, during the deceleration, the inverter detects the middle direct voltage and compares it with the over voltage point at stall defined by Pd.07. If the middle direct voltage exceeds the stall over-voltage point, the inverter will stop reducing its output frequency. When the middle direct voltage becomes lower than the point, the deceleration continues.
- When the inverter is in the status of over-voltage at stall, the time last more than 1 minute or press "STOP/RESET" key directly and hold over 2 seconds, then the inverter will coast to stop.

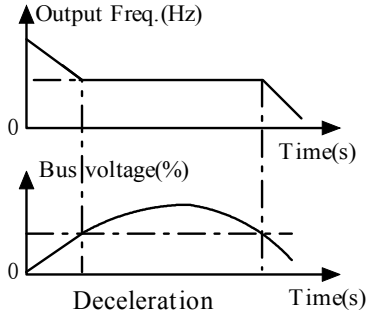


Fig. 5-13-5 Deceleration

Pd.08 Input phase loss detection level	Range:1~100%【100%】
Pd.09 Input phase loss detection delay time	Range: 2~255s【10s】

Note:

- Input phase loss detection function can detect loss of input phase or a serious imbalance in the three-phase input, in order to protect inverter. If the input phase loss detection is hypersensitive, you can appropriately increase the detection level (Pd.08) and detection delay time (Pd.09). Conversely, decrease the detection level (Pd.08) and detection delay time (Pd.09).

Pd.10 Output phase loss detection level (SP0)	Range: 0~100%【2%】
Pd.11 Output phase loss detection delay time	Range: 0.0~25.0s【2.0s】

Note:

- Output phase loss detect function can detect loss of output phase or a serious imbalance in the three-phase output, in order to protect inverter and motor. If the detection of output phase loss is hypersensitive, you can appropriately decrease the detection level (Pd.10) and increase the detection delay time (Pd.11). Conversely, increase the detection level (Pd.10) and decrease detection delay time (Pd.11).

Pd.12 Enabling keyboard keys UP/DN	Range: 0,1【0】
0: Invalid	1: Enabled

Note:

- In the digital encoder damage cases, set Pd.12 to 1, so “JOP” key can be used as UP and direction key can be used as DN, or press “＞＞+JOP” key and hold 5 minutes, then the function will be enabled.

Pd.13 AE1, AE2 Alarm choice	Range: 0,1【0】
0: Not show alarm	1: Display alarm

Note:

- The function is used to decide whether need to display alarm when analog signal is abnormal. When the setting is 1, warning AE1 and AE2 will display respectively if analog signal 1 or 2 is abnormal; when the setting is 0, warning will not display.

Pd.14 Auto reset times	Range: 0~10【0】
Pd.15 Reset Interval	Range: 2.0~20.0s every time【5.0s】

Note:

- It means there is no auto-reset function when auto reset times is zero. Only three faults: OC, OU and GF can be auto reset.
- Auto reset function can reset these three faults in preset times (Pd.14) and interval (Pd.15). During the reset interval, the inverter stops output and runs at zero-speed. It will restart according to start mode after reset. When Pd.14 is set to 0, it means "auto reset" is disabled and the protective function will be activated in case of fault.

🕮 *Tips:*

Be careful in using auto-reset function, otherwise human injury or material loss may occur.

SC fault need 10 seconds waiting time for manual reset.

Pd.16 acceleration over-current counting	Setting range: 0~250【100】

Notes:

In the acceleration process, when the output current reaches the current limiting action level Pd.05, the inverter's frequency stops changing, and if continuous current limiting time reaches the set delay Pd.16, the inverter begins to decelerate. After the current recovers to the normal value, the inverter continues to accelerate and control current is not higher than Pd.05.

If OL、OC appears in current limitation during acceleration, the value of Pd.16 should be reduced appropriately; If the frequency or current oscillate frequently or sharply, the value of Pd.16 should be increased appropriately; the adjustment of Pd.16 should not be too large.

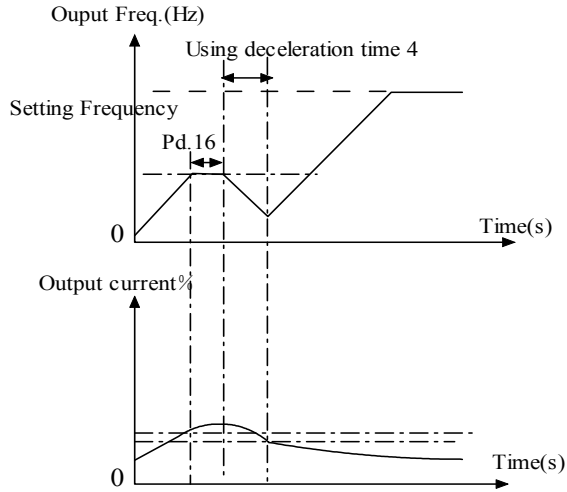


Fig. 5-13-6 Acceleration speed over current

Pd.17 Automatic running selection after power on	Setting range: 0,1【1】

0: No action after power on 1: Run automatically after power on

Notes:

- No action after power on: Not allow to run automatically when power on.
- Run automatically after power on: Originally general functions are reserved.

Pd.18 Running selection after power off	Setting range:0,1【0】

0:Machine shut down after power off (through the shutdown way) 1:Machine does not shut down after power off (short time)

Notes:

- Machine shut down after power off: shut down according to the set way
- Machine doesn't shut down after power off: After power off, output can be held in short time and can continue to run after power recovers. This function only suits light load equipment, such as wind machines and water pumps etc. It needs to combine other parameter and the detailed setting is given below:

	Power<=22KW	Power>22KW
P0.21 Acceleration time 1	20s	60s
P2.28 Acceleration time 3	20s	60s
P2.29 Deceleration time 3	6s	20s
P1.15 Instantaneous stop processing	2:Once instantaneous stop, display Uu	2: Once instantaneous stop, displays Uu

System power off illustration

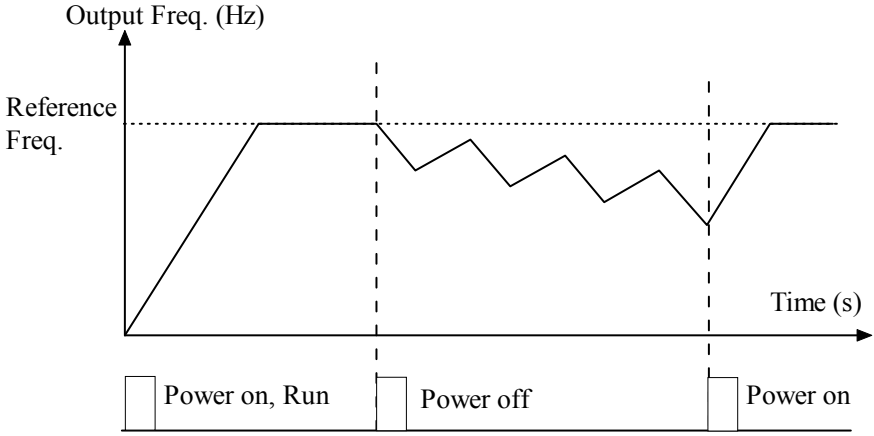


Fig. 5-13-7 Machine does not shut down after power failure

5.15 Running History Record (Group PE)

PE.00 Type of latest fault	Range: Table 5-14-1【NULL】
PE.01 Output frequency at last fault	Range: 0~Frequency upper limit【0.00Hz】
PE.02 Reference frequency at last fault	Range: 0~Frequency upper limit【0.00Hz】
PE.03 Output current at last fault	Range: 0~2 times of rated current【0.0A】
PE.04 DC bus voltage at last fault	Range: 0~1000V【0V】

Note:

◆ If faults occur during operating, the inverter stops PWM output immediately, and accesses to the fault protective state. Moreover, the fault indicator "TRIP" is lit up and flickered. The operating condition (such as output frequency, reference frequency, output current, and DC bus voltage etc.) of latest fault and types of the last 3 faults, could see in PE.01~PE.08. Descriptions of faults are shown in Table 5-14-1:

Table 5-14-1 Fault categories

Fault code	Fault categories	Fault code	Fault categories
NULL	No fault	Uu1	Bus Under voltage
Uu2	Control circuit Under voltage	Uu3	Charging circuit is in poor condition
OC1	Over current in Acc process	OC2	Over current in Dec process

Fault code	Fault categories	Fault code	Fault categories
OC3	Over current in constant speed Operation	Ou1	Over Voltage in Acc process
Ou2	Over Voltage in Dec process	Ou3	Over voltage in constant speed operation
GF	Ground Fault	OH1	Heat-sink Overheat
OL1	Motor Overload	OL2	Inverter Overload
SC	Load Short-Circuit	EFO	External Fault of serial communication
EF1	External Fault of terminal	SP1	Input phase failure or Unbalance
SPO	Output phase failure or Unbalance	CCF1	Control Circuit Fault 1: Transmission between the inverter and keyboard cannot be established 5 seconds after supplying power.
CCF2	Control circuit fault 2: Transmission between the inverter and keyboard is established once after supplying power, but later transmission fault continues for more than 2 seconds.	CCF3	EEPROM Fault
CCF4	AD Conversion Fault	CCF5	RAM Fault
CCF6	CPU disturbance	PCE	Parameters copy Error
HE	Hall current detection fault	dE	Pulse coder fault

PE.05 Running status at last fault	Range: 0~3【StP】

0: StP Stop
1: Acc Accelerate
2: dEc Decelerate
3: con constant

PE.06 Fault History 1 (Last One)	Range: Table 5-14-1【NULL】
PE.07 Fault History 2	Range: Table 5-14-1【NULL】
PE.08 Fault History 3	Range: Table 5-14-1【NULL】

Note:

◆ Memorize the types of the last 3 faults. See Table 5-14-1 for the details of faults.

PE.09 Total Operating time	Range: 0~65530h【0】
PE.10 Total Power On time	Range: 0~65530h【0】

PE.11 Total electric-consumption (MWh)	Range: 0~9999MWh【0】
PE.12 Total electric-consumption (KWh)	Range: 0~999KWh【0】

Note:

- "Total Operating time" (PE.09) records the actual operating time from first use of the inverter to present.
- "Total Power On time" records the actual time that the inverter is power-on from first power on to present.
- "Total electric-consumption (MWh)" records the high 16 bits of inverter's total electric--consumption.
- "Total electric-consumption (KWh)" records the low 16 bits of inverter's total electric--consumption.

5.16 Protection of Parameters (Group PF)

PF.00 User password	Range: 0~9999【0】

Note:

- User password setting: The initial value of user password is 0, which means the password protection function is invalid. At this state, user can access all parameters and parameters content of Group PF.
- Unlock the user password: If the user password is effective, the preset password is required to access Group PF. Otherwise, no parameters of Group PF can be accessed.
- Changing the user password: If password protection function is effective, right password must be input first to unlock. After unlocking, select PF.00, re-change this parameter value, and press "ENTER" to save the value. Now, the password changing is completed. Before changing the user password, remember to set PF.01 to 0, so that all parameters are allowed to be changed.

🕮 *Tips:*

The password will become effective when you press "PRG/ESC" to exit from Group PF if you set user password.

Please remember the password, otherwise, you will have no access to all parameters of Group PF.

If you forget user password, please contact with manufacturer,

Example: Set the password to 1234, then exit from Group PF and unlock the user password. The process is shown in Fig. 5-15-1 and Fig. 5-15-2.

PF.01 Parameter write-in protection	Range: 0~2【0】

0: All parameters can be changed;

1: Only setting frequency (P0.00) and PF.01 can be changed;

2: Only PF.01 can be changed.

Note:

- PF.01 is set to 0: All parameters are allowed to be changed But only the parameters, which are marked "○" in function table, can be changed no matter what the inverter

is running or not. The parameters, which are marked "×" can be only changed when the inverter is in stop state. Other parameters cannot be changed. About the changeable of parameters, refer to Chapter 4 for details. In addition, you can examine the parameters display on keyboard. If any digit of the parameter is flashing, the parameter is allowed to change. If none digit of the parameter is flashing, it cannot be changed.

- PF.01 is set to 1: only P0.00 and PF.01 can be changed;
- PF.01 is set to 2: only PF.01 can be changed.

🕮 *Tips:*

If PF.01 is set to 0 (all parameters can be changed), reference frequency, speed PID input, and analog PID digital input can be adjusted and saved online in parameters monitoring state.
If PF.01 is set to 1, only reference frequency can be adjusted online.
If PF.01 is set to 2, All online adjusting are disabled.

PF.02 Parameter initialization	Range: 0~2【0】

0: No operation
1: Clear fault history
2: Restore to defaults (except records and password).

Note:

- PF.02 is set to 0: No operation.
- PF.02 is set to 1: When PF.02 is set to 1, the fault records of PE.00~PE.08 will be cleared in favor of faults debugging and analyzing.
- PF.02 is set to 2: If PF.02 is set to 2, the parameters (except running history and user password) are restored to defaults.

🕮 *Tips:*

If user forgets the setting value of parameters, and does not want to set them one by one, setting PF.02 to 2 can be used to rapidly restored to defaults, in favor of parameters resetting.
PF.02 will be restored to 0 automatically after clearing the fault records or restoring to defaults. This means operation has already been finished.

PF.03 Parameter copy	Range: 0~3【0】
0: No action	1: Parameters download
2: Parameters upload	3: Download parameters except motor's

Note:

- PF.03 is set to 0: No action;
- When PF.03 is set to 1 (Parameters download), the copied parameters stored in the keyboard will be download to the inverter.
- If PF.03 is set to 2 (Parameters Upload), all parameters set by user in inverter will be copied to EEPROM on keyboard.

◆ If PF.03 is set to 3, the rated parameters stored in the keyboard except motor's will be cope to inverter.

🕮 *Tips:*

When inverter is working in the same application, using this function can quickly copy the set parameters, and shorten the time spent on debugging and maintenance.
PF.03 is only valid for LCD keyboard.
Parameter copy is only effective to LCD keyboard. PF0.3 will be set automatically to 0 .
At present, only 35R5GB/37R5PB inverter and above models can match LCD keyboard, but parameter copy of LCD keyboard is not open at now.

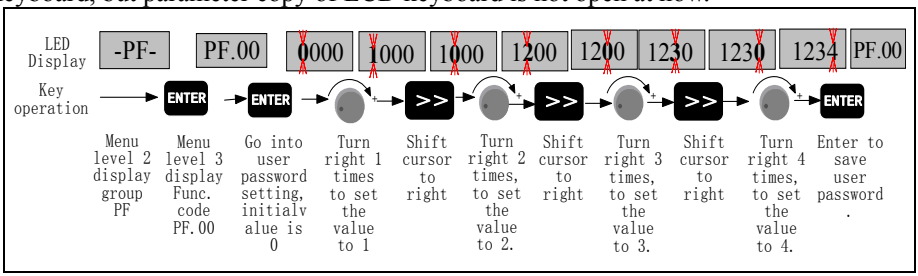


Fig. 5-15-1Flow chart of user password setting

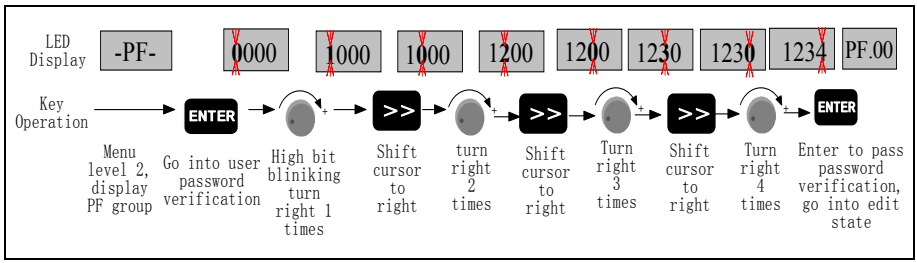


Fig. 5-15-2 Flow chart of user password unlocking

PF.04 G/P selection	Range: 0,1【0】

0: Type G (Constant torque) 1: Type P (Inlet fan and pump series loads)

Note:

◆ The parameter is only valid to the inverter of G/P series, otherwise it is always 0.

◆ Default value of the inverter is 0. If want type P, please setting PF.04 to 1.

Example: When the inverter model is type G (such as 31R5GB), you want the inverter of 32R2PB (Type P), set PF.04 to 1.

🕮 *Tips:*

By this way, you can get a type G inverter from a type P inverter.

Chapter 6 Troubleshooting

6.1 Troubleshooting

When the inverter has detected a fault, the keyboard will display the fault code, and the inverter will stop PWM output and come into fault state. In the fault indicator TRIP will flicker, the fault relay will output the programming function and the motor will coast to stop. At this time, you should find the reason of fault and apply corrective actions. If the listed troubleshooting cannot solve the problem, please contact our company directly. After debugging, you can press STOP RESET or replace external terminals to restart the inverter. Attention: the inverter can't startup even through debugging has been finished if operating signal isn't removed, you should cut operating signal first and then close again or remove main circuit power supply once to make the fault reset. If the SC fault appeared, the replacement is only permitted after 10 seconds. If you want to see the work condition (such as output frequency, reference frequency, output current, bus voltage., etc) or contents of the latest three fault, please press PRG ESC to enter into program state and then dial  to see parameter value of function code PE.00~PE.08.

Table 6-1 Troubleshooting

Fault display	Name of protection	Possible reasons of fault	Actions
Uu1	Bus Under voltage during running.	●Abnormity input voltage	●Check voltage of power supply ●Check the setting of detection level
Uu2	Control circuit under voltage①	●Control circuit under voltage	
Uu3	Charge circuit abnormal①	●MC fault	●Check charge circuit
OC1	Over current in Acc process	●Too short accelerating time ●Unsuitable V/F curve ●Voltage of power supply is low ● Capacity of inverter is too small. ●Output load of the inverter is short circuited	●Increase accelerate time ●Adjust the setting of V/F curve, appropriate setting of torque boost mode ●Check input power supply ● Select bigger capacity inverter. ●Check resistance of the motor's winding; check insulation of the motor

Fault display	Name of protection	Possible reasons of fault	Actions
OC2	Over current in Dec process	●Too short decelerating time ●Inertia torque of the load is big. ●Too low inverter's power ●Output load of the inverter is short circuited	●Increase decelerate time ●Add appropriate braking component ●Select a high-power inverter ●Check resistance of the motor's winding; check insulation of the motor
OC3	Over current in constant-speed Operation	●Abnormity Load ●Too short accelerating/ decelerating time setting ●Low voltage of power supply ●Too low inverter's power ●Output load of the inverter is short circuited	●Check the load ●Add accelerate/decelerate time properly ●Check input power supply ●Select the inverter with higher power ●Check resistance of the motor's winding; check insulation of the motor
Ou1	Over Voltage in acceleration process	●Abnormity Input voltage ●Too short accelerating time setting ●Stall point of overvoltage is too low	●Check input power supply/ the setting of detection level ● Increase accelerating time. ● Increase stall point overvoltage
Ou2	Over voltage in deceleration process	●Abnormity input voltage ●Too short decelerating time setting ●Inertia torque of the load is big ●Stall point of overvoltage is too low	●Check input power supply/ the setting of detection level ●Increase decelerating time properly ●Add appropriate braking component ● Increase stall point overvoltage

Fault display	Name of protection	Possible reasons of fault	Actions
Ou3	Over voltage in constant speed Operation	●Abnormity input voltage ●Too short accelerating/ decelerating time setting ●Inertia torque of the load is big ●Stall point of overvoltage is too low	●Check input power supply/ the setting of detection level ●Increase decelerating time properly ●Add appropriate braking component ● Increase stall point overvoltage
GF	Ground Fault	●Grounding current of output side exceeds specified value	●Check whether the insulation of the motor become bad ●Check whether the cable connecting the inverter and the motor is damaged
OH1	Heat sink overheat	●Ambient temperature is too high ●Obstruction of ventilation channel ●Cooling Fan does not work	●Lower the ambient temperature ●Clean the ventilation channel ●Replace the cooling fan
OL1	Motor overload	●Inverter's output exceed the over loading value of the motor ●Improper V/F curve ●Low AC supply voltage ●Common motor has operated with heavy load at low speed for a long time ●Load changes fast	●Reduce the load ●Adjust V/F curve and torque boost ●Check the AC supply voltage ●Use a special motor if the motor is required to operate for a long time ● Check the load.

Fault display	Name of protection	Possible reasons of fault	Actions
OL2	Inverter overload	●Inverter's output exceed its overloading value ●DC injection braking current is too big ●Improper V/F curve ●Low AC supply voltage ●Too heavy load ●Too short accelerating time	●Reduce the load, increase accelerating time ●Reduce the DC injection braking current, increase braking time ●Adjust V/F curve and torque boost ●Check the AC supply voltage ● Select bigger capacity inverter. ●Increase accelerating time
SC	Load short-circuit	●Inverter's output load is short circuited ●The output side is short circuit grounding	●Check resistance of the motor's winding ●Check the insulation of the motor ●Check the insulation of the motor
EF0	External fault comes from RS485 serial communicatio n	●MODBUS serial transmission error ●Faults comes from external control circuit	●Set correct overtime detecting time or set overtime detecting time of Pb.03 to 0.0s ●Check external control circuit ●Check input terminals, if the fault appeared even when the terminals aren't used, please, seek tech support
EF1	External fault on terminals X1~X8		
SP1	Input phase failure or Unbalance	●Input R, S, T have phase loss or imbalance	●Check input voltage ●Check input cable connection
SP0	Output phase failure or Unbalance	●Output U, V, W have phase loss or imbalance	●Check output cable connection ●Check the insulation of the motor and cables

Fault display	Name of protection	Possible reasons of fault	Actions
CCF1	Control circuit fault0	●The inverter connect keyboard once after electrifying, then transmitting fault continue for 2 seconds or above(during operating)	●Reconnect the keyboard ●Check connection cable of keyboard ●Replace the keyboard ●Replace the control board
CCF2	Control circuit fault1	●Transmission between the inverter and keyboard is established once after supplying power, but later transmission fault continues for more than 2 seconds.	
CCF3	EEPROM fault	●EEPROM fault of the control board	●Replace the control board
CCF4	AD conversion fault	●AD conversion fault of the control board	●Replace the control board
CCF5	RAM fault	●RAM fault of the control board	●Replace the control board
CCF6	CPU disturbance	●Serious interference ●MCU of the control board read-write error ●The communication cable is reverse connected or the Data-chosen-switch is dialed wrong	●Press STOP RESET to reset ●Add a filter on the side of power supply ●Seek for tech support
PCE	Parameter copying error②	●Copy wrong parameter between the keyboard and EEPROM of control board ●EEPROM of control board is damaged	●Recopy the parameter ●Replace the control board ●Seek for tech support

Fault display	Name of protection	Possible reasons of fault	Actions
HE	Hall current detection fault	●The inverter's current detection circuit is faulty ●The current sensor is damaged	●Replace the inverter ●Seek for tech support
dE	Pulse coder fault	●Pulses per revolution or lower frequency are too small. ●Terminal (3004GB/35R5PB and below: X4, X5, 35R5GB/37R5PB and above: X7, X8) setting is inconsistent with the wiring ●Encoder wiring error motor stall ●The encoder is damaged	●Set correct pulse detection method ●Check the pulse input wiring (Double phases detected, for 3004GB/35R5PB and below: A-X4, B-X5, for 35R5GB/37R5PB and above: A-X7, B-X8) ●Make sure that the motor is running smoothly ●Replace encoder ●Check the input terminals, seek for technical support

Attention:

①For mid-power/mini-watt inverters (3022G/3030P and the below models), there aren't fault Uu2 (Control circuit under voltage) and Uu3 (Bad charge circuit).

②Only LCD keyboard has parameter-copying function, a standard LED keyboard doesn't has this function.

③ S2R4GB~3004GB/35R5PB have no short-circuit protection/output grounding protection (SC).

6.2 Warning Display and Explanation

After action of warning function, warning code is flickered display, but the inverter is not in fault-protecting state: PWM output will not be closed off, fault relay will not act. In addition, **the inverter would automatically return to prevenient operation state after the warning signal disappeared.**

The following table lists different kinds of Warnings.

Table 6-2 Warning display and description

Warning display	Display content	Description
Uu	Under voltage detection	Detected under voltage, the inverter can continue working after detected
OLP2	Warning of the inverter's overload beforehand	The inverter working current exceeded overload detection level and maintained a longer time than the setting of overload detection time. The inverter would continue working after detected.
OH2	Temperature of the radiator is high	Temperature of radiator is over OH2 detecting benchmark, the inverter would continue working after detected.
AE1	Abnormity analog signal 1	AI1 analog input beyond range: -0.2~+10.2V
AE2	Abnormity analog signal 2	AI2 analog input beyond range: -0.2~+10.2V
SF1	Illogical function code setting	Function of I/O terminals, SS0-2, TT0-1 haven't been set completely
SF2	Selected mode differ from setting of terminals	Setting operation mode isn't complied with the setting of terminalsX1~X8(S2R4GB~3004GB/35R5PB is X1~X5)
SF3	Output terminal selection error (Only for 35R5GB/37R5PB and above models)	The inverter has three open collector output, the output terminals D0, Y1, Y2 are programmable multi-function terminals. Users can select a part of control signal and monitor signal according to needs. When collector output is selected for direction of programmed operating step or faults, the content defined for function must be the same(26 or 27) to make D0, Y1, Y2 be an available combination

6.3 Motor's Faults and Corrective Measure

If the motor has one of the following faults, please find the reason and take corresponding corrective measure. Seek for tech support if the measure does not work.

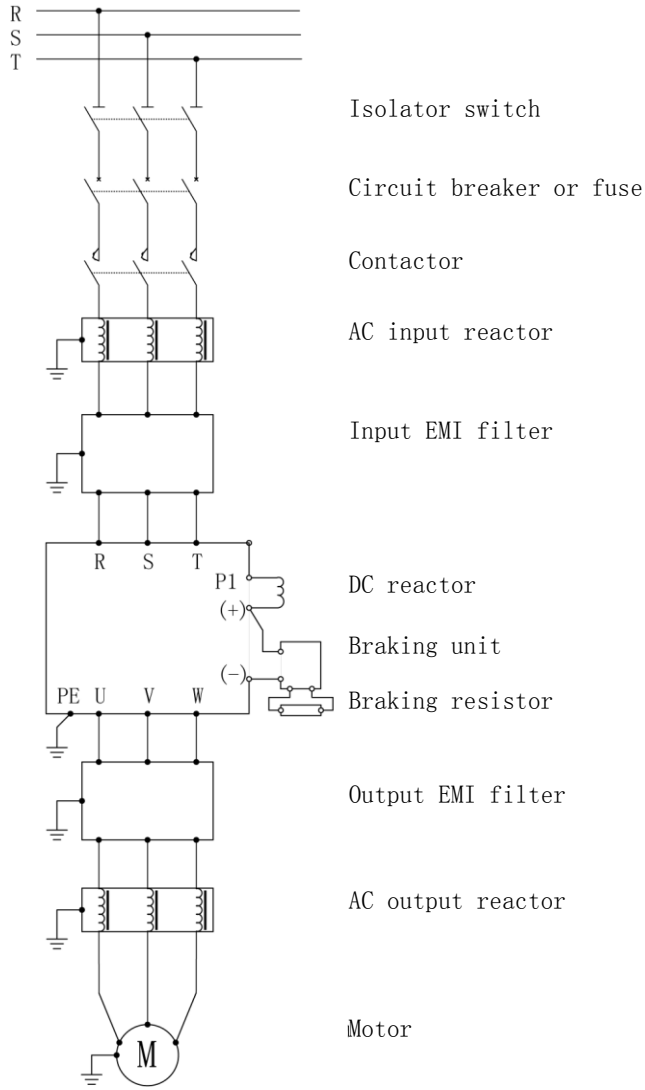
Table 6-3 Motor fault and corrective measure

Fault	Content of checking	Corrective measure
The motor doesn't work	Whether the power supply connect to terminals R, S, T. Whether charge LED lit	●Turn on the current ●Cut the current and then turn on again ●Check voltage of power supply ●Be sure the bolts fasten terminals firmly
	Use a rectifying voltmeter to test whether the voltage of terminals U, V, W is correct	●Cut the current and then turn on again
	Whether the motor is locked for over loading	●Reduce the load and remove the lock
	Is there any fault code displayed on the keyboard? Is indicator TRIP flashing?	●Fault code referred in Table 6-1
	Is there any running command	●Check whether operating terminal connection and connection between 24V and PLC are firm
	Whether prohibit reverse operation setting is according with running direction.	●Set reverse operation enable or change the direction order of motor
	Whether terminals operating signal cut first and then close after fault.	●Cut terminals operating signal first and then close
	Whether frequency reference voltage has been given by analog input	●Check frequency reference voltage
	Whether the setting of run command mode selection is correct	●Select correct mode
Motor's rotation direction is contrary	Whether the connection of terminals U, V, W is correct	●Switch the motor's connection of terminals U, V, W ●Adjust parameter value of P2.25
Motor rotate but can't shift	Whether the connection of frequency circuit is correct	●Correct the connection
	Whether the load is too heavy	●Reduce the load or increase Acc/Dec time

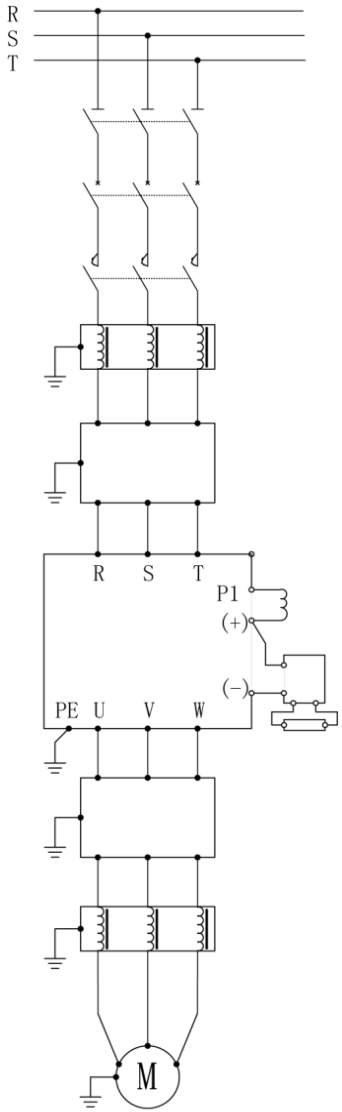
Fault	Content of checking	Corrective measure
Motor's rotate speed is too fast or too low	Whether the max output frequency setting is correct	●Check the setting of maximum output frequency
	Use a rectifying voltmeter to test Whether the voltage drop between the motor's terminals is too much	●Check V/F characteristics
Motor's rotate speed isn't steady	Whether the load is too heavy	●Reduce the load
	Whether the load wave	●Reduce waving of the load
	Is there any phase loss of power supply	●Check phase loss of power supply. ●For single-phase power supply, connect AC reactor to power supply
	Whether the frequency-giver is steady or not	●Check the frequency-giver
Noise of the motor is too loud	Bearings' abrasion, lubrication, rotor's eccentricity	●Repair the motor
	Whether the carrier-frequency is too low	●Increase the carrier wave frequency
Vibration of the motor is too much	Is there any mechanical resonance	●Adjust the jump frequency
	Whether the under-chassis of the motor is level	●Adjust the under-chassis of the motor
	Whether the output of the three phases is balanceable	●Check output of the inverter

Chapter 7 Peripheral Equipments

7.1 Peripheral Equipments Connection Diagrams



7-1 S2R4GB~3015GB/3018PB Diagrams of Peripheral Equipments



Isolator switch

Circuit breaker or fuse

Contactor

AC input reactor

Input EMI filter

DC reactor

Braking unit

Braking resistor

Output EMI filter

AC output reactor

Motor

7-2 3018G/3022P~3500G Diagrams of Peripheral Equipments

7.2 Function of Peripheral Equipments

Table 7-1 Function of Peripheral Equipments

Peripherals and Options	MCCB	MC	*ACL	*EMI-NF	*U_B&R_B
Description	Cut off failure Current fast and Other circuit resulting in power source failure	Cut off mains power supply and prevent power failure restart and fault restart	Improve input power factor. Decrease higher harmonic wave and suppress surge of power source	Decrease radio noise generated by inverter	Applicable when Brake torque cannot meet the need. Used for large inertia, frequent brake and quick stop.

Note: in the part list, which is marked with *, is an option.

7.2.1 AC Reactor

Using AC reactor can restrain higher harmonic wave and improve power factor obviously. In the following situation, users are advised to use ac reactor.

- Ratio of capacity: power supply source: Inverter>10:1
- Silicon controlled load and switching controlled power factor compensator in a same place.
- Degree of three-phase voltage unbalance is more than 3%

Table 7-2 AC reactor selection

Voltage (V)	Power (kW)	Current (A)	Inductance (mH)		Power	(kW)	Current (A)	Inductance (mH)
Single-phase 220	0.4	5.1	10		Three-phase 380	11	27	0.8
	0.75	9.2	7.6			15	34	0.6
	1.5	13	4.8			18.5	41	0.5
	2.2	25	3.2			22	52	0.42
Three-phase 380	0.75	3.7	7.6			30	65	0.32
	1.5	5.4	4.8			37	80	0.26
	2.2	7	3.2			45	96	0.21
	4	11	2.0			55	128	0.18
	5.5	14	1.5			75	165	0.13
	7.5	18	1.2			93	195	0.11

Three-phase 380	110	22	0.09		Three-phase 380	250	480	0.04
	132	262	0.08			280	530	0.04
	160	302	0.06			315	605	0.04
	185	364	0.05			355	660	0.03
	200	385	0.05			400	750	0.03
	220	420	0.05			500	900	0.025

7.2.2 EMI Filter

EMI filter is used to restrain transmit of Electromagnetic Interference (EMI) and external radio interference; including instant impulsion and surge.

Table 7-3 Three-phase three-wire EMI filter selection

Voltage (V)	Motor Power(kW)	Filter Type	Primary Parameter of Filter					
			Common-mode input loss dB			Differential mode loss dB		
			0.1MHz	1MHz	30MHz	0.1MHz	1MHz	30MHz
Single-phase 220	0.4	DL-5EBT1	75	85	55	55	80	60
	0.75	DL-10EBT1	70	85	55	45	80	60
	1.5	DL-20EBT1	70	85	55	45	80	60
	2.2							
	0.75	DL-5EBT1	75	85	55	55	80	60
	1.5							
	2.2	DL-10EBT1	70	85	55	45	80	60
	4							
Three-phase 380	5.5-7.5	DL-20EBT1	70	85	55	45	80	60
	11-15	DL-35EBT1	70	85	50	40	80	60
	18.5-22	DL-50EBT1	65	85	50	40	80	50
	30-37	DL-80EBT1	50	75	45	60	80	50
	45	DL-100EBK1	50	70	50	60	80	50
	55-75	DL-150EBK1	50	70	50	60	70	50

If a high-level of EMI is expected and CE, UL, CSA standards are required or when weak noise resistance equipment is installed around the inverter, please fit noise filter in the system. The wiring cables should be as short as it can be and the filter should be

closer to the inverter. The grounding of the filter should not employ thin and long wire, but directly connect the filter housing to the back plate of metal case where the paint has been scraped off. This grounding method through surface contacting can effectively reduce the HF grounding resistance, and the filter is capable of maximizing its potential effect.

7.2.3 Brake Unit and Resistor

The inverter series of 3015GB/3018PB and the below models have built-in brake function. If users want to increase their brake torque, the only thing to do is to mount external brake resistor. Built-in brake function isn't applied for 3018G/3022P and above models. If users want to increase the system brake torque, external brake unit should be mounted. The brake unit includes brake control, drive and the discharge part of the resistance. Brake control part should be adjusted according to the over-voltage protection setting. If the discharge resistor with over-temperature protection, it is recommended that, the control contact should be connected to the main control circuit.

Table of brake resistor and power for hundred-percent brake torque:

Table 7-4 Motor power and brake resistor selection

Voltage (V)	Motor Power (kW)	Resistance (Ω)	Resistor power (kW)		Voltage (V)	Motor Power (kW)	Resistance (Ω)	Resistor Power (kW)
Single-phase 220	0.4	200	0.1		Three-phase 380	45	13.6	9
	0.75	150	0.2			55	20/2	12
	1.5	100	0.4			75	13.6/2	18
	2.2	75	0.5			93	20/3	18
Three-phase 380	0.75	300	0.4			110	20/3	18
	1.5	300	0.4			132	20/4	24
	2.2	200	0.5			160	13.6/4	36
	4	200	0.5			185	13.6/4	36
	5.5	100	0.8			200	13.6/5	45
	7.5	75	0.80			220	13.6/5	45
	11	50	1			245	13.6/5	45
	15	40	1.5			280	13.6/6	54
	18.5	30	4			315	13.6/6	54
	22	30	4			355	13.6/7	63
	30	20	6			400	13.6/8	72
	37	16	9			500	13.6/8	90

7.2.4 Leakage Current Protector

Because safety capacitor or distributed capacitance to earth exists in interior of inverter and motor and in the input or output leading wires, and higher carrier frequency is used for low noise, the leakage current of the inverter is to high, obvious in large capacity machine. Sometimes, it may lead defective action of protective circuit.

If you encounter problems above, except lessening carrier frequency and shortening leading wire, you have to mount leakage current protector:

Mount leakage current protector at the input terminal (come after MCCB)
Current action level (with inverter) must be ten times more than the total leakage current (without inverter) of circuit, ratio noise filter and motor, etc.

7.2.5 Capacitor Box

The capacitor box is particularly applied in the circumstance requiring continuous duty when the power-off is relative long (more than 20ms).
You can order from our company, please specify the actual load, the required continuous duty time after power-off when you place the order, so that our company can prepare you the product.
As the capacitance box may influence some parameters in your machine after it is assembled, the preparation by the user is not recommended.

Chapter 8 Maintenance

DANGER

1. Terminals of the inverter have high-voltage. Never touch them, or it will cause electric shock.
2. Replace all protective covers before powering up the inverter. When removing the cover, be sure to shut off the power supply to the inverter.
3. Turn off the main circuit power supply and verify the charge LED has lit off before performing maintenance or inspection.
4. Only authorized personnel should be permitted to perform maintenance, inspections or parts replacement, or you will risk electric shock.

CAUTION

1. The keyboard PCB board, control PCB board and drive board employs CMOS ICs.
   Do not touch the CMOS elements.
2. Do not connect or disconnect wiring or connectors while power is applied to the circuit.
3. Do not check signals during operation, or the equipment will be damaged.

8.1 Inspection and Maintenance

Inverter is a typical product, which combines the power electronics technology with the microelectronics technology. Therefore, it double features with industrial equipments and microelectronics equipments. The change of environment such as temperature. Humidity, smog and internal components aging factor will cause kinds of faults to the inverter. For long time secure operation, daily inspection and regular maintenance (at least 3 or 6 months interval) is needed.

8.1.1 Daily Inspection

Before inverter running, please check below:

- Whether Sound and vibration of motor are abnormal
- Whether heating of inverter and motor are abnormal.
- Whether ambient temperature is too high.
- Whether load ammeter normal or not.
- Whether cooling fans are in normal operation.
- Whether brake resistors are with good insulation earth.

The daily inspecting contents and cautions are listed in Table 8-1.

Table:8-1 The daily inspecting contents and cautions

serial number	Inspection part	Inspection part	Inspection item	Access standard
1	Display	LED monitors	Display normal or abnormal	Confirmed by operation mode
2	Cooling system	Fan	Rotate flexibly, Abnormal sound	Without abnormal
3	Main part	Inside cabinet	Heat, abnormal sound or smell	Without abnormal
4	Environme nt	Ambient	Temperature humidity, dust, Hazardous gas	According to 2.2
5	Voltage	Input/ output terminal	Input/output Voltage normal of not	According to appendices 2
6	Load	Motor	Heat, abnormal sound of vibration	No abnormal

8.1.2 Regular Maintenance

The power supply must be cut off before regular maintenance. Only after the monitor has no display and charge LED has lit off 5-10 minutes can the maintenance begin. On the other hand, you will risk electric shock because there are storage capacitors within the inverter that will hold charge even after the input power is disconnected.

The regular maintenance contents and cautions are listed in Table 8-2.

Table: 8-2 The regular maintenance contents and cautions

Component	Check	Corrective Action
External Terminals, Connectors, Mounting Screws, etc.	Loose screws or connectors	Securely tighten.
Heat sink	Build-up of dust and dirt	Blow with dry, compressed air(39.2×10^4 to 58.8×10^4 Pa(4 to 6kg.cm^2)pressure)

Component	Check	Corrective Action
Printed Circuit Board (PCB)	Accumulation of conductive dust of oil	Blow with dry, compressed air(39.2×10^4 to 58.8×10^4 Pa (4 to 6kg.cm^2) pressure), if dust and oil can not be removed, then replace the board.
Cooling Fan	For abnormal noise and vibration, Accumulation of dust and dirt	Replace the cooling fan, keep clean
Power Components	Accumulation of dust and dirt	Blow with dry, compressed air($39.2\times10^4$to 58.8×10^4Pa(4 to 6kg.cm^2)pressure)
Electrolytic capacitor	Discoloration or odor	Replace the capacitor
Braking resistor	Isolation to earth is fine	Put it on dry, insulation place

Don't dismount or shake any part of the inverter and pull out the plug-ins when inspect, otherwise the inverter will work in fault state and the keyboard will display the fault code. Even worse, it may cause fault to component or damage to main part IGBT.

Using different meters may get different result.

Please use moving coil. Voltmeter to measure input Voltage and bridge voltage meter to measure output voltage. Clamping ammeter is advised to measure input/output current and electro-dynamic power meter is the best instrument to measure power. If condition is limited, users can use the same meter to measure some times and take notes for comparison.

For waveform testing, the scanning frequency of electric oscilloscope should be more than 40MHz. For instant changing waveform, the Perfect frequency is over 100MHz. Please isolate the mains electrical supply before the testing.

Recommendable wiring of main circuit electro measurement (Figure8-1) and description (Table8-3) are the following:

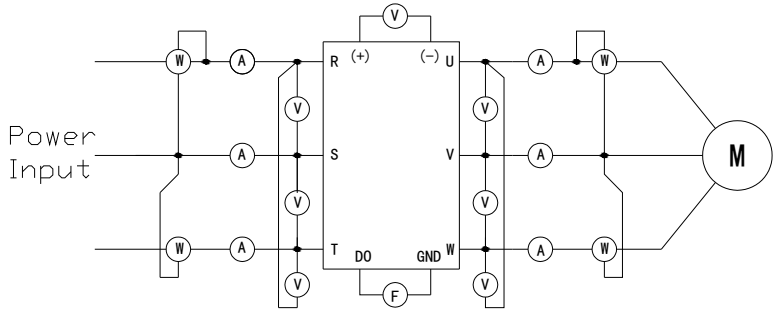
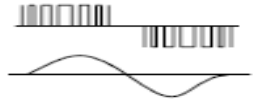


Fig. 8-1 Recommendable Wiring of Main Circuit Electro Measurement

Table 8-3 Description of Main Circuit Electro Measurement

Item		Input (Power supply)			DC Intermediate Link	Output (Motor)			D0 terminals
Wave form	Voltage								
	Current								
Measuring instrument		Voltmeter	Current meter	Power meter	DC voltmeter	Volt meter	Current meter	Power meter	Volt meter
Instrument Type		Moving-coil	Electro-Magnetic	Electro-dynamic	Magneto-Electric	Rectifier -type	Electro-Magnetic	Electro-dynamic	Magneto-Electric
Parameter		Virtual value of First harmonic	Total virtual value	Total virtual power	DC voltage	Virtual value of First harmonic	Total virtual value	Total virtual value of power	DC voltage

When power supply is asymmetric seriously or three phases current is not balanced, please use electro-dynamic type three-phase wattmeter to measure the power.

Because the product has passed electric insulation test and dielectric strength examination, similar experiment is not required. In addition, the experiment will decrease the insulating voltage proof and improper experiment may cause product failure. If the experiment must be done, only skilled workers satisfy the qualification.

When doing experiment of main circuit voltage proof, please choose capacity equivalent instrument, using time and leakage current of which can be set. Moreover, this experiment will shorten life span of the device. Also, the main circuit terminals (R, S, T,

U, V, W, P1, + ,-)must be short-circuited before using megohm-meter and the megohm voltage level must match the system(220V system/megohm-meter 250V, 380V system/megohm-meter 500V, 660V system/megohm-meter 1000V. Control circuit can't be measure by megohm-meter, but by universal meter (high resistance).

Earth-resistance of product (380V) should not be less than 5 MΩ and that of control circuit shouldn't be less than 3 MΩ.

8.1.3 Replace Device at Regular Intervals

For security of the inverter operation, to ensure the long term and reliable operation, the lifetime of components used in the inverter must be periodically maintained. The lifetime of the component will be different because of the different environment and conditions. For constant operation, users can follow the next table to replace the device. In addition, the operation environment, load status and the current state should be considered.

Table 8-4 Parts Replacement Schedule

Parts	Standard replacing years
Cooling Fan	2~3years
Electrolytic capacitor	4~5years
Printed Circuit Board	5~8years
Fuses	10years

8.2 Storage and Keeping

After bought in, the inverter needs to be stored temporarily of secularly if it isn't immediately used:

- Environmental temperature should be in the defined range. Prevent it from being in contact with damp, dust powder, metal dirt; keep it in a draughty place.
- If stored period has exceeded one year, users should do charging experiment to recover the characteristics of electrolytic capacitor. When charging, please use voltage regulator to increase input voltage to rated voltage of the inverter slowly and last the charging 1~2 hours.
- Experiment described above should be done at least one time per year.
  Voltage proof experiment will shorten life span of the inverter. For the electric insulation test, please choose 500V megohm-meter, Earth resistance should not be less than 4 MΩ.

Chapter 9 Quality Guarantees

Quality guarantees is transacted as the following rules and regulations:

The warranty range is confined to the inverter only. The start time of warranty period is calculated from the delivery date of the product. Our products are guaranteed for twelve months, but not exceed 24 months from the manufacturing date marked on the nameplate of the inverter.

The remedy of faults caused by the following reasons will be at user's cost, even though it happens during the guarantee period:

- Improper operation, unauthorized repair or modification.
- Operation beyond the standard specifications.
- Falling down, barbarous transport.
- Device aging and failure caused by unsuitable environment.
- Exterior ingoing foreign matters (such as insects) cause the drive be damaged.
- Damage caused by wrong wiring.
- Damage caused by earthquake, fire, storm wind, flood, lightning, abnormal voltage and other natural disaster, or effect hereof.

For failure products, our company has the right to entrust maintenance to others in charge.

Responsibility of manufacturer:

A. Internal

- One month goods exchanging, maintenance and return after delivery
- Three months goods exchanging, maintenance after delivery
- Twelve months goods maintenance after delivery

B. Abroad

- Eighteen months goods maintenance after the delivery.

The service fee will be charged according to the actual costs. If there is any contract, please follow the principle of contract priority.

All distributors, manufacturers and agents of our company in the whole country can provide service.

Addition:

Responsibility immunity:

- Abuse producing or inducing failure is out of our responsibility
- The damage or referred, secondary damage caused by the fault of the equipment will not be compensated.

Note to Users:

The manual is just applicable to the inverter of this series.

Our company will be responsible for the inverter during all its life and provide technical

service.

Though the product is designed and manufactured under a strict quality control, be sure to inquire us first if the inverter is planned to be used on the following occasions in which failure or error operation would cause damage to body or life .

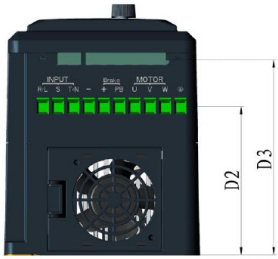
- Transport equipment;
- Medical apparatus;
- Nuclear energy, electric power unit;
- Aviation and spaceflight equipment;
- All kinds of safety device;
- Other special purpose.

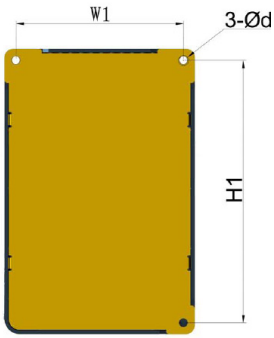
Hope to users:

Sincerely, we hope you to give advice about design, performance, quality and service of our products. Our company will be appreciating.

Appendix 1 Exterior Size and Mounting Size (Unit: mm)

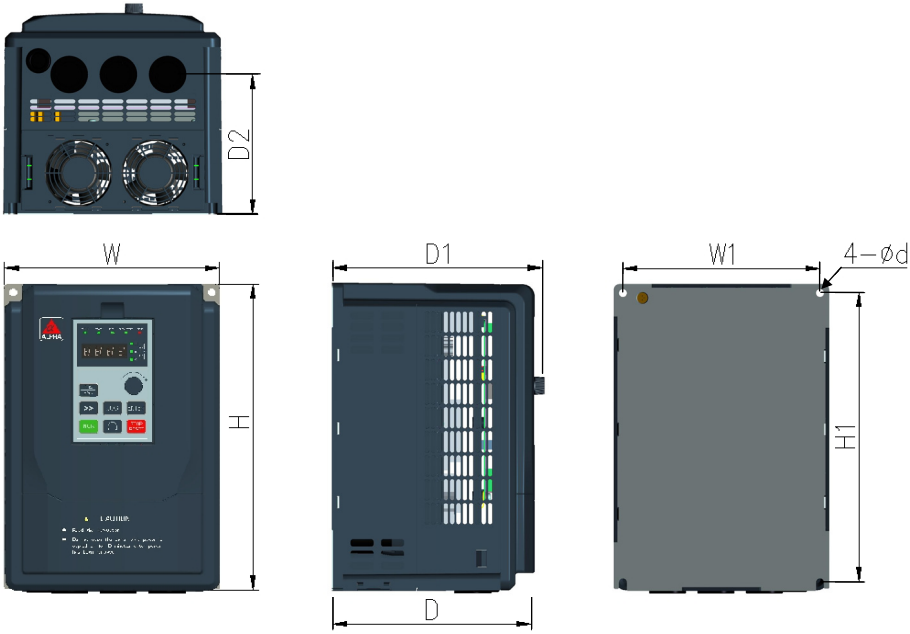
S2R4GB~3004GB/35R5PB:





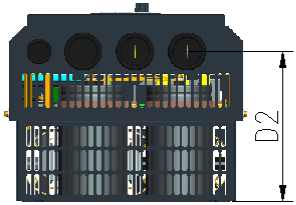
Inverter Model	H	H1	W	W1	D	D1	D2	D3	d
S2R4GB, S2R75GB	141.5	130.5	85	74	113	123	63	88	4.5
S21R5GB, S22R2GB	180	169	115	105	150	158	85	120	4.5
3R75GB/31R5PB, 31R5GB/32R2PB, 32R2GB/3004PB	180	169	115	105	150	158	85	120	4.5
3004GB/35R5PB	195	179.5	130	114.5	157	167	100	130	5.5

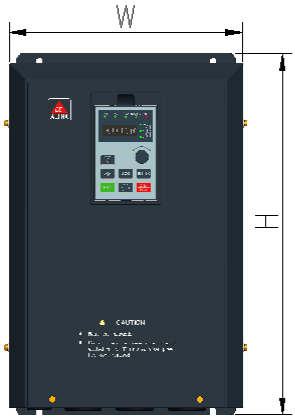
35R5GB/37R5PB~37R5GB/3011PB:

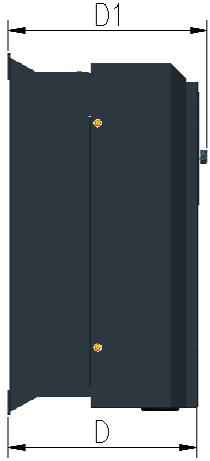


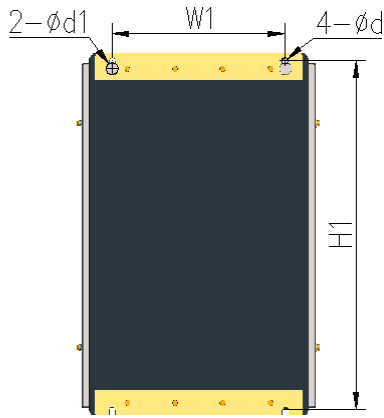
Inverter Model	H	H1	W	W1	D	D1	D2	d
35R5GB/37R5PB, 37R5GB/3011PB	270	255	190	175	176	186	122	7

3011GB/3015PB~3132G/3160P:



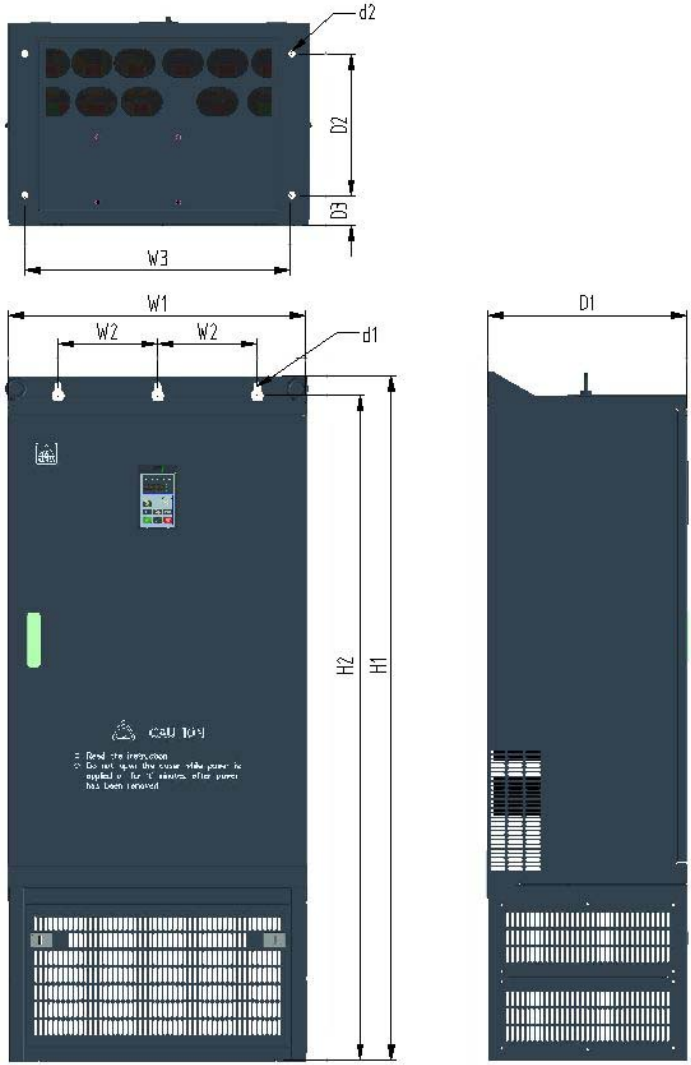






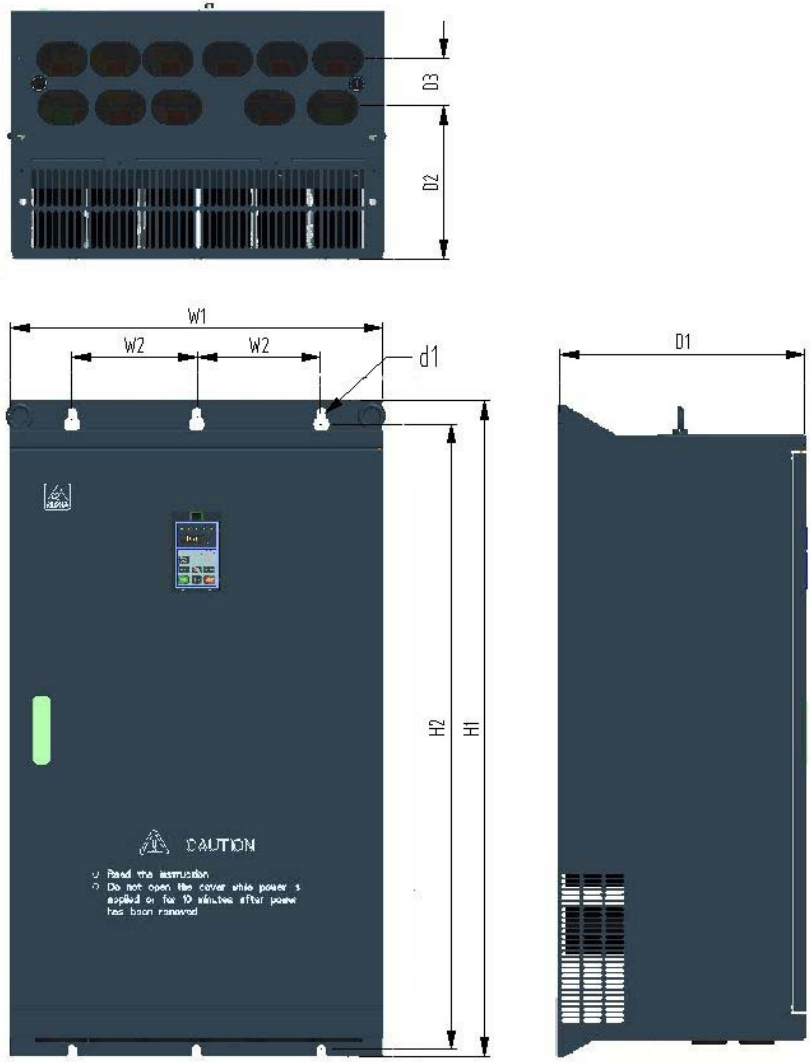
Inverter Model	H	H1	W	W1	D	D1	D2	d	d1
3011GB/3015PB, 3015GB/3018PB	373	360	235	180	176	188	125	7	12
3018G/3022P, 3022G/3030P	420	405	270	200	218	230	175	7	14
3030G/3037P, 3037G/3045P	503	488	311	200	230	242	185	8	14
3045G/3055P, 3055G/3075P	590	570	351	200	254	266	208	10	18
3075G/3093P, 3093G/3110P	698	672	400	280	260	272	213	12	22
3110G/3132P, 3132G/3160P	850	823	505	420	280	292	199	12	22

3160G/3185P-X~3355G/3400P-X:



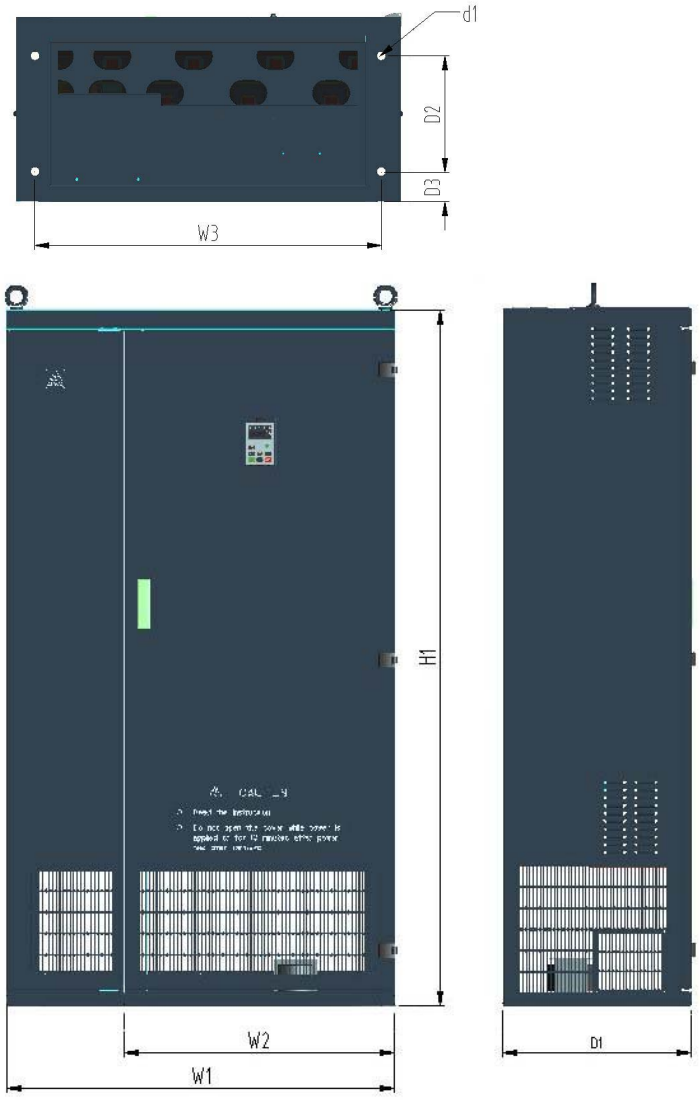
Inverter Model	W1	W2	W3	H1	H2	D1	D2	D3	d1	d2
3160G/3185P-X, 3185G/3200P-X, 3200G/3220P-X, 3220G/3250P-X	600	200	530	1380	1360	400	280	60	3-φ14	4-φ14
3250G/3280P-X, 3280G/3315P-X, 3315G/3355P-X, 3355G/3400P-X	800	300	730	1535	1515	410	288	60	3-φ14	4-φ14

3160G/3185P-V~3355G/3400P-V:



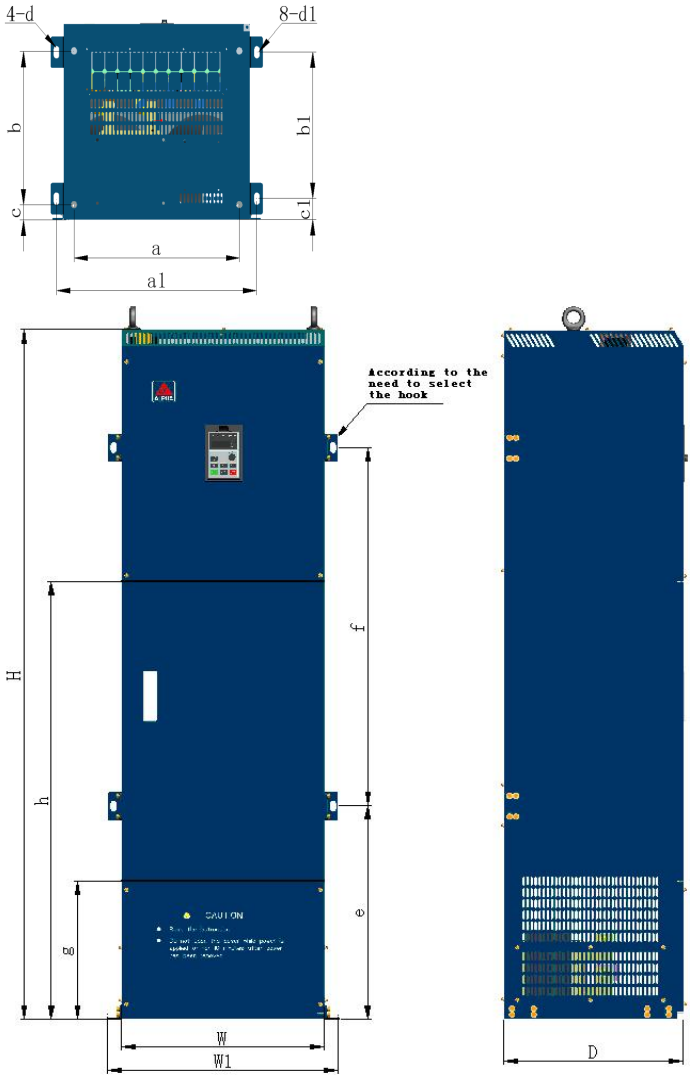
Inverter Model	W1	W2	H1	H2	D1	D2	D3	d1
3160G/3185P-V, 3185G/3200P-V, 3200G/3220P-V, 3220G/3250P-V	600	200	1056	1026	400	245	77	6-φ14
3250G/3280P-V, 3280G/3315P-V, 3315G/3355P-V, 3355G/3400P-V	800	300	1210	1179	410	250	88	6-φ14

3400G-X~3500G-X:



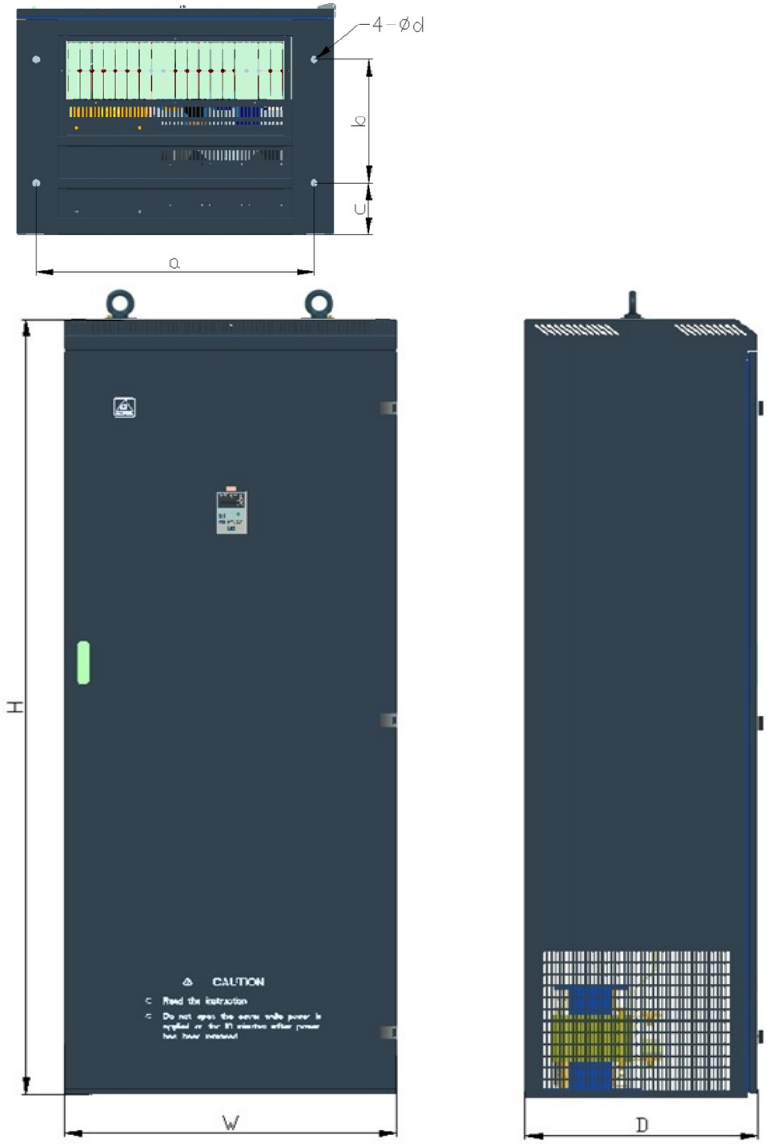
Inverter Model	W1	W2	W3	H1	D1	D2	D3	d1
3400G-X, 3500G-X	1000	700	900	1800	480	300	80	4-φ22

3160G/3185P~3355G/3400P:



Inverter Model	W	W1	D	H	a	b	c	d
3160G/3185P, 3185G/3200P, 3200G/3220P, 3220G/3250P	450	514	400	1600	400	315	30	13
3250G/3280P, 3280G/3315P, 3315G/3335P, 3335G/3400P	450	514	400	1800	400	315	30	13

3400G~3500G:



Inverter Model	W	H	D	a	b	c	d
3400G, 3500G	1000	700	900	1800	480	300	80

Appendix 2 Technology Standards

Items	Standards				
Rated input voltage, frequency	1AC 200~240V 50/60Hz 3AC 380V~440V 50/60Hz				
Permission input working voltage range	1AC 220: 176~264V, frequency less than ±5% 3AC 304~456V, voltage unbalance rate less than 3%, frequency less than ±5%				
Inverter Model	S2R4GB	S2R75GB	S21R5GB	S22R2GB	
Motor Output(kW)	0.4	0.75	1.5	2.2	
Rated output current(A)	2.4	4.5	7.0	11.0	
Inverter Model	3R75GB	31R5GB/ 31R5GB	32R2GB/ 32R2PB	3004GB/ 3004PB	35R5GB/ 35R5PB
Motor Output(kW)	0.75	1.5	2.2	4.0	5.5
Rated output current(A)	2.5	4.0	6.0	9.0	13.0
Inverter Model	37R5GB/ 37R5PB	3011GB/ 3011PB	3015GB/ 3015PB	3018G/ 3018PB	3022G/ 3022P
Motor Output(kW)	7.5	11	15	18.5	22
Rated output current(A)	17.0	25.0	32.0	37.0	45.0
Inverter Model	3030G/ 3030P	3037G/ 3037P	3045G/ 3045P	3055G/ 3055P	3075G/ 3075P
Motor Output(kW)	30	37	45	55	75
Rated output current(A)	60.0	75.0	90.0	110.0	152.0
Inverter Model	3093G/ 3093P	3110G/ 3110P	3132G/ 3132P	3160G/ 3160P	3185G/ 3185P
Motor Output(kW)	93	110	132	160	185
Rated output current(A)	176.0	210.0	253.0	304.0	342.0
Inverter Model	3200G/ 3200P	3220G/ 3220P	3250G/ 3250P	3280G/ 3280P	3315G/ 3315P

Items	Standards				
Motor Output(kW)	200	220	250	280	315
Rated output current(A)	380.0	426.0	480.0	520.0	600.0
Inverter Model	3355G/ 3355P	3400G/ 3400P	3500G		
Motor Output(kW)	355	400	500		
Rated output current(A)	680.0	750.0	900.0		
Rated output voltage	0~Rated input voltage				
Overload Capability	Types for general purpose control: 150% 1 minute, 180% 20 seconds; Types for constant pressure water supply: 120% 30 second; 150% 1 second.				
Control method	Magnetic flux vector control				
Frequency range	0.00~650.0Hz(S2R4GB~3004GB/35R5PB); 0.00~400.00Hz(35R5GB/37R5PB~3500G)				
Frequency Setting Resolution	Digital instruction ±0.01％(-10℃~+40℃); Analog instruction ±0.01％(25℃±10℃)				
frequency setting resolution	Digital Reference 0.01 Hz; Analog Reference 1/1000 of the maximal frequency				
Output frequency resolution	0.01 Hz				
Frequency setting signal	0~10V, 0~20 mA				
Accelerating/ decelerating characteristic	0.1~3600 second(Accelerating and decelerating time can be set separately)				
Brake torque	With additional braking resistor, the brake torque can reach 125%				
No. of V-f Patterns	4 fixed V/F Patterns selectable and 1 custom				
Protective function	Overvoltage, Under voltage, Current limiting, Over current, Thermal overload, Electronic thermal relay, over voltage stalling, Data protection damaged, External fault.				

Items	Standards
Ambient Temperature	-10℃~+40℃
Humidity	5~95% Relative humidity (RH) (non-condensing)
Store temperature	-40℃~+70℃
Mounting place	Indoors, less than 1000 meters above sea level, Dust free, Away from corrosive gases and direct sunlight.
Vibration	Be less than 0. 5 gravity acceleration
Protection level	IP 20
Cooling method	Force-cooled Inverter Model power below 22 KW has fan controlling system.

Appendix 3 Main Circuit Output Cable Selection (Recommended)

Voltage (V)	Power grade(kW)	Wire gauge(mm^2)	The maximal length of output cable(m)			
			Without output reactor		With output reactor	
			No Shielded Cable (m)	Shielded Cable (m)	No Shielded Cable (m)	Shielded Cable (m)
220	0.4 kW	2.5	110	80	150	105
	0.75kW	2.5	110	80	150	105
	1.5kW	4	180	150	230	175
	2.2kW	4	180	150	230	175
380	0.75kW	2.5	110	80	150	105
	1.5kW	2.5	110	80	150	105
	2.2kW	4	180	150	230	175
	4kW	4	180	150	230	175
	5.5kW	4	200	160	250	185
	7.5kW	6	200	160	250	185
	11kW	6	200	160	250	185
	15kW	6	200	160	250	185
	18.5kW	10	200	160	250	185
	22kW	16	200	160	250	185
	30kW	25	220	180	280	210
	37kW	25	220	180	280	210
	45kW	35	240	200	320	250
	55kW	35	240	200	320	250
	75kW	70	260	220	380	260
	93kW	70	260	220	380	260
	110kW	95	260	220	380	260
	132kW	150	260	220	380	260
	160kW	185	280	240	440	340
	185kW	185	280	240	440	340
	200kW	240	280	240	440	340
	220kW	150*2	300	260	500	400
	250kW	185*2	320	280	550	430

Voltage (V)	Power grade(kW)	Wire gauge(mm^2)	The maximal length of output cable(m)			
			Without output reactor		With output reactor	
			No Shielded Cable (m)	Shielded Cable (m)	No Shielded Cable (m)	Shielded Cable (m)
380	280kW	185*2	320	280	550	430
	315kW	250*2	320	280	550	430
	355kW	325*2	320	280	550	430
	400kW	325*2	320	280	550	430
	500kW	325*2	320	280	550	430

Appendix 4 MODBUS Communication

This series of inverter can perform serial transmission by using a programmable controller (PLC) and MODBUS communication.

Composition of MODBUS Communication

MODBUS is composed of one master PLC and 1 to 31 (maximum) slave inverters. In signal transmission between master and slave units, the master unit always starts transmission and the slave units respond to it.

The master unit performs signal transmission with one slave unit at a time. Hence, different address numbers must be assigned to each slave unit in advance and the master unit specifies a number to perform signal transmission.

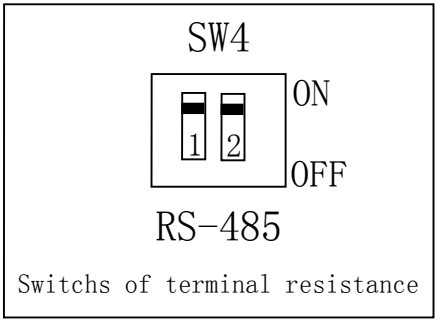
The slave receives the command from the master, performs the function and returns the response to the master unit.

MODBUS Communication Specification

Interface	RS-485
Start-stop synchronous	Asynchronous, half-duplex Communication.
Communication parameters	Baud rate: 1200/2400/4800/9600/19200/38400 bps Data length: 8 bit fixed. Parity selection: EVEN / ODD / NONE STOP bit: 1 bit fixed.
Communication protocol	In accordance with MODBUS
Maximum number of units to be connected	31

MODBUS Communication Terminals

To use MODBUS communication function, please connect Terminal 485+, Terminal 485- to PLC. If there is more than one inverter connected to PLC, the terminal resistance should switch at ON position as the following. (The terminal resistance is only for model of 35R5GB/37R5PB and above models)



Note on Communication Wiring:

(1) Communication wires must be separated from the main circuit and other power supply wires.

(2) Communication wires must be shielded cable and one terminal near the inverter the shielded layer must connect to the terminal GND of inverter, the other terminal should keep free to avoid disturber.

Sequence to Communication with PLC:

1. Cut off the power supply, Use Shielded Cable to connect RS485 terminal with PLC；
2. Power on the inverter；
3. Use keyboard and set the communication parameters (P0.01, P0.02, P0.04, P7.00, P7.01, Pb.00~Pb.07)；
4. Perform communication between PLC and the linked inverter.

MODBUS Communication Parameters Set

To communication with PLC, the inverter must be programmed. Here are some communication parameters that should be modified in advance.

"○"write-in is possible during running; "×"write-in is impossible during running but possible during stop.

Function code	Parameter name	Setting range	Default	Change	MODBUS address
P0.01	Frequency setting mode 1	0: NULL 1: Keyboard digital setting 2: Terminal AI1 3: Terminal AI2 4: Pulse input 5: Serial communication * NOTE 1 6: Multi-speed running 7: Terminal Up/Down 8: Programmed running (PLC) 9: PID 10: Wobble frequency running	1	×	0002H frequency range: 0~650.0Hz
P0.02	Frequency setting mode 2	Idem,0~6	0	×	0002H communication frequency instructions
P0.04	Running command control mode select	0: Keyboard control 1: Terminal control 1(STOP inactive) 2: Terminal control 2(STOP active) 3: Serial communication 1(STOP inactive) 4: Serial communication 2(STOP active) 5: Terminal control 3 (STOP and JOG invalid)	0	×	0001H communication control instruction is operation signal

Function code	Parameter name	Setting range	Default	Change	MODBUS address
P7.00	Feed select	0: PID feed 1: AI1 Terminal 2: AI2 Terminal 3: Pulse 4: Serial communication	1	×	0004H Given PID, 0~1000 is corresponding 0.0~100.0%
P7.01	Feedback select	0: AI1 Terminal 1: AI2 Terminal 2: Serial communication 3: Pulse feedback 4: |AI1-AI2| 5: Reserved 6: AI1+AI2 7: MIN{ AI1, AI2} 8: MAX{ AI1, AI2} 9: PG or single phase speed measure input	1	×	0003H communication PID feedback, 0~1000 is corresponding 0.0~100.0%
Pb.00	MODBUS Baud rate selection	0:1200 1:2400 2:4800 3:9600 4:19200 5:38400 * NOTE 2	3	×	
Pb.01	MODBUS Station Address	0~31 * NOTE 3	1	×	
Pb.02	MODBUS Parity	0: Even parity 1: Odd parity 2: No parity * NOTE 2	0	×	
Pb.03	Communication overtime check	0~100.0s 0: no overtime checking; Other: timeout detection time	0.0s	○	
Pb.04	Response delay time	0-500 ms	5 ms	×	
Pb.05	Communication frequency instruction unit	0:0.01 Hz * NOTE 4 1:0.1 Hz	0	×	

Function code	Parameter name	Setting range	Default	Change	MODBUS address
Pb.06	Selection of MODBUS data storage	0: Not save to EEPROM 1: Directly save to EEPROM	0	×	
Pb.07	CCF6 Fault Handling	0: Not generate fault and keep on running 1: Generate fault and stop	0	×	

* NOTE 1: Only select communication function of parameters: P0.01, P0.02, P0.04, P7.00, P7.01, can MODBUS(0001H-0004H)write-in message be accept by the inverter Or the inverter will response an error "02H".

* NOTE 2: If MODBUS Baud Rate and MODBUS Parity have been changed, the new parameters will not be effective until the invert power off and restart.

The master and the slave must keep the same communication parameters setting. Otherwise, it is hard to make communication between them, or communication error.

* NOTE 3: When the MODBUS Station Address of inverter is zero, the inverter will not accept the message that the master sends, even if the broadcast instruction. When the address has been changed, it will take effect at once.

* NOTE 4: To be compatible with the inverter of other series, Please select the unit of frequency reference carefully. If we set Pb.05= 1, the send value 01F4H will be equal to 50.00 Hz as frequency reference. However, if we set Pb.05=0, the send value 01F4H will be equal to 5.00 Hz as frequency reference. If we want to set frequency reference as 50.00 Hz, the message value must be 1388H.

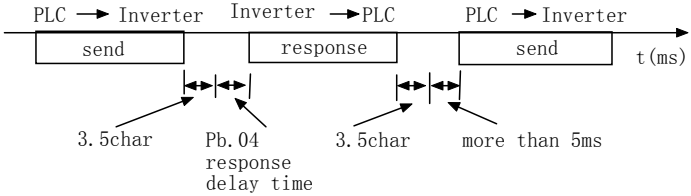
Transmission period limiting

In order to cut down the packet loss rate caused by communication interference and to reach the optimum communication effect, please limit the transmission periods according to your need in the master station, thus ensuring the normal process of data transmitting and receiving.

Pb.00 MODBUS Baud rate selection	**Minimum transmission period (Even parity checking only)**	**Recommended transmission period (no checking methods limiting)**
0:1200	220ms	250ms
1:2400	110ms	150ms
2:4800	65ms	100ms
3:9600	50ms	90ms
4:19200	35ms	80ms
5:38400	17ms	50ms

*notes:
In the way of choosing even parity checking, user can obtain the fastest communication response.
The minimum transmission period is the interval between sending data from master station and receiving the correct data from the slave.
If the transmission period is smaller than the minimum one, the master station is likely to receive disorderedly coded data.

Format of MODBUS Messages
When the inverter communicates with master controller (Such as PC, PLC, etc.), the master send message to the inverter and the inverter sends an answer message to the master. The process or of MODBUS communication is like the right diagram description.
As the MODBUS instructions are various, the content may be different. The distance between two MODBUS messages must keep the under mentioned time.



Slave Address
Function Code
Content
CRC (Error check)

Inverter Address: (0~31)
When the inverter address value is set to 0, in broadcast mode, the master sends out message simultaneously, the inverter will not give a response to the master.
The Supported MODBUS Instructions:

Instruction number (16 bits)	Functions	Instruction		Right response		Abnormal	
		Minimum Number of Data Items Handled by One Message	Maximum Number of Data Items Handled by One Message	Minimum Number of Data Items Handled by One Message	Maximum Number of Data Items Handled by One Message	Minimum Number of Data Items Handled by One Message	Maximum Number of Data Items Handled by One Message
03H	Read-out of holding register Content	8	8	7	7	5	5
06H	Write-in to single	8	8	8	8	5	5
08H	Loop back Test	8	8	8	8	5	5
10H	Write-in to holding register	11	11	8	8	5	5

CRC check: CRC-16 is calculated as follows:

1. The initial value of general CRC-16 calculation result is "0", the initial value of the communication terminal is "1" (every bit of the 16-bit is "1").

2. The LSB of the communication frame is the MSB of calculation result, the MSB is the LSB of calculation result. To calculate the CRC-16, switch the MSB and LSB.

3. The CRC-16 of the response messages must be calculated to be compared with the received CRC-16 of the communication frame.

```
unsigned int CRC16(unsigned char*uptr, unsigned int ulenth)
{
    unsigned int crc=0xffff ;
    unsigned char uindex ;
    if(ulenth>=9)
    {
        ulenth=9;
    }
    while(ulenth!=0)
    {
      crc^=*uptr ;
      for(uindex=0; uindex<8;uindex++)
      {
          if((crc&0x0001)==0)
          {
                crc=crc>>1 ;
          }
          else
          {
                crc=crc>>1 ;
                crc^=0xa001 ;
          }
      }
          ulenth-=1 ;
          uptr++;
    }
    return(((crc&0x00FF)<<8)|((crc&0xFF00)>>8));
}
```

Instructions example

Read Holding Registers [03H]

The contents of the specified number are read out in MODBUS address. The holding register contents are divided into the high 8-bit and low-order 8-bit, and become the data in the response message in that order.

Example: Read out the slave 1 running status

Command Message

Slave Address		01
Function Code		03
Starting No.	Upper	00
	Lower	20
Quantity	Upper	00
	Lower	01
CRC	Upper	85
	Lower	C0

Normal Response Message

Slave Address		01
Function Code		03
No. of Data		02
Data	Upper	00
	Lower	C1
CRC	Upper	79
	Lower	D4

AbnomalResponse Message

Slave Address		01
Function Code		83
Error Code		03
CRC	Upper	01
	Lower	31

Note：No. of Data is double Command Message Quantity

Write-in to single register [06H]

Single specified data item is written in the specified register, specified data is stored in the specified register. It is necessary to arrange the written data items in the MODBUS register address table in the order of the upper 1 byte and the lower 1 byte.

Example: Start slave 1.

Command Message

Slave Address		01
Function Code		06
Starting No.	Upper	00
	Lower	01
Quantity	Upper	00
	Lower	01
CRC	Upper	19
	Lower	CA

Normal Response Message

Slave Address		01
Function Code		06
Starting No.	Upper	00
	Lower	01
Quantity	Upper	00
	Lower	01
CRC	Upper	19
	Lower	CA

AbnomalResponse Message

Slave Address		01
Function Code		86
Error Code		02
CRC	Upper	C3
	Lower	A1

Feedback loop Test [08H]

The transmitted message is returned unchanged as a response message. This test is used for checking the signal communication between master and slave. Test data can use any value.

Example: Loopback test with slave 1.

Command Message

Slave Address		01
Function Code		08
Test NO.	Upper	00
	Lower	00
Test Data	Upper	12
	Lower	34
CRC	Upper	ED
	Lower	7C

Normal Response Message

Slave Address		01
Function Code		08
Test NO.	Upper	00
	Lower	00
Test Data	Upper	12
	Lower	34
CRC	Upper	ED
	Lower	7C

AbnomalResponse Message

Slave Address		01
Function Code		88
Error Code		03
CRC	Upper	06
	Lower	01

Write-in to specified MODBUS Register [10H**]**

Communications parameters are stored in special MODBUS address, data storage address in the list must be MODBUS. It is necessary to arrange the written data items in the holding register numbers in the order of the upper 1-byte and the lower 1-byte.

Example: frequency reference is 50.00 Hz

Command Message

Slave Address		01
Function Code		10
Starting No.	Upper	00
	Lower	02
Quantity	Upper	00
	Lower	01
No. of Data		02
Data	Upper	13
	Lower	88
CRC	Upper	AA
	Lower	E4

Normal Response Message

Slave Address		01
Function Code		10
Starting No.	Upper	00
	Lower	02
Quantity	Upper	00
	Lower	01
CRC	Upper	A0
	Lower	90

AbnomalResponse Message

Slave Address		01
Function Code		90
Error Code		03
CRC	Upper	0C
	Lower	01

Note：No. of Data is double Command Message Quantity

Save the data to the EEPROM command [10H]

The address of MODBUS register, which contains the function parameters, is stored in the private address 0x00FF and the parameters of MODBUS register are saved to the EEPROM. It is mostly like the "Enter" key of the keyboard. The saved data will not loss after power off. The saved data content is constructed by the 8-bit high and 8-bit low in order. The address 0x00FF is dedicated to save data when Pb.06 = 0.

Example: 30.00 Hz frequency reference is saved in EEPROM.

Command Message (Frequency Reference Write)

Slave Address		01
Function Code		10
Starting No.	Upper	01
	Lower	00
Quantity	Upper	00
	Lower	01
No. of Data		02
Data	Upper	0B
	Lower	B8
CRC	Upper	B1
	Lower	D2

Normal Response Message (ENTER)

Slave Address		01
Function Code		10
Starting No.	Upper	**00**
	Lower	**FF**
Quantity	Upper	00
	Lower	01
No. of Data		02
Data	Upper	01
	Lower	00
CRC	Upper	B3
	Lower	CF

AbnomalResponse Message (Under voltage writing)

Slave Address		01
Function Code		90
Error Code		23
CRC	Upper	0D
	Lower	D9

Write 2 Register [10H]: With this instruction, the value of the action command (0001) and the reference frequency (0002) can be modified simultaneously;

Notes:

You should set the operation control mode and frequency-setting mode as serial communication at the same time.

Example: Start No.1 inverter as clockwise operating, set the frequency as 50HZ. (Pb.05=0)

Command Message

Slave Address		01
Function Code		10
Starting No.	Upper	00
	Lower	01
Quantity	Upper	00
	Lower	02
No. of Data		04
Data	Upper	00
	Lower	01
	Upper	13
	Lower	88
CRC	Upper	6E
	Lower	F5

Normal Response Message

Slave Address		01
Function Code		10
Starting No.	Upper	00
	Lower	01
Quantity	Upper	00
	Lower	02
CRC	Upper	10
	Lower	08

AbnomalResponse Message

Slave Address		01
Function Code		90
Error Code		03
CRC	Upper	0C
	Lower	01

Note：No. of Data is double Command Message Quantity

●Data List:

●Command data (Only write-in is possible)

Address	Name	BIT	Descriptions
0000H		(Reserved)	
0001H	Run Operation Signal	0	Run command (1: Run 0: Stop)
		1	Reverse command (1: REV 0: FWD)
		2	External fault (1: External fault [EF0])
		3	Fault reset (1: Fault reset)
		4	Multi-function reference 1 (P3.01 X1 Terminal function)
		5	Multi-function reference 2 (P3.02 X2 Terminal function)
		6	Multi-function reference 3 (P3.03 X3 Terminal function)
		7	Multi-function reference 4 (P3.04 X4 Terminal function)
		8	Multi-function reference 5 (P3.05 X5 Terminal function)
		9	Multi-function reference 6 (P3.06 X6 Terminal function)(Only 35R5GB/37R5PB ~ 3500G)
		A	Multi-function reference 7 (P3.07 X7 Terminal function) (Only 35R5GB/37R5PB ~ 3500G)
		B	Multi-function reference 8 (P3.08 X8 Terminal function) (Only 35R5GB/37R5PB ~ 3500G)
		C-F	(Reserved) *NOTE 1
0002H	Frequency Reference	The unit is selected by the constant Pb.04 *NOTE 2	
0003H		Communication PID feedback, Data range 0-1000 corresponding to 0.0~100.0%. Set PC.15 value to 1 for monitoring PID feedback by keyboard	
0004H		Communication PID feed, Data range 0-1000 corresponding to 0.0~100.0%. Set PC.16 value to 1 for watching PID feed by keyboard	
0005-001FH		(Reserved)	

*NOTE 1: Reserved BIT always writes “0”.

*NOTE 2: If communication frequency reference is more than the maximum frequency, the communication instruction will not be accept by the inverter.

*NOTE 3: When read the only write-in registers, the inverter will response with fault content“02H”.

Save parameters [Enter instruction] (Only for write)

MODBUS address	Name	Content	Setting range	Initial value
00FFH	Enter instruction	To save the data and write the data to EPROM	0100H ~ 1004H	—

To save the parameters stored in RAM to EEPROM, Write the saved data corresponding MODBUS address to register 0x00FF, the data will be saved.

Because the life of EEPROM is about 100 thousand times. So do not use the saving data instruction continually.

The saving data instruction function is like the “ENTER” key function of keyboard. Pressing the “ENTER” key can save the modified parameter value into EEPROM. The MODBUS address 0x00FF is specially designed to save RAM data. It can be only write, if read this address; write wrong address response error will create (communication error code number 02H).

●Monitor Data (Only read-out is possible)

Address	Name	BIT	Content
0020H	Status signal	0	During Running 1: Running
		1	During Reverse 1: Reverse
		2	During Reset 1: Reset
		3	Fault 1: Fault
		4	Warning 1: Warning
		5	Multi-function contact output 1 (1: DO ON (closed) 0: OFF (open))
		6	Multi-function contact output 2 (1:Y1 ON(closed) 0: OFF (open)) (Only 35R5GB/37R5PB ~ 3500G)
		7	Multi-function contact output 3 (1:Y2 ON(closed) 0: OFF (open)) (Only 35R5GB/37R5PB ~ 3500G)
		8-F	(Reserved)

Address	Name	BIT	Content
0021H	Fault content	0	Over current (OC)
		1	Over voltage while Accelerating (Ou1)
		2	Inverter overload (OL2)
		3	Inverter overheat (OH1)
		4	Over voltage while decelerating (Ou2)
		5	Overt voltage while constant running (Ou3)
		6	Hall current check error (HE)
		7	External fault (EFO~EF1)
		8	Hardware fault (CCF3~CCF6)
		9	Motor overload (OL1)
		A	Input/output phase loss or imbalance (SP1~SP2)
		B	During under voltage (Uu1)
		C	Control power supply under voltage (Uu2)
		D	Charge circuit under voltage (Uu3)
		E	Grounding(GF) or Load short circuit (SC)
		F	Keyboard disconnected or connect abnormal (CCF1~CCF2)
0022H	Warning content	0	Bus under voltage warning (Uu)
		1	Inverter overload warning (OLP2)
		2	Analog input AI1 abnormal (AE1)
		3	Analog input AI 2 abnormal (AE 2)
		4	Inverter overheat warning (OH2)
		5	(Reversed)
		6	Function setting illogical, such as SS0-2 and TT0-1 aren't entirely set (SF1)
		7	Running mode is not corresponding to the Terminal setting (SF2)
		8	Output Terminal function selection 27, 28 not reach to 3(SF3)
		9-F	(Reserved)
0023H	Frequency reference before compensation		
0024H	Frequency reference after compensation		

Address	Name	BIT	Content		
0025H	AI1 analog input(V)				
0026H	AI2 analog input(V)				
0027H	Output current (A)				
0028H	Output voltage (V)				
0029H	Reference frequency (Hz)				
002AH	(Reserved)				
002BH	Terminal status	0	Terminal X1	1:CLOSED	0:OPEN
		1	Terminal X2	1:CLOSED	0:OPEN
		2	Terminal X3	1:CLOSED	0:OPEN
		3	Terminal X4	1:CLOSED	0:OPEN
		4	Terminal X5	1:CLOSED	0:OPEN
		5	Terminal X6 (Only 35R5GB/37R5PB ~ 3500G)	1:CLOSED	0:OPEN
		6	Terminal X7 (Only 35R5GB/37R5PB ~ 3500G)	1:CLOSED	0:OPEN
		7	Terminal X8 (Only 35R5GB/37R5PB ~ 3500G)	1:CLOSED	0:OPEN
		8	Terminal DO	1:CLOSED	0:OPEN
		9	Terminal Y1 (Only 35R5GB/37R5PB ~ 3500G)	1:CLOSED	0:OPEN
		A	Terminal Y2 (Only 35R5GB/37R5PB ~ 3500G)	1:CLOSED	0:OPEN
		B	RELAY 1	1:CLOSED	0:OPEN
		C	RELAY 2 (Only 35R5GB/37R5PB ~ 3500G)	1:CLOSED	0:OPEN
		D-F	(Reserved)		
002CH		(Reserved)			

Address	Name	BIT	Content		
002DH	Multi-function output terminal monitor	0	DO	1:“ON”	0:“OFF”
		1	Y1(Only35R5GB/37R5PB ~ 3500G)	1:“ON”	0:“OFF”
		2	Y2(Only35R5GB/37R5PB ~ 3500G)	1:“ON”	0:“OFF”
		3	RELAY 1	1:“ON”	0:“OFF”
		4	RELAY2(Only 35R5GB/37R5PB ~ 3500G)	1:“ON”	0:“OFF”
		5-F	(Reserved)		
002EH-0030H	(Reserved)				
0031H	DC bus voltage				
0032H	Output torque				
0033H	Rotate speed (r/min)				
0034H	Reference speed (r/min)				
0035H	Linear speed (m/s)				
0036H	Reference line speed (m/s)				
0037H	Output power				
0038H	PID feedback(%)				
0039H	PID feed(%)				
003AH	Setting length				
003BH	Actual length				
003CH	Exterior count				
003DH~003FH	(Reserved)				
0040H~004CH	Terminal state, 0040H ~ 004CH in turn corresponds to the BIT0 ~ BITC 002BH				
004DH~00FEH	(Reserved)				

●**MODBUS registers address:**

Function parameter No. (DEC)	MODBUS registers address No. (HEX)
(ENTER to save data)	(00FFH)
(Only write-in data)	(0001H~001FH)
(Only read-out data)	(0020H~004FH)
P0.00~P0.22	0100H~ 0116H*
P1.00~P1.16	0200H~ 0210H
P2.00~P2.34	0300H~ 0322H
P3.00~P3.26	0400H~ 041AH
P4.00~P4.25	0500H~ 0519H
P5.00~P5.36	0600H~ 0624H
P6.00~P6.11	0700H~ 070BH
P7.00~P7.18	0800H~ 0812H
P8.00~P8.04	0900H~ 0906H
P9.00~P9.09	0A00H~ 0A09H
PA00~PA.09	0B00H~ 0B09H
Pb.00~Pb.06	0C00H~ 0C08H
PC.00~PC.22	0D00H~ 0D16H
Pd.00~Pd.19	0E00H~ 0E13H
PE.00~PE.12	0F00H~ 0F0CH
PF.00~PF.03	1000H~ 1004H
(Reserved, for parameter extending)	(1100H~FFFFH)

*Note

In the function table, the MODBUS address coding rules:

High 8 bits HI = (Parameter group number + 1)

Low 8 bits LO = (Function Parameter number)

The function parameter P0.11 can be only read. In addition, function group PF can't be read and written.

Reading reserved address will return communication error code "02 H".

●Fault Response Error Codes with MODBUS

Error Code	Fault Content
01H	Function error Unregistered function code, beyond 03H,08H,10H
02H	Register No. error Unrecognized register no. No register address, register address is 0000. Read only write-in MODBUS address [0x00FFH] . Not open the MODBUS address communication function. (*NOTE 1)
03H	Data length error No. of data items <1 or > 2
21H	Parameter setting error Write upper/lower limit error. (*NOTE2)
22H	Write mode error. Write data to the parameters that can't be changed in running state.(*NOTE 3) Parameter is protected to be written. Write is disabled for the register.(* NOTE 4) Write data to the only read-out register address/ Write data to EEPROM during "CCF3" fault.
23H	Write in date during under voltage. Save data during under voltage.
24H	While data is saving by keyboard, write communication data. (During fault reset, power loss or data is saving).
25H	CRC check error.(*NOTE 5)

*NOTE 1: Write communication frequency reference to MODBUS addresses 0002H while P0.01 and P0.02 select other frequency setting modes not serial communication mode. Set P0.01 or P0.02 as communication function. Write communication run command to MODBUS address 0001H while P0.04 selects other control mode not serial communication mode.

* NOTE 2: When the written value is out of the range of upper and the lower limitation or the associated parameters limitation, MODBUS response error "21H" will be generated. Moreover, the values of the registers will not be changed.

* NOTE 3: Write data when the inverter is in running state. Check the data write-in possibility in function parameter table. If the data needs to be changed, stop the inverter first and then change the value of data.

* NOTE 4: Write data when the parameters are protected by parameter PF.01, set PF.01 to zero, then the protected data can be changed.

* NOTE5: CRC16 error check has happened. The inverter will answer with fault code "25H" for the user debugging.

Appendix 5 Keyboard Mounting Size (Unit: mm)

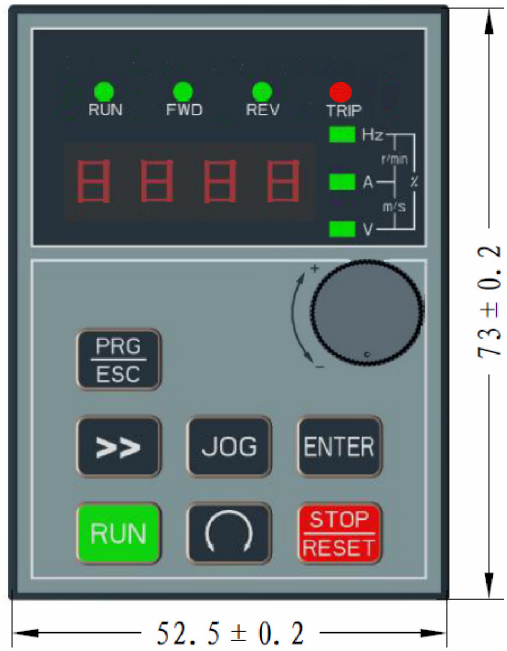


Fig. A5-1 Keyboard Mounting Size of S2R4GB~3004GB/35R5PB

Fig. A5-2 Keyboard Mounting Size of 35R5GB/37R5PB~3500G

Appendix 6 Inverter Warranty

User name:	
User address:	
Contact:	Tel:
Post code:	Fax:
Type:	Num:
Purchase date:	Fault date:

Fault condition

Motor: KW Poles	Motor uses:
Failure date: Input power no-load load % Others:	
Fault phenomena:	
Fault display: OC OL OU OH LU None Others:	
Used control terminal:	
Reset operation: can can't	Output voltage: have no
Working time: hour	Fault frequency:

Installation situations

Source voltage U-V V, V-W V,W-U V	
Transformer capacity: KVA	Inverter grounding : Yes No
Distance from power: m	Distance from motor: m
Vibration: None General Strong	Dust: None General Much
Other situations:	

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