

|QZ9000| Series Lift Inverter

Manual

Thank you very much for choosing QZ9000 series high-performance vector control special for crane inverter.

Please read the operation manual carefully before installation, operation, maintenance or inspection in this manual, the safety precautions were sorted to “  WARNING” or “  CAUTION” .

“  WARNING” Indicates a potentially dangerous situation which, if can not avoid will result in death or serious injury.

“  CAUTION” Indicates a potentially dangerous situation which, if can not avoid will cause minor or moderate injury and damage the device. This symbol is also used for warning any un-safety operation. In some cases, even the contents of “CAUTION” still can cause series accident. Please follow these important precautions in any situation.

The figures in this instruction manual are for convenience with description, they may have slight differences compared to the product, and the product update can also cause slight differences between the figure and product, the actual sizes are subject to actual products.

Please keep the operation manual handy for future reference, maintenance, inspection and repair.

If you have any questions, please contact us or our agents in time, you will always receive our best attention,

Chapter 1 Introduction

1.1 Technology Features

Item		QZ9000	
Basic Function	Control Mode	V/F control Sensorless flux vector control (SVC) Close-loop vector control (FVC)	
	Maximum frequency	0~150Hz	
	Carrier frequency	1kHz~12kHz The carrier frequency is automatically adjusted based on the load features.	
	Input frequency resolution	Digital setting:0.01Hz Analog setting: Maximum frequency x 0.025%	
	Start torque	G type:0.25Hz/150%(SVC); 0Hz/180% (FVC)	
	Speed range	1: 200 (SVC)	1:1000 (FVC)
	Speed stability accuracy	±0.5% (SVC)	±0.02% (FVC)
	Torque control accuracy	±5% (SVC), ±3% (FVC)	
	Overload capacity	G Type:60s for 150% of the rated current, 3s for 180% of the rated current.	
	Torque boost	Auto-boost; Customized boost: 0.1%~30.0%	
	Ramp Mode	Straight-line or curve ramp. Three groups of acceleration/deceleration time with the range of 0.00`6500.0s	
	Multiple speeds	It implements up to 8 speeds via terminal states	
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically when the mains voltage changes	
	Over-voltage/over-current stall control	The current and voltage are limited automatically during the running process so as to avoid frequent tripping due to over voltage/over current	
	Rapid current limit	It helps to avoid frequent over current faults of the inverter.	
	Torque limit and control	It can limit the torque automatically and prevent frequent over current tripping during the running process. Torque control can be implemented in the	

		FVC mode.
Special Function	Support for kinds of PG cards	Support for PG cards of resolver, differential, open collector
	Instantaneous stop doesn't stop	The load feedback energy compensates the voltage reduction so that the inverter can continue to run for a short time.
	Communication	RS-485, CAN
	Protection mode	Motor short-circuit detection at power-on, input/output phase loss protection, over current protection, over voltage protection, under voltage protection, overheat protection and overload protection
	Lifting process control	Inverter built in anti-sway, grab and other complex lifting process control, used for lifting, translation, slewing and other driving in lifting equipment.
Input/Output terminal	Input terminal	Maximum 10 digital input terminals 2 analog input terminals 1 voltage input (only support for 0~10V,) , 1 voltage input(0~10V) or current input (4~20mA) (Different power are with different terminals, see details at circuit description)
	Frequency source	Digital setting, analog voltage setting, analog current setting, communication setting, serial port setting. You can perform switchover in various ways.
	Command source	Operation panel/Control terminals/Serial communication port You can perform switchover between these sources in various ways.
	Output terminal	2 digital output terminals 2 relay output terminals
Display & Operati on panel	LED display	It display the parameter
	Key locking and function selection	It can lock the keys partially or completely and define the function range of some keys so as to prevent mal-function.
Environment	Installation location	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapor, drip or salt.
	Altitude	Lower than 1000m
	Ambient	— 10℃~ + 40℃ (de-rated if the ambient

temperature	temperature is between 40℃~50℃)
Humidity	Less than 95%RH, without condensing
Vibration	Less than 5.9m/s2 (0.6g)
Storage temperature	-20℃~+60℃

1.2 Description of nameplate

MODEL: QZ9400-7R5G-□

INPUT:3PH 380V 50Hz/60Hz

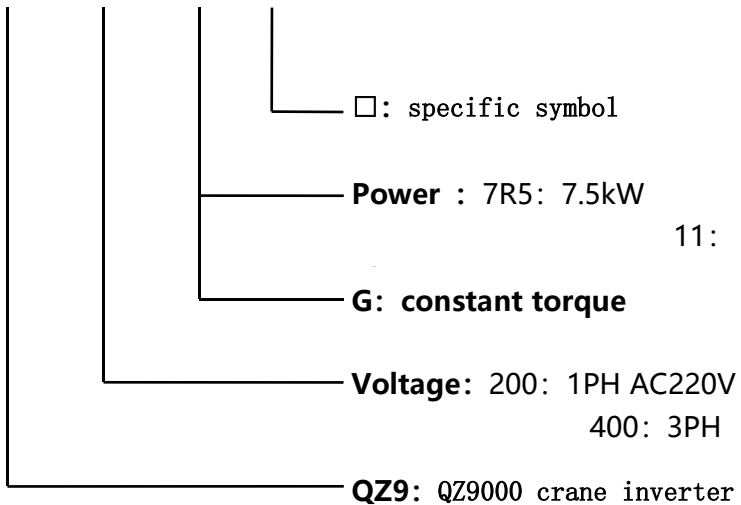
OUTPUT:3PH 380V 17A

FREQ RANGE:0.1-150HZ 7.5kW



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Model: QZ9 - 400 - 7R5G - □



1.3 Selection guide

Voltage: 3PH AC380V $\pm$ 15%

Model No.	Input voltage	Rated output power(KW)	Rated input current (A)	Rated output current (A)	Motor Power (KW)
QZ9400-7R5G	3PH AC380V $\pm$ 15%	7.5	20.0	17.0	7.5
QZ9400-11G		11	26.0	25.0	11
QZ9400-15G		15	35.0	32.0	15
QZ9400-18.5G		18.5	38.0	37.0	18.5
QZ9400-22G		22	46.0	45.0	22
QZ9400-30G		30	62.0	60.0	30
QZ9400-37G		37	76.0	75.0	37
QZ9400-45G/		45	92.0	90.0	45
QZ9400-55G		55	113.0	110.0	55
QZ9400-75G		75	157.0	150.0	75
QZ9400-90G		90	180.0	176.0	90
QZ9400-110G		110	214.0	210.0	110
QZ9400-132G		132	256.0	253.0	132
QZ9400-160G		160	307.0	300.0	160
QZ9400-200G		200	385.0	380.0	200
QZ9400-220G		220	430.0	420.0	220
QZ9400-250G		250	475.0	470.0	250
QZ9400-280G		280	525.0	520.0	280
QZ9400-315G		315	610.0	600.0	315
QZ9400-350G		350	665.0	640.0	350
QZ9400-400G		400	700.0	690.0	400
QZ9400-450G		450	800.0	790.0	450

1.4 Installation

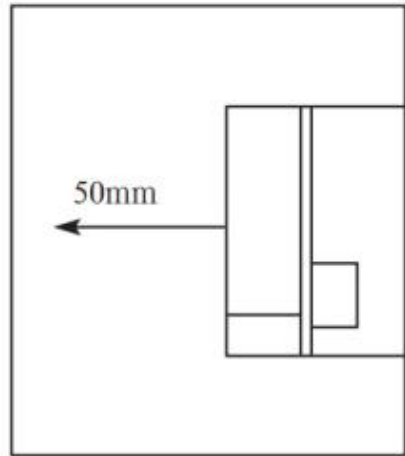
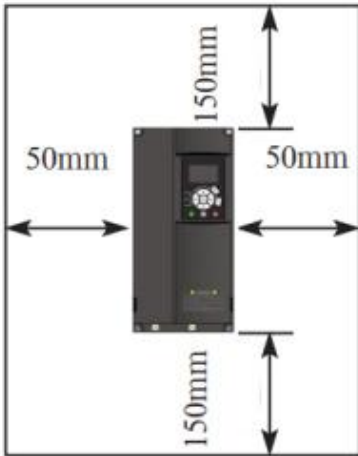
1.4.1 Environment Requirement

Inverter's installation environment on the service life of inverter, and has direct influence on the normal function, Inverter can't satisfy the specification of environment, protection or fault could lead to the Inverter QZ9000 series inverter of wall hung inverter, please use the vertical installation so that the air convection and the heat dissipation effect can be better.

Inverter's installation environment, please make sure it must comply with

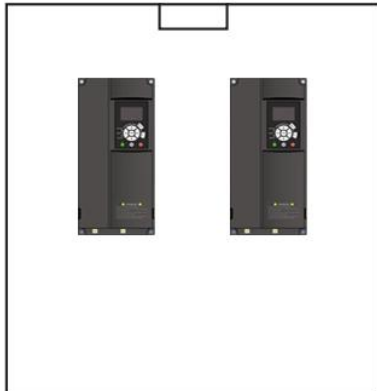
- (01) - 10 °C to + 40 °C ambient temperature
- (02) Environment humidity 0 ~ 95% and no condensation
- (03) Avoid direct sunlight
- (04) Environment does not contain corrosive gas and liquid
- (05) Environment without dust, floating fiber, cotton and metal particles
- (06) Away from the radioactive material and fuel
- (07) Away from electromagnetic interference source (such as electric welding machine, big power machine)
- (08) Installed planar solid, no vibration, if it cannot avoid vibration, please add antivibration pads to reduce the vibration
- (09) Please install the inverter in the well ventilated place, easy to check and maintain, and install on the solid non-combustible material, away from the heating element (such as braking resistance, etc.)
- (10) Inverter can output the rated power when installed in the altitude of lower than 1000m. It will be derated when the altitude is higher than 1000m.
- (11) Inverter's installation, please reserve enough space, especially many inverters' installation, please pay attention to the placement of the Inverter, and configure cooling fans, make the environment temperature lower than 45 °C.

(1) Single Inverter Installation:

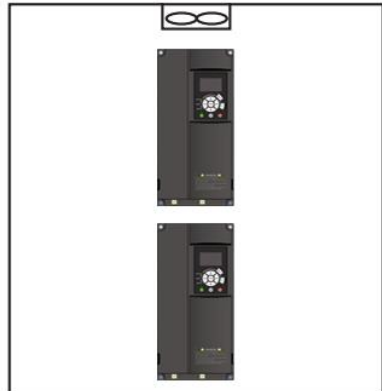


(2) Multiple inverters installed in one control cabinet

① When encasing the multiple inverters, install them in parallel as a cooling measure.

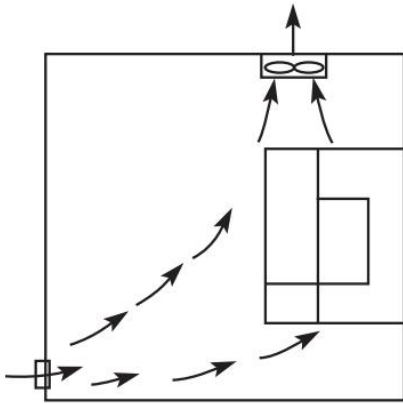


Favorable placing

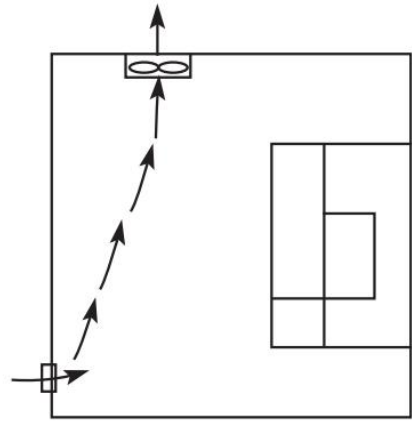


Unfavorable

② If multiple inverter are installed in one control cabinet, please leave enough clearances and take cooling measure

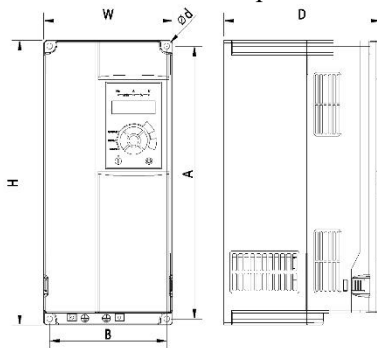


Correct installation position of the fan



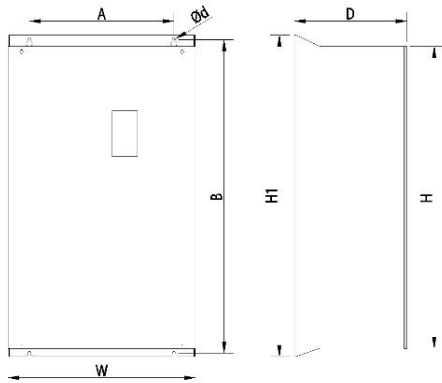
Incorrect installation position of the fan

1.4.2 The inverter' s outside shape and installation dimensions



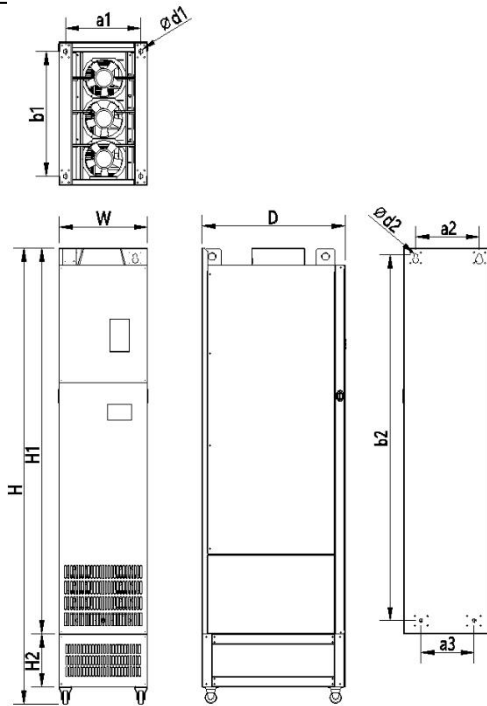
TYPE
B

TYPE	Inverter model	W	H	D	A	B	Ød
B	QZ9400-7R5G QZ9400-11G	106	240	168	230	96	4.5
B	QZ9400-15G QZ9400-18.5G QZ9400-22G	151	332	183	318	137	7
B	QZ9400-30G QZ9400-37G	217	400	216	385	202	7



TYPE
C

TYPE	Inverter model	W	H	H1	D	A	B	$\varnothing d$
C	QZ9400-45G QZ9400-55G	300	440	470	240	200	455	9
C	QZ9400-75G QZ9400-90G QZ9400-110G	275	590	630	310	200	612	9
C	QZ9400-132G QZ9400-160G	400	675	715	310	320	695	11



TYPE D

TYPE	Inverter model	Outline dimension(mm)					Installation Size (mm)			Wall mount Installation Size (mm)			
		W	H	H1	H2	D	a1	b1	d1	a2	a3	b2	d2
D	QZ9400-200G QZ9400-220G	300	1445	1180	200	500	250	430	14	220	150	1135	13
D	QZ9400-250G	330	1595	1330	200	545	280	475	14	220	185	1275	13
D	QZ9400-280G QZ9400-315G	325	1495	1230	200	545	275	470	14	225	185	1175	14
D	QZ9400-350G QZ9400-400G QZ9400-450G	335	1720	1455	200	545	285	470	14	240	200	1380	14

**WARNING**

⌘ Only the person, who has passed the training on the design, installation, commissioning and operation of the device and gotten the certification, is permitted to operate this equipment.

⌘ Even if the inverter is not running, the following terminals still have dangerous voltage:

-Power Terminals: R,S,T

-Motor Connection Terminals: U,V,W

⌘ When power off, should not install the inverter until 10 minutes later, which can ensure the device discharge completely.

⌘ Do not connect the power supply to output terminals (U, V, W), other wise it will cause the drive damage.

⌘ Before power on, please make sure the R,S,T and U,V,W are connected correctly.

⌘ Do not touch the inverter with wet hands, other wise, the electric shock may happen.

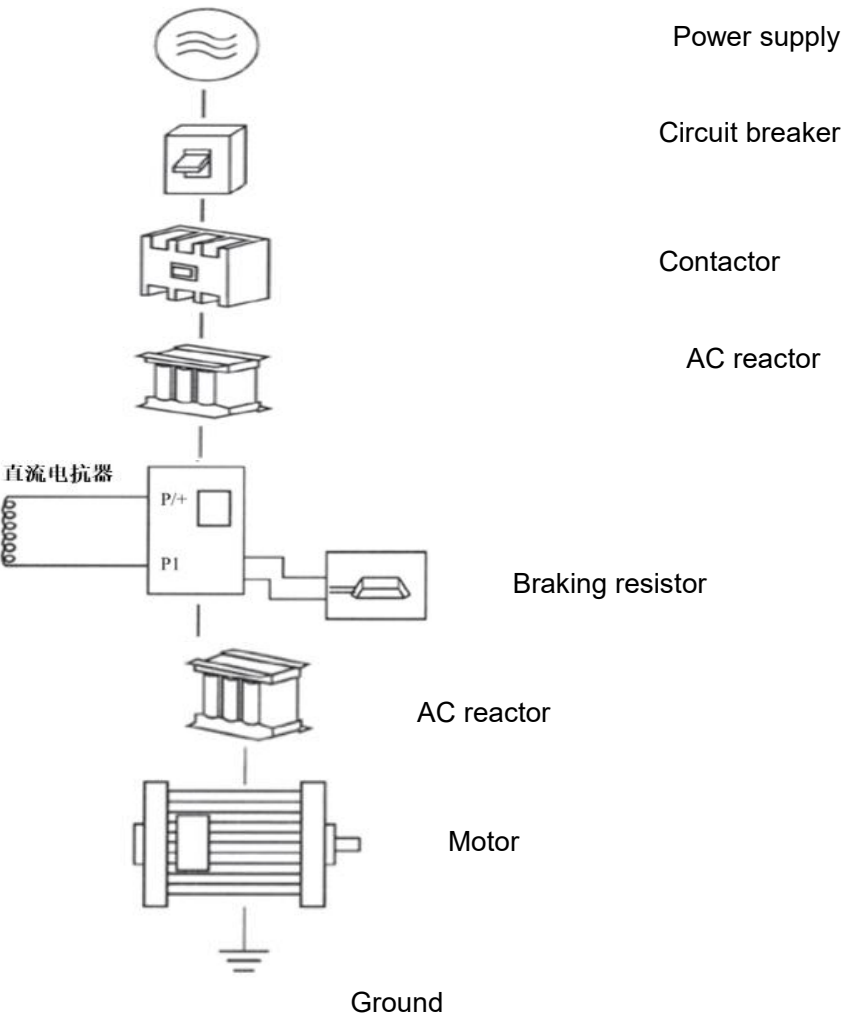
**CAUTION**

⌘ Make sure the rated voltage of the inverter is corresponding to the AC power voltage.

⌘ Make sure the power supply cable and motor cable are well connected.

Chapter 2 Wiring

2.1 Connection of Peripheral Devices



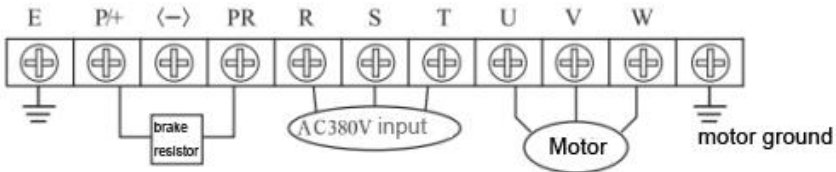
2.2 Terminal diagram

2.2.1 Main circuit terminal description

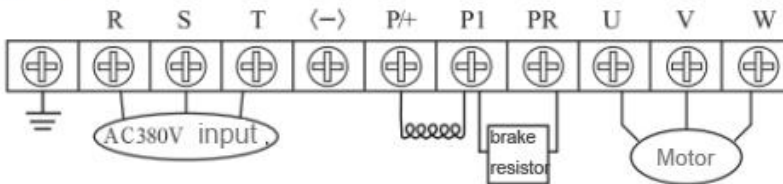
Name	Function description
E 	Terminal of ground
R、S、 T	Power input
P/+、 (+)	DC voltage +
P1	Remove the connector between the P / + and P1, connect the DC reactor (45KW~315KW with the terminal), 350~450KW built in DC reactor
PR	Braking resistor can be connect between P1 and PR or (+) and PR
(-)	Braking unit can be connected DC voltage - :P1 、 (-) or (+) 、 (-)
U、 V、 W	Connect to 3 phase motor

2.3 Main circuit wiring example

Main circuit terminal wiring diagram (Without reactor)



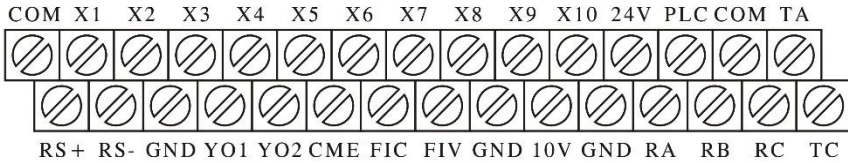
With reactor



Note: Please pay attention to the position of the terminal, otherwise the inverter will be damaged

2.4 Control circuit terminal

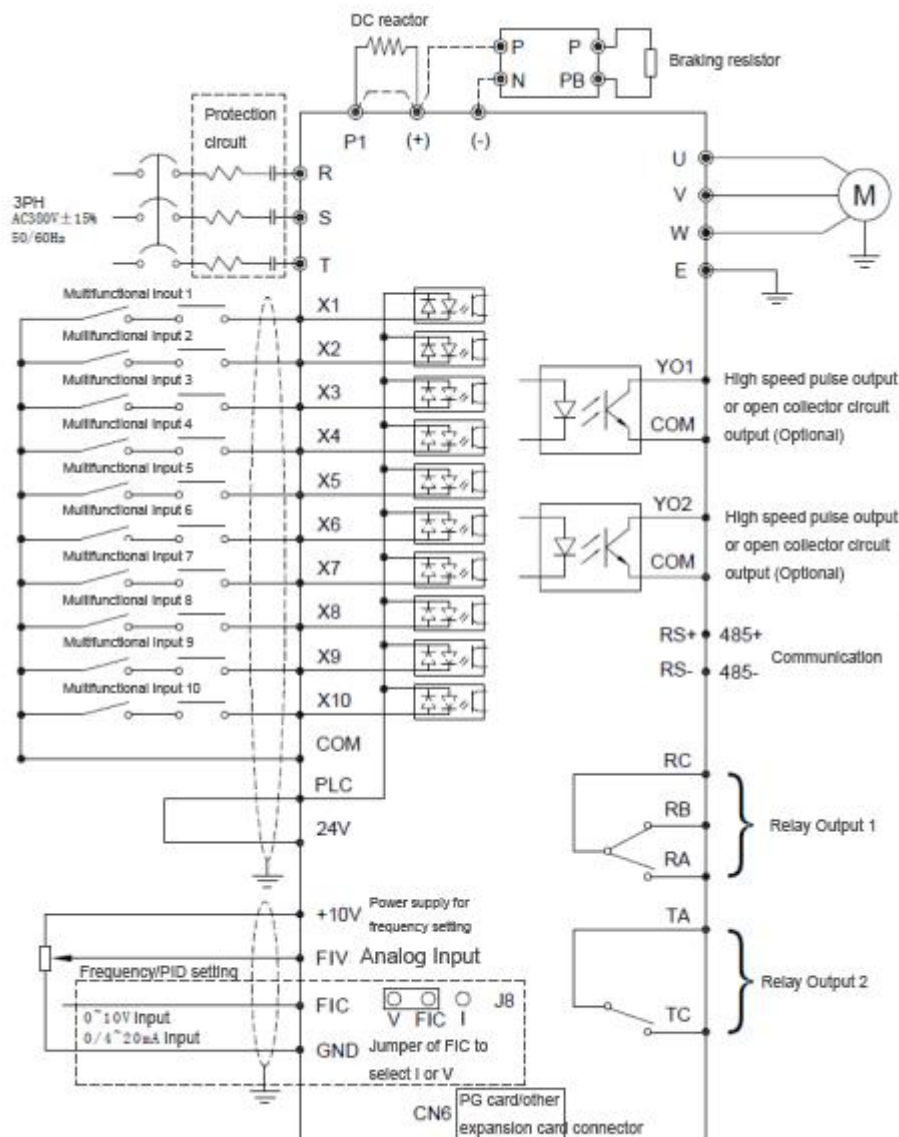
2.4.1 Main circuit terminal



2.4.2 Main circuit terminal function description

Terminal Name	Terminal function and description
X1-X10	ON-OFF signal input, optical coupling with PLC and COM. Input voltage range: 9-30V Input impedance: 3.3k Ω
PLC	External power supply. +24V terminal is connected to PLC terminal as default setting. If user need external power disconnect +24V with PW terminal and connect PLC terminal with external power supply.
+24V	Provide output power supply of +24V. Maximum output current: 150mA
COM	Common terminal for +24V
FIV	Analog input, 0~10V, Input impedance: 20k Ω
FIC	Analog input, 0~10V/0~20mA, switched by J8. Input impedance: 10k Ω (voltage input)/250k Ω (current input)
+10V	Supply +10V for inverter
GND	Common ground terminal of analog signal and +10v. GND must isolated from COM
YO1/YO2	Open collector output terminal, its common terminal as COM
RA 、 RB 、 RC	Relay output: RC common; RB-NC; RA-NO Contact capacity: AC250V/3A, DC30V/1A
TA、 TC	Relay output: TC common; TA-NO Contact capacity: AC250V/3A, DC30V/1A
RS+、 RS-	485 communication port. 485 differential signal, +, -

2.5 Typical wiring diagram



2.6 Peripheral Devices Specifications

Applicable Inverter Type	Motor output (KW)	Main Circuit Cable Type (mm ²)	Breaker selection (A)	Input side Magnetic Contractor (A)
QZ9400-7R5G	7.5	4	32	25
QZ9400-11G	11	4	40	32
QZ9400-15G	15	6	50	38
QZ9400-18.5G	18.5	10	50	40
QZ9400-22G	22	10	63	50
QZ9400-30G	30	16	100	65
QZ9400-37G	37	25	100	80
QZ9400-45G	45	35	125	95
QZ9400-55G	55	50	160	115
QZ9400-75G	75	70	225	170
QZ9400-90G	90	95	250	205
QZ9400-110G	110	120	315	245
QZ9400-132G	132	120	350	300
QZ9400-160G	160	150	400	300
QZ9400-200G	200	185	500	410
QZ9400-220G	220	240	630	475
QZ9400-250G	250	240	630	475
QZ9400-280G	280	240	800	620
QZ9400-315G	315	150*2	800	620
QZ9400-350G	350	185*2	1000	800
QZ9400-400G	400	240*2	1250	800
QZ9400-450G	450	240*2	1250	1000

2.7 Main Circuit Wiring

2.7.1 Wiring at input side of main circuit

2.7.1.1 Circuit breaker

It is necessary to connect a circuit breaker which is compatible with the capacity of inverter between 3ph AC power supply and power input terminals (R,S,T). The capacity of breaker is 1.5~2 times to the rated current of inverter. For details, see <specifications of Breaker, Cable, and Contactor>.

2.7.1.2 Electromagnetic contactor

In order to cut off the input power effectively when something is wrong in the system, contactor should be installed at the input side to control the ON-OFF of the main circuit power supply.

2.7.1.3 Input AC reactor

In order to prevent the rectifier damage result from the large current, AC reactor should be installed at the input side. It can also prevent rectifier from sudden variation of power voltage or harmonic generated by phase-control load.

2.7.2 Wiring at inverter side of main circuit

2.7.2.1 DC reactor

DC reactor can improve power factor, it can prevent the rectifier bridge destroy when overload due to connect a big capacity transformer, it can prevent the destroy of the rectifier circuit while power grid suddenly change or phase control overload.

2.7.2.2 Braking unit and braking resistor

Inverter of 380V below 315kW have built-in braking unit. In order to dissipate the regenerative energy generated by dynamic braking, the braking resistor should be installed at (+) and PB terminals. The wiring length of the braking resistor should be less than 5m. The temperature of braking resistor will increase because the regenerative energy will be transformed to heat. Safety protection and good ventilation is recommended.

Inverter need connect external braking unit which should be installed at (+) and (-) terminals. The cable between inverter and braking unit should be less than 5m. The cable between braking unit and braking resistor should be less than 10m.

Be sure that the electric polarity of (+)(-) terminal is right; it is not allowed to connect (+) with (-) terminals directly, otherwise inverter damage or fire may occur.

2.7.3 Wiring at motor side of main circuit.

Output reactor must be installed in the following condition. When the distance between inverter and motor is more than 50m, inverter may be tripped by over-current protection frequently because of the large leakage current resulted from the parasitic capacitance with ground. And the same time to avoid the damage of motor insulation, the output reactor should be installed.

2.7.4 Grounding wiring (E)

In order to ensure safety and prevent electrical shock and fire, terminal E must be grounded with ground resistance. The ground wire should be big and short, and

it is better to use copper wire ($>3.5 \text{ mm}^2$). When multiple inverters need to be grounded, do not loop the ground wire.

2.8 Control loop wiring

2.8.1 Note

Please use multi-core shielded cable or twisted pair to connect terminals, the shielded cable that next to inverter should be connected to the ground terminal E. When wiring, control cable should be more than 20cm away from power cable, motor cable, relay cable, contactor cable. Do not make it parallel wiring, but vertical wiring, in case of malfunction due to external interfere.

2.9 Installation Guidline to EMC compliance

2.9.1 EMC introduce

EMC is the abbreviation of electromagnetic compatible, which means the device or system has the ability to work normally in the electromagnetic environment and will not generate any electromagnetic interference to other equipment. EMC includes two subjects: electromagnetic interference and electromagnetic anti-jamming.

According to the transmission mode, Electromagnetic interference can be divided into two categories: conducted interference and radiated interference. Conducted interference is the interference transmitted by conductor. Therefore, any conductors (such as wire, transmission line, inductor, capacitor and so on) are the transmission channels of the interference.

Radiated interference is the interference transmitted in electromagnetic wave, and the energy is inverse proportional to the square of distance.

Three necessary conditions or essentials of electromagnetic interference are: interference source, transmission channel and sensitive receiver. For customers, the solution of EMC problem is mainly in transmission channel because of the device attribute of disturbance source and receiver can not be changed.

2.9.2 Like other electric or electronic devices, inverter is not only an electromagnetic interference source but also an electromagnetic receiver. The operating principle of inverter determines that it can produce certain electromagnetic noise. At the same time inverter should be designed with certain anti-jamming ability to ensure the smooth working in certain electromagnetic environment. Following is its EMC features:

2.9.2.1 Input current is non-sine wave. The input current includes large amount of high-harmonic waves that can cause electromagnetic interference, decrease the grid power factor and increase the line loss.

2.9.2.2 Output voltage is high frequency PWM wave, which can increase the temperature rise and shorten the life of motor. And the leakage current will also increase, which can lead to the leakage protection device malfunction and generate strong electromagnetic interference to influence the reliability of other electric

devices.

2.9.2.3 As the electromagnetic receiver, too strong interference will damage the inverter and influence the reliability of other electric devices.

2.9.2.4 In the system, EMS and EMI of inverter coexist. Decrease the EMI of inverter can increase its EMS ability.

2.9.3 EMC installation guideline

In order to ensure all electric devices in the same system to work smoothly, this section, based on EMC features of inverter, introduces EMC installation process in several aspects of application (noise control, site wiring, grounding, leakage current and power supply filter). The good effective of EMC will depend on the good effective of all of these five aspects.

2.9.3.1 Noise control\

All the connections to the control terminals must use shielded wire. And the shield layer of the wire must ground near the wire entrance of inverter. The ground mode is 360 degree annular connection formed by cable clips. It is strictly prohibitive to connect the twisted shielding layer to the ground of inverter, which greatly decrease or loses the shielding effect.

2.9.3.2 Site wiring

Power supply wiring: the power should be separated supplied from electrical transformer. Normally it is 5 core wires, three of which are fire wires, one of which is the neutral wire, three of which is the ground wire. It is strictly prohibitive to use the same line to be both neutral wire and the ground wire.

Device categorization: there are different electric devices contained in one control cabinet, such as inverter, filter, PLC and instrument etc, which have different ability of emitting and withstanding electromagnetic noise. Therefore, it needs to categorize these devices into strong noise device and noise sensitive device. The same kinds of device should be placed in the same aream and the distance between devices of different category should be more than 20cm. Wire arrangement inside the control cabinet: thre are signal wire(light current) to make the power cable(strong current) in one cabinet. For the inverter, the power cables are categorized into input cable and output cable. Signal wires can be easily disturbed by power cables to make the equipment malfunction.

When wiring , signal cables and power cables should be arranged in different area. It is strictly prohibitive to arrange them in parallel or interlacement at a close distance (less than 20cm) or tie them together. If the signal wires have to cross the power cables, they should be arranged in 90 angles. Power input and output cables should not either be arranged in interlacement or tied together, especially when installed the EMC filter. Otherwise the distributed capacitances of its input and output power cable can be coupling each other to make the EMC filter out of function.

2.9.3.3 Inverter must be ground safely when in operation. Grounding enjoys priority in all EMC methods because it does not only ensure the safety of

equipment and persons, but also is the simplest, most effective and lowest cost solution for EMC problems. Grounding has three categories: special pole grounding, common pole grounding and series-wound grounding. Different control system should use special pole grounding, and different devices in the same control system should use common pole grounding, and different devices connected by same power cable should use series-wound grounding.

2.9.3.4 Leakage current

Leakage current includes line-to-line leakage current and over-ground leakage current. Its value depends on distributed capacitances and carrier frequency of inverter. The over-ground leakage current, which is current passing through the common ground wire, can not only flow into inverter system but also other devices. It also can make leakage current circuit breaker, relay or other devices malfunction. The value of line-to-line leakage current, which means the leakage current passing through distributed capacitors of input output wire, depends on the carrier frequency of inverter, the length and section areas of motor cables. The higher carrier frequency of inverter, the longer of the motor cable and/or the bigger cable section area, the larger leakage current will occur.

Countermeasure: decreasing the carrier frequency can effectively decrease the leakage current. In the case of motor cable is relatively long(longer than 50m), it is necessary to install AC reactor or sinusoidal wave filter at the output side, and when it is even longer, it is necessary to install one reactor at every certain distance.

2.9.3.5 EMC filter

EMC filter has a great effect of electromagnetic decoupling, so it is preferred for customer to install it.

For inverter, noise filter has following categories:

Noise filter installed at the input side of inverter;

Install noise isolation for other equipment by means of isolation transformer or power filter.

2.9.4 When install inverter and EMI filter according to the operate manual and wiring, it can meet below requiremen:

EN61000-6-4: Pass electromagnetic interference test in industrial environment.

EN61800-3: Meet the require of the EN61800-3 electromagnetic radiation standard (II environment), If add EMC filter, it can meet the require of EN61000-6-3 electromagnetic radiation standard(Home environment) and EN61000-6-4 electromagnetic radiation standard (Industrial environment)

Chapter 3 Operation

3.1 Keypad description

3.1.1 Keypad

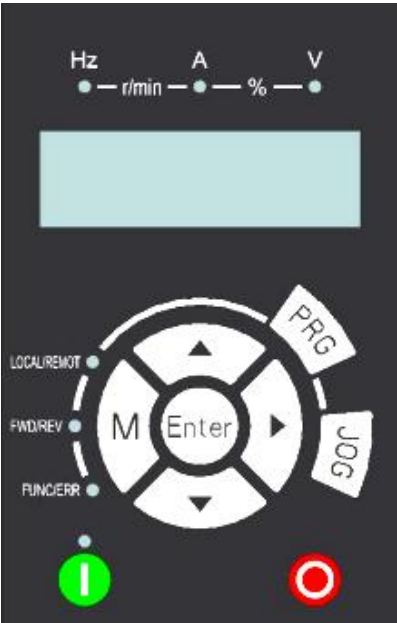


Figure 3-1

3.1.2Function Key description

Key	Name	Description
PRG	Programming key	Entry or escape of first-level menu
ENTER	Enter key	Progressively enter menu and confirm parameters
▲	UP Increment Key	Increase data or function codes
▼	Down Decrement Key	Decrease data or function codes
▶	Shift Key	In parameter setting mode, press this button to select the bit to be modified. In the other modes, cyclically displays parameters by right shift

	Run Key	Start to run the inverter in keypad control mode
	Stop/Fault reset Key	In running status, restricted by F7.04, can be used to stop the inverter. When fault alarm, can be used to reset the inverter without any restriction.
JOG and M	No function	

3.1.3 Indicator light description

Symbol	Description
Hz	Frequency Unit
A	Current Unit
V	Voltage Unit
FWD/REV	Forward/Reverse indicator light: Light off indicate Forward status; Light on indicate Reverse status
LOCAL/REMOT	Indicator light in control mode It indicates in the operate panel control status when light off, it indicates in the terminal control status when light linking, it indicates inverter is in run status when light on.
FUNC/ERR	Warning indicator It indicates inverter run regular when light off, it indicates inverter overload pre-warning when light linking, it indicates inverter fault when light on.
	Running state indicator It indicates inverter is stop when light off, it indicates inverter is auto-tuning when light linking, it indicates inverter is running when light on.

3.2 Operation Process

3.2.1 Three levels of menu are:

- a. Function code group (First-level)
- b. Function code (Second-level)
- c. Function code value (Third-level)

in the running to protect state, inverter can't run.

3.2.3 Motor parameter auto-tuning

Choosing no PG vector control operation mode, input motor nameplate parameters must be accurate, inverter will base on nameplate parameters matching standard motor; In order to get better control performance, motor parameter auto-tuning is suggested and auto-tuning steps are as follows:

First will run command channel choice (P0.02) choice for keyboard commands. Then the actual parameters according to the motor, please input the following parameters.

P1.01: the motor rated power;

P1.02: the motor rated voltage;

P1.03: the motor rated current;

P1.04: the motor rated frequency;

P1.05: the motor rated speed.

With PG vector control, need to set below parameters:

P2.27- Number of Encoder lines

P2.28- Encoder type

In the process of auto-tuning, the keypad display STUDY, when it display frequency, motor parameter self-learning is finished.

Note: in the process of auto-tuning, motor and load should be released, otherwise, the motor parameters obtained from the auto-tuning may not be correct.

The detail operate please refer to P2.37 description.

3.3 Running state

3.3.1 Power-on initialization

In the process of the Inverter's power-on, the system first initializes, LED display for "9000", and 7 lights are all bright. After the initialization is complete, the drive is in the standby mode.

3.3.2 Standby Status

In the stop or running status, can display a variety of state parameters. Press left button to select

3.3.3 Motor parameters self-learning please refer to the detailed descriptions of P2.37 function code.

3.3.4 In the running state, kinds of status parameters can choose whether to display the status parameters: operating frequency, set frequency, bus voltage, output voltage, output current, running rotating speed, output frequency, output torque, ON-OFF input state, open collector output state, analog input FIV voltage, analog input FIC voltage, torque setting value.

3.3.5 Failure: inverter offers a variety of fault information, please refer QZ9000 series inverter faults and their countermeasures.

3.4 Quick commissioning

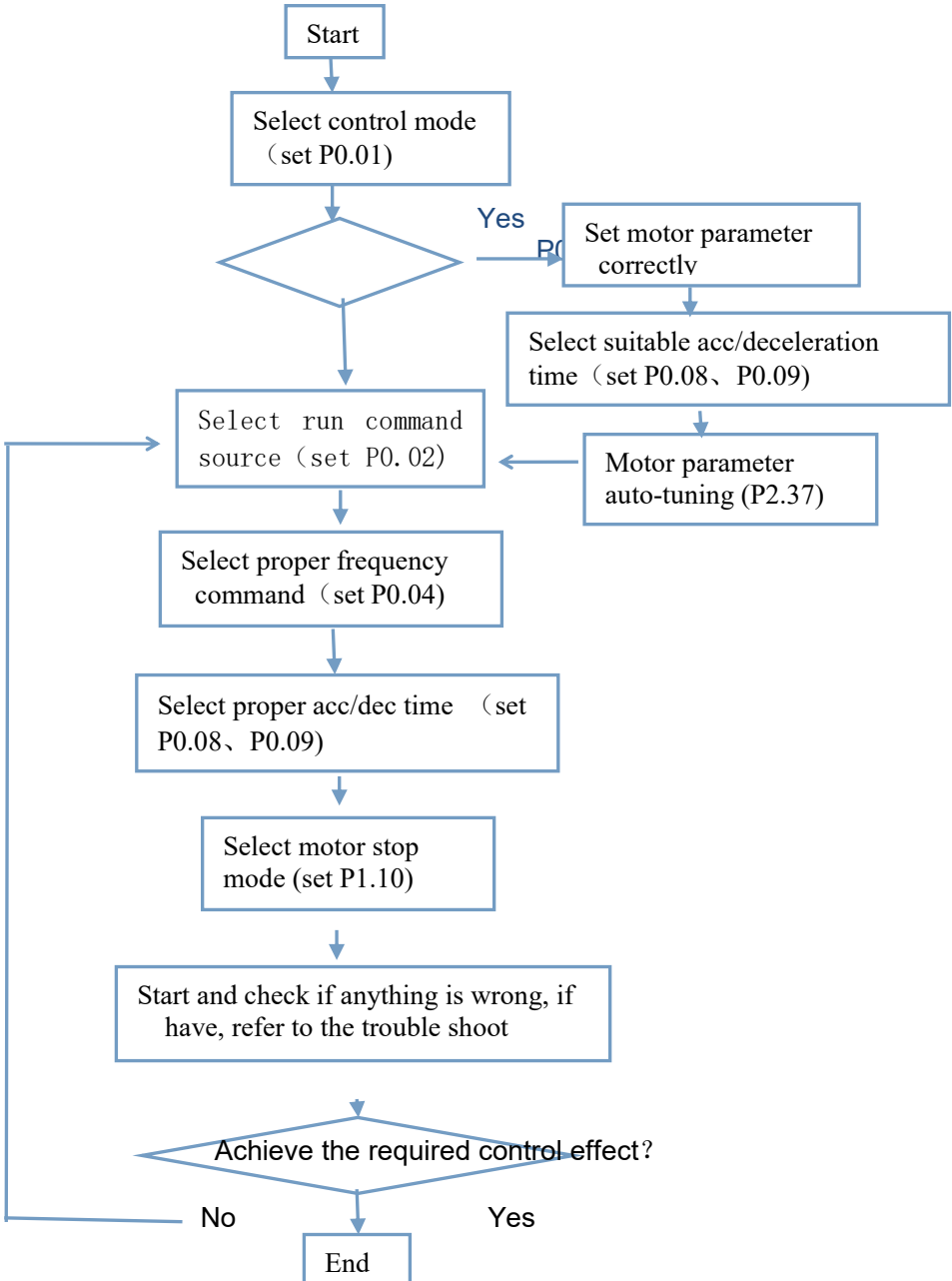


Figure 3.3 Quick test process

Chapter 4 Detailed Function parameter Descriptions

Group P0 Basic function

P0.01	Control selection	Mode	Default	0
	Setting range	0	V/F control	
		1	Sensorless flux vector control (SVC)	
		2	Close-loop vector control (FVC)	

0: V/F control

It is applicable to applications with lower require for speed accuracy. This series improved the low speed start up torque, can be use in lifting mode.

1: Sensorless flux vector control (SVC)

It indicates open-loop vector control, and is applicable to high-performance control applications. One inverter can only drive one motor.

2: Close-loop vector control (FVC)

It indicates close-loop vector control, motor should install encoder, the PG card of inverter should be the same type accordingly. It applicable to high-accuracy speed control or torque control application. One inverter can only drive one motor.

P0.02	Command selection	source	Default	0
	Setting range	0	Operation panel control (LED off)	
		1	Terminal control (LED on)	
		2	Communication control (LED blinking)	

It is used to determine the input channel of the inverter control commands, such as run, stop, forward rotation, reverse rotation .

0: Operation panel control(“LOCAL/REMOT”indicator off)

Commands are given by pressing keys RUN and STOP/RESET on the operation panel.

1: Terminal control(“LOCAL/REMOT”indicator on)

Commands are given by means of multifunctional input terminals with functions such as FWD, REV, JOGF, and JOGR.

2: Communication control(“LOCAL/REMOT”indicator blinking)

Commands are given from host computer via communication.

P0.04	Main source	frequency selection A	Default	0
	Setting range	0	Multi-speed setting	
		1	FIV	
		2	FIC	
		3	Reserved	
		4	Acceleration/Deceleration setting	
		5	Reserved	
		6	Communication setting	

Choose inverter main input channel of a given frequency.

A total of 10 given frequency channels:

0: Multistage setting

select speed through the digital input X terminal state of different combinations, QZ9000 can set up 3 multispeed instruction terminals and select 8 state of those terminals. Through the function of the PC group code corresponding to any 8 Multistage instruction.

Digital input terminal function X terminal as multispeed selection terminal need to be done in group P5 corresponding settings, please refer to the specific content P5 group of related function parameters.

1: FIV

2: FIC

Frequency given by analog input terminal. QZ9000 provides two analog input terminal (FIV, FIC), Among them, the FIV is from 0V to 10V voltage input, FIC is from 0V to 10V voltage input, can also be used for 4 ~ 20 mA current input, jump line selection by the panel.

FIV, FIC of the input voltage value, the corresponding relationship with the target frequency, users are free to choose.

QZ9000 provide 2 set of corresponding relation curve, the 2 groups of curve is linear relationship (2 point correspondence), user can set through group P5.

6: Communication refers to the main frequency given source by the upper machine is given by way of communication.

QZ9000 support communication method: RS-485。

P0.08	Acceleration time 1	Default	Model dependent
	Setting range	0.00s~65000s	

P0.09	Deceleration time 1	Default	Model dependent
	Setting range	0.00s~65000s	

Acceleration time refers to the the inverter from zero, the deceleration time needed for reference frequency (P0.24 determine).

Deceleration time refers to the inverter from benchmark frequency (P0.24 determine), deceleration down to zero frequency time required.

P0.10	Frequency preset	Default	50.00Hz
	Setting range	0.00~Maximum frequency	

When frequency source selection set for "digital" or "terminal UP/DOWN", the function code value is the frequency of the inverter digital set initial value

P0.11	Rotation direction	Default	0
	Setting range	0	Same direction
		1	Reverse direction

By changing the function code, no need to change the motor wiring for the purpose of the motor' s direction , its effect is equivalent to adjust electric machine (U, V, W) any two lines for motor direction of rotation transformation.

Tip: after initialization, parameters will restore the original state of the motor running direction. Pay attention to the good debugging system which is forbidden to change the motor' s running direction

P0.12	Maximum frequency	Default	50.00Hz
	Setting range	50.00Hz~150.00Hz	

All given frequency will limit by the Maximum frequency.

P0.16	Minimum frequency	Default	0.00Hz
	Setting range	0.00Hz~上限频率 P0.12	

Frequency instruction lower than the minimum frequency setting(P0.16), inverter running as lower limit frequency.

P0.17	Carrier frequency	Default	Model dependent
	Setting range	1.0kHz~12.0kHz	

This function adjusting carrier frequency inverter. By adjusting the carrier frequency can reduce electrical noise, to avoid the resonance point of mechanical system, reduce the line of floor drain current and reducing interference caused by inverter .

When the carrier frequency is low, the output current of higher harmonic component increases, motor loss increases, the motor temperature increases. When the carrier frequency is higher, the motor loss reduces, the motor temperature rise

reduces, but the loss of the inverter increases, the temperature rise of the inverter increases, increased interference.

Adjusting the carrier frequency will affect the performance of the following:

Carrier frequency	low → high
The motor noise	large → small
The output current waveform	Bad → good
Temperature Rise in Electric Motors	High → low
The temperature rise of the inverter	Low → high
leak current	Small → large
Foreign raXated interference	Small → large

Different power inverter, the carrier frequency of the factory settings is different. Although the user can modify according to need, but pay attention: if the carrier frequency set to a higher value than the factory, will lead to inverter radiator temperature increasing, the user needs to derate to use inverter, otherwise the inverter is in danger of overheating alarm.

P0.25	UP/DOWN basic frequency	Default	50.00HZ
	Setting range	Opening frequency to maximum frequency	

This parameter only valid frequency source as acc/dec given. When terminal UP/DOWN action, target frequency is base on P0.25 increasing or decreasing.

Group P1 Start stop control

P1.07	Acceleration/Deceleration mode		Default	0
	Setting range	0	Linear acceleration/deceleration	
		1	S-curve acceleration/deceleration 1	
		2	S-curve acceleration/deceleration 2	

It is used to set the frequency change mode during the inverter start and stop process.

0: Linear acceleration/deceleration

The output frequency increases or decreases in linear mode. The Z2000 provides four group of acceleration/deceleration time, which can be selected by using P5.00 to P5.08.

1: S-curve acceleration/deceleration A

The output frequency is increasing or decreasing as S-curve. S-curve is required to use in the occasion where smoothly start or stop, such as the elevator,

conveyer belt, etc. Function code P1.08 and P1.09 respectively defines S-curve the start and end of the acceleration/deceleration time rate.

2: S-curve acceleration/deceleration B

In this curve, the rated motor frequency is always the inflexion point. This mode is fb usually used in applications where acceleration/deceleration is required at the speed higher than the rated frequency.

When the set frequency is higher than the rated frequency, the acceleration/deceleration time is:

$$t = \left(\frac{4}{9} * \left(\frac{f}{f_b} \right) + \frac{5}{9} \right) * T$$

In the formula, “f” is the set frequency, “fb” is the rated motor frequency and T is the acceleration time from 0 Hz to the rated frequency fb.

S-curve acceleration/deceleration B

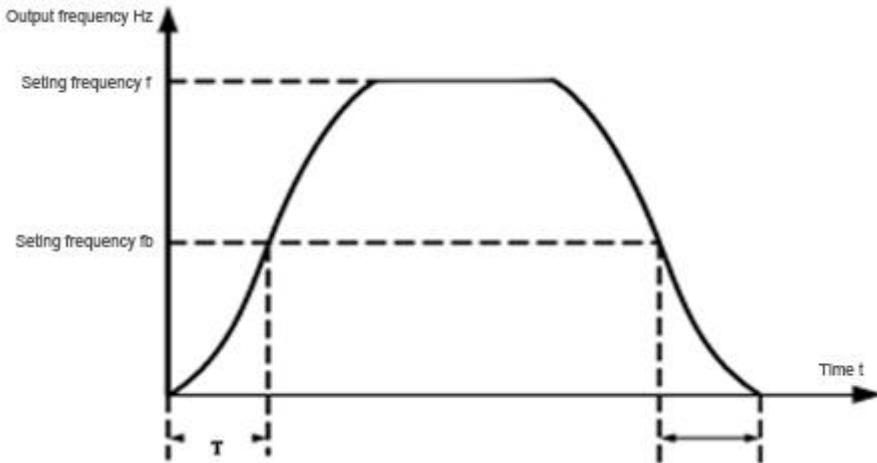


Figure 4-1

P1.08	Time proportion of S-curve start segment	Default	30.0%
	Setting range	0.0%～（100.0%-P1.09）	
P1.09	Time proportion of S-curve end segment	Default	30.0%
	Setting range	0.0%～（100.0%-P1.08）	

These two parameters respectively define the time proportions of the start segment and the end segment of S-curve acceleration/deceleration A. They must satisfy the requirement:

$$P1.08 + P1.09 \leq 100.0\%.$$

In Figure 4-2, t1 is the time defined in P1.08, within which the slope of the

output frequency change increases gradually. t_2 is the time defined in P1.09, within which the slope of the output frequency change gradually decreases to 0. Within the time between t_1 and t_2 , the slope of the output frequency change remains unchanged, that is, linear acceleration/deceleration.

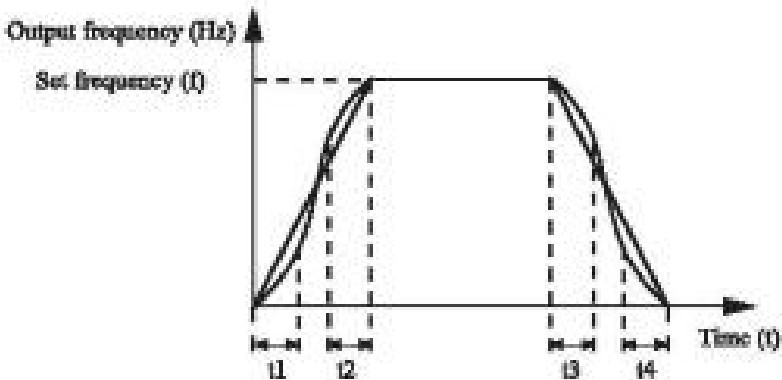


Figure 4-2 S-curve acceleration/deceleration 1

P1.10	Stop mode		Default	0
	Setting range	0	Decelerate to stop	
		1	Coast to stop	

0: Decelerate to stop

After the stop command is enabled, the inverter decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

1: Coast to stop

After the stop command is enabled, the inverter immediately stops the output. The motor will coast to stop based on the mechanical inertia.

P1.11	Initial frequency of stop	Default	0.00Hz
	DC braking		
	Setting range	P0.16~P2.04	
P1.13	Stop DC braking current	Default	30%
	Setting Range		
	Setting range	0%~120%	

During the process of decelerating to stop, the AC drive starts DC braking when the running frequency is lower than the value set in P1.11.

This parameter specifies the output current at DC braking and is a percentage relative to the base value. If the rated motor current is less than or equal to 80% of the rated AC drive current, the base value is the rated motor current. If the rated motor current is greater than 80% of the rated AC drive current, the base value is 80% of the rated inverter current.

Stop DC braking time

This parameter specifies the holding time of DC braking. If it is set to 0, DC braking is canceled.

P1.16	Brake open frequency	Default	2.00Hz
	Setting range	P0.16~15.00Hz	
P1.17	Brake open current	Default	30. 0%
	Setting range	0.0~150.0%	
P1.18	Brake open mechanical time	Default	0.50s
	Setting range	0.00~5.00s	
P1.19	Brake open rotating direction	Default	0
	Setting range	0~1	

Brake open frequency is the output frequency of the inverter before the brake is fully open, that is motor output full torque at the lowest frequency. Brake open current is relative to rated motor current percentage. When inverter's output current reach this value, it will output brake open instruction immediately. Brake open mechanical time is mechanical brake open time from start to fully open, during the time, inverter maintain brake open frequency(P1.16) output.

Brake open running direction is the motor rotating direction when brake open, set as 1 and brake will open at forward always, set as 0, it will be the same direction as actual given.

P1.20	Brake frequency	Default	2.00Hz
	Setting range	P0.16~15.00Hz	
P1.21	Brake mechanical time	Default	0.50s
	Setting range	0.00~5.00s	
P1.22	Brake delay time	Default	0.0s
	Setting range	0.0~30.0s	

P1.20 parameter indicate the inverter output lower than the setting value when deceleration process, it will output brake close instruction immediately.

Brake mechanical time is the mechanical brake time from start close to fully

close, during the time, the inverter maintain brake frequency output.

Brake delay parameter is the brake don't output brake close instruction immediately, but output the instruction after the parameter delay time set. It is invalid when quick stop and coast to stop.

P1.23	Brake action curve		Default	1
	Setting range	0	No brake control	
		1	Auto-brake control 1	
		2	Auto-brake control 2	

When this parameter set to 0, brake control output the same instruction as inverter running.

When this parameter set as 1, during the brake open time, inverter output maximum torque, brake open after current reached.

When this parameter set as 2, during the brake open time, inverter output the specific torque, brake open after current reached.

Maximum torque and brake open torque set refer to group C0.

P1.24	Restart selection in the process of brake process		Default	0
	Setting range	0	No allow to restart in the process of brake	
		1	Allow to restart in the process of brake	

If you select 0, if the brake has begun to close during the stop process, the start instruction will not be accepted. You must wait until the brake is completely turned off and the inverter stop output to continue running.

If you select 0, In the process of stop, even if the brake has started to close, the inverter also accept new instruction.

P1.25	Restart waiting time		Default	0.0s
	Setting range		0.0~30.0s	

This parameter means that after the inverter is stopped, to start the next startup operation need to wait the restart waiting time delay.

P1.26	Brake feedback		Default	0
	Setting range	0	Do not use brake feedback	
		1	For action detection	
		2	For full monitor	

0: No brake feedback connector input to inverter, or no need brake feedback

function.

- 1: Detect brake feedback when action, it will alarm if no feedback signal.
- 2: Detect feedback signal when power on, it need to connect two signal, one is brake open feedback signal and the other one is brake feedback signal.

P1.27	Running command reverse timing control		Default	0
	Setting range	0	No allow to direct reverse during operation	
		1	Allow to direct reverse during operation	
P1.28	Zero-crossing jump frequency during running		Default	2.00 Hz
	Setting range		0~20.00Hz	

If the parameter is set to 0, it means that if the reverse running command is given during running, the inverter will stop normally and restart the reverse running after inverter stop output.

If the parameter is set to 1, it means that if the reverse running command is given during running, the inverter will decelerate to the zero-crossing jump frequency, and then start directly from the reverse frequency given by the zero-crossing jump frequency (P1.28), no brake on-off control in this process.

Group P2 Motor parameter

P2.01	Rated power	Default	Model dependent
	Setting range	0.1kW~1000.0kW	
P2.02	Rated voltage	Default	Model dependent
	Setting range	1V~2000V	
P2.03	Rated current	Default	Model dependent
	Setting range	0.01A~655.35A (inverter power≤55kW) 0.1A~6553.5A (inverter power>55kW)	
P2.04	Rated frequency	Default	Model dependent
	Setting range	0.01Hz~Maximum frequency	
P2.05	Rated rotating speed	Default	Model dependent
	Setting range	1rpm~65535rpm	

Above function code is motor nameplate parameters, and all relative parameters need to be set accurately according to motor nameplate. For the asynchronous motor auto-tuning, it need set motor nameplate correctly.

P2.06	Stator resistance (asynchronous motor)	Default	Model dependent
	Setting range	0.001Ω～30.000Ω	
P2.07	Rotor resistance (asynchronous motor)	Default	Model dependent
	Setting range	0.001Ω ～ 65.535Ω (Inverter Power≤55kW) 0.0001Ω～6.5535Ω (Inverter Power>55kW)	
P2.08	Leakage inductive reactance (asynchronous motor)	Default	Model dependent
	Setting range	0.01mH～655.35mH(Inverter Power≤55kW) 0.001mH～65.535mH(Inverter Power>55kW)	
P2.09	Mutual inductive reactance (asynchronous motor)	Default	Model dependent
	Setting range	0.1mH ～ 6553.5mH (Inverter Power≤55kW) 0.01mH ～ 655.35mH (Inverter Power>55kW)	
P2.10	No-load current (asynchronous motor)	Default	Model dependent
	Setting range	0.01A～P2.03 (Inverter Power≤55kW) 0.1A～P2.03 (Inverter Power>55kW)	

The parameters in P2.06 to P2.10 are asynchronous motor parameters. P2.06～ P2.10 parameters are ordinary unavailable on the motor's nameplate and are obtained by means of inverter's auto-tuning .Asynchronous motor's stationary auto-tuning can obtain only P2.06 to P2.08 three parameters. Asynchronous motor's dynamic auto-tuning can obtain besides all the parameters in P2.06 to P2.10, and can also obtain encoder phase sequence and current loop PI. Each time "Rated motor power" (P2.01) or "Rated motor voltage" (P2.02) is changed, the inverter automatically restores values of P2.06 to P2.10 to the parameter setting for the common standard Y series asynchronous motor. If it is impossible to perform asynchronous motor's stationary auto-tuning manually input the values of these parameters according to data provided by the motor manufacturer.

If it is impossible to perform asynchronous motor's stationary auto-tuning manually input the values of these parameters according to data provided by the motor manufacturer.

P2.27	Encoder pulses per revolution	Default	1024
	Setting range	1~65535	

This parameter is used to set the pulses per revolution(PPR) of ABZ incremental encoder. In CLVC mode, the motor can not run properly if this parameter is set incorrectly.

P2.28	Encoder type		Default	0
	Setting range	0	ABZ incremental encoder	
		1	Reserved	
		2	Resolver	

QZ9000 support a variety of encoder type, different encoder needs matching PG card, please correct choose and buy when using the PG card. After installed the PG card, set P2.28 according to the actual situation correctly, otherwise inverter may not run properly.

P2.30	ABZ incremental encoder AB phase sequence		Default	0
	Setting range	0	Forward	
		1	Reverse	

The function code is only valid for ABZ incremental encoder, set P1.28=0. It is use to set AB phase sequence of ABZ incremental encoder. When the motor complete tuning, can get ABZ encoder AB phase sequence.

P2.35	Encoder wire-break detection function selection		Default	0
	Setting range	0	Close	
		1	Open	
P2.36	Encoder wire-break fault detection time		Default	0.000s
	Setting range		0.0s: No action, 0.000s~1.000s	

These two parameter is used to encoder detection, set P2.35=1, encoder fault will warning. P2.36 is use to set the time that a wire-break fault lasts. If it is set to 0.000s, the inverter does not detect the encoder wire-break fault. If the duration of the encoder wire-break fault detected by the inverter exceeds P2.36 the time set in this parameter, the inverter reports “PG”.

P2.37	Auto-tuning selection		Default	0
	Setting range	0	No auto-tuning	
		1	Asynchronous motor static auto-tuning	
		2	Asynchronous motor complete auto-tuning	
		3	Asynchronous motor static complete auto-tuning	

0: No auto-tuning

Auto-tuning is prohibited.

1: Asynchronous motor static auto-tuning

It is applicable to scenarios where complete auto-tuning cannot be performed because the asynchronous motor can't be easily disconnected to the load.

Before performing static auto-tuning, properly set the motor type and motor nameplate parameters of P2.01 to P2.05 first. The inverter will obtain three parameters of P2.06 to P2.08 by static auto-tuning .

Action description: Set this parameter to 1, and press RUN. Then, the inverter starts static auto-tuning.

2: Asynchronous motor complete auto-tuning

To perform this type of auto-tuning , ensure that the motor is disconnected to the load. During the process of complete auto-tuning , the inverter performs static auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in P0.08. The inverter keeps running for a certain period and then decelerates to stop within deceleration time set in P0.09. Before performing complete auto-tuning, properly set the motor type, motor nameplate of P2.01~P2.05, “Encoder type” (P2.28) and “Encoder pulses per revolution”(P2.27) first.

The inverter will obtain motor parameters of P2.06 to P2.10, AB phase sequence of ABZ incremental encoder(P2.30) and vector control current loop PI parameters of P3.13 to P3.16 by complete auto-tuning.

Action description: Set this parameter to 2. and press RUN. Then the inverter starts complete auto-tuning.

3: Asynchronous motor static complete auto-tuning

It is applicable to asynchronous motor can't disconnected to the load, it will obtain motor parameters of P2.06 to P2.10.

Action description: Set this parameter to 3 and press RUN, inverter starts static complete auto-tuning.

Group P3 Vector Control Parameters

P3.00	Speed loop proportional gain1	Default	20
	Setting range	1~100	
P3.01	Speed loop integral time 1	Default	0.50s
	Setting range	0.01s~10.00s	
P3.02	Switchover frequency 1	Default	5.00Hz
	Setting range	0.00~P3.05	
P3.03	Speed loop proportional gain 2	Default	15
	Setting range	0~100	
P3.04	Speed loop integral time 2	Default	1.00s
	Setting range	0.01s~10.00s	
P3.05	Switchover frequency 2	Default	10.00Hz
	Setting range	P3.02~Maximum output frequency	

Speed loop PI parameters vary with running frequencies of the inverter.

If the running frequency is less than or equal to "Switchover frequency 1" (P3.02), the speed loop PI parameters are P3.00 and P3.01.

If the running frequency is equal to or greater than "Switchover frequency 2" (P3.05), the speed loop PI parameters are P3.03 and P3.04.

If the running frequency is between P3.02 and P3.05, the speed loop PI parameters are obtained from the linear switchover between the two groups of PI parameters, as shown in Figure 4-3.

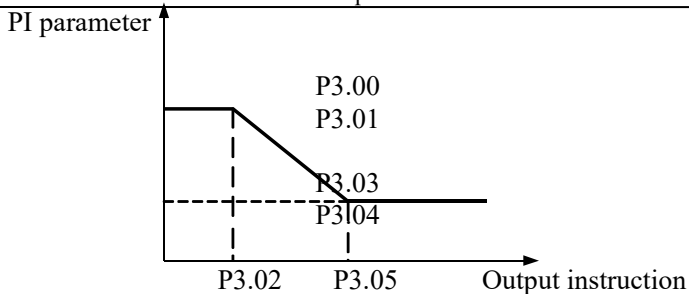


Figure 4-3 Relationship between running frequency and PI parameters

The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator.

To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation.

The recommended adjustment method is as follows:

If the factory setting cannot meet the requirements, make proper adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

Note: Improper PI parameter setting may cause too large speed overshoot, and over-voltage fault may even occur when the overshoot drops.

P3.06	Vector control slip gain	Default	100%
	Setting range	50%~200%	

For SFVC, it is used to adjust speed stability accuracy of the motor. When the motor with load runs at a very low speed, increase the value of this parameter; when the motor with load runs at a very large speed, decrease the value of this parameter.

P3.07	Time constant of speed loop filter 速	Default	0.080s
	Setting range	0.000s~1.000s	

In the vector control mode, the output of the speed loop regulator is torque current reference. This parameter is used to filter the torque references. It is no need to adjust generally and it can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly. If the value of this parameter is small, the output torque of the inverter may fluctuate greatly, but the response is quick.

P3.10	Digital setting of torque	Default	180.0%
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	upper limit in speed control mode		
	Setting range	0.0%~200.0%	
P3.12	digital setting of torque upper limit in speed control mode (power generation)	Default	180.0%
	Setting range	0.0%~200.0%	

In the speed control mode, the maximum output torque of the inverter is restricted by torque upper limit control.

P3.13	Excitation adjustment proportional gain	Default	10
	Setting range	0~100	
P3.14	Excitation adjustment integral gain	Default	10
	Setting range	0~100	
P3.15	Torque adjustment proportional gain	Default	10
	Setting range	0~100	
P3.16	Torque adjustment integral gain	Default	10
	Setting range	0~100	

These are current loop PI parameters for vector control. These parameters are automatically obtained through "Asynchronous motor complete auto-tuning ", and commonly no need to modify.

The dimension of the current loop integral regulator is integral gain rather than integral time.

Note that too large current loop PI gain may lead to oscillation of the entire control loop. Therefore, when current oscillation or torque fluctuation is great, manually decrease the proportional gain or integral gain here.

P3.22	Field weakening multiple	Default	100.0%
	Setting range	100.0%~300.0%	
P3.23	Slack rope torque	Default	5.0%
	Setting range	0.0%~P3.25	

P3.24	Load allow	Default	80.0%
	Setting range	P3.25～100.0%	
P3.25	Light load coefficient	Default	35.0%
	Setting range	P3.25～P3.24	
P3.26	Light load detection frequency	Default	40.00 Hz
	Setting range	P1.16～P0.12	
P3.27	Light load detection time	Default	0.5s
	Setting range	0.0～5.0s	
P3.28	Forward frequency correction	Default	100.0%
	Setting range	0～100%	
P3.29	Reverse frequency correction	Default	100.0%
	Setting range	0～100%	

The light-load high-speed function indicate that the target frequency is greater than the rated frequency, the inverter automatically calculates the maximum output frequency according to the load condition to avoid faults such as overload and over current caused by the load. When the output frequency of the inverter reaches the set value of P3.26, the inverter maintains the frequency output with a maintenance time of P3.27. After the maintenance time is reached, detect the output torque T , and T is used to calculate the current maximum frequency F . If the target frequency of current is greater than the rated frequency and $P3.22 > 100.0\%$, the light-load high-speed function is enabled. When $T \leq \text{slack rope torque}$ or $T \geq \text{allowable load}$, the highest value of F is the rated frequency; when $\text{slack rope torque} < T \leq \text{light load coefficient}$, the highest value of F is $P3.22 \times \text{rated frequency}$; when $\text{light load coefficient} < T < \text{the load allow}$, F is linearly adjusted between the rated frequency and the maximum frequency.

P3.28 and P3.29 indicate that when the light load coefficient $\leq T \leq \text{load allow}$, Finally the target frequency of the inverter is $F \times P3.28$ (Forward running) or $F \times P3.29$ (Reverse running). The actual operating frequency is also limited by the maximum torque that the inverter or motor can reach.

P3.30	Overload protection torque threshold	Default	0.0
	Setting range	0.0～150.0%	

If the value is set to 0, this function will not be activated. If this value is not 0,

this function will take effect. If the output torque is greater than the set value of P3.30, it will automatically stop and limit continue forward operation. Limit are relieved immediately after reverse operation.

P3.31	Constant control	power	Default	0
	Setting range	0	Disabled	
		1	Enabled	

If select 1, when the power exceeds the rated power during operation, the frequency will be automatically reduced to maintain constant power operation. If it is set to 0, this function will be disabled.

Group P4 V/F Control parameter

This group of function codes is only valid for V / F control, but not for vector control.

P4.01	Torque boost	Default	Model dependent
	Setting range	0.0%~30%	
P4.02	Cut-off frequency of torque boost	Default	50.00Hz
	Setting range	0.00Hz~maximum output frequency	

To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of the inverter at low frequency by modifying P4.01. If the torque boost is set to too large, the motor may overheat, and the inverter may suffer over-current. If the load is large and the motor startup torque is insufficient, increase the value of P4.01. If the load is small, decrease the value of P4.01. If it is set to 0.0, the inverter performs automatic torque boost. In this case, the inverter automatically calculates the torque boost value based on motor parameters including the stator resistance.

P4.02 specifies the frequency under which torque boost is valid. Torque boost becomes invalid when this frequency is exceeded, as shown in the following figure.

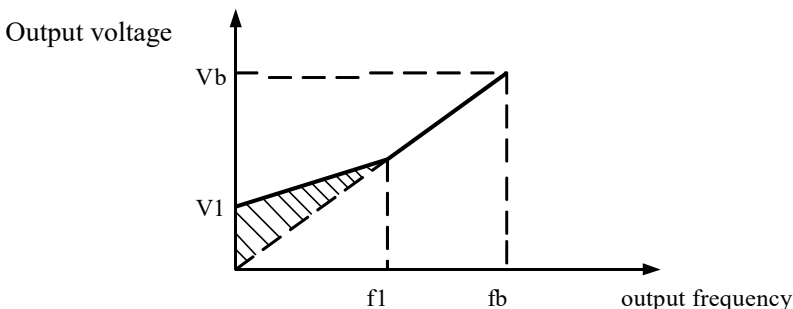


Figure 4-4 Manual torque boost

Vl: Voltage of manual torque boost Vb Maximum output voltage
 fl: Cut-off frequency of manual torque boost
 fb: Rated running frequency

P4.09	V/F slip compensation gain	Default	0.0%
	Setting range	0.0%~100.0%	

V/F slip compensation parameter is valid only for the asynchronous motor.

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case load changes.

If this parameter is set to 0.0%, it indicates that the compensation when the motor bears rated load is the rated motor slip. The rated motor slip is automatically obtained by the inverter through calculation based on the rated motor frequency and rated motor rotational speed in group P2.

When adjust the V/F slip compensation gain, Generally, At rated load, if the motor rotational speed is different from the target speed, slightly adjust this Parameter.

P4.10	V/F over-excitation gain	Default	0
	Setting range	0~200	

During deceleration of the inverter, over-excitation can restrain rise of the bus voltage, to prevent the over-voltage fault. The larger the over-excitation is, the better the restraining result is.

Increase the over-excitation gain if the inverter is liable to over-voltage error during deceleration. However, too large over-excitation gain may lead to an increase in the output current. Set P4.09 to a proper value in actual applications.

Set the over-excitation gain to 0 in the applications where the inertia is small and the bus voltage will not rise during motor deceleration or where there is a braking resistor.

P4.11	V/F oscillation suppression gain	Default	Model dependent
	Setting range	0~100	

Set this parameter to a value as small as possible in the prerequisite of efficient oscillation suppression to avoid influence on V/F control. Set this parameter to 0 if the motor has no oscillation. Increase the value properly only when the motor has obvious oscillation. The larger the value is, the more obvious the oscillation suppression result will be.

When the oscillation suppression function is enabled, the rated motor current and no-load current must be correct. Otherwise, the V/F oscillation suppression effect will not be satisfactory.

Group P5 Input terminals

QZ9000 series inverter with 10 multi-function digital inputs , two analog input terminals. (Analog terminal can be used as X terminal)

P5.00	X1 function selection	Default	1
P5.01	X2 function selection	Default	2
P5.02	X3 function selection	Default	8
P5.03	X4 function selection	Default	9
P5.04	X5 function selection	Default	10
P5.05	X6 function selection	Default	5
P5.06	X7 function selection	Default	0
P5.07	X8 function selection	Default	0
P5.08	X9 function selection	Default	0
P5.09	X10 function selection	Default	0

The following table lists the functions available for the multi-function input terminals.

Can choose the functions in the table as follows:

Value	Function	Description
0	No function	Set 0 for reserved terminals to avoid malfunction.
1	Forward RUN (FWD)	The terminal is used to control forward or reverse RUN of the inverter.
2	Reverse RUN (REV)	
3	Fault reset (RESET)	The terminal is used for fault reset function, the same as the function of RESET key on the operation panel. Remote fault reset can be implemented by this function.
4	Fast stop	The inverter blocks its output, the motor coasts to rest and is not controlled by the inverter.
5	Coast to stop	The decelerate to stop is consistent with the cancel of the running command, and the brake logic is valid.
6	Decelerate to stop	If the fast stop is valid, the brake frequency will be given immediately, and the brake will stop according to the normal brake logic.

7	Normally open (NO) input of external fault	If this terminal becomes ON, the inverter reports EF and performs the fault protection action.
8	Multi-reference terminal 1	The setting of 8 speeds can be implemented through combinations of 8 states of these three terminals. Refer to table 2 for more details.
9	Multi-reference terminal 2	
10	Multi-reference terminal 3	
11	Brake open feedback	When the brake feedback(P1.26) is set to 1, only connect to instruction 11, when the brake feedback is set to 2, it will need to connect to instruction 11 and instruction 12.
12	Brake close feedback	
13	2 segment accelerate ramp switchover	It is used to switch different accelerate/decelerate time, for detail, refer to P8.00~P8.10
14	2 segment decelerate ramp switchover	
15	3 segment accelerate ramp switchover	
16	3 segment decelerate ramp switchover	
19	Accelerate to run (UP)	Modify the frequency increasing instruction and decreasing instruction when the frequency is given by the external terminal. When the frequency source is set to the acceleration / deceleration setting, set frequency through up and down.
20	Decelerate to run (DOWN)	
21	Torque control/Speed control	Make the inverter switchover between torque control and speed control mode. If this terminal is valid, it will switch to torque mode. Otherwise it will be speed mode

	switchover	
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Table 2: Multi-reference instruction function description

The 3 multi-reference terminals have 8 state combinations, corresponding to 8 reference values, as listed in the following table:

K3	K2	K1	Reference setting	Corresponding Parameter
OFF	OFF	OFF	Reference 0	PC.00
OFF	OFF	ON	Reference 1	PC.01
OFF	ON	OFF	Reference 2	PC.02
OFF	ON	ON	Reference 3	PC.03
ON	OFF	OFF	Reference 4	PC.04
ON	OFF	ON	Reference 5	PC.05
ON	ON	OFF	Reference 6	PC.06
ON	ON	ON	Reference 7	PC.07

P5.10	Terminal filter time	Default	0.010s
	Setting range	0.000s~1.000s	

It is used to set the software filter time of terminal status. If terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of filter time will reduce the response of input terminal.

P5.12	Terminal UP/DOWN rate	Default	5.00Hz/s
	Setting range	0.01Hz/s~50.00Hz/s	

It is used to adjust the rate of change of frequency when the frequency is adjusted by means of terminal UP/DOWN.

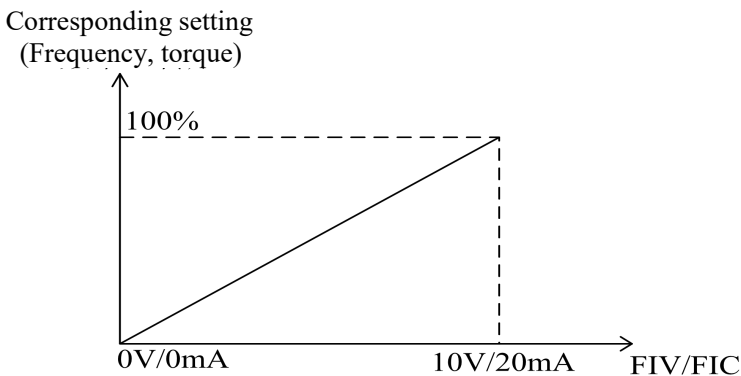
P5.13	FIV minimum input	Default	0.00V
	Setting range	0.00V~P5.15	
P5.14	Corresponding setting of FIV minimum input	Default	0.0%

	Setting range	-100.00%~100.0%	
P5.15	FIV maximum input	Default	10.00V
	Setting range	P5.13~10.00V	
P5.16	Corresponding of FIV maximum input	Default	100.0%
	Setting range	-100.00%~100.0%	
P5.17	FIV filter time	Default	0.10s
	Setting range	0.00s~10.00s	

These parameters are used to define the relationship between the analog input voltage and the corresponding setting. When the analog input voltage exceeds the maximum value (P5.15), the analog voltage maximum value is calculated by “maximum input”. When the analog input voltage is less than the setting minimum input (P5.13), the value is calculated by the minimum input. When the analog input is current input, 1mA current corresponds to 0.5V voltage. FIV input filter time is used to set the software filter time of FIV. If the analog input is liable to interference, increase the filter time value of this parameter to stabilize the detected analog input. However, increase of the FIV filter time will slow down the response of analog detection. Set this parameter properly based on actual conditions.

In different applications, 100% of analog input corresponds to different nominal values. For details, refer to the description of different applications.

Two typical setting examples are shown in the following figure.



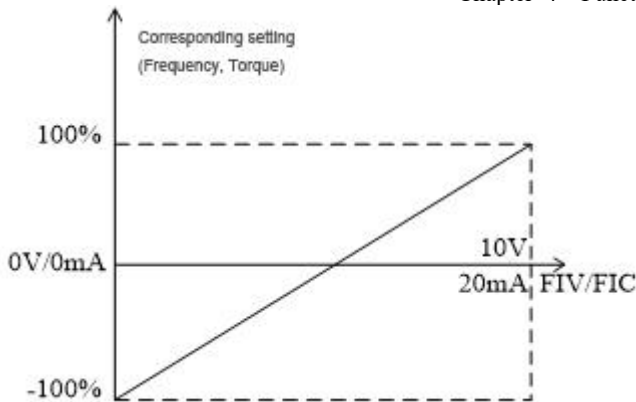


Figure 4-5 Corresponding relationship between analog input and set values

P5.18	FIC minimum input	Default	0.00V
	Setting range	0.00V~P5.20	
P5.19	Corresponding setting of FIC minimum input	Default	0.0%
	Setting range	-100.00%~100.0%	
P5.20	FIC maximum input	Default	10.00V
	Setting range	P5.18~10.00V	
P5.21	Corresponding setting of FIC maximum input	Default	100.0%
	Setting range	-100.00%~100.0%	
P5.22	FIC filter time	Default	0.10s
	Setting range	0.00s~10.00s	

The method of setting and function of FIC, please refer to FIV.

P5.28	FIV function selection	Default	0
	Setting range	0-133	
P5.29	FIC function selection	Default	0
	Setting range	0-133	

The FIV and FIC can be used as X terminal when the terminals are not enough. The functions are the same as X terminals, below 2V is low level, above 8V is high level, and other voltages are uncertain.

P5.30	Up/Down frequency lowest	Default	0
	Setting range	0.00-15.00	
P5.31	Up/Down memory	Default	0
	Setting range	0-1	
P5.32	Up/Down Optimization function selection	Default	0
	Setting range	0-1	
P5.33	Up/Down frequency limit	Default	5.00Hz
	Setting range	0.00Hz-50.00Hz	

Up / Down minimum frequency is used to limit the minimum frequency in Up / Down mode. Up / Down memory indicate whether to memory when power off in the UP/DOWN mode, 0 means don't memory, 1 means memory.

When the Up / Down optimization function is 1, the optimization function is turned on. When the optimization function is turned on, the acceleration / deceleration function will be affected. The inverter will automatically calculate the time from deceleration of the current frequency to the Up / Down limit frequency (P5.33).

Group P6 Output terminals

The QZ9000 provides 2 multi-function output terminal (YO1/YO2), 2 multi-function relay output terminals.

P6.02	Relay output function selection (TA-TC)	Default	1
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P6.03	Relay output function selection (RA-RB-RC)	Default	13
P6.05	YO1 function selection (open collector output terminal)	Default	0
P6.06	YO2 function selection (open collector output terminal)	Default	0

The functions of the multi-function terminals are described in the following table.

Value	Function	Description
0	No output	The terminal has no function.
1	Brake control output	It indicate that the inverter is in the running state and has an output frequency (can be zero), output ON signal.
2	Fault output (Fault stop)	When inverter fault and stop, output ON signal
3	Fault alarm	Please refer to description of function code P9.47
4	Fault notice	Please refer to description of function code P9.47
8	Inverter overload pre-warning	The terminal outputs ON 10s before the inverter overload protection action is performed.
9	Motor overload pre-warning	The inverter judges whether the motor load exceeds the overload pre-warning threshold before performing the protection action. If the pre-warning threshold is exceeded, the terminal outputs ON. For motor overload parameters, see the descriptions of P9.00 to P9.02.
10	Low voltage startup protection	Voltage lower than under voltage value when startup,output the signal
11	Over load protection start	The inverter output power exceeds the ratio set by P3.30, outputs ON signal.
12	Over torque output	The inverter output torque exceeds the torque set in P8.36, and output the ON signal
13	Motor fan control	It is used for motor fan control. The inverter will start when the inverter is running, and the fan will be turned off after shutdown.

14	Frequency reached output	When running frequency reached the set frequency, output ON signal
15	Inverter running	When the inverter is running, it outputs ON signal. This signal is OFF in the stop state.
19	Self-start function output	When the self-start function effective, the inverter will start outputting this signal.

Group P7 Operation Panel and Display

Set display and monitoring parameters

P7.06	Load speed display coefficient	Default	1.0000
	Setting range	0.0001~6.5000	

This parameter is used to adjust the corresponding relationship between the inverter output frequency and the load speed when it need to display the load speed.

P7.09	Accumulative running time	Default	-
	Setting range	0h~65535h	

It is used to display the accumulative running time of the inverter.

P7.13	Accumulative power-on time	Default	-
	Setting range	0h~65535h	

It is used to display the accumulative power-on time of the inverter since the delivery.

P7.14	Accumulative power consumption	Default	-
	Setting range	0~65535 degree	

It is used to display the accumulative power consumption of the inverter until now.

Group P8 Auxiliary Functions

P8.00	Acceleration mode selection		Default	0
	Setting range	0	Do not use special Acceleration/Deceleration	
		2	3 segment of acceleration and deceleration automatically switch according to frequency	
		4	3 segment of acceleration and deceleration switch by terminals	
P8.01	Deceleration mode selection		Default	0
	Setting range	0	Do not use special Acceleration/Deceleration	
		2	3 segment of acceleration and deceleration automatically switch according to frequency	
		4	3 segment of acceleration and deceleration switch by terminals	
P8.02	Hold time of each segment		Default	0.0s
	Setting range		0.0~600.0s	
P8.03	Acceleration time 2		Default	3.0s
	Setting range		0.0s~600.0s	
P8.04	Deceleration time 2		Default	3.0s
	Setting range		0.0s~600.0s	
P8.05	Acceleration frequency 2		Default	0.00Hz
	Setting range		0.00Hz~Maximum frequency(P0. 12)	
P8.06	Deceleration frequency 2		Default	0.00Hz
	Setting range		0.00Hz~Maximum frequency(P0. 12)	
P8.07	Acceleration time 3		Default	3.0s
	Setting range		0.0s~600.0s	
P8.08	Deceleration time 3		Default	3.0s
	Setting range		0.0s~600.0s	
P8.09	Acceleration frequency 3		Default	0.00Hz

	Setting range	0.00Hz～Maximum frequency(P0. 12)	
P8.10	Deceleration frequency 3	Default	0.00Hz
	Setting range	0.00Hz～Maximum frequency(P0. 12)	

The QZ9000 provides a total of three groups of acceleration/deceleration time, that is, the preceding two groups and the group defined by P0.08 and P0.09. The three groups of acceleration and deceleration time are switch over according to the settings of P8.00 and P8.01. If it is set to 0, it will accelerate and decelerate according to the time of P0.08 and P0.09. If it is set to 2, it will automatically switch over different acceleration and deceleration time according to the frequency set by P8.05、P8.06、P8.09 和 P8.10. If it is set to 4, it will switch over acceleration / deceleration time by the terminal.

P8.15	Droop control	Default	0.00Hz
	Setting range	0.00Hz～10.00Hz	

This function is generally used for load distribution when multiple motors drag the same load.

Droop control indicate when the load increases, the output frequency of the inverter decreases. In this way, when multiple motors drag the same load, the output frequency of the motor with a heavy load decreases more, it will reduce the motor load and makes the Load even. This parameter refers to the frequency drop value of the output when the inverter outputs the rated load.

P8.19	Frequency detection value (FDT1)	Default	50.00Hz
	Setting range	0.00Hz～Maximum frequency	
P8.20	Frequency detection hysteresis (FDT1)	Default	5.0%
	Setting range	0.0%～100.0% (FDT1 电平)	

If the running frequency is higher than the value of P8.19, the corresponding YO terminal becomes ON. If the running frequency is lower than value of P8.19, the YO terminal outputs on is canceled.

These two parameters are respectively used to set the detection value of output frequency and hysteresis value upon cancellation of the output. The value of P8.20 is a percentage of the hysteresis frequency to the frequency detection value (P8.19).The FDT function is shown in the following figure.

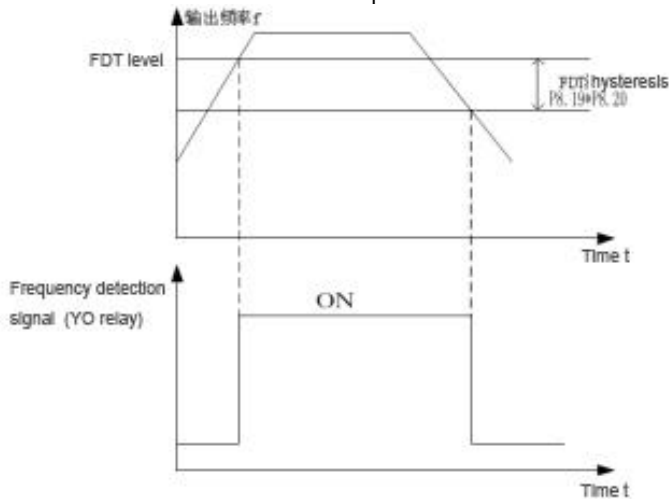


Figure 4-6 FDT level

P8.28	Low speed running protection frequency	Default	5.00Hz
	Setting range	0.01Hz~20.00Hz	
P8.29	Low speed running protection time	Default	0s
	Setting range	0s~1000s	

This function is used to protect non-inverter motors. When the non-inverter motor is running at low speed, the air flow of the fan at the shaft end is too small. Long-time operation will cause the motor overheat and burn. When the time set > 0 , this function takes effect.

P8.36	Over-torque output threshold	Default	0.0%
	Setting range	0.0% (No detection) 0.1%~200.0% (rated motor current)	

When the inverter output torque is greater than the over-torque output threshold, the inverter multi-function YO output ON signal

P8.48	Inverter fan control		Default	0
	Setting range	0	Fan runs during operation	
		1	Fan runs always	

It is used to select the operation mode of the inverter cooling fan. When the it is set to 0, the fan runs in the operation state. If the radiator temperature is higher

than 40 degrees in stop state, the fan will run. If the radiator temperature is lower than 40 degrees in stop state, the fan will not run.

If it is set to 1, the fan keeps running after power on.

P8.49	Motor fan control delay	Default	30s
	Setting range	0s~3000s	

Cooperate with No. 13 terminal output instruction , when the inverter stops, the motor fan will delay the time set in P8.49, and then turn off.

Group P9 Fault and protection

P9.00	Motor overload protection selection		Default	1
	Setting range	0	Disabled	
		1	Enabled	
P9.01	Motor overload protection gain		Default	1.00
	Setting range		0.20~10.00	

P9.00 = 0

The motor overload protective function is disabled. The motor is exposed to potential damage due to overheating. A thermal relay is suggested to be installed between the inverter and the motor.

P9.00 = 1

The Inverter judges whether the motor is overloaded according to the inverse time-lag curve of the motor overload protection.

The inverse time-lag curve of the motor overload protection is:

$220\% \times P9.01 \times \text{rated motor current}$ (if the load remains at this value for one minute, the inverter reports motor overload fault), or $150\% \times P9.01 \times \text{rated motor current}$ (if the load remains at this value for 60 minutes, the inverter reports motor overload fault).

Set P9.01 properly based on the actual overload capacity. If the value of P9.01 is set too large, the damage to the motor may result when the motor overheats but the inverter does not report the alarm.

P9.02	Motor overload warning coefficient	Default	80%
	Setting range	50%~100%	

This function is used to give a warning signal to the control system via YO before motor overload protection. This parameter is used to determine the percentage, at which pre-warning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be. When the accumulative output current of the inverter is greater than the value of the overload inverse time-lag curve multiplied by P9.02, the multifunction digital YO terminal on the inverter (Motor overload pre-warning) outputs ON.

P9.03	Over-voltage stall gain	Default	0
	Setting range	0 (no over voltage stall) ~100	
P9.04	Over-voltage stall protective voltage	Default	640V
	Setting range	620V-660V	

When the DC bus voltage exceeds the value of P9.04 (Over-voltage stall protective voltage) during deceleration of the inverter, the inverter stops deceleration and keeps the present

running frequency. After the bus voltage declines, the inverter continues to decelerate. P9.03 (Over-voltage stall gain) is used to adjust the over-voltage suppression capacity of the inverter. The larger the value is, the greater the over-voltage suppression capacity will be.

In the prerequisite of no over-voltage occurrence, set P9.03 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and an over-voltage fault may occur. If the over-voltage stall gain is set to 0, the over-voltage stall function is disabled.

P9.05	Over-current stall gain	Default	20
	Setting range	0~100	
P9.06	Over-current stall protective current	Default	150%
	Setting range	100%~200%	

When the output current exceeds the over-current stall protective current during acceleration/deceleration of the inverter, the inverter stops acceleration/deceleration and keeps the present running frequency. After

the output current declines, the inverter continues to accelerate/decelerate.

P9.05 (Over-current stall gain) is used to adjust the over-current suppression capacity of the inverter. The larger the value is, the greater the over-current suppression capacity will be. In the prerequisite of no over-current occurrence, set P9.05 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and over-current fault may occur. If the over-current stall gain is set to 0, the over-current stall function is disabled.

P9.07	Short-circuit to ground upon power-on		Default	0
	Setting range	0	Disabled	
		1	Enabled	

It is used to determine whether to check the motor is short-circuited to ground at power-on of the inverter. If this function is enabled, the inverter's UVW will have voltage output a while after power-on.

P9.12	Input phase loss protection selection		Default	1
	Setting range	0	Disabled	
		1	Enabled	

It is used to determine whether to perform input phase loss protection.

P9.13	Output phase loss protection selection		Default	1
	Setting range	0	Disabled	
		1	Enabled	

It is used to determine whether to perform output phase loss protection.

P9.14	1st fault type	0~99
P9.15	2nd fault type	
P9.16	3rd (latest) fault type	

It is used to record the types of the recent three faults of the inverter. 0 indicates no fault. For possible causes and solution of each fault, refer to Chapter 5.

P9.47	Fault protection action	Set the fault level, each bit	11115
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	selection 1	represents a fault. There are 4 types of fault levels, and each type implements corresponding fault measures. If set as 5, inverter is running normally.	
P9.48	Fault protection action selection 2		11111
P9.49	Fault protection action selection 3		11411
P9.40	Fault protection action selection 4		11111
P9.41	Fault protection action selection 5		11111

Set the fault level, each bit represents a fault. There are 4 types of fault levels, and each type implements corresponding fault measures.

First-level fault, operation panel displays fault code, output function 1 (brake control) is invalid, output function 2 (fault stop) is valid, and the inverter performs coast to stop.

Second-level fault, operation panel displays fault code, output function 3 (fault alarm) is invalid, the inverter performs fast stop.

Third-level fault, operation panel displays fault code, output function 3 (fault alarm) is valid, the inverter performs deceleration to stop.

Fourth-level fault, operation panel displays fault code, output function 4 (fault notice) is valid, inverter working does not effect.

If set as 5, inverter is running normally.

Group Pb Lifting auxiliary parameters

Group Pb is the lifting auxiliary parameter, do not need to modify generally.

Pb.00	Position display proportion	Default	1
	Setting range	1-65535	
Pb.01	Initial position	Default	0
	Setting range	0-65535	

This parameter is use to set pulse display coefficient, Pulse no. Of D0.37 and D0.38 = Input pulse / Pb.00. When the position check terminal is valid, the value of D0. 37 and D0.38 is the value of Pb.01.

Pb.02	Number of self-starting pulses	Default	0
	Setting range	0-65535	

This function is only valid in close loop vector control, when brake is effective, inverter will start automatically and warning notice if a slip hook happen. It will help to detect the early brake invalid to avoid slip hook, remind the user to repair in time.

Pb.03	Frequency abnormal detection period	Default	0.50
	Setting range	0.00-1.00	

This parameter is use to set detection time of frequency abnormal, if the rotate speed of motor feedback is opposite to the given rotate speed, and the time is > Pb.03, it report oSP. If set to 0, the warning is disabled.

Pb.04	Frequency following deviation detection reference	Default	20
	Setting range	0-30	
Pb.05	Frequency following deviation detection period	Default	0.50
	Setting range	0.00-1.00	

These two parameters is to set the threshold of the ESP alarm. To turn off this alarm, set Pb.05 to 0.

Pb.08	Speed reduction with pressure function selection		Default	0
	Setting range	0	Close	
		1	Open	
Pb.09	Action voltage of speed reduction with pressure function selection		Default	85%
	Setting range		70%-100%	

These two parameters are used to set the function of speed reduction with pressure. The function indicates that the inverter can automatically reduce the output frequency to maintain full torque output when the bus voltage is continuously low. When Pb.08 is set to 1, the speed reduction with pressure function is enabled, and when it is set to 0, the function is invalid.

Group PC Multi-Reference

QZ9000 provide 8 speed instruction, can select different speed through 3 X terminals

PC.00	multi-reference 0	Default	5.00
	Setting range	0-Maximum frequency(P0. 12)	
PC.01	multi-reference 1	Default	20.00
	Setting range	0-Maximum frequency(P0. 12)	
PC.02	multi-reference 2	Default	35.00

	Setting range	0-Maximum frequency(P0. 12)	
PC.03	multi-reference 3	Default	0.00
	Setting range	0-Maximum frequency(P0. 12)	
PC.04	multi-reference 4	Default	50.00
	Setting range	0-Maximum frequency(P0. 12)	
PC.05	multi-reference 5	Default	0.00
	Setting range	0-Maximum frequency(P0. 12)	
PC.06	multi-reference 6	Default	0.00
	Setting range	0-Maximum frequency(P0. 12)	
PC.07	multi-reference 7	Default	0.00
	Setting range	0-Maximum frequency(P0. 12)	

The corresponding relationship between the multi-reference and the X terminal refer to table 2, group P5.

Group Pd Communication parameters

Refer to QZ9000 Communication Protocol

Group PP User-Defined Function Codes

PP.00	User password	Default	0
	Setting range	0~65535	

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must input the correct password in order to enter the menu. If the password is incorrect you cannot view or modify parameters. If PP.00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

PP.01	Restore default settings		Default	0
	Setting range	0	No operation	
		1	Restore factory settings except motor parameters	
		2	Clear records	

1: Restore default settings except motor parameters

If PP.01 is set to 1, most function codes are restored to the default settings

except motor parameters, frequency reference decimal point(P0.22, fault records, accumulative running time (P7.09), accumulative power-on time (P7.13) and accumulative power consumption (P7.14).

2: Clear records

If PP.01 is set to 2, the fault records, accumulative running time (P7.09), accumulative power-on time (P7.13) and accumulative power consumption (P7.14) are cleared.

Group C0 Torque Control and Restricting Parameters

C0.00	Speed/Torque control selection		Default	0
	Setting range	0	Speed control	
		1	Torque control	
		2	Auto switch to torque according to C0.09	
		3	Auto switch to torque according to C0.10	
		5	Switch torque through terminal	

It is used to select the inverter's control mode: speed control or torque control.

QZ9000's multifunctional digital X terminal can the switching of speed and torque control. It can also switch automatically according to the values of C0.09 and C0.10. If the frequency is greater than C0.09 or the torque is greater than C0.10, it will automatically switch to the torque mode.

C0.01	Torque setting source selection in torque control		Default	0
	Setting range	0	Digital setting (C0.03)	
		1	FIV	
		2	FIC	
		5	Communication setting	
C0.03	Torque digital setting in torque control		Default	50%
	Setting range		0.0%~500.0%	

C0.01 is used to set the torque setting source. There are a total of four torque setting sources. The torque setting is a relative value. 100.0% corresponds to the inverter's rated torque. 100% of communication, analog input corresponds to C0.03.

C0.05	Forward maximum frequency in torque control	Default	50.00Hz
	Setting range	0.00Hz～Maximum frequency (P0.12)	
C0.06	Reverse maximum frequency in torque control	Default	50.00Hz
	Setting range	0.00Hz～Maximum frequency (P0.12)	

This two parameters are used to set the maximum frequency in forward or reverse rotation in torque control mode.

In torque control, if the load torque is smaller than the motor output torque, the motor's rotational speed will rise continuously. To avoid runaway of the mechanical system, the motor maximum rotating speed must be limited in torque control.

C0.07	Acceleration time in torque control	Default	0.00s
	Setting range	0.00s～65000s	
C0.08	Deceleration time in torque control	Default	0.00s
	Setting range	0.00s～65000s	

In torque control, the difference between the motor output torque and the load torque determines the speed change rate of the motor and load. The motor rotational speed may change quickly and this will result in noise or too large mechanical stress. The setting of acceleration/deceleration time in torque control makes the motor rotational speed change smoothly.

However, in applications requiring rapid torque response, set the acceleration/deceleration time in torque control to 0.00s. For example, two inverters are connected to drive the same load. To balance the load allocation, set one inverter as master in speed control and the other as slave in torque control. The slave receives the master's output torque as the torque command and must follow the master rapidly. In this case, the acceleration/deceleration time of the slave in torque control is set to 0.00s.

C0.09	Torque switchover frequency clamp	Default	25.00Hz
	Setting range	0.00Hz～Maximum frequency(P0. 12)	
C0.10	Torque switchover torque clamp	Default	50.0 %

	Setting range	0.0%~150.0%
--	---------------	-------------

This parameter is used to switchover between speed and torque. If the control mode is set to 2 and the frequency is greater than C0.09, it will automatically switch to the torque control mode. If the control mode is set to 3 and the torque is greater than C0.10, it will automatically switch to the torque control mode.

Group C5: Control Optimization Parameters

C5.00	DPWM switchover frequency upper limit		Default	12.00Hz
	Setting range		5.00Hz~Maximum frequency(P0. 12)	
C5.01	PWM modulation mode		Default	0
	Setting range	0	Asynchronous modulation	
		1	Synchronous modulation	

The DPWM switchover frequency upper limit is mainly use to switch 7-segment and 5-segment. The 7-segment continuous modulation causes more loss to switches of the inverter and heat sink temperature is high but smaller current ripple. Generally, asynchronous modulation is selected below 100Hz. During synchronous modulation, the carrier changes linearly with the output frequency. The above two parameters generally do not need to be adjusted.

C5.02	Dead compensation mode selection		Default	1
	Setting range	0	No compensation	
		1	Compensation mode 1	
		2	Compensation mode 2	

It doesn't have to modify generally. If motor oscillate, try to adjust the parameter.

C5.03	Random PWM depth		Default	0
	Setting range	0	Random PWM depth Disabled	
		1	1-10	

Random PWM depth is set to improve the motor's noise, reduce electromagnetic interference.

C5.04	Fast current limiting open		Default	1
-------	----------------------------	--	---------	---

	Setting range	0	Disabled
		1	Enabled

Opening fast current limiting can reduce over current fault, make the inverter work continuously. Opening fast current limiting for a long time, can make the inverter overheat, Report a fault CBC. CBC represents fast current limiting fault and need to stop.

C5.05	Current detection compensation	Default	5
	Setting range	0~100	

It is used to set current detection compensation of inverter, don't recommend to modify.

C5.06	Lack voltage setting	Default	350.0V
	Setting range	210.0V-630.0V	

Used to set the voltage of inverter's lack voltage fault LU, Different voltage levels of inverter's corresponding to different voltages, Respectively: three-phase 380V:350V.

Chapter 5 Fault checking and ruled out

5.1 Fault alarm and countermeasures

QZ9000 with kinds of warning information and the protection function, once the failure, protection function, inverter to stop output, inverter fault relay contact action, and in the inverter fault code shown on the display panel. the user can check himself according to the tips before seeking service, analyze the cause of the problem, find out the solution. If it is belong to the dotted line frame stated reason, please seek service ,with your purchased inverter agents or direct contact with our company.

Table 5-1 Fault display and countermeasures

Fault name	Display	Possible causes	Solutions
Inverter unit protection	oC	1: The output circuit is grounded or short circuited. 2: The connecting cable of the motor is too long. 3: The module overheats. 4: The internal connections become loose. 5: The main control board is faulty. 6: The drive board is faulty. 7: The inverter module is faulty	1: Eliminate external faults. 2: Install a reactor or an output filter. 3: Check the air filter and the cooling fan. 4:Connect all cables Properly. 5:Looking for technical support 6:Looking for technical support 7:Looking for technical support

Over-current during acceleration	oC1	1: The output circuit is grounded or short circuited. 2: Inverter is under vector control and do not auto-tuning 3: Acceleration time is too short 4: Manual torque boost or V/F curve is not appropriate. 5: Voltage too low 6: Operate start on rotating motor 7: A sudden load is added during acceleration 8: The inverter model is too small power class.	1: Eliminate external faults. 2: Motor auto-tuning 3: Add the Acceleration time 4: Adjust the torque boost or change the V/F curve manual 5: Adjust the power voltage to normal range 6: Select speed tracking start or wait until the motor stops 7: Cancel sudden load 8: Select an inverter of higher power class.
Over-current during deceleration	oC2	1: The output circuit is grounded or short circuited. 2: Inverter is under vector control and do not auto-tuning 3: Deceleration time is too short 4: Voltage too low 5: A sudden load is added during acceleration 6: Do not install braking unit or braking resistor	1: Eliminate external faults. 2: Motor auto-tuning 3: Add the deceleration time 4: Adjust the power voltage to normal range 5: Cancel sudden load 6: Install braking unit and braking resistor
Over-current at constant speed	oC3	1: The output circuit is grounded or short circuited. 2: Inverter is under vector control and do not auto-tuning 3: Voltage too low	1: Eliminate external faults. 2: Motor auto-tuning 3: Adjust the power voltage to normal range 4: Cancel sudden load 5: Select an inverter of

		4: A sudden load is added during acceleration 5: The inverter model is too small power class.	higher power class.
Over-voltage during acceleration	oU1	1: The input voltage is too high. 2: An external force drives the motor during acceleration. 3: The acceleration time is too Short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit and braking resistor.
Over-voltage during deceleration	oU2	1: The input voltage is too high. 2: An external force drives the motor during deceleration. 3: The deceleration time is too Short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install the braking resistor. 4: Install the braking unit and braking resistor.
Over-voltage at constant speed	oU3	1: The input voltage is too high. 2: An external force drives the motor during deceleration.	1: Adjust the voltage to normal range. 2: Adjust the load or install braking unit and braking resistor
Control power fault	PoFF	1: Input voltage is not within the range of the specification	1: Adjust the voltage to normal range.
Lack of voltage	LU	1: Instantaneous power failure	1: Fault reset 2: Adjust the voltage to

		2: Input voltage is not within the range of the specification 3: Bus voltage is abnormal 4: Rectifier bridge and buffer resistance are faulty 5: Drive board is faulty 6: Power board is faulty	normal range. 3: Looking for technical support 4: Looking for technical support 5: Looking for technical support 6: Looking for technical support
Inverter overload	oL2	1: Load is too large or blocking 2: The inverter model is of too small power class.	1: Check the load and motor, machine 2: Select an inverter of higher power class.
Motor overload	oL1	1: P9.01 is set improperly. 2: Load is too large or blocking 3: The inverter model is of too small power class.	1: Set the parameter correctly 2: Check the load and motor, machine 3: Select an inverter of higher power class
Input phase loss	LI	1: The three-phase power input is abnormal 2: The drive board is faulty 3: The lightening board is faulty 4: The main control board is faulty	1: Eliminate external faults. 2: Looking for technical support 3: Looking for technical support 4: Looking for technical support
Output phase loss	Lo	1: The cable connecting the AC drive and the motor is faulty. 2: The inverter's three-phase output is unbalanced when the motor is running. 3: The drive board is	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal. 3: Looking for technical support .

		faulty. 4: The module is faulty.	
Module overheat	oH	1: The ambient temperature is too high.. 2: The air filter is blocked. 3: The fan is damaged. 4:The thermally sensitive resistor of the module is damaged. 5:The inverter module is damaged.	1:Lower the ambient temperature. 2:Clean the air filter. 3:Replace the damaged fan. 4:Replace the damaged thermally sensitive resistor. 5:Replace the inverter module.
External equipment fault	EF	1: External fault signal is input via X. 2: External fault signal is input via virtual I/O.	Reset the operation
Communication fault	CE	1: The host computer is in abnormal state. 2: The communication cable is faulty. 3: The communication parameters in group PD are set improperly.	1: Check the cabling of host computer. 2: Check the communication cabling. 3: Set the communication parameters properly
Contactor fault	rAy	1: The drive board and power supply are faulty. 2: The contactor is faulty.	1: Replace the faulty drive board or power supply board. 2: Replace the faulty Contactor.
Current detection fault	IE	1: The HALL device is faulty. 2: The drive board is faulty.	1: Replace the faulty HALL device. 2: Replace the faulty drive board.
Motor auto-tuning fault	TE	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting the inverter and the motor.

Encoder fault	PG	1: The encoder type is incorrect 2: The cable connection of the encoder is incorrect 3: The encoder is damaged 4: The PG card is faulty	1: Set the encoder type correctly based on the actual situation 2: Eliminate external faults. 3: Replace the damaged Encoder 4: Replace the faulty PG card
EEPROM read-write fault	EEP	1、EEPROM chip is damaged.	Replace the main control board.
Short circuit to ground fault	GND	The motor is short circuited to the ground.	Replace the cable or motor.
Pulse-by-pulse current limit fault	CBC	1: The load is too heavy or locked-rotor occurs on the motor. 2: The inverter model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an inverter of higher power class.
Too large speed deviation fault	ESP	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed.	1: Set the encoder parameters properly. 2: Perform the motor auto- tuning.
Speed and running direction are opposite	oSP	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: Load is too large, exceed the motor torque	1: Set the encoder parameters properly. 2: Perform the motor auto- tuning. 3: Select inverter according to actual situation
Brake fault	bcE	1: Check brake feedback parameter setting 2: Check brake open feedback connect wiring and brake sensor	1: Set brake feedback parameter correctly 2: Re-install the brake sensor
Brake open fault	boE	1: Check brake open feedback parameter	1: Set brake feedback parameter correctly

		setting 2: Check brake open feedback connect wiring and brake sensor	2: Re-install the brake sensor
Long time low speed alarm	LSP	1: Check low speed running alarm parameter setting 2: Check running speed setting	1: Set low speed running alarm parameter correctly 2: Modify running speed
Both forward and reverse are valid	FrAc	Check lifting joystick	Re-wiring or change the lifting joystick
Joystick is not becoming 0 fault	FrPo	Check lifting joystick	Re-wiring or change the lifting joystick

5.2 Common Faults and Solutions

You may come across the following faults during the use of the inverter.

Refer to the following table for simple fault analysis.

Table 5-2 Troubleshooting to common faults of the inverter

SN	Fault	Possible Causes	Solutions
1	There is no display when the power is on	1: There is no power supply to the inverter or the power input to the inverter is too low. 2: The power supply of the switch on the drive board of the inverter is Faulty. 3: The rectifier bridge is damaged. 4: The control board or the operation panel is faulty. 5: The cable connecting the control board and the drive board and the operation panel breaks.	1: Check the power supply. 2: Check the bus voltage. 3: Looking for technical support
2	“2000” is displayed when the power is on	1: The cable between the drive board and the control board is in poor contact. 2: Related components on the control board are damaged. 3: The motor or the motor cable is short circuited to the ground.	Looking for technical support

		4: The HALL device is faulty. 5: The power input to the inverter is too low.	
3	“GND” is displayed when the power is on	1: The motor or the motor output cable is short-circuited to the ground. 2: The inverter is damaged.	1: Measure the insulation of the motor and the output cable with a megger. 2: Looking for technical support
4	The inverter display is normal when the power is on. But “2000” is displayed after running and stops immediately.	1: The cooling fan is damaged or locked-rotor occurs. 2: The external control terminal cable is short circuited.	1: Replace the damaged fan. 2: Eliminate external faults.
5	OH (module overheat) fault is reported frequently.	1: The setting of carrier frequency is too high. 2: The cooling fan is damaged, or the air filter is blocked. 3: Components inside the inverter are damaged (thermal coupler or others).	1: Reduce the carrier frequency (P0.17). 2: Replace the fan and clean the air filter. 3: Looking for technical support
6	The motor does not rotate after the inverter runs.	1: Check the motor and the motor Cables. 2: The inverter parameters are set improperly (motor parameters). 3: The cable between the drive board and the control board is in poor contact. 4: The drive board is faulty.	1: Ensure the cable between the inverter and the motor is normal. 2: Replace the motor or clear mechanical faults. 3: Check and reset motor parameters.

7	The S terminals are disabled.	1: The parameters are set incorrectly. 2: The external signal is incorrect 3: The jumper bar across OP and +24 V becomes loose. 4: The control board is faulty.	1: Check and reset the parameters in group P5. 2: Re-connect the external signal cables. 3: Re-confirm the jumper bar across OP and +24 V. 4: Looking for technical support
8	Reserved		
9	The inverter reports Over-current and over-voltage frequently.	1: The motor parameters are set improperly. 2: The acceleration/deceleration time is improper. 3: The load fluctuates.	1: Reset motor parameters or re-perform the motor auto-tuning . 2: Set proper acceleration/deceleration time. 3: Looking for technical support
10	RAY is reported when the power is or the inverter is running.	The soft startup contactor is not picked up.	1: Check whether the contactor cable is loose. 2: Check whether the contactor is faulty. 3: Check whether 24 V power supply of the contactor is faulty. 4: Looking for technical support

Chapter 6 Maintenance



WARNING

- Maintenance must be performed according to designated maintenance methods.
- Maintenance, inspection and replacement of parts must be performed only by certified person.
- After turning off the main circuit power supply, wait for 10 minutes before maintenance or inspection.
- DO NOT directly touch components or devices of PCB board. Otherwise inverter can be damaged by electrostatic.
- After maintenance, all screws must be tightened.

6.1 Inspection

In order to prevent the fault of inverter to make it operate smoothly in high-performance for a long time, user must inspect the inverter periodically (within half year). The following table indicates the inspection content.

Items to be checked	Items to be checked
Temperature/humidity	Ambient temperature shall be lower than 40℃ Humidity shall meet the requirement of 20~90% and has no Gel
Smoke and dust	No dust accumulation, no traces of water leakage and no condensate.
Inverter	Check the inverter to ensure it has no abnormal heat abnormal vibration
Fan	Ensure the fan operation is normal, no debris stuck, etc.
Power input	Power input voltage and frequency are at the permissible range
Motor	To check the motor whether the motor has abnormal vibration ; abnormal heat; abnormal noise and phase loss, etc

6.2 Periodic Maintenance

Customers should check the drive in a regular time to make it operate smoothly in

high-performance for a long time.the checking contents are as follows:

Items to be checked	checking contents	Solutions
the screws of control terminals	whether the screws of control terminals are loose	tighten them
PCB	Duct and dirt	Clean the dust on PCBs and air ducts with a vacuum cleaner
Fan	abnormal noise,abnormal vibration, whether it has used up 20,000 hours	Clear debris and replace the fan
Electrolytic capacitor	Whether the color is changed and the smell is abnormal	Change the electrolytic capacitor
Heatsink	Duct and dirt	Clean the dust and air ducts with a vacuum cleaner
Power Components	Duct and dirt	Clean the dust and air ducts with a vacuum cleaner

6.3 Replacement of wearing parts

Fans and electrolytic capacitors are wearing part, please make periodic replacement to ensure long term, safety and failure-free operation. The replacement periods are as follows:

- ◆ Fan: Must be replaced when using up to 20,000 hours;
- ◆ Electrolytic Capacitor: Must be replaced when using up to 30,000~40,000 hours.

6.4 Inverter Warranty

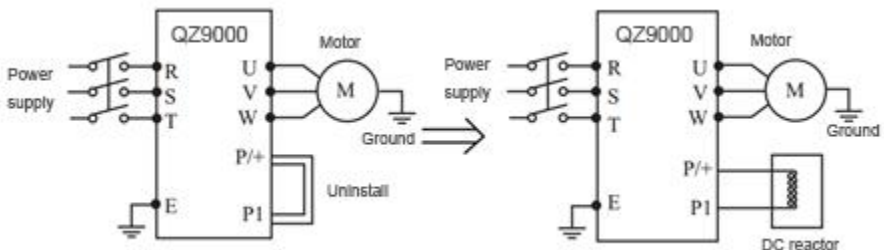
The company provides 12 months of warranty for QZ9000 Inverter since it goes out from the factory

Chapter 7 Peripheral Devices Selection

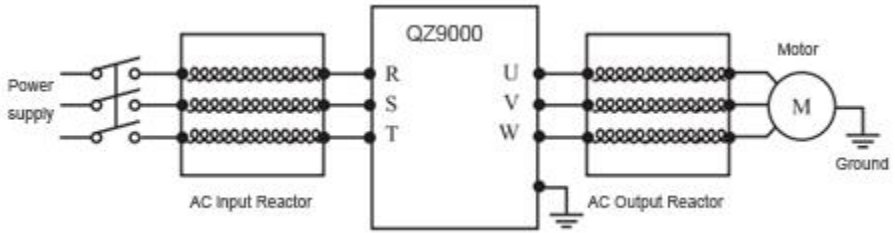
devices name	Descriptions
Circuit breaker and leakage breaker.	Protect inverter wiring, convenient to the installation and maintenance.
Electromagnetic contactor	Inverter is convenient to the power supply's power-on and power-off, ensure the safety
Surge absorber	Absorb surge current of electromagnetic contactor and control relay switch
Isolation Transformers	Isolation to the Inverter's input and output, Reduce interference
DC Reactor	Protect the Inverter and suppress higher harmonics.
AC Reactor	Protect the Inverter and suppress higher harmonics. Prevent the impact of surge voltage
Brake resistor and brake unit	Absorb the renewable Energy
Noise filter	To reduce the electromagnetic disturbance which is generated by inverter.
Ferrite ring	To reduce the electromagnetic disturbance which is generated by inverter.

7.1 Wiring

7.1.1 DC reactor install wiring



7.1.2 AC input/output reactor install wiring



7.2 DC reactor

Inverter model	Power (KW)	DC reactor selection		Remark
		Rated current (A)	Inductance (mH)	
QZ9400-30G	30	65	0.8	Built in optional
QZ9400-37G	37	78	0.7	
QZ9400-45G	45	95	0.54	Can be connected external
QZ9400-55G	55	115	0.45	
QZ9400-75G	75	160	0.36	
QZ9400-90G	90	180	0.33	
QZ9400-110G	110	250	0.26	
QZ9400-132G	132	250	0.26	
QZ9400-160G	160	340	0.18	
QZ9400-185G	185	460	0.12	
QZ9400-200G	200	460	0.12	
QZ9400-220G	220	460	0.12	
QZ9400-250G	250	500	0.12	
QZ9400-280G	280	650	0.11	Built in
QZ9400-315G	315	650	0.11	
QZ9400-350G	350	800	0.06	Built in

QZ9400-400G	400	800	0.06	
QZ9400-450G	450	1000	0.05	

7.3 AC input reactor

Inverter Model	Power (KW)	AC reactor selection		Remark
		Rated (A)	current Inductance (mH)	
QZ9400-7.5G	7.5	20	0.75	
QZ9400-11G	11	30	0.6	
QZ9400-15G	15	40	0.42	
QZ9400-18.5G	18.5	50	0.35	
QZ9400-22G	22	60	0.28	
QZ9400-30G	30	80	0.19	
QZ9400-37G	37	90	0.16	
QZ9400-45G	45	120	0.13	
QZ9400-55G	55	150	0.1	
QZ9400-75G	75	200	0.12	
QZ9400-90G	90	250	0.06	
QZ9400-110G	110	250	0.06	
QZ9400-132G	132	290	0.04	
QZ9400-160G	160	330	0.04	
QZ9400-200G	200	490	0.03	
QZ9400-220G	220	490	0.03	

QZ9400-250G	250	530	0.03	
QZ9400-280G	280	600	0.02	
QZ9400-315G	315	660	0.02	
QZ9400-350G	350	800	0.0175	
QZ9400-400G	400	800	0.0175	
QZ9400-450G	450	1000	0.014	

7.4 AC output reactor

Inverter model	Power (KW)	AC reactor selection		Remark
		Rated current (A)	Inductance (mH)	
QZ9400-7R5G	7.5	20	0.13	
QZ9400-11G	11	30	0.087	
QZ9400-15G	15	40	0.066	
QZ9400-18.5G	18.5	50	0.052	
QZ9400-22G	22	60	0.045	
QZ9400-30G	30	80	0.032	
QZ9400-37G	37	90	0.03	
QZ9400-45G	45	120	0.023	
QZ9400-55G	55	150	0.019	
QZ9400-75G	75	200	0.014	
QZ9400-90G	90	250	0.011	
QZ9400-110G	110	250	0.011	
QZ9400-132G	132	290	0.008	
QZ9400-160G	160	330	0.008	
QZ9400-200G	200	490	0.004	
QZ9400-220G	220	490	0.004	

QZ9400-250G	250	530	0.003	
QZ9400-280G	280	600	0.003	
QZ9400-315G	315	660	0.002	
QZ9400-350G	350	800	0.002	
QZ9400-400G	400	800	0.002	
QZ9400-450G	450	1000	0.0012	
QZ9400-450G	450	1000	0.0012	

7.5 Brake resistor

Inverter Model	Brake resistor		Brake unit CDBR	Brake torque (10%ED)	Motor (KW)
	Power W	Resistance $\Omega(\geq)$			
QZ9400-7R5G	500W	65	Built in	125	7.5
QZ9400-11G	800W	43		125	11
QZ9400-15G	1000W	32		125	15
QZ9400-18.5G	1300W	25		125	18.5
QZ9400-22G	1500W	22		125	22
QZ9400-30G	2500W	16		125	30
QZ9400-37G	3.7KW	12.6		125	37
QZ9400-45G	4.5KW	9.4	Built in	125	45
QZ9400-55G	5.5KW	9.4		125	55
QZ9400-75G	7.5KW	6.3		125	75
QZ9400-90G	4.5KW*2	9.4*2		125	90
QZ9400-110G	5.5KW*2	9.41*2		125	110
QZ9400-132G	6.5KW*2	6.3*2		125	132
QZ9400-160G	16KW	2.5		125	160
QZ9400-200G	20KW	2.5		125	200
QZ9400-220G	22KW	2.5		125	220

QZ9400-250G	12.5KW*2	2.5*2		125	250
QZ9400-280G	14KW*2	2.5*2		125	280
QZ9400-315G	16KW*2	2.5*2		125	315
QZ9400-350G	17KW*2	2.5*2	External	125	350
QZ9400-400G	14KW*3	2.5*3		125	400
QZ9400-450G	15KW*3	2.5*3		125	450

Appendix A List of Function Parameters

If PP-00 is set to a non-zero number, parameter protection is enabled. You must enter the correct user password to enter the menu. To cancel the password protection function, enter with password and set PP-00 to 0.

Parameters menu the user customizes are not protected by password. Group P is the basic function parameters, Group D is to monitor the function parameters. The symbols in the function code table are described as follows:

"☆": The parameter can be modified when the inverter is in either stop or running state.

"★": The parameter cannot be modified when the inverter is in the running state.

"●": The parameter is the actually measured value and cannot be modified.

"*": The parameter is factory parameter and can be set only by the manufacturer.

Standard Function Parameters:

Function Code	Name	Setting range	Default	Property
Group P0 Basic function				
P0.01	Control Mode selection	0: V/F control 1: Sensorless flux vector control (SVC) 2: Close-loop vector control (FVC)	0	★
P0.02	Command source selection	0: Operation panel control (LED off) 1: Terminal control (LED on) 2: Communication control (LED blinking) 烁)	0	☆
P0.04	Main frequency source selection A	0: Multi-speed setting 1: AI1 setting 2: AI2 setting 3: Reserved 4: Acceleration/Deceleration setting 9: Communication setting	0	★
P0.08	Acceleration time 1	0.0s~600.0s	3.0s	☆
P0.09	Deceleration time1	0.0s~600.0s	3.0s	☆

Appendix B Communication Protocol

P0.10	Frequency preset	P0.16~P0.12	50.00Hz	☆
P0.11	Rotation direction	0: Same direction 1: Reverse direction	0	☆
P0.12	Maximum frequency	50.00Hz~150.00Hz	50.00Hz	★
P0.16	Minimum frequency	0.00Hz~15.00Hz	0.00Hz	☆
P0.17	Carrier frequency	1.0kHz~12.0kHz	Model dependent	☆
P0.25	UP/DOWN basic frequency	Opening frequency to maximum frequency	50.00Hz	☆
Group P1 Start stop control				
P1.07	Acceleration/ Deceleration mode	0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration 1 2: S-curve acceleration/deceleration 2	0	★
P1.08	Time proportion of S-curve start segment	0.0%~40.0%	30.0%	★
P1.09	Time proportion of S-curve end segment	0.0%~40.0%	30.0%	★
P1.10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	☆
P1.11	Initial frequency of stop DC braking	P0.16~P2.04	0.00Hz	☆
P1.13	Stop DC braking current Setting Range	0%~120%	50%	☆
P1.16	Brake open frequency	P0.16~15.00Hz	2.00 Hz	☆
P1.17	Brake open current	0.0~150.0%	30.0%	☆
P1.18	Brake open mechanical time	0.00~5.00s	0.50s	☆
P1.19	Brake open rotating direction	0: Brake opening torque is the same as the running direction 1: Brake opening torque is always forward	0	☆
P1.20	Brake frequency	P0.16~20.00Hz	2.00 Hz	☆
P1.21	Brake mechanical	0.00~5.00s	0.50s	☆

Appendix B Communication Protocol

	time			
P1.22	Brake delay time	0.0~30.0s	0.0s	☆
P1.23	Brake action curve	0: No brake control 1: Auto-brake control 1 2: Auto-brake control 2	1	☆
P1.24	Restart selection in the process of brake process	0: No allow to restart in the process of brake 1: Allow to restart in the process of brake	0	☆
P1.25	Restart waiting time	00.0~15.0s	0.3s	☆
P1.26	Brake feedback	0: Do not use brake feedback 1: For action detection 2: For full monitor	0	☆
P1.27	Running command reverse timing control	0: No allow to direct reverse during operation 1: Allow to direct reverse during operation	0	☆
P1.28	Zero-crossing jump frequency during running	0~20.00Hz	2.00 Hz	☆

Group P2 Motor parameter

P2.01	Rated motor power	0.4kW~1000.0kW	Model dependent	★
P2.02	Rated motor voltage	0V~2000V	380V	★
P2.03	Rated motor current	0.01A~655.35A (Inverter Power≤55kW) 0.1A~6553.5A (Inverter Power>55kW)	Model dependent	★
P2.04	Rated motor frequency	0.01Hz~P0.12	50.00Hz	★
P2.05	Rated motor rotating speed	0rpm~3000rpm	1400rpm	★
P2.06	Stator resistance (asynchronous motor)	0.001Ω~65.535Ω (Inverter Power≤55kW) 0.0001Ω~6.5535Ω (Inverter Power>55kW)	Tuning parameters	★
P2.07	Rotor resistance (asynchronous motor)	0.001Ω~65.535Ω (Inverter Power≤55kW) 0.0001Ω~6.5535Ω	Tuning parameters	★

Appendix B Communication Protocol

		(Inverter Power>55kW)		
P2.08	Leakage inductive reactance (asynchronous motor)	0.01mH~655.35mH (Inverter Power≤55kW) 0.001mH~65.535mH (Inverter Power>55kW)	Tuning paramters	★
P2.09	Mutual inductive reactance (asynchronous motor)	0.1mH~6553.5mH (Inverter Power≤55kW) 0.01mH~655.35mH (Inverter Power>55kW)	Tuning paramters	★
P2.10	No-load current (asynchronous motor)	0.01A~P2.03 (Inverter Power≤55kW) 0.1A~P2.03 (Inverter Power>55kW)	Tuning paramters	★
P2.27	Encoder pulses per revolution	0~8192	1024	★
P2.28	Encoder type	0: ABZ incremental encoder 1: Reserved 2: Resolver	0	★
P2.30	ABZ incremental encoder AB phase sequence	0: Forward 1: Reverse	0	★
P2.35	Encoder wire-break detection function selection	0: Close 1: Open	1	★
P2.36	Encoder wire-break fault detection time	0.000s~1.000s	0.000s	★
P2.37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static auto-tuning 2: Asynchronous motor complete auto-tuning 3: Asynchronous motor static complete auto-tuning	0	★
Group P3 Vector Control Parameters				
P3.00	Speed loop proportional gain1	1~100	60	☆
P3.01	Speed loop integral time 1	0.01s~10.00s	0.50s	☆
P3.02	Switchover frequency 1	0.00~P3.05	5.00Hz	☆

Appendix B Communication Protocol

P3.03	Speed loop proportional gain 2	1~100	20	☆
P3.04	Speed loop integral time 2	0.01s~10.00s	1.00s	☆
P3.05	Switchover frequency 2	P3.02~P0.12	10.00Hz	☆
P3.06	Vector control slip gain	50%~200%	100%	☆
P3.07	Time constant of speed loop filter	0.000s~1.000s	0.080s	☆
P3.10	Digital setting of torque upper limit in speed control mode	0.0%~500.0%	180.0%	☆
P3.12	Digital setting of torque upper limit in speed control mode (power generation)	0.0%~500.0%	180.0%	☆
P3.13	Excitation adjustment proportional gain	0~100	10	☆
P3.14	Excitation adjustment integral gain	0~100	10	☆
P3.15	Torque adjustment proportional gain	0~100	10	☆
P3.16	Torque adjustment integral gain	0~100	10	☆
P3.22	Field weakening multiple	100.0%~300.0%	100.0%	☆
P3.23	Slack rope torque	0.0%~P3.25	5.0%	
P3.24	Load allow	P3.25~100.0%	80.0%	
P3.25	Light load coefficient	P3.25~P3.24	35.0%	
P3.26	Light load detection frequency	P1.16~P0.12	40.00 Hz	
P3.27	Light load detection time	0.0~5.0s	0.5s	
P3.28	Forward frequency correction	0~100%	100%	
P3.29	Reverse frequency correction	0~100%	100%	
P3.30	Overload protection torque threshold	0.0~150.0%	0.0	

P3.31	Constant power control	0: Disabled 1: Enabled	1	
Group P4 V/F Control parameter				
P4.01	Torque boost	0.0%~30.0%	Model dependent	☆
P4.02	Cut-off frequency of torque boost	0.00Hz~P0.12	50.00Hz	★
P4.09	V/F slip compensation gain	0.0%~100.0%	0.0%	☆
P4.10	V/F over-excitation gain	0~200	0	☆
P4.11	V/F oscillation suppression gain	0~100	Model dependent	☆
Group P5 Input terminals				
P5.00	X1	0: No function	1	★
P5.01	X2	1: Forward RUN (FWD)	2	★
P5.02	X3	2: Reverse RUN (REV)	8	★
P5.03	X4	3: Fault reset (RESET)	9	★
P5.04	X5	4: Fast stop	10	★
P5.05	X6	5: Coast to stop	5	★
P5.06	X7	6: Decelerate to stop	0	★
P5.07	X8	7: Normally open (NO) input of external fault	0	★
P5.08	X9	8: Multi-reference terminal 1	0	★
P5.09	X10	9: Multi-reference terminal 2 10: Multi-reference terminal 3 11: Brake open feedback 12: Brake close feedback 13: 2 segment accelerate ramp switchover 14: 2 segment decelerate ramp switchover 15: 3 segment accelerate ramp switchover 16: 3 segment decelerate ramp switchover 19: Accelerate to run (UP) 20: Decelerate to run	0	★

Appendix B Communication Protocol

		(DOWN) 21: Torque control/Speed control switchover		
P5.10	Terminal filter time	0.000s~1.000s	0.010s	☆
P5.12	Terminal UP/DOWN rate	0.01Hz/s~50.00Hz/s	5.00Hz/s	☆
P5.13	FIV minimum input	0.00V~P5.15	0.00V	☆
P5.14	Corresponding setting of FIV minimum input	0.0%~+100.0%	0.0%	☆
P5.15	FIV maximum input	P5.13~+10.00V	10.00V	☆
P5.16	Corresponding of FIV maximum input	0.0%~+100.0%	100.0%	☆
P5.17	FIV filter time	0.00s~10.00s	0.10s	☆
P5.18	FIC minimum input	0.00V~P5.20	0.00V	☆
P5.19	Corresponding setting of FIC minimum input	0.0%~+100.0%	0.0%	☆
P5.20	FIC maximum input	P5.18~+10.00V	10.00V	☆
P5.21	Corresponding setting of FIC maximum input	0.0%~+100.0%	100.0%	☆
P5.22	FIC filter time	0.00s~10.00s	0.10s	☆
P5.28	FIV function selection	0-133	0	☆
P5.29	FIC function selection	0-133	0	☆
P5.30	Up/Down lowest frequency	0.00-15.00	0	☆
P5.31	Up/Down memory	0-1	0	☆
P5.32	Up/Down Optimization function selection	0-1	0	☆
P5.33	Up/Down limit frequency	0.00-50.00	5.00	☆
Group P6 Output terminals				
P6.01	Reserved	1: Brake control output	0	☆
P6.02	Relay output function selection (TA-TC)	2: Fault output (Fault stop) 3: Fault alarm	1	☆

Appendix B Communication Protocol

P6.03	Relay output function selection (RA-RB-RC)	4: Fault notice 8: Inverter overload pre-warning	13	☆
P6.04	Reserved	9: Motor overload pre-warning	0	☆
P6.05	YO1 output function selection	10: Low voltage startup protection	0	☆
P6.06	YO2 output function selection	11: Over load protection start 12: Over torque output 13: Motor fan control 14: Frequency reached output 15: Inverter running 19: Self-start function output	0	☆
P6.10	Reserved	-100.0%~+100.0%	0.0%	☆
P6.11	Reserved	-10.00~+10.00	1.00	☆
P6.12	Reserved	-100.0%~+100.0%	0.0%	☆
P6.13	Reserved	-10.00~+10.00	1.00	☆
Group P7 Operation Panel and Display				
P7.06	Load speed display coefficient	0.0001~6.5000	1.0000	☆
P7.09	Accumulative running time	0h~65535h	-	●
P7.11	Software	-	-	●
P7.13	Accumulative power-on time	0h~65535h	-	●
P7.14	Accumulative power consumption	0kW~65535 degree	-	●
Group P8 Auxiliary Functions				
P8.00	Acceleration mode selection	0: Do not use special Acceleration/Deceleration	0	☆
P8.01	Deceleration mode selection	2: 3 segment of acceleration and deceleration automatically switch according to frequency 4: 3 segment of acceleration and deceleration switch by terminals	0	☆
P8.02	Hold time of each segment	0.0-600.0s	0.0s	☆
P8.03	Acceleration time 2	0.1s~600.0s	3.0s	☆
P8.04	Deceleration time 2	0.1s~600.0s	3.0s	☆

Appendix B Communication Protocol

P8.05	Acceleration frequency 2	0.00Hz～Maximum frequency(P0. 12)	0.00Hz	☆
P8.06	Deceleration frequency 2	0.00Hz～Maximum frequency(P0. 12)	0.00Hz	☆
P8.07	Acceleration time 3	0.1s～600.0s	3.0s	☆
P8.08	Deceleration time 3	0.1s～600.0s	3.0s	☆
P8.09	Acceleration frequency 3	0.00Hz～Maximum frequency(P0. 12)	0.00Hz	☆
P8.10	Deceleration frequency 3	0.00Hz～Maximum frequency(P0. 12)	0.00Hz	☆
P8.15	Droop control	0.00Hz～20.00Hz	0.00Hz	☆
P8.19	Frequency detection value (FDT1)	P1.16～P0.12	50.00Hz	☆
P8.20	Frequency detection hysteresis (FDT1)	0.0%～100.0% (FDT1 level)	5.0%	☆
P8.28	Low speed running protection frequency	0.01Hz～20.00Hz	5.00Hz	☆
P8.29	Low speed running protection time	0s～1000s	0s	☆
P8.36	Over-torque output threshold	0.0% (No detection) 0.1%～200.0% (rated motor current)	0.0%	☆
P8.48	Inverter fan control	0: Fan runs during operation 1: Fan runs always	0	☆
P8.49	Motor fan control delay	0～3000s	30s	☆
Group P9 Fault and protection				
P9.00	Motor overload protection selection	0: Disabled 1: Enabled	1	☆
P9.01	Motor overload protection gain	0.20～10.00	1.00	☆
P9.02	Motor overload warning coefficient	50%～100%	80%	☆
P9.03	Over-voltage stall gain	0～100	0	☆
P9.04	Over-voltage stall protective voltage	620.0～660.0	640.0	☆
P9.05	Over-current stall gain	0～100	20	☆

Appendix B Communication Protocol

P9.06	Over-current stall protective current	100%~200%	150%	☆
P9.07	Short-circuit to ground upon power-on	0: Disabled 1: Enabled	0	☆
P9.12	Input phase loss protection selection	0: Disabled 1: Enabled	1	☆
P9.13	Output phase loss protection selection	0: Disabled 1: Enabled	1	☆
P9.14	1st fault type	0: No fault 1: Inverter unit protection 2: Over-current during acceleration 3: Over-current during deceleration 4: Over-current at constant speed 5: Over-voltage during acceleration 6: Over-voltage during deceleration 7: Over-voltage at constant speed 8: Buffer resistance overload 9: Undervoltage 10: Inverter overload 11: Motor overload 12: Input phase loss 14: Module overheat 15: External equipment fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 20: Encoder/PG card faulty 22: Inverter hardware fault 23: Short circuit to ground 25: Output phase loss 37: Motor over speed 38: Speed deviation too large 40: Fast current limit overtime 41: Brake open fault 42: Brake fault	-	●

Appendix B Communication Protocol

		43: Long time low speed running fault 44: Both Forward and Reverse operate enabled 45: Joystick no becoming 0 fault 48 Communication abnormal 49: Parameter read write abnormal 50: External input fault		
P9.15	2nd fault type		—	●
P9.16	3rd (latest) fault type		—	●
P9.47	Fault protection action selection 1	Set the fault level, each bit represents a fault. There are 4 types of fault levels, and each type implements corresponding fault measures. If set as 5, inverter is running normally.	11115	☆
P9.48	Fault protection action selection 2		11111	☆
P9.49	Fault protection action selection 3		11411	☆
P9.50	Fault protection action selection 4		11111	☆
P9.51	Fault protection action selection 5		11111	☆
Group Pb Lifting auxiliary parameters				
PB.00	Position display proportion	1-65535	1	☆
PB.01	Initial position	0-65535	0	☆
PB.02	Number of self-starting pulses	0-65535	0	☆
PB.03	Frequency abnormal detection period	0.00-1.00	0.50	☆
PB.04	Frequency following deviation detection reference	0-30	20	☆
PB.05	Frequency following deviation detection period	0.00-1.00	0.50	☆
PB.08	Speed reduction with pressure function selection	0: Close, 1: Open	0	☆
PB.09	Action voltage of speed reduction with	70%-100%	85%	☆

Appendix B Communication Protocol

	pressure function selection			
Group PC Multi-Reference				
PC.00	multi-reference 0	0-Maximum frequency(P0. 12)	5.00	☆
PC.01	multi-reference 1	0-Maximum frequency(P0. 12)	20.00	☆
PC.02	multi-reference 2	0-Maximum frequency(P0. 12)	35.00	☆
PC.03	multi-reference 3	0-Maximum frequency(P0. 12)	0.00	☆
PC.04	multi-reference 4	0-Maximum frequency(P0. 12)	50.00	☆
PC.05	multi-reference 5	0-Maximum frequency(P0. 12)	0.00	☆
PC.06	multi-reference 6	0-Maximum frequency(P0. 12)	0.00	☆
PC.07	multi-reference 7	0-Maximum frequency(P0. 12)	0.00	☆
Group Pd Communication parameters				
PD.00	Baud rate	5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	9600	☆
PD.01	Data format	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd Parity check (8-O-1) 3: 8-N-1	3	☆
PD.02	Local address	1~247, 0 Broadcast address	1	☆
PD.03	Response delay	0ms~20ms	2	☆
PD.04	Communication timeout	0.0 (Disabled) , 0.1s~60.0s	0.0	☆
Group PP User-Defined Function Codes				
PP.00	User password	0~65535	0	☆
PP.01	Restore default settings	0: No operation 1: Restore factory settings except motor parameters 2: Clear records	0	★
Group C0 Torque Control and Restricting Parameters				
C0.00	Speed/Torque control selection	0: Speed control 1: Torque control 2: Auto switch to torque according to C0.09 3: Auto switch to torque according to C0.10	0	★

Appendix B Communication Protocol

		5: Switch torque through terminal		
C0.01	Torque setting source	0: Digital setting (C0.03) 1: FIV 2: FIC 3: Reserved 4: Reserved 5: Communication setting	0	★
C0.03	Torque digital setting in torque control	0.0%~500.0%	50.0%	☆
C0.05	Forward maximum frequency in torque control	0.00Hz~Maximum frequency(P0. 12)	50.00Hz	☆
C0.06	Reverse maximum frequency in torque control	0.00Hz~Maximum frequency(P0. 12)	50.00Hz	☆
C0.07	Acceleration time in torque control	0.0s~600.0s	0.0s	☆
C0.08	Deceleration time in torque control	0.0s~600.0s	0.0s	☆
C0.09	Torque switchover frequency clamp	0.00Hz~Maximum frequency(P0. 12)	25.00Hz	☆
C0.10	Torque switchover torque clamp	0.0%~150.0%	50.0%	☆
Group C5: Control Optimization Parameters				
C5.00	DPWM switchover frequency upper limit	5.00Hz~Maximum frequency(P0. 12)	12.00Hz	☆
C5.01	PWM modulation mode	0: Asynchronous modulation 1: Synchronous modulation	0	☆
C5.02	Dead compensation mode selection	0: No compensation 1: Compensation mode 1 2: Compensation mode 2	1	☆
C5.03	Random PWM depth	0: Disabled 1~10: Enabled	0	☆
C5.04	Fast current limiting open	0: Disabled 1: Enabled	1	☆
C5.05	Current detection compensation	0~100	5	☆
C5.06	Lack voltage setting	210.0~630.0	350	☆

Group D0: Monitoring Parameters

Function code	Parameter Name	Unit
Group D0: Basic monitoring parameters		
D0.00	Running frequency (Hz)	0.1Hz
D0.01	Setting frequency (Hz)	0.1Hz
D0.02	Bus voltage (V)	0.1V
D0.03	Output voltage (V)	1V
D0.04	Output current (A)	0.01A
D0.05	Output power (kW)	0.1kW
D0.06	Output torque (%)	0.1%
D0.07	X input state	1
D0.08	YO output state	1
D0.09	FIV voltage (V)	0.01V
D0.10	FIC voltage (V)	0.01V
D0.14	Load speed display	0.1
D0.17	Brake use times high level	0.01kHz
D0.18	Brake use times low level	0.01kHz
D0.19	Feedback speed (unit: 0.1Hz)	0.1Hz
D0.25	X9-X10 state	1
D0.25	Current power on time	1Min

Appendix B Communication Protocol

D0.26	Current running time	1Min
D0.27	Reserved	1Hz
D0.28	Communication setting value	0.01%
D0.29	Encoder feedback speed	0.01Hz
D0.35	Target torque (%)	0.1%
D0.36	Resolver position	1
D0.37	ABZ position high level	0.1°
D0.38	ABZ position low level	1
D0.39	Fault code	1
D0.61	Inverter state	1

The Group D0 is used to monitor the inverter's running state. You can view the parameter values by using operation panel, convenient for on-site commissioning or from the host computer by means of communication.

Appendix B

Communication Protocol

QZ9000 series inverter provides RS485 communication interface, and support the Modbus communication protocol. Users can be achieved by computing machine or PLC central control, through the communication protocol set frequency converter running commands, modify or read function code parameters, read the inverter working condition and fault information, etc.

1. The agreement content

The serial communication protocol defines the serial communication transmission of information content and format. Including: host polling or wide planting format; Host encoding method, the content includes: the function of the required action code, data transmission and error checking, etc. From the ring of machine should be used is the same structure, content including: action confirmation, return the data and error checking, etc. If there was an error in receiving information from a machine, or cannot achieve the requirements of the host, it will organize a fault feedback information in response to the host.

Application mode converter with RS485 bus access to the "from" single main PC/PLC control network.

(1) The interface way RS485 interface hardware

(2) Asynchronous serial transmission mode, half-duplex transmission mode. At the same time the host and the only one to send data from the machine and the other can only receive data. Data in the process of serial asynchronous communication, the form of a message, a frame of a frame to send

(3) Topological structure from single host machine system. From the machine address set in the range of 1 ~ 247, 0 for broadcast communication address. In the network from the machine address must be unique.

Protocol Description:

QZ9000 series inverter is a kind of asynchronous serial port communication protocol of master-slave Modbus communication protocol, the network has only one equipment (host) to establish agreement (called "query/command"). Other equipment (machine) can only by providing data response of the main machine "query/command", or "query/command" according to the host to make the corresponding action. Host in this refers to the personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc., from machine refers to QZ9000 inverter. The host can communicate to a separate from the machine, also can to all under a broadcast information from machine release. For

access to the host alone "query/command", from the machine to return to a information (called response), for radio host information, from the machine without feedback response to the host.

Communications data structure

Communication data structure QZ9000 series frequency converter of the Modbus protocol communication data format is as follows: using the RTU mode, messages are sent at least begin with 3.5 characters pause time interval.

In network wave rate under varied characters of the time, this is the most easy to implement (below T1, T2, T3, T4).Transmission equipment is the first domain address.

The transmission character of you can use is the hex 0...9, A...F.Continuously detect network bus network facilities, including pause interval of time.When the first domain (domain) to receive, every equipment decoding to determine whether to own.After the last transmission character, a pause at least 3.5 characters time calibration for the end of the message.A new message can be started after the pause.

The entire message frame must be as a continuous flow of transmission.If the time frame to complete more than 1.5 characters before pause time, receiving equipment will refresh incomplete message and assume that the next byte is a new message the address of the domain.Likewise, if a new message in less than 3.5 characters of time and then a message before, receiving equipment will think it is a continuation of the previous message.This will result in an error, because in the final CRC field value can't be right.

RTU frame format:

The frame header START	3.5 characters
Slave address ADR	Communication address: 1~247
command code CMD	03: Read the machine parameters; 06: write the machine parameters
Date content DATA (N- Data content DATA (N- Data contentDATA0	Information content: Function code parameter address, function code number of parameters, function code parameter values, etc
high-order position of CRC CHK	
low-order position of CRC CHK	
END	3.5 characters'time

CMD (Command instruction) and DATA (the description of data word)
 command code: 03H, read N word (Word) (Can read the most words of 12)
 For example, From the machine address of 01 inverter startup F105 continuous read
 for two consecutive values

The host command information

ADR	01H
CMD	03H
high-order position of the starting address	F1H
low-order position of the starting address	05H
high-order position of register	00H
low-order position of register	02H
low-order position of CRC CHK	Wait to calculate the CRC CHK values
high-order position of CRC CHK	

In response to information from the slave machine

Set PD.05 to 0:

ADR	01H
CMD	03H
high-order position of bytes	00H
low-order position of bytes	04H
Data high-order position of F002H	00H
Data low-order position of F002H	00H
Data high-order position of F003H	00H
Data low-order position of F003H	01H
low-order position of CRC CHK	Wait to calculate the CRC CHK values

high-order position of CRC CHK	
-----------------------------------	--

Set PD.05 to 1:

ADR	01H
CMD	03H
The number of bytes	04H
Data high-order position of F002H	00H
Data low-order position of F002H	00H
Data high-order position of F003H	00H
Data low-order position of F003H	01H
low-order position of CRC CHK	Wait to calculate the CRC CHK values
high-order position of CRC CHK	

The command code: 06H write a word (Word) For example, write 3000 (BB8H) to slave machine.

Address 05H frequency converter's F00AH address.

The host command information

ADR	05H
CMD	06H
high-order position of data address	F0H
low-order position of data address	0AH
high-order position of information content	0BH
low-order position of information content	B8H

low-order position of CRC CHK	Wait to calculate the CRC CHK values
high-order position of CRC CHK	

In response to information from the slave machine

ADR	02H
CMD	06H
high-order position of data	F0H
low-order position of data	0AH
high-order position of information content	13H
low-order position of information content	88H
low-order position of CRC CHK	Wait to calculate the CRC CHK values
high-order position of CRC CHK	

Check way——CRC Check way: CRC (Cyclical Redundancy Check) use RTU frame format, The message includes error detection field based on the method of CRC. CRC domain test the whole content of a message. CRC domain is two bytes, contains a 16-bit binary values. it is calculated by the transmission equipment, added to the message. receive messages the device recalculate. And compared with receives the CRC in the domain of value, if the two CRC value is not equal, then there is an error in transmission.

CRC is saved in 0xFFFF, Then call a process to continuous 8-bit bytes of the message and the values in the current register for processing. Only 8 bit data in each character of CRC is effective, Starting bit and stopping bit and parity bits are invalid.

In the process of CRC, Each of the eight characters are separate and dissimilar or register contents (XOR), The results move to the least significant bit direction, set the most significant bit to 0. LSB is extracted to test, if set LSB to 1, Register and preset value dissimilarity or alone, if set LSB to 0, is not to. The whole process will repeat 8 times. when the last time (the eighth time) is completed, next 8-bit bytes and separate and register under the current value of the alien or. The values in the final register, Is all bytes in the message is executed after the CRC value.

When CRC added to the messages .The low byte to join first and then high byte.CRC Simple function is as follows:

```

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

```

Address definition of communication parameters

This part is the content of the communication, used to control the operation of the inverter, inverter status and related parameters setting.Read and write functional code parameter (some function code which can not be changed, only for the use of manufacturers or monitoring) : function code parameter address label rules:

By function block number and the label for the parameter address representation rules .

High byte: F0~FF (P group) 、 A0~AF (C group) 、 70~7F (D group) low byte: 00~FF

Such as: P3.12, The address is expressed as F30C; attention: PF group: Neither read the parameters, and do not change parameters; D group: only can read, do not change the parameters.

When some parameters in converter is in operation, can't not be changed; Some parameters of the frequency converter in any state, cannot be changed;Change function code parameters, but also pay attention to the range of parameters, units, and related instructions.

In addition, because the EEPROM is stored frequently, the service life of the block can reduce the the life of the block EPROM, so some function codes under the mode of communication, do not need to be stored, just change the value of RAM.If it is P group of parameters, in order to realize the function, as long as putting this

Appendix B Communication Protocol

function code address high F into 0 can be achieved.If it is C group of parameters, in order to realize the function, as long as putting the function code the address of high A into 4 can be achieved.Corresponding function codes are shown as the following address: the high byte: 00 ~ 0F (P group), 40 ~ 4F(group B) low byte: 00 to FF

Such as:

Function code P3.12 is not stored in the EEPROM,The address is expressed as 030C; Function code C0-05 is not stored in the EEPROM,The address is expressed as 4005; The address representation can only do writing RAM, can't do reading action,when reading,it is invalid address. For all the parameters, can also use the command code 7H to implement this function.

Stopping/starting parameters:

Parameter address	Parameter description
1000	Communication Setting value (-10000~10000) (decimal system)
1001	Operating frequency
1002	Bus voltage
1003	output voltage
1004	output current
1005	output power
1006	output torque
1007	running velocity

Attention:

Communication setting value is relative percentage, 10000 corresponds to 100.00% and - 10000-100.00%.The frequency of dimensional data, the percentage is relative to the percentage of maximum frequency (P0.12);Counter rotating torque dimensional data, the percentage is P2.10.

Control command input to the converter: (write-only)

The command word	Command function
2000	0001: Running forward
	0002: Reverse running
	0003: Forward point move
	0004: Reversal point move
	0005: Free downtime
	0006: Slowdown stop

0007: Fault reset

Read the inverter state: (read-only)

Status word address	Status word function
3000	0001: Running forward
	0002: Reverse running
	0003: closing down

Parameters lock password check: (if return for 8888H,it indicates that the password check through)

Password address	The content of the input password
1F00	*****

Frequency inverter fault description:

Inverter fault address	Inverter fault information
8000	0: No fault 1: Inverter unit protection 2: Over-current during acceleration 3: Over-current during deceleration 4: Over-current at constant speed 5: Over-voltage during acceleration 6: Over-voltage during deceleration 7: Over-voltage at constant speed 8: Buffer resistance overload 9: Undervoltage 10: Inverter overload 11: Motor overload 12: Input phase loss 14: Module overheat 15: External equipment fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 20: Encoder/PG card faulty 22: Inverter hardware fault 23: Short circuit to ground 25: Output phase loss 37: Motor over speed 38: Speed deviation too large 40: Fast current limit overtime 41: Brake open fault

	42: Brake fault 43: Long time low speed running fault 44: Both Forward and Reverse operate enabled 45: Joystick no becoming 0 fault 48 Communication abnormal 49: Parameter read write abnormal 50: External input fault
--	--

Communication fault address	Fault functional description
8001	0000: No fault 0001: Password error 0002: The command code error 0003: CRC Checking error 0004: Disabled address 0005: Disabled parameter 0006: correcting parameter is invalid 0007: System is locked 0008: Block is EEPROM operation

PD group Communication parameters description

PD.00	Baud rate	Default	0005
	Setting range	Unit's digit: MODUBS Baud rate 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	

This parameter is used to set data transfer rate between the PC and inverter. Notice that setting the baud rate of upper machine and converter must be consistent, otherwise, the communication can't carry on. The faster the baud rate, the greater the communication.

PD.01	The data format	The factory value	0
	setting range	0: No check: The data format<8,N,2> 1: Even-parity: The data format<8,E,1> 2: Odd parity check: The data	

Appendix B Communication Protocol

		format<8,O,1> 3: No check: The data format<8-N-1>
--	--	--

PC and data format set by the frequency converter must be consistent, otherwise, the communication can't carry on.

PD.02	The machine address	The factory value	1
	setting range	1~247, 0 is the broadcast address	

When the machine address is set to 0, namely for the broadcast address, realize PC broadcasting functions.

The machine address has uniqueness (except the broadcast address), which is to achieve the basis of upper machine and inverter peer-to-peer communications.。

PD.03	Response delay	The factory value	0
	setting range	0~20ms	

Response delay: refers to the frequency converter data to accept the end up to a upper machine to send data in the middle of the interval of time. If the response time delay is less than the system processing time, the response time delay will be subject to system processing time, processing time, such as response time delay is longer than system after processing the data, the system will delay waiting, until the response delay time to up to a upper machine to send data.

PD.04	Communication timeout	The factory value	0.0 s
	setting range	0.0 s (invalid) 0.1~60.0s	

When the function code is set to 0.0 s, communication timeout parameter is invalid. When the function code is set to valid values, if a communication and the interval time of the next communication beyond the communication timeout, system will be submitted to the communication failure error (CE).Usually, it is set into is invalid. If in the continuous communication system times parameter is set , you can monitor the communication status.