K&R® 科润技术

ACD320 Series
GENERAL VECTOR AC DRIVE

User Manual

K&R®

User Manual | ver 1.1

Preface

This manual is helpful for type selecting, installation, parameter setting, site commissioning, rubleshooting, and daily maintenance of the inverter. To guarantee safe operation of the inverter, please read this manual thoroughly, and keep it handy for referance in the future..

First use this product:

For those users who use this product for the first time, should read this manual thoroughly. If you have any question in the Function and Functional performance, please feel free to contact our technical support personnel for assist.

Notice:

- Before wiring, please make sure to cut off the power.
- The electronic components in the inverter are sensitive to static, so please do not put anything in the inverter, and do not touch the main circuit board.
- After cutting off the AC power supply, if the indicator light still on, please do not touch the circuit and any part in the inverter, beacause there still be high voltage in the inverter which is very dangerous.
- The terminals of inverter must be connected to the ground correctly.
- The Input power line absolutely can not be connected to the Output terminal U/T1、V/T2 and W/T3.

Application range of this manual:

This manual is applied to ACD320 Series Inverters of our company.

Chapter 1 Safety information and use notice points 1

1.1 Safety precautions 1

1.2 Use range 2

1.3 Use notice points 2

1.4 Scrap notice points 3

Chapter 2 Type and specification of the inverter 4

2.1 Incoming inverter inspect 4

2.2 Type explanation 4

2.3 Nameplate explanation 4

2.4 Series type explanation 5

2.6 Out size 8

2.7 Product technic index and specification 11

Chapter 3 Installation and wiring 16

3.1 Installation ambient 16

3.2 Electrical Installation 17

3.3 BasicWiring Diagram 20

3.4 Main Circuit Terminals andWiring 23

3.5 Control Terminals and Wiring 24

3.6 EMC Issues 30

Chapter 4 Digital Keypad Operation 33

4.1 Description of the DigitalKeypad 33

4.2 Modify and Check the Function Codes 34

4.3 How to View Status Parameters 35

4.4 Password Setting 35

4.5 Auto Tuning of Motor Parameters(Referto F1.11) 36

Chapter 5 Function parameters list 38

5.1 Symbol description *38*

5.2 Function parameter schedule graph *38*

Chapter 6 Parameter Description **54**

6.1 F0 Basic Function Parameters *54*

6.2 F1 Motor Parameters *64*

6.3 F2 Input and Output Terminal Function Parameters *69*

6.4 F3 Human Machine Interface Parameters *78*

6.5 F4Application Function Parameters *82*

6.6 F5 Protection Parameters *92*

6.7 F6 Communication Parameters *95*

6.8 F7 Senior Function Parameters *98*

6.9 F8 Supplementary function Parameters 1 ..... *103*

6.10 F9 Supplementary function Parameters 2 ..... *106*

Chapter 7 Fault Diagnosis and Countermeasures **109**

7.1 Failure and countermeasure *109*

7.2Fault and Countermeasures *114*

7.3 Failure record lookup *125*

7.4 Failure reset *125*

Chapter 8 Maintenance **126**

8.1 Routine maintenance *126*

8.2 Inspection and replacement of damageable parts *126*

8.3 Repair guarantee *127*

8.4 Storage *127*

Chapter 9 Appendix **129**

Appendix 1 ACD320 series serial communication protocol *129*

Appendix 2 All BrakingResistors & Braking Units Use in AC Drives *143*

Appendix 3 Parameter illustration of the inverter specially used for one driving one constant pressure water supply..... *144*

Appendix 4 Example for one driving two constant pressure water supply controlling card and water supply mode that one for use and one for supplement（one driving two circularly running）..... *147*

Chapter 1 Safety information and use notice points

In order to ensure the safety of your personal and equipment, please read this chapter of content conscientiously before using the inverter .

1.1 Safety precautions

There are three kinds of safety relevant warnings in this service manual.They are as follows:

This symbol briefs on: if do not operate as request, the body injured or equipment damaged may occur.

This symbol is briefed on useful information.

This symbol briefs on: if do not operate as request, death, severely injured or serious property loss may occur.

(1) Forbid to connect U/T1、V/T2、W/T3 output end to AC power supply, otherwise cause the totally damage of the inverter.
(2) Don't make DC- and P2 or DC+ short-circuited, otherwise cause the inverter to be damaged.
(3) The inverter is forbidden to install on flammables, otherwise have the danger of fire.
(4) Don't install it in the environment with explosive gas,otherwise have the risk of explosion.
(5) After connecting main loop, should carry on insulating treatment to bare wiring end , otherwise have danger of getting an electric shock.
(6) If being connected to the power supply, don't operate the inverter with moist hands, otherwise have danger of getting an electric shock.
(7) The ground terminal of the inverter must be grounded well.
(8) Inverter being connected to power supply, please don't open cover and carry on wiring, Can connect the wire or the check only after closing power for 10 minutes.
(9) Only qualified personnel may carry on wiring and forbid leaving over any conductive thing in machine, otherwise have danger of gentting an electric shock or causing damage of the inverter.
(10) inverter stored for 2 years, should be stepped up gradually with voltage regulator first while having the electricity ,otherwise have danger of getting an electric shockor explosion.

(1) It is prohibited that conncet AC 220V signal to control ends except RA, RB, RC, TA, TB, TC, otherwise have danger of damaging property.
(2) If the inverter is damaged or without all parts, please don't install and operate it, otherwise have danger of fire or cause personnel injury.
(3) In the process of installation, should choose a place where can lay up the inverter, otherwise have danger of personnel injury or property damage while falling down.

1.2 Use range

(1) This inverter is only suitable for three phases AC asynchronous motor in general industrial field.

(2) When apply inverter to such equipments that arerelated much to the life, great property, safety devices etc., please must handle cautiously and consult producer.

(3) This inverter belongs to the control device of general industrial motor, if used in dangerous equipments, must consider the security safeguard procedures when the inverter breaks down.

1.3 Use notice points

(1) ACD280 series inverter is voltage-type inverter, so temperature, noise and vibration slightly increasing compared to power source running when using, belongs to normal phenomenon.

(2) If need to run for a long time with constant torque of low-speed, must select motor of frequency conversion. To use general asynchronous AC motor when running at a low speed should control temperature of the motor or carry on heat dissipation measure forcedly, so as not to burn the generator.

(3) Such mechanical devices such as gearbox and gear wheel need lubrication. After running at a low speed for a long time, may be damaged because the lubrication result become poor, so please take necessary measures in advance.

(4) When the motor running with frequency above specified, besides considering the vibration, noise increase of the motor, must also conform speed range of the motor bearing and the mechanical device.

(5) For hoist and great inertia load, the inverter would shut off frequently due to over-current or over-voltage failure in order to guarantee normal work. At this time, should consider to choose the proper brake package.

(6) Should switch on/off the inverter through terminal or other normal order channels. It is prohibited that switch on/off the inverter frequently by using strong electric switch such as magnetic control conductor, otherwise will cause the equipment damage.

(7) If need to install such switch as the magnetic control conductor, etc. between inverter output and the motor, please guarantee the inverter is switched on/off without output, otherwise may damage the inverter.

(8) The inverter may meet with mechanical resonance of the load within certain range of frequency output, can set up jumping frequency to evade.

(9) Before using, should conform the voltage of the power is within the working voltage

range allowed, otherwise should vary voltage or order special inverter.

(10) In the condition of altitude above 1000 meters, should use the inverter in lower volume, reduce output current by 10% of specified current after each 1500 meters height increasing.

(11) Should make insulation check to the motor before using it for the first time or after a long time placement. Please inspect with 500V voltage-type megohm meter according to method shown as graph 1-1 and insulation resistance should not be smaller than 5MΩ, otherwise inverter may be damaged.

(12) To forbid assembling capacitor for improving power factor or lightning proof voltage-sensible resistance etc., otherwise will cause malfunction trip of the inverter or damage of the parts, show as graph 1-2

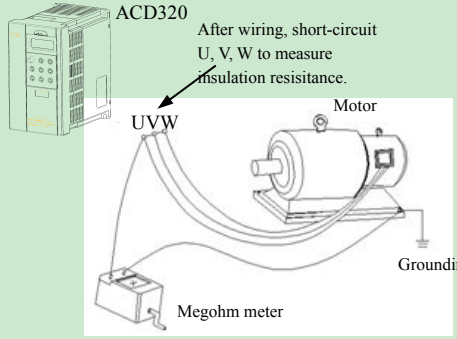


Fig.1-1 motor insulation measure

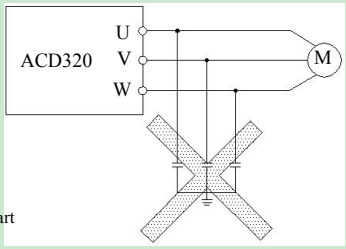


Fig.1-2 capacitor at output forbidden

1.4 Scrap notice points

When disposing scrap inverter and its parts, please note:

(1) The unit: please discard as industrial useless.

(2) Electrolytic capacitor: when burning the inverter electrolytic capacitor in it may explode.

(3) Plastic: when plastic, rubber parts etc. in the inverter are burning, they may bring bad, poisonous gas, so please be ready to safeguards.

Chapter 2 Type and specification of the inverter

2.1 Incoming inverter inspect

(1) Check if there is a damage during transportation and inverter itself has damage or fall-off parts

(2) Check if parts presented in packing list are all ready.

(3) Please confirm rated data of the inverter is in line with your order requirement.

Our product is guaranteed by strict quality system during manufacturing, packing, transportation etc,. please contact our company or local agent rapidly if some careless omission or mistake arise, we'll deal with it as soon as possible.

2.2 Type explanation

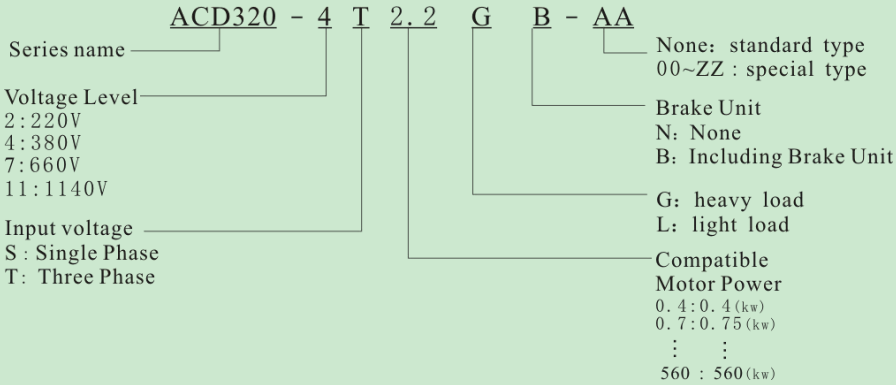


Fig.2-1 type explanation

2.3 Nameplate explanation

Nameplate presented as figure 2-2 with type and rating data at the bottom of inverter right side

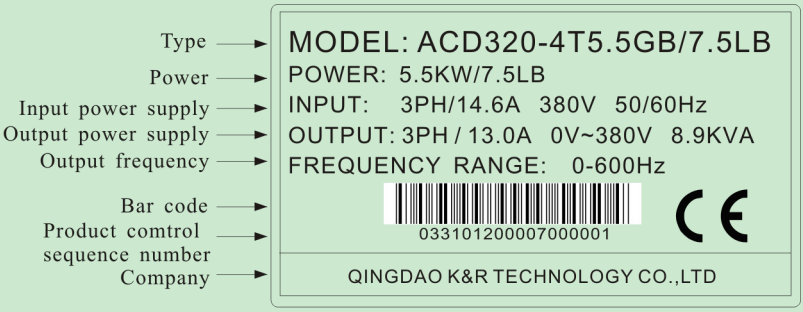


Fig. 2-2 Nameplate

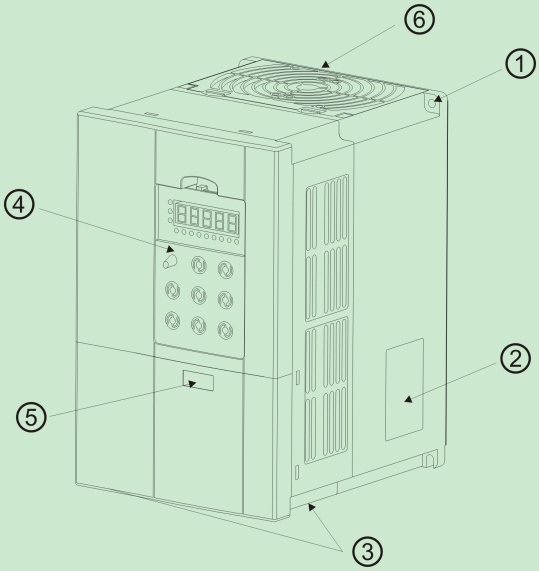
2.4 Series type explanation

Table 2-1 series type explanation

Inverter type	Input voltage(V)	Rated power (KVA)	Rated input current(A)	Rated output current(A)	Adapted motor(KW)
ACD320-2T0.4	Three phase 220V range: -15%～20%	1.0	5.4	2.3	0.4
ACD320-2S0.4					
ACD320-2T0.7		1.5	8.2	4.0	0.75
ACD320-2S0.7					
ACD320-2T1.5		3.0	14.0	7.0	1.5
ACD320-2S1.5					
ACD320-2T2.2		4.0	23.0	9.6	2.2
ACD320-2S2.2					
ACD320-2S3.7		5.7	31.5	15.0	3.7
ACD320-2S4.5		6.9	39	18.0	4.5
ACD320-2S5.5		7.6	44	20.0	5.5
ACD320-2S7.5		11.4	65	30.0	7.5
ACD320-4T0.7	Three phase 380V range:： -15%～20%	1.5	3.4	2.1	0.75
ACD320-4T1.5		3.0	5.0	3.8	1.5
ACD320-4T2.2		4.0	5.8	5.1	2.2
ACD320-4T3.0		4.9	8.3	6.8	3.0
ACD320-4T4.0		5.9	10.5	9.0	4.0
ACD320-4T5.5		8.9	14.6	13.0	5.5
ACD320-4T7.5		11.0	20.5	17.0	7.5
ACD320-4T11		17.0	26.0	25.0	11
ACD320-4T15		21.0	35.0	32.0	15
ACD320-4T18.5		24.0	38.5	37.0	18.5
ACD320-4T22		30.0	46.5	45.0	22
ACD320-4T30		40.0	62.0	60.0	30
ACD320-4T37		57.0	76.0	75.0	37
ACD320-4T45		69.0	92.0	91.0	45
ACD320-4T55		85.0	113.0	112.0	55
ACD320-4T75		114.0	157.0	150.0	75
ACD320-4T90		134.0	180.0	176.0	90
ACD320-4T110		160.0	214.0	210.0	110

Inverter type	Input voltage(V)	Rated power (KVA)	Rated input current(A)	Rated output current(A)	Adapted motor(KW)
ACD320-4T132	Three phase 380V range: -15%～20%	192.0	256.0	253.0	132
ACD320-4T160		231.0	307.0	304.0	160
ACD320-4T185		237.0	340.0	330.0	185
ACD320-4T200		250.0	385.0	377.0	200
ACD320-4T220		280.0	430.0	426.0	220
ACD320-4T250		355.0	468.0	465.0	250
ACD320-4T280		396.0	525.0	520.0	280
ACD320-4T315		445.0	590.0	585.0	315
ACD320-4T355		500.0	665.0	650.0	355
ACD320-4T400		565.0	785.0	725.0	400
ACD320-4T450		630.0	883.0	820.0	450
ACD320-7T132	Three phase 660V range: -15%～20%	192.0	170.0	150.0	132
ACD320-7T160		231.0	200.0	175.0	160
ACD320-7T185		240.0	218.0	198.0	185
ACD320-7T200		250.0	235.0	215.0	200
ACD320-7T250		355.0	265.0	260.0	250
ACD320-7T280		396.0	305.0	299.0	280
ACD320-7T315		445.0	350.0	330.0	315
ACD320-7T355		500.0	382.0	374.0	355
ACD320-7T400		565.0	435.0	410.0	400
ACD320-7T450		630.0	490.0	465.0	450
ACD320-7T500		700.0	595.0	550.0	500
ACD320-7T560		730.0	605.0	575.0	560

2.5 Appearance and parts name explanation



①:Screw hole

②:Nameplate

③:Motor output terminal lower-cover

④:Operation surface

⑤:Power input terminal upper-cover

⑥:Heat radiation vent

⑦:Power input terminal

⑧:External input/output terminal

⑨:Energy consumption braking resistance terminal

⑩:Motor output end

⑪:Grounding end

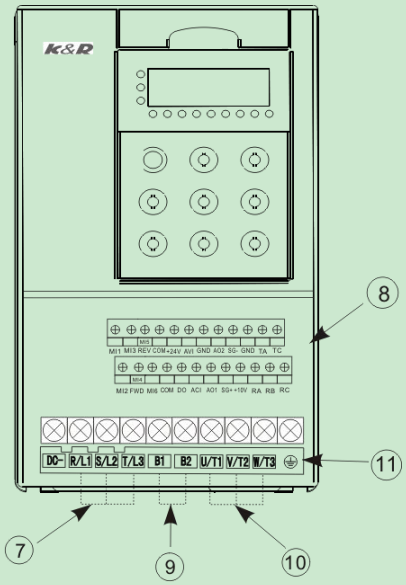


Fig.2-3 parts name sketch

2.6 Out size

2.6.1 Keypad out size

For example：36.5[1.44] Unit：millimeter [inch]

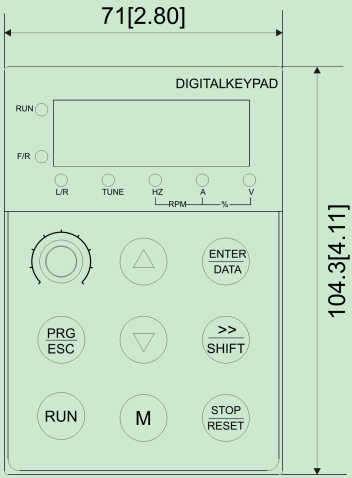


Fig.2-4 Fig.a Outer dimension

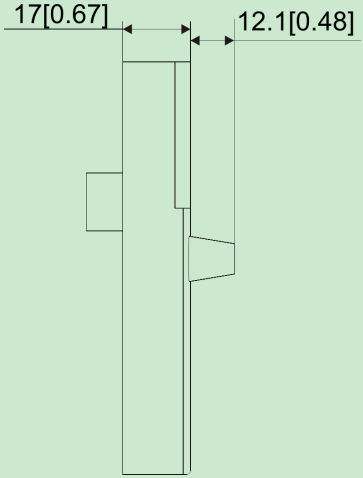


Fig.2-4 Fig.b Outer dimension

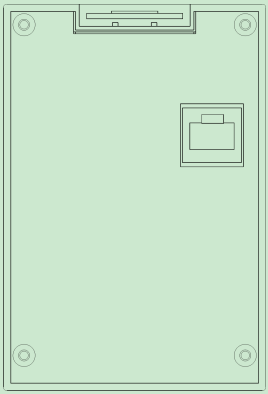
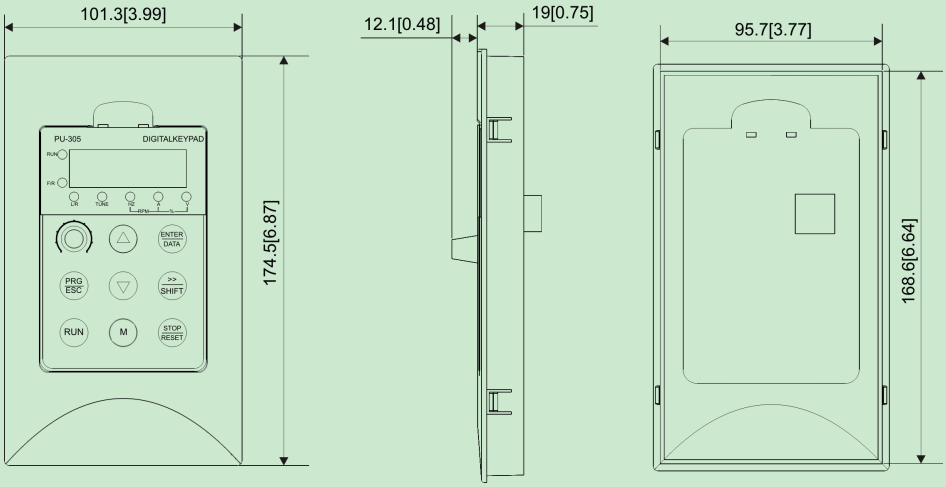
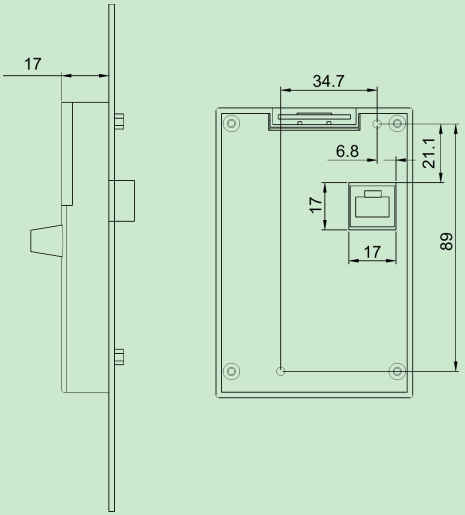


Fig.2-4 Fig.c Outer dimension

Out-pull panel indicator A- using keypad sheath

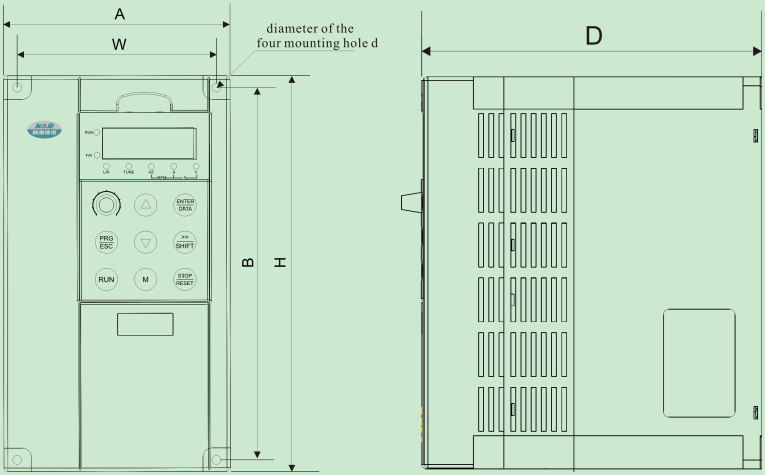


Out-pull panel indicator B- not using keypad sheath

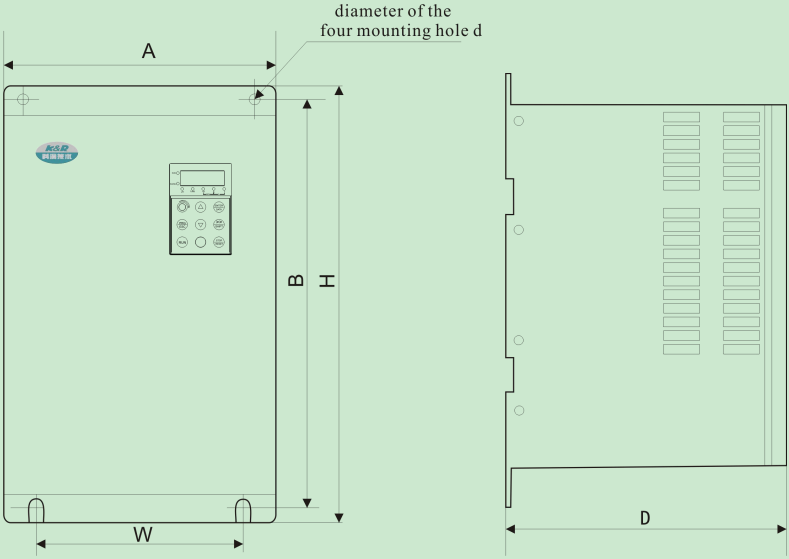


2.6.2 Chassis out size

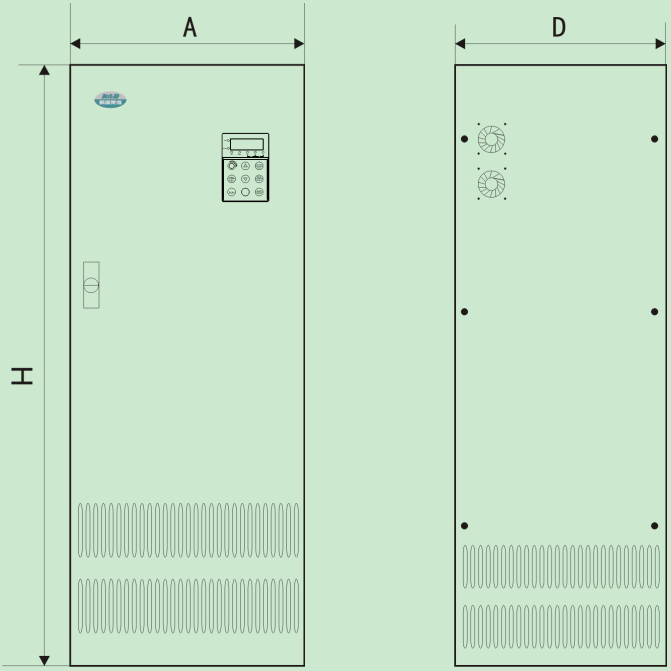
2.6.2.1 Plastic **chassis out size(wall mounted)**



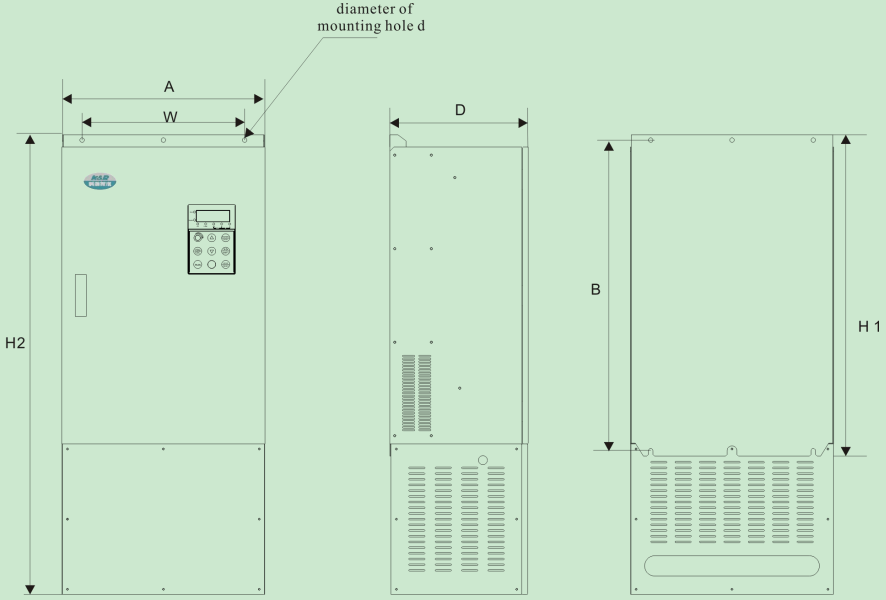
2.6.2.2 Metals **chassis out size(wall mounted)**



2.6.2.3 Metals **chassis outline dimention drawing (clothes closet)**



2.6.2.4 Metals **chassis outline dimention drawing** (the Cabinet machine and the wall hangs machine**)**



Size table

<table>
<tr><th rowspan="2">Chassis</th><th rowspan="2">Specification and type</th><th colspan="6">Size（mm）</th><th rowspan="2">Shell</th></tr>
<tr><th>A</th><th>B</th><th>H</th><th>W</th><th>D</th><th>d</th></tr>
<tr><td rowspan="12">E22</td><td>ACD320-2T0.4GB
ACD320-2S0.4GB</td><td rowspan="12">118.0</td><td rowspan="12">172.5</td><td rowspan="12">185.0</td><td rowspan="12">105.5</td><td rowspan="9">150.0</td><td rowspan="12">5.0</td><td rowspan="15">Plastic chassis</td></tr>
<tr><td>ACD320-2T0.75GB
ACD320-2S0.75GB</td></tr>
<tr><td>ACD320-2T1.5GB
ACD320-2S1.5GB</td></tr>
<tr><td>ACD320-4T0.75GB</td></tr>
<tr><td>ACD320-4T1.5GB</td></tr>
<tr><td>ACD320-4T2.2GB</td></tr>
<tr><td>ACD320-2T2.2GB
ACD320-2S2.2GB</td><td rowspan="3">170.0</td></tr>
<tr><td>ACD320-4T3.0GB/4.0</td></tr>
<tr><td>ACD320-4T4.0GB</td></tr>
<tr><td rowspan="3">E75</td><td>ACD320-4T5.5LB</td><td rowspan="3">160.0</td><td rowspan="3">235.0</td><td rowspan="3">247.0</td><td rowspan="3">148.0</td><td rowspan="3">186.0</td><td rowspan="3">5.5</td></tr>
<tr><td>ACD320-4T5.5GB/7.5</td></tr>
<tr><td>ACD320-4T7.5GB</td></tr>
<tr><td rowspan="3">E011</td><td>ACD320-4T11LB</td><td rowspan="3">210.0</td><td rowspan="3">322.0</td><td rowspan="3">336.0</td><td rowspan="3">150.0</td><td rowspan="3">200.0</td><td rowspan="3">7.0</td><td rowspan="9">Wall mounting Metals chassis</td></tr>
<tr><td>ACD320-4T11GB/15L</td></tr>
<tr><td>ACD320-4T15GB/18.5</td></tr>
<tr><td rowspan="3">T030</td><td>ACD320-4T18.5G/22L</td><td rowspan="3">285.0</td><td rowspan="3">457.0</td><td rowspan="3">475.0</td><td rowspan="3">195.0</td><td rowspan="3">240.0</td><td rowspan="3">9.0</td></tr>
<tr><td>ACD320-4T22G/30L</td></tr>
<tr><td>ACD320-4T30G/37L</td></tr>
<tr><td rowspan="2">E037</td><td>ACD320-4T37G/45L</td><td rowspan="2">320.0</td><td rowspan="2">536.0</td><td rowspan="2">555.0</td><td rowspan="2">230.0</td><td rowspan="2">229.0</td><td rowspan="2">10.0</td></tr>
<tr><td>ACD320-4T45G/55L</td></tr>
<tr><td rowspan="2">E055</td><td>ACD320-4T55G/75L</td><td rowspan="2">410.0</td><td rowspan="2">611.0</td><td rowspan="2">634.0</td><td rowspan="2">320.0</td><td rowspan="2">236.0</td><td rowspan="2">12.0</td></tr>
<tr><td>ACD320-4T75G/90L</td></tr>
<tr><td rowspan="3">T090</td><td>ACD320-4T55G/75L</td><td rowspan="3">375.0</td><td rowspan="3">725.0</td><td rowspan="3">750.0</td><td rowspan="3">290.0</td><td rowspan="3">335.0</td><td rowspan="3">13.0</td></tr>
<tr><td>ACD320-4T75G/90L</td></tr>
<tr><td>ACD320-4T90G/110L</td></tr>
<tr><td rowspan="2">E132</td><td>ACD320-4T110G/132L</td><td rowspan="2">500.0</td><td rowspan="2">765.0</td><td>H1：790.0</td><td rowspan="2">400.0</td><td rowspan="2">340.0</td><td rowspan="2">11.0</td><td rowspan="2">H1:the wall hangs machine H2:the Cabinet machine</td></tr>
<tr><td>ACD320-4T132G/160L</td><td>H2：1130.0</td></tr>
<tr><td rowspan="3">K200</td><td>ACD320-4T160G/185L</td><td rowspan="3">685.0</td><td rowspan="3">-</td><td rowspan="3">1400.0</td><td rowspan="3">-</td><td rowspan="3">440.0</td><td rowspan="3">-</td><td rowspan="6">Clothes closet Metals chassis</td></tr>
<tr><td>ACD320-4T185G/200L</td></tr>
<tr><td>ACD320-4T200G/220L</td></tr>
<tr><td rowspan="6">K400</td><td>ACD320-4T220G/250L</td><td rowspan="6">800.0</td><td rowspan="6">-</td><td rowspan="6">1600.0</td><td rowspan="6">-</td><td rowspan="6">550.0</td><td rowspan="6">-</td></tr>
<tr><td>ACD320-4T250G/280L</td></tr>
<tr><td>ACD320-4T280G/315L</td></tr>
<tr><td>ACD320-4T315G/355L</td></tr>
<tr><td>ACD320-4T355G/400L</td></tr>
<tr><td>ACD320-4T400G/450L</td></tr>
</table>

K630	ACD320-4T500G/560L ACD320-4T560G/630L ACD320-4T630G/700L	1260.0	-	2290	-	620.0	-	

Note：H1 is the height of wall mounted inverter, H2 is the height of clothes closet inverter.

2.7 Product technic index and specification

Item		Specifications
Individualized function	Maximum frequency	600.00Hz
	Carrier frequency	1kHz～15kHz；the carrier frequency will be automatically adjusted according to the load characteristics.
	Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency ×0.1%
	Control mode	Open loop vector control (SVC) V/F control Open loop torque control
	Startup torque	G model：0.5Hz/150%（SVC） L model：0.5Hz/100%
	Speed adjustment range	1：100（SVC）
	Speed stabilization precision	±0.5%（SVC）
	Torque control precision	±15%（SVC）
	Overload capacity	G model: 150% rated current 60s; 180% rated current 1s. L model: 120% rated current 60s; 150% rated current 1s.
	Torque boost	Automatic torque boost; manual torque boost 0.1% to 30.0%
	V/F curve	Two types: straight line and square type
	Acceleration/deceleration curve	Straight line or S curve acceleration/deceleration mode; four kinds of acceleration/deceleration time; acceleration/deceleration time ranges between 0.0s to 3600.0s
	DC brake	DC brake frequency: 0.00Hz to maximum frequency; brake time: 0.0s to 50.0s, and brake current value: 0.0% to 150.0%.
	Jog control	Jog frequency range: 0.00Hz to 50.00Hz; Jog acceleration/deceleration time: 0.0s to 3600.0s.
	Simple PLC and MS Speed Running	It can realize a maximum of 8 segments speed running via the built-in PLC or control terminal.
	Built-in PID	It is easy to realize process-controlled close loop control system.

	Auto voltage regulation (AVR)	It can keep constant output voltage automatically in case of change of mains voltage.
	Torque limit and control	“Digging machine” feature, which can limit the torque automatically and prevent frequent over current tripping during the running process; the close loop vector mode can implement torque control.
	Peripherals self-detection upon power-on	It can conduct safety detections on the peripherals upon power-on, including earth and short circuit detections.
	Shared DC Bus Function	It can realize the function that multiple inverters share the DC bus.
	M key	Programmable key: Select the command channel switching/forward and reverse rotations/jog operation/up and down.
Run	running command channel	Three types of channels: operation panel reference, control terminal reference and serial communication port reference. These channels can be switched in various modes.
	Frequency source	There are totally eight types of frequency sources, such as digital reference, analog voltage reference, analog current reference, and serial port reference etc. These frequency sources can be switched in various modes.
	Input terminal	There are five digital input terminals, one of which can be used as high-speed pulse input. (The number of digital input terminals can be expanded to ten) It can be compatible with active PNP or NPN input mode. There are two analog input terminals, one of which can be used only as voltage input, while the other can be used as voltage or current input. (It can expand one voltage input terminal)
	Output terminal	There is one high-speed pulse output terminal (can be selected as open collector mode), with square wave output of 0kHz to 50kHz. It can output such physical parameters as setting frequency and output frequency. One digital output terminal (can be expanded to two) One relay output terminal (can be expanded to two) One analog output terminal (can be expanded to two), with optional 0//4mA to 20mA or 0/2V to 10V. It can realize the output of such physical parameters as setting frequency and output frequency.
Display and Keyboard Operation	LED display	It can display the parameters
	protection function	It can implement power-on motor short-circuit detection, input/output phase loss protection, over current protection, over voltage protection, under voltage protection, over heat protection and overload protection.

Environment	Using Place	Indoor, not bare to sunlight, not dust, no corrosive gas, no flammable gas, no oil fog, no water drop or salt etc.
	altitude	Lower than 1,000 meters
	ambient temperature	-10 ℃ Celsius to +40 ℃ Celsius (derated when used in the ambient temperature of 40 ℃ Celsius to 50 ℃Celsius)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9 m/s^2(0.6g)
	Storage temperature	－20℃～＋60℃

Note

In order to give full play to the interver's superior performance, please choose correct type and check relevant content according to Chapter 2, then it can be used after wiring.

Must choose correct type, otherwise may cause abnormal running of the motor or damage of the inverter.

Chapter 3 Installation and wiring

3.1 Installation ambient

3.1.1 Demand for installation ambient

(1) Installed in drafty indoor place, ambient temperature within -10ºC~40ºC, need external compulsory heat sink or reduce the volume if temperature exceeds 40ºC.

(2) Avoid installing in place with direct sunlight, much dust, floating fibre and metal power.

(3) Forbid to install in place with corrosive, explosible gas.

(4) Humidity should be smaller than 95%RH, without condensation water.

(5) Installed in place of plane fixing vibration smaller than 5.9 m/s²(0.6G)

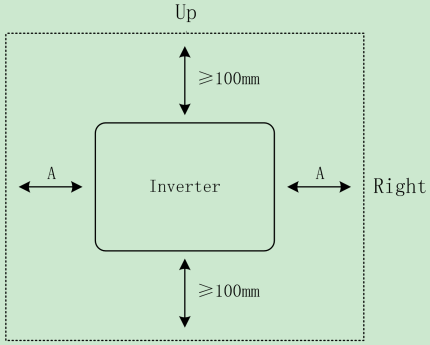
(6) Keep away from electromagnetic disturbance source and other electronic apparatus sensible to electromagnetic disturbance.

3.1.2 Installation direction and place

(1) Normally the inverter should be mounted vertically, horizontal mounting will seriously affect heat dissipation and the inverter must be used in lower volume.

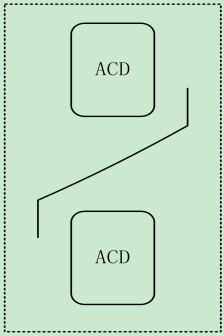
(2) Demand for minimum mounting space and distance, please see Fig.3-1

(3) When install multiple inverters up and down, must apply leading divider between them, see Fig.3-2



Note: No need to consider the dimension Afor inverter of 22kWor below. Ashall be bigger than 50mm for the inverter of 22kWor above

Installation of single inverter



Note: Install an airflow- guidance plate for the up and down installation of inverters.

Up and down installation of inverters

Fig.3-1 DZB Series Inverter Installation Location

The user shall focus on the heat dissipation issues when installing the inverter, and pay attention to the following points:

1) Install the inverter vertically so that the heatmay be expelled from the top, but do not install the inverter upside down.When twoVariable SpeedDrives are mounted up and dow n, an air flow diverting plate should be fixed in between as shown in Fig. 3-1.

2) Installation space is shown in Fig.3-1 so as to ensure the heat dissipation space, but consider the heat dissipation of other components when placing the inverter.

3) The installation bracket must be flame retardant.

4) Install the heat sink outside of the cabinet if the inverter is installed in the area with metal powder. And in this case, the space inside the sealing cabinet shall be big enough.

3.2 Electrical Installation

3.2.1 Applicable devices and recommendablewiring of main circuit:

<table>
<tr><td rowspan="2">MODEL
ACD320
Series</td><td rowspan="2">Appli
cable
Motor
(KW)</td><td colspan="2">INPUT(RST)</td><td colspan="4">Wire Size (mm²)</td></tr>
<tr><td>AirCircuit
Breakers
MCCB</td><td>Magnetic
Contactor
MC</td><td>Power
Terminal</td><td>DC
Reactor</td><td>Breaking
Terminal</td><td>Control
Terminal</td></tr>
<tr><td>2S0.4
2T0.4</td><td>0.4</td><td rowspan="3">DZ20-100(16A)</td><td rowspan="3">CJ20-16</td><td>1.5</td><td rowspan="3">4</td><td>1.5</td><td rowspan="16">0.5～0.75</td></tr>
<tr><td>2S0.7
2T0.7</td><td>0.75</td><td rowspan="2">2.5</td><td rowspan="2">2.5</td></tr>
<tr><td>2S1.5
2T1.5</td><td>1.5</td></tr>
<tr><td>2S2.2
2T2.2</td><td>2.2</td><td rowspan="2">DZ20-100(32A)</td><td rowspan="2">CJ20-40</td><td rowspan="2">4</td><td rowspan="2">6</td><td rowspan="2">4</td></tr>
<tr><td>2S3.7</td><td>3.7</td></tr>
<tr><td>4T0.7</td><td>0.75</td><td rowspan="4">DZ20-100(16A)</td><td rowspan="6">CJ20-16</td><td rowspan="2">1.5</td><td rowspan="4">4</td><td rowspan="2">1.5</td></tr>
<tr><td>4T1.5</td><td>1.5</td><td rowspan="2">2.5</td><td rowspan="2">2.5</td></tr>
<tr><td>4T2.2</td><td>2.2</td></tr>
<tr><td>4T4.0</td><td>3.7</td></tr>
<tr><td>4T5.5</td><td>5.5</td><td rowspan="2">DZ20-100(32A)</td><td rowspan="2">4</td><td rowspan="3">6</td><td rowspan="2">4</td></tr>
<tr><td>4T7.5</td><td>7.5</td></tr>
<tr><td>4T11</td><td>11</td><td rowspan="3">DZ20-100(50A)</td><td rowspan="3">CJ20-40</td><td>6</td><td rowspan="4">4</td></tr>
<tr><td>4T15</td><td>15</td><td>8</td><td rowspan="2">8</td></tr>
<tr><td>4T18</td><td>18.5</td><td rowspan="2">10</td></tr>
<tr><td>4T22</td><td>22</td><td>DZ20-100(63A)</td><td rowspan="2">CJ20-63</td><td rowspan="3">16</td></tr>
<tr><td>4T30</td><td>30</td><td>DZ20-100(80A)</td><td rowspan="3">6</td></tr>
<tr><td>4T37</td><td>37</td><td rowspan="2">DZ20-100(100A)</td><td rowspan="2">CJ20-100</td><td rowspan="2">16</td></tr>
<tr><td>4T45</td><td>45</td><td>25</td><td>25</td></tr>
<tr><td>4T55</td><td>55</td><td>DZ20-200(200A)</td><td>CJ20-160</td><td>35</td><td>25*2(50)</td></tr>
</table>

<table>
<tr><td>4T75</td><td>75</td><td></td><td></td><td>25*2(50)</td><td>35*2(70)</td><td>10</td><td></td></tr>
<tr><td>4T90</td><td>90</td><td rowspan="2">DZ20-400(250A)</td><td rowspan="5">CJ20-250</td><td>35*2(70)</td><td rowspan="2">50*2(95)</td><td>16</td><td></td></tr>
<tr><td>4T110</td><td rowspan="3">50*2(95)</td><td rowspan="3">25</td><td></td></tr>
<tr><td>4T132</td><td rowspan="3">DZ20-400(350A)</td><td rowspan="3">70*2(150)</td><td></td></tr>
<tr><td>4T160</td><td>160</td><td></td></tr>
<tr><td>4T185</td><td>185</td><td></td></tr>
<tr><td>4T200</td><td>200</td><td>DZ20-400(400A)</td><td>CJ20-400</td><td>70*2(150)</td><td>70*2(150)</td><td>16*2(35)</td><td></td></tr>
<tr><td>4T220</td><td>220</td><td rowspan="2">DZ20-630(500A)</td><td rowspan="3">CJ20-630</td><td rowspan="2">95*2(185)</td><td rowspan="2">95*2(185)</td><td rowspan="3">25*2(50)</td><td></td></tr>
<tr><td>4T250</td><td>250</td><td></td></tr>
<tr><td>4T280</td><td>280</td><td rowspan="2">DZ20-630(600A)</td><td rowspan="2">120*2(240)</td><td rowspan="2">120*2(240)</td><td></td></tr>
<tr><td>4T315</td><td>315</td><td></td></tr>
<tr><td>4T355</td><td>355</td><td>DZ20-800(800A)</td><td>CJ20-800</td><td>150*2(300)</td><td>150*2(300)</td><td>35*2(70)</td><td></td></tr>
<tr><td>4T400</td><td>400</td><td>DZ20-800(800A)</td><td>CJ20-800</td><td>150*2(300)</td><td>150*2(300)</td><td>35*2(70)</td><td></td></tr>
<tr><td>4T450</td><td>450</td><td>DZ20-1250(1000A)</td><td>CJ20-500*2</td><td>185*2(370)</td><td>185*2(370)</td><td>50*2(100)</td><td></td></tr>
<tr><td>4T560</td><td>560</td><td>DZ20-1250(1250A)</td><td>CJ20-630*2</td><td>185*2(370)</td><td>185*2(370)</td><td>50*2(100)</td><td></td></tr>
<tr><td>4T630</td><td>630</td><td>DZ20-1250(1250A)</td><td>CJ20-630*2</td><td>185*2(370)</td><td>185*2(370)</td><td>50*2(100)</td><td></td></tr>
</table>

3.2.2 周边设备配线图及其应用注意事项：

Wiring Diagram of Peripheral Equipment and the notice

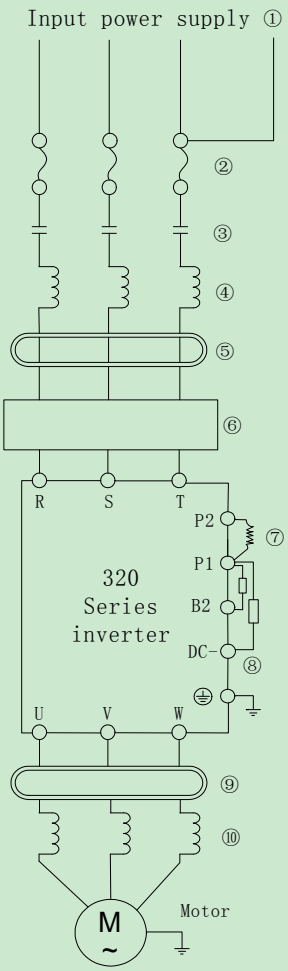


Fig.3-2 Wiring of Peripheral Equipment

①Power supply：voltage levels：220V,400V。

②fuse or the Electric leakage chopper

Fuse or leaking current breaker

Please use fuse that conform to the rated voltage and current level of inverter.

Be used to control the power of inverter, it palys a role of protecting the inverter. Used to switch run and stop is forbidden.

③Magnetic control conductor

Do not use magnetic control conductor for power switch of the inverter, for which may reduce the inverter life.

④Input end AC reacter:

It can effectively restrain the harmonics of power supply wire, or improve the power factor when the imbalance of main power supply voltage is more than 3%(and the power capacity is larger than 500KVA at the same time) or when power supply voltage changes dramatically.

⑤Radio interference filter

Nearby equipment, such as radio receiver, may brings electromagnetic disturbance noise. The EMC radio interference filter is helpful for reducing radio noise.

⑥EMI filter

Reduce the noise conducting by the power supply wire produced by inverter.

⑦DC reactor

To inhibit high-order harmonics produced by inverter.

⑧Braking Resistors and braking Units

Improve braking Torque of inverter, or be used in occasions that ON/OFF is operated frequently and rotatory inertia is great.

⑨Output end noise filter

Reduce the noise from output of inverter.

⑩Input end AC reacter:

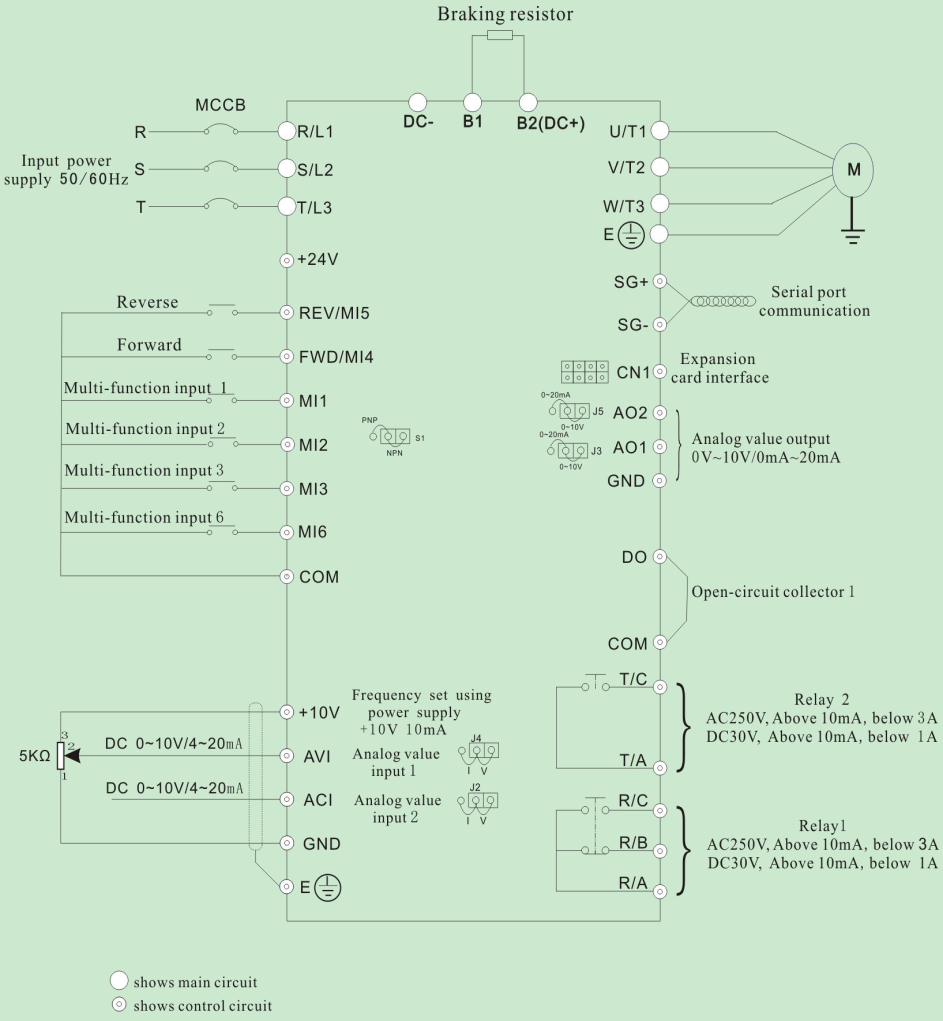
Reduce the motor vibration caused by power supply switch waveform.

When wire between inverter and motor is long than 10 meters, which

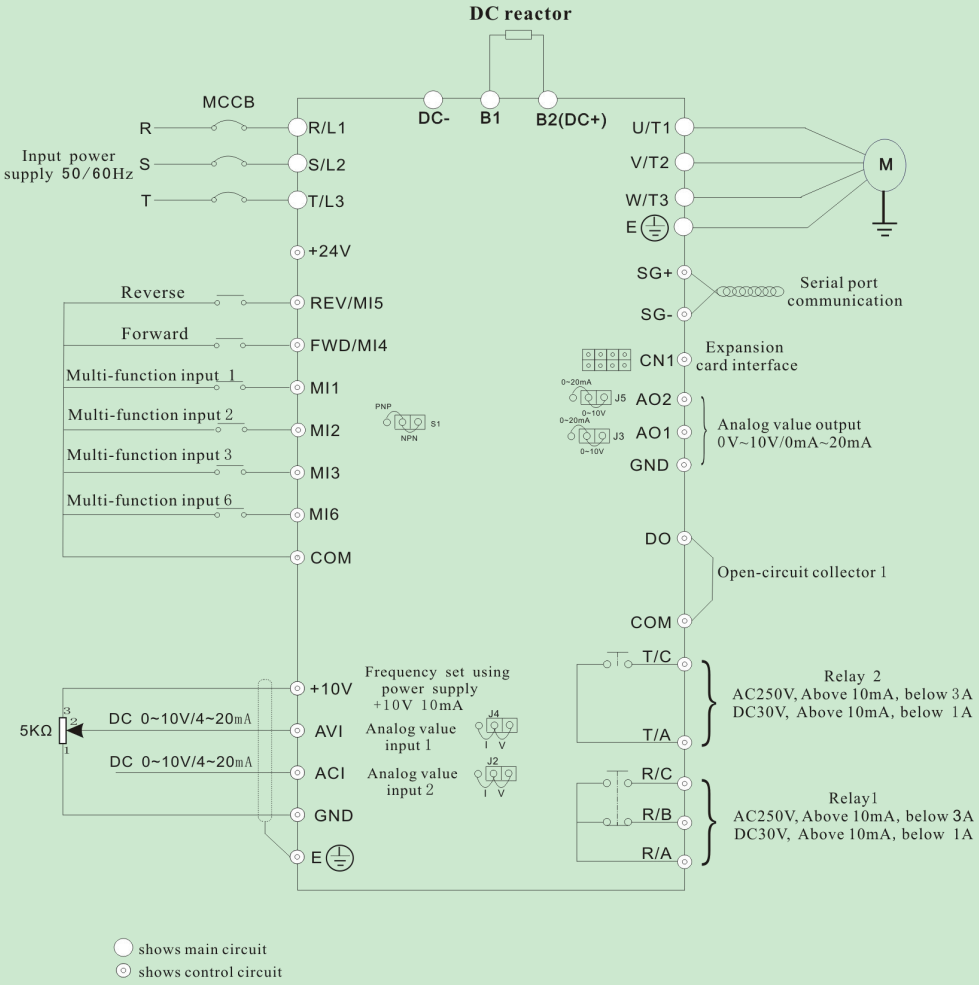
3. 3 BasicWiring Diagram

Usersmust connect wires according to the following circuit diagram shown below.

Below 7.5KW



11～30KW：


DC reactor
MCCB
R
S
T
Input power supply 50/60Hz
R/L1
S/L2
T/L3
DC-
B1
B2(DC+)
U/T1
V/T2
W/T3
E
M
+24V
Reverse
REV/MI5
Forward
FWD/MI4
Multi-function input 1
MI1
Multi-function input 2
MI2
Multi-function input 3
MI3
Multi-function input 6
MI6
COM
PNP
NPN
S1
SG+
SG-
Serial port communication
CN1
Expansion card interface
0~20mA
0~10V
J5
J3
AO2
AO1
GND
Analog value output 0V~10V/0mA~20mA
DO
Open-circuit collector 1
COM
T/C
T/A
Relay 2 AC250V, Above 10mA, below 3A DC30V, Above 10mA, below 1A
+10V
Frequency set using power supply +10V 10mA
5KΩ
DC 0~10V/4~20mA
AVI
Analog value input 1
J4
ACI
Analog value input 2
J2
GND
E
R/C
R/B
R/A
Relay1 AC250V, Above 10mA, below 3A DC30V, Above 10mA, below 1A
shows main circuit
shows control circuit

Above 37KW ：

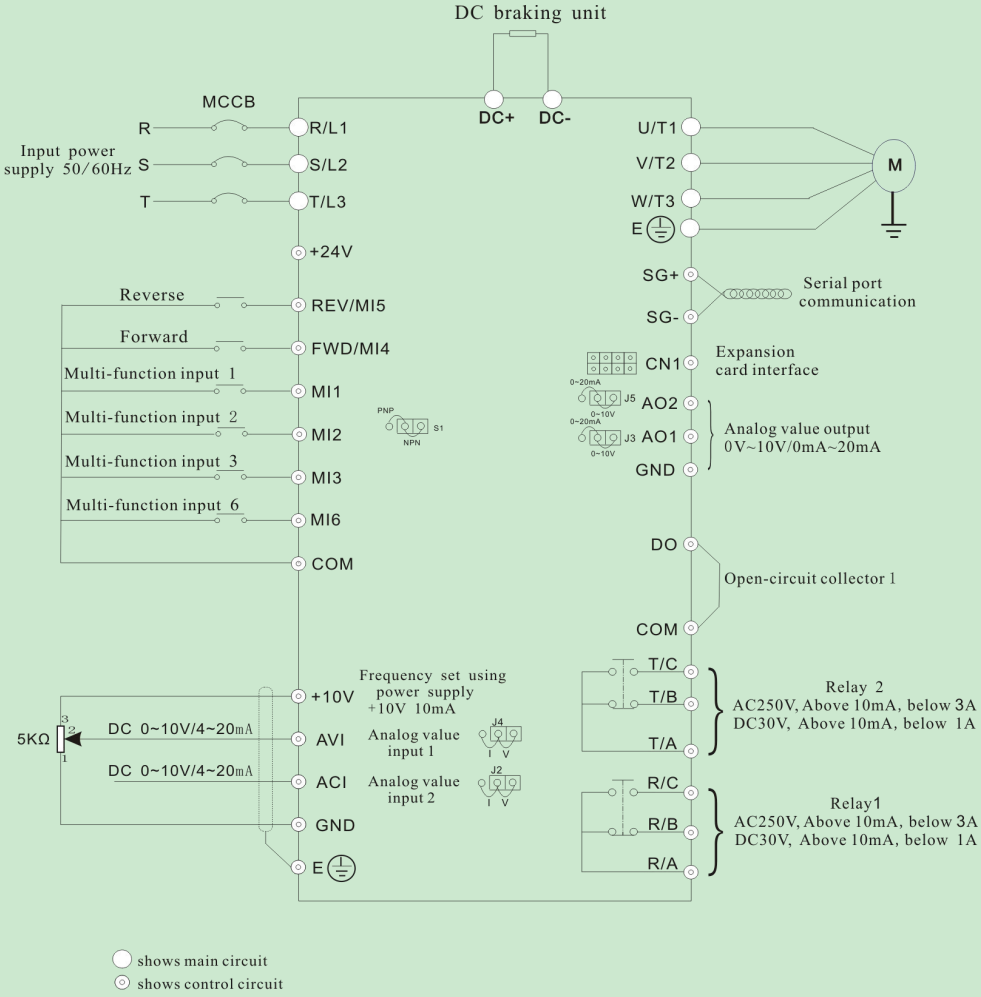


Fig.3-3 Basic running wiring diagram

Note：

Breaking resistor terminals （B2/B1） for the inverter of 15KW or below.

Braking unitand and DC link reactor terminals （P1/P2/DC-）for the inverter 18.5KW~30KW.

Braking unitand terminals （DC+/DC-）for the inverter above 37KW.

提示

1、 T090、the Cabinet machine of E132、K200、K400 is Built in reactor；

2、 H1 is the height of wall mounted inverter, H2 is the height of clothes closet inverter.

2、E037、E055 is Selection of reactor；

3、The wall hangs machine of E132 is External standard reactor（ ※The wall hangs machine of E132 has to the outer reactor, The fault of not configued reactor is beyond the scope of the warrantv）

3. 4 Main Circuit Terminals andWiring

⚠ Danger

★Wiring can only be done after the mains input is cut off, otherwise therewill be danger of electric shock!

★Only qualified and trained engineer can perform thewiring, otherwise there will be danger of electric shock!

★Grounding cable must be grounded, otherwise there will be danger of electric shock or fire!

⚠ Danger

★Please confirmthe mains voltage level is same with that of the inverter, otherwise the inverter may be damaged!

★Make sure the ratings of the drivenmotor are in compliance with the inverter, otherwise the motor may be damaged or the inverter may be in protection status!

★Do not confuse the input terminals with the output terminals (U, V,W), otherwise there will be danger of damaging the inverter!

★Brake resistor cannot be connected between the DC bus terminals (+) and (-), otherwise fire may occur!

（1）Main Circuit Terminals of Inverter

Terminals	Description
R/L1、S/L2、T/L3	AC input line terminals
U、V、W	Motor connection
B1、B2（DC+）	Connection for the braking resistor (option)
P1/B2(DC+)、DC-	Connection for the braking unit (option)
P1/B2（DC+）、P2	Connection for the DC Link Reactor (option)
⏚ E	Ground

（2）Notes on Wiring

A. Input power supply R/L1，S/L2 and T/L3:

There is no phase-ration requirement for the input of inverter.

B．DC bus P1/B2(DC+) and (DC-) terminals:

Pay attention that the DC bus terminals（P1/B2(DC+) and (DC-) still have voltage after power off, and the user can only touch the terminals after the CHARGE LED turns off and the voltage is below 36V, otherwise there is a danger of electric shock.

When selecting the brake unit for the inverter above 18.5kW,pay attention that the polarity of (DC+) and (DC-) cannot be reverse, otherwise the inverter may burn or be damaged.

The cable length of brake unit shall be less than 10 mand twisted pair cables shall be used.

Do not connect the brake resistor directly to the DC bus, otherwise the inverter may burn or be damaged.

C. Brake resistor terminals of B1、B2（DC+）

The brake resistor terminal is effective only for the inverter of 15kW or below and has a built-in brake unit. Select the recommended resistor with the cable length of less than 5m, otherwise the inverter may burn or be damaged.

D. Inverter output U, V and W:

Inverter output terminals cannot connect to capacitors or surge snub devices, otherwise the inverter may be in protective status or damaged.

If the cables between the motor and the inverter are too long, electrical resonance may occur due to the distributed capacitance,whichmay result in damaging the motor insulation or big leakage current, so if the cable length is longer than 100m,AC reactormust be installed.

E. Grounding Terminal ⏚:

GroundingTerminal must be connected to earth reliably and the grounding resistance shall be less than 5Ω, otherwise the equipmentmay work abnormally or be damaged. Do not share the PE and neutral line of themains supply.

3. 5 Control Terminals and Wiring

1）Layout of ControlTerminals(Fig.3-4,Fig3-5):

Below 7.5KW

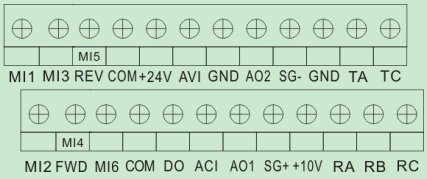


Fig.3-4

Above 11KW

Fig.3-5

2）Function of Control Terminals：

Item	Symbol	Name	Function description	spec
Muiti-function input terminal	MI1-COM	Multi-function input terminal 1	Used for multi-function input terminal, for detailed see Chapter 6 Section terminal function parameter(F2 group) input end function description. MI4 factory default forward running ， MI5 factory default reverse running. (common end: COM)	Optocoupler isolation input Input impedance: R=2KΩ Max.input frequency:200Hz
	MI2-COM	Multi-function input terminal 2		
	MI3-COM	Multi-function input terminal 3		
	FWD（MI4）-COM	Multi-function input terminal 4		
	REV（MI5）-COM	Multi-function input terminal 5		
	MI6-COM	Multi-function input terminal 6		
power supply	+10V-GND	+10V power supply	Provide +24V power supply.(negative pole： GND)	Max. output current：50mA
	+24V-COM	+24V power supply	+24V power supply(negative pole:COM)	Max. output current：200mA
	COM	+24V power supply negative pole	Common end of MI1,MI2,MI3,MI4，MI5，MI6 and reference ground of +24V power supply.	Internal isolating between COM and GND
	GND	+10V power supply negative pole	Reference ground of analog signal and +10V power supply.	
Analog value input	AVI-GND	Analog value input 1	Accept analog voltage,current input，voltage， current optioned by jumping-wire J4, factory default is current. （reference ground：GND）	Input voltage range：DC 0～10V（input impedance：100KΩ） Input current range：0～20mA(input impedance：500Ω); Resolution：1/1000
	ACI-GND	Analog value input 2	Accept analog voltage/current input，voltage， current optioned by jumping-wire J2, factory default is current. （reference ground：GND）	Input voltage range：DC 0～10V（input impedance：100KΩ） Input current range：0～20mA(input impedance：500Ω); Resolution：1/1000

Analog value output	AO1-GND	Analog value output 1	Provide analog voltage/current output, for detailed see F2.22 parameter description, output voltage/current optioned by J3, factory default output voltage. (reference ground: GND)	Voltage output range: 0~10V Current output range: 0~20mA
	AO2-GND	Analog value output 2	Provide analog voltage/current output, for detailed see F9.09 parameter description, output voltage/current optioned by J5, factory default output voltage.	Voltage output range: 0~10V Current output range: 0~20mA
Multi-function output terminal	DO-COM	Open circuit collector output terminal	Used for multi-function switch output terminal, for detailed see Chapter 6 terminal function parameter(F2 group) output end function description.(common end: COM)	Optocoupler isolation output Work voltage range: 15~30V Max. output current: 50mA Use method see description of parameter F2.20
Serial port communication	SG+	RS485 serial port communication	485 difference signal positive end	For standard RS-485 communication interface，please use twisted-pair or shielded wire.
	SG-		485 difference signal negative end	
Relay output terminal	R/A-R/B	Relay output 1	Always-closed terminal	Contact capacity：AC250V，3A，COSΦ=0.4。DC 30V，1A
	R/A-R/C		Always-open terminal	
	T/A-T/B	Relay output 2	Always-closed terminal	Contact capacity：AC250V，3A，COSΦ=0.4。DC 30V，1A
	T/A-T/C		Always-open terminal	
Assistant interface	CN1	Expansion card interface	28PIN interface，connected to selectable card	-
	J1	Native keypad interface	Connecting to native keypad or wire of pull-out keypad	-
dial switch	S1	NPN/PNP	Multi-function input NPN, PNP input choice	Please refer to “Description of control terminal wiring” for detail

3）Notes on Control Terminals:

A) Analog input terminal:

Since the weak analog voltage signal is easily disturbed by external disturbance source, shielded

cable shall be used and the cable shall be as short as possible and the length shall not exceed 20m, as shown in the figure 3-6:

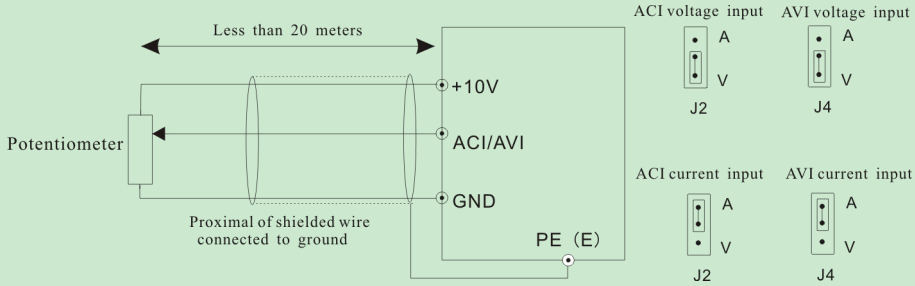


Fig. 3 -6 Analog Input Terminal of ACD Series Inverter

If the analog signal is severely disturbed, filter capacitor or ferrite core shall be installed at the analog signal source as shown in the Fig. 3-7：

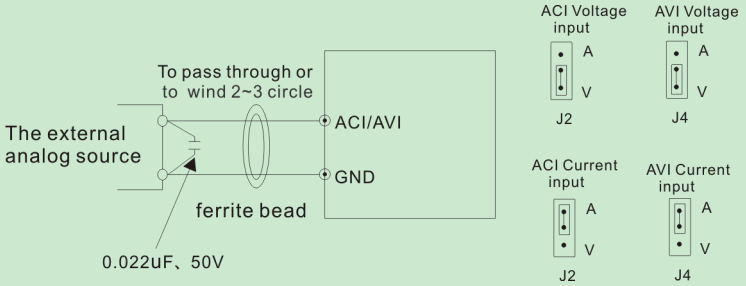


Fig. 3-7 Analog Input TerminalWith Filter devices

(2) **Analog output terminal wiring**

Analog output terminal AO1, AO2 connected to analog meter and kinds of physical data can be indicated, thereinto AO1 can output current(0~20mA) or voltage(0~10V) decided by jumping-wire J3, AO2 can output current(0~20mA) or voltage(0~10V) decided by jumping-wire J5. Terminal wiring mode as Fig.3-8.

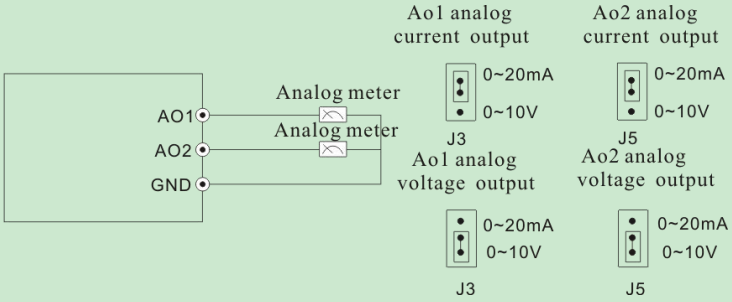


Fig.3-8 Analog output terminal wiring diagram

（3） MI1～MI6、FWD、REV terminal wiring method

A. the mode of dry contact

① Use interior 24V power supply, when input polarity is PNP， the wiring mode as Fig.3-9.

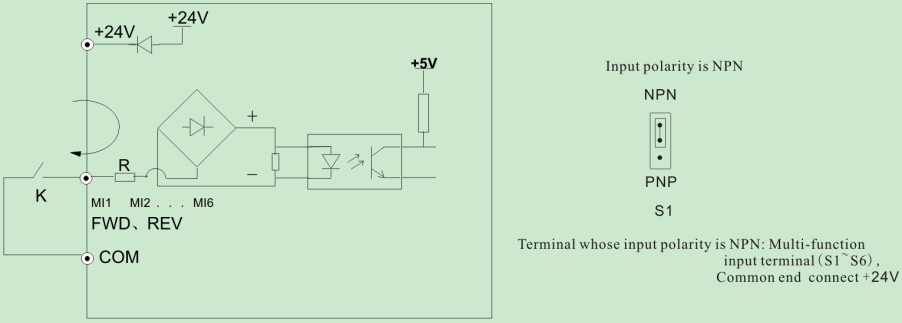


Fig.3-9 Source Electrode Connection mode when using interior 24V power supply

② Use interior 24V power supply, when input polarity is PNP， the wiring mode as Fig.3-10.

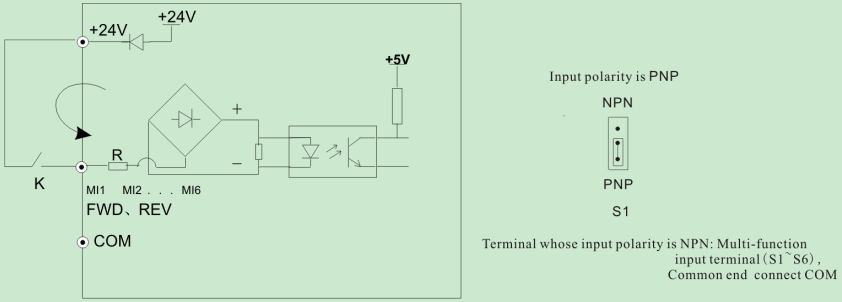


Fig.3-10 Drain electrode connection mode when using interior 24V power supply

B. Source(Drain) Electrode Connection

① The use of inverter internal +24V power supply, external controller for NPN typecommon emitter connection pole output， As shown in Figure 3-11。

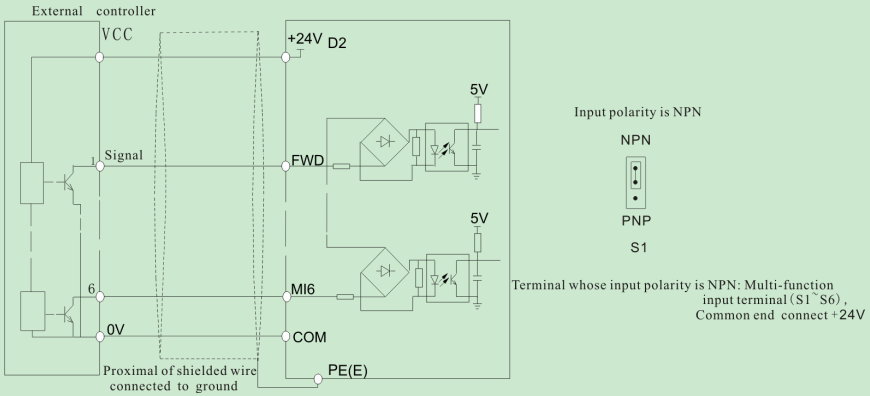


Fig.3-11 Source Electrode Connection mode when using interior 24V power supply

②The use of inverter internal +24V power supply, external controller for PNP typecommon emitter connection pole output， As shown in Figure 3-12。

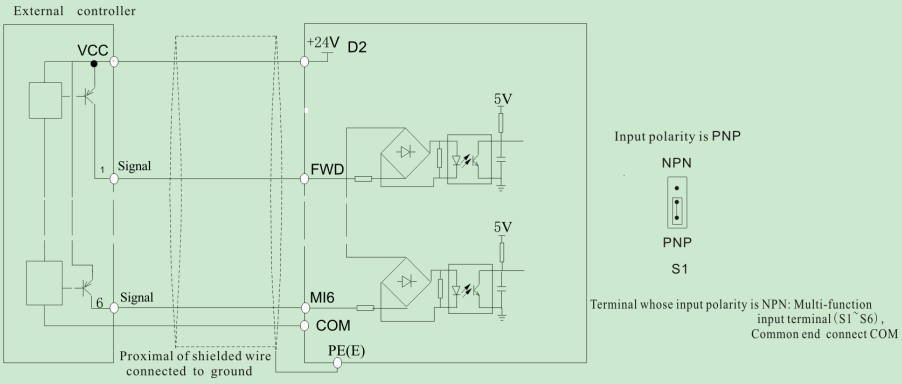


Fig.3-12 Drain electrode connection mode when using interior 24V power supply

（4）Number output terminal DO

When number output terminal need to drive the delay, absorber diode should be added to the two sides of delay coil, else DC 24V power supply may be damaged.

Note: The absorption diode shall be installed with correct polarity, as shown in Fig.3-13.

Otherwise, when the digital output terminal has output, the DC 24V power supply and output circuit will be damaged immediately.

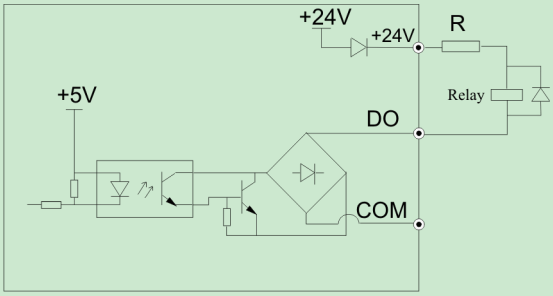


Fig.3-13 Schematic diagram for connection of digital output terminal

（5）Delay output terminal RA/B/C、TA/B/C wiring

If driving an inductive load(such as the electromagnetic relay,the contactor), surgevoltage absorption circuit should be installed, such as RC absorption circuit(Pay attention that its leaking current should be less than keeper current of the contactor or relay controlled by it), voltage-sensible resistance, and diode,etc.(If it is used in DC electromagnetic loop, check the polarity when install). Component of absorption circuit should be installed on the two side of the coil of delay or contactor.

3.6 EMC Issues

3.6.1 Influence ofHarmonics

1) The high frequency harmonics of mains supply will influence the rectifying circuit of the inverter. The harmonics will heat the rectifying circuit and even damage the circuit. So, it is recommended to install the filtering device in the environmentwhere the power quality is poor.

2）Since the inverter output has high frequency harmonics, the output cannot be installedwith capacitor or surge suppressing devices because the capacitor and surge suppressing device may resonate the circuit and damage the equipment.

3.6.2 EMI

1) Two kinds of EMI, one is the EMI around the inverter and disturbs the inverter. This kind of EMI is weak, besides the inverter has been designed with strong immunity.Another is the EMI from the inverter that may influence the equipment around the inverter. The inverter itself is a disturbance source because it outputs PWM wave through high carrier frequency, so solving the

EMI issue is mainly toreduce the EMI of inverter.

Methods:

A) Inverter and other equipment shall be well grounded and the grounding resistance shall be less than 5ohm.

B) Inverter's power cables shall be vertical instead of parallel with the control cables.

C) For the applicationwith strong disturbance, the power cables from the motor to the inverter shall be shielded and the shielding layer shall be grounded.

D) The cables of disturbed equipment shall be twisted shielded cables and the shielding layer shall be grounded.

2) Reducing the disturbance to the inverter from other equipment

The relay, contactor or electronic -magnetic braking device will disturb the inverter.

Take the following actions to solve this issue:

A) Install surge suppressing devices to the disturbing device

B) Install filter to the input of the inverter

C) Inverter's control cables shall be shielded and the shielding layer shall be grounded

3)Method to reduce the disturbance fromthe inverter to the equipment

Two kinds of noises, one is the radiation from the inverter itself, and another is the radiation from the cable between the inverter and the motor. These two kinds of radiations induce the cables of the equipment and make the equipment work abnormally. Following method can be used:

A) If themeasuring meters, radio equipment and sensors and their signal cables are installed in a cabinet together with the drive, these equipment cableswill be easily disturbed. Take the actions below to solve the problem: The equipment and the signal cables should be as far away from the inverter as possible; Signal cables and power cables shall not be routed in parallel or bound together; The signal and power cables should be shielded; Install radio noise filter and linear noise filter at the input and output sides of the inverter.

B) If the external equipment shares a sameAC supply with the inverter, and the above cannot eliminate the disturbance, then the user should install a linear filter or a radio noise filter.

C) Ground the external equipment and eliminate the disturbance of the leakage current fromthe inverter's grounding cable.

3.6.3 Leakage current

The inverter has two kinds of leakage current, one is the grounding leakage current and another is the leakage current between the lines:

1) Grounding leakage current:

The distributed capaci tance exists between the cables and the ground, and the bigger the capacitance and the bigger the leakage current, so themotor cables should be as short as possible. Besides, the bigger the carrier frequency is, the bigger the leakage current is, so the user can also reduce the carrier wave frequency, but themotor noise may increase. Installing reactor can also reduce the leakage current.

The leakage current is increasedwith the increase of the circuit current, so the leakage current is big if the motor power is big.

2) Leakage current between lines:

The distributed capacitance exists in the inverter output cables, andresonancemayoccurifhigh frequency harmonics exist in the current, thus the leakage current occurs, which may result in the wrong action of relay.

The method to solve this issue is to reduce the carrier frequency or install the output reactor. It is recommended to use inverter protection function instead of a thermal relay to protect themotor before using the inverter.

Chapter 4 Digital Keypad Operation

4.1 Description of the DigitalKeypad

DigitalKeypad Parts and Functions

This digital keypad module includes two parts: display panel and a keypad.The display panel allows the user to program the AC drive, aswell as view the different operating parameters. The keypad is the user interface to the AC motor drive. Refer to the following figure for a description of the different parts.

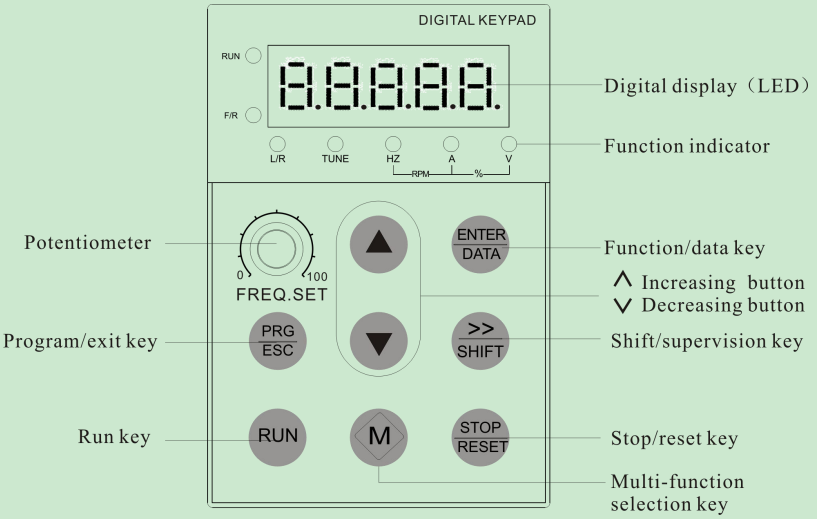


Fig. 4-1 Operation Panel Schematic Diagram

Table 4-1 keypad function table

Key	Description
PRG ESC	Program /Esc First-stage menu entry or exit
>> SHIFT	Under stop and run display interface, the display parameter can be chosen by moving to the right circularly; when the parameter is modified, its modified bit can be chosen, please refer to F3.05，F3.06，F3.07
ENTER DATA + M	Under stop and run display interface, the display parameter can be chosen by moving to the left circularly; when the parameter is modified, its modified bit can be chosen, please refer to F3.05，F3.06，F3.07
ENTER DATA	Enter into the next menu or setting parameter confirmation

M	Refer to F3.02 for detailed operation method.
RUN	Enter into run under keypad mode
STOP RESET	To press the key can stop the running inverter; it can also used to reset the inverter when in malfunction alarm status, the function of the key is restricted by F3.03.
▲	To increase data or function code(to press it continuously can improve increasing speed)
▼	To decrease data or function code(to press it continouously can improve decrease speed)
RUN + STOP RESET	When RUN key and STOP/RESET key are pressed at the same time, the inverter

4.2 Modify and Check the Function Codes

ACD320 series inverter's operation panel uses 3-level menu to conduct parameter settings.

3-level menu: function parameter group (first level) →function code (second level) →setting of function code (third level). Operation procedure is shown in Fig. 4-2.

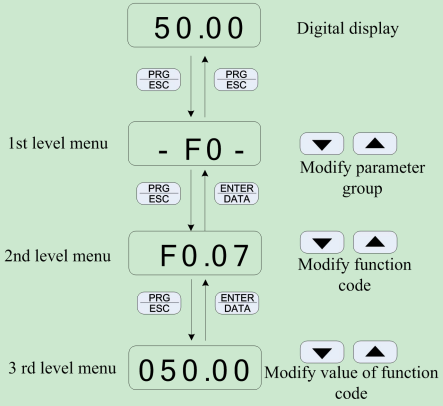


Fig. 4-2 Operation Procedures for 3-level Menu

Note: When operating 3-level menu, pressing PRG/ESC or ENTER/DATA can return to second level menu. The difference is: pressing ENTER/DATA will save the parameters and return to second level menu and then shift to the next function code, while pressing PRG/ESC will return to second level menu without saving the parameters.

Example: Change the setting of F1.02 from 10.00Hz to 15.00Hz. (Bold means flash bit.)

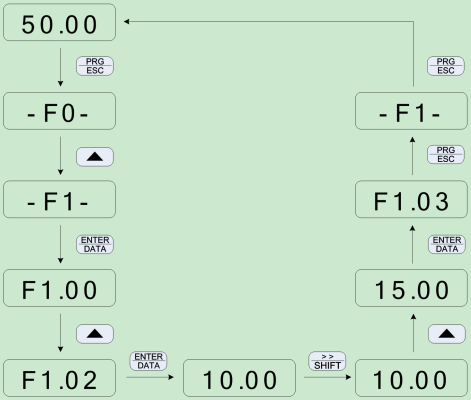


Fig. 4-3 Example for Parameter Changing

In third level menu, if the parameter has no flash bit, it means the function code cannot be changed and the possible reasons are:

1) This parameter of this function code cannot be changed, such as the actually detected parameter and running record parameter.

2) This function code cannot be changed in operating status and can only be changed when the inverter is stopped.

4.3 How to View Status Parameters

When ACDSeries inverter is in the stop or running status, several status parameter of the inverter can be displayed on the LED nixie tube. The status can be chosen wether to display by function code F3.05(running parameter)、F3.06 (stop parameter), please refer to the discrption of F3.05 and F3.06 for detail. Pressing the key SHIFT can switch the display of stop or running status parameters by moving to the right circularly, and pressing the key ENTER +M can switch the display of stop or running status parameters by moving to the left circularly.

There are nine stop status parameters to be displayed in the stop status, Setting frequency, DC bus voltage, Input terminal status,Output terminal status,PID setpoint,PID feedback, **AVI** value, **ACI** value, segment of multi-speed , the function code F3.06 can decide these parameters wether to display by bit. Pressing the key SHIFT can switch the display of the selected parameters by moving to the right circularly, and pressing the key ENTER +M can switch the display of the selected parameters by moving to the left circularly.

The inverter has fifteen running status parameters to be displayed in the running status, they are running frequency, setting frequency, Output current,Output voltage, Running speed, Output

power, Output torque, DC bus voltage, PID setpoint, PID feedback, Input terminal status, Output terminal status, AVI value, ACI value, current segment of multi-speed, setting torque, the function code F3.05 can decide these parameters wether to display by bit. Pressing the key SHIFT can switch the display of the selected parameters regularly.

If the inverter is powered on again after power-off, the parameters displayed are defaulted as those selected before the power-off.

4.4 Password Setting

ACD320 inverter provides password protection for users. When F3.00 is not zero, that is the user password, once exiting the function code editing status, the password protection function is valid if there is no operation within one minute. If the userpresses PRG/ESC again, the inverter shall display “0.0.0.0.0.”, and the user can only enter the menu after inputting the user password. Otherwise, the user cannot enter.If the user wants to cancel the password protection function, F3.00 should be set 0.

4.5 Auto Tuning of Motor Parameters(Referto F1.11)

Before running the inverter that has selected the vector control mode or open loop torque mode, accurate motor nameplate parameters must be input to the inverter correctly. ACD320 inverter will configure the standard motor parameters according to the nameplate parameters. Vector control mode is highly dependent on the motor parameters and correct parameters must be acquired for achieving good control performance.

Motor auto tuning procedures:

Firstly set the command source (F0.01) as the operation panel command channel.

Then input the following parameters according to the actual parameters of motor:

F1.01 Rated power of motor

F1.02 Rated frequency of motor

F1.03 Rated speed of motor

F1.04 Rated voltage of motor

F1.05 Rated current of motor

If the motor is disconnected from the load completely, select 1 (complete tuning) in F1.11, and press RUN in keypad, the inverter will calculate the parameters below automatically:

F1.06 Stator resistance

F1.07 Rotor resistance

F1.08 Leakage inductance

F1.09 Mutual inductance

F1.10 Excitation current with no load

If the motor cannot disconnect from its load, set F1-11 to 2 (static tuning), and then press the RUN. The inverter will measure the stator resistance, rotor resistance and leakage inductance in sequence, but it will not calculate the mutual inductance and the excitation current with no load, and the user can use the nameplate parameters that are rated voltage U, rated current I, rated frequency f and power factor η to calculate these two parameters.

The calculation methods of the motor current with no load and the mutual inductance are described as follows:

Excitation current with no load: $I_0 = I \cdot \sqrt{1-\eta^2}$

Mutual inductance calculation: $L_m = \frac{U}{2\sqrt{3}\pi f \cdot I_0} - L_\delta$

Where I_0 is the excitation current with no load, L_m is the mutual inductance and L_δ is the leakage inductance.

Chapter 5 Function parameters list

5.1 Symbol description

× ---- parameter can't be changed in process of running

○ ---- parameter can be changed in process of running

* ---- read-only parameter, unmodifiable

5.2 Function parameter schedule graph

Function Code	Name	Set range	Default Value	Modification	Serial No
H0—Basic run function parameter group					
F0.00	Control mode	0: Speed sensorless vector control (SVC) 1: V/F control 2:open loop torque control	1	×	0
F0.01	Command source selection	0: Keyboard 1: Terminal 2: Communication	0	×	1
F0.02	Keyboard and terminal UP/DOWN setting	0: Valid, and inverter memorize when power down 1: Valid, and inverter does not memorize when power down 2: Invalid	0	○	2
F0.03	Frequency command Selection	0: Keyboard 1: AVI 2: ACI 3: AVI+ACI 4: Multi-speed 5: PID control 6: 485communication 7: simple PLC 8: keypad analog potentiometer	0	○	3
F0.04	Maximum output frequency	10.00～600.00Hz	50.00Hz	×	4
F0.05	Upper limit frequency	F0.06～F0.04	50.00Hz	○	5
F0.06	Lower limit frequency	0.00Hz～F0.05	0.00Hz	○	6
F0.07	Keyboard frequency setting	0.00Hz～F0.04	50.00Hz	○	7
F0.08	ACCEL time 1	0.1～3600.0s	10.0s	○	8
F0.09	DECEL time 1	0.1～3600.0s	10.0s	○	9
F0.10	Operation direct ion selection	0: Operating at default direction 1: Operating at reverse direction 2: NO inverse operating	0	×	10

F0.11	Carrier frequency setting	1.0～15.0kHz	Set by model	○	11
F0.12	Functional parameters restoration	0: NO operation 1: Restore default value 2: Delete failure records	0	×	12
F0.13	AVR selection	0: Invalid 1: Valid all the time 2: Invalid during deceleration	1	○	13
F0.14	Star t Mode	0: Direct start 1: DC braking first and then start	0	×	14
F0.15	Start frequency	0.50～10.00Hz	0.00Hz	○	15
F0.16	Hold time of start frequency	0.0～50.0s	0.0s	○	16
F0.17	Braking current before start ing	0.0～150.0%	0.0	○	17
F0.18	Braking time before start ing	0.0～50.0s	0.0s	○	18
F0.19	Stop Mode	0: DECEL Stop 1: Free run Stop	0	○	19
F0.20	Beginning Frequency of braking	0.00～F0.04	0.00Hz	○	20
F0.21	Waiting time of braking	0.0～50.0s	0.0s	○	21
F0.22	DC braking current	0.0～150.0%	0.0	○	22
F0.23	DC braking time	0.0～50.0s	0.0s	○	23
F0.24	Dead time between forward and reverse	0.0～3600.0s	0.0s	○	24
F0.25	Terminal comma nd Protection when power on	0: Terminal command invalid when power on 1: Terminal command valid when power on	0	○	25
F1 Motor Parameter					
F1.00	Inverter model	0: G model 1: L model	0	×	26
F1.01	Motor rated power	0.4～900.0kW	Set by model	×	27
F1.02	Motor rated frequency	0.01Hz～F0.04	50.00Hz	×	28
F1.03	Motor rated speed	0～36000rpm	Set by model	×	29
F1.04	Motor rated voltage	0～460V	Set by model	×	30

F1.05	Motor rated current	0.1～1000.0A	Set by model	×	31
F1.06	Motor stator resistance	0.001～65.535Ω	Set by model	○	32
F1.07	Motor rotor resistance	0.001～65.535Ω	Set by model	○	33
F1.08	Motor stator/rotor inductance	0.1～6553.5mH	Set by model	○	34
F1.09	Mutual inductance of motor stator/rotor	0.1～6553.5mH	Set by model	○	35
F1.10	No-load current	0.01～655.35A	Set by model	○	36
F1.11	Self-learning of motor parameters	0: NO operation 1: complete tuning Self-learnin 2: static tuning Self-learning	0	×	37
F1.12	Speed loop proportional gain1	0～100	30	○	38
F1.13	Speed loop integral time1	0.01～10.00s	0.50s	○	39
F1.14	Switching low point frequency	0.00Hz～F1.17	5.00Hz	○	40
F1.15	Speed loop proportional gain 2	0～100	10	○	41
F1.16	Speed loop integral time 2	0.01～10.00s	1.00s	○	42
F1.17	Speed loop integral time 2	F1.14～F0.04	10.00Hz	○	43
F1.18	VC slip compensating factor	50%～200%	100%	○	44
F1.19	Upper torque limit setting	0.0～200.0% (inverter rated current)	150.0%	○	45
F1.20	V/F curve setting	0: Linear V/F curve 1: square torque V/F curve	0	×	46
F1.21	Torque boost	0.0%(auto) 0.1%～30.0%	0.0%	○	47
F1.22	Torque boost cut-off	0.0～80.0% (relative to motor rated frequency)	60.0%	×	48
F1.23	V/F slip compensation limit	0.0～200.0%	0	○	49
F1.24	Energy	0: No Operation	0	○	50

	Conservation Selection	1: Energy Conservation			
F2 Input and Output Terminal Function Parameters					
F2.00	On-off signal filter times	1～10	5	○	51
F2.01	MI1 Terminal Function Selection	0: No Function 1: Forward 2: Reverse 3: three-wire control 4: Forward Jogging 5: Reverse Jogging 6: Free run stop 7: Failure reset 8: External fault input 9: Frequency setting(UP) 10: Frequency setting(DOWN) 11: Frequency up/down setting clear 12: Multi-Speed Terminal 1 13: Multi-Speed Terminal 2 14: Multi-Speed Terminal 3 15: ACCEL/DECELTime selection 16: PID control pause 17: Traverse pause at current frequency 18: Traverse reset 19: ACCEL/DECEL forbid 20: external sleep signal 21: Reserved 22: Reserved 23： One driving two water supply mode is ineffective（switch to manual operation） 24: Reserved 25:Simple PLC run reset 26:Simple PLC run ineffective 27:Switch to set of ACI frequency 28:Jog key 29:Torque control forbidden 30:Eliminate the increasing or decreasing set of frequency temporarily. 31：Reserved.	0	×	52
F2.02	MI3 Terminal Function Selection		0	×	53
F2.03	MI3 Terminal Function Selection		0	×	54
F2.04	MI4/FWD Terminal Function Selection		1	×	55
F2.05	MI5/REV Terminal Function Selection		2	×	56
F2.06	Function selection of terminal MI6		0	×	57
F2.07	Terminal control mode	0: two-wirecontrol 1 1: two-wirecontrol 2 2: three-wire control 1 3: three-wire control 2	0	×	58
F2.08	UP/DOWN	0.01～50.00Hz/s	0.50Hz/s	○	59

	frequency increment variable rate				
F2.09	AVI lower limit	0.00V～10.00V	0.30V	○	60
F2.10	AVI lower limit corresponding setting	-100.0%～100.0%	0.0%	○	61
F2.11	AVI upper limit	0.00V～10.00V	9.70V	○	62
F2.12	AVI upper limit corresponding setting	-100.0%～100.0%	100.0%	○	63
F2.13	AVI input filtering time	0.00s～10.00s	0.10s	○	64
F2.14	ACI lower limit	0.00V～10.00V	0.30V	○	65
F2.15	ACI lower limit corresponding setting	-100.0%～100.0%	0.0%	○	66
F2.16	ACI upper limit	0.00V～10.00V	9.70V	○	67
F2.17	ACI upper limit corresponding setting	-100.0%～100.0%	100.0%	○	68
F2.18	ACI input filtering time	0.00s～10.00s	0.10s	○	69
F2.19	Relay RA/B/C output selection	0: NO output 1: Frequency reached	3	○	70
F2.20	DO （Open circuit collector ） output selection	2: FDToutput 3: Fault output 4: Motor running forward	3	○	71

F2.21	Relay TA/B/C output selection	5: Motor running reverse 6: Null speed operating 7: Upper limit frequency reached 8: Lower limit frequency reached 9～12: Reserved 13:High pressure arrives detect value 14:Low pressure arrives detect value 15:Sleep status indication 16:Lack of water alarm ingdication. 17:Non-zero speed operating. 18:Running 19:Reserved 20:Reserved 21:Simple PLC run for a cycle until output of signal. 22:Reserved 23:Reserved 24:Reserved	3	○	72
F2.22	AO1 Analog output Selection	0: Setting frequency 1: Running frequency 2: Output current 3:Output voltage 4: Running speed 5: Outputpower 6: Output torque 7: AVI input value 8: ACI input value 9～10: Reserved	0	○	73
F2.23	AO1 Lower limit	0.0%～100.0%	0.0%	○	74
F2.24	Lower limit corresponding AO1 output	0.00V～100.0V	0.00V	○	75
F2.25	AO1 Upper limit	0.0%～100.0%	100.0%	○	76
F2.26	Upper limit corresponding AO1 output	0.00V～100.0V	10.00V	○	77
F3 HumanMachine Interface Parameters					
F3.00	User password	0～65535	0	○	78
F3.01	Application of macroinstruction	0: General-purpose inverter 1233: The application macro of Offset printing machine 1235: The application macro of engraving machine 1237:Constant pressure water supply macroinstruction	0	×	79
F3.02	Function selection	0：Jog running	0	○	80

	of M key	1.Switch between running forward and reverse 2: Elimate the set of UP/DOWN			
F3.03	STOP function option	0:Keypad control valid 1: Keypad and terminal control valid 2: Keypad and communication control valid 3: All control modes valid	0	○	81
F3.04	Reserved		2	○	82
F3.05	operation status display parameter option	Displayed Message / Code	1183	○	83
		BIT0: Running frequency / 1			
		BIT1: Setting frequency / 2			
		BIT2: Output current / 4			
		BIT3: Output voltage / 8			
		BIT4: Running speed / 16			
		BIT5: Output power / 32			
		BIT6: Output torque / 64			
		BIT7: DC bus voltage / 128			
		BIT8: PID setpoint / 256			
		BIT9: PID feedback / 512			
		BIT10: Input terminal status / 1024			
		BIT11: Output terminal status / 2048			
		BIT12: AVI value / 4096			
		BIT13: ACI value / 8192			
		BIT14: Current segment of multi-speed control / 16384			
		BIT15: torque setting value / 32768			
Note: The set value is the sum of all displayed code, if the inverter need to display output current, running speed, bus-bar voltage, set the value 4+16+128=148, the parameter can be displayed after saving and exiting the set period.					
F3.06	Stop status display parameter option	BIT0：Setting frequency / 1	207	○	84
		BIT1：DC bus voltage / 2			
		BIT2：Input terminal status / 4			
		BIT3：Output terminal status / 8			
		BIT4：PID setpoint / 16			
		BIT5：PID feedback / 32			
		BIT6：AVI value / 64			
		BIT7：ACI value / 128			
		BIT8：Current segment of multi-speed control / 256			
F3.07	operation status display preferential option	0～15(0:invalid)	0	○	85
F3.08	IGBTmodule temperature	0～100℃	Actual value	*	86
F3.09	Software version	0.00～655.35	Actual value	*	87
F3.10	Accumulative operat ing time	0～65535h	0	*	88

F3.11	The fault before previous fault type	0：No fault 1: IGBT module protection 2: Acceleration over-current 3: Deceleration over-current 4: Constant speed over-current 5: Acceleration over-voltage 6: Deceleration over-voltage 7: Constant speed over-voltage 8: Control power fault（Stop over-voltage） 9: Operation under-voltage fault 10: Inverter overload 11: Motor overload 12: Input side phase failure 13: Output side phase failure 14: Inverter overhea 15: External fault 16:RS485 communication fault 17:Reserved 18: Current detect error 19: Motor self-learning error 20:Reserved 21: EEPROM operation error 22: hardware fault 23: short-current fault 25: PID feedback disconnect er ror 26:Water-lack protection failure 27：the inverter operation time reached	0	*	89
F3.12	Previous fault type		0	*	90
F3.13	Current fault type		0	*	91
F3.14	Operating frequency at current fault	0.00～600.00Hz	0．00Hz	*	92
F3.15	Output amperage at current faul t	0.0～2000.0A	0.0A	*	93
F3.16	Bus voltage at current fault	0.0～1000.0V	0.0V	*	94
F3.17	Reserved		0	○	95
F3.18	Reserved		0	○	96
F4 Application Function Parameters					
F4.00	ACCELTime2	0.1～3600.0s	10.0s	○	97
F4.01	DECELTime2	0.1～3600.0s	10.0s	○	98
F4.02	Frequency of Jog running	0.00～F0.04	5.00Hz	○	99
F4.03	The acceleration time of JOG running	0.1～3600.0s	10.0s	○	100

F4.04	The deceleration time of JOG running	0.1～3600.0s	10.0s	○	101
F4.05	Skip frequency	0.00～F0.04	0.00Hz	○	102
F4.06	Skip frequency range	0.00～F0.04	0.00Hz	○	103
F4.07	Traverse frequency range	0.00～100.0%（relative to set frequency）	0.00%	○	104
F4.08	Kick frequency range	0.00 ～ 50.0% （ relative to traverse frequency range）	0.00%	○	105
F4.09	Traverse frequency up time	0.1～3600.0s	5.0s	○	106
F4.10	Traverse frequency down time	0.1～3600.0s	5.0s	○	107
F4.11	Fault auto-reset times	0～3	0	○	108
F4.12	Interval time setting of automatic resetting fault	0.1～100.0s	1.0s	○	109
F4.13	FDT level detection value	0.00～F0.04	5.00Hz	○	110
F4.14	FDT delay detection value	0.00～100.0%（FDT level)）	5.0%	○	111
F4.15	Frequency reaching detection range	0.0～100.0%（maximum frequency）	0.0%	○	112
F4.16	Energy consumption(brake) braking voltage	115.0～140.0%（standard DC bus voltage）380V	130.0%	○	113
		115.0～140.0%（standard DC bus voltage）220V	120.0%		
F4.17	Speed display ratio	0.1～999.9% Speed=120×runningfrequency×F4.17/pole number	100.0%	○	114
F4.18	PID setpoint Sources Option	0: Given by Keyboard(F4.19) 1: Given by Analog Channel AVI 2: Given by Analog Channel ACI 3: Given by Remote Communication 4: Multi-speed setpoint	0	×	115
F4.19	Preset PID setpoint	0.0%～100.0%	0.0%	○	116
F4.20	PID Feedback Sources Option	0: AVI Feedback 1: ACI Feedback 2: AVI+ACI Feedback 3: Communication feedback 4: AVI-ACI Feedback	0	×	117
F4.21	PID Output Characteristics Option	0: Positive 1: Negative	0	×	118

F4.22	Proportional gain (Kp)	0.00～100.00	1.00	○	119
F4.23	Integral time (Ti)	0.01～10.00s	0.10s	○	120
F4.24	Differential time (Td)	0.00～10.00s	0.00s	○	121
F4.25	Sampling cycletime (T)	0.01～100.00s	0.10s	○	122
F4.26	PID control discrepancy limit	0.0～100.0%	0.0%	○	123
F4.27	Feedback disconnection detecting value	0.0～100.0%	0.0%	○	124
F4.28	Feedback disconnection detecting time	0.0～3600.0s	1.0s	○	125
F4.29	Multi-Speed 0	-100.0～100.0%	0.0%	○	126
F4.30	Multi-Speed 1	-100.0～100.0%	0.0%	○	127
F4.31	Multi-Speed 2	-100.0～100.0%	0.0%	○	128
F4.32	Multi-Speed 3	-100.0～100.0%	0.0%	○	129
F4.33	Multi-Speed 4	-100.0～100.0%	0.0%	○	130
F4.34	Multi-Speed 5	-100.0～100.0%	0.0%	○	131
F4.35	Multi-Speed 6	-100.0～100.0%	0.0%	○	132
F4.36	Multi-Speed 7	-100.0～100.0%	0.0%	○	133
F5 Protection Parameters					
F5.00	Motor Overload Protection Option	0: Noprotection 1: normal motor 2: Variable Frequency motor	1	×	134
F5.01	Motor Overload Protection Current	20%～120.0%(motor rated current)	100.0%	○	135
F5.02	Power-down Frequency Drop Point	70.0～110.0%（standard bus voltage）	80.0%	○	136
F5.03	Instant power-down Frequency drop rate	0.00Hz～F0.04	0.00Hz	○	137
F5.04	Over-voltage Stall Protection	0: prohibit 1: allow	0	○	138
F5.05	Over-voltage Stall Protection Voltage	110～150%（380V）	120%	○	139
		110～150%（220V）	115%		
F5.06	Over-curent stall	80～200%	160%	○	140

	point set				
F5.07	The frequency decrease rate	0.00～200.00Hz/s	50.00	○	141
F6 Communication Parameters					
F6.00	Communication address	1～247,0 is the broadcast address	1	○	142
F6.01	Baud rate setting	0：1200BPS 1：2400BPS 2：4800BPS 3：9600BPS 4：19200BPS 5：38400BPS	3	○	143
F6.02	Data pattern	0: No check N,8,1 for RTU 1: Odd check（E，8，1） for RTU 2: Even check（O，8，1） for RTU 3: No check（N，8，2） for RTU 4: Odd check（E，8，2） for RTU 5: Even check（O，8，2） for RTU 6: No check（N，7，1） for ASCII 7: Odd check（E，7，1） for ASCII 8: Even check（O，7，1） for ASCII 9: No check（N，7，2） for ASCII 10: Oddcheck（E，7，2） for ASCII 11: Even check（O，7，2） for ASCII 12: No check（N，8，1） for ASCII 13: Oddcheck（E，8，1） for ASCII 14: Even check（O，8，1） for ASCII 15: No check（N，8，2） for ASCII 16: Oddcheck（E，8，2） for ASCII 17: Even check（O，8，2） for ASCII	0	○	144
F6.03	Communication response delay	0～200ms	5ms	○	145
F6.04	Communication overtime fault time	0.0（invalid），0.1～100.0s	0.0s	○	146
F6.05	Communication error measure	0: Alarm and free run stop 1: No alarm and keep running 2: No alarm and stop according to stop mode (by communication)	1	○	147
F6.06	Response measure	0: Response whenwrite 1: No response when write	0	○	148
F7 Advanced Function Parameters					
F7.00	Constant pressure water supply mode	0：One driving two circularly water supply mode is invalid.	0	○	149

		0：One driving two circularly water supply mode is valid(water supply card is needed as an accessory)			
F7.01	Timing switching interval	0 means that timing switching is invalid.	0	○	150
F7.02	Pump switching distinguish time	0.0～6553.5s	100.0s	○	151
F7.03	Electromagnetic switch delay time	0.2～10.0s	0.5s	○	152
F7.04	Inverter using delay time	0.0～999.9	1.0s	○	153
F7.05～F7.11	Reserved		0	○	
F7.12	High pressure arrives the monitoring point	0～100	0	○	161
F7.13	Low pressure arrives the monitoring point	0～100	0	○	162
F7.14	Water supply card relay B1 output function （B1-RCM）	25：The 1st pump of variable frequency	25	*	163
F7.15	Water supply card relay G1 output function （G1-RCM）	26：The 1st pump of AC power	26	*	164
F7.16	Water supply card relay B2 output function （B2-RCM）	27：The 2nd pump of variable frequency	27	*	165
F7.17	Water supply card relay G2 output function （G2-RCM）	28：The 2nd pump of AC power	28	*	166
F7.18～F7.20	Reserved				
F7.21	Sleep detection frequency	0～max. freq.	0	○	170
F7.22	Sleep detection delay	0～999.9s	0	○	171
F7.23	Revival pressure.	1～100	0	○	172
F7.24	Revival detection delay	0～999.9s	0	○	173
F7.25	Water-lack	0～999.9s	0	○	174

	detection delay				
Function Code	**Name**	**Set range**	**Default Value**	**Modification**	**Serial No**
F7.26	PID adjustable range	0～50.0	10.0	○	175
F7.27	Operation when set frequency is lower than low limit frequency	0:Run at lower limit Freq. 1:Run at 0Hz.	0	○	176
F7.28	Selcet sleeping signal	0: Select internal sleeping signal 1: Select external sleeping signal 2: Internal and external signal are valid at the same time.	0	○	177
F7.29	Simple PLC running mode	1: Run circularly. 2: Stop after running for one circulation. 3: Run at the selected speed after running for one circulation.	1	○	178
F7.30	The 0st step running time.	0～999.9	0	○	179
F7.31	The 1st step running time.	0～999.9	0	○	180
F7.32	The 2nd step running time.	0～999.9	0	○	181
F7.33	The 3rd step running time.	0～999.9	0	○	182
F7.34	The 4th step running time.	0～999.9	0	○	183
F7.35	The 5th step running time.	0～999.9	0	○	184
F7.36	The 6th step running time.	0～999.9	0	○	185
F7.37	The 7th step running time.	0～999.9	0	○	186
F7.38	Simple PLC selection record or not when power off.	0: Record when power off 1: No record when power off.	0	○	187
F7.39	Simple PLC running time unit.	0:s 1:min	0	○	188
F7.40	Failure shield	BIT0: Module protection shield 0:Invalid 1: Valid — 1 BIT1: Soft overcurrent shield. 0:Invalid 1: Valid — 2 BIT2: Over-voltage shield. 0:Invalid 1: Valid — 4	0	×	189

		BIT3: Reserved.	8			
		BIT4: Inverter overload shield. 0:Invalid 1: Valid	16			
		BIT5: Input lack-phase shield. 0:Invalid 1: Valid	32			
		BIT6: Output lack-phase shield. 0:Invalid 1: Valid	64			
		BIT7: Reserved.	128			
		BIT8: current detecting circuit failure 0:Invalid 1: Valid	256			
		BIT9: Earthing short circuit failure shield. 0:Invalid 1: Valid	512			
		BIT10: Inverter over heating shield. 0:Invalid 1: Valid(all frequency section is valid)	1024			
		Note:Please refer to F8.09 for hardware overcurrent shield.				
Function Code	**Name**	**Set range**		**Default Value**	**Modification**	**Serial No**
F8 Supplementary function Parameters 1						
F8.00	Inhibit oscillation low frequency threshold point	0～500		5	○	190
F8.01	Inhibit oscillation high frequency threshold point	0～500		100	○	191
F8.02	Inhibit oscillation scope limit value	0～10000		5000	○	192
F8.03	Inhibit oscillation dividing frequency of low and high frequency	0.00～F0.04（max. freq.）		12.50	○	193
F8.04	Inhibit oscillation	0: Oscillation inhibit is valid. 1: Oscillation inhibit is invalid.		1	○	194
F8.05	PWMselection	0:PWM mode1 1:PWM mode 2		0	×	195
F8.06	Torque setting mode selection	0: Keyboard setting torque（100.0% is equal to the value of F1.19） 1: Analog AVI setting torque（100.0% is equal to the value of F1.19） 2: Analog ACI setting torque（100.0% is equal to		0	○	196

		the value of F1.19） 3: Analog AVI+ACI setting torque （100.0% is equal to the value of F1.19） 4: Multisection torque setting （100.0% is equal to the value of F1.19） 5: Telecommunication setting（100.0% is equal to the value of F1.19），that is the actual torque setting value = 100.0% * F1.19.			
F8.07	Keyboard setting torque	-100.0% ～ 100.0%）（100.0% is equal to the value of F1.19）	50．0%	○	197
F8.08	Upper limit Freq. setting selection	0: Keyboard set the upper limit Freq. (F0.05) 1:Analog AVI set upper limit Freq.(100%corresponds to the max. fre. of F0.04) 2: Analog ACI set upper limit Freq.(the same as 1) 3: Multisection setting upper limit Freq. (the same as 1) 4: Telecommunication setting upper limit Freq. (the same as 1)	0	○	198
F8.09	Current limit selection(selection of hardware overcurrent)	0: Current limit is effective all the time(and hardware overcurrent is ineffective) 1: Current limit is ineffective when run at constant speed(and hardware overcurrent is effective)	0	○	199
F9 Supplementary function Parameters 2					
F9.00	Polarity selection of input and output terminal	BIT0:MI1 1 BIT1:MI2 2 BIT2:MI3 4 BIT3:MI4 8 BIT4:MI5 16 BIT5:MI6 32 BIT6:RA，RB，RC 64 BIT7:DO-R 128 BIT8:TA，TB，TC 256	0	○	200
F9.01	Carrier wave selection with the temperature adjustment	0: Effective 1: Ineffective	1	○	201
Function Code	**Name**	**Set range**	**Default Value**	**Modification**	**Serial No**
F9.02	Acce. time 3	0.1～3600.0s	445.0	○	202
F9.03	Dece. time 3	0.1～3600.0s	445.0	○	203
F9.04 F9.08	Reserved.				

F9.09	AO2 analog output selection	0: setting frequency 1: running frequency 2: output current 3: output voltage 4: running speed 5: output power 6: output torque 7: analog AVI input value 8: analog ACI input value 9～10: Reserved	0	○	209
F9.10	AO2 analog output lower limit	0.0%～100.0%	0.0%	○	210
F9.11	AO2 lower limit corresponding analog	0.00～10.00V	0.0%	○	211
F9.12	AO2 analog output upper limit	0.0%～100.0%	100.0%	○	212
F9.13	AO2 upper limit corresponding analog	0.00V～10.00V	10.00V	○	213
FA Reserved.					
Fb Reserved					
FC Reserved					
Fd Reserved					
FE Default parameters					
Note: Please refers to F3.05，F3.06，F3.07 for the selection of upervision parameter, more details refer to Chapter 4 and Chapter 6.					

Chapter 6 Parameter Description

6.1 F0 Basic Function Parameters

Function Code	Name	Setting Range	Default Value
F0.00	Control mode	0: Speed sensorless vector control (SVC) 1: V/F control 2:open loop torque control	1

Selection of Speed Control Mode

0: Vector Control without PG: Open loop vector control

This control mode is suitable for the application requiring high torque at low speed and superior speed control. One inverter can drive only one motor. E.g. machine tool, wiring machine, plastic injection machine etc.

1:V/F ControlMode

V/F controlmode is suitable for the application which does not require high control accuracy, e.g. pump and fans, and also suitable for cases with one inverter drivingmultiple motors.

2: Open loop torque control

Suitable for situation that torque control accuracy is not high required, such as wire, 拉丝 and other occasions. In torque control mode, the speed of the motor is determined by its load，and the accelerating and decelerating speed will not be decided by accelerating and decelerating time any longer.

Note: If vector control mode is selected, it is amust to correctly set up the nameplate parameters of motor, and accomplish self learning of motor parameters before operation to acquire correct motor parameters. Only obtaining correctmotor parameters can exert the high performance of vector control mode.

Note:

Power section	F0.00 Factory value
0.4KW～75KW	0: No PG vector control mode
90KW～700KW	1: control mode

Function Code	Name	Setting Range	Default Value

F0.01	Command source selection	0: Keyboard 1: Terminal 2: Communication	0

Path Selection for the inverter Control Command

0: Keyboard Command Path

The buttons RUN and STOP on the keyboard are for operation control.

1:Terminal Command Path

Multifunction input terminals of forward, reverse, forward jogging, reverse jogging and so on, perform the operation command control.

2:Communication Command Path

Operation command control is performed through communication pattern by upper level machine.

Function Code	Name	Setting Range	Default Value
F0.02	Keyboard and terminal UP/DOWN setting	0: Valid, and inverter memorize when power down 1: Valid, and inverter does not memorize when power down 2: Invalid	0

ACD320 series inverter can set up the frequency though " ∧ " and " ∨ " buttons on the keyboard and terminal UP/DOWN (Frequency setting increase /Frequency setting decrease), and as it has the highest purview, it can combine with any other frequency setting path tomainly accomplishes the fine adjustment of inverter output frequency during control system commissioning.

0: Valid, and the inverter memorizes when power down.Able to set up frequency command, and memorize this set frequency when the inverter is power down.When the power is back,automatically combine it with current frequency setting.

1: Valid, and the inverter does notmemorize when power is down.Able to set up frequency,but when the inverter power is down, this frequency setting is not memorized.

2: Invalid. The frequency set through keyboard and terminal UP/DOWN is automatically cleared,and the settings through keyboard and terminal UP/DOWN are invalid.

Note: After the user restores the default values of inverter function parameters, the

frequency value, set through keyboard and terminal UP/DOWN, is automatically cleared.

Function Code	Name	Setting Range	Default Value
F0.03	Frequency command Selection	0: Keyboard 1: AVI 2: ACI 3: AVI+ACI 4: Multi-speed 5: PID control 6: 485communication 7: simple PLC 8: keypad analog potentiometer	0

Selection of inverter frequency command input channels. There are 9 main frequency setting channels:

0: Keyboard

Accomplish keyboard frequency setting bymeans ofmodifying the value of function code F0.07" Keyboard frequency setting"

1: AVI

2: ACI

3: AVI+ACI

Thismeans that the frequency is set up through analog input terminals. ACD series inverter provides 2 analog input channel. VI is 0-10V voltage input mode, while CI can be 0-10V input or 0 (4)-20mAinput.

The 100.0%setting of analog input is corresponding to the maximum frequency (Function Code F0.04), and -100.0%is corresponding to maximumreverse frequency (Function Code F0.04).

4:Multi-speed operation

The inverter is operated in the mode of multi-speed once this frequency settingmode is chosen. It isneeded to set up the parameters of F2 Group and F4 Group "Multi-speed control group" to determine the coincidence relation between given percentage and given frequency.

5: PIDcontrol

Selection of this parametermeans that the operation mode of inverter is PID controlmode.In this case, it is required to set up F4 Group "PID control group" . The operation frequency of inverter is the frequency value which PID gives. Please refer to the description of F4 Group "PID

functions" for the definition of PID setpoint source, assigned value, feedback source and so on.

6: 485communication

7: simple PLC

8: keypad analog potentiometer

Note: No matter what the setting value of F0.03 is, frequency given of multi-section speed has the highest priority when the corresponding Mi terminal closed, as long as one of the value in F2.01～F2.06 of Mi terminal is 12 or 13 or 14.

Function Code	Name	Setting Range	Default Value
F0.04	Maximum output frequency	10.00～600.00Hz	50.00Hz

It is used to set up the maximum output frequency of inverter. Please note that, it is the basis of frequency setting and acceleration/deceleration speed.

Function Code	Name	Setting Range	Default Value
F0.05	Upper limit frequency	F0.06～F0.04	50.00Hz

It is the upper limit of inverter output frequency, which should be less than or equal to the maximum output frequency.

Function Code	Name	Setting Range	Default Value
F0.06	Lower limit frequency	0.00Hz～F0.05	0.00Hz

The lower limit of inverter output frequency.

If setpoint frequency is lower than lower limit frequencywhen startup, inverter can not run.operate at the lower limit frequency, stop or be dormant. Therein,Maximumoutput frequency ≥upper limit frequency≥ lower limit frequency.

Function Code	Name	Setting Range	Default Value
F0.07	Keyboard frequency setting	0.00 Hz～F0.04	50.00Hz

When Frequency Command is chosen as "keyboard Setting" , this function code value is the initial set value of inverter frequency.

Function Code	Name	Setting Range	Default

			Value
F0.08	ACCELtime 1	0.1～ 3600.0s	10.0s
F0.09	DECEL time 1	0.1～ 3600.0s	10.0s

Acceleration time means the time t1 required for inverter to accelerate to the maximum output frequency (F0.04) from 0Hz.

Deceleration time is the time t2 required for inverter to decelerate to 0Hz fromthe maximumoutput frequency (F0.04).

It is indicated by following figure

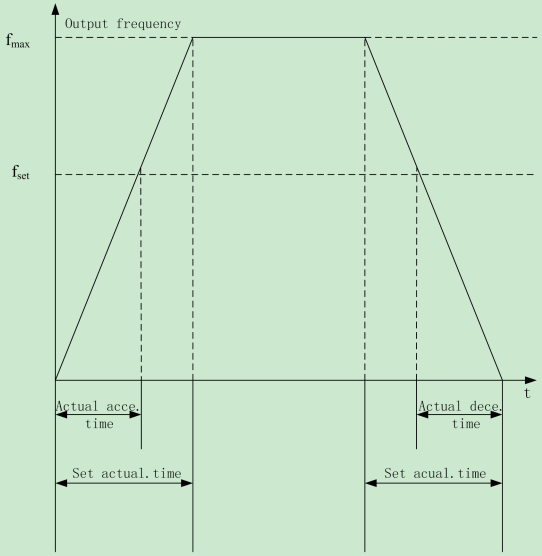


Fig 6-1 Acceleration and Deceleration time diagram

When the set frequency is equal to the maximum frequency, the actual Acceleration/Deceleration time are equal to the set Acceleration/Deceleration time.

When the set frequency is less than the maximum frequency, the actual Acceleration/Deceleration time are less than the set Acceleration/Deceleration time.

Actual Acceleration /Deceleration time = set Acceleration/Deceleration time (set frequency/max.frequency)

ACD320 series inverter has 2 groups ofAcceleration/Deceleration time.

1st group: F0.08, F0.09;

2nd group: F4.00, F4.01;

The Acceleration /Deceleration time can be chosen through multifunction digital input terminal (F2 Group).

The factory value of decelerating time is10.0s as to the inverter whose power is 5.5KW and below, the value is 20.0S as to the inverter whose power is between7.5KW and 55KW, while the value is 40.0S as to the inverter whose power is 75KW and above.

Function Code	Name	Setting Range	Default Value
F0.10	Operation direction selection	0: Operating at default direction 1: Operating at reverse direction 2: NO inverse operating	0

0: Operating at default direction.When the inverter is power connected, it operates at the actual direction.

1: Operating at reverse direction. By means of changing the function code, the motor rotating direction can be changed without changing any other parameters, which is equivalent to change the motor rotating direction by exchanging any two of motor cables (U, V,W).

Note: After the parameters are initialized, the motor operating direction can be restored to be its original state. Be caution to use it in the case that changing motor rotating direction is forbidden after the system commissioning is completed.

2: Forbid inverse operating. Forbidding inverter inverse operation is suitable to specific application that inverse operating is forbidden.

Function Code	Name	Setting Range	Default Value
F0.11	Carrier frequency setting	1.0～15.0kHz	Set by model

Carrier frequency	Electronmagnetic noise	Cacophony,Leakage current Heat	Heat radiation
1KHz	large ↑	small ↑	small ↑
10KHz			
15KHz	small ↓	large ↓	large ↓

Fig 6-2 Relationship between environment and Carrier frequency

Relationship betweenModel and Carrier frequency

Carrier frequency / Model	Max carr ier frequency (KHz)	Min carrier frequency (KHz)	Factory setting (KHz)
G: 0.4k W～11K W L: 0.75kW～15 KW	15	1	6
G: 15kW～55 K W L: 18.5kW～75KW	8	1	3
G: 75kW～300KW L: 90kW～315KW	8	1	1.5

This function is mainly used to improve the motor operating noise and inverter interference to external. The advantages of using high carrier frequency: relatively ideal current wave shape, less harmonic current wave and low motor noise;

The disadvantages of using high carrier frequency: increased switch loss and inverter temperature rises, affecting inverter output capacity so that it should be operated at derating under high carrier frequency conditions; in the mean time, inverter leakage current and its electromagnetic interference to external are increased.

The situations of using low carrier frequency is on the contrary. Too low carrier frequency can cause operation unstable, torque reduced and even oscillation at low frequency.

When inverter is factory released, its carrier frequency has been set properly. Generally the user does not need to modify this parameter.

Function Code	Name	Setting Range	Default Value
F0.12	Functional parameters restoration	0: Nooperation 1: Restore default value 2: Delete failure records	0

1: The inverter restores all parameters to their default value.

2: The inverter deletes recent failure records.

After the chosen function operation is completed, this function code is automatically restored to 0.

Function Code	Name	Setting Range	Default Value

F0.13	AVR selection	0:Invalid 1:Valid all the time 2: Invalid during deceleration	1

AVR means output voltage auto regulation.WhenAVR is invalid, output voltage will change according to the change of input voltage (or DC bus voltage); WhenAVR is valid,output voltage will remain constant within output capacity.

Note: When the motor is decelerating to stop, the inverter would decelerate to stop in a shorter time and not to be over-voltage if automatic voltage stabilization AVR function is closed.

Function Code	Name	Setting Range	Default Value
F0.14	Start Mode	0:Directstart 1:DC braking first and then start	0

0: Direct start: start from the starting frequency.

1: DC braking first and then start: First perform DC braking (pay attention to set up parametersF0.17 and F0.18), and then start and run the motor at the start frequency. It is suitable for small inertia loading which can cause reverse rotation at starting.

Function Code	Name	Setting Range	Default Value
F0.15	Start frequency	0.50～10.00Hz	0.00Hz
F0.16	Hold time of start frequency	0.0～50.0s	0.0s

Setting proper starting frequency can increase the starting torque.Within the hold time of the starting frequency (F0.16), the inverter output frequency is the starting frequency, and then,from the starting frequency, running to the target frequency. If the target frequency (frequency command) is less than the starting frequency, inverter does not operate and is at stand-by state. The starting frequency value is not restricted by the lower limit frequency.

During FWD/REV switching, the starting frequency is inactive.

Function Code	Name	Setting Range	Default Value
F0.17	Braking current before starting	0.0～150.0%	0.0%
F0.18	Braking time before starting	0.0～50.0s	0.0s

When it is being started, the inverter first performs DC braking according to the set prior-to-starting DC braking current, and after the set prior-to-starting DC braking time is passed then begins to perform acceleration. If the set DC braking time is 0, DC braking is invalid.

The bigger the DC braking current, the greater the braking force. The prior-to-starting DC braking current is the percentage of the rated inverter current.

Function Code	Name	Setting Range	Default Value
F0.19	Stop Mode	0: DECELStop 1: FreerunStop	0

0: Deceleration stop

After the stop command is enabled, the inverter decreases the output frequency according to the Decelerationmode and the definedAcceleration /Deceleration time, and the motor is stopped when the frequency is 0.

1: Free-run stop

Once the stop command is valid, the inverter immediately ends the output. The loading is freely stopped by its mechanical inertia.

Function Code	Name	Setting Range	Default Value
F0.20	Beginning Frequency of braking	0.00～F0.04	0.00Hz
F0.21	Waiting time of braking	0.0～50.0s	0.0s
F0.22	DC braking current	0.0～150.0%	0.0%
F0.23	DC braking time	0.0～50.0s	0.0s

Beginning frequency of DC brake when stopping.During the Deceleration stop, when this frequency is reached, the DC brake is started.

Waiting time of DC brake when stopping: Prior to the DC brake, the inverter blocks the output, and after this delay time, the DC braking is started. It is used to prevent over-current fault caused by DC braking at high speed.

DC brake current when stopping: indicates the applied DC brake energy. The bigger the current, the stronger the DC brake energy should be.

DC brake time when stopping: the durative time that the DC brake energy is applied. If the time is 0, DC brake is invalid, and the inverter stops the motor based on the set Deceleration time.

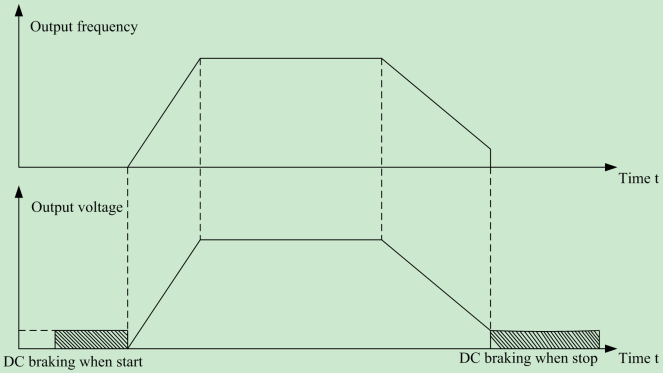


Fig. 6-3 DC Brake Diagram

Function Code	Name	Setting Range	Default Value
F0.24	Dead time between forward and reverse	0.0～3600.0s	0.0s

In the transition process when the inverter runs transforming between forward and reverse, the transition time that the output frequency is 0 is as follows:

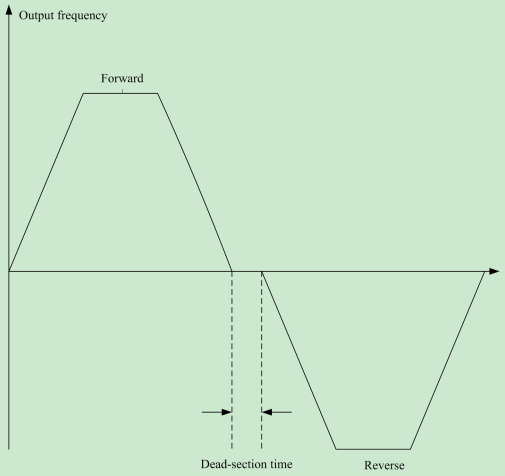


Fig. 6-4 FWD/REV Dead Time Diagram

Function Code	Name	Setting Range	Default

			Value
F0.25	Terminal command protection when power on	0: Terminal command invalid when power on	0
		1: Terminal command valid when power on	

If operating command channel is set to terminal control, system will detect terminal status automatically during inverter power on.

0: Terminal command invalid when power on. Inverter will not run if it detect operating command terminal is valid.When the operating command terminal is invalid and enable this terminal again, inverter will run.

1: Terminal command valid when power on. Inverter will startup automatically after initialization is finished if it detect operation command terminal is valid.

Note: Customer should be careful when you select this function, it may cause severe consequence.

6.2 F1 Motor Parameters

Function Code	Name	Setting Range	Default Value
F1.00	0: G model 1: L model	0-1	0
F1.01	Motor rated power	0.4～900.0kW	Set by model
F1.02	Motor rated frequency	0.01Hz～F0.04	50.00Hz
F1.03	Motor rated speed	0～36000rpm	Set by model
F1.04	Motor rated voltage	0～460V	Set by model
F1.05	Motor rated current	0.1～1000.0A	Set by model

Note: please set these codes according to motor nameplate parameters. The superior performances of vector control require precise motor parameters.

ACD series inverter provides parameter self-learning function. Accurate parameter self-learning comes from correct setting of motor nameplate parameters.

In order to ensure the control performances, please do the motor setting based on the inverter standard adaptive motor. If the motor rated power has a too big difference to the standard adaptive motor, the inverter control performances will be deteriorated distinctly.

Note: resetting of motor rated power (F1.01) can initialize motor parameter F1.02-F1.10.

Function Code	Name	Setting Range	Default Value
F1.06	Motor stator resistance	0.001～65.535Ω	Set by model
F1.07	Motor rotor resistance	0.001～65.535Ω	Set by mode
F1.08	Motor stator/rotor inductance	0.1～6553.5mH	Set by mode
F1.09	Mutual inductance of motor stator/rotor	0.1～6553.5mH	Set by mode
F1.10	No-load current	0.01～655.35A	Set by mode

After the motor self-learning is normally ended, F1.06-F1.10 setting values are automatically replaced. These parameters are the basis of high performance vector control and have direct effect on the control performance.

Important: users DO NOT change this group parameters at will.

Function Code	Name	Setting Range	Default Value
F1.11	Self-learning of motor parameters	0:NOoperation	0
		1: complete tuning Self-learning	
		2: static tuning Self-learning	

Note:This function is invalid for ACD200Seriess.

0: NO operation, forbidding self-learning.

1: self-learning of parameters

Prior to parameters self-learning, the motor must be disconnected with its load-ensuring the motor at no-load condition, and confirming the motor is at static state.

Prior to parameters self-learning, it is a must to correctly input the motor nameplate parameters(F1.01~F1.05), otherwise what is self learned about motor parameters may be not correct.

Prior to parameters self-learning, theAcceleration and Deceleration time (F0.08 and F0.09) should be set properly based on the motor inertia, otherwise over current fault may happen during motor parameters self-learning.

When the self-learning of motor parameters is started by setting F1.11 as 1 and then pushing the button FUNC/DATA, LED displays -TUN- and flickering, then push the button RUN to

begin the procedure of the motor parameters self-learning. At this time, TUN-0 is displayed. After the motor is started, TUN-1 is shown and RUN light is flickering.

When the self-learning of parameters is finished, -END- is displayed, and finally back to the stop state interface.

When -TUN- is blinking, the process of parameters self-learning can exit by pushing the button PRGM/RESET .

During the process of parameters self-learning, it can be stopped by pressing the button STOP.

Please note, the start and stop of the parameters self-learning can only be done through keypad. Once the parameter self-learning is finished, this function code automatically restores to 0.

Function Code	Name	Setting Range	Default Value
F1.12	Speed loop proportional gain1	0～100	30
F1.13	Speed loop integral time1	0.01～10.00s	0.50s
F1.14	Switching low point frequency	0.00Hz～F1.1 7	5.00Hz
F1.15	Speed loop proportional gain 2	0～100	25
F1.16	Speed loop integral time 2	0.01～10.00s	1.00s
F1.17	Switching high point frequency	F1.14～F0.04	10.00Hz

Above parameters are valid only to vector control, but invalid toV/F control.When the frequency is less than the switching frequency point 1 (F1.14), the speed loop PI parameters are F1.12 and F1.13.When frequency is higher than the switching frequency point 2 (F1.17),the speed loop PI parameters are F1.15 and F1.16. Between the switching points, PI parameter is acquired according to the line type variation of the two group parameters, as shown in following figure.

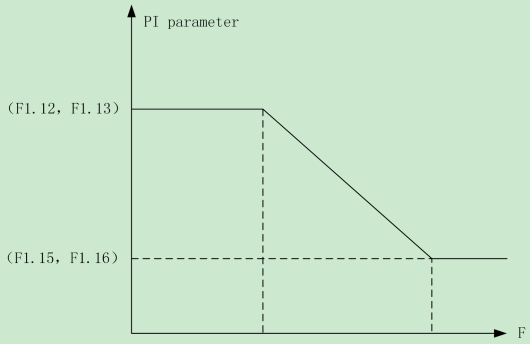


Fig. 6-5 PI ParameterDiagram

By means of setting the proportion factor and integration time of the speed regulator, the speed dynamic response of vector control can be regulated. Increasing the proportional gain,and reducing the integration time, can equally quicken the dynamic response of speed loop,but either the proportional gain being too much or the integration time being too short can easily cause system oscillation and too big overshoot. The proportional gain being too small also can lead to system steady state oscillation and possibility of speed steady-state error occurring.

Speed loop PI parameters have an intimate relationwith the inertia ofmotor system, and therefore based on the default PI parameter the user needs to make adjustment for different loading character in order to meet different requirement.

Function Code	Name	Setting Range	Default Value
F1.18	VC slip compensating factor	50%～200%	100%

The slip compensating factor is used to adjust the slip frequency of vector control and improve the system speed control accuracy. Properly regulating this parameter can effectively restrain the speed steady-state error.

Function Code	Name	Setting Range	Default Value
F1.19	Upper torque l imit setting	0.0 ～ 200.0%(inverter rated current)	150.0%

The setting 100.0%is corresponding to the rated output current.

The function code below (F1.20~F1.24) are valid to V/F control (F0.00 =1), but invalid to

vector control.

Function Code	Name	Setting Range	Default Value
F1.20	V/F curve setting	0: LinearV/Fcurve 1: square torque V/F curve	0

0: LinearV/F curve. It is applicable to constant torque load.

1: 2.0 exponential V/F curve. It is applicable to variable torque load, such as blower, pump etc.

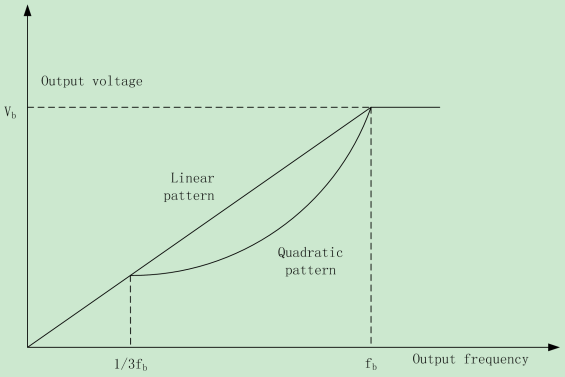


Fig. 6-6 V/F curve

Function Code	Name	Setting Range	Default Value
F1. 21	Torque boost	0.0%:(auto) 0.1 % ～ 30.0 %	0
F1. 22	Torque boost cut-off	0.0% ～ 50.0% (relative to motor rated frequency)	20.0%

Torque Boost is mainly applied to less than cut-off frequency (F1.22). TheV/F curve after boost is shown in following figure. Torque booth can improve the low frequency torque performance ofV/F control.

Based on the load, a torque should be chosen properly. For heavy load, increase the torque boost, but the torque boost should not be set too big, whichwill result in the motor operating at overexcitation and that it could be overheated, and also the inverter output current is big, reducing efficiency.

When the torque boost is set as 0.0%, the inverter is at automatic torque boost.

Torque boost cut-off frequency: below this frequency, torque boost is valid, and above this frequency setting, torque boost is invalid.

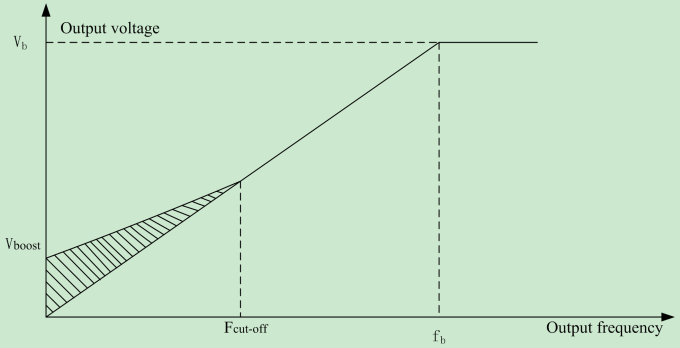


Fig. 6-7Manual torque boost diagram

Function Code	Name	Setting Range	Default Value
F1. 23	V/F slip compensation limit	0.0～200.0%	0

Setting this parameter can compensate the motor speed change produced because of undertaking loading while on V/F control, to increase the rigidity of motor mechanical performance. This value should be set as the motor rated slip frequency.

Function Code	Name	Setting Range	Default Value
F1. 24	Energy Conservation Selection	0: No Operation 1: Energy Conservation	0

When the motor is running in no-load or lower-load during,the inverter can output voltage by adjust automatically current kf the load。

Note:This function is especially valid for variable torque load (such as fan and pump).

6.3 F2 Input and Output Terminal Function Parameters

Function Code	Name	Setting Range	Default Value
F2.00	On-off signal filter times	1～10	5

It sets up MI1～MI6,AVI and ACI terminals sample filtering time. In big interference situation, this parameter should be increased in order to preventmal operation.

Function Code	Name	Setting Range	Default Value

F2.01	MI1 Terminal Function Selection	0～31	0
F2.02	MI2 Terminal Function Selection	0～31	0
F2.03	MI3 Terminal Function Selection	0～31	0
F2.04	MI4/FWD Terminal Function Selection	0～31	1
F2.05	MI5/REV Terminal Function Selection	0～31	2
F2.06	MI6 Terminal Function Selection	0～31	0

These parameters are used to set up the corresponding functions of digitalmultifunction input terminals.

Setting value	Function	Description
0	No Function	Even if there is a signal input, the inverter does not run. Terminals which are not used can be set to be no function in order to prevent malfunction
1	Forward	The inverter ’s forward or reverse running can be control by external terminals.
2	Reverse	
3	Three-wire operation control	By means of this terminal the inverter s operation mode can be defined to be three-wire control mode. For details, please refer to the function code description of F2.07 three-wire control mode.
4	Forward Jogging	At Jogging operation, the frequency and Jogging Acceleration/Deceleration time can be found in detail descriptions of F4.02,F4.03 and F4.04 function codes.
5	Reverse Jogging	
6	Free-run stop	The inverter turns off output, and the motor stop process is not controlled by the inverter. It is often applied when the inertia loading is big and there is no requirement on stop time. This mode has the same definition as F0.19 does.
7	Failure reset	This is external failure reset. It has the same function as STOP button on the keyboard. Using this function can performlong-distance failure reset.
8	External fault input	When external fault signal is input, the inverter reports it and stops.
9	Frequency up setting（UP）	When the frequency is set by external terminal, modify the frequency up and down command.When the frequency source is set as digital setting, the set frequency can be regulated up and down.
10	Frequency down setting （DOWN）	
11	Frequency up/down setting clear	Using terminal can clear UP/DOWNset frequency so that set frequency can be restored the frequency setting given by frequency

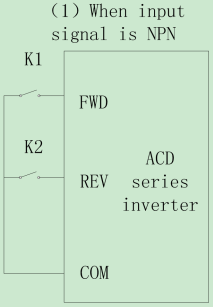
<table>
<tr><td></td><td></td><td>command channel.</td></tr>
<tr><td>12</td><td>Multi-speed terminal 1</td><td rowspan="3">8 stages speed can be set up via these 3 terminals digital state combination.
Note:multi-speed 1 is the low position, and multi-speed 3 is the high position.</td></tr>
<tr><td>13</td><td>Multi-speed terminal 2</td></tr>
<tr><td>14</td><td>Multi-speed terminal 3</td></tr>
<tr><td>15</td><td>ACCE/DCCE time selection terminal</td><td>2 kinds ofACCE/DCCE time can be chosen via these two terminals digital state combination.
<table>
<tr><th>Terminal</th><th>ACC/DCC time selection</th><th>Parameter</th></tr>
<tr><td>O F F</td><td>ACCE time 0</td><td>F0.08、F0.09</td></tr>
<tr><td>N</td><td>ACCE time 1</td><td>F4.00、F4.01</td></tr>
</table></td></tr>
<tr><td>16</td><td>PID control pause</td><td>PID is temporarily out of work, and the inverter keeps its current frequency output</td></tr>
<tr><td>17</td><td>Traverse pause</td><td>The inverter pauses at its current output frequency.After this function is cancelled, continue to start its traverse operation at its current frequency.</td></tr>
<tr><td>18</td><td>Traverse reset</td><td>The inverter is back to its center frequency output.</td></tr>
<tr><td>19</td><td>Acceleration/ Deceleration forbid</td><td>Ensure the inverter is not interfered by external signals (excluding stop command), maintaining its current output frequency.</td></tr>
<tr><td>20</td><td>External sleep signal</td><td>Please refer to F7.28 for detailed description.</td></tr>
<tr><td>23</td><td>One driving two circularly water supply mode is ineffective</td><td>One driving two circularly water supply mode is ineffective, and it is used in the case of manual operation.</td></tr>
<tr><td>21,22，24</td><td>Reserved</td><td></td></tr>
<tr><td>25</td><td>Simple PLC run reset</td><td>To restore the PLC run to initial state.</td></tr>
<tr><td>26</td><td>Simple PLC run ineffective</td><td>PLC run pause.</td></tr>
<tr><td>27</td><td>Switch to the set of ACI frequency.</td><td>No matter which value F0.03 is set, frequency setting channel is ACI effective when terminal is closed, and F0.03 run command channel recover after terminal isopened.</td></tr>
<tr><td>28</td><td>Jog key</td><td>Jog run according to current status(forward or reverse)</td></tr>
<tr><td>29</td><td>Torque control forbidden</td><td>The inverter switch the control mode from torque control to speed comtrol.</td></tr>
<tr><td>30</td><td>Frequency</td><td>When terminal is closed, the frequency value UP/DOWN has set is</td></tr>
</table>

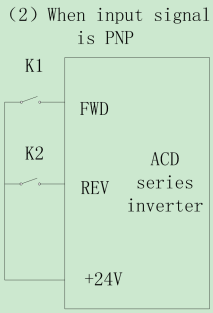
	increasing/decreasing set clear temporarily	clear, and the given frequency will return to that the frequency command channel has given, while it will to the frequency value after the increasing/decreasing set.
31	Reserved	

Function Code	Name	Setting Range	Default Value
F2.07	Terminal cont rol mode	0: two-wirecontrol 1 1: two-wirecontrol2 2: three-wire control 1 3: three-wire control 2	0

This parameter defines four different control modes which controls the inverter operation through external terminals.

0: Two-wire type control, integrate Enable with direction. This mode is the most often used two-wire controlmode. The motor forward and reverse operations are determined by the defined FWD and REV terminal command.

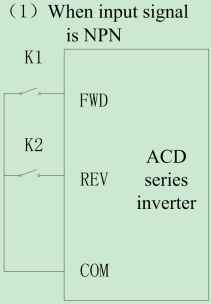


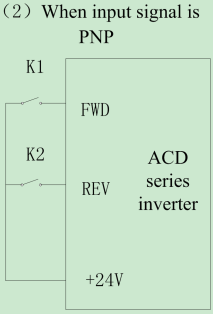


K1	K2	Operation Command
OFF	OFF	STOP
ON	OFF	FWD
OFF	ON	REV
ON	ON	STOP

Fig. 6-8 Two-wire operation mode 1

1: Two-wire control, separateEnable fromdirection.When thismode is used, the defined FWDis enable terminal. The direction is determined by the defined REVstate.

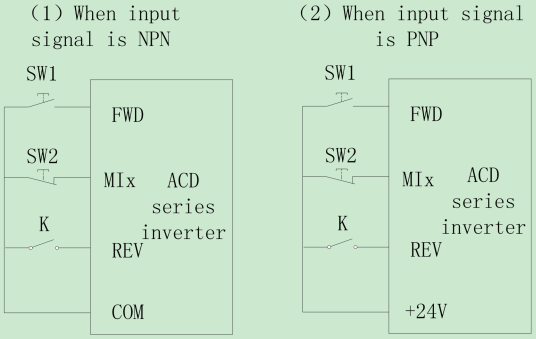




K1	K2	Operation Command
OFF	OFF	STOP
ON	OFF	FWD
OFF	ON	STOP
ON	ON	REV

Fig. 6-9 Two-wire operation mode 2

2: Three-wire control 1, integrate Enable with direction.At thismode, EN is the Enable terminal with the direction controlled by the defined FWD. REV define the direction.



K	Operation Command
OFF	FWD
ON	REV

Fig. 6-10 Three-wire operation mode 1

K: FWD/REV switch SW1: RUN button SW2: STOP button

MIx is defining the corresponding terminal function as Function 3 “Three-wire operation control ”.

3: Three-wire control, separate Enable from direction.At thismode EN is the Enable terminal, SW1 or SW3 define operating command and control direction at the same time. Stop command is defined by SW2.

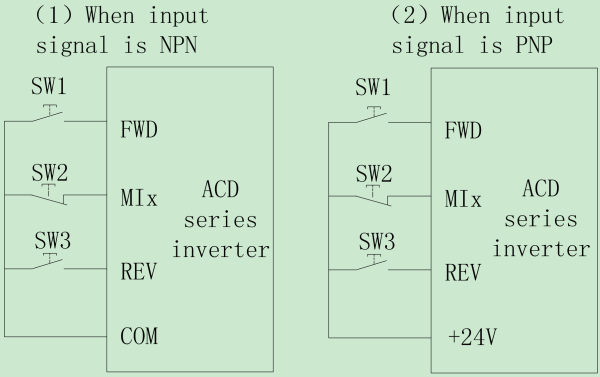


Fig. 6-11 Three-wire operation mode 2

SW1: FWD operating button SW2: STOP button K: REVoperating button

MIx is defining the corresponding terminal function as Function 3 “Three-wire operation control ”.

Note: For two-wire operation mode, when FWD/REV terminal is enabled and the stop command produced by other sources stops the equipment, the inverter does not start to operate after the stop command disappears even if the control terminal FWD/REV is still valid. If the inverter needs to operate, it is required to trigger FWD/REVagain.

Function Code	Name	Setting Range	Default Value
F2.08	UP/DOWN frequency increment variable rate	0.01～50.00Hz/s	0.50Hz/s

Terminal UP/DOWN regulates the change rate of frequency setting.

Function Code	Name	Setting Range	Default Value
F2.09	AVI lower limit	0.00V～10.00V	0.30V
F2.10	AVI lower limit corresponding setting	-100.0%～100.0%	0.0%
F2.11	AVI upper limit corresponding setting	0.00V～10.00V	9.70V
F2.12	AVI upper limit corresponding setting	-100.0%～100.0%	100.0%
F2.13	AVI input filtering time	0.00s～10.00s	0.10s

Above function codes define the relationship between analog input voltage and the setting value that analog input is corresponding to.When the analog input voltage exceeds the range of the set maximum or minimum input, the beyond portion should be calculated with maximum input or minimum input.

When analog input is amperage input, 0mA-20mAis corresponding to 0V-10V.

For different applications, the corresponding nominal value of analog setting 100.0%is different. For details, please refer to each application description.

Following figures shows several settings. Note: AVI lower limit must be less or equal to AVI upper limit.

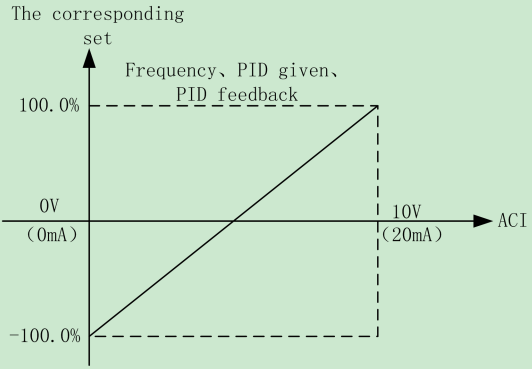


Fig. 6-12Relationship between analog input and setting value

AVI input filtering time determines analog input sensitiveness. Increasing this parameter, in order to prevent malfunction caused by interference to the analog, can strengthen the anti-interference ability, but reduce the analog input sensitiveness.

Function Code	Name	Setting Range	Default Value
F2.14	ACI lower limit	0.00V～10.00V	0.30V
F2.15	ACI lower limit corresponding setting	-100.0%～100.0%	0.0%
F2.16	ACI upper limit	0.00V～10.00V	9.70V
F2.17	ACI upper limit corresponding setting	-100.0%～100.0%	100.0%
F2.18	ACI input filtering time	0.00s～10.00s	0.10s

ACI function settings are similar toVI setting method.

ACD320 Series inverter provides 2 paths of analog input port.

ACD320 Series inverter standard unit has twomultifunction digital output terminal, one (or two) multifunction relay output terminals and one analog output terminal.

Function Code	Name	Setting Range	Default Value
F2.19	Relay RA/B/C output selection	0～24	3
F2.20	DO （Open circuit collector ）output selection	0～24	3

F2.21	Relay TA/B/C output selection	0～24	3

Open collector output functions are indicated as following table:

Setting value	Function	Descript ion
0	Zero Output	Output terminal has no function
1	Frequency reached	Please refer to the detail description of function code F4.15
2	FDT reached	Please refer to the detail description of function code F4.13,F4.14
3	Fault output	Once inverter fault happens, output ON signal
4	Inverter is running forward	ON signal Indicates the inverter is running forward with output frequency
5	Inverter is running revers	ON signal Indicates the inverter is running reverse with output frequency
6	Null speed operation	When the inverter output frequency is less than the starting frequency, output ON signal
7	Upper limit frequency reached	When the operating frequency reaches the upper frequency limit, output ON signal.
8	Lower limit frequency reached	When the operating frequency reaches the lower frequency limit, output ON signal.
9～12	Reserved	Reserved
13	High pressure arrives detect value	When the pressure is higher than F7.12 detection value, ON signal output.
14	Low pressure arrives detect value	When the pressure is lower than F7.13 detection value, ON signal output.
15	Sleep status indication	Output ON signal and display “EoPP” in sleep status.
16	Lack of water alarm indication.	Output ON signal and display “U-26” when lack of water.
17	Run at nonzero speed	Output ON signal when output frequency is larger than minimum output frequency.
18	Running	Output ON signal when the inverter has output or operation command input.
19～20	Reserved	Reserved

21	Simple PLC run for a cycle	After simple PLC run for a cycle, output impulse signal of 500ms.
22～24	Reserved	Reserved

Function Code	Name	Setting Range	Default Value
F2.22	AO1 output selection	0～10	0

The standard analog output is 0-20mA(or 0-10V). Current or voltage output can be selected by Jumper S2. Its corresponding value range is shown as following table:

Setting Value	Function	Range
0	Setting frequency	0-maximum output frequency
1	Operating frequency	0-maximum output frequency
2	Output current	0-double rated inverter current
3	Output voltage	0-1.5 times rated inverter voltage
4	Motor speed	0-double rated motor speed
5	Output power	0-double rated power
6	Output torque	0-double rated motor current
7	Analog AVI input	0～ 10V/0～20mA
8	Analog ACI input	0～ 10V/0～20mA
9～10	Reserved	Reserved

Function Code	Name	Setting Range	Default Value
F2.23	AO1 Lower limit	0.0%～100.0%	0.0%
F2.24	Lower limit corresponding AO1 output	0.00V～10.00V	0.00V
F2.25	AO1 Upper limit	0.0%～100.0%	100.0%
F2.26	Upper limit corresponding AO1 output	0.00V～10.00V	10.00V

Above function codes define the relationship between output value and analog output corresponding output value.When the output value exceeds the maximum output or the minimum output range, the beyond portion should be calculated with maximum output or minimum output.

When analog output is current output, 1mAis equivalent to 0.5V For different applications, the analog output corresponding to 100%output value is different. For details, please refer to the instruction of each application.

Following figures explain several setting circumstances:

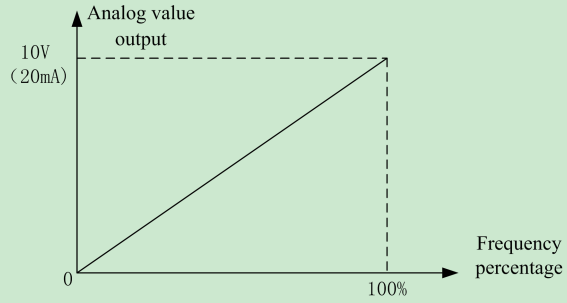


Figure 6-13 The coincidence relationship between assigned value and analog output

6.4 F3 Human Machine Interface Parameters

Function Code	Name	Setting Range	Default Value
F3.00	User password	0～65535	0

User password is applied to prevent non-authorized person to look and modify parameter.Input a nonzero five digit number as password, then press ENTER/DATA to confirm, if there is no button operation in one minute, password function becomes effective.

After password becomes effective, customer can not access parameter list if password input is incorrect. Please remember the password. If it is not necessary to set password, just set 00000 to clear password.

Function Code	Name	Setting Range	Default Value
F3.01	Application of macroinstruction	0～65535	0
F3.02	Selection of M key function	0:JOG running 1: Switch between running forward and reverse 2: Clear the set of UP/DOWN	

F3.01=1233 the application macro of Offset printing machine, F3.01=1235 the application macro of engrving machine F3.01=1237 the application macro of constant pressure water supply.

The only need is to set F3.01 to corresponding macroinstruction, then restore F0.12=1 to

factory value, and fine control relevant parameter.

Function Code	Name	Setting Range	Default Value
F3.03	STOP function option	0: Keypad control valid 1: Keypad and terminal control valid 2: Keypad and communication control valid 3: All controlmodes valid	0

This function code is to define the STOPstop function validity options.

Function Code	Name	Setting Range	Default Value
F3.04	Reserved		0

Function Code	Name	Setting Range	Default Value
F3.05	operation status display parameter option	0-65535	1183
F3.06	Stop status display parameter option	0-65535	207
F3.07	operation status display p eferential option	0～15(0:invalid)	0

Operation status display:

Displayed Message	Code	F3.07 code
BIT0: Running frequency	1	1
BIT1: Setting frequency	2	******
BIT2: Output current	4	2
BIT3: Output voltage	8	3
BIT4: Running speed	16	4
BIT5: Output power	32	5
BIT6: Output torque	64	6
BIT7: DC bus voltage	128	7

BIT8: PID setpoint	256	8
BIT9: PID feedback	512	9
BIT10: Input terminal status	1024	10
BIT11: Output terminal status	2048	11
BIT12: AVI value	4096	12
BIT13: ACI value	8192	13
BIT14: Current segment of multi-speed control	16384	14
BIT15:Torque setting value	32768	15

Stop status display:

Displayed Message	Code
BIT0:Setting frequency	1
BIT1:DC bus voltage	2
BIT2:Input terminal status	4
BIT3:Output terminal status	8
BIT4:PID setpoint	16
BIT5:PID feedback	32
BIT6:AVI value	64
BIT7:ACI value	128
BIT8:Current segment of multi-speed control	256

Option: setting parameter=the sum total of display code for example:

require to display at operation status:Output current,Running speed,Output power 4+16+32=52, then setting F3.05to 52 , its corresponding parameter can be viewed at operation through pressing button "DATA".

This I/O terminal status is displayed in decimal system,S1 (MO1) corresponding to the lowest digit.

For instance, input status displays 3 is indicting that terminal S1 and S2 are closed and others are open.

For details, please see F3.17 and F3.18 description.

Input terminal state display with 10 hexadecimal, as following table:

Input terminal	Effective	Ineffective
MI1	1	0
MI2	2	0
MI3	4	0
MI4	8	0
MI5	16	0

MI6	32	0

For example:If input state displays 3, it means terminal MI1, MI2 is effective, and the other terminals are ineffective .

Output terminal state display with 10 hexadecimal, as following table:

Output terminal	Effective	Ineffective
TA/B/C	1	0
RA/B/C	2	0
DO	4	0

If output state displays 3, it means that terminalTA/TB/TC、RA/RB/RC are effective, and DO terminal is ineffective .

The display of operating status of F3.07 selected preferentially.

0:The displaying content in operating state is selected by SHIFT key of the keyboard.

1--15: Correspond to F3.05 displaying contents.

In run status, switch to the displaying content that the parameter selects with 10 seconds delay when there is no SHIFT key operation.

Automatically switch to the displaying content that the parameter selects when switching from stop status to run status.

Function Code	Name	Setting Range	Default Value
F3.08	IGBT module temperature	0～100.0℃	Actual value
F3.09	Software version		Actual value
F3.10	Accumulative operating time	0～65535h	0

These functions only can be viewed but can not be modified.

IGBTmodule temperature: indicates the temperature of the inverter IGBTmodule.

Over-temperature protection value of different invertermay be different.

Software version: software version number.

Inverter accumulative operating time: displays current inverter accumulative operation time.

Function Code	Name	Setting Range	Default Value
F3.11	The fault before previous fault type	0～29	
F3.12	Previous fault type	0～29	

F3.13	Current fault type	0～29	

Record three recent fault types: 0 is no fault; 1~22 is 22 different kinds of fault. For details,please see fault analysis.

Function Code	Name	Setting Range	Default Value
F3.14	Operat ing frequency at current fault	The output frequency when current fault happens	0.00Hz
F3.15	Output amperage at current fault	The output amperage when current fault happens	0.0A
F3.16	Bus voltage at current fault	The bus voltage when current fault happens	0.0V

Function Code	Name	Setting Range	Default Value
F3.17	Reserved		
F3.18	Reserved		

6.5 F4Application Function Parameters

Function Code	Name	Setting Range	Default Value
F4.00	ACCELTime 2	0.1～3600.0s	10.0s
F4.01	DECEL Time 2	0.1～3600.0s	10.0s

Acceleration/Deceleration time can be chosen to be F0.08, F0.09 or above three time settings. Their meanings are all the same; please refer to F0.08 and F0.09 related description.

TheAcceleration/Deceleration time 0-1 at inverter operation can be chosen through different combination of multifunction digital input terminals.

Function Code	Name	Setting Range	Default Value
F4.02	Frequency of JOG running	0.00 ～ F0.04(maximum frequency)	5.00Hz
F4.03	The acceleration time of JOG running	0.1～3600.0s	10.0s

F4.04	The deceleration time of JOG running	0.1～3600.0s	10.0s

It is to define the inverter set frequency and Acceleration/Deceleration time at Jog operation. Jog operation is performed by direct start mode and deceleration stop mode.

The Acceleration time of JOG running is the time required for inverter to accelerate from 0Hz to the maximum output frequency (F0.04).

The Deceleration time of JOG runing is the time required for inverter to decelerate from the maximum output frequency (F0.04) to 0Hz.

Function Code	Name	Setting Range	Default Value
F4.05	Skip frequency	0.00～F0.04	0.00Hz
F4.06	Skip frequency range	0.00～F0.04	0.00Hz

When the set frequency is within the skip frequency range, the actual operating frequency will be operated near the boundary of skip frequency range.

By means of setting skip frequency, the inverter can keep away from the mechanical resonance point of the load.

This inverter has one skip frequency point available. If these two skip frequencies are both set to 0, this function will be inactive.

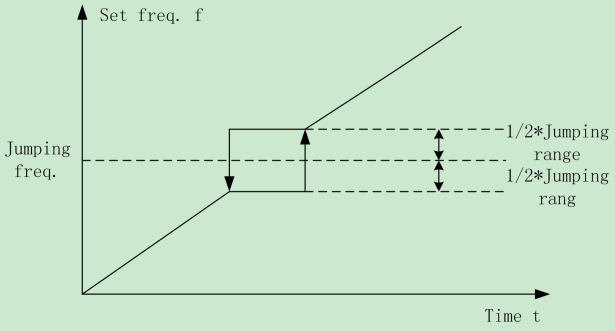


Fig. 6-14 Skip frequency schematic diagram

Function Code	Name	Setting Range	Default Value
F4.07	Traverse frequency range	0.0～100.0%（relative to set frequency）	0.0%

F4.08	Kick frequency range	0.0～50.0%（relative to traverse frequency range）	0.0%
F4.09	Traverse frequency rising time	0.1～3600.0s	5.0s
F4.10	Traverse frequency descending time	0.1～3600.0s	5.0s

Traverse frequency function is suitable to industries such as textile, fiber and so on, and to applications which require traversing andwinding functions.

Traverse frequency function means that the inverter output frequency is traversing up and down around the set frequency. The operating frequency locuswith time axis is shown as following diagram, in which the amplitude of traverse is set by F4.07.When F4.07 is set to be 0, i.e. traverse range is 0, the traverse frequency function will be inactive.

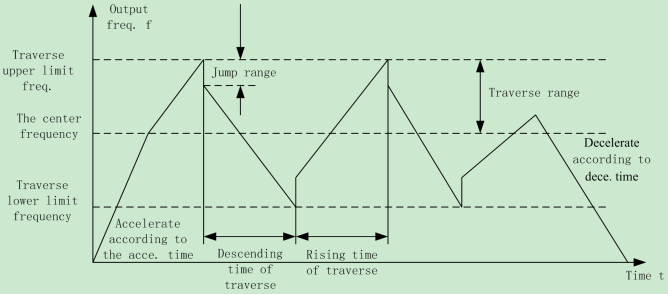


Fig. 6-15 Traverse Frequency Operation Diagram

Traverse frequency range: traverse operation frequency limits by upper and lower limit frequency.

Traverse range relative to the center frequency: amplitude of traverseAW= CF ×AWrange F4.07

Kick frequency = amplitude of traverseAW× Kick Frequency Range F4.08. I.e. the kick frequency is the value relative to amplitude of traverse at traverse-frequency operation.

Traverse frequency rising time: the time required to rise from the lowest traverse frequency to the highest traverse frequency.

Traverse frequency fall time: the time required to fall from the highest traverse frequency to the lowest traverse frequency.

Function Code	Name	Setting Range	Default Value

F4.11	Fault auto-reset times	0～3	0
F4.12	Interval time setting of automatic resetting fault	0.1～100.0s	1.0s

Fault auto-reset times: used to set the auto-reset times when inverter chooses fault auto-reset. If this value is exceeded, inverterwill wait for trouble shooting.

Interval time setting of fault auto-reset: chose the interval time between fault occurring and automatic resetting actuated.

Function Code	Name	Setting Range	Default Value
F4.13	FDT level detection value	0.00～ F0.04	50.00Hz
F4.14	FDT delay detection value	0.0～100.0%(FDTlevel)	5.0%

Set output frequency detection value and the delay value of output action dismissed, as shown by following figure:

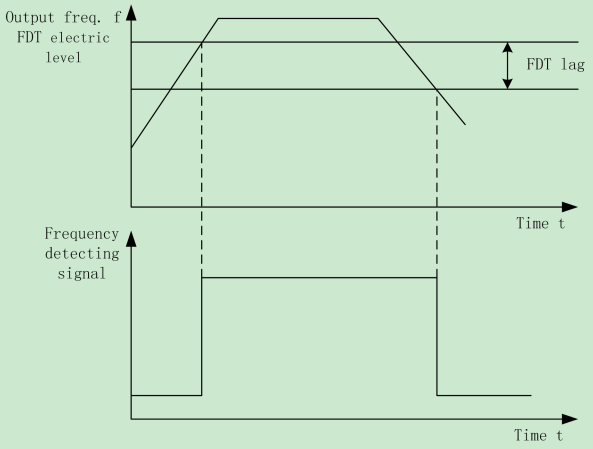


Fig.6-16 FDT LevelDiagram

Function Code	Name	Setting Range	Default Value
F4.15	Frequency reaching detection range	0.0～100.0%(maximum frequency)	0.0%

When the inverter output frequency reaches the set frequency value, this function can regulate its detect ion range value, as shown by following figure:

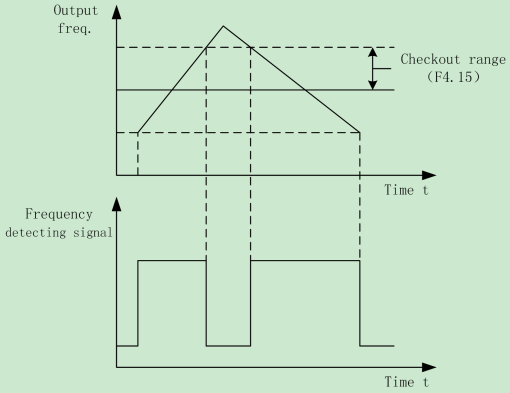


Fig.6-17 Frequency Reaching Detection Range Diagram

Function Code	Name	Setting Range	Default Value
F4.16	Brake Threshold Value Voltage	115.0～140.0% (standard DC bus voltage) 380V	130.0%
		115.0～140.0%(standard DC bus voltage) 220V	120.0%

This function is to set up the initiative bus voltage of dynamic braking, and properly regulating this value can result in an effective brake to the load.

Function Code	Name	Setting Range	Default Value
F4.17	Speed display ratio	0.1～999.9% Speed=120 × running frequency × F4.17/pole number	100.0%

Speed=120×running frequency ×F4.17/pole number

This function is used to calibrate speed display error, it has no impact on actual speed.

PID control is one method normally used to process control, holding the control value to the target value by the negative feedback systemwhich regulates the inverter output frequency by means of proportion, integration and differential operations on the difference between the control value feedback signal and the target value signal. It is applicable to the process controls such as flow control, pressure control and temperature control and so on. The control functional block diagramis shown as follows:

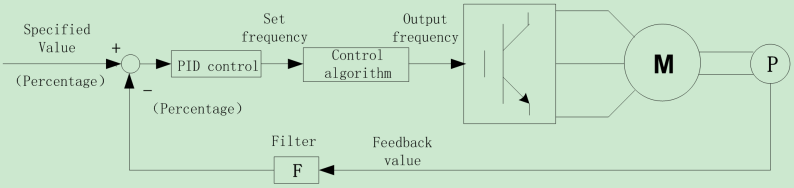


Fig.6-18 Process PID Functional BlockDiagram

Function Code	Name	Setting Range	Default Value
F4.18	PID setpoint Sources Option	0: Given by Keyboard (F4.19) 1: Given by Analog Channel AVI 2: Given by Analog Channel ACI 3: GivenbyRemote Communication 4: Multi-seg setpoint	0

When frequency source is chosen to be PID, i.e. F0.03 is chosen to be 5, these group functions are active.

This parameter is to determine the assignment channel of the process PIDtarget value.

The set target value of process PID is a relative value, and the set 100%is corresponding to the 100% feedback signal of the system being controlled.

The system always performs the calculation according to relative value (0-100%)

Note: If multistage input, it can be accomplished by means of setting F4 group parameters.

Function Code	Name	Setting Range	Default Value
F4.19	PresetPID setpoint	0.0%～100.0%	0.0%

When F4.08=0 is chosen, i.e. the target source is the keyboard, it is required to set this parameter.

The reference value of this parameter is the system feedback value.

Function Code	Name	Setting Range	Default Value
F4.20	PID Feedback Sources Option	0: AVI Feedback 1: ACI Feedback	0

		2: A VI+ACI Feedback 3: Communication feedback 4: AVI-ACI Feedback	

The PID feedback channel is chosen by this parameter.

Important: The assignment channel and feedback channel can not be in coincidence, otherwise PID is unable to control effectively.

Function Code	Name	Setting Range	Default Value
F4.21	PID Output Characteristics Option	0: positive 1: negative	0

PID output is positive characteristic:when the feedback signal is bigger than the PID given signal, it is required for the inverter output frequency to decrease to counterbalance the PID, for instance, the winding tension PID control.

PID output is negative characteristic:when the feedback signal is bigger than the PID giver signal, it is required for the inverter output frequency to increase to counterbalance the PID,for instance, the unreeling tension PIDcontrol.

Function Code	Name	Setting Range	Default Value
F4.22	Proportional gain (Kp)	0.00～100.00	1.00
F4.23	Integral time (Ti)	0.01～10.00s	0.10s
F4.24	Differential time (Td)	0.00～10.00s	0.00s

Proportional gain (Kp): determines the adjusting strength of PIDadjustor. The bigger the P, the bigger the adjusting strength is. This parameter being 100 means that when the difference between the PID feedback value and the assigned value is 100%, the adjusting range of PID adjustor to the output frequency command is the maximum frequency (ignore integral action and derivative action).

Integrating time (Ti): determines the speed at which PIDadjustor performs integral regulation to the discrepancy between the PID feedback value and the assigned value. The Ti is indicating the period of time that integral controller (ignore proportional action and derivative action), when the discrepancy between the PID feedback value and the assigned value is 100%, continuously regulates to make the regulating amount to reach the maximumfrequency (F0.047). The shorter the integrating time, the stronger the adjusting strength is.

Differential time (Td): determines the controlling strength at which PID adjustor performs

adjustment to the variance ratio of discrepancy between the PIDfeedback value and the assigned value. TheTd is indicating the period of time within which if the feedback value is changed 100%, the regulating amount of integral controller is the maximum frequency (F0.04) (ignore proportional action and integral action). The longer the Td, the bigger the controlling strength is.PID is the most popularly used controlmode in process control, with each part playing different role. Following simply introduces the operational principle and the controlling method:

Proportion control (P): when there is discrepancy between feedback and the assignment,output the regulating amount in proportion to the discrepancy. If the discrepancy is constant,the regulating amount keeps constant. Proportion control can response quickly to the feedback variation, but only using proportion control is unable to perform noncorresponding control. The bigger the proportional gain, the faster the system regulating speed, but being too bigmay cause oscillation. The control method is first to set a long integrating time and a zero differential time, and then run the system only by using proportion control. Change the assigned value, and watch the stable discrepancy (steady-state error) of feedback signal and assigned value. If the steady-state error is at the varying direction of assigned value (for instance, increase the assigned value, the feedback value after the system is steady is always less than the assigned value), continue to increase the proportional gain, otherwise decrease it.Repeat the above until the steady-state error is relatively small (it is very difficult to do no steady-state error).

Integral time (I): when there is a discrepancy between the feedback and assignment,continuously accumulate the output regulation amount. If the discrepancy still exists, continue to increase the regulation amount until there is no discrepancy. Integral controller can effectively eliminate the steady-state error. Integral controller being too strong can cause repeated overshooting, systemunstable and up till oscillating. The characteristic of oscillation caused by too strong integral action is that the feedback signal is swinging up and down around the assigned value, and the amplitude of swing increases gradually till the oscillation happens. Normally the integral time is adjusted from big to small, gradually regulate the integral time, and watch the effect, until the systemstable speed meets requirements.

Differential time (D): when the discrepancy between feedback and assignment varies,output a regulation amount in proportion to the variance ratio of discrepancy. The regulation amount is related to the direction and magnitude of discrepancy variation, but irrelevant to the direction and value of the discrepancy itself. The differential control action is to perform the control according to the varying trendwhen the feedback signal variation happens, and thereby to restrain the feedback signal variation. It should be caution to use differential controller as the differential control have a trend to magnify the system interference, especially the high varying frequency

interference.

Function Code	Name	Setting Range	Default Value
F4.25	Sampling cycle time (T)	0.01～100.00s	0.10s
F4.26	PID control discrepancy limit	0.0～100.0%	0.0%

Sampling time (T): is the time to sample the feedback value. In each sampling period the controller runs one time. The longer the sampling time, the slower the responding.

PID control discrepancy limit: the allowable maximum discrepancy of PIDsystem output value relative to the closed-loop assigned value.As shown in following diagram,within the discrepancy limit, PID controller stops adjustment. Properly setting this function code can improve the accuracy and stability of PIDsystem.

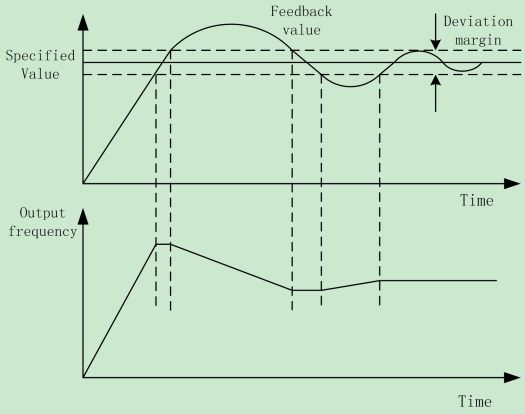


Fig. 6-19 Coincidence relation of discrepancy limit and output frequency

Function Code	Name	Setting Range	Default Value
F4.27	Feedback disconnection detecting value	0.0～100.0%	0.0%
F4.28	Feedback disconnection detecting time	0.0～3600.0s	1.0s

Feedback disconnected detecting value: this detecting value is relative to the full range (100%).

The system detects the PID feedback value all the time.When the feedback value is less or equal to the feedback disconnected detecting value, the system starts to time the detection.When

the detecting time exceeds the feedback disconnected detecting time, the system will send an alert of feedback disconnecting failure . (U-25)

Function Code	Name	Setting Range	Default Value
F4.29	Multi-Speed 0	-100.0～100.0%	0.0%
F4.30	Multi-Speed 1	-100.0～100.0%	0.0%
F4.31	Multi-Speed 2	-100.0～100.0%	0.0%
F4.32	Multi-Speed 3	-100.0～100.0%	0.0%
F4.33	Multi-Speed 4	-100.0～100.0%	0.0%
F4.34	Multi-Speed 5	-100.0～100.0%	0.0%
F4.35	Multi-Speed 5	-100.0～100.0%	0.0%
F4.36	Multi-Speed 7	-100.0～100.0%	0.0%

Note: The multi-speed symbol defines the operation direction. If it is negative, the operation direction is reverse. Frequency setting 100.0% is corresponding to maximum frequency(F0.04).

When MI1=MI2=MI3=OFF，the input mode is chosen by F0.03. When terminals MI1、MI2、MI3 are not all OFF and multi-step speed run, priority of multi-step speed is higher than the input of keyboard,simulation and communication frequency, through the combined code, 8-step speed can be chosen at most.

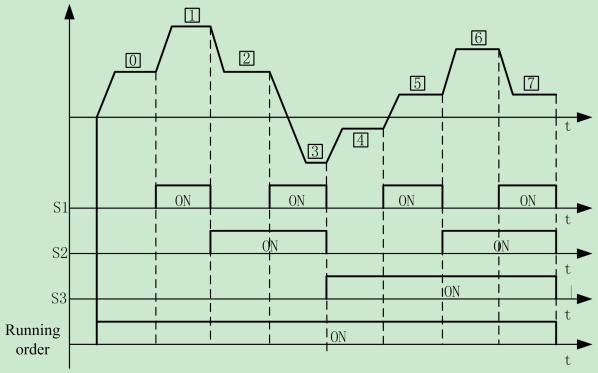


Fig.6-20multi-speed logic Diagram

The selection of stop channel starting is also determined by function code F0.01 when inverter is running at multi- speed, and the multi- speed control process is shown in Fig.6-20. The relation between MI1、MI2、MI3 terminal and multi-speed section is shown in the following table.

Relationship betweenmulti-speed and MI1、MI2、MI3 terminals:

MI1	MI2	MI3	Current segment of multi-speed control
OFF	OFF	OFF	Multi-Speed 0
ON	OFF	OFF	Multi-Speed 1
OFF	ON	OFF	Multi-Speed 2
ON	ON	OFF	Multi-Speed 3
OFF	OFF	ON	Multi-Speed 4
ON	OFF	ON	Multi-Speed 5
OFF	ON	ON	Multi-Speed 6
ON	ON	ON	Multi-Speed 7

6.6 F5 Protection Parameters

Function Code	Name	Setting Range	Default Value
F5.00	Motor Overload Protection Option	0: Noprotection 1: normal motor 2: Variable Frequencymotor	1

0: no protection. There is nomotor overloading protection characteristic (caution to use),and thereby the inverter has no protection to the overloaded motor.

1: normalmotor (with low speed compensation).As generalmotor has a poor heat emission at low speed, the relevant electronic thermal protection should be regulated properly.The low speed compensation characteristic heremention is to switch down the overloading protection threshold for themotor with an operation frequency lower than 30 Hz.

2:Variable frequencymotor (without lowspeed compensation).As the heat emission of special variable frequency motor is not affected by speed, it is not required to regulate the protection value for lowspeed operation.

Function Code	Name	Setting Range	Default Value
F5.01	Motor Overload Protection Current	20.0% ～ 120.0%(motor rated current)	100.0%

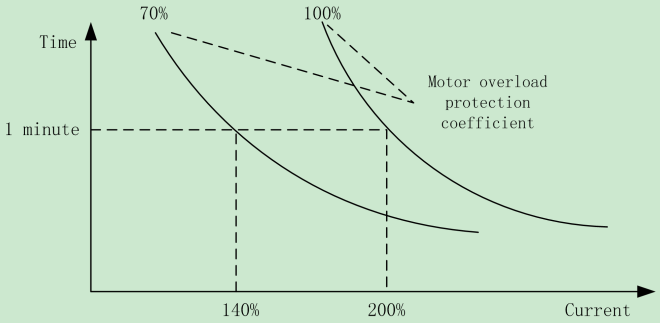


Fig.6-21 Motor Overload Protection Current

The value can be determined by following equation:

Motor overload protection current = (maximum current/rated current) ×100%

It is mainly applied to the cases that big inverter drives small motor, requiring to correctly set up this function to protect the motor.

Function Code	Name	Setting Range	Default Value
F5.02	Power-down Frequency Drop Point	70.0～110.0%(standard bus voltage)	80.0%
F5.03	Instant power-down Frequency drop rate	0.00Hz～F0.04	0.00Hz

If the instant power-down drop rate is set to be 0, the instant power-down restart function is invalid.

Instant power-down frequency drop point: it is indicting when the bus voltage, after the power network is down and drops to the instant power-down frequency drop point, the inverter starts to decrease the operation frequency based on the instant power-down frequency drop rate, enabling the motor to generate electricity which is fed back to keep the bus voltage, and thus ensuring the inverter is operating normally till inverter power is on again.

Important: Adjusting these two parameters properly canmagnificently achieve the power network switching instead of causing inverter protection and thus causing production shutdown.

Function Code	Name	Setting Range	Default Value
F5.04	Over-voltage Stall Protection	0: prohibit 1: allow	80.0%

F5.05	Over-voltage Stall Protection Voltage	110～150%(380V)	120%
		110～150%(220V)	115%

During the inverter deceleration, the load inertia may cause the actualmotor speed drop rate lower than the output frequency drop rate, and thereby the motor generates electricity and feeds it back to the inverter, causing the inverter bus voltage going up and even bus over-voltage breakdown which then can cause inverter tripping if no provision ismade.

Over-voltage stall protection function is to detect the bus voltage and compare itwith the stall over-voltage point defined by F5.05 (relative to the standard bus voltage). If it exceeds the over-voltage stall point, inverter output frequency stop going down, and when the next bus voltage detected is lower than the over-voltage stall point, the inverter continues to decelerate,as shown by following figure:

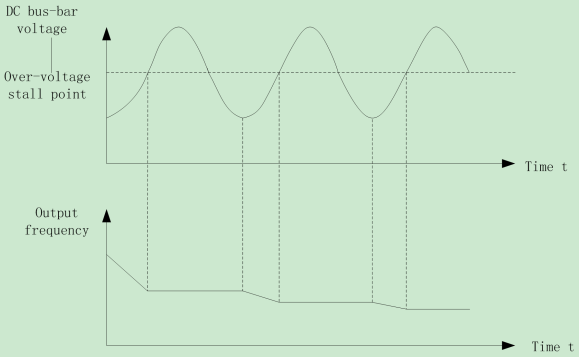


Fig.6-22Over-voltage Stall Function

Function Code	Name	Setting Range	Default Value
F5.06	Auto limit current level	100～200%	160%
F5.07	Limit current frequency drop rate	0.00～200.00Hz/s	50.00Hz/s

When inverter is running, the actual climbing rate of motor speed is lower than climbing rate of output frequency because load is too big. If you don扶 take any action, it will cause over current fault in acceleration then inverter will trip.

Over-current stall protection function is to detect output current and compare it with the current limit defined by F5.06. If it exceeds the current limit, output frequency drop down according to F5.07.When it show that output current is lower than limit current, inverterwill remain normal operation.

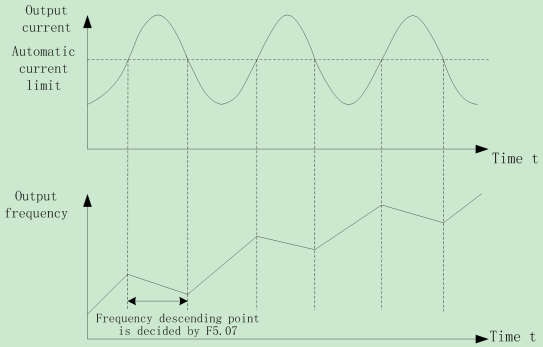


Fig. 6-23 Limit current protection

6.7 F6 Communication Parameters

Function Code	Name	Setting Range	Default Value
F6.00	Communication Address	1~ 247,0 is the broadcast address	1

When master machine plan to transmit a frame, slave communication address is set to be 0, it is also broadcast address.All slavemachine inMODBUS will receive this frame but not response.

Note: slave address is not allowed to set 0.

Local communication address is unique for every slave machinewithin communication network. This is basis of utilization of point to point communication betweenmaster machine and inverter.

Function Code	Name	Setting Range	Default Value
F6.01	Baud rate setting	0:1200BPS 1:2400BPS 2:4800BPS 3:9600BPS 4:19200BPS 5:38400BPS	3

This parameter is used to set transmission rate.

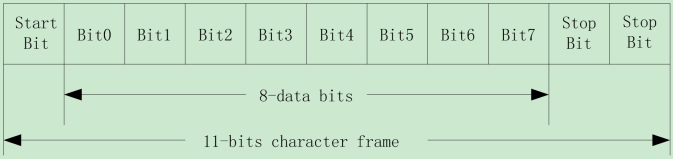
Function Code	Name	Setting Range	Default Value

F6.02	Data pattern	0: No check（N，8，1）for RTU 1: Odd check（E，8，1）for RTU 2: Evencheck（O，8，1）for RTU 4: Odd check（E，8，2）for RTU 5: Evencheck（O，8，2）for RTU 6: No check（N，7，1）forASCII 7: Odd check（E，7，1）for ASCII 8: Evencheck（O，7，1）forASCII 9: No check（N，7，2）forASCII 10: Odd check(E,7,2)for ASCII 11: Evencheck(O,7,2)forASCII 12: No check(N，8，1）forASCII 13: Odd check(E,8,1)for ASCII 14: Evencheck(O,8,1)forASCII 15 : No check(N,8,2)forASCII 16: Odd check(E,8,2)for ASCII 17: Evencheck(O,8,2)forASCII	0

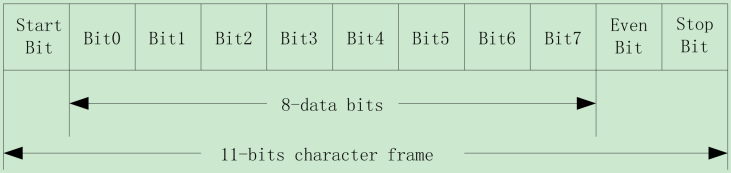
The data pattern set by inverter must be the same as data pattern set bymaster machine.Otherwise,communication can not accomplish.

11-bits(for RTU)

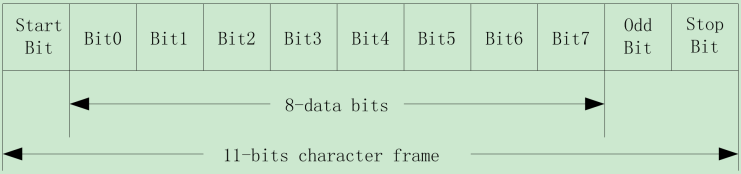
DATA Frame:8-N-2



DATA Frame:8-E-1

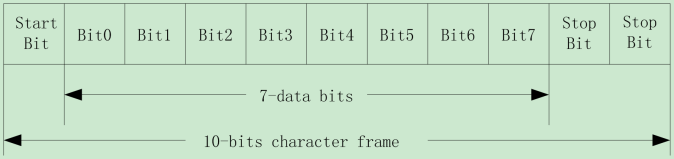


DATA Frame:8-O-1

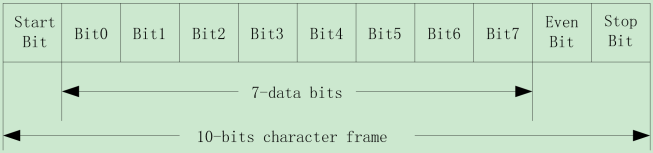


10-bits(forASCII)

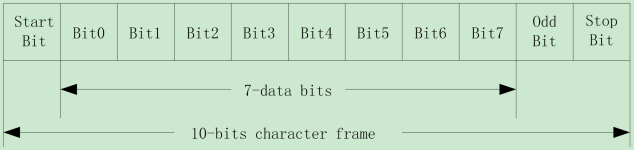
DATA Frame:7-N-2



DATA Frame:7-E-1



DATA Frame:7-O-1



Function Code	Name	Setting Range	Default Value
F6.03	Communication response delay	0～200ms	5ms

Response delay: means the interval time from the end of data receive to transmitting response data to upper level machine. If response delay time is smaller than system operation time, response delay time should be system operation time. If response delay time is longer than system operation time, inverter can not transmit data to upper levelmachine until response delay time reached.

Function Code	Name	Setting Range	Default Value
F6.04	Communication over time fault time	0.0（invalid），0.1～100.0s	0.0s

When this parameter is set to be 0.0s, this function is invalid.

When this function is valid, if the interval time between two communications exceeds communication overtime time, it will cause communication fault (U-16).

Normally，it is set to be ineffective. Cmmunication status can be monitored by setting the parameter in continuous communication system.

Function Code	Name	Setting Range	Default Value
F6.05	Communication er ror measure	0: Alarmand free run stop 1: No alarm and keep running 2 : No alarm and stop according to stop mode (by communication) 3: No alarm and stop according to stop mode (by all control mode)	1

The inverter can shield the failure alarm and stop to keep running by setting protecting action selection in abnormal communication condition.

Function Code	Name	Setting Range	Default Value
F6.06	Response measure	0: Response when write 1: No response when write	0

When this parameter is set to be 0, Response when write.

When this parameter is set to be 1, No Response whenwrite.This function can improve communiation speed.

6.8 F7 Senior Function Parameters

Function Code	Name	Setting Range	Default Value
F7.00	The choice of constant pressure water supply mode	0: One driving two circularly water supply mode is ineffective 1: One driving two circularly water supply mode is ineffective	0

When one driving two water supply circle mode is effective，the water supply card is a

must, and full details are given in the appendix.

Function Code	Name	Setting Range	Default Value
F7.01	Rotate time interval regularly	0（ineffctive），1～65535min	0

This parameter set the regular rotating time when two pumps are cycle used,and such setting can effectively prevent the other pump from rusting for a long time.

When the setting is 0, the regular rotating function will be closed.

Function Code	Name	Setting Range	Default Value
F7.02	Pump switching distinguish time	0.0～6553.5s	100.0s

Set stable distinguish time needed in the process from output frequency reaching high limit to inverter adding pump and from output frequency reaching low limit to inverter reducing pump.

Function Code	Name	Setting Range	Default Value
F7.03	Electromagnetic switch dalay time	0.2～10.0s	0.5s

This parameter define the electromagnetic switch dalay time when the change is from power source to frequency conversion or the reverse.

Function Code	Name	Setting Range	Default Value
F7.04	Variable frequency pump	0.0～999.9s	1.0s

The time of inverter sustaining at 0Hz after the Variable frequency pump is used.

Function Code	Name	Setting Range	Default Value
F7.12	High pressure arrives the monitoring point	0～100.0%	100.0%
F7.13	Low pressure arrives the monitoring point	0～100.0%	0.0%
F7.14	Water supply relay B1 fuction（B1-RCM）	25: The 1st pump of variable frequency	25

F7.15	Water supply relay B1 fuction（G1-RCM）	26: The 1st pump of AC power	26
F7.16	Water supply relay B1 fuction（B2-RCM）	27: The 2nd pump of variable frequency	27
F7.17	Water supply relay B1 fuction（G2-RCM）	28: The 2nd pump of AC power	28
F7.18～F7.20	Reserved	Reserved	
F7.21	Sleep detection frequency	0～the maximum frequency	0.00
F7.22	Sleep detection delay	0～999.9s	0.0

When feedback pressure is larger than high pressure and reach detecting point(F7.12), inverter will stop outputting, turn into sleeping state immediately，and display “EoPP”.

When output frequency is lower then that F7.21 have set and keep F7.22 delay, the inverter will stop output , turn into sleeping state, and display “EoPP”.

Remark:When any parameter is 0, the sleeping function is ineffective.

Function Code	Name	Setting Range	Default Value
F7.23	Revival pressure	1～100.0%	0.0
F7.24	Revival detection delay	0～999.9s	0.0

In positive acting mode, when feedback value is lower than the set value of F7.23 and keep F7.24 delay, the inverter relieve sleeping status and start to output again.

Remark:When any parameter is 0, revival function is ineffective.

Function Code	Name	Setting Range	Default Value
F7.25	Water-lack detection delay.	0～999.9s	0.0

When output frequency is at the upper limit, the inverter stop to output and display “U-26” alarm if the feedback value haven’t arrived the specified value and keep F7.25 delay.

Function Code	Name	Setting Range	Default Value
F7.26	PID adjusting range	0～50.0	10.0

Set the PID effective tuning range, improve the controllability of motor acceleration and deceleration outside the range，the acceleration and deceleration time is subject to F0.08/F0.09，and the time within the range can be seen by setting parameters F9.02, F9.03.

Function Code	Name	Setting Range	Default Value
F7.27	Operation when set frequency is lower than low limit frequency	0: Run at lower limit Freq. 1: Run at 0Hz.	0

Select the run status of the inverter when the set frequency is lower than low limit frequency.

The function can be selected to stop the inverter in order to avoid the motor long-term running at a low speed.

Function Code	Name	Setting Range	Default Value
F7.28	Select sleeping signal	0: Select internal sleeping signal 1: Select external sleeping signal 2: Internal and external signal are valid at the same time.	0

Select internal sleeping signal, please refer to F7.21、F7.22.

Select external sleeping signal, please refer to the set of corresponding MI terminal（F2.01～F2.06）.

2:Internal and external signal are valid at the same time, sleeping is effective as long as one in internal sleeping signal and external sleeping signal is effective.

Function Code	Name	Setting Range	Default Value
F7.29	Simple PLC run	1: Run circularly. 2: Stop after running for one circulation. 3: Run at the final value after running for one circulation.	1

When F0.03=7, simple PLC (program) run is effective.

Function Code	Name	Setting Range	Default Value

F7.30	The 0st step running time.	0～999.9	0
F7.31	The 1st step running time.	0～999.9	0
F7.32	The 2nd step running time.	0～999.9	0
F7.33	The 3rd step running time.	0～999.9	0
F7.34	The 4th step running time.	0～999.9	0
F7.35	The 5th step running time.	0～999.9	0
F7.36	The 6th step running time.	0～999.9	0
F7.37	The 7th step running time.	0～999.9	0

In simple PLC run mode, PLC run and skip the step whose running time is set to be 0, and simple PLC run will not operate if all the set is 0.

When PLC run from 0th to the 7th step, the parameter corresponding to the frequency set is F4.29~F4.36.

Function Code	Name	Setting Range	Default Value
F7.38	PLC selection record or not when power off.	0: Record when power off 1: No record when power off	0

PLC selection record or not when power off means whether to record the running status before power off.

Function Code	Name	Setting Range	Default Value
F7.39	running time unit	0:s 1:min	0
F7.40	Failure shield	0: Effective 1:Ineffective	0

Discription of failure shield display:

Display content when stop	Code
BIT0: Module protection shield 0:Invalid 1: Valid	1
BIT1: Soft overcurrent shield. 0:Invalid 1: Valid	2
BIT2: Over-voltage shield. 0:Invalid 1: Valid	4

BIT3: Reserved	8
BIT4: Inverter overload shield. 0:Invalid 1: Valid	16
BIT5: Input lack-phase shield. 0:Invalid 1: Valid	32
BIT6: Output lack-phase shield. 0:Invalid 1: Valid	64
BIT7: Reserved	128
BIT8: Current detecting circuit failure 0:Invalid 1: Valid	256
BIT9: Earthing short circuit failure shield. 0:Invalid 1: Valid	512
BIT10: Inverter over heating shield. 0:Invalid 1: Valid(all frequency section is valid)	1024

If soft overcurrent shield inverter overload shield are needed, set F7.40=2+64=66.

Please refer to F8.09 for detailed description of hardware overcurrent shield.

6.9 F8 Supplementary function Parameters 1

Function Code	Name	Setting Range	Default Value
F8.00	Inhibit oscillation low frequency threshold point	0～500	5
F8.01	Inhibit oscillation high frequency threshold point	0～500	100

Current oscillation is prone to occur when the motor is running at certain frequency segments, the light is to cause the motor instable running, and the serious is to cause inverter overcurrent. When F8.04=0, enable vibration suppression function，when the set of F8.00, F8.01 is small, oscillation restraining effect and current increasing is obvious, and when the set of F8.00, F8.01 is large, oscillation restraining effect is weak.

Function Code	Name	Setting Range	Default Value
F8.02	Inhibit oscillation scope limit value	0～10000	5000

High voltage increasing value can be restricted when inhibiting oscillation by setting F8.02.

Function Code	Name	Setting Range	Default Value
F8.03	Inhibit oscillation dividing frequency of low and high frequency	0.00～F0.04（Max. freq.）	12.50

F8.03 is the demarcation point of F8.00 and F8.01.

Function Code	Name	Setting Range	Default Value
F8.04	Inhibit oscillation	0、1	1

0: Inhibit oscillation effective

1: Inhibit oscillation ineffective

Inhibit oscillation function is for the VF control, current oscillation often occurs for general motors in no-load or light load operation, causing the motor abnormal running, the serious is to make inverter overcurrent. When F8.04=0, enable vibration suppression function, the inverter will restrain the oscillation that the motor appears according to the parameters in F8.00 ~ F8.03.

Function Code	Name	Setting Range	Default Value
F8.05	PWM selection	0、1	0

0:PWM mode 1, the mode is normal PWM mode, the noise of motor is small at low frequency, while large at high frequency.

1:PWM mode 2, noise of the motor is small when running at this mode but high temperature rises, and tne inverter should be used in lower volume if such function is selected.

Function Code	Name	Setting Range	Default Value
F8.06	Torque setting mode selection	0～5	0
F8.07	Keyboard setting torque	-100.0% ～ 100.0%（100.0% is equal to the value of F1.19）	50．0%

F8.06 Selection of torque setting channel :

1: Analog AVI setting torque（100.0% is equal to the value of F1.19）

2: Analog ACI setting torque（100.0% is equal to the value of F1.19）

3: Analog AVI+ACI setting torque（100.0% is equal to the value of F1.19）

4: Multisection torque setting （100.0% is equal to the value of F1.19）

5: Telecommunication setting（100.0% is equal to the value of F1.19）

Only when F0.00=2, torque control and the function code of F8.06 is valid. Under torque control, the inverter output the torque according to the setting torque command, the output frequency is restricted by the upper limit frequency, when load speed is greater than the upper limit frequency, the output frequency of inverter is restricted and will be indifferent with the setting torque.

When the torque command is keyboard setting (when F8.06 is 0), torque command is obtained by setting the function code F8.07. When the torque setting is negative, the motor will reverse. Keyboard setting, analog value, multi-speed and communication setting, 100.0% that inputs is equal to the motor rated current of F1.19 times, -100.0% that inputs is equal to the motor rated current of negative (reverse) F1.19 times .

Through the multi function input terminal,can switch between torque control and speed control.

When the set torque is greater than the load torque, output frequency of the inverter will increase, when output frequency of the inverter arrive upper limit frequency, the converter runs at the upper limit frequency all the time.

When the set torque is less than the load torque, output frequency of the inverter will decrease, and when output frequency of the inverter arrives lower limit frequency which the inverter runs at all the time.

Note:When stop command is valid, inverter switch from torque control to speed control automatically.

Function Code	Name	Setting Range	Default Value
F8.08	Upper limit Freq. setting selection	0～4	0

Option of the upper frequency setpoint Sources. Especially in the torque control, the output frequency of the inverter can be changed by changing the upper limit frequency.

0: Keyboard set the upper limit Freq. (F0.05)

1: Analog AVI set upper limit Freq.(100%corresponds to the max. fre. of F0.04)

2: Analog ACI set upper limit Freq.(the same as 1)

3: Multisection setting upper limit Freq. (the same as 1)

4:Telecommunication setting upper limit Freq. (the same as 1)

Function Code	Name	Setting Range	Default Value
F8.09	Current limit selection(hardware overcurrent shield)	0、1	0

Automatic current limiting function is always effective in acceleration and deceleration conditions,

While the effectiveness of this function is determined by the automatic current limiting action selection (F8.09) when running at constant speed.

F8.09=0 imply that automatic current limit is effective and hardware overcurrent shield when running at a constant speed.

F8.09=1 imply that automatic current limit is effective and hardware overcurrent doesn't shield when running at a constant speed.

The output frequency may change in automatic current limiting action, so this function is unsuitable in situation that relatively stable output frequency is required when running at constant speed.

When automatic current limit is effective , overload of the inverter may be affected due to the low set of current limit level.

6.10 F9 Supplementary function Parameters 2

Function Code	Name	Setting Range	Default Value
F9.00	Polarity choice of input/output terminal (display the code of the content)	0～65535	0

BITi=0: positive logic，BITi=1: negative logic。

Polarity choice of input/output terminal display content code:

Display content	Code
BIT0:MI1	1
BIT1:MI2	2
BIT2:MI3	4
BIT3:MI4	8
BIT4:MI5	16
BIT5:MI6	32

BIT6:RA，RB，RC	64
BIT7:DO-R	128
BIT8:TA，TB，TC	256

Function Code	Name	Setting Range	Default Value
F9.01	Carrier wave selection with the temperature adjustment	0:Invalid 1: Valid	1

When it is effective that carrier wave adjusts with the temperature, inverter detect the temperature of IGBT heat sink, the carrier wave frequency will change automatically when exceeding a certain value. Set it invalid for the noise scene of high requirements.

Function Code	Name	Setting Range	Default Value
F9.02	Accelerating time 3	0.1～3600.0	20.0
F9.03	Decelerating time 3	0.1～3600.0	20.0

Only when the constant pressure water supply PID is valid, the absolute value of inaccuracy between feedback pressure and the set pressure, within PID adjustment range (F7.26), F9.02 and F9.03 is valid.

Function Code	Name	Setting Range	Default Value
F9.09	AO2 analog output selection	0～10	0

Standard output of analog output is 0 ~ 20mA or 0 ~ 10V, current or voltage output can be selected by controlling the J5. The range of the corresponding value it indicates is as shown in the following table:

Setting	Function	Range
0	Set frequency	0 to maximum output frequency
1	Running frequency	0 to maximum output frequency
2	Output current	0 to 200% of the rated current of the

		motor
3	Output voltage	0 to 150% of the rated voltage of the motor
4	Running speed	0 to 200% of the rated running speedof the motor
5	Output power	0 to 200% rated power of the motor
6	Output torque	0 to 200% of the rated current of the motor
7	Analog value AVI input	0～ 10V/0～20mA
8	Analog value ACI input	0～ 10V/0～20mA
9～10	Reserved	Reserved

Function Code	Name	Setting Range	Default Value
F9.10	AO2 analog output lower limit	0.0%～100.0%	0.0%
F9.11	AO2 lower limit corresponding analog	0.00～10.00V	0.0%
F9.12	AO2 analog output upper limit	0.0%～100.0%	100.0%
F9.13	AO2 upper limit corresponding analog	0.00V～10.00V	10.00V

The above function code defines the relationship between the output value and the analog output corresponding value, the part of the output value that exceeding the maximum or minimum output setting scope will be calculated according to the maximum or minimum output.

When analog output is the current output, 1mA current is equivalent to the 0.5V voltage.

In different applications, 100% of analog output corresponding to the output values are different, please refer to the specific description of each application part.

Chapter 7 Fault Diagnosis and Countermeasures

7.1 Failure and countermeasure

Possible failure types in ACD320 are shown in Table 7-1 and failure code is from U-01 to U-23. Some failure code is reserved for intelligent automatic diagnosis function which will be executed continuously in future. When failure takes place in the inverter, the user should check according to note of this table first and record failure phenomena detailedly. Please contact our after-sale service and technical support Department or agent in your local place when technical service is needed

Table 7-1 failure type and the countermeasure

Failure code	Failure type	Possible reason	Countermeasure
U-01	Inverting module protection	Transient overcurrent of the inverter	Refer to countermeasure for overcurrent
		phase to phase short circuit or earthing short circuit of output 3 phase	wiring again
		Wether the connecting wire from inverter to motor is too long	Install reactor or output filter
		Air-path blocked or fan damaged	To clear air-path or replace the fan
		Ambient temperature is too high	Lower ambient temperature
		Connecting wire or insert on control board loose	Check and connect the wire again
		Unwonted current wave caused by missing output phase etc.	Check wiring
		Assistant power supply damaged and drive voltage lacking	Look for service from manufacturer or agent
		Unwonted control board	Look for service from manufacturer or agent
U-02	Overcurrent during accelerating process	Wheter grounding or short circuit exist in output loop of inverter.	wiring again
		Wether the connecting wire from inverter to motor is too long	Install reactor or output filter
		Auto tuning of motor parameters doesnot run in vector control mode.	Start auto tuning of motor parameters
		Accelerating time is too short	Prolong accelerating time

		Improper V/F curve or manual torque boost.	Adjust V/F curve setting.adjust manual torque boost or change to automatic torque boost
		Restart rotating motor	Set speed checking restart function or start after the motor stopping
		Low power source voltage	Check input power supply
		Exsit shock load in the accelerating process.	Cansel shock load.
		Power of inverter is a bit small	Choose inverter with high-power
U-03	Overcurrent during decelerating process	Wheter grounding or short circuit exist in output loop of inverter.	wiring again
		Wether the connecting wire from inverter to motor is too long	Install reactor or output filter
		Auto tuning of motor parameters doesnot run in vector control mode.	Run auto tuning of motor parameters
		Decelerating time is too short	Prolong decelerating time
		low power source voltage	Check input power supply
		Have potential energy load or big Inertia load	Increase braking power of external energy consumption braking subassembly
		Power of inverter is a bit small	Choose inverter with high-power
failure code	failure type	possible reason	countermeasure
U-04	overcurrent during constant speed process	Wheter grounding or short circuit exist in output loop of inverter.	Wiring again.
		Wether the connecting wire from inverter to motor is too long	Install reactor or output filter.
		Auto tuning of motor parameters doesnot run in vector control mode.	Run auto tuning of motor parameters.
		Load change suddenly or Have unwonted phenomena	Check or reduce break of the load
		Accel/Decel time is set to too short	Prolong accelerating decelerating time properly
		low power source voltage	Check input power supply
		Power of inverter is a bit small	Choose inverter with high-power

U-05	overvoltage during accelerating process	input voltage is a bitter high	Check input power supply
		There is external force driving the motor in accelerating process.	Cancel this force or addbraking resistor
		Accel time is set to too short	Prolong accelerating time properly
		Restart rotating motor	Set to be speed tracking starting
U-06	Overvoltage during decelerating process	Input voltage is too high	Check input power supply
		There is external force driving the motor in decelerating process.	Cancel this force or addbraking resistor
		Decelerating time is too short	Prolong decelerating time
		Have potential energy load or big inertia load	Increase braking power of external energy consumption braking subassembly
U-07	Overvoltage during constant speed process	Input voltage is too high	Check input power supply
		There is external force driving the motor in operating process.	Cancel this force or addbraking resistor
		Accel/Decel time is set to too short	Prolong accelerating decelerating time properly
		Input voltage change abnormally	Assemble reactor
		Load inertia is a bit big	Use energy consumption subassembly
U-08	Control power failure	Unwonted input voltage	Check input power supply or look for service
U-09	Under voltage failure	transient power off	Reset falure.
		Input voltage is too low	Check input power supply
U-10	Inverter overload	Accel time is too short	Prolong accelerating time
		DC injection braking is too big	Reduce DC injection braking current.prolong braking time
		Improper V/F curve	Adjust V/F curve and torque boost
		Restart rotating motor	Set to be speed tracking starting
		power source voltage is too low	check power source voltage
		Load is too big or motor is blocked.	Reduce the load and check the motor and macine.
		Power of inverter is a bit small	Choose inverter with high-power

U-11	Motor overload	Improper V/F curve	Adjust V/F curve and torque boost
		power source voltage is too low	check power source voltage
		General motor run at low speed with big load	Can choose frequency conversion motor for long time low speed run
		motor overload protection factor set incorrectly	to set motor overload protection factor correctly
		motor blocked up or load change too suddenly and quickly	Reduce the load and check the motor and

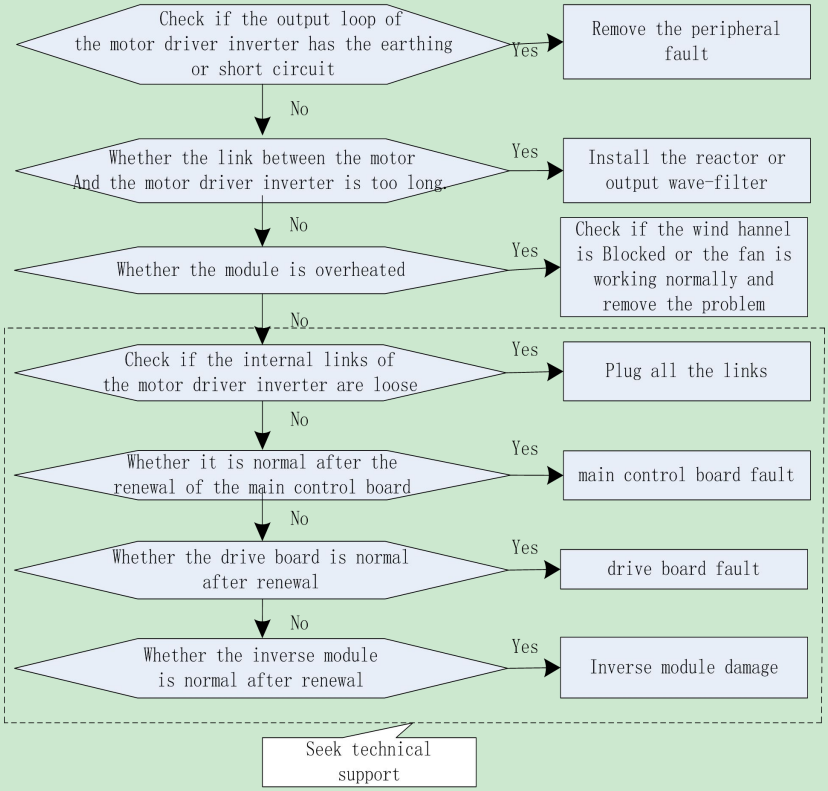
failure code	failure type	possible reason	countermeasure
U-12	Missing input phase	Three-phase input power is abnormal	Check and remove the problems in the peripheral lines,To make the three-phase power entering the frequency inverter normal
U-13	Missing output phase	The lead wire from inverter to the motor is abnormal.	Remove peripheral fault.
		Check if the three-phase output of frequency inverter is balanced when running without motor	Check if the motor three-phase winding is normal, If no, remove the fault.
U-14	inverter over heating	Air-path blocked	To clear air-path or improve ventilation condition
		Ambient temperature is too high	Improve ventilation condition, lower carrier frequency
		Fan damaged	Replace the fan
U-15	external device failure	use sudden stop key in  non-keypad run mode	Reset running
		Use sudden stop key  under condition of stall	Set running parameter correctly
		Sudden stop terminal MI for external failure closed	Open external failure terminal after external failure is settled
U-16	RS485 communication failure	Baud rate set improperly	set Baud rate properly

		The wiring of Serial port communication error	Check if communication wiring is correct
		Communication function code parameter F4 set improperly.	Modify the set of F4.03、F4.04.
		Upper device doesn't work	Check if upper device work and wiring is correct
U-17	Reserved	Reserved	Reserved
U-18	current detecting circuit failure	Connecting wire or insert on control board loose	Check and connect the wire again
		Assistant power supply damaged	Look for service from manufacturer or agent
		Hall device damaged.	Look for service from manufacturer or agent
		Amplifying circuit is abnormal.	Look for service from manufacturer or agent
U-19	Auto tuning of motor parameters failure	Motor parameters is not set according to rated data of motor	Set the parameter of motor correctly
		Whether it is proper to manually raise torque or Accel/Decel time set	Adjust the manual raising of torque or extend Accel/Decel time.
		The motor parameter identification has been performed	Ckeck the lead wire from inverter to the motor.
U-20	Reserved		
U-21	EEPROM abnormal	Mistake take place when read or write control parameter	Reset by pressing Look for service from manufacturer or agent
U-22	Hardware of inverter failure	Overvoltage failure	Deal witn the failure according to the overvoltage fault .
		Overcurrent failure.	Deal witn the failure according to the overcurrent fault .
		Overvoltage or overcurrent hardware circuit failure.	Look for service from manufacturer or agent

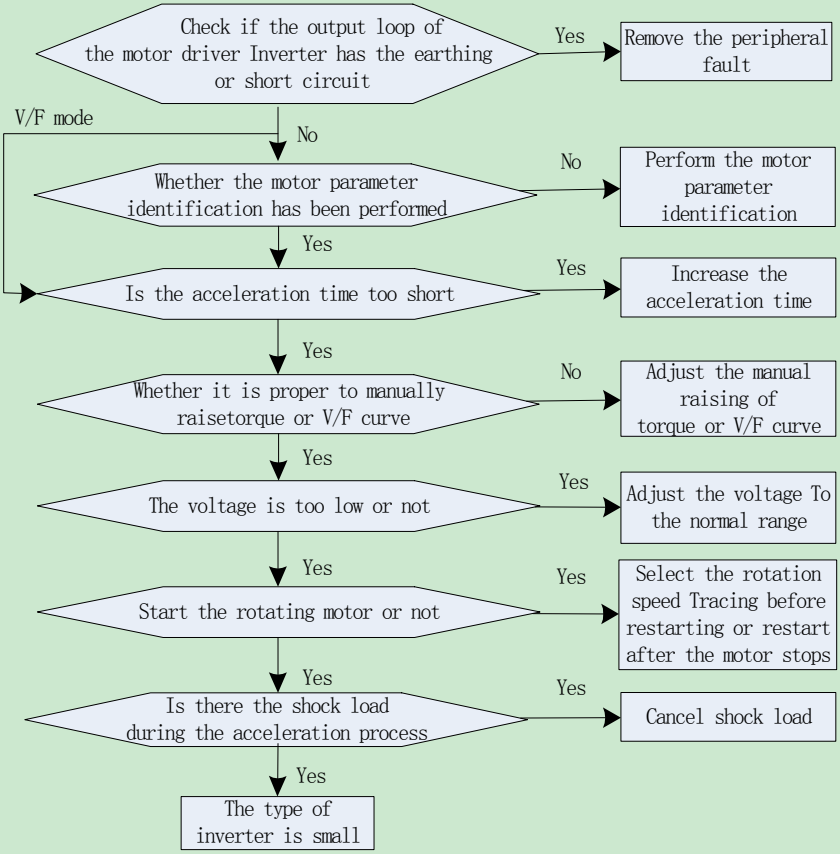
U-23	Earthing short circuit failure.	The motor has earthing short circuit.	Change cable or motor.
U-25	PID disconnection failure.	Wiring loose	Check wiring
		Analog value input circuit failure.	Look for service from manufacturer or agent
U-26	Lack of water when constant pressure water supply	Lack of water	Check the pool.
P.oFF	Under voltage stop	Input voltage is too low	Check the input voltage
		Dispear when power off	Normal phenomenon
		Missing input phase	Please check the input voltage
0.0.0.0.0.	Keywords is valid	User's keywords are valid.	When it dispays "0.0.0.0.0.", please input the set keywords, if the user have forgotten the keywords, look for service from agent
EoPP	Constant pressure water supply sleeping	Normal sleep	Normal phenomenon
		Set of sleeping and revival parameter is wrong	Please set the parameter F7.21～F7.24 correctly.

7.2 Fault and Countermeasures

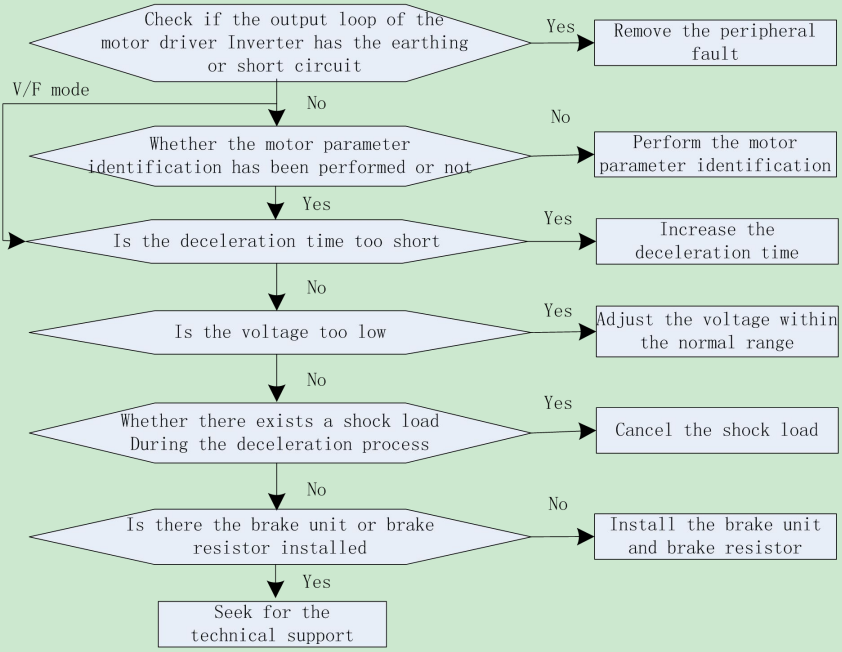
1.Inverting module protection（U-01）



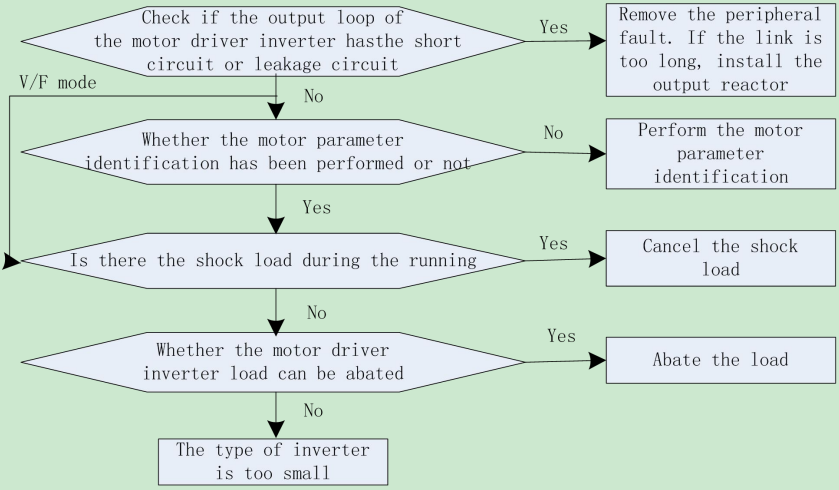
2.Over current during acceleration（U-02）



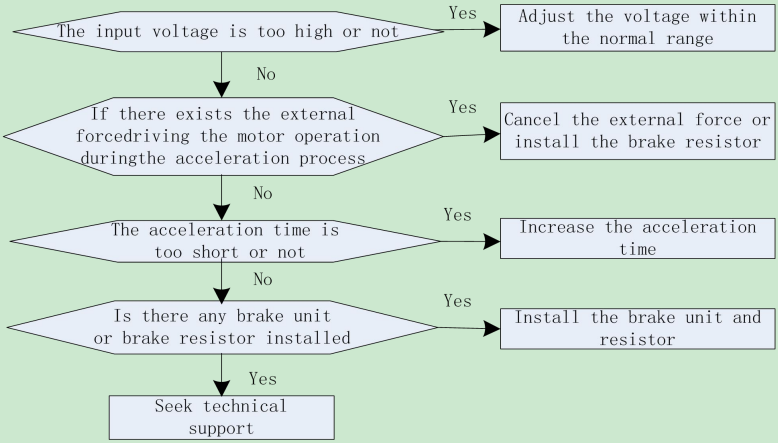
3.Over current during deceleration（U-03）



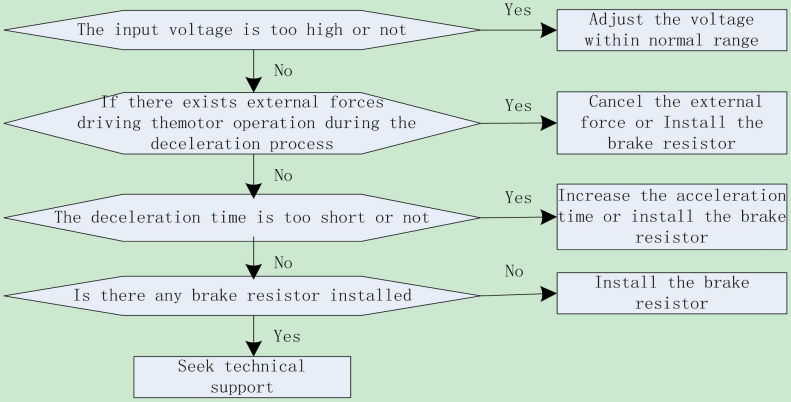
4.Over current during running（U-04）



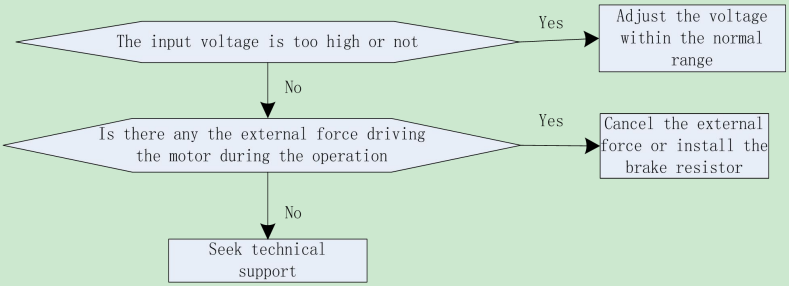
5.Over voltage during acceleration（U-05）



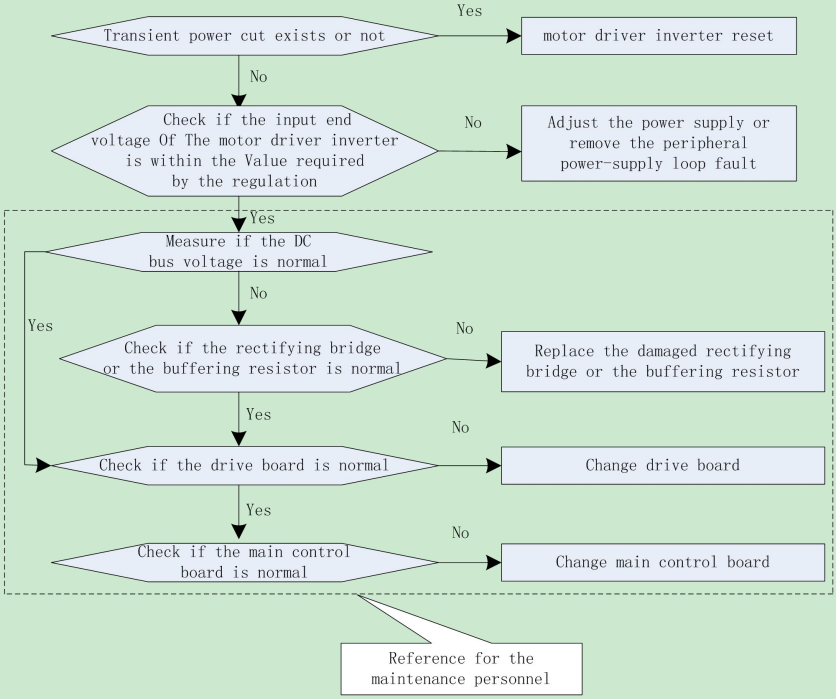
6.Over voltage during deceleration（U-06）



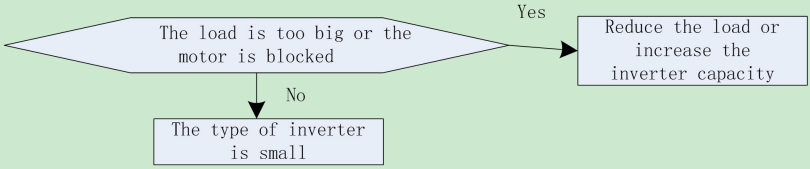
7.Over voltage during running（U-07）



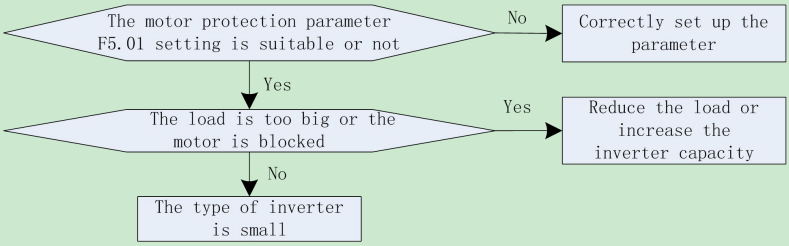
8.Under voltage（U-09）



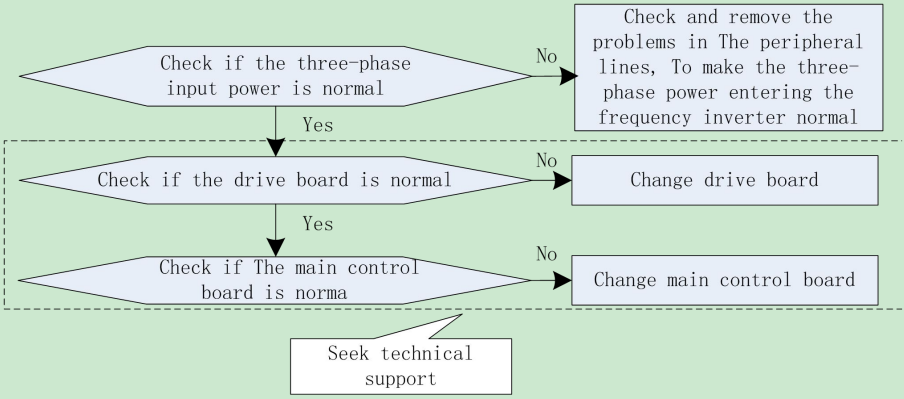
9.InverterOver Load（U-10）



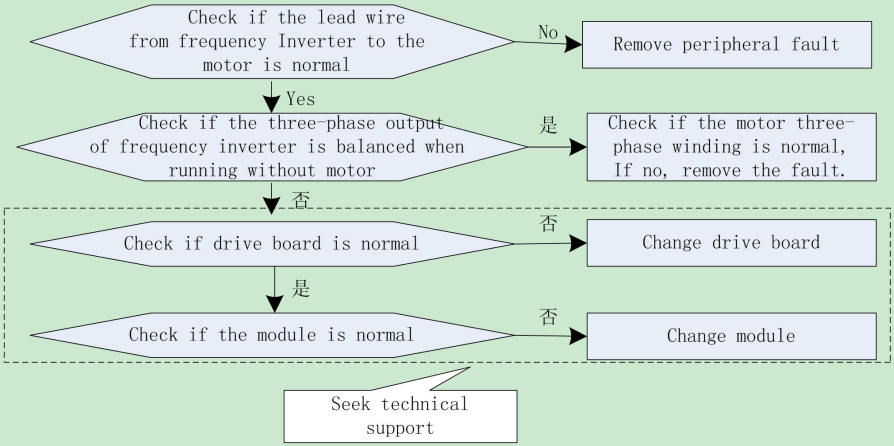
10.Motor Over Load（U-11）



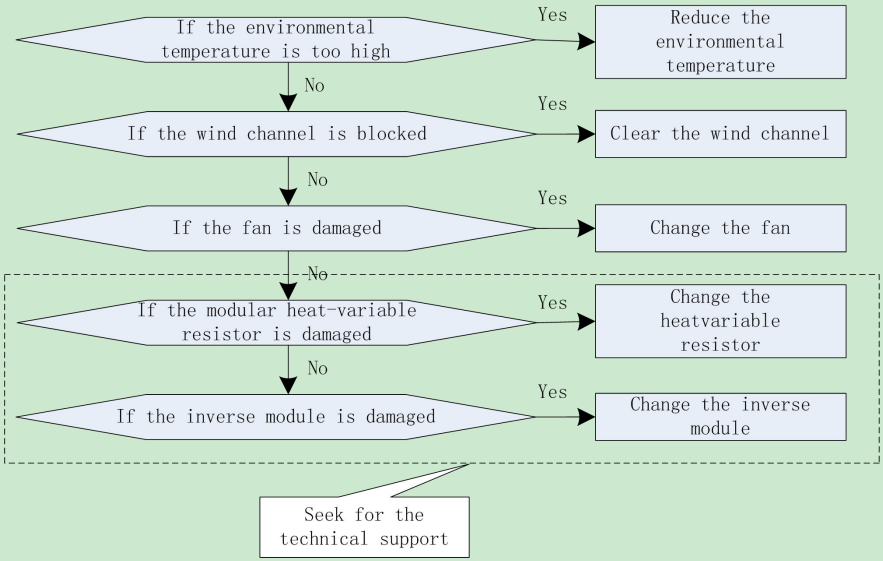
11.Input phase failure（U-12）



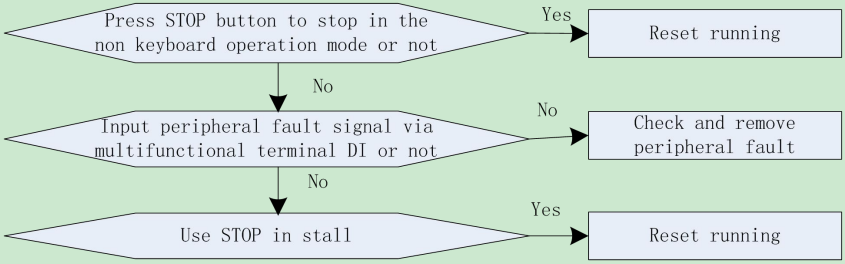
12.Output phase failure（U-13）



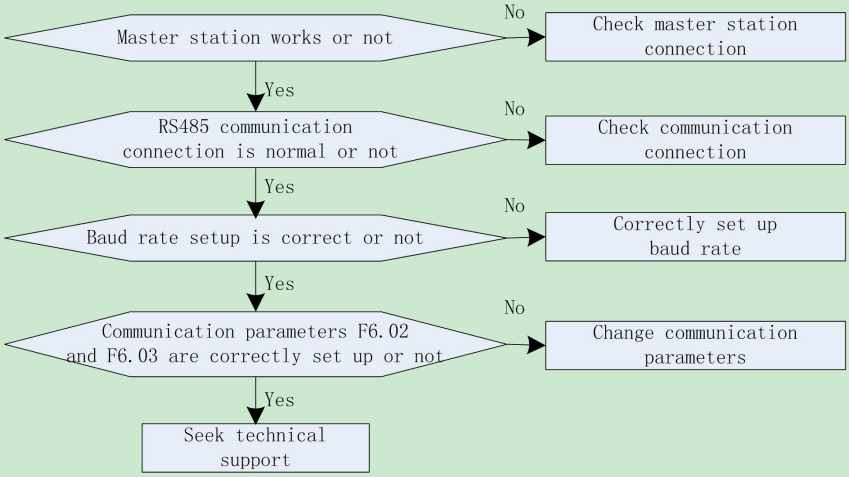
13.Inverting Module Over Heat(U-14)



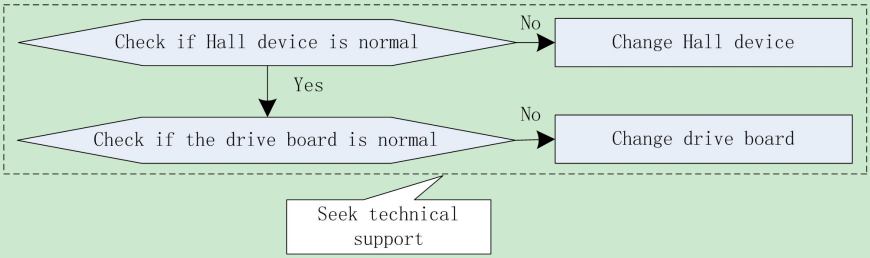
14.External Failure（U-15）



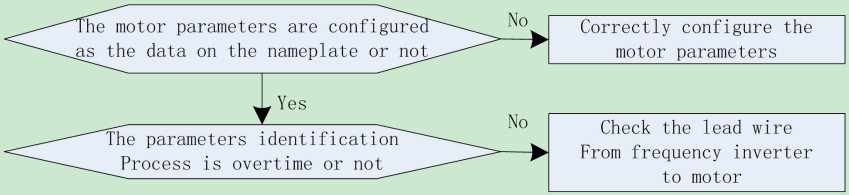
15.Communication Failure（U-16）



16.Current Inspection Circuit Failure（U-18）



17.Motor self-learning failure（U-19）



18.EEPROM read-write failure(U-21)

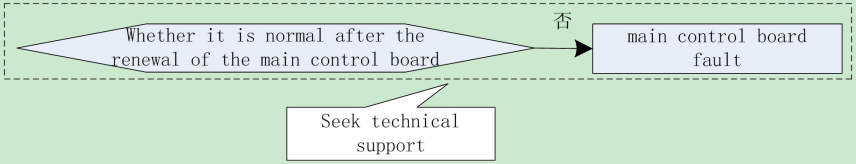


Table7-2 failure phenomenon and analysis

order number	failure phenomenon	possible reason	countermeasure
1	No display after electrified.	Input power of the inverter is not connected.	Check the input power.
		Keyboard and the CPU board is not well wired.	Check the wire between keyboard and the CPU board.
		The control board and the power drive board is not well wired.	Check the wire between control board and the power drive board.
		Parts of inverter damage.	Look for service from manufacturer.
2	Dispay 8.8.8.8.8. after electrified.	Keyboard and the control board is not well wired.	Check the wire between keyboard and the control board.
		Parts of inverter damage.	Look for service from manufacturer.
3	Display U-23 after electrified	Earthing short circuit of motor or output wire.	Check the insulation of motor and output wire with megger
		The inverter is damaged.	Look for service from the manufacturer.
4	After electrified the inverter does not run when the RUN key is pressed.	Input voltage is too low.	Check the input voltage.
		DC bus-bar of inverter detection error	Check the monitoring parameters wheter DC bus bar voltage is too low

5	The motor does not rotate when the inverter runs.	Motor damages or it is blocked up.	Change the motor or clear up mechanical failure.
		The setting of parameter is wrong (mainly refer to motor parameter of group F1)	Check and reset parameter of group F1.
6	MI terminal is ineffective	The setting of parameter is incorrect.	Check and reset relative parameter of group F2 and F9.00.
		The orientation of dial switch is incorrect.(NPN or PNP)	The dial switches to the other end
		The control board fails.	Look for service from the manufacturer.
7	Frequent alarm U-14（Module is too hot）	The carrier frequency is too high.	Lower carrier frequency（F0.11）.
		Fan damaged or air-path blocked.	Replace the fan and clear air-path.
		Parts of the inverter is damaged.	Look for service from the manufacturer.
8	Frequent alarm that overvoltage or overcurrent failure	The parameter of motor is not properly setted.	Reset motor parameters of F1 and run auto tuning of motor parameters.
		Accel/Decel time is not suitable.	Set appropriate accelerating decelerating time.

		Load fluctuates.	Look for service from the manufacturer.

7.3 Failure record lookup

This series inverter can record latest 3 failure code and inverter run parameter of the last failure, to search these informations can redound to finding out reason of the failure.

Failure information is all stored in F3 group parameter, please enter into F3 group parameter to see about information by referring to keypad operation method.

Code	Content	Code	Content
F3.11	previous one failure type	F3.15	output current at last failure
F3.12	previous two failure type	F3.16	Bus-bar vlot. at last failure
F3.13	Latest failure type		
F3.14	Running frequency at last failure		

7.4 Failure reset

(1) Before reset you must find out reason of failure downright and eliminate it, otherwise may cause permanent damage to the inverter.

(2) If can't reset or failure takes place again after resetting, should look for reason and continuous resetting will damage the inverter.

(3) Reset should take place 5 minutes after overload, overheat protection action.

To resume normal running when failure takes place in the inverter, you can choose following any kind of operation:

(1) After you set any terminal of MI1~MI6 to be inputted by external RESET (F2.01～F2.06=7), you can open it after connected to COM.

(2) When failure code is displayed, press STOP RESET key after restoration is confirmed.

(3) Cut off power supply.

Notice:The function of STOP RESET refers to parameters in F3.03.

Chapter 8 Maintenance

8.1 Routine maintenance

When you use ACD280 series you must assemble and operate it according to demand listed in this《service manual》strictly. During run state, temperature, humidity, vibration and aging parts may affect it. To avoid this, it is recommended to perform routine inspections.

Table 8-1 Daily inspection items

Period		Inspection item	Inspection content	Criterion
Daily	Periodic			
√		Run state parameter	(1)output current	(1)within range of rated value
			(2)output voltage	(2)within range of rated value
			(3)inside temp	(3)temp. increment < 35.
√		Cooling system	(1)installing ambient	(1)good ventilation, unblocked air-path
			(2)local fan	(2)rotate normally without abnormal noise
√		Motor	(1)heating	(1)no abnormality
			(2)noise	(2)even
	√	Inverter	(1) vibration, heating	(1)vibration balanced, proper wind temp.
			(2)noise	(2) without abnormal sound
			(3)fixation of lead, terminal	(3)fixed screw don't loose
√		Run ambient	(1)temperature, humidity	(1)-10.~+40. 40.~50.used in lower volume or execute compulsory heat dissipating
			(2)dust, water and leakage	(2)no water leakage imprint, no dust
			(3)gas	(3)no peculiar smell

Recommend to inspect with following instrument:

Input voltage: electric voltmeter.output voltage: rectifying voltmeter.input output current: pincers ammeter.

8.2 Inspection and replacement of damageable parts

Some component parts in the inverter will be abraded or bear descending performance for long-term usage， to assure that, the inverter can run stably and reliably, it is recommended to

perform defending maintenance and replace corresponding parts if necessary.

(1) cooling fan

Abnormal noise, even oscillation may take place if the fan have wearing bearing, aging blade, here replacement of the fan should be considered.

(2) filter electrolyte capacitance

When frequent-changing load causes increasing pulsant current and aging electrolyte under high ambient temperature, the electrolyte capacitance may be damaged and here should replace it.

8.3 Repair guarantee

(1) Within 12 months from purchasing date, if failure caused by inverter itself takes place under normal conservation and usage, we will provide free repair service. Repair beyond that period requires regular material expenses.

(2) We will take some upkeep if one of following situations takes place within period of repair guarantee.

a. If did not use the inverter according to.service manual.strictly or did not use it under ambient demanded in.service manual., which cause failure.

b. Failure caused by applying the inverter to non-normal function;

c. Failure caused by self-repair, refit which is not already allowed;

d. Damage caused by bad keeping, falling down from high place or other extrinsic factor after purchasing the inverter;

e. Failure caused by natural disaster or its reason such as unwonted voltage, thunderbolt, water fog, fire, salt corroding, gas corroding, earthquake and storm etc.;

f. Make bold to tear up product logo (such as: nameplate etc.); Body serial number don't accord with that in repair guarantee card.

(3) We calculate service fee based on actual cost, which is subject to contract if any.

(4) You can contact the agent and also our company directly if you have questions. After repair guarantee period, we shall also provide lifetime charged repair service for our products.

Note

Our company will also provide lifetime repair service with fee for inverter which is not within period of repair guarantee.

8.4 Storage

The user must pay attention to following points for temporary storage and long-term storage after purchasing the inverter:

(1) Avoid storing the inverter in high temperature, moist place and place of dust, metal powder and assure good ventilation.

(2) Longtime storage will cause electrolyte capacitance of low quality, so must assure that it's electrified for one time within 2 years and electrification time is not shorter than 5 hours and input voltage must be increased to rated value gradually by voltage adjustor.

Chapter 9 Appendix

Appendix 1 ACD320 series serial communication protocol

The ACD320 series inverter provides RS485 communication ports, and adopts the standard ModBus communication protocol for master/slave communications. The user can use PC/PLC or control upper computer to implement centralized control (setting inverter control command, operating frequency, modificationof related functional code parameters,working status of inverter, and fault message monitoring), to meet special application requirement.

1、 Protocol Content

The Modbus serial communication protocol defines frame content and use format of asynchronous transmission in serial communications. Including: polling and broadcast frame of the master, and reply frame format of the slave. The frame content of the master includes: address (broadcast address) of the slave, execution command, data, error check,and so on. The response of the slave also adopts the same structure. Itscontent includes:action confirmation, return data, error check, and so on. If an error occurs when the slave is receiving a frame or the slave cannot complete the action required by the master, the slave will organize a fault frame and send it to the master as a response message.

2、 Application Mode

The ACD320 series inverters access to the "single-master multi-slave" control network with RS232/RS485 bus.

3、 Bus Structure

(1)Interface mode

RS485 hardware interface

(2)Transmission mode

Asynchronous serial and half-duplex transmission mode.At the same moment, only one of the master and slave sends data, while the other receives data. Data is sent frame by frame in form of packets during asynchronous serial communications.

(3)System topology:

"single master multi-slave". The addresses of the slaves range from 1 through 247.Where "0" is the broadcast communication address.The address of each slave over the network is a unique one. This is the basis for ensuring ModBus serial communications.

4、 Protocol Description

The communication protocol for ACD320 inverters is a asynchronous serial master/slave ModBus communication protocol. Only one device (the master) can establish a protocol (called

"query/command") over the entire network. Other devices (the slave) can only provide data to make response to the "query/command" of the master or take the corresponding actions according to the "query/command" of the master. The master here refers to a PC,industrial control device or programmable logic controller (PLC), and the slave refersto ACD320 inverters or other control devices running the same communication protocol. The master can conduct independent communications with a single slave or can advertise broadcast messages to all slaves.For the "query/command" of the master who makes independent access, the slave should return a message (called response); for the broadcast messages advertised by the master, the slave does not need to make a response to the master.

5、 Communication Frame Structure

There are two kinds of communication data format: one is RTU (Remote Terminal Unit)mode, the other is ASCII(American Standard Code for Information International Interchange).

In the RTU mode, format for each byte is as follows:

Coding system: Eight-bit binary notation, hexadecimal 0-9,A~F, and each 8-bit frame field includes two hexadecimal characters.

In theASCII mode, format for each byte is as follows:

Coding system: communication protocol beongs to hexadecimal, Character meaning of ASCII information: every hexadecimal “0”···“9”， “A”···“F” stand for every ASCII information.

Character	‘0’	‘1’	‘2’	‘3’	‘4’	‘5’	‘6’	‘7’
ASCII CODE	0x30	0x31	0x32	0x33	0x34	0x35	0x36	0x37
Character	‘8’	‘9’	‘A’	‘B’	‘C’	‘D’	‘E’	‘F’
ASCII CODE	0x38	0x39	0x41	0x42	0x43	0x44	0x45	0x46

Every byte includes start bits, seven or eight data bits, parity check bits and stop bits.

The description of byte fram is as follow:

11 bit byte frame:

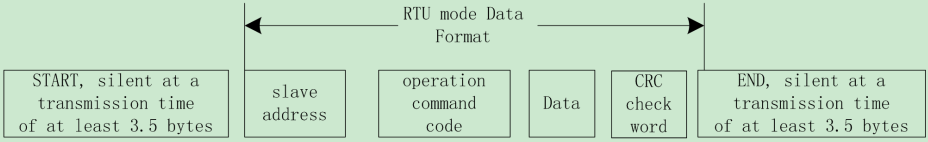
START	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	No parity check bit / Even parity check bit	Stop bit

									Odd parity check bit	

10 bit byte frame:

START	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	No paritycheck bit	Stop bit
								Even parity check bit	
								Odd parity check bit	

In RTU mode, new frames always become silent at a transmission time of at least 3.5 bytes, as the start. Over a network using baud rate to calculate the transmission rate, the transmission time of 3.5 bytes can be controlled easily. The subsequently transmitted data fields are in turn: slave address, operation command code, data, CRC check word, the transmission bytes of each field are 0 through 9 andA through F in hexadecimal notation.The network device monitors the activities of the communication bus all the time, even during the silent interval. Once receiving the first field (address message), each network device will confirm the byte.After the completion of the transmission of the last byte, another transmission time interval similar to that of 3.5 bytes is used to indicate the end of the frame.After that, the transmission a new frame starts.



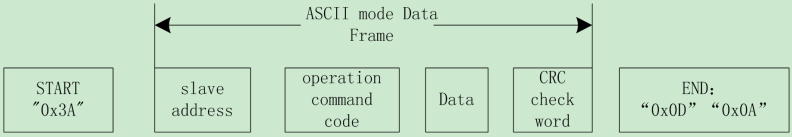
The information of a frame should be transmitted in consecutive data streams. If there is an interval over 1.5 bytes before the completion of the transmission of the entire frame, the receiving device will clear the incomplete information, and mistake that the last byte is the addressfield part of the new frame. Likewise, if the interval between the start of a new frame and the previous frame is less than 3.5 bytes, the receiving device will regard it as the subsequent part of the previous frame. Due to frame disorder, the final CRC value is incorrect, which will lead to communication failure.

Standard Structure of RTU Frame:

Frame header (START)	T1-T2-T3-T4 (transmission time of 3.5 bytes)
Slave address field (ADDR)	Communication address: 0~247 (decimal) ("0" standsfor the broadcast address)
Function field (CMD)	03H: Read slave parameters; 06H: Write slave parameters

DATA（N-1）…DATA（0）	Data of 2*N bytes: this part is the main content of communications, and is also the data exchange core in communications.
CRC CHK lower bit	Detection value: CRC value (16BIT).
CRC CHK higher bit	
Frame tail END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

In ASCII mode, frame header is ":" "0x3A" ,frame tail is "CRLF" "0x0D""0x0A").Except frame header and frame tail, all other bytes are transmitted by ASCII coding system. It will transmit high4 bits first, then transmit low 4 bits. The data length is 7 or 8 bit in ASCII mode. Capital ASCII is used to demonstrate 'A'~'F' and use LRC check, cover the information from slave address to data. The checksum is equal to the radix complement of the sum of all characters involved in checking the data.



ASCII frame standard structure

START	':'（0x3A）
Address Hi	Communication address: 2 ASCII combine 8-bit address
Address Lo	
Function Hi	Function code:
Function Lo	2ASCII combine 8-bit address
DATA（0）…DATA（N-1）	Data content: nx8-bit 2nASCII combine data content n<=16,maximum 32ASCII
LRC CHK Hi	LRC check:
LRC CHK Lo	2 ASCII combine 8-bit check code
END Hi	End:END Hi=CR（0x0D），END Lo=LF（0x0A）
END Lo	

6. Command Codes and Communication Data

6.1Command Code: 03H (0000 0011), read N words (can ready a maximum of consecutive five

words)

For example: for an inverter with the slave address of 01H, the start address of memory is 0004, ready consecutive two words, the structure of the frame is as follows:

RTU Command Message of the Master

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	03H
Higher bits of start address	00H
Lower bits of start address	04H
Higher bits of data number	00H
Lower bits of data number	02H
CRC CHK lower bit	85H
CRC CHK higher bit	CAH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

RTU Response Message of the Slave

START	T1-T2-T3-T4(transmission time of 3.5 bytes)
ADDR	01H
CMD	03H
byte number	04H
Higher bits of data address 0004H	00H
Lower bits of data address 0004H	00H
Higher bits of data address 0005H	00H
Lower bits of data address 0005H	00H
CRC CHK lower bit	FAH
CRC CHK higher bit	33H
END	T1-T2-T3-T4（transmission time of 3.5 bytes）

ASCII Command Message of the Master

START	':'
ADDR	'0'
	'1'
CMD	'0'
	'3'
Higher bits of start address	'0'
	'0'
Lower bits of start address	'0'
	'4'
Higher bits of data number	'0'
	'0'
Lower bits of data number	'0'
	'2'
LRC CHK Hi	'F'
LRC CHK Lo	'6'
END Lo	CR
END Hi	LF

ASCII Response Message of the Slave

START	':'
ADDR	'0'
	'1'
CMD	'0'
	'3'
byte number	'0'
	'4'
Higher bits of data address 0004H	'0'
	'0'
Lower bits of data address 0004H	'0'
	'0'
Higher bits of data address 0005H	'0'
	'0'
Lower bits of data address	'0'

0005H	‘0’
LRC CHK Hi	‘46’
LRC CHK Lo	‘8’
END Lo	CR
END Hi	LF

6.2Command code: 06H (0000 0110), read one word

For example, read5000 (1388H) into the address 0007 of the inverter with the slave address of 02H, the structure of the frame is as follows:

RTU Command Message of the Master

START	T1-T2-T3-T4（transmission time of 3.5 bytes）
ADDR	02H
CMD	06H
Write higher bits of the data address	00H
Write lower bits of the data address	07H
Higher bits of data content	13H
Lower bits of data content	88H
CRC CHK lower bit	35H
CRC CHK higher bit	6EH
END	T1-T2-T3-T4（transmission time of 3.5 bytes）

RTU Response Message of the Slave

START	T1-T2-T3-T4（transmission time of 3.5 bytes）
ADDR	02H
CMD	06H
Write higher bits of the data address	00H
Write lower bits of the data address	07H
Higher bits of data content	13H
Lower bits of data content	88H
CRC CHK lower bit	35H

CRC CHK higher bit	6EH
END	T1-T2-T3-T4（transmission time of 3.5 bytes）

ASCII Command Message of the Master

START	‘:’
ADDR	‘0’
	‘2’
CMD	‘0’
	‘6’
Write higher bits of the data address	‘0’
	‘0’
Write lower bits of the data address	‘0’
	‘7’
Higher bits of data content	‘1’
	‘3’
Lower bits of data content	‘8’
	‘8’
LRC CHK Hi	‘5’
LRC CHK Lo	‘6’
END Lo	CR
END Hi	LF

ASCII Response Message of the Slave

START	‘:’
ADDR	‘0’
	‘2’
CMD	‘0’
	‘6’
Write higher bits of the data address	‘0’
	‘0’
Write lower bits of the data address	‘0’
	‘7’
Higher bits of data content	‘1’
	‘3’
Lower bits of data content	‘8’

	‘8’
LRC CHK Hi	‘5’
LRC CHK Lo	‘6’
END Lo	CR
END Hi	LF

6.3 Communication frame error check

Frame error check includes twoparts: byte bit check (odd/even parity check) and entire frame data check (CRC check).

6.3.1 Byte bit check:

The user can select different bit check modes according to the actual needs. Alternatively, the user can select "no parity". This will affect the check bit setting of each byte.

Even check: Insert a even check bit before data transmission to demonstrate the number of "1" in data content is odd or even. If the number is even, check bit is set "0",otherwise the check bit isset "1", so the parity remain unchanged.

Odd check: Insert a odd check bit before data transmission to demonstrate the number of "1" in data content is odd or even. If the number is odd, check bit is set "0",otherwise the check bit is set "1", so the parity remain unchanged.

For example, If we want to transmit "11001110", the number of "1" is 5, check bit is "1"when use even check; check bit is "0" when use odd check. The receiver need to do the parity checking. If the parity of received data is not the same as the preset value,the communication has some errors.

6.3.2 Cyclical Redundancy Check (CRC):

The RTU frame format is used. The frame includes frame error detection field calculated on the basis of CRC. The CRC field detects the content of the entire frame.The CRC field has two bytes, including 16 bits of binary values. It is added to the frame after calculation of the transmission device. The receiving device recalculates the CRC of the frame, and compares it with the value in the received CRC field. If the two CRC values are not the same, it indicates a transmission error.

CRC is first stored in 0xFFFF, and then a process is called to process over six consecutive bytes in the frame and the value in the current register. Only the 8-bit data in each character is valid for CRC. The start bit, stop bit and parity check bit are invalid.

During CRC generation, each 8-bit character independentlyconducts (XOR) with the content of the register, the result moves to the least significant bit (LSB) direction,and the most significant bit (MSB)is filled in with 0. LSB is extracted for detection. If LSB is 1, the register

independently conducts (XOR) with the preset value; if LSB is 0,the operation will not be conducted.The entire process will be repeated eight times.After the completion of the last bit (the eight bit), the next 8-bit byte will independently conduct (XOR) with the current value of the register. The final value in the register is the CRC value after the execution of all bytes in the frame.

The calculation method of CRC is the CRC principle in international standard.When editing CRC algorithm, the user can refer to the CRC algorithm in related standard, to write a CRC calculation program that really meets requirement.

Asimple function for CRC calculation is provided for reference (programmed in C language):

```
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）;
}
```

In ladder logic, CKSM calculates the CRCvalue accordingto the frame content in tale loop-up method. This method features simple program, fast operation speed, but wider ROM space of program. Please use this method prudently in occasions with certain program space requirement.

6.3.3 ASCII Mode Chesk(LRC Check

LRC Check Code is grouped of the value fromAddress to Data Content,lookup 6.2 check code of communication message above:

0x02+0x06+0x00+0x08+0x13+0x88=0xAB, then get the two bytes =0x55 behind the radix complement of 2.

6.4 Definition of Communication DataAddress

This part is the definition of the communication data address, used to control inverter operation, and obtain inverter statusinformation and settings of related functional parameters of the inverter.

（1）Functional code parameter expression rule

To use a functional code serial number as a parameter to correspond to the register address, conversion inhexadecimal notation is needed. For example, the serial number of P5.05 is 139, the address of the functional address in hexadecimal notation is 008BH.(Refer to the table in Chapter 5 for specific function code)

Ranges of higher/lower bytes are respectively: higher-bit bytes: 00~11; lower-bit bytes: 00~FF.

Note : Some parameters should not be changed during operation of the inverter. Some parameters should not be changed no matter in which state the inverter is. To change functional code parameters, pay attention to the setting range, unit and related description of the parameters.

In addition, frequency storage of EEPROM may reduce the service life of the EEPROM. For users, some functional codes do not need storage in communication mode. Change the value in RAM to meet the user requirement. To implement this function, change the most significant bit of the corresponding functional code address from 0 to 1. For example, functional code P0.07 is not stored in EEPROM Modify the value in RAM only, and set the address to 8007H. This address can only be used in writing RAM, cannot be used for reading. It will be an invalid address if it is used for reading.

（2）Address of other functions:

Function Description	Address Definition	Data Meaning	R/W Feature
Run/stop parameter address	1000H	Communication setting range (-10000~10000) Note: the communication setting is the percentage of the relative value (-100.00%~ 100.00%), which can conduct communication wiring operation. If it is set as frequency source, it corresponds to the percentage of the maximum frequency (P0.04); If it is set or fed back as PID, it corresponds to the percentage of PID. Where, PID setting value and PID feedback value go through PID calculation in form of percentage.	W/R
	1001H	Running frequency	R
	1002H	DC bus voltage	R
	1003H	Output voltage	R

	1004H	Output current	R
	1005H	Output power	R
	1006H	Output torque	R
	1007H	Running speed	R
	1008H	Input terminal signal	R
	1009H	Output terminal signal	R
	100AH	AVI voltage	R
	100BH	ACI voltage	R
	100CH	Reserved	R
	100DH	Reserved	R
	100EH	Reserved	R
	100FH	load speed	R
	1010H	PID setpoint	R
	1011H	PID feedback	R
	1012H	Current segment of multi-speed control	R
	1013H	Setting frequency	R
Communication control command	2000H	0001H: Forward running	W/R
		0002H: Reverse running	
		0003H: Forward jogging	
		0004H: Reverse jogging	
		0005H: Free stop (emergency stop)	
		0006H: Decelerate to stop	
		0007H: Fault reset	
		0008H: Jogging stop	
Inverter state	3000H	0001H: Forward running	R
		0002H: Reverse running	
		0003H: Inverter standby	
		0004H: Fault	
Inverter fault address	8000H	Fault message codes should be consistent with fault types in the functional code menu. The difference is that here hexadecimal data is returned to the upper computer, instead of fault characters.	R
Communication fault address	8001H	0000H: Not fault	R
		0001H: Password error	
		0002H: Command code error	
		0003H: CRC error	
		0004H: Illegal address	
		0005H: Illegal data	
		0006H: Parameter change invalid	
		0007H: System locked	
		0008H:Inverter busy (EEPROM is storing)	

6.5 Exception response:

The AC motor drive is expected to return a normal response after receiving command messages from the master device. In the exception response, the most significant bit of the original command code is set to "06" no matter the command code is "03"or"06", and the data address is fixed to be 0x8001.

For example:

RTU Fault Response Message of the Slave

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	06H
higher bits of the fault response	50H
lower bits of the fault response	01H
higher bits of the fault code	00H
lower bits of the fault code	05H
CRC CHK lower bits	09H
CRC CHK higher bits	09H
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

ASCII Fault Response Message of the Slave

START	‘:’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘6’
higher bits of the fault response	‘5’
	‘0’
lower bits of the fault response	‘0’
	‘1’
higher bits of the fault code	‘0’
	‘0’
lower bits of the fault code	‘0’
	‘5’
LRC CHK Hi	‘A’

LRC CHK Lo	'6'
END Lo	CR
END Hi	LF

Fault code meaning:

Fault code	Data Meaning
1	Password error
2	Command code error
3	CRC error
4	Illegal address
5	Illegal data
6	Parameter change invalid
7	System locked
8	Inverter busy (EEPROM is storing)

Appendix 2 All BrakingResistors & Braking Units Use in AC Drives

Applicable Motor		Braking Unit		Braking Resistors Model No. ofUnits Used				Braking Torque 10%ED
Voltage	KW （HP）	Model 70BR	Number	Resistors Values Recommended	Resistors Model	Number		
220V Series	0.5(0.7)	built-in		80W 200Ω	80W 120Ω	1		100%
	0.75(1.0)	built-in		80W 200Ω	80W 120Ω	1		
	1.5(2.0)	built-in		150W 100Ω	150W 100Ω	1		
	2.2(3.0)	built-in		200W 80Ω	200W 68Ω	1		
	3.7(5.0)	built-in		300W 50Ω	300W 50Ω	1		
400V Series	0.75(1.0)	built-in		80W 400Ω	80W 400Ω	1		
	1.5(2.0)	built-in		120W 330Ω	180W 300Ω	1		
	2.2(3.0)	built-in		160W 250Ω	250W 250Ω	1		
	3.7(5.0)	built-in		300W 150Ω	400W 150Ω	1		
	5.5(7.5)	built-in		400W 100Ω	600W 100Ω	1		
	7.5(10)	built-in		550W 75Ω	800W 75Ω	1		
	11(15)	built-in		1000W 50Ω	1000W 50Ω	1		
	15(20)	built-in		1500W 40Ω	1500W 40Ω	1		
	18.5(25)	4030	1	2500W 35Ω	2500W 35Ω	1		
	22(30)	4030	1	3000W 27.2Ω	1200W 6.8Ω	4		
	30(40)	4045	1	5000W 17.5Ω	2500W 35Ω	2		
	37(50)	4045	1	9600W 16Ω	1200W 8Ω	8		
	45(60)	4045	1	9600W 13.6Ω	1200W 6.8Ω	8		
	55(75)	4030	2	6000W 20Ω	1500W 5Ω	4	The number each Braking Unit needs	
	75(100)	4045	2	9600W 15Ω	1200W 7.5Ω	8		
	90(125)	4045	2	9600W 13.6Ω	1200W 6.8Ω	8		
	110(150)	4045	3	9600W 16Ω	1200W 8Ω	8		
	132(175)	4045	3	9600W 13.6Ω	1200W 6.8Ω	8		
	160(220)	4045	4	9600W 13.6Ω	1200W 6.8Ω	8		
	220(300)	4045	5	9600W 13.6Ω	1200W 6.8Ω	8		
	250(330)	4045	6	9600W 13.6Ω	1200W 6.8Ω	8		

Note:

●Please only use the resistors and recommended values.

●The power and resistance recommended in above table is calculated by 100% of braking torque and 10% of using frequency, under the circumstance that the load is satisfied and the system is reliable, the resistor power and resistance can be increased or reduced properly; If increasing of braking torque is needed or when using frequency is too high, power of braking resistors and resistance should be changed properly, or consult our company.

●Take into consideration the safety of the environment when installing the braking resistors.

Appendix 3 Parameter illustration of the inverter specially used for one driving one constant pressure water supply

1. Parameter illustration of running mode macroinstruction

Function code	Name	Setting range	Macroinstruction setting	Change	Communication address
Basic parameters					
F0.00	Speed control mode	0～2	1	×	0
F0.01	Running command channel	0～2	1	×	1
F0.03	Frequency command selection	0～8	5	○	3
F0.05	Running frequency upper limit	0.00～Maximum frequency	49.00	○	5
F0.06	Running frequency lower limit	0.00～F0.05	20.00	○	6
F0.08	Acceleration time 1	0.1～3600.0s	10.0s	○	8
F0.09	Deceleration time 1	0.1～3600.0s	10.0s	○	9
F2.01	MI1 function selection	23:One driving two circularly water supply mode is ineffective（switch to manual operation）	23	×	52
F3.05	Display selection of running status parameter	1～65535	1183	○	83
F3.06	Display selection of stopping status parameter	1～511	207	○	84
F3.07	Display of operating status selected preferentially	0～15（0: It is invalid to select preferentially）	0	○	85
F4.18	PID setpoint Sources Option	0：（F4.19）Digital provision	0	×	115
F4.19	Preset PID setpoint	0.0%～100.0%	50.0%	○	116
F4.20	PID Feedback Sources Option	0：AVI effective	0	×	117
F4.21	PID Output Characteristics Option	0～1	0	×	118
F4.22	Proportional gain (Kp)	0.00～100.00	5.00	○	119
F4.23	Integral time (Ti)	0.01～10.00s	0.50s	○	120
F4.24	Differential time (Td)	0.00～10.00s	0.10s	○	121
F4.25	Sampling cycletime (T)	0.01～100.00s	0.10s	○	122
F4.26	PID control discrepancy limit	0.0～100.0%	5.0%	○	123
F4.27	Feedback disconnection detecting value	0.0～100.0%	0.0%	○	124
F4.28	Feedback disconnection detecting time	0.0～3600.0s	1.0s	○	125
F9.02	Acce. time 3	0.0～3600.0s	445.0s	○	202
F9.03	Dece. time 3	0.0～3600.0s	445.0s	○	203
F7.26	PID adjusting range	0～50.0	5.0	○	175
Parameters when sleeping and revival and lack of water detection are needed					

F7.21	Sleep detection frequency	0～Maximum frequency	0	○	170
F7.22	Sleep detection delay	0～999.9s	0	○	171
F7.23	Revival pressure	1～100	0	○	172
F7.24	Revival detection delay	0～999.9s	0	○	173
F7.25	Water-lack detection delay	0～999.9s	0	○	174
F7.28	Selection of sleeping signal	0～2	0	○	177

2. Detailed description of the parameters

Function code	Name	Setting range	Factory value
F0.08	Acce. Time 1	0.1～3600.0s	10.0s
F0.09	Dece. Time 1	0.1～3600.0s	10.0s

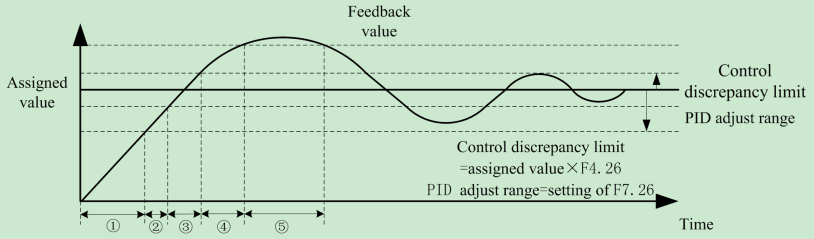
The acceleration and deceleration time at PID contol is set according to the actual situation.

Function code	Name	Setting range	Factory value
F3.05	Operation status display parameter option	1～65535	1183
F3.06	Stop status display parameter option	1～511	207
F3.07	Operation status display preferential option.	0～15（0: It is invalid to select preferentially）	0

F3.05=775 is set at PID control, (display the running frequency, setting frequency, output current , PID provision, PID feedback value), F3.06=51 (display setting frequency, bus-bar voltage, PID value, PID feedback value), F3.07=8 (display PID value preferential), the user can set accordingly. The detailed explanation of parameters is refered in Chapter 6.

Function code	Name	Setting range	Factory value
F9.02	Acce. Time 3	0.1～3600.0s	445.0s
F9.03	Dece. Time 3	0.1～3600.0s	445.0s

The set of accelerating and decelerating time at PID control, this parameter is related to the set of F4.26 and F7.26, as shown in the following instructions.



①Feedback value < assigned value -F7.26:the acceleration and deceleration time of output frequency is set by F0.08/F0.09.

② Assigned value-F7.26< feedback value< assigned value- assigned value×F4.26: the acceleration and deceleration time of output frequency is set by F9.02、F9.03.

③ Assigned value - assigned value×F4.26< feedback value < assigned value + assigned value×F4.26:output frequency keep the same basically.

④ Assigned value + assigned value×F4.26< feedback value < assigned value +F7.26:the acceleration and deceleration time of output frequency is set by F9.02 and F9.03.

⑤ Assigned value +F7.26<feedback value:the acceleration and deceleration time of output frequency is set by F0.08/F0.09.

3. Macroinstruction set of one driving one constant pressure water supply

Only to set F3.01 =1237, then set F0.12 = 1, the constant pressure water supply application of macro is effective, parameters are initialized to the factory value in the above form and fine control led.

Appendix 4 Example for one driving two constant pressure water supply controlling card and water supply mode that one for use and one for supplement（one driving two circularly running）

ACD320 general-purpose can achieve one driving two mode and two pump supply water circularly at constant pressure after installed the D28WS water supply control card.Also can realize water supply that one for use and one for supplement at constant pressure, which bring convenience and reduce the cost.

1. Type explanation

Name	Type
One driving two constant pressure water supply control card	D28WS

2． Size and installation

The installation method:(1) Please install when the converter is completely power off;

(2)Please install the PC isolated columns on the control board and install the insulating trip.

(3)Well connect one driving two constant pressure water supply controlling card and expansion card interface of control board, while the PC isolation column is installed on the water supply control card;

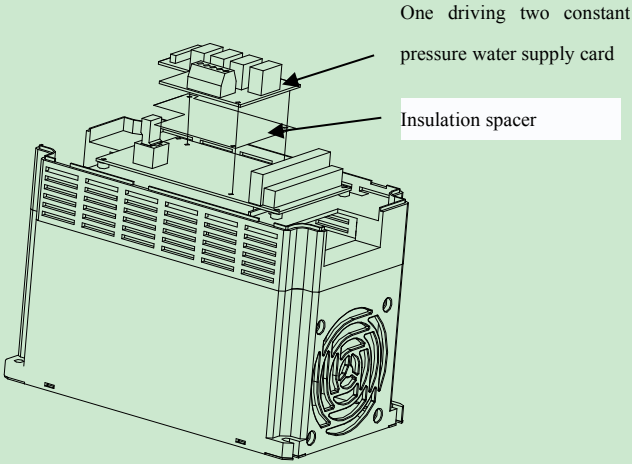


Fig. 9-1 Installation diagram for one driving two constant pressure water supply card

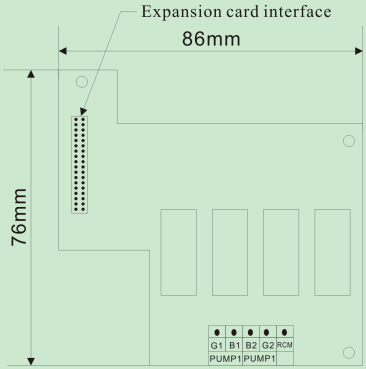


Fig. 9-2 Diagram for the size of one driving two constant pressure water supply card

3. Control terminals and wiring

G1	B1	G2	B2	RCM
PUMP1		PUMP2		RCM

Item	Symbol	Name	Function description
Relay output terminal	B1-RCM	Relay output always-open terminal, the 1st pump of variable frequency	1. The magnetic control conductor control the output of node Contact capacity: AC380V/3A,DC30V/1A、
	G1-RCM	Relay output always-open terminal, the 1st pump of AC power	
	B2-RCM	Relay output always-open terminal, the 2nd pump of variable frequency	
	G2-RCM	Relay output always-open terminal, the 2nd pump of AC power	

4. Function parameters

Please refer to appendix 3, and details is referred in F4 and F7.

5. Example for water supply mode that one for use and one for supplement（one driving two circularly running）

5.1 Process requirements

（1）Water supply mode that one for use and one for supplement（one driving two circularly running）

（2）Sleep and revival function to save energy。

（3）Timing switch of two pumps to prevent rust.

5.2 Equipment of the pump

Equipment of twice water supply system of the structure is as follows:

One inverter of 15KW （rated current 29A，rated voltage 380V）

5.3 Selection of pressure gage

Long-distance pressure gage，DC:0~10Voutput，measurement range 1Mpa。

5.4 The selection of inverter

Choose inverter ACD320-4T11GB/15LB and water supply control card D28WS according to the type of the inverter.

5.5 Hardware connection

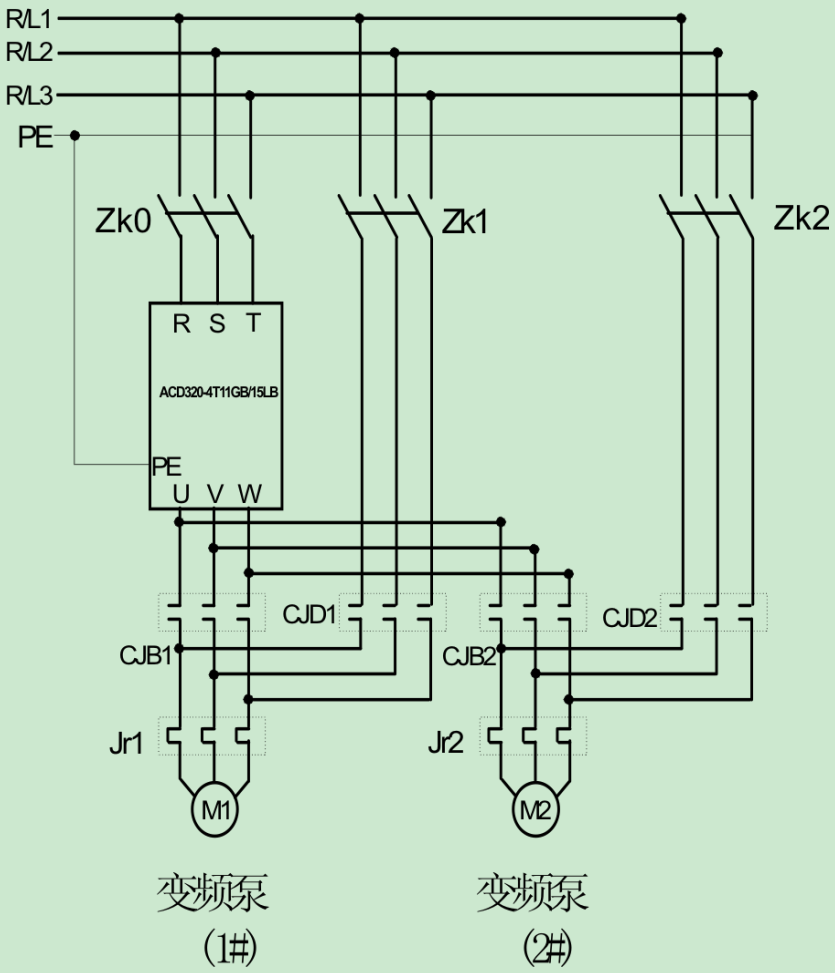


Fig. 9-1 Diagram

5.6 Set of parameters

Only to set F3.01 =1237, then set F0.12 = 1, the constant pressure water supply application of macro is effective, parameters are initialized to the factory value according to the form in appendix 3 and fine control the following parameters:

Function code	Name	Setting range	Setting value
F7.00	The choice of constant pressure water supply	0:One driving two circularly water supply	1

	mode	mode is ineffective 1:One driving two circularly water supply mode is effective	
F2.01	Choice of multi function input terminal	23: One driving two circularly water supply mode is ineffective （ switch to manual operation	23

Other pararmeters are fine controlled accordingly.

K&R 科润技术

Warranty Agreement

1. The warranty period of the product is 12 months. During the warranty period, if the product fails or is damaged under the condition of normal use by following the instruction, Our Company will be responsible for free maintenance.
2. Within the warranty period, maintenance will be charged for the damages caused by the following reasons:

A.Damage caused by uncorrect use or self-repair, refit which is not already allowed;

B.Failure caused by force majeure such as earthquake, fire, hurricane and flood disaster, thunderbolt, unwonted voltage,or other natural disaster,and contrived reasons.

C.The hardware damage caused by dropping or transportation upon the procurement.

D. Damages caused by operation which is not according to the service manual.

E. The damage or failure caused by the trouble out of the equipment (e.g. external device)

F.Make bold to tear up product logo (such as: nameplate etc.)

3. If there is any failure or damage to the product, please correctly fill out the Product Warranty Card in detail.
4. The maintenance fee is charged according to the newly adjusted Maintenance Price List by our company.
5. In general, the warranty card will not be re-issued. Please keep the card and present it to the maintenance personnel when asking for maintenance.

6. If there is any problem during the service, please contact the agent of our company or our company directly.

7. Our free after-sale service of the inverter saled in China is just for mainland (users in Hongkong, Taiwan and overseas can refer to the "overseas warranty regulations").

8. This agreement shall be interpreted by Qingdao K&R technology co., LTD..

Address: Block A4, high-tech park, No.1 Jinye Road, high-tech zone, Qingdao
P.C.: 266000
Tel: 0532-58710577
Fax: 0532-58710377
Website: Http://www.k-r.net.cn

K&R® 科润技术

Product Warranty Card

<table>
<tr><td rowspan="3">Customer information</td><td>Add. of unit:</td><td></td></tr>
<tr><td rowspan="2">Name of unit:

P.C.:</td><td>Contact person:</td></tr>
<tr><td>Tel.:</td></tr>
<tr><td rowspan="3">Product information</td><td colspan="2">Product model:</td></tr>
<tr><td colspan="2">Body barcode</td></tr>
<tr><td colspan="2">Name of agent:</td></tr>
<tr><td>Failure information</td><td colspan="2">(Maintenance time and content):

Maintenance personnel:</td></tr>
</table>

Respected Customer:

Thank you for choosing product of Qingdao K&R technology co., LTD.. In order to know the situation of the quality of the product in use and to provide better service for you, please fill the table in detail, then send it to our customer service center by post or fax when the inverter has run for a whole month. After we receive the completed product quality feedback card, we will send you a beautiful souvenir, to express our thanks. If you can give any suggestions to improve the quality of the inverter or the service, you have opportunity to gain a special reward.

QINGDAO K&R TECHNOLOGY CO.,LTD.

Cutomer service center

Product quality feedback card

Customer's name		Tel.		
Address			P.C.	
Product model:			Installation Date	
Serial number of the inverter				
Product pearance or structure				
Product performance				
Product packing				
Prodyct material				
Quality situation In use				
Your opinion or suggestions to improve the product				

Address: Block A4, high-tech park, No.1 Jinye Road, high-tech zone, Qingdao
P.C.: 266000
Tel: 0532-58710577
Fax: 0532-58710377
Service hotline:400-670-6968

K&R

K&R® AC DRIVE

Qingdao K&R Technology Co.Ltd.

Adrress: Hi-tech park A4 of I high and new technology
development zone, no.1 jinye road,chengyang Qingdao

postcode:266100

Website:Http://www.k-r.net.cn