KCLY

KOC-P5/G5 SERIES

VFD AC DRIVES

Users' munal

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KCLY201101P5G5MANUAL

Safety Precautions

Proper transportation, installation, operation and maintenance decide the secure performance of the product. Pay attention to the safety precautions before working on the product.

DANGER! This sign means that the mal-usage may lead to injury or fatal error.

NOTE! This sign means that the mal-usage may lead to slight or medium human injury or equipment damage.

Contents

Section Ⅰ Check the Product at Acceptance

NOTE!
Do not install defective inverter or uncompleted inverter, otherwise, injury might occur.

Although we check the goods strictly before shipment, you are suggested to check the goods carefully because some unexpected damage may be made during the transportation.

1.1 Check the content

Please check the following items when you receive the goods: (Table 1-1)

What to check?	How to Check
Is the model correct?	Check the label at the side of the inverter's body.
Is anything damaged?	Make an overall inspection.
Are the screws tight?	Fasten those loose screws with a screw driver.
Are there user's manual, QC Pass document or other accessories inside the box?	Check if they are in the box.

Please contact your supplier or contact us if there is any thing wrong.

1.2 Model number designation

KOC - G5 - 7.5 T4

Product Code	Series Code	Capacity	Voltage	Special Notice
KOC	G5 general type P5 for pumps, blowers	1.5: 1.5 kW 2.2: 2.2 kW 3.7: 3.7 kW 11 : 11 kW ⋮ 400 : 400 kW	T4: 380V T6: 660V	Blank: Standard B: With braking function

1.3 Main Structure

Section Ⅱ Installation and Wiring

2.1 Dimension (See Appendix 1)

2.2 Requirement to the installation place

NOTE!

1. **Move the inverter by holding the bottom.**
   The inverter might fall onto your feet and hurt you if you hold its cover.
2. **Please install the inverter onto apyrous material like metal.**
   Fire may happen if it is installed on flammable material.
3. **Please use cooling fan when install over two inverters in a cabinet. The temperature of the air in-led side should be lower than 40℃.**
   Fire or other accident may happen if it is over heat.

2.2.1 Installation place

Please install the inverter at the place with the following working conditions:

- Good ventilation
- Ambient temperature -10°C to +40°C, for naked inverter -10°C to +50°
- Humidity lower than 90%RH. No rain drops.
- Do not install on flammable material like wood.
- No direct sun light
- No flammable and erosive air or liquid
- No dust, oil dust, floating fiber or fine metal powder
- The installation base is strong.
- No vibration.
- Keep the unit away from electromagnetic interference and the interference source
- Lower than 1000 meters sea level. Within 1000 meters sea level, the higher the sea level, the lower the rated output. The ambient temperature is allowed to decrease by 0.5℃ with sea level every 100 meters higher.

2.2.2 Ambient temperature

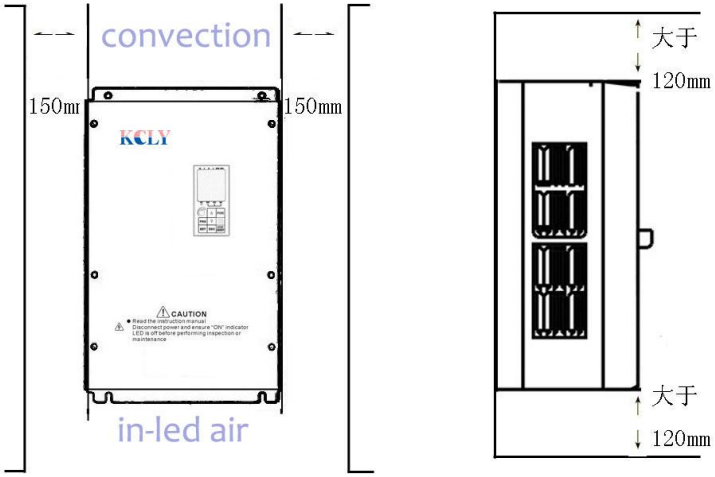
Good ventilation ensures the good performance of the inverter. Keep the ambient temperature below 40°C when it is installed in a closed cabinet by using cooling fan or air conditioner.

2.2.3 Prevention

Please cover the inverter against the dust during installation. Prevent the metal powder entering the inverter. Uncover the inverter after the installation is over.

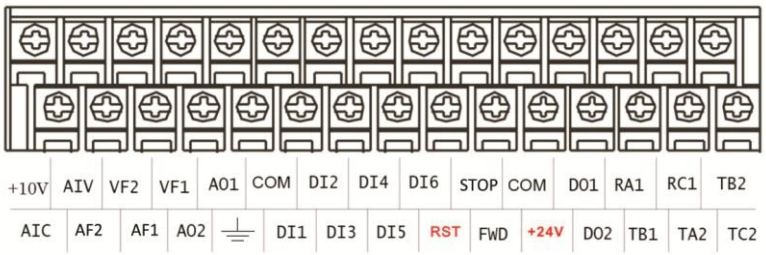
2.3 Installation Direction

The whole G9 series are forced cool down by fan, therefore, the inverter must be installed vertically and keep enough space betweem objects nearby.

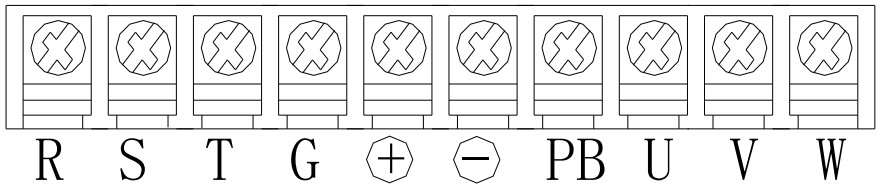


2.4 Wiring

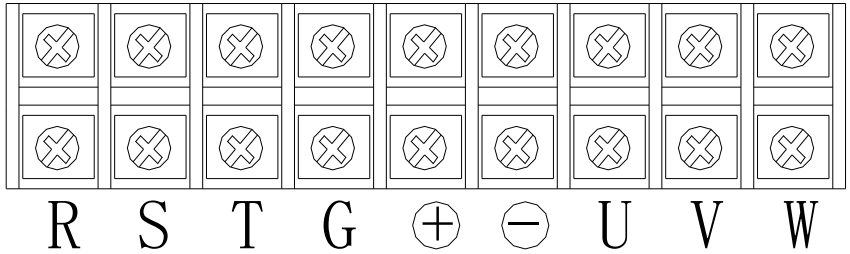
2.4.1 Control Circuit Terminals



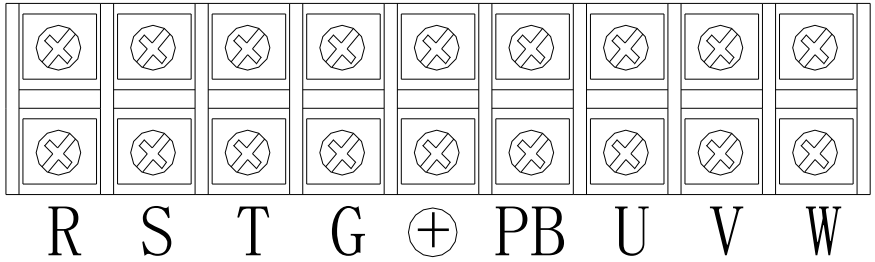
2.4.2 Main Circuit Terminals –



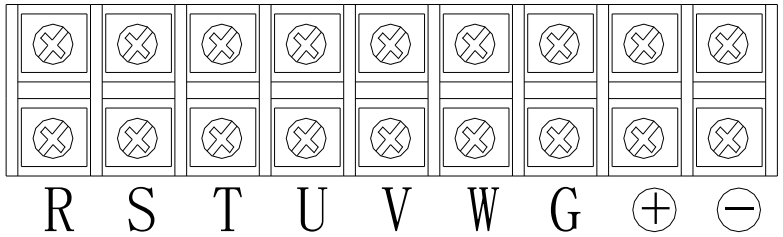
Standard 1. 5-15KW Main Circuit Terminals



Standard 18.5-75KW Main Circuit Terminals



Standard 18.5-75KW with Brake Unit Main Circuit Terminals



Above 93kW Main Circuit Terminals (with in-built choker for 220KW and above)

2.4.3 Explanation about Main Circuit Terminals

Power Input : R, S, T

Grounding : G

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DC common bus: ⊕ ⊖

Connecting Motor: U, V, W

Brake resistor: PB

Note: PB takes place of ⊖ when there is braking function in 22-75KW inverters

2.4.4 The functions of Main Circuit Terminals

Terminal functions

terminal	Description	**Functions**
R,S,T	Power input	Connect to 3-phase or single phase AC power
U,V,W	Inverter output	Connect to 3 phase AC motor
⊕ ⊖	For external brake unit	⊕ ⊖ are the positive and negative ends of the common DC bus
⊕ PB	For external brake resistor	The two wires of the brake resistor connect to ⊕ and PB
G	Earthing point	Grounded to the earth

Note: Some terminals are not there because the order and number of the terminals in the main circuit of each series are different.

2.4.5 Main circuit wiring

Make sure that the motor runs forwardly at FOR command. If it reverses, exchange the connection among any two terminals of U, V, W, or choose the opposite selection of the parameter F046 to change the motor's running direction.

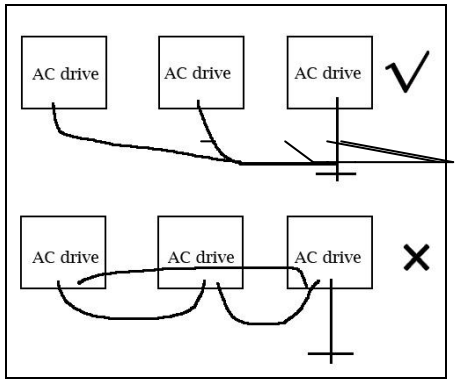
Do not connect the input power cable wrongly to an output terminal; otherwise, the interior components would be damaged. Grounding the output terminal is prohibited.

Do not touch or short circuit the output cable to the case, or the inverter might be damaged.

Grounding

The earthing terminal G must be grounded. The earthing resistance of 380V inverters must be lower than 10Ω .

Do not share the earthing cable with the electric welders or the power equipments. The specifications of the earthing cable should be in line with the electricity equipments technical standards and be short circuit with the earthing point. Do not circuit the earthing cables when more than 2 inverters are applied. The correct and wrong groundings are shown below:



Note: The motor's neutral point in Y connection method cannot be grounded

Phase shift capacitor is prohibited

Do not connect the phase shift capacitor or LC/RC filters to the output circuit, otherwise, the inverter might be damaged.

Electric magnetic switch between the inverter and the motor is prohibited.

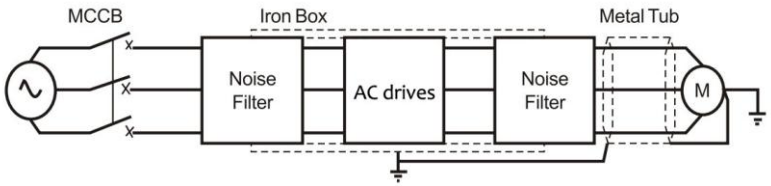
Do not connect the electric magnetic switch or magnetic contactor to the output circuit, otherwise, the surge current of the inverter will trigger the OC protection, more seriously, the inner components of the inverter might be damaged.

Protect the inverter against conduction interference

To compress the conduction interference from the output side, please install noise filter or lead the output cables to the grounding metal tube. When the distance between the output cables and the signal cables is more than 30CM, the conduction interference decreases obviously.

Protect the inverter against RF interference

The input cables, output cables and the inverter give RF interference. If we add noise filter at the input and output sides and screen them with iron utensils, the RF interference will be decreased. The cables connect the inverter with the motor must be as short as possible. See the below sketch, please:



The cable length between the inverter and the motor:

The longer the cable, the higher the carrier frequency and the greater the higher harmonics leak current on the cable. The leak current badly affects the inverter and

the surrounding equipments so it must be limited to the smallest. The relationship between the cable length and the carrier frequency is:

when the cable length between the inverter and the motor is	＜50m	＜ 100m	＞100m
the carrier frequency	＜8kHz	＜4kHz	＜2kHz

2.4.6 Wiring terminals of the control circuit

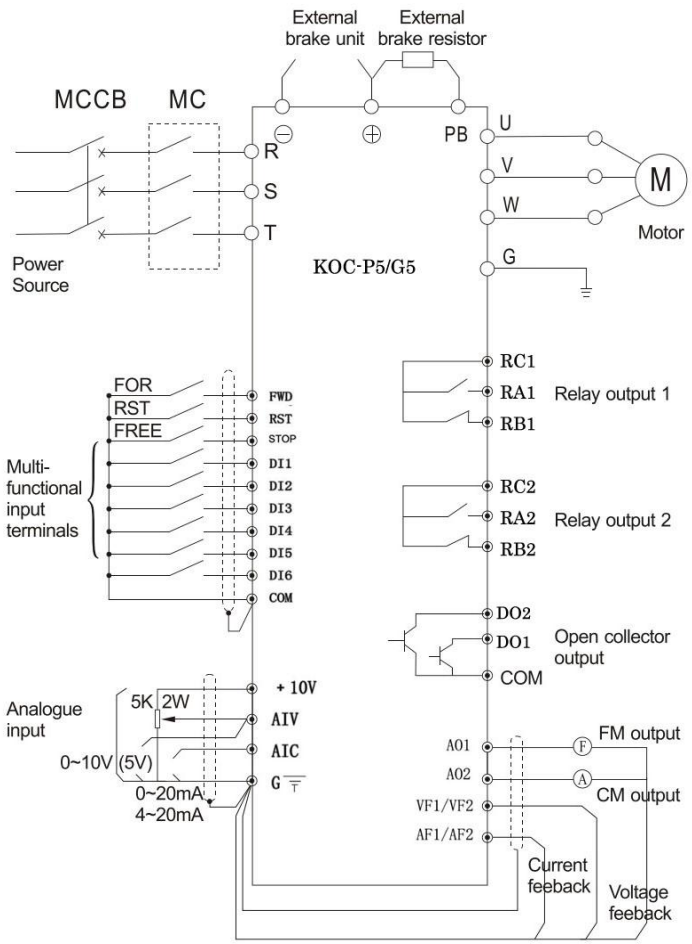
The control signal cable should be no longer than 50m and be more than 30cm away from the power cable to decrease the interference and attenuation of the control signal. Twisted-pair screen cable should be used to connect the analogue input and output signals.

2.4.7 Control circuit terminals functions

Class	Terminal	Name	Description	Signal level
Control Signal	COM	+24V common point	----------	----------
	FOR	Forward	Effective when connects to COM	Opto-coupling isolated-input 24V/8mA
	STOP	Free stop	Effective when connects to COM	
	RST	Reset	Effective when connects to COM	
	DI1-DI6	Multi-function input terminals	programmable	
Analogue I/O signal	AO1	Frequency meter output	0-10V/100% frequency; current multi-function analogue monitor	
	AO2	Current meter output		
	+10V	Signal power 10V	Analogue+10V power supply	10V/50mA
	AIV	Analogue set input voltage	0-10V/100% 0-5V/100%	0-10V(5V)
	AIC	Analogue set input current	4-20mA/100% 0-20mA/100%	4(0)-20mA
	VF1,VF2	Voltage feedback input signal	0-10V	0-10V
	AF1,AF2	Current feedback input signal	4-20mA	4-20mA
	G	Common ground	----------	----------
Auxiliary power	+24V, COM	+24V Power supply	+24V	24V/200mA
Output signal	RA1,RB1, RC1	Fault output 1	Fault when TA-TC close or TB-TC open (programmable)	250VAC/1A 30VDC/1A
	RA2,RB2, RC2	Fault output 2		
	DO1,DO2	Output signal	Open collector signal output (programmable)	24VDC/50mA

Note: **The +24V power supply is only for terminal control. It cannot be used for external sensor.**

2.5 Standard wiring



Note:

1,The external MC is to against the fault restart or power off restart;

2,The protection against the overheat of the resistor of the external brake unit should be connect to the multi-functional terminal (DI1-DI6)whose parameter is set to 10.

3,○ main circuit terminal, ◎ control circuit terminal

2.6 Wiring precaution

※ Don't install electromagnetic contactor between the frequency converter and motor.

※ To disassemble or replace the motor, the input power supply must be turned off .

※ The motor or power supply can be switched on/off only after the converter stops output.

※ If electromagnetic contactor, relay, etc. is too near to the frequency converter, a surge absorbing device should be installed to minimize the electromagnetic interference.

※ Use isolation device for inverter's external control lines or use screened cable.

※ Except screened cable, a separate circuit should be used to the input command signal lines. Better to keep the circuit far from the main circuit.

※ To avoid interference, the twisted screen cable is suggested for control circuit cable connection. The distance should be within 50m.

※ Do not touch the screen cable to other signal cables and equipment cases. Wrap the naked screen cable with insulation tapes.

※ If the frequency converter is equipped with peripheral devices (such as filter, reactor), please measure its insulation resistance to the earth with 1000V megohm meter, and ensure the resistance value is not below 4MΩ .

※ If start the frequency converter frequently, do not switch off its power supply. Use COM/FWD to start or stop the converter in order to avoid damaging the diode bridge.

※ In order to prevent unexpected accidents, earth terminal E must be grounded securely, otherwise current leakage will occur.

Section Ⅲ Operation

DANGER!

1. **Close the terminal block's cover before giving power.**
   Otherwise, electric shock may occur.
2. **If the inverter is set to pick up after power resumption, leave it away from other machines because it will restart once the power is on.**
   Otherwise, injury may occur.

NOTE!

1. **The discharge of the high voltage at each side of the brake resistor will generate heat; therefore, do not touch the brake resistor.**
   Otherwise, electric shock or burn may occur.
2. **Reaffirm the motor and the machine's application range before they are put into use.**
   Otherwise, injury may occur.
3. **Do not check the signal during operation.**
   Otherwise, equipments might be damaged.
4. **Do not change the inverter's settings randomly although many parameters can be changed during running. The parameters have been set properly in the factory.**
   Otherwise, accident may occur because the running status is changed.

3.1 Keypad functions and keypad operation

All models in this series use the same keypad which includes two LED screens of 4digits and seven segments, keys, analogue potentiometer, running indictors and unit indicators. The user can set parameters, stop/start the inverter and monitor the operation through the keypad.

3.1.1 Keypad introduction

When set parameters, the upper LED displays the parameter function while the lower LED displays the corresponding parameter value. When the inverter is running, both of the LEDs display the parameter values. The parameter can be selected by F001 and F002, it can also be changed by SET and ESC on line. The value displayed is the current value of the parameter. The parameters changed on line will be saved even after power off.

3. 1. 2 Function of Operation Keys

Key	Function
PRG	is to enter the menu. The datum blinks when it can be changed
SET	Under parameter-setting status:datum stops blink when the input value is memorized. Under running status,SET is to change the upper LED parameters

ESC	Under parameter-setting status, ESC is to exit from data change or exit from menu. Under running status, ESC is to change the lower LED parameters
∧	Under parameter-setting status, ∧ is to move to next parameter(s) or to increase the parameter value; Under running status and when the keypad digital input is effective, ∧ is to increase the input reference or the PID input, that is, digital keypad potentiometer function. Under fault-inquiry status, ∧ is to move to next Error code
∨	Under parameter-setting status, ∨ is to move to last parameter(s) or to decrease the parameter value; Under running status and when the keypad digital input is effective, ∨ is to decrease the input reference or the PID input, that is, digital keypad potentiometer function. Under fault-inquiry status, ∨is to move to last Error code
FOR	is forward running reference when the keypad control is selected
REV/JOG	it is REV when the keypad control is selected and F014 is set to 1; it is JOG when F014 is set to 0
STOP/RESET	Under running status, inverter stops at the deceleraton speed; under fault status, it resets (resets only after the fault is cleared)

3.1.3 Explanation for the unit indicators

Name		Mode	Content
Unit Indicator	Hz	flash	The value is the set frequency
	Hz	on	The value is the output frequency
	A	on	The value is the actual output current
	%	on	The value is the percentage of output current
	%	flash	The value is the percentage of left time of each steps of program running
	V	on	The value is the input voltage
	V	flash	The value is the output voltage
	RPM	on	The value is the mechanism speed
	Mpa	flash	The value is the set pressure
	Mpa	on	The value is the feedback pressure
	all off		The value is the total running time
Running indicator	KEY	on	keypad control
	RUN	on	inverter is set with the direction same as the motor running
	RUN	flash	inverter is set with the direction different from the motor running
	FOR	on	Forward running valid, there is output
	FOR	flash	Forward running valid, but there is no output
	REV	on	Reverse running valid, there is output
	REV	flash	Reverse running valid, but there is no output

3.2 How to set parameter

We provide up to 200 function parameters in this series of frequency inverter. Most of the parameters can be changed during running. Please refer to Parameter List and Parameters Description for their details.

When you are unsatisfied with your parameter settings, parameter F191 is used to restore factory parameter settings without changing the factory value.

Set the inverter's parameters through keypad before put it into use can change the factory value. Use parameter F192 to lock the parameter to save the settings and prevent hunting.

For example, let's change the carrier frequency from factory setting 3kHz to 6kHz:

Key	Status	Display	Explanation
	when the inverter stops or is running	upper: 50.00 lower: 46.00	upper LED indicator is on; lower LED indicator is on
PROG	enter parameter-setting mode	upper: F003, lower: 0	Enter F003 when gives power; enter the parameter which was set lastly when inverter is running
∧ ∨	search for the parameter you want to change	upper: F022, lower: 3.000	upper LED shows parameter code; lower LED shows parameter value
PROG	enter parameter-changing mode	upper: F022, lower: 3.000	lower LED digits blink
∧ ∨	to change the parameter value	upper: F022, lower: 6.000	lower LED digits blink
SET	confirm the value	upper: F022, lower: 6.000	parameter-setting completed, the lower LED stops blink
ESC	exit from the parameter-setting mode	upper: 50.00 lower: 46.00	although the running status is the same, the carrier frequency has been changed to 6kHz

3.3 Test running

3.3.1 Select the running mode

Parameter F003 provides 3 running modes, they are keypad control, terminal control and RS-485 control. Parameter F004 set the frequency references of each mode.
Keypad control mode uses digital setting or keypad potentiometer analog setting
Terminal control mode uses analog setting or ascending/descending operation through switching value control, and multi-step, traverse, program running through programmable control.
Parameter F005 set the input selections of analog setting.
Parameter F111 set the input signal selections of PID control.

3.3.2 Check before test running

Before test running, please make sure that the main circuit connection is right, the terminal screws are tight, the wiring is correct, the power cable is solid and the load is correct.

3.3.3 Check during test running

During test running, please check that the motor runs smoothly in the correct direction without abnormal vibration, it runs smoothly during acceleration and deceleration, the load is not over current and the display on the keypad correct.

3.3.4 Check the motor's forward direction

Method: when give power to the inverter and the keypad indicator is on, "Koc"on the LEDs will blink several times, then both upper and lower LED will display "0.00"(If the value is bigger than 0.00, please turn the potentiometer to the initial position in anticlockWise direction). The unit indicators "Hz" and "KEY" are on at the same time. "Hz" on the upper LED is the setting frequency and the "Hz" on the lower LED is the output frequency. Keep pressing "REV/JOG"key, the inverter starts running and the "RUN" and "FOR" indicators are on. The upper LED displays setting JOG frequency "5.00"Hz, the lower LED displays running frequency from "0.00"Hz to "5.00"Hz according to the JOG acceleration time set by F032. Motor speeds up to 5 Hz. Release "REV/JOG"key, the value of the lower LED decreases till the inverter stops running. The keypad display goes back to initial. (P type inverter factory setting JOG frequency is 50 Hz).
Check if the forward running direction is correct. If it is wrong, please set parameter F046, no need to change the phase order of motor connection.

3.3.5 Keypad potentiometer running

Method: when the power is on, the local potentiometer is at the initial position, the "KEY" indicator is on, both upper and lower LED display "0.00"Hz, and the relative unit indictors are on, press the "FOR"key, the "RUN" indicator will be on and the "FOR" indicator will blink. Now the inverter is running in forward direction at a speed lower than the min. start frequency. Turn the potentiometer clockWise, the upper LED displays the set frequency and the lower LED increases from 0.00Hz to the set frequency according to the acceleration time set by F019.

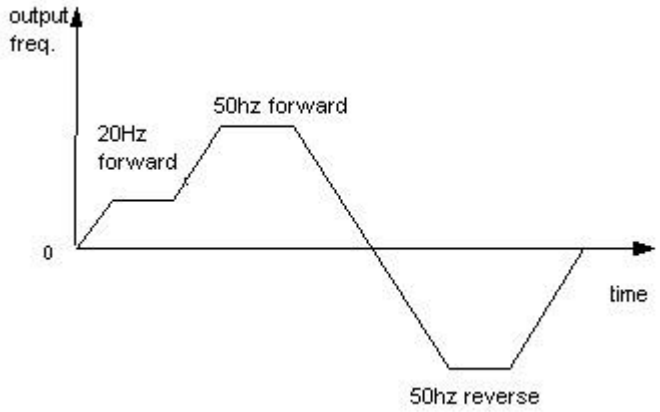
Check the operation parameters. You can change parameters display such as voltage, current and output frequency by using "SET"and "ESC"keys during running.

The frequency inverter stops running by pressing "STOP/RESET"key.

It is very convenient to use local potentiometer for applications no need of high frequency resolution.

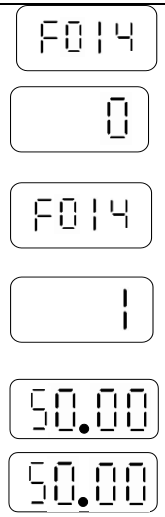
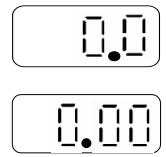
3.3.6 Keypad digital setting running

Under keypad control, run a motor forward whose base frequency is 50Hz to 20Hz and then run forward at 50Hz and then run reverse at 50Hz with the same acc/dec time. Check the current at reverse running.
See the sequence fig as below,



Operation	Function	Display	Explanation
1. power on	Upper LED displays the set frequency, lower LED displays the output freq.	0.00 0.00	Displays the factory settings, "KEY", "HZ" indicators are on and "HZ" on the upper LED blinks.
2. set freq. setting mode PRG	Enter the parameter-setting mode	F003 0	Upper LED displays the parameter code, lower LED displays the parameter value
△	Search for the parameter code	F004 0	
PRG	Enter parameter-changing mode	0	Parameter value blinks
△	Change the parameter value	1	Parameter value blinks
SET	Complete	1	Complete setting

3.Change the set freq. △ PRG ▽ SET		F013 50.00 50.00 F013 20.00	"Hz" indicator on the upper LED is on, the factory setting of digital set frequency is 50.00. Parameter value blinks The set freq. has been changed to 20.00HZ
4. exit the parameter setting mode ESC	Exit	20.00 0.00	Press ESC to exit from the current parameter setting mode. If you are setting a parameter, pressing ESC to exit from this parameter
5. Forward running at 20Hz FOR	Forward running	20.00 20.00	Lower LED increases from 0.00 Hz to 20Hz. The motor runs forward. The FOR indicator is on.
6.Forward running at 50Hz △	Press key till arrive the target value.	50.00 50.00	The set frequency and the output frequency increase to 50.00Hz.

7.Reverse running at 50Hz PRG △ PRG △ SET ESC REV/JOG	1.Change F014 from 0 to 1 during running. 2.Give the Reverse running command		RUN indicator blinks during deceleration and stops blink when acceleration begins. REV is on. Press "SET" key when the lower LED parameter blinks. Reverse running at 50Hz.
8.Output current SET	Change the parameters displayed on upper and lower LED with "SET" and "ESC" keys		The blinking "Hz" indicator on upper LED is off, "A" indicator is on, the output current is about 16.8 amp
9.Stop running STOP/RESET			Inverter stops running. The upper LED displays 0.0 (amp) and the lower LED displays 0.00 (Hz)

Note: Press "ESC"key to exit parameter-setting under running status. Otherwise, the parameter code will be F003 when you enter parameter-setting mode next time.

Section Ⅳ Function Parameter Table

Code	Function Description	Range of set value and definition	Factory setting	Adjustable when running
F001	Upper LED Monitoring selections	0: Set frequency 1: output frequency 2: Actual output current 3:Percentage of output current 4: Actual Input voltage 5. Actual Output voltage 6: Motor speed 7. Percentage of left time of step running 8: Total running time 9: PID setting 10: PID Feedback	0	√
F002	Lower LED Monitoring selections		1	√
F003	Control Method	0: by keypad 1: by terminals 2: by RS-485 control	0	×
F004	Frequency Setting Mode	0: keypad digital setting 1: analog input 2: PID control running 3. program running 4. traverse running 5. multi-step speed 6. ascending/descending mode 7: RS485 input	1	×

F005	Frequency Setting Analogue Input Mode	0.keypad potentiometer 1.external terminal voltage signal input AIV:0-10V 2.external terminal voltage signal input AIV:0-5V 3.external terminal current signal input AIC:4-20mA 4.external terminal current signal input AIC:0-20mA (I series: 0-1A) 5.external terminal K1*(0-10V) +K2* (4-20mA) 6.external terminal K1*(0-10V) +K2* (0-20mA) 7.external terminal K1*(0-5V)+K2* (4-20mA) 8.external terminal K1*(0-5V)+K2* (0-20mA) 9.external terminal K1*(0-10V)+K2*(4-20mA) -50% 10.external terminal K1*(0-10V)+K2*(0-20mA) -50% 11.external terminal K1*(0-5V)+K2*(4-20mA) -50% 12.external terminal K1*(0-5V)+K2*(0-20mA) -50% 13.external terminal K1*(0-10V)+K2*keypad potentiometer	0	×
F006	Keypad potentiometer input analogue signal gain	0 - 200%	105%	√

F007	Keypad potentiometer analogue input 0 drifting	0 - 90%	3%	√
F008	External terminal AIV,AIC input analogue signal gain	0 - 200%	105%	√
F009	AIV,AIC analogue input zero drifting	0 - 90%	4%	√
F010	External terminal analogue input coefficient K1	0 - 200%	100%	×
F011	External terminal analogue input coefficient K2	0 - 200%	100%	×
F012	Analogue setting offset freq.	0.00 - upper limit frequency	0Hz	×
F013	Keypad digital setting freq.	Lower limit freq. - upper limit freq.	50Hz	√
F014	Keypad REV/JOG key function selection	0: JOG key 1: REV key	0	√
F015	Max. frequency (Fmax)	0.5 - the highest frequency,	50Hz	×
F016	Base frequency	15.00 - the highest frequency	50Hz	×
F017	Upper limit frequency	0.00 - Max. frequency	50.00	√
F018	Lower limit frequency	0.00 - upper limit frequency	0.00	√
F019	Acceleration time at1	0.1 - 9999	10Sec.	√
F020	Deceleration time dt1	0.1 - 9999	10Sec.	√
F021	SVPWM generation mode	0. step synchronous modulation 1. stepless synchronous modulation 2. asynchronous modulation 3. synchronous modulation	1	×
F022	Carrier frequency	0.540 - 8.00kHz	3.00Hz	√
F023	Torque boost	0 – 33	1	×
F024	Self-set V/F curve	0: No 1: Yes	0	×
F025	Self-set voltage V1	0 - 100%	18%	×

F026	Self-set frequency F1	0.50 - 400.0Hz	10 Hz	×
F027	Self-set voltage V2	0 - 100%	52%	×
F028	Self-set frequency F2	0.50 - 400.0Hz	30 Hz	×
F029	Self-set voltage V3	0 - 100%	100%	×
F030	Self-set frequency F3	0.50 - 400.0Hz	50Hz	×
F031	Jog frequency	0.50 - 400.0Hz	5Hz	√
F032	Jog acceleration time	0.1 - 9999Sec	2.0sec	√
F033	Jog deceleration time	0.1 - 9999Sec	2.0sec	√
F034	Acceleration mode	0: direct line type 1: reverse L type 2: S type 3: blower type	0	×
F035	Deceleration mode	0: direct line type 1: reverse L type 2: blower and inertia type 3: pump type	0	×
F036	Motor stop mode	0: slow down stop 1: free stop	0	√
F037	Start frequency	0.50 - 60.0Hz	0.50Hz	×
F038	Stop frequency	0.50 - 60.0Hz	0.50Hz	×
F039	Min. running frequency	0.00 - 400Hz	0.0Hz	√
F040	AVR	0: Valid 1: Invalid	0	√

F041	Manual control voltage output	0: manual control voltage invalid 1. external terminal VF1:0-10V 2. external terminal VF1:0-5V 3. external terminal AF1:4-20mA 4. external terminal AF1:0-20mA 5. external terminal VF2: 0-10V 6. external terminal VF2: 0-5V 7. external terminal AF2:4-20mA 8. external terminal AF2:0-20mA	0	×
F042	Percentage of output voltage	25 - 100%	100%	√
F043	Economic running during acc/dec	0: No 1: Yes	0	√
F044	Min output voltage percentage at economical running	25 - 100%	100%	√
F045	Reverse prohibited	0: not prohibited 1: prohibited	0	×
F046	Opposite direction running	0: No 1: Yes	0	×
F047	Power consumption brake	0. Do not brake 1. safe brake 2. normal brake.	0	√
F048	Over-voltage stalling protection	0: No 1: Yes	1	√
F049	Current limit	0: No 1: Yes	0	√
F050	Pick up	0: No 1: Yes	0	×
F051	Restart after power off	0: No 1: Yes	0	×
F052	Reset times after fault	0 - 10	0	×
F053	Proportional factor of motor speed	0.1 - 60.0	30.0	√

F054	clear the total running time	0: Do not clear 1: Clear automatically after power off	0	√
F055	Warm up time	(0.0-9999)*10Sec	0 Sec	√

F060	Programming input terminal DI1	0: Reverse (REV) 1: JOG 2: Multi-step speed control 1 3: Multi-step speed control 2 4. Multi-step speed control 3 5. acc/dec running frequency increase by degrees 6. acc/dec running frequency decrease by degrees 7. analogue signal input terminal selection 8.tri-line running control 9. cancel PID control 10. external failure alarm	0	×
F061	Programming input terminal DI2		1	×
F062	Programming input terminal DI3		2	×
F063	Programming input terminal DI4		3	×
F064	Programming input terminal DI5		4	×
F065	Programming input terminal DI6		5	×
F066	Multi-step speed terminal control mode	0: hold 1: Jog	0	×
F067	Multi-step rotation direction control mode	0: follow the program running direction 1: abide by the terminal input direction	0	√
F068	Free stop terminal control mode	0: Auto restore after break off 1: Do not restore after break off	0	×
F069	Tri-line running control mode	0: standard running 1: tKOC-line running 2: tri-line running	0	×
F070	Programming terminal 1# output function (RA1,RB1,RC1)	0: zero frequency (standby) 1: fault trip alarm 2: frequency arrival 3: running	1	×

F071	Programming terminal 2# output function (RA2,RB2,RC2)	4: inverter reverse 5: low voltage 6: under load precaution 7: impact current arrival 8: output ⩾ upper limit frequency 9: output ⩽ lower limit frequency 10: current limit or lower frequency output 11: pipe line leak warning 12: pipe line block warning 13: high pressure arrival 14: low pressure arrival 15: sensor disconnected	2	×
F072	Programming terminal 3# output function (DO1)		3	×
F073	Programming terminal 4# output function (DO2)		4	×
F074	Amplifying coefficient of the analogue output proportion of the frequency meter	30 - 105%	100%	√
F075	Amplifying coefficient of the analogue output proportion of the current meter	30 - 105%	100%	√
F076	Frequency meter base point adjust	0 – 6550	100	√
F077	Current meter base point adjust	0 - 6550	100	√
F078	Frequency level detect 1	0.00 - 400.0Hz	30.00	√
F079	Frequency level detect 2	0.00 - 400.0Hz	30.00	√
F080	Percentage of under load precaution	0 - 99%	0%	√
F081	Impact current percentage	110 - 200%	150%	√
F090	DC braking voltage	0.0 - 10.0%	5%	√
F091	DC braking time when stop	0.0 - 10.0Sec	0sec	√

F092	DC braking start frequency when stop	0.00 - 60.00Hz	0Hz	√
F093	DC braking time when start	0.0 - 10.0Sec	0Sec	√

F100	Jump frequency 1	0.00 - 400.0Hz (highest freq.)	0.00hz	√
F101	Jump frequency 2	0.00 - 400.0Hz (highest freq.)	0.00hz	√
F102	Jump frequency 3	0.00 - 400.0Hz (highest freq.)	0.00hz	√
F103	Jump frequency range	0.00 - 5.00Hz	0.00hz	√

F110	PID control mode	0: negative feedback 1: positive feedback	0	×
F111	PID set signal selection	0. external terminal AIV:0-10V 1. external terminal AIV:0-5V 2. external terminal AIC:4-20mA 3. external terminal AIC:0-20mA 4. keypad potentiometer input 5. keypad numerical input 6. Rs-485 input	4	×
F112	Keypad numerical PID set value	0.0 - 100%	50%	√

F113	PID feedback signal selection	0. external terminal VF1:0-10V 1. external terminal VF1:0-5V 2. external terminal AF1:4-20mA 3. external terminal AF1:0-20mA 4. external terminal VF2: 0-10V 5. external terminal VF2: 0-5V 6. external terminal AF2:4-20mA 7. external terminal AF2:0-20mA	2	×
F114	Max. sensor range	1.0 - 99.0	10	×
F115	Feedback filter time constant	0.0 - 60.0S	2Sec	√
F116	Proportion gain P	0.1 - 100.0	50.0	√
F117	Integral time I	0.1 - 100.0S	2Sec	√
F118	Differential time D	0.000 - 9.999S	0.000	√
F119	inspection coefficient of stop	0 - 20%	5%	√
F120	Start pressure value	30 - 100%	80%	√
F121	Upper pressure arrival	0 - 100%	100%	√
F122	Lower pressure arrival	0 - 100%	0%	√
F123	Tube leak confirm value	0 - 9999S	0sec	√
F124	Tube block up confirm value	0 - 100%	100%	√
F125	System precaution stop select	0: running 1: stop running	0	√

F130	Program running mode	0: single circulation 1: continuous circulation 2: single circulation and then running at the 7th step speed till STOP command received	0	×
F131	Re-start after abnormal stop and automatic reset under program running mode	0: running at 1st step speed 1: running at the stop speed	0	×
F132	Program running after stop and restart	0: running at 1st step speed 1: running at the stop speed	0	×
F133	Multi-step speed 1	0.50 – the highest frequency	5 Hz	√
F134	Multi-step speed 2		10 Hz	
F135	Multi-step speed 3		20 Hz	
F136	Multi-step speed 4		30 Hz	
F137	Multi-step speed 5		40 Hz	
F138	Multi-step speed 6		45 Hz	
F139	Multi-step speed 7		50 Hz	
F140	speed 1 running direction	0: Forward 1: Reverse	0	√
F141	speed 2 running direction		0	
F142	speed 3 running direction		0	
F143	speed 4 running direction		0	
F144	speed 5 running direction		0	
F145	speed 6 running direction		0	
F146	speed 7 running direction		0	
F147	Acceleration time at2	0.1 - 9999Sec	10Sec	√
F148	Deceleration time dt2		10Sec	
F149	Acceleration time at3		10Sec	
F150	Deceleration time dt3		10Sec	
F151	Acceleration time at4		10Sec	
F152	Deceleration time dt4		10Sec	
F153	Acceleration time at5		10Sec	

F154	Deceleration time dt5		10Sec	
F155	Acceleration time at6		10Sec	
F156	Deceleration time dt6		10Sec	
F157	Acceleration time at7		10Sec	
F158	Deceleration time dt7		10Sec	
F159	speed 1 running time T1	(0.00 - 9999)×10Sec	2.00	√
F160	speed 2 running time T2		2.00	
F161	speed 3 running time T3		2.00	
F162	speed 4 running time T4		2.00	
F163	speed 5 running time T5		2.00	
F164	speed 6 running time T6		2.00	
F165	speed 7 running time T7		2.00	
F170	Traverse running frequency f1	0.5 - upper limit frequency	40Hz	√
F171	Traverse running frequency f2	0.5 - upper limit frequency	20Hz	√
F172	Traverse running difference frequency △f	0.00 - 5.00Hz	2Hz	√
F173	Traverse running time T1	(0.00 - 9999)×10Sec	2.00	√
F174	Traverse running time T2	(0.00 - 9999)×10Sec	2.00	√
F180	RS-485 baud rate	0: 1200, 1: 2400, 2: 4800, 3: 9600,		×
F181	RS-485 Communication address	1 - 255		×

F190	Failure inquiry	0: Do not inquire 1: Inquire	0	√

F191	Restore to factory setting	0: No 1: Yes	0	×
F192	Parameter locking	0: NO 1: YES	0	√
F193	Auto parameter setting	0: No 1: Yes	0	×
F194	Load type	0: Unclear 1. constant torque type 2. Blower(brake first) 3. Pump(water hummer) 4. Inertia object (free run) 5. Friction type(acceleration curve is reversed L) 6. conveyor (acceleration curve is S type) 7. Drill press 8. Kowtow machine	1	×
F200	Motor rated power	0.75 - inverter rated capacity (KW)		×
F201	Motor rated voltage	100 - inverter rated voltage (V)		×
F202	Motor rated current	0.1 - inverter rated current (A)		×
F203	Motor rated frequency	Base frequency – the highest frequency		×
F210	Inquire the inverter's series	0: G 1: P 2: H 3: I 4: SF(T) 5: GH		×
F211	Inquire the inverter's rated output capacity	0.75 - 1200 KW		×
F212	Inquire the inverter's rated input voltage	100 - 1140 V		×
F213	Inquire the inverter's rated output current	0.1 - 1000 A		×
F214	Inquire the highest frequency	120.0 - 2000 Hz		×
F215	Inquire the version of software			×
F216	Inquire the manufacturing time-Year			×

F217	Inquire the manufacturing time-Month			×
F218	Inquire the manufacturing time-Day			×
F219	Inquire the serial number 1 of the inverter			×
F220	Inquire the serial number 2 of the inverter			×

Note: " √ "indicates that the parameter is adjustable during running.

Section Ⅴ Function Parameters Description

5.1 Basic Function

5.1.1 Select LED Screen (0-10) (F001, F002)

There are two LED screens on the keypad. This parameter chooses one item from ten monitor items. The upper LED can be changed by SET on the keypad and the lower LED can be changed by the ESC on the keypad.

The following table is the designation of codes.

Code	Monitored subject	Indicator	Definition
0	Set frequency	Hz（flash）	Set frequency
1	Output frequency	Hz	Shows the output frequency of the inverter
2	Actual output current	A	indicates the actual value of the load current
3	Output current percentage	%	Shows the percentage of the load current The value is the ratio of the value detected by the inner current sensor to the rated output current of the inverter.
4	Actual input voltage	V	indicates the actual voltage of power supply on input side, which is calculated by measuring the voltage on DC bus. If power feedback exists, indicated value will be greater than actual value of input voltage.
5	Actual output voltage	V(flash)	indicates the inverter actually output voltage
6	Motor speed	RPM	indicates the linear speed of motor, and the indicated value relates to function F053. User can correct the indicated speed value of motor by modifying this parameter.

7	the percentage of the left time of each step speed	% (flash)	the percentage of the left time of each step speed. Valid under program running control
8	Total running time	off	indicates the total running time, and the unit is hour.
9	PID set	Mpa(flash)	indicates the percentage of setting pressure.
10	PID feedback	Mpa	indicates the percentage of the feedback pressure.

5.1.2 Operation control mode (F003)

0: keypad operation

FOR(forward), REV/JOG and STOP/RESET keys on the keypad are effective. REV/JOG is switched by F014, REVerse is also controlled by F045 (except program running and multi-step speed running); STOP mode is controlled by F036. RESET could be fault reset or escape at parameter set mode, but its parameter goes back to F003.

1: terminals blocks control

FOR, REV and JOG (selecting programmable terminal DI1 – DI6) short circuits with COM to control forward, reverse and jog running. JOG is higher priority under this mode. See F069 for the detail.

2: RS-485 control

RS-485 communication operation command

STOP key on the keypad, RST terminal and STOP in the RS-485 communication are all effective RESET command when fault reset.

5.1.3 Frequency setting mode (F004)

0: Up/Down key on the keypad or set F013

1: analogue input

The analogue input keypad potentiometer or AIV, AIC terminals can be selected by F005.

2.PID control running

REV is invalid. The feedback signals enter from VF, AF. Several modes are

selectable. See 3.3.3

3. program running

The operation direction is free from the reverse prohibition and decided by the direction of the multi-step speed operation.(See 3.3.4)

4: traverse running

no reverse, no upper and lower frequency limitation. (See 3.3.9)

5: multi-step speed on the terminal blocks

This function is controlled by programmable terminal DI1-DI6. The speed of each step is set by F133-F139, max. 7 steps could be set. The 0 step speed is set by the keypad potentiometer and its acc/dec time is set by F019/F020. The 1st step acc/dec time are set by F019/F020. The 2nd to 7th steps acc/dec time are set by F147-F158. The direction of the each step is not decided by F045 (reverse prohibited) but by F067. The multi-step speed terminal control speed mode is valid when F066 is set hold on or jog..

See the below table for the multi-step speed:

ON= connect with COM OFF= disconnect with COM

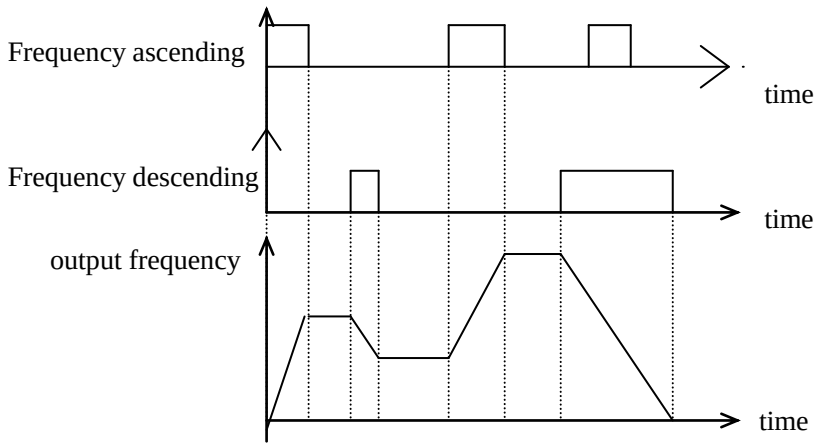
Speed / Terminal	1X	2X	3X	4X	5X	6X	7X
Speed1	ON	OFF	ON	OFF	ON	OFF	ON
Speed 2	OFF	ON	ON	OFF	OFF	ON	ON
Speed 3	OFF	OFF	OFF	ON	ON	ON	ON

Multi-speed1, 2, 3 are the terminals 2, 3, 4 of DI1-DI6. See F060-F065 for the details about the external terminals.

The ∧ ∨ keys on the keypad can adjust the speed during running, but the adjustment will not be saved after power off.

6: ascending & descending running controlled by the terminal

This function is controlled by programmable terminal DI1-DI6. Reverse is invalid when use this control. The output frequency is limited by upper and lower frequency limit when short circuit COM with ON.



7: RS485 input

Control according to communication protocol through terminal CN2 and CN5

5.1.4. Set frequency analogue input selections (F005)

0:keypad potentiometer set

1:external terminal voltage signal input AIV: 0-10V

2:external terminal voltage signal input AIV: 0- 5 V

3: external terminal current signal input AIC: 4 -20mA

4: external terminal current signal input AIC: 0 -20mA (in 9I series: AIC: 0-1A)

5:external terminal K1*(0-10V)+K2*(4-20mA)

6: external terminal K1*(0-10V)+K2*(0-20mA)

7:external terminal K1*(0-5V)+K2*(4-20mA)

8:external terminal K1*(0-5V)+K2*(0-20mA)

9:external terminal K1*(0-10V)+K2*(4-20mA)-50%

10: external terminal K1*(0-10V)+K2*(0-20mA)-50%

11: external terminal K1*(0-5V)+K2*(4-20mA)-50%

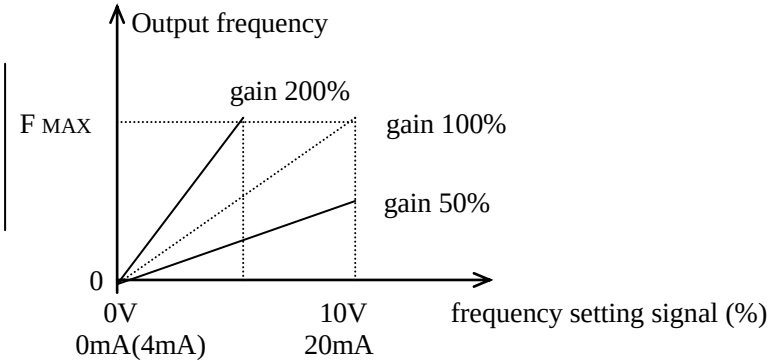
12: external terminal K1*(0-5V)+K2*(0-20mA)-50%

13: external terminal K1*(0-10V)+K2* keypad potentiometer

Keypad potentiometer input analogue signal gain (0-200%) (F006)

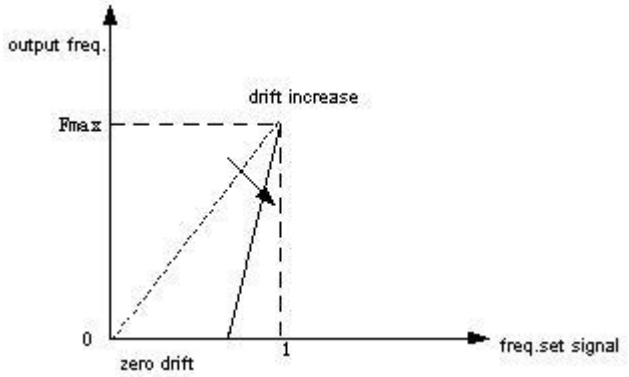
When the frequency setting is controlled by the keypad potentiometer or terminal

analog input, the frequency setting signal gain is the ratio of maximum output frequency percentage to the maximum output frequency's frequency setting signal percentage. This parameter is used for the compensation of frequency setting signal.



Keypad potentiometer analogue input Zero Drift value (0-90%) (F007)

It is the analogue input ratio between the drift value and the analogue input corresponded to the max. frequency when it is set 0. It is used to applications that the analogue signal zero drift need to be eliminate.



External terminals AIV,AIC input analogue signal gain(0-200%) (F008)

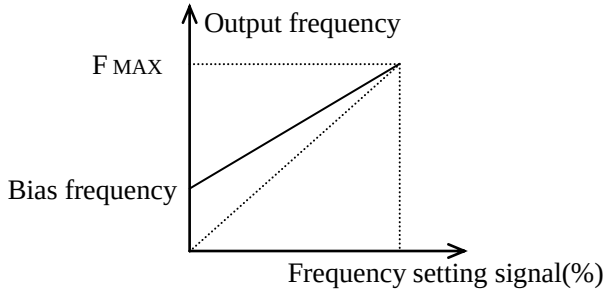
External terminals AIV,AIC analogue input zero drift value(0-90%) (F009)

External terminals analogue input coefficient K1 (0-200%) (F010)

External terminals analogue input coefficient K2 (0-200%) (F011)

Analogue set bias frequency (0-upper limit frequency) (F012)

Bias frequency is the output frequency correspond to min. signal when the frequency setting is controlled by keyboard potentiometer or terminal analog input. This parameter is used for fine control.



Keypad set frequency (lower limit frequency - upper limit frequency) (F013)

Keypad REV/JOG key function selection (F014)

0: JOG key 1: REV key

5.1.5 Frequency parameters (F015-018)

Max. frequency (F_{MAX}) (0.50-the highest frequency) (F015)

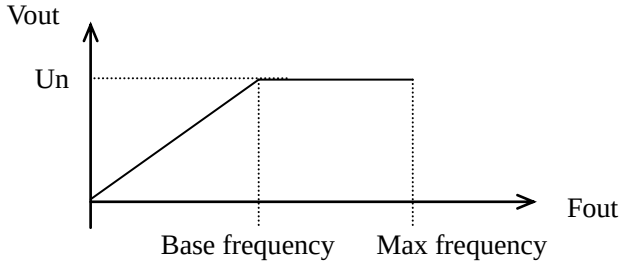
F_{MAX} is the output frequency corresponded to the max. analogue input, it is also the base to set the acc/dec time.

Note: The highest frequency is different in different product series. It is 400Hz in G (general type), I (for plastic machines) and T (for textile machines), 120Hz in P (for blowers and pumps) and 2000Hz in H (for spindles)

The base frequency (F_{BASE}) (15.00-the highest frequency) (F016)

Select **F_{BASE}** for the motors with different base frequency.

Basic V/F feature curve:

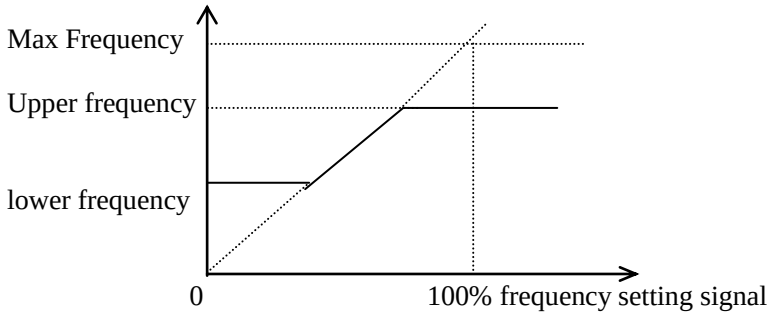


Upper limit frequency (lower limit freq.-Max. freq.) (F017)

Lower limit frequency (0.00-Upper limit freq.) (F018)

When the frequency setting command is greater than upper limit, the operation

frequency is the upper limit. When the frequency setting command is below the lower limit, the operation frequency is the lower limit. When starting the standstill motor, the frequency converter's output is accelerated towards the set value from 0Hz according to the acceleration time. When the motor stops, the set frequency starts to decelerate towards 0Hz according to the deceleration time.



5.1.6 The 1st step acc/dec time(F019-020)

The 1st step acc time at1(0.1-9999s) (F019)

The time to accelerate from 0Hz to the max. frequency.

The 1st step dec time dt1(0.1-9999s) (F020)

The time to decelerate from the max. frequency to 0Hz

SVPWM generation mode (F021)

Please select the most suitable method according to the actual application:

0: step synchronous modulation

1: stepless synchronous modulation

2: asynchronous modulation

3.:synchronous modulation

5.1.7 Carrier frequency (0.540-8.00KHZ) (F022)

This function is mainly used to decrease the possible noise and vibration during the operation of inverter. When carrier frequency is higher, the output current has better wave and the motor produces light noise, so it is very suitable for quiet places. But the damage to the switches of main components and the heat generated by the inverter are great, the efficiency is decreased and the output capacity is reduced. At the same time, more serious radio interference is resulted and special attention must be paid for application where very low EMI is needed, and filter option can be used if necessary. Another problem for application of high carrier frequency is the increase of capacitance-leakage current. The protector for leakage current may malfunction,

and over current is also possibly caused.

When low carrier frequency is applied, the case is almost contrary to the above mentioned.

Different motor has different reflection to the carrier frequency. The best carrier frequency is gained after regulation according to actual conditions. The higher the motor capacity is, the lower the carrier frequency should be selected.

Note: The higher carrier frequency causes the higher the inverter's temperature rise.

Take 380V as example:

30KW and below, the carrier frequency ＜8KHz

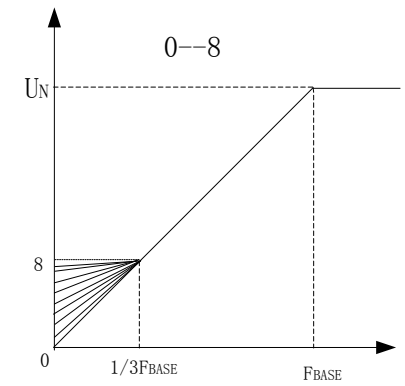
37-75KW, the carrier frequency ＜4KHz

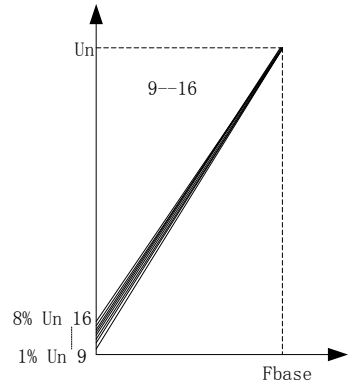
93-200 KW , the carrier frequency ＜3KHz

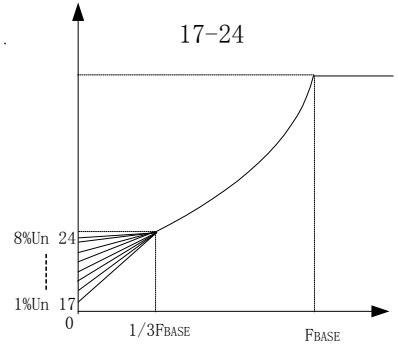
above 220kW, the carrier frequency ＜2KHz

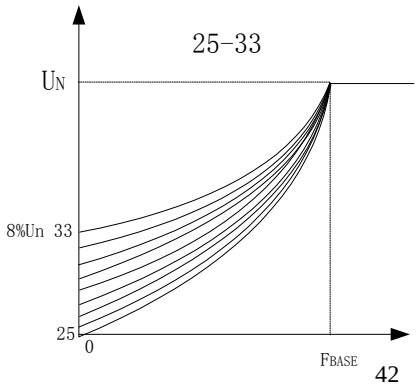
Note: F191 (Restore factory setting) is invalid to this parameter.

5.1.8 Torque boost (F023)









34 kinds of V/F curves are provided among which 0-16 are suitable for constant torque and 17-32 are suitable for blowers and pumps.

0:basic V/F feature without torque boost

1-8: torque boost within 0-1/3$F_{BASE,}$

9-16: torque boost within 0-$F_{BASE,}$

17-24:torque boost within 0-1/3$F_{BASE,}$ (square torque curve)

25-33:torque boost within 0-F_{BASE} (square torque curve)

5.1.9 Set V/F curve at discretion (F024-F030)

self-set V/F curves selection(F024)

0:invalid 1:valid

self-set voltage V1/V2/V3(0.0-100.0%) (F025/F027/F029)

The user set the 1st, 2nd and 3rd voltage percentage according to the inverter's 100% rated output voltage as reference base and corresponding to the F1, F2 and F3.

Self-set frequency F1/F2/F3 (0.50-400.0HZ) (F026/F028/F030)

The user sets the V/F curve's 1st, 2nd and 3rd frequency valued corresponding to the V1, V2 and V3

Take a 380V inverter and a 380V/50Hz motor for an example:

V1: 5% , F1: 2.50

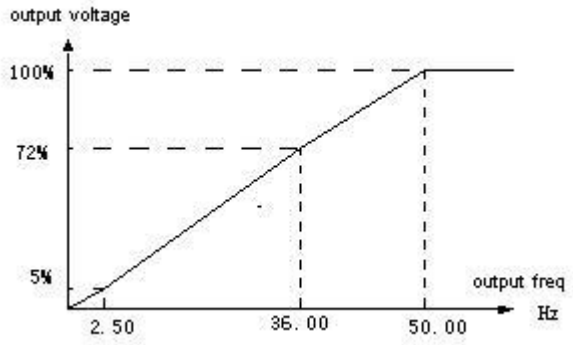
V2: 72% F2: 36.00

V3: 100% F3: 50.00

The parameters must be

0 ≤ F1 < F2 < F3 ≤ the highest frequency

0≤V1≤V2≤V3≤100%



5.1.10 Jog (F031-F033)

Jog frequency (0.50-400Hz) (F031)

Jog frequency in not limited by the upper/lower limit frequency. The factory settings of jog frequency and output frequency of P type are different from those of other types because when the fire-fighting command is valid, the jog function can accelerate the output rapidly to 50Hz and most extensively meet the requirement of fire-fighting.

Acc/dec time of Jog (0.1-9999Sec) (F032/F033)

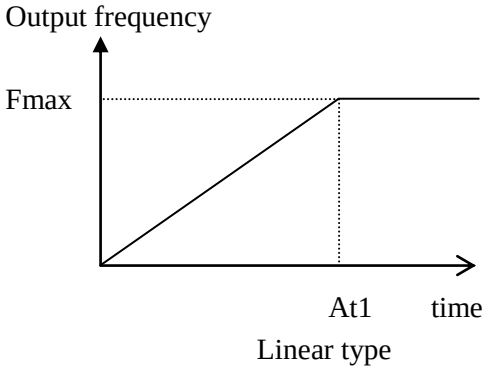
The definition of acc/dec time of Jog is the same as that of the 1st step speed. The terminal jog command has priority but free, that is, for any speed control method, once the terminal jog command is valid, the operating frequency must be immediately accelerated or decelerated to the jog frequency within the jog acceleration or deceleration time under present control method.

The jog command of keypad has not priority.

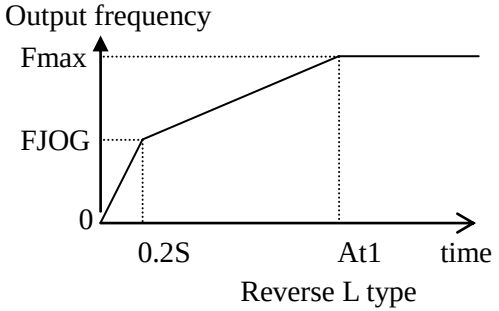
5.1.11 Acceleration mode (F034)

0: linear type 1: reverse L type

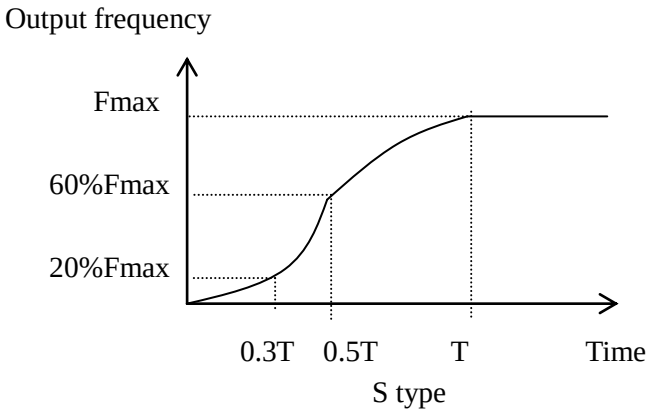
2: S type 3: blower type



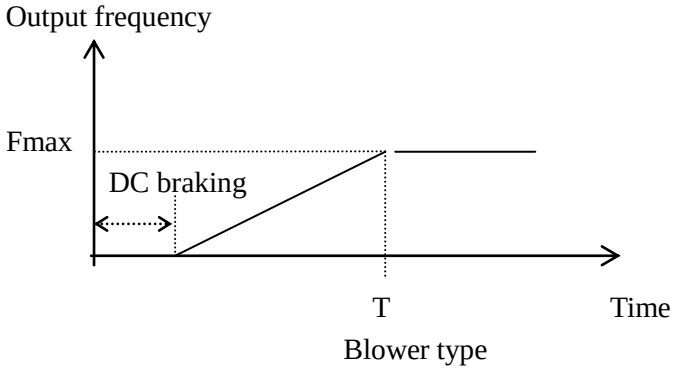
Linear type



Reverse L type



S type

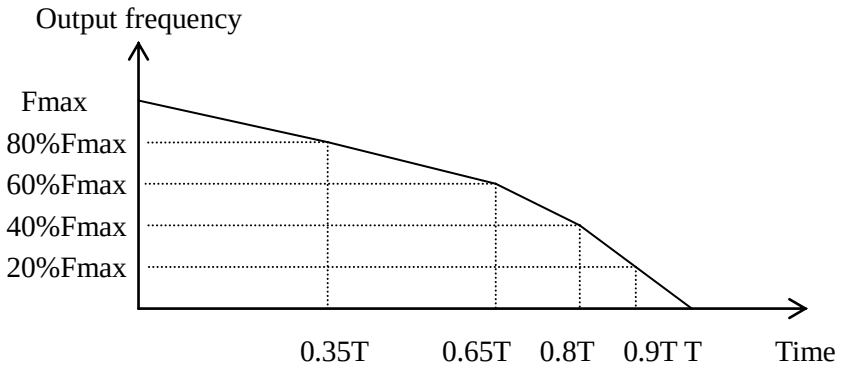


Blower type

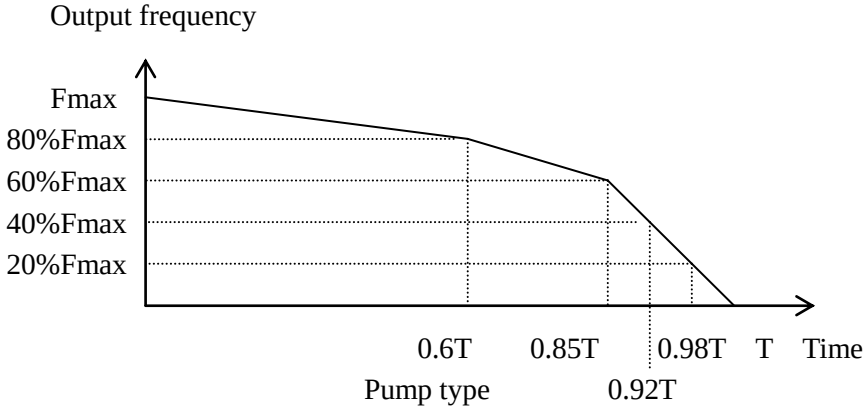
5.1.12 Deceleration mode (F035)

4 modes for deceleration (0: linear, 1: reverse L 2: blower and inertia type, 3: pump type) are provided to meet the demands for different machines.

The direction of the deceleration mode of linear type and reverse L type is the opposite direction of acceleration mode of themselves.



Blower and inertia object type



Pump type

5.1.13 Motor stop mode (F036)

0: decelerate and stop: the inverter decelerates to the stop frequency and finally stops according to the set decelerate time.

1: free stop: the inverter stops output immediately at the STOP command and stops freely by load inertia.

5.1.14 Start frequency (0.50-60.00HZ) (F037)

It is the min. output frequency when the inverter starts

5.1.15 Stop frequency (0.50-60.00HZ) (F038)

When STOP command comes, the inverter will decelerate according to dec time to stop frequency and finally stops output. The motor stops

5.1.16 Min. running frequency (0.00-400.0HZ) (F039)

The inverter stops when the set frequency is lower than the min. running frequency. The inverter takes the set frequency as 0.00Hz when the it is lower than the min. running frequency.

5.1.17 AVR selection (F040)

0:valid 1:Invalid

When the AVR is invalid, the output voltage varies with the input voltage; when the AVR is valid, it can protect the stability of the output voltage. Since the system has the function of Automatic Voltage Regulation (AVR), CPU detects the voltage of DC bus of inverter and optimizes it at real-time. When the grid voltage fluctuates, the output voltage changes a little. Its V/F characteristics are always close to the state set for rated input voltage. If the grid voltage is below this set value, the output voltage can only be proportional to the input voltage

5.1.18 Manually control the output voltage selection (F041)

0: manual control invalid

1: external terminal VF1:0-10V

2: external terminal VF1:0-5V

3: external terminal AF1:4-20mA

4: external terminal AF1:0-20mA

5: external terminal VF2:0-10V

6: external terminal VF2:0-5V

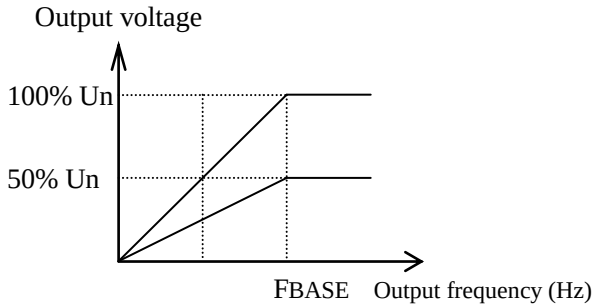
7: external terminal AF2:4-20mA

8: external terminal AF2:0-20mA

5.1.19 Output voltage percentage (25% - 100%) (F042)

It is the percentage of output voltage and rated output voltage of the inverter and is used to adjust output voltage to suit the different V/F characteristics.

Output voltage = rated output voltage*output voltage percentage



Un: the rated output voltage of the inverter

5.1.20 Economic running during acc/dec(F043)

0: invalid 1: valid

5.1.21 Min. output voltage percentage under economic running mode (25% - 100%) (F044)

The inverter calculates the best output voltage according to the load status at constant speed running. (not calculate at acc/dec running if F043=0). It decreases the output voltage and increases the power factor and motor effectivity to save the energy, therefore it decides the min.output voltage. For example, when the parameter is set 100%, the economic running mode is off.

Actual output voltage = rated output voltage*output voltage percentage*economic output voltage percentage (real time value)

5.1.22 Reverse prohibit (F045)

0: invalid 1: valid

The inverter's forward direction might be different form the motor's. The user can define it by changing the output phase sequence. When this parameter is set 1, the reverse command from both external terminal and keyboard are invalid. Reverse prohibit is invalid at multi-step speed running and program running.

5.1.23 Opposite to the set running direction (F046)

0:the motor's running direction is the same as its set direction

1:the motor's running direction is opposite to its set direction

5.1.24 Power consumption brake selection (F047)

0:invalid

1:valid, secure brake

2:valid, normal brake

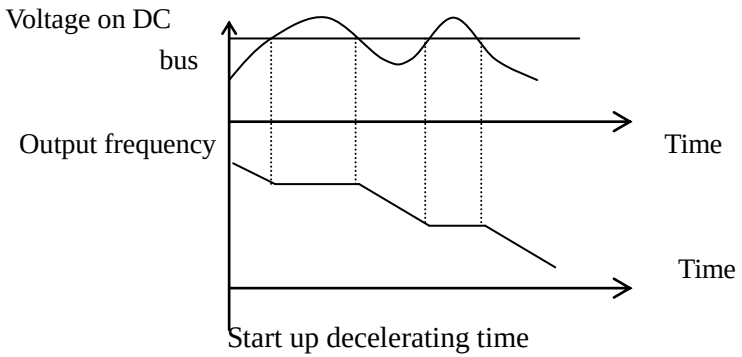
5.1.25 Over voltage stall protection (F048)

0: invalid

1: valid.

When the inverter decelerates, the motor will generate feedback energy back to inside of inverter due to the load inertia. When this function is valid, the inverter will stop decelerating when it detects an over voltage at the DC common bus. (Output frequency remains unchanged) and will not decelerate until the voltage is below the set value.

This function should be set to 0 for B type inverter or inverter with external braking unit.

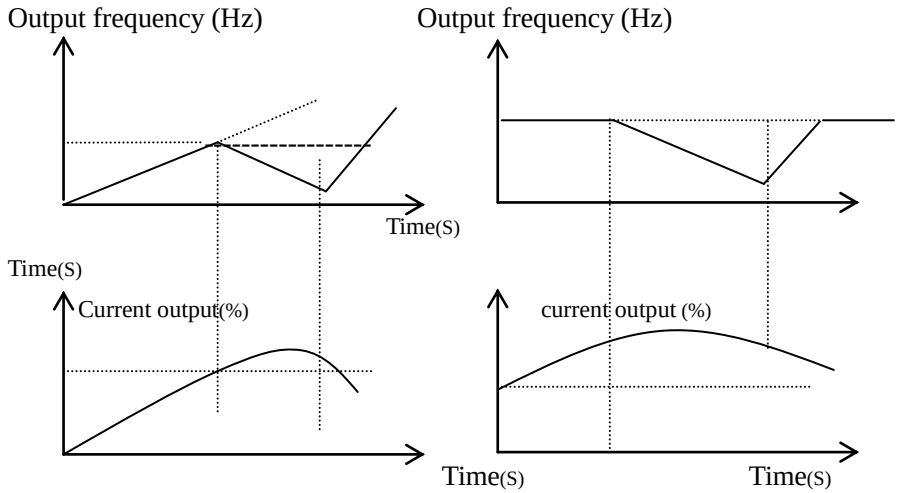


5.1.26 Current limit function (F049)

0: invalid 1: valid.

When the inverter accelerates or runs steadily, its output current could rise very quickly due to too fast acceleration or too heavy load of the motor. When the function is valid and the current exceeds 140% of the rated current, the inverter will stop acceleration (the output frequency remains the same at first and will lower to and remain min. 1.00Hz if the current doesn't decrease), while when the current is below 140% of the rated current, the inverter will continue acceleration.

When the inverter runs at the set frequency, it will reduce the output frequency automatically if the current is too high, in order to avoid tripping OC. When the current is below the standard value, the output frequency will restore to the set frequency.



acceleration OC stable OC

5.1.27 Pick up selection (F050)

When this parameter is 1, if resume running, it will pick up. But when this parameter is 0, it starts at 0.5Hz or at start frequency (start frequency is bigger than 0.5Hz.).

Restart after power off (F051)

0: not start when power supply is given after power off.

1: keep the former running state if the motor is still running when power off and then power on.

Give power supply after the control part of the inverter completely discharged, if the operation control parameter F003 is set 0: keypad, this parameter is valid, otherwise, it is invalid.

5.1.28 Reset times after fault (0-10) (F052)

The inverter can run in the same state after automatic reset when OC, OU or OL fault occurs during operation. The automatic reset times is decided by this parameter and the max. is 10 times. If the parameter is set 0, no automatic reset after fault unless the LU (or MCC) fault occurs to the DC main circuit.

5.1.29 Proportional factor of mechanical speed (0.1-60.0) (F053)

This proportional factor is used to regulate the display of the motor speed.

During the operation monitoring,

motor speed = operation frequency×proportional factor of mechanical speed

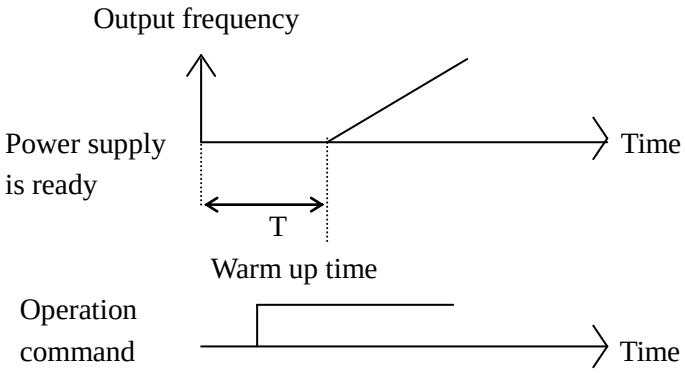
5.1.30 Clear total running time (F054)

0:Do not clear

1:Clear after power off

5.1.31 Warm up time ((0.0-9999)*10) (F055)

When the power supply is ready, count the time till the warm up time is up. The unit is 10 seconds. The unit of backWard counting display is 1 second.



5.2 Functions of External Terminals

5.2.1 Function parameters of the external terminals

The input functions of programmable terminals DI1-DI6 (F060-F065)

Code	Name	Definition
0	REV	Rev command
1	JOG	JOG command
2	multi-step speed 1	multi-step speed command
3	multi-step speed 2	
4	multi-step speed 3	
5	asc/des running frequency increase	asc/dec control.
6	asc/des running frequency decrease	
7	Analogue signal input selection	AIV, AIC input signal selection.

8	Tri-wiring running	See F069
9	PID control off	under PID control, choose PID close loop control or PID control off
10	External fault alarm	external fault signal input

5.2.2 Multi-step speed terminal control mode (F066)

0: hold on

valid when the terminals keep short circuiting with COM; invalid when open

1: jog

valid when the terminals short circuit with COM.

5.2.3Multi-step speed running direction control (F067)

0 : set according to the program running direction parameter

1 : set according to the terminal input running direction

5.2.4 Free stop terminal control (F068)

0: auto restore when open

1: non-auto restore when open

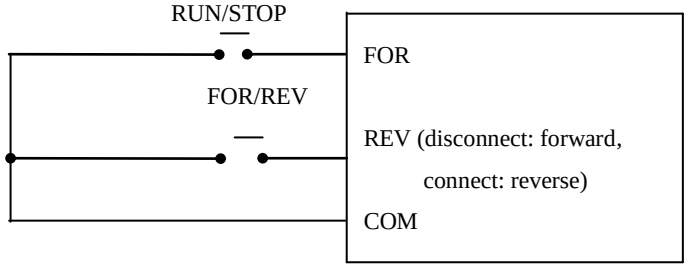
Valid only for terminals' standard running control and 2-wiring control. Invalid for keypad control, RS-485 control, 3-wiring control with RUN close but doesn't hold on.

5.2.5 3-wiring control selection (0-2) (F069)

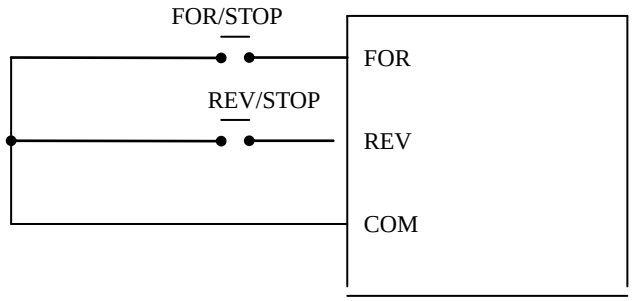
0: standard running control 1: 2-wiring running control

2: 3-wiring running control

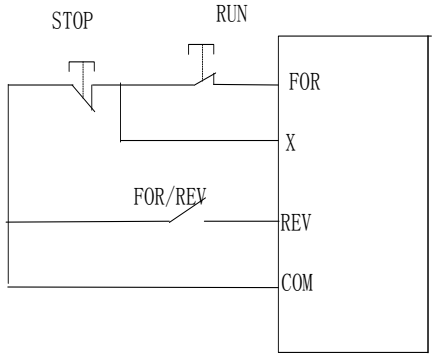
e.g.: standard running control



e.g.:2-wiring running control



e.g.:3-wiring running control



NOTE: Stop/Run are dip switch. Run is to start; Stop is to stop. We get X when DI1-DI6 is set to 8. We get REV when DI1-DI6 is set to 0.

5.2.6 Parameter of the multi-function output terminals (F070-073)

Programmable 1# terminal output selection (RA1,RB1,RC1) (F070)

Programmable 2# terminal output selection (RA2, RB2, RC2) (F071)

Programmable 3# terminal output selection (DO1) (F072)

Programmable 4# terminal output selection (DO2) (F073)

value	Definition	Functions
0	0 frequency (sleep status)	Output signal at standby status
1	fault trip alarm	Output signal when fault, say OU,LU,SC,OC,OH.
2	Frequency arrival	Output signal when the frequency rises to the value set by the frequency level inspection.
3	running	Output signal when there is output frequency
4	Reverse	Output signal when the inverter reverses.
5	low voltage	Output signal when the inverter is under voltage and displays LU
6	under load alarm	Output signal when the load current is lower than the percentage set in F080 and exceeds the setting time.
7	Impact-current arrival	Output signal when the impact-current arrive to the setting value
8	output≥Upper limit frequency	Output signal when the output frequency of inverter is upper limit.
9	output≤Lower limit frequency	Output signal when the output frequency of inverter is lower limit.
10	Current limit or decrease output freq.	Output signal when current limit or lower output frequency decrease when the inverter running with setting frequency.
11	Tube leak alarm	Output signal when the tubing leak inspection value reaches the setting data of F123.
12	Tube block up alarm	Output signal when the tube block up inspection value reaches the setting data of F124.
13	Upper pressure arrival	Output signal when the pressure inspection value reaches the setting data of F121
14	Lower pressure arrival	Output signal when the pressure inspection value reaches the setting data of F122
15	sensor juncture disconnect	Select 4-20mA output sensor, the sensor juncture is thought to disconnect when the feedback inspection is below 3mA. It detects only with PID control and 4-20mA feedback signal

5.2.7 Frequency meter analogue output proportion amplified coefficient (30%-105%) (F074)

set range: 30-105%

5.2.8 Current meter analogue output proportion amplified coefficient (30%-105%) (F075)

set range: 30-105%

5.2.9 Base point adjustment of frequency meter (0-6550) (F076)

Adjust the Zero point of frequency meter output signal FM. The adjusting range is 0-10% and the value is 0-6550.

5.2.10 Base point adjustment of current meter (0-6550) (F077)

Adjust the Zero point of current meter output signal CM. The adjusting range is 0-10% and the value is 0-6550.

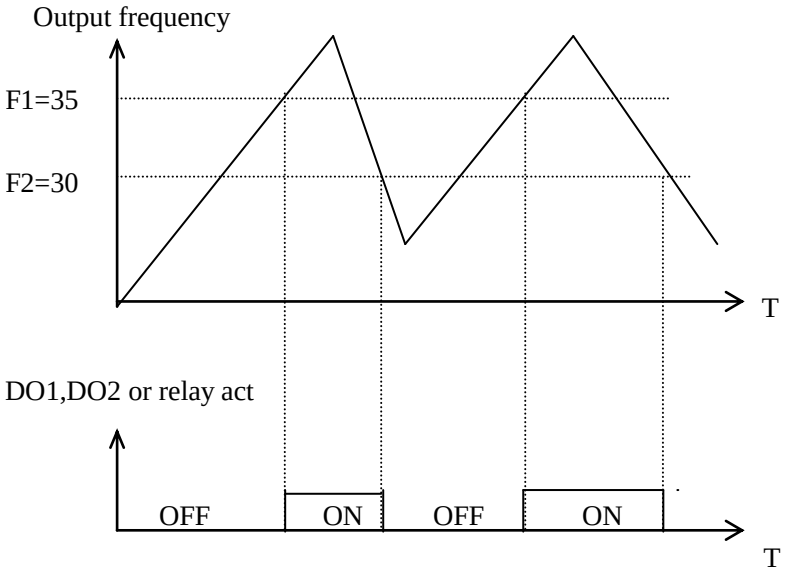
5.2.11 Frequency level inspection 1 (0.00-the highest freq.) (F078)

5.2.12 Frequency level inspection 2 (0.00-the highest freq.) (F079)

When one of F070-F073 is set 2 and the output frequency arrives or exceeds the setting frequency, the related output terminal (RA1,RB1,RC1), (RA2,RB2,RC2),DO1 or DO2 is activated or connected.

For example, set frequency level inspection1: F1=35 Hz

set frequency level inspection 2: F2=30 Hz



When F1≤F2, this function is equal to one frequency level inspection F1. This means that F2 is inefficient.

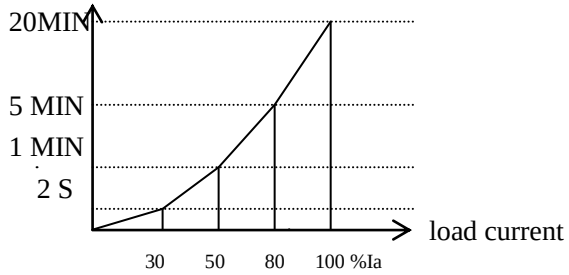
5.2.13 Under-load precaution percentage (0-99%) (F080)

This parameter is used with under-load alarm function.

$$\text{under-load alarm percentage} = \frac{\text{setting load action current Ib}}{\text{rated current of inverter Ia}} * 100\%$$

When the setting is 0, this function is invalid. If one of the selecting output terminal is set 6, the terminal outputs signal when inverter runs steadily and the load current is lower than Ib and arrives to the related time. The action time and load current is as follows:

RELAY action time



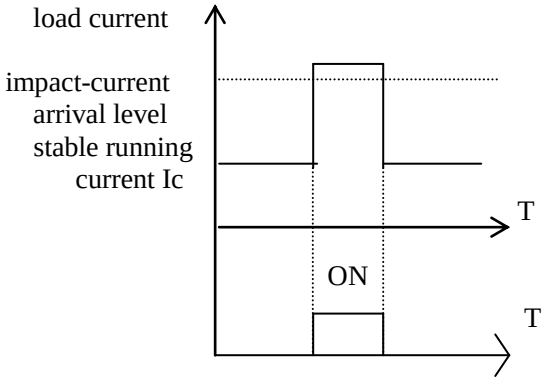
under-load alarm curve

5.2.14 Impact-current percentage (110-200%) (F081)

This parameter is used with impact-current arrival function.

$$\text{Impact-current percentage} = \frac{\text{impact current} * 100\%}{\text{stable running current Ic}}$$

The inverter outputs Ic when running steadily with load. The impact current percentage is the Ic percentage. When the selecting output signal terminal is set 7 and the load current raises rapidly and over this setting data, the terminal will output signal.



5.3 Special functions parameters

5.3.1 DC brake (F090-F093)

The DC brake voltage (0.0-10%) (F090)

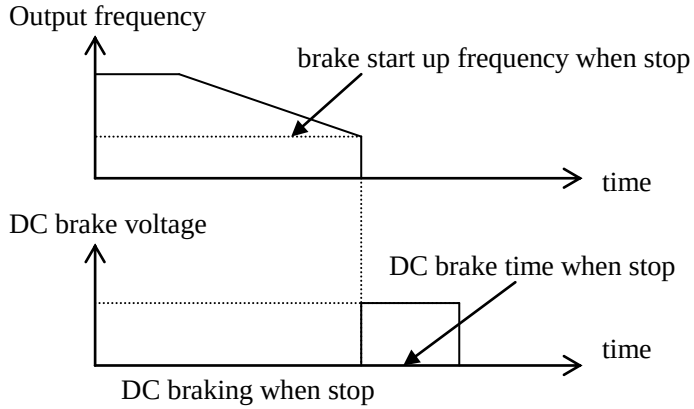
This parameter is used to set the standard value of DC brake voltage of the motor at DC braking. This value is based on the rated voltage of the inverter, so please set this parameter by increasing it gradually.

The DC brake time when stop (0.0-10.0S) (F091)

It is the duration of DC brake voltage for a stop.

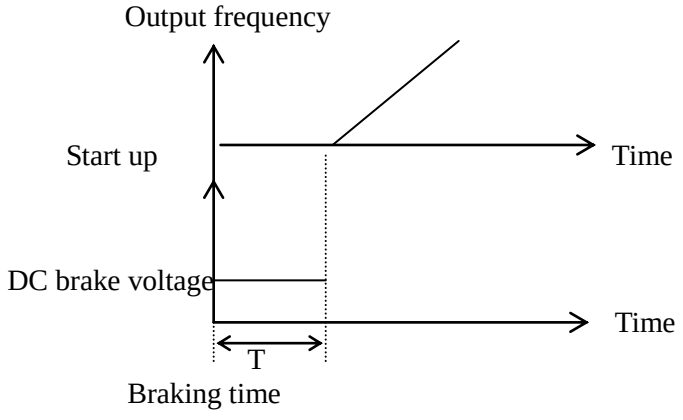
The DC brake start up frequency when stop (0.00-60.0HZ) (F092)

When the inverter decelerates to this frequency, it stops the output of PWM waves, and then start to output the DC brake voltage waves.



The DC brake time when start (0.0-10.0S) (F093)

Only when the acc curve is blower type and the pick up is invalid there is start up DC brake time.



5.3.2 Jump frequency (F100-103)

Jump frequency 1 (0.00 – the highest frequency) (F100)

Jump frequency 2 (0.00 – the highest frequency) (F101)

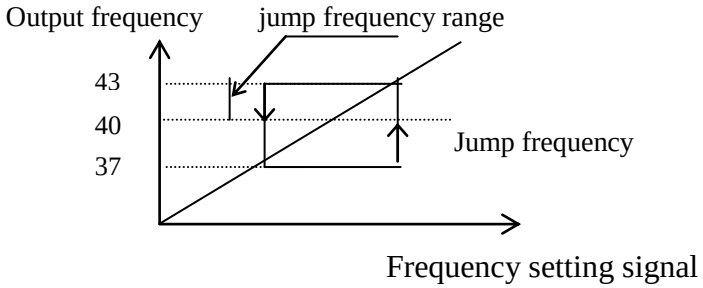
Jump frequency 3 (0.00 – the highest frequency) (F102)

The range of jump frequency (0.00 – 5.00 Hz) (F103)

This function is used to jump over the resonance frequency caused by the machine's natural vibration point. Up to 3 resonance frequency points can be set.

The jump frequency range is frequencies around the jump frequency point. It may be higher or lower than the jump frequency point.

The running is shown as below.

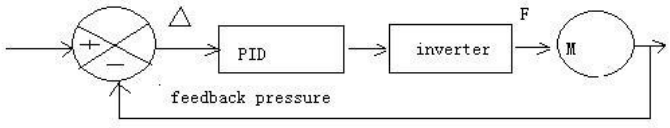


5.3.3 PID control (F110-F125)

PID control mode (F110)

0: negative feedback 1: positive feedback

When the start command is received, the inverter automatically control the output frequency by comparing the set signal and the feedback signal on the terminal block under PID control mode.



(△＝set pressure — feedback pressure)

0: negative feedback: when △>0, frequency rises; when △<0, frequency decreases

1: positive feedback: when △>0, frequency decreases; when △<0, frequency rises

When the terminal which is set to 9 among DI1-DI6 connects, the PID control is off. The set pressure signal becomes the set frequency signal. PID ends.

PID set signal selection (F111)

0: external terminals AIV:0-10v. When the signals at AIV, AIC are set at the same time and the terminal which is set 7 among DI1-DI6 is connected, the set signal automatically change to AIC input, that is, 4-20mA is valid to complete the manual/auto control switch.

1: external terminal AIV: 0-5V

2: external terminal : 4-20mA

3: external terminal AIC: 0-20mA

4: keypad potentiometer input

5: keypad digit input, adjust according to the set value of F112

6: RS-485 input, adjust according to the RS485 input set pressure

Keypad numerical PID setting value (0 – 100%) (F112)

Valid when F111 is set to 5.

0 - 100.0% is corresponding to 0 to max. pressure. When this parameter is valid, it changes synchronically with the set pressure.

PID feedback signal selection (F113)

0: external terminal VF1: 0 - 1 0 V

1: external terminal VF1: 0-5V

2: external terminal AF1: 4-20mA

3: external terminal AF1: 0-20mA

4: external terminal VF2: 0-10V

5: external terminal VF2: 0-5V

6: external terminal AF2: 4-20mA

7: external terminal AF2: 0-20mA

Max. range of the sensor (1.0 - 99.0) (F114)

Set range: 1.0-99.0

It is used to rectify the display data of setting pressure and feedback pressure.

$$\text{Actual LED display value} = \frac{\text{the set or feedback pressure signal} \times \text{max. sensor value}}{\text{Max. pressure signal}}$$

The time constant of feedback filter (0.0 – 60.0 Sec.) (F115)

Increase the parameter, the feedback dynamic change value decreases; decrease the parameter, the feedback dynamic change value increase.

Proportion gain P (0.1 – 100.0) (F116)

Set range:0.1-100.0

Proportion gain P decides how the P action will affect the error response. The bigger the gain is, the faster the response is. While too big of the gain, it will cause vibration; the smaller the gain, the slower the response.

Integral time constant I (0.1 – 100.0) (F117)

Set range: 0.1-100.0 second.

The Integral time constant I decides the effect of the Integral action. The longer the time, the slower the response and the weaker of the exterior interference control ability. The shorter the time is, the faster the response is. When the time is too short, the vibration will occur.

Differential time constant D (0.000 - 9.999) (F118)

Set range: 0.000-9.999 second.

Inspection coefficient of Stop (0 – 20%) (F119)

This parameter is used to the standard when the motor stops because the adjusting system is not in use, such as no water to be consumed in the water supply system. For example, the parameter is set 5%, the maximum range of the sensor is set 5.0MPa, the set pressure is 5.0MPa, then the feedback pressure of stop is:

5.0MPa-5%×5.0MPa=4.75Mpa

The inverter will do stop inspection every other period when the system becomes stable. The system is considered as not in use and the motor will stop if the feedback pressure is higher than the feedback pressure of stop for some time.

Starting pressure value (30% - 100%) (F120)

The inverter re-starts only when the starting pressure is larger than the feedback pressure as the inverter stops.

This parameter is used to prevent the inverter starting too frequently. The definition of this parameter is the percentage of feedback pressure to the setting pressure, and the setting range is 30-100%.

***Note: When the start pressure is bigger than the feedback pressure of stop, the inverter will start frequently.**

Upper pressure arrival value (0 – 100%) (F121)

Set range: 0-100%

If one output signal terminal within output terminal blocks is set 13 (upper pressure arrival), the inverter will output the arrival signal when the feedback pressure arrive or exceed this setting value. It is the percentage of feedback pressure to setting pressure.

Lower pressure arrival value (0 – 100%) (F122)

Set range: 0-100%

If one output signal terminal within output terminal blocks is set 14 (lower pressure arrival), the inverter will output the arrival signal when the feedback pressure arrive or is below this setting value. It is the percentage of feedback pressure to setting pressure.

Tube leak confirm value standard (0 -9999) (F123)

Set range: 0-9999 Second.

This function is invalid when the parameter is set 0.

The inverter recognizes that there is serious leakage or tube break if the feedback pressure can't reach the setting pressure after the inverter running some time with upper limit frequency and in PID control mode.

The inverter will output alarm signal if one output signal terminal within output terminal blocks is set 11(tubing leak alarm), continue to run when F125 selects keep running or stops and shows fault when F125 selects stop.

The definition of this parameter is the continuous running time of the inverter with upper limit frequency.

Tube block up confirm value (0 – 100%) (F124)

Set range: 0-100%.

This function is invalid if the parameter is set 100%.

The inverter recognizes that there is tube block if the load current is lower than the set value when it runs with upper limit frequency and in PID control mode.

The inverter will output alarm signal if one output signal terminal within output terminal blocks is set 12 (tubing block up alarm), continue to run when F125 selects keep running, or it will stops and shows fault when F125 selects stop.

System precaution stop select (F125)

0: keep running

1: stop running

Under PID control mode, the parameter decides whether or not the inverter should stop running when pipe leak, pipe block or sensor disconnection is detected during operation.

If Stop Running is selected, when the system detects the mentioned precautions the system will stop output and display the failures as follows,

pipe leak: LEA

pipe block: CHo

sensor disconnected: Sen

5.3.4 Program running

The function code of program running is set by F004, the running mode of it is set by F130. Re-start mode after stop is set by F132; restart after abnormally stop and automatic reset is set by F131. Start/stop can be controlled by keypad, terminal or RS-485 by setting F003. Max.7-step speed can be set and their speed is set by F133 - F139, direction is set by F140 - F146, acc/dec time set by F019 - F020, F147 - F158, running time set by F159 - F165.

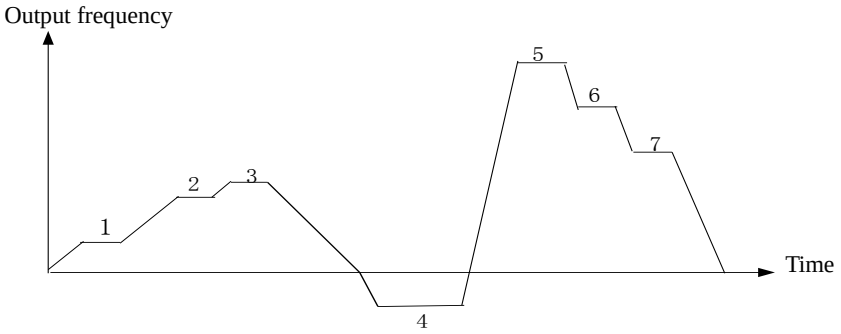
Program running mode (F130)

0: single circulation

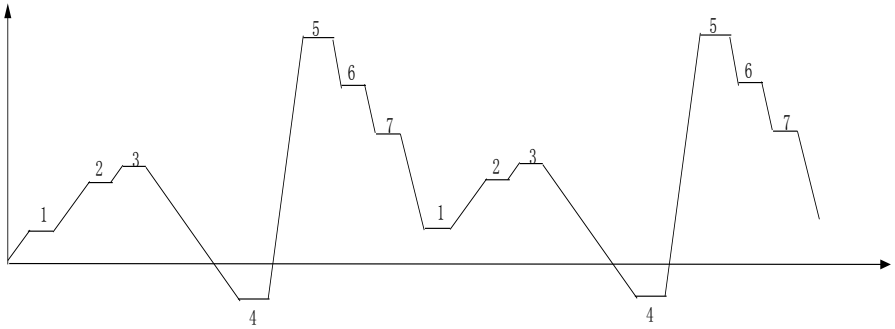
1: continuous circulation

2: single circulation but running at multi-step speed 7 after single circulation and stopping by the stop command.

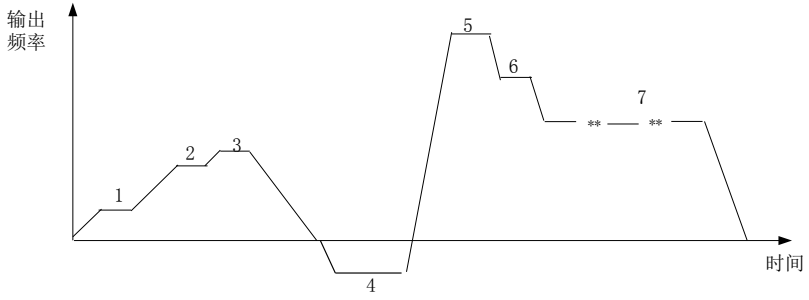
0: single circulation mode



1: continuous circulation



2: single circulation but running at multi-step speed 7 after single circulation and stopping by the stop command.



Re-start mode of program running after abnormal stop and automatically reset (F131)

valid when F052>0

0: according to multi-step speed 1

1: according to the speed at which the inverter is running when abnormally stop

Re-start mode of program running after stop (F132)

valid when normally stop and power is on

0: according to multi-step speed 1

1: according to the speed at which the inverter is running when normally stop

5.3.5 Set the 1st-7th step speed (F133-F139)

Set range: lower frequency limit – upper frequency limit

This parameter is to set the frequency of each step under program running mode and multi-step speed running mode. If there is no multi-speed signal input to the terminal under terminal input control mode, the frequency is set by the potentiometer on the keypad. Under terminal control mode, the frequency is set by the ∧ ∨ keys on the keypad.

1st multi-step speed F1 (F133)

2nd multi-step speed F2 (F134)

3rd multi-step speed F3 (F135)

4th multi-step speed F4 (F136)

5th multi-step speed F5 (F137)

6th multi-step speed F6 (F138)

7th multi-step speed F7 (F139)

5.3.6 Running direction of 1-7 step speed (F140-146)

0: Forward

1: Reverse

5.3.7 Multi-step speed Acc / Dec time 2-7 (0.1 - 9999) (F147-F158)

Set range: 0.1-9999Sec

Set the Acc/Dec time of 7 steps speed respectively. The definition is the same as Acc/Dec time 1. They determine the time needed to reach the speed, respectively depending on the acceleration time for acceleration or on the deceleration time for

deceleration, but the time is not the actual time needed.

Multi-step speed acceleration time at2 (F147)

Multi-step speed deceleration time dt2 (F148)

Multi-step speed acceleration time at3 (F149)

Multi-step speed deceleration time dt3 (F150)

Multi-step speed acceleration time at4 (F151)

Multi-step speed deceleration time dt4 (F152)

Multi-step speed acceleration time at5 (F153)

Multi-step speed deceleration time dt5 (F154)

Multi-step speed acceleration time at6 (F155)

Multi-step speed deceleration time dt6 (F156)

Multi-step speed acceleration time at7 (F157)

Multi-step speed deceleration time dt7 (F158)

5.3.8 Running time of 1-7 step speed (F159-F165)

Set range: (0.00 – 9999)*10 Second

It is the running time of each step speed when program control. The setting unit is 10 Sec.

E.g: The real running time is 2.0×10=20 Sec if the set value is 2.0.

1st multi-step speed running time T1 (F159)

2nd multi-step speed running time T2 (F160)

3rd multi-step speed running time T3 (F161)

4th multi-step speed running time T4 (F162)

5th multi-step speed running time T5 (F163)

6th multi-step speed running time T6 (F164)

7th multi-step speed running time T7 (F165)

5.3.9 Traverse running (F170-174)

Valid when F004=4.

Traverse running frequency f1 (F170)

set range:0.5-400.0Hz (Fmax)

Traverse running frequency f2 (F171)

set range:0.5-400.0Hz (Fmax)

Traverse running difference frequency △f (F172)

set range:0.00-5.00Hz

Traverse running timing T1 (F173)

set range: (0.00-9999)*10sec

Traverse running timing T2 (F174)

set range: (0.00-9999)*10sec

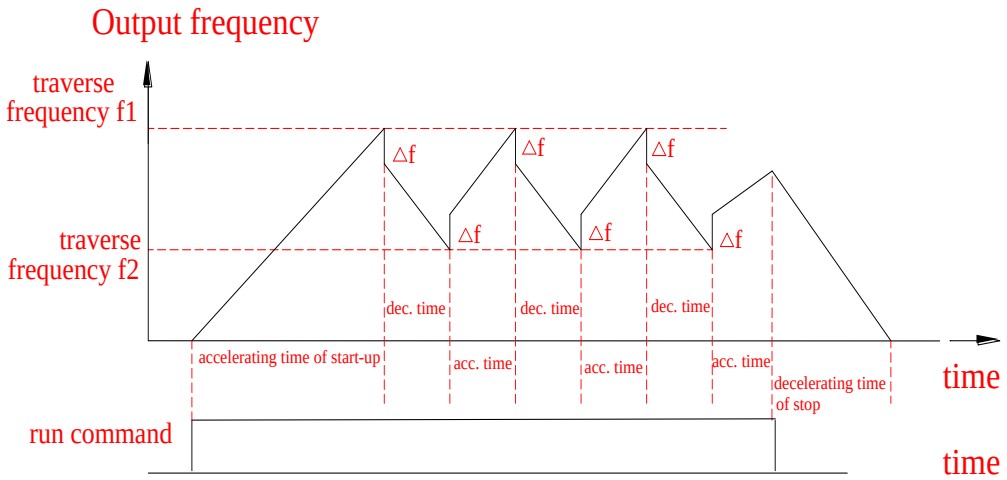
Traverse running cannot reverse running.

It calculates the Acc/Dec time according to f1, f2, △f, T1, T2 and must be in accordance with

$$\begin{cases} F1 \geqslant F2+\triangle f \\ F2 \geqslant 0.50Hz \\ 0 \leqslant \triangle f \leqslant 5.00Hz \end{cases}$$

otherwise, displays “ErrF ”

E.g: Traverse running



5.3.10 RS-485 Communication Parameters

RS-485 Communication Baud rate (F180)

0: 1200 1: 2400 2: 4800 3: 9600

RS-485 Communication local address (F181)

Set range:1-255

This parameter is valid under RS-485 control

The local address number will be distributed to each inverter when the inverter operates with computer network. Each address number is exclusive in the network.

Address 0 is the default broadcasting address.

5.4 System Parameters

5.4.1 Fault inquiry function (F190)

0: not inquire 1: inquire

When the parameter is set Inquire, the LED displays data in cycle by up and down keys. Press the ESC key to restore to "not inquire" state.

The following is the record of running faults. No record for the current fault that is the same as the last time and running time is shorter than 1 second.

Pr.	Definition	Note
F300	current fault information	See faults list
F301	total running time on the occurrence of current fault	unit:×10Sec
F302	output frequency on the occurrence of current fault	unit: Hz
F303	input voltage on the occurrence of current fault	unit: V
F304	output current on the occurrence of current fault	unit: A
F305	running direction on the occurrence of current fault	
F306	running state on the occurrence of current fault	
F307	voltage limit state on the occurrence of current fault	
F308	current limit state on the occurrence of current fault	
F310	last fault information	
F311	total running time on the occurrence of last fault	unit:×10Sec
F312	output frequency on the occurrence of last fault	unit: Hz
F313	input voltage on the occurrence of last fault	unit: V
F314	output current on the occurrence of last fault	unit: A
F315	running direction on the occurrence of last fault	
F316	running state on the occurrence of last fault	
F317	voltage limit state on the occurrence of last fault	
F318	current limit state on the occurrence of last fault	
F320	the second but last fault information	
F321	total running time on the occurrence of the second but last fault	unit:×10Sec
F330 F331	the third but last fault information and total running time	

5.4.2 Restore factory setting (F191)

If the parameter is set valid, all of the functional parameters restore factory settings and are recorded. They won't disappear when power is off. Those who have no factory setting will remain the same.

0: No 1: Yes

5.4.3 Parameter locking (F192)

When this parameter is set valid, none of the function parameters (except keypad speed adjustment, keypad pressure set and parameter locking itself) can be modified.

0: invalid 1: valid

5.4.4 Automatically set the parameters (F193)

0: No 1: Yes

Adjust the parameters automatically. These parameters are:

Pr / load	Torque boost	Acc mode	Dec mode	Upper limit freq.	Lower limit freq.	Current voltage limit	Reverse prohibited	Stop method	Base freq.	Output voltage
unclear	0	S type	linear	Base freq.	0		No.	dec		
constant torque	0	S type	linear	Base freq.	0		No.	dec		
blower	25	blower type	blower and inertia	Base freq.	No change		Yes	free		
pump	17	S type	pump	Base freq.	15.00		Yes	dec		
inertia subject	0	linear	blower and inertia	Base freq.	20.00	yes	Yes	free	motor freq.	motor rated voltage
attrition	0	reverse L	linear	Base freq. *1.5	15.00		Yes	dec		
conveyor	0	S type	linear	Base freq.	0		Yes	dec		
drill press	17	reverse L	linear	Base freq.	0		Yes	dec		
kowtow machine	0	linear	linear	Base freq. *1.25	15.00		Yes	free		

Automatically setting Acc/Dec time value (no voltage grade)

Motor rated current (A)	2.5	8.5	38	90	210	340	1000
At1 (Sec)	5.0	8.0	12	20	30	40	60
Dt1 (Sec)	8.0	12	20	30	40	60	100

5.4.5 Load type (F194)

0: unclear
1: constant torque (linear type)
2: blower (braking first)
3: pump (water-hammer proof)
4: inertia object
5: attrition (reverse L)
6: conveyor (S type)
7: drill press
8: kowtow machine

5.4.6 Motor's parameters (F200-203)

Motor rated capacity (0.75 KW – inverter rated capacity) (F200)

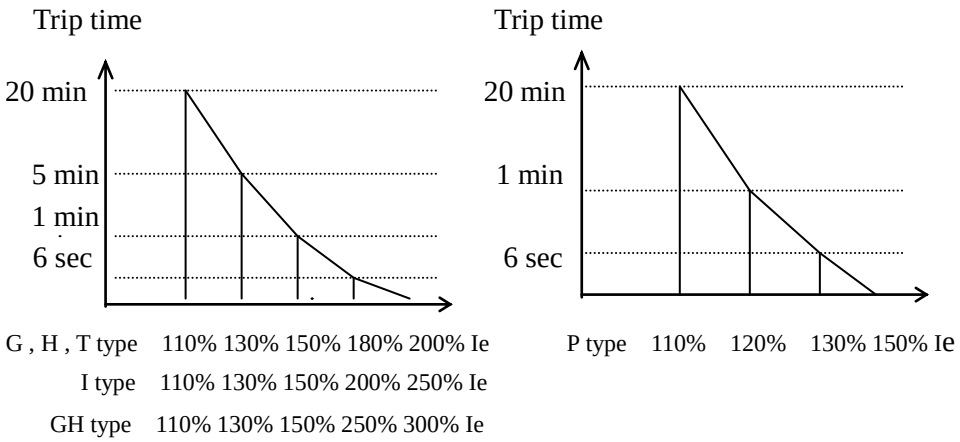
Motor rated voltage (100 V – inverter rated voltage) (F201)

Only when F193 is valid, set F042 according to the motor's rated voltage automatically. It could not be higher than the inverter's rated output voltage. Please set F042 directly if you want to change the output voltage of the inverter according to that of the motor.

Motor rated current (0.1 A - inverter rated current) (F202)

It's adjustable, but must be lower than the rated current of the inverter. The factory setting is the same as the rated current of the inverter. It is to decide the protection capacity of the inverter against the overload of the motor (OL curve). Change this parameter to protect the motor when the self-cooling motor becomes over heat at low speed running or the motor's capacity changes (motor's capacity is little than the rated capacity of the inverter).

If the motor's rated current is Ie



OL curve of the motor

Motor rated frequency (base frequency – the highest frequency) (F203)

Only when F193 is set to automatically set, this value is set to be the base frequency of the inverter. The user can set the base frequency directly if he needs to adjust the inverter's base frequency according to the motor's frequency.

5.4.7 Inverter's parameter inquiry (F210-F220)

Inquire the inverter's series (F210)

0: G type 1: P type 2: H type

3: I type 4: T (SF) type 5: GH type

Inquire the inverter's rated output capacity (F211)

Inquire the inverter's rated input voltage (F212)

Inquire the inverter's rated output current (F213)

Inquire the inverter's the highest frequency (F214)

Inquire the inverter's software version (F215)

Inquire the inverter's production date-year (F216)

Inquire the inverter's production date-month (F217)

Inquire the inverter's production date-day (F218)

Inquire the inverter's serial number 1 (F219)

Inquire the inverter's serial number 2 (F220)

Section Ⅵ Fault Diagnosis and Solutions

6.1 Fault display and information

The upper LED will automatically enter Fault Display and flash the fault code when any abnormity occurs. The inverter stops output and the RUN indicator on the keypad extinguishes.

The method is to check F052 Fault auto-reset first. If it is invalid, it is quit possibly a protection against transient fault. Please reset (by using STOP/RESET key, RST terminal or RS-485 command) and continue the operate if the correct display resumes. If the fault cannot be reset, please check F190 to analyze it and then solve it.

The definition of fault indication

Ref.	display	fault
0	NoEr	No fault
1	93nE	Memory error
2	L.U.	Low power supply voltage
3	o.U.	Over power supply voltage
4	o.C.	Over output current
5	o.L.	Over load
6	P.H	Lack of input phase (not detect)
7	ErrM	DC main circuit contactor fault (not detect)
8	o.H.	Over heat of the inverter
9	o.H.o.	Over heat of the motor (not detect)
10	b.s.	DC fuse fault (not detect)
11	d.f.	Lack of output phase (not detect)
12	LEA	Pipe leak
13	Cho	Pipe block
14	Sen	Feedback sensor fault
15	Erro	External fault of inverter
16	93Er	Memory fault
17	ErrU	User-set V/F curve parameter setting error
18	ErrF	Traverse running parameter setting error
19	ErrP	Password error (must return the

		inverter to the factory)
20	LIFE	Trial use time terminated
21	ErrC	CPU inner error
22	ErrO	CPU inner error
23	Err1	CPU inner error
24	Err2	CPU inner error
25	Err3	CPU inner error
26	Err4	CPU inner error
27	Err5	CPU inner error
28	Err6	CPU inner error
29	Err7	Data error
30	rEP	Rep error (not detect)
31	S.C.	Load short circuit

6.2 Faults and solutions

After the inverter enters fault state, one of the output terminal on the output terminal blocks can output signal according to its setting value. See F070 to F074 for details.

General fault solutions are:

1) Reset
2) Non-substantial failure: when the failure is caused by external power, transient load, dust penetration, loose connectors and wrong parameter settings, you can solve by yourself.
3) Substantial failure: when the failure is caused by the main components, please unload it and switch off the power. Do not disassemble it by yourself within warrantee period. Please contact us for technical support.

The frequent problems are:

Problems	**Possible causes**	**Solutions**
Keyboard cannot control	Control mode setting is wrong	Check the parameter F003
	Frequency setting is wrong	Check the parameter F004
Potentiometer cannot regulate speed	Control mode setting is wrong	Check the parameter F003
	Analog input signal selection is wrong	Check the parameter F005
	Frequency setting is wrong	Check the parameter F004

The motor does not rotate	LED monitor indicates error message	Follow the error message to check it
	No voltage between terminals P and N.	Check the voltage at R, S or T and charging circuit.
	U, V or W terminal produces no output or abnormal output.	Check the set control mode and frequency parameter. Check the terminal condition if it is operated by an external terminal.
	Re-start after power off or free run	Remember the set operating state.
	Too heavy load on the motor	Check and lower the load.
OC	Over current during acceleration	Re-set or adjust the parameters of F019, F022, F023, F034
	Over current during deceleration	Re-set or adjust the parameters of F020, F035
	Over current during operation	Check the load change and eliminate it.
	Over current during starting or operation from time to time	Check if there is slight short circuit or grounding.
	Disturbance	Check the earthing wire, screened cable's grounding and terminals.
OL	Lower power supply voltage	Correct the voltage or decrease load
	Too heavy load	Lower the load
	Improper parameter is set	Adjust the F201, F202, F023, F022, F019, F020, F021
OU	Power supply voltage exceeds the limit	Measure the voltage and correct it.
	Too fast deceleration	Adjust the F020, F035
	The load has too much inertia	Reduce the load inertia, or increase the capacity of inverter, or use B type inverter or add a braking unit.
LU	Too low power supply voltage	Check the voltage and correct it.
	The power is off transiently	Check power supply terminals connecting or add options of capacitor boxes.
	Grid capacity is too small or great rush current exists on the grid.	Make renovation on power supply system
OH	Too high ambient temperature	Improve ambient conditions
	The cooling fan does not run.	Check it and repair.
	The carrier frequency is too high	Check the setting value of F022

Note: Do not touch any component or PCB before the CHARGE indicator extinguishes. Make sure the discharge is completed with meters before you work inside the inverter, otherwise, electric shock may happen. Do

not touch any component or PCB without taking anti-static measures, otherwise, the components might be damaged.

6.3 Motor failure and solutions

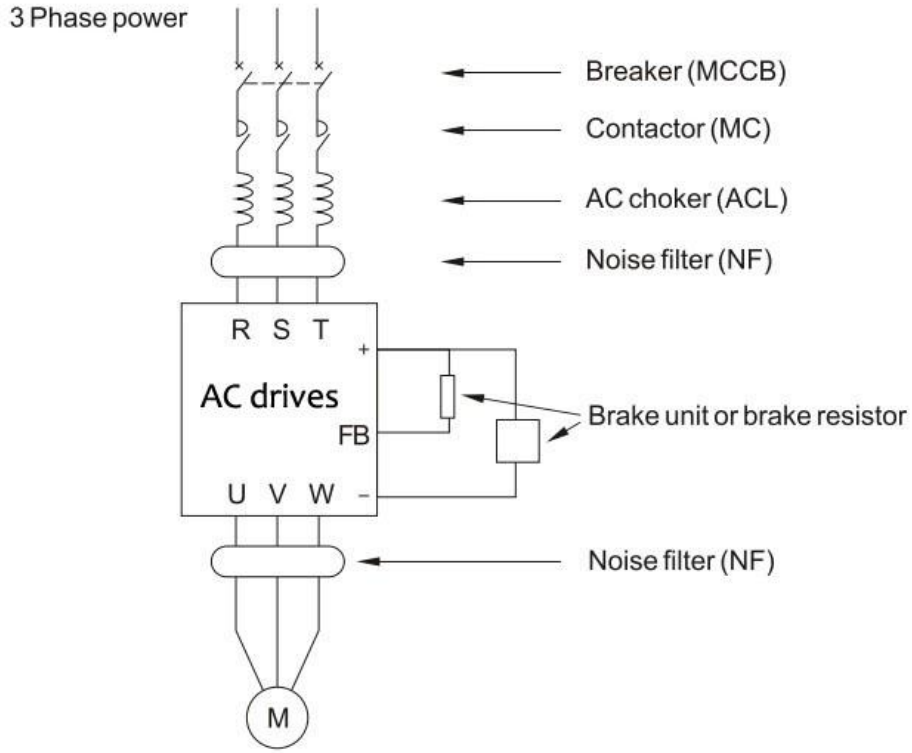
Take relative measures to solve the following failures. If it cannot be solved, please contact for technical support.

Table of Motor Failure and Solutions

Failure	Check	Solution
Motor does not run	Is there power voltage on R, S, T terminals? Is the CHARGE indicator on?	Switch on the power; Switch off and switch on again; Check the power voltage; Tight the terminal screw.
	Is the voltage on the output terminal U,V, W correct with a voltage meter?	Switch off the power and switch on again.
	Is the motor locked due to overload?	Decrease the load and unlock the motor.
	What error code does the keypad display?	Refer to the error code table.
	Has FOR or REV reference been input?	Check the wiring
	Has the frequency set voltage been input?	Change the wiring and check the frequency set voltage.
	Is the running mode set correctly?	Set it correctly
Motor reverses to your set	Is the U, V, W terminals wiring correct?	Correct the wiring of U, V, W terminals
Motor cannot change speed	Is the frequency setting wiring correct?	Wire correctly
	Is the running mode set correctly?	Choose the correct running mode.
	Is it over load?	Decrease the load
Motor runs too fast or too slowly	Is motor's rated value such as polar, voltage correct?	Check the motor's technical data plate.
	Is the mechanical acc/dec gear ratio correct?	Check the gear
	Is the max. output frequency set correct?	Check the max. output frequency value
	Is the voltage drop between the motor's terminals too much?	Check the V/F feature.
Motor's speed is not stable	Is it overload	Decrease the load
	Does the load change drastically?	Decrease the change of the load, or increase the motor's capacity.
	Is there phase failure?	Check the 3-phase power connection. For 1 phase power, connect the AC choker to the power source.

Section Ⅶ Periphery Equipments

7.1 The Wiring of Periphery Equipments and the Options



7.2 When to Use the Periphery Equipments and Options

Equipments	MCCB	MC	*ACL	*NF	*UB
Functions	To quickly stop the fault current of the inverter and prevent a possible power failure caused by inverter or circuit problem.	To stop the main power when the inverter is out of control. Prevent re-start after power off or after failure.	To optimize the input power factor and decrease the high harmonious wave and compress the power surge.	To minimize the radio interference generated by the inverter. (when the wiring distance between the motor and inverter is shorter than 20 meters, NF is suggested to be used at the power side; longer than 20 meters, at the output side).	Used when the brake torque is not enough, such as for great inertia load, braking frequently or fast stop.

Note: * means Optional. You must claim for it when you place order.

7.2.1 AC Choker

AC Choker is to compress the high harmonious wave of the inverter and to optimize the power factor. AC Choker is recommended when:

- The ratio of the application's power capacity and the inverter's capacity is over 10:1
- There are SCR (silicon controllable rectifier) or power factor compensation device with switch control on the same power supply.
- The imbalance degree of the 3 phase voltage is ⩾3%

Common AC choker List

Voltage	power (KW)	current (A)	Induction (mH)	power (KW)	current (A)	Induction (mH)
380	1.5	4.8	4.8	75	165	0.13
	2.2	6.2	3.2	93	195	0.11
	3.7	9.6	2.0	110	224	0.09
	5.5	14	1.5	132	262	0.08
	7.5	18	1.2	160	302	0.06
	11	27	0.8	185	340	0.06
	15	34	0.6	200	385	0.05
	18.5	41	0.5	220	420	0.05
	22	52	0.42	245	470	0.04
	30	65	0.32	280	530	0.04
	37	80	0.26	315	605	0.04
	45	96	0.21	355	660	0.03
	55	128	0.18	400	750	0.03

7.2.2 Radio Noise Filter

The radio noise filter is used to restrain the conduction of electrical magnetic interference noise produced by the inverter and to control the interference of the radio, momentary concussion and surge. Normally, when there is request for anti-ratio interference, for meeting CE, UL, CSA standards, the filter should be adopted. When you use the filter, the wiring must be as short as possible and the filter must be as close as possible to the inverter.

(V)	Power (KW)	Filter model	Filter parameters					
			Common-mode input consumption (dB)			Different-mode input consumption (dB)		
			0.1MHz	1MHz	30MHz	0.1MHz	1MHz	30MHz
380	0.75-1.5	DL-5EBT1	75	85	55	55	80	60
	2.2-3.7	DL-10EBT1	70	85	55	45	80	60
	5.5-7.5	DL-20EBT1	70	85	55	45	80	60
	11-15	DL-35EBT1	70	85	50	40	80	60
	18.5-22	DL-50EBT1	65	85	50	40	80	50
	30-37	DL-80EBT1	50	75	45	60	80	50
	45	DL-100EBK1	50	70	50	60	80	50
	55-75	DL-150EBK1	50	70	50	60	70	50

7.2.3 Brake Unit and Brake Resistor

Braking unit is used when you need great torque for applications which have great inertia load, brake frequently or stop quickly. If brake unit is not enough to strengthen the brake torque, you can add the external brake resistor.

KOC 9G/9P series have optional built-in brake unit below 75KW(75kW is included). Please claim for it when you place order. The built-in brake unit contains control part and drive part. The discharge resistor should be connected to the main circuit. Please use external brake unit for inverters above 93KW.

When the brake torque is 100%, the commonly used brake resistor is as below,

Voltage (V)	Motor Power (KW)	Resistance (Ω)	Resistor power(KW)	Motor Power (KW)	Resistance (Ω)	Resistor power(KW)
380	1.5	400	0.25	75	13.6/2	18
	2.2	250	0.25	93	20/3	18
	3.7	150	0.40	110	20/3	18
	5.5	100	0.50	132	20/4	24
	7.5	75	0.80	160	13.6/4	36
	11	50	1	185	13.6/4	36
	15	40	1.5	200	13.6/5	45
	18.5	30	4	220	13.6/5	45
	22	30	4	245	13.6/5	45
	30	20	6	280	13.6/6	54
	37	16	9	315	13.6/6	54
	45	13.6	9	355	13.6/7	63
	55	20/2	12	400	13.6/8	72

7.2.4 Current leakage protector

The inverter, especially low-noise type, motor and input/output cables generate static capacity, so the grounding current leakage might be high. In case of activate protection circuit wrongly, we suggest to install current leakage protector at the inverter's input side, back of MCCB.

The operative current of current leakage protector should be 10 times larger than the circuit's total current leakage including circuit, wireless noise filter and motor when it does not run an inverter.

7.2.5 Capacitor box

Capacitor box is needed when inverter must run continuously when there is power failure over 20ms. Since capacitor box will affect some parameter settings, please order it from us when you place the order of inverter and we will set all the necessary parameters for you.

Section Ⅷ Maintenance

DANGER!

1. **High voltage on the terminals. Do not touch them, otherwise, electric shock may occur.**
2. **Cover the terminals before power is on. Uncover the terminals after power is off, otherwise, electric shock may occur.**
3. **Cut off the main circuit power supply, give maintenance after CHARGE diode is off. Danger lies in the vestige voltage of capacitors.**
4. **Maintenance and check should be carried out by professional technicians, otherwise, electric shock may occur.**

NOTICE

1. **Pay special attention to the CMOS IC on the keypad PCB, control PCB and driver PCB.**
   Your finger static electricity may damage the IC on the PCBs.
2. **Do not change the cable connection or terminal connection when power is on, otherwise, electric shock may occur.**
3. **Do not check the signal during running, otherwise, the equipment might be damaged.**

8.1 Maintenance

Under normal working conditions，in addition to daily inspection of the inverter, it should be subject to regular inspection (for example a overall maintenance in at most six months).

8.1.1 Daily inspection maintenance

When you switch on the inverter, please check

- if there is abnormal sound or vibration from the motor;

- if the inverter and the motor are over heat;
- if the ambient temperature is too high;
- if the load current meter is the same as before;
- if the cooling fan runs correctly.

Daily check point:

Rf	What to check	Where to check	How to check	Criteria
1	Display	LED monitor	Any display error?	According to the running status
2	Cooling system	Cooling fan	Is there strange noise? Does it run smoothly?	Normal
3	Body	Inside the housing	Is there temperature rise, strange noise, or smell?	Normal
4	Environment	Environment	Check the temperature, humidity, dust and poisonous air.	Section 2.2
5	Voltage	Input, output terminals	Check the input, output voltage	Refer to Specification Table
6	Load	Motor	Is there temperature rise, strange noise, or vibration?	Normal

Regular maintenance

Please cut off the power supply and wait 5-10 minutes after the main circuit indictor is off before carrying out regular maintenance. Otherwise, electric shock may occur.

Regular check point:

Where to Check	What to Check	Solution
Screws on the main circuit and control circuit terminals	Are they loose?	Screw them tight.
Heat sink	Is there dust?	Blow the dust off with a

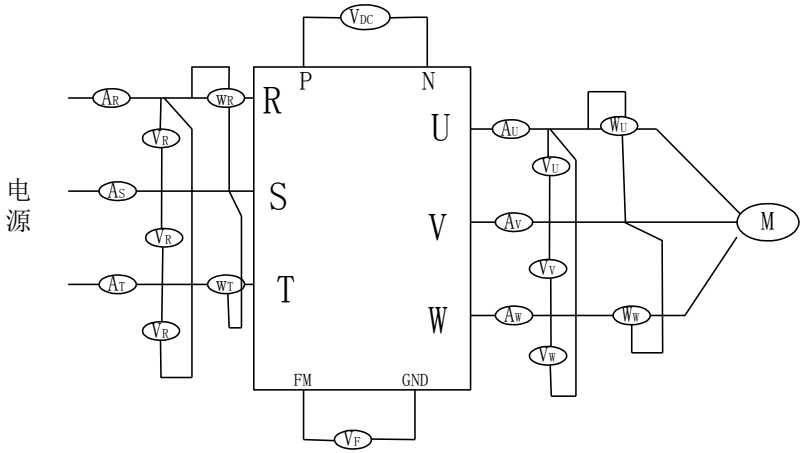
		4-6kg/cm^2 compressor.
PCB	Is there dust?	Blow the dust off with a 4-6kg/cm^2 compressor.
Cooling fan	Does it run smoothly? Is there strange noise or vibration?	Change the cooling fan
Power components	Is there dust?	Blow the dust off with a 4-6kg/cm^2 compressor.
Electrolysis capacitors	Is there color change, strange smell, bubble or leak?	Change the electrolysis capacitors

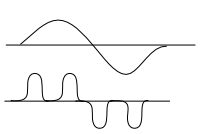
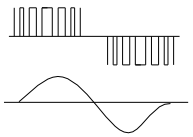
During inspection, do not disassemble or shake the components without reason, and still less pull off the plug-in-parts at will. Otherwise, the unit will operate wrongly or enter the mode of fault display, even the components might be fault or the main switch components of IGBT module may be damaged.

If measure is necessary, please be noted that there may be measurement difference with different measuring instruments. It is recommended that the input voltage be measured with pointer-type voltmeter, output voltage with rectification voltmeter, current input and output with tong-test ammeter and power with electrically driven wattmeter.

Please use the oscilloscope whose scan frequency is greater than 40 MHz to test the waveform. Oscilloscope whose scan frequency over 100 MHz is recommended for measuring transient waveform. Electric isolation must be done before measure.

The Connection method is recommended as below for main circuit measure.



Item		Input (power supply) side			DC	Output (motor) side			AO1 terminal
WF	V								
	C								
Name of meter		Voltage meter $V_{R、S、T}$	Current meter $A_{R、S、T}$	Power meter $W_{R、T}$	DC voltage meter V_{DC}	Voltage meter $V_{U、V、W}$	Current meter $A_{U、V、W}$	Power meter $W_{U、V}$	Voltage meter V_F
Parameter		Base wave virtual value	Total virtual value	Total virtual power	DC voltage	Base wave virtual value	Total virtual value	Total virtual power	DC voltage

Electric insulation test and dielectric test have been made in the factory, so users do not need to test again. These tests will decrease the inverter's insulation level.

When perform electrical pressure withstand test to the main circuit, please adopt electrical pressure device whose time and leak current can be adjusted. This test will shorten the life of the inverter. When perform insulation test to the main circuit, R, S, T, U, V, W, P, N etc. main circuit terminals must be short circuited and be measured by megaohm meter. (250V meter for 220V inverter, 500V for 380V inverter, 1000V for 660V inverter).

Do not measure the control circuit with a megaohm meter. Please use the high resistance level of a multi-meter.

To 380V inverters, the grounding insulation resistance of main circuit must be no less than 5MΩ and of the control circuit must be no less than 3MΩ .

8.1.3 Components which should be changed regularly

To make the inverter run stably for a long term, please maintain and renew some components regularly according their life expectance. Generally, the life expectance of components under normal work condition is as the following table:

Part name	Life expectance
Cooling fan	2 - 3 years
Electrolysis capacitor	4 - 5 years
Fuse	10 years
PCB	5 - 8 years

8.2 Storage

If the inverter is not put into use immediately and need to be kept well for some time or stored for a long time, the following measurements must be taken,

1: Keep it in a dry and adequately ventilated place without dust and metal powder at the temperature specified in the specifications.

2: If the inverter is not put into use in one year, a charge test should be made, so as to resume the performance of the electrolysis capacitor of main circuit in it. For charging, a voltage regulator should be used to slowly increase the input voltage of the inverter until it reaches the rating, and the charge should last more than 1-2 hours. This test should be made at least once a year.

3: Repeat the above action at least once a year.

4: Don't perform breakdown test at random, for this test will shorten the life of the inverter. The dielectric test must be performed after the insulation resistance is measured with a 500 V megohm meter and this value must not be less than 4MΩ .

Section Ⅸ Warrantee

The warrantee period for the inverter itself is 12 months from the delivery date and no longer than 24 months since the manufacture date marked on the nameplate.

Repair service is charged even in warrantee period if the failure is caused by the following occasion:

- Improper operation, repair or alternation without our permission;
- Apply the inverter exceeding the specification;
- Rough handing
- The work environment does not comply with the requirement on the user's manual
- Wrong wiring;
- Earth quake, fire, flood, lightning strike, abnormal voltage or other natural disaster.

We are entitled to ask the third party to repair the defective inverter.

The warrantee product used in China

- Can be replaced, refunded and repaired within the first month after delivery.
- Can be replaced and repaired within the first 3 months after delivery
- Can be repaired within 12 months.

Inverters used in abroad has 3 months warrantee since the day of delivery.

Agreed cost prior to the actual cost.

After-sale service can be provided by our distributors, production bases and agents all over the country.

We are irresponsible for

- any fault caused by improper operation which doe not follow the user's manual.
- any loss, effect, subsequent damages resulted from the inverter's failure.

Please keep in mind:

- This user's manual is only suitable for this series of products.
- We are always responsible for our product and provide service for the application of it.
- Please inquire us before you apply the product to the equipments which may lead to injury or death, such as:
  - vehicles
  - medical equipment
  - nuclear, electricity equipment
  - aviation equipment
  - security equipment
  - other special equipment.

Your complaint or suggestion on the design, performance, quality and service about our product will be appreciated.

Appendix I

Dimension

Installation Dimension

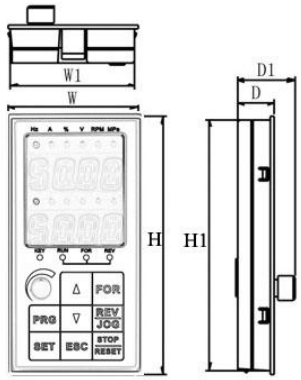


fig. 1

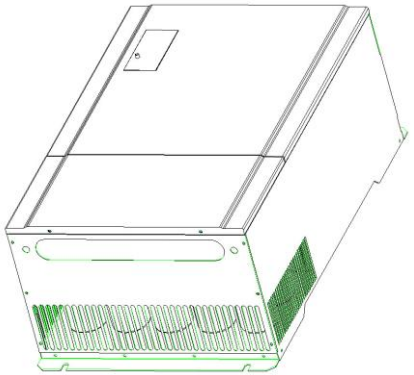


fig. 2

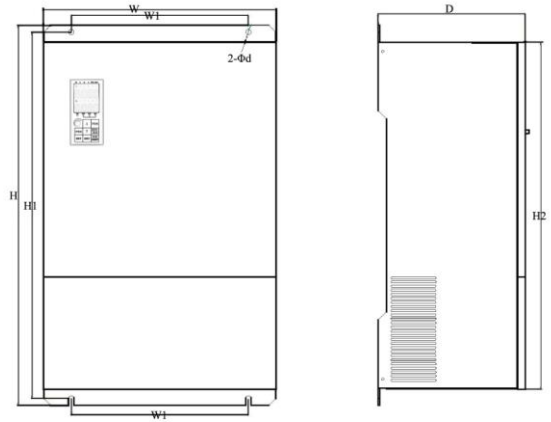


fig. 3

P5 fans and pumps type

Model	W (mm)	W1 (mm)	H (mm)	H1 (mm)	H2 (mm)	D (mm)	D1 (mm)	d (mm)	picture
Keypad	70	66	138	134		20	30		fig.1
KOC-P5-7.5T4	202.5	150	328	312	291	178.5		7	fig.3
KOC-P5-11T4									
KOC-P5-15T4	215	155	350	334	310	209		7	fig.3
KOC-P5-18.5T4									
KOC-P5-22T4	278	200	550	530	490	250		10	fig.3
KOC-P5-30T4									
KOC-P5-37T4	348	200	550	525	480	250		10	fig.3
KOC-P5-45T4	341	200	560	537	505	260		12	fig.3
KOC-P5-55T4									
KOC-P5-75T4	370	270	608.5	584.5	552.5	275.5		12	fig.3
KOC-P5-93T4	511	390	835	805	762.5	324		12	fig.3
KOC-P5-110T4									
KOC-P5-132T4									
KOC-P5-160T4									
KOC-P5-185T4	695	580	1140	1110	1072	335		14	fig.3
	cabinet:1700*700*465								
KOC-P5-200T4									
KOC-P5-220T4	820	600	1334	1300	1260	460		14	fig.3
KOC-P5-250T4									
KOC-P5-280T4		cabinet:1700*820*465							
KOC-P5-315T4									
KOC-P5-355T4	cabinet:1700*820*465								fig.3

G5 general type

型号	W (mm)	W1 (mm)	H (mm)	H1 (mm)	H2 (mm)	D (mm)	D1 (mm)	d (mm)	picture
keypad	70	66	138	134		20	30		fig.1
KOC-G5-5.5T4	202.5	150	328	312	291	178.5		7	fig.3
KOC-G5-7.5T4									
KOC-G5-11T4	215	155	350	334	310	209		7	fig.3
KOC-G5-15T4									
KOC-G5-18.5T4	278	200	550	530	490	250		10	fig.3
KOC-G5-22T4									
KOC-G5-30T4									
KOC-G5-37T4	341	200	560	537	505	260		12	fig.3
KOC-G5-45T4									
KOC-G5-55T4	370	270	608.5	584.5	552.5	275.5		12	fig.3
KOC-G5-75T4	370	270	608.5	584.5	552.5	275.5		12	fig.3
KOC-G5-93T4	511	390	835	805	762.5	324		12	fig.3
KOC-G5-110T4									
KOC-G5-132T4									
KOC-G5-160T4	695	580	1140	1110	1072	335		14	fig.3
KOC-G5-185T4		cabinet:1700*700*465							
KOC-G5-200T4									
KOC-G5-220T4	820	600	1334	1300	1200	450		14	fig.3
KOC-G5-2250T4		cabinet:1700*820*465							
KOC-G5-280T4									
KOC-G5-315T4	cabinet:1700*820*465								fig.3
KOC-G5-355T4									
KOC-G5-400T4									

Appendix II Standard Specification

1, The rated output current of KOC series

Voltage(V)	220V 1Φ	220V (240V)	380V (415V)	660V
Capacity (kW)	Current (A)	Current (A)	Current (A)	Current (A)
0.4	2.5	2.5	-	-
0.75	4	4	-	-
1.5	7	7	4.0	-
2.2	10	10	6.0	-
4	16	16	9.6	-
5.5	20	20	13	-
7.5	30	30	17	-
11	42	42	25	-
15	55	55	32	-
18.5	-	70	38	-
22	-	80	45	-
30	-	110	60	-
37	-	130	75	45
45	-	160	90	52
55	-	200	110	63
75	-	260	150	86
93	-	320	180	98
110	-	380	215	120
132	-	420	260	150
160	-	550	310	175
185	-	600	350	200
200	-	660	380	220
220	-	720	420	240
245	-	-	470	270
280	-	-	530	310
315	-	-	600	345
355	-	-	660	380
400	-	-	750	430
500	-	-	-	540
600	-	-	-	660

2, Specification of KOC-P5/G5 for 380v/415v

Item		Specification
Output	Ration	100% continuousness
	Output rated voltage	max. output voltage is the same as the input power supply voltage
	Max. over load current	G: 150% 1 minute, 180% 2sec (P: 120% 1 min, 130% 6 sec; I: 150% 1 min, 200% 6 sec)
Power supply	Rated voltage and frequency	3 phase 380v/415v, 660v/690v; 50-60Hz
	Voltage fluctuation	10% ~ -15%
	Frequency fluctuation	+/- 5%
Control	Control mode	SVPWM control
	Frequency range	G: 0 - 400Hz (P: 0 - 120Hz, H: 0 - 2000Hz)
	Frequency accuracy	digital command +/- 0.01% (-10℃ ~ +40℃)
	Set frequency resolution	digital command 0.01Hz; analogue command 0.1Hz/60Hz
	Output frequency resolution	0.01Hz
	Voltage/Frequency feature	34 fixed V/F features selectable, any V/F features can be set.
	Acc/Dec feature	0.1 - 9999 sec (Acc and Dec time set separately)
	Brake torque	125% with additional brake resistor
	Frequency set signal	0-10V, 0-5V, 4-20mA, 0-20mA
Protection		Over voltage, under voltage, current limit, over current, overload, electronic thermal relay, overheat, over voltage stalling, data protection, under load precaution, loaded short circuit
Display	Two line LED keypad	parameter set / running display / faults display / function code / data / status
Working environment	Installation place	Indoors, not higher than 1000m above sea level, without dust, corrosive air and direct sunlight.
	Ambient temperature and humidity	-10℃ - 40℃, 20% – 90%RH (without dewing)
	Vibration	Lower than 0.5g when below 20Hz
	Storage temperature	-20 ~ +65℃
	Installation method	Wall hooking or cabinet
	Protection class	IP20 below 7.5kW and IP10 above 11KW
	Cooling method	Forced air cooling

Appendix III RS-485 Communication

KOC INVERTER RS-485 Communication Protocol

1. RS-485 serial communication terminals are defined as below:

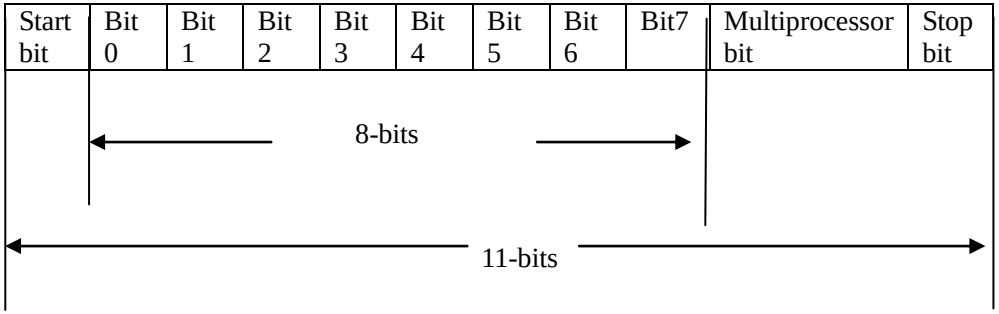
   SG+: signal positive

   SG- : signal negative

Please set the serial baud rate and serial communication address of RS-485 communication of the inverter through its keypad before using RS-485 serial communication program on the computer.

2. Serial half duplex asynchronous communication: one master sending and several slaves receiving, the slaves cannot send information without the master's asking.
3. Baud rate: 1200BPS, 2400BPS, 4800BPS, 9600BPS

Digit cell pattern:



Note: Multiprocessor bit is to realize multi-machine communication. When sending the inverter's address (A byte), Multiprocessor bit =1 while other Multiprocessor bit=0.

5. Method of error check (checksum)

Add Checksum after the information. Checksum equals to the last byte of the sum of all bytes.

6. Date package pattern: AKP$D_0D_1D_2D_3$S

A: A is the inverter's address (1-255) and is a must. When A=00H, it is effective to all the slaves which do not need to send information back. So when A=00H, only the operation commands can be sent for broadcast.

K: Function code

P: Parameter number. It is the digit part of the parameter. It is an integral number smaller than 255.

$D_0D_1D_2D_3$: is the parameter value without the decimal point. It is a hex digit with 4 bytes. Deliver from the least significant byte D_0 to the most significant byte D_3. (The decimal digits refers to the setting range of the parameters in the "Function Parameter Table")

S: Count the checksum: S is the value of the last byte (bit7-bit0) of the hex sum of all the above bytes (S = A+K+P+D_0+D_1+D_2+D_3) .

7. Example of the master asking information:

Send from the Master	Byte	Information sent (hex)	Note
Slave address (A)	1	XXH	Get data from the slave No. XXH
Function code (K)	1	01H	Give running reference 01H
Parameter No. (P)	1	02H	Give FOR command to the slave
The lowest byte of the datum (D_0)	1	00H	The setting is 00H when it has no meaning.
Lower byte of the datum (D_1)	1	00H	The setting is 00H when it has no meaning.
Upper byte of the datum (D_2)	1	00H	The setting is 00H when it has no meaning.
The most byte of the datum (D_3)	1	00H	The setting is 00H when it has no meaning.
Checksum byte (S)	1	XXH	The master counts the checksum byte.

8. Example of the slave responding information:

Response from the slave	Byte	feedback Information (hex)	Note
Slave address (A)	1	XXH	Feedback from slave No. XXH
Function Code (K)	1	01H	Give running reference 01H
Parameter No. (P)	1	02H	Slave respond the FOR command.
The lowest byte of the datum (D_0)	1	00H	The setting is 00H when it has no meaning.
Lower byte of the datum (D_1)	1	00H	The setting is 00H when it has no meaning.
Upper byte of the datum (D_2)	1	00H	The setting is 00H when it has no meaning.
The most byte of the datum (D_3)	1	00H	The setting is 00H when it has no meaning.

Checksum byte (S)	1	XXH	The slave count the checksum byte

K, P, $D_0D_1D_2D_3$ were defined as below: (H is hex)

K	P	$D_0D_1D_2D_3$
K=01H: give running reference	P: 1=stop/reset, 2=FOR, 3=REV	No meaning
K=02H: inquire running status	Master sends P: no meaning. Slave responds P: 1=STOP/RESET, 2=FOR, 3=REV, 4=BRK	No meaning
K=03H: operation parameter setting	P: 1=the set frequency during running (the 2 valid digits after the decimal)	Actual set value without decimal point
	P: 2=the set pressure during running (the 2 valid digits after the decimal)	Actual set value without decimal point
K=04H:inqure running monitor	P: 0 set frequency; 1: output frequency; 2: actual value of output current; 3: percentage of output current; 4: actual value of input voltage; 5: actual value of output voltage; 6: mechanic speed; 7: percentage of left time of step speed running; 8: accumulative total running time 9: PID setting value 10: PID feedback value (refer to *Note 3 for the decimal digits)	The master sends: no meaning The slave responds: the current actual value without decimal point
K=05H: setting parameter	P: the digit part of parameter number	The master sends: The actual setting value without decimal point
K=06H: inquire the function parameter	P: the digit part of parameter number	The master sends:no meaning The slave responds: the current actual value without decimal point

K=0AH: inquire the current fault	P: 0 inquire fault information	The master sends: no meaning The slave responds: (Refer to *Note 4)
	P: 1 elapsed running time before failure	The master sends: no meaning The slave responds: time value without the decimal point
	P: 2 output frequency at fault	The master sends: no meaning The slave responds: frequency value without the decimal point
	P: 3 input voltage at fault	The master sends: no meaning The slave responds: Voltage value without the decimal point
	P: 4 output current at fault	The master sends: no meaning The slave responds: current value without the decimal point
	P: 5 running direction at fault	The master sends: no meaning The slave responds: 0=FOR, 1=REV
	P: 6 running status at fault	The master sends: no meaning The slave responds: 0=constant speed, 1=acceleration, 2=deceleration

	P: 7 voltage limit status at fault	The master sends: no meaning The slave responds: 0=No, 1=Yes
	P: 8 current limit status at fault	The master sends: no meaning The slave responds: 0=No, 1=Yes
K=0BH: inquire last fault	P: 0 inquire the fault info.	The master sends: no meaning The slave responds: (Refer to *Note 4)
	P: 1 elapsed running time before failure	The master sends: no meaning The slave responds: time value without the decimal point
	P: 2 output frequency at fault	The master sends: no meaning The slave responds: frequency value without the decimal point
	P: 3 input voltage at fault	The master sends: no meaning The slave responds: voltage value
	P: 4 output current at fault	The master sends: no meaning The slave responds: current value without the decimal point
	P: 5 running direction at fault	The master sends: no meaning The slave responds: 0=FOR, 1=REV

	P: 6 running status at fault	The master sends: no meaning The slave responds: 0=constant speed, 1=acceleration, 2=deceleration
	P: 7voltage limit status at fault	The master sends: no meaning The slave responds: 0=No, 1=Yes
	P: 8 current limit status at fault	The master sends: no meaning The slave responds: 0=No, 1=Yes
K=0CH: inquire the second most recent fault	P: 0 inquire the fault info.	The master sends: no meaning The slave responds: (Refer to *Note 4)
	P: 1 elapsed running time at fault	The master sends: no meaning The slave responds: time value without the decimal point
K=0DH: inquire the third most recent fault	P: 0 inquire the fault info.	The master sends: no meaning The slave responds: (Refer to *Note 4)
	P: 1 elapsed running time at fault	The master sends: no meaning The slave responds: time value without the decimal point
K=0EH: the slave responds 0EH when it is fault but receives reset and fault inquiry signals from the master		

K=0FH: When the master sends invalid signal, the slave feedback K=0FH	No meaning
K=10H When the parameter value sent by the master is over limit, the slave feedback K=10H	
K=11H: When the parameter which the master is to set is locked, the slave feedback K=11H	
K=12H: the slave answers that the sum check is wrong	No meaning
K=13H: the slave feedback K=13H when it cannot recognize the function code (K) sent by the master.	

* Note 1: When the slave is OK, it will send back the copy of the data package that is setting character data received from the master if the value of the data package is thought to be right.

* Note 2: From K=0EH to K=13H is the single side information that can only be sent from the slave to the master. If the master has identified a mistake in the check byte, the master will re-send the former information but not K=12H.

*Note 3: the decimal digit of each operation monitoring：

0 set frequency	2 decimal digits
1 output frequency	2 decimal digits
2 actual output current	1 decimal digit
3 percentage of output current	1 decimal digit
4 actual input voltage	0 decimal digit
5.actual output voltage	0 decimal digits
6 motor speed	3 decimal digits
7 percentage of left time of step speed running	1 decimal digit
8 accumulative total running time	2 decimal digits
9 PID set	2 decimal digits
10 PID feedback	2 decimal digits

* Note 4：fault information is listed as bellow：

0 = no fault
1= memory error
2= power supply is under voltage
3= power supply is over voltage
4= over output current
5= overload
6= P.H input phase lost
7= Err_M
8= inverter is over heat
9= motor is over heat (do not inspect)
10=inverter’s DC fuse error
11= output phase lost
12= pipeline leak
13= pipeline block
14= feedback sensor error
15= inverter’s external fault
16= memory error
17= the parameter of user-set V/F curve is fault
18= traverse parameter is set fault
19= password error
20= trial use is over
21= CPU inner error

22= CPU inner error
23= CPU inner error
24= CPU inner error
25= CPU inner error
26= CPU inner error
27= CPU inner error
28= CPU inner error
29=data error
30= Err_rep
31= Err_sc (load short circuit)

9. The period of A byte sent to K byte sent is <20ms, other bytes' period are < 10ms. It takes less than 80ms for an inverter to process receiving a data package.

For example:

1 . The master gives FOR command to No.11 inverter

A=11=0BH (the inverter's address =0BH)
K=01H (the running reference is 01H)
P=02H (the FOR command is 02H)
D_0 =00H (No Meaning is 00H)
D_1=00H (lower byte is 00H)
D_2=00H (upper byte is 00H)
D_3=00H (the most byte is 00H)
S=0EH (checksum byte is 0EH)
(S=0BH+01H+02H+00H+00H+00H +00H=0EH)

The delivery sequence from the master is 0BH, 01H, 02H, 00H, 00H, 00H, 00H, 0EH.

The inverter will send back the copy of the data package 0BH, 01H, 02H, 00H, 00H, 00H, 00H, 0EH if it receives it correctly and it has no faults.

2. Inquire the running status

The procedures to inquire No.11 inverter's running status:

A=11=0BH (the inverter's address =0BH)

K=02H (status inquiry is 02H)
P=00H (No Meaning is 00H)
D_0 =00H (the lowest byte is 00H)
D_1=00H (lower byte 00H)
D_2=00H (upper byte is 00H)
D_3=00H (the most byte is 00H)
S=0DH (checksum byte is 0DH)
(S=0BH +02H+00H+00H+00H +00H+00H=0DH)

The master's delivery sequence is 0BH, 02H, 00H, 00H, 00H, 00H, 00H, 0DH

When the inverter runs in forward and has no faults, it will send back the information of the data package 0BH, 02H, 02H, 00H, 00H, 00H, 00H, 0FH if it receives it correctly.

3 .Set the operation parameters

The procedures to change the set frequency of No.11 inverter to 50.00Hz are:

Without decimal point, 50.00 is 5000=1388H
A=11=0BH (the inverter's address =0BH)
K=03H (operation parameter set is 03H)
P=01H (the set frequency =01H)
D_0 =88H (the lowest byte is 88H)
D_1=13H (lower byte is 13H)
D_2=00H (upper byte is 00H)
D_3=00H (the most byte is 00H)
S=AAH (checksum byte is AA H)
(S=0BH+03H +01H+88H+13H+00H+00H=AAH)

The master's delivery sequence is 0BH, 03H, 01H, 88H, 13H, 00H, 00H, AAH.

4. Operation monitoring inquiry:

The procedures to inquiry No.28's operation monitoring (for example, its motor speed) are:

A=28=1CH (the inverter's address=1CH)

K=04H (operation monitoring inquiry is 04H)

P=06H (motor speed=06H)

D_0 =00H (the lowest byte is 00H)

D_1=00H (lower byte is 00H)

D_2=00H (upper byte is 00H)

D_3=00H (the most byte is 00H)

S=26H (checksum byte is 26 H)

(S=1CH+04H+06H+00H+00H+00H+00H=26H)

The master's delivery sequence is 1CH, 04H, 06H, 00H, 00H, 00H, 00H, 26H

If the inverter sends back the data package 1CH, 04H, 06H, 62H, 49H, 1BH, 00H, ECH (1CH+04H+06H+62H+49H+1BH+00H=ECH), because 1B4962H=1788258, the motor speed is a number has 3 decimal digits, the actual motor speed of No.28 inverter is 1788.258 rpm.

5. Function parameter setting

The procedures to set parameter F003 to RS-485 control of No.18 inverter are:

A=18=12H (the inverter's address=12H)

K=05H (operation parameter set is 05H)

P=03H (The number part of the parameter code 003=03H, letter F is omitted)

D_0 =02H (the lowest byte 02H shows the set value of the function parameter F003, it is RS-485 control)

D_1=00H (lower byte is 00H)

D_2=00H (upper byte is 00H)

D_3=00H (the most byte is 00H)

S=1CH (checksum is 1C H)

(S=12H+05H+03H +02H+00H+00H+00H=1CH)

The master's delivery sequence is 12H, 05H, 03H, 02H, 00H, 00H, 00H, 1CH

The inverter will send back the copy of the data package 12H, 05H, 03H, 02H, 00H, 00H, 00H, 1CH

6. Function parameter inquiry

The procedures to inquire the function parameter F005 (Set frequency analogue input selections) of No.18 inverter are:

A=18=12H (the inverter's address =12H)

K=06H (function parameter inquiry is 06H)

P=05H (The number part of the parameter code 005=05H, letter F is omitted)

D_0 =00H (the lowest byte 00H)

D_1=00H (lower byte is 00H)

D_2=00H (upper byte is 00H)

D_3=00H (the most byte is 00H)

S=1DH (checksum is 1C H)

(S=12H+06H+05H +00H+00H+00H+00H=1DH)

The master's delivery sequence is 12H, 06H, 05H, 00H, 00H, 00H, 00H, 1DH.

If the inverter sends back the package in the order of 12H, 06H, 05H, 00H, 00H, 00H, 1DH

(12H+06H+05H+00H+00H+00H+00H=1DH)

then the inverter's F005=0, that Set frequency analogue input selections is 0: keypad potentiometer set

Note: Take the last byte as S (checksum) if the checksum byte is more that 8 bit.

7. Current fault inquiry:

To inquire the output frequency of current fault of No. 10 inverter:

The computer sends 0AH, 0AH, 02H, 00H, 00H, 00H, 00H, 16H

If the inverter sends back:

0AH, 0AH, 02H, 88H, 13H, 00H, 00H, B1H

Because 1388H=5000, the output frequency is a number has two decimal digits, the current fault output frequency is 50.00Hz.