TECOREP-GROUP

HC1 AC MOTOR DRIVE

HC1-C+

User Manual

Tecorp Technology Co.,Ltd.

Thank you for choosing and using the general-purpose inverter of HC1-C+ Series of multi-functions and high performance which manufactured by Tecorp Electronics Co., Ltd.

Please read this Manual carefully before installation and operation, to maintain the inverter well, and maximize its function; moreover; to ensure the safety of the operator.

In this Manual, the safety notices are classified into "Danger" and "Precaution", please pay attention and be very careful to such symbols and corresponded contents.

"Danger" means improper handling or incorrect operating may cause personal death or serious injury.

"Precaution" means improper handling or incorrect operating may cause personal injury or fault of the inverter and mechanical system, and it can also cause some serious consequences.

The diagrams and drawings in this Manual are helpful to the product description, because regular update it may differ from the product. Please follow current rules according to the actual product.

The end-user should keep this manual well for the future reparation and maintenance.

If you have any further question, please contact with our company agency, we are glad to help you and supply the solution as soon as possible.

Thanks for your cooperation.

Contents

Chapter 1 Safety notices

1-1 Confirmation on receiving

⚠ Warning

This product has checked under precise testament before left factory. For some problems may happen during the delivering process, please check the product first when received:
Whether the product became deformed, broken during delivering or not. Such broken frequency inverter still possible causes personal injury when installed.
Whether the package is intact, User's Manual and other fittings are attached or not. Please keep User's Manual and the Warranty Card well for the future maintenance.
Please check the received product's specification and any inside or outside problem of the machine.

1-2 Transportation and installation

⚠ Warning

Please pack the inverter with proper protection to reduce any possible damage.
Please pack the inverter firmly from the bottom to the surface during delivering, to reduce any possible damage to users and products.
Please install the inverter in noninflammable place, and keep it away from inflammables.
Please check and make sure the inverter installed in correct direction.

Please install the inverter in a safe place and only use under the following environmental conditions:
Environmental temperature: -10℃ ~ 40℃ (non-freezing);
Relative humidity: 95% above (non-condensing);
Surroundings: indoor (away from any corrosive gas, inflammable gas, oil mist, dust and direct sunshine).
Altitude: 1000m below or above the sea level (the inverter shall be used in lower step when it used in 1000m place above the sea level).
Vibration: 0.5G below.
Please check the installing platform can endure the weight of the inverter, and never fall down; meanwhile; please make sure the place is safe and reliable. Prevent children and matterless people from getting close to it.
Please make sure the product installed and fixed with screws according to the User's Manual method, and screws must tightly fix to sure the inverter won't fallen.
In order to reduce any possible problem or accident happen, carefully install those screws, scrapes and other conductors.
When install some inverters in one control cabinet, please follow the instruction of User's Manual. Besides, please make sure there is enough equipped spaces, and a heat emitting fan of the air circulation in the control cabinet. Meanwhile, make ensure the temperature of the cabinet under 40℃, overheat may cause any device faults, fire or other accidents.
The installation of the inverter shall be carried out by professional installation personnel.

1-3 Wiring and junction

⚠ Warning

Please pay attention do not damage, attach any weight, and clamp

force to the wire; otherwise the wire may be broken and caused electric shock.

Please do not equip any phase container, surge absorber or radio noise filter to the output side of the inverter, or it will cause some device fault.

Please do not equip any air switch, contactor or any other switch element to the output side of the inverter, please ensure the frequency has no output of open or close action when necessary.

Please separate the power line from the control line to avoid interference.

Danger

Please make sure the power supply is OFF state before wiring.

The wiring work shall be carried out by a professional electrician.

Wiring shall be carried out according to the wire specification in the User's Manual.

Please correctly earths the device follow the specification in the User's Manual, to reduce potential hazard of electric shock or fire.

The power supply of the inverter shall be strictly separate from other power supplies of electric welding machine or devices that may cause huge interference.

Please never touch the base plate with wet hands, or it may cause electric shock.

Please do not directly touch any terminal and connecting input or output line of the inverter, to reduce electric shock possibility.

Please make sure the voltage of the power supply is complying with the nominal voltage of the inverter, or it will cause device fault or personal injury.

Please make sure the power supply is connected to the R/L1 and S/L2 terminals. Please do not connect the power supply to the U, V or W terminal, or it will cause an internal fault to the inverter.

Please never take any voltage without standard test of the inverter, or it will bring an internal fault to the device.
Please install the braking unit, braking resistor and other fittings as per the specified method in User's Manual, or it may cause a fault to the inverter.
Please make sure all terminal screws are tightened, or it will bring a fault to the inverter.

1-4 Device setting test

Warning

Before the power supply switched on, please make sure the shell is well-mounted, and never dismantle it in power supplying.
Please make sure all lines including signal lines, and correctly connected before the power supply switched on; otherwise the inverter may be broken.
Please make sure all parameters are correctly set before test.
Please make sure there is no device will be damaged when the inverter switched on, and recommended to take the commissioning test without load.
Please press down the Emergency Stop button when the Functional Setting Stop doesn't work.
Please do not switch on or off the inverter by an electromagnetic contactor; on the other hand, it will reduce product's life.

Danger

AS setting the function of Restart at Failure, the device will automatically restart when out of operating; therefore, please do not close the device in such situation.
Please make sure the motor and other devices are used within the applicability, or else. Please do not modify the parameter setting of the inverter during operation.

Please never touch the heat sink or braking resistor during operation, or it will cause a fire.
Please never touch the plate or operate any switch button with wet hands; otherwise, it will cause an electric shock or personal injury.
Please never switch on or off a motor when the machine is running, otherwise the inverter will be broken.

1-5 Check and maintenance

Warning

Please make sure the power supply is switched off and the power supply indicator turned off before inspection and maintenance, otherwise it will cause an electric shock.
In order to protect the device from any influence of static electricity, please touch a metal object to eliminate the static electricity before touching the inverter for inspection and maintenance.
Please never use a megohmmeter (insulation resistance) to test the control loop of the frequency inverter.

Warning

Inspection, maintenance or part of replacement must be carried out by a designated professional.
Inspection, maintenance or part of replacement must be carried out according to the specified method in User's Manual; the inverter can not be restructured by ourselves; otherwise, it will cause an electric shock, personal injury or device fault.

1-6 Exception processing

Danger

When the inverter can not start normally, please find out the reason as per the error indication. After solved the problem, the inverter will

restart with resetting. Otherwise, the problem has not solved and the inverter restart after resetting, it may have any further problem of the inverter or other devices.

If the inverter has problem and can't work normally, please contact with our company agency immediately. Rather than repaired by others or yourselves.

1-7 Scrapping processing

⚠ Warning

When the inverter rejected to work, please do not use or burn it makes any damage.

Chapter 2 Product introduction

2-1 Unpacking inspection

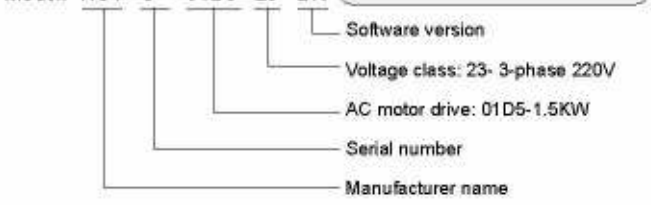
When the inverter is unpacked, please follow below conditions to check:

To check the type of the inverter complies with the condition of order or not.

To check there's any damage of the inverter, and fittings are completed or not.

If there would have any problems, please contact the supplier immediately.

2-2 Description of the frequency inverter



2-3 Product specifications

Item		HC1-C +
Input	Nominal voltage & frequency	Single-phase, three-phase AC220V 50/60Hz; three-phase AC380 50/60 HZ
	Allowable voltage range	Single-phase, three-phase AC170~240V; 3PH AC330-440V

Item		HC1-C +
Output	Voltage	0~220V; 0 ~ 380V AC
	Frequency	0.1~400.0Hz
Control mode		Space vector, V/F control
Display		Quad bit nixie tube display & indicator display: set frequency, output frequency, output current, rotating direction, rotating speed and fault, etc.
Control characteristics	Frequency setting resolution	Digital setting: 0.1Hz, simulated setting: 0.1% of the maximum output frequency
	Output frequency accuracy	0.1Hz
	V/F control	V/F curve can be freely set to comply with various loads.
	Torque control	Automatic boosting: the torque boosting can be fixed automatically according to the actual load; Manual boosting: 0.0~20.0% torque boosting is settable.
	Multifunctional input	6 multifunctional input terminals for 15-step speed control, programmed operation, 4-step accelerating or decelerating switch, UP/DOWN and emergency stop functions, etc.
	Multifunctional output	2 multifunctional output terminals for indicating and warning for operating, null speed, external irregularity and programmed operation, etc.
	Accelerating / decelerating time setting	0~999.9s separately settable accelerating/ decelerating time
Other functions		Built-in PID control and 2 counter units, standard RS485 communication function and selectable automatic voltage regulation; Frequency setting mode: analog quantity 0~10V, 0~20mA, manipulator setting, RS485 setting and up/down setting, etc.
Protective functions		Overload protection: 150% constant torque for 1 minute, settable over-voltage / under-voltage protection; Other protections: overheat protection, short circuit protection, over current protection and parameter lock, etc.

Item		HC1-C +
Working conditions	Environmental temperature: -10℃~40℃ (non-freezing) Relative humidity: 90% below (non-condensing) Altitude: 1000m below Vibration: 0.5G below	
Structure	Cooling mode: forced air cooling Protection grade: IP20	
Installation	Wall-mounted	

2-4 Product serial models

Model	Input	Power output	Capacity KVA	Current output (A)	Load capacity (60s) (A)	Motor equipped KW
HC1C*00D423BK	1PH / 3PH 220V - 50 / 60HZ	0.4	1.0	2.5	3.75	0.4
HC1C*0D7523BK	1PH / 3PH 220V - 50 / 60HZ	0.75	2.0	5.0	7.5	0.75
HC1C*01D523BK	1PH / 3PH 220V - 50 / 60HZ	1.5	2.8	7.0	10.5	1.5
HC1C*0D7543BK	3PH 380V 50/60HZ	0.75	2.2	2.7	4.05	0.75
HC1C*01D543BK	3PH 380V 50/60HZ	1.5	3.2	4.0	6.0	1.5
HC1C*02D243BK	3PH 380V 50/60HZ	2.2	4.0	5.0	7.5	2.2

2-5 Product storage

The inverter must be kept in its original package box before installation. When the inverter is seldom use or kept in storage most of the time. Please pay attention to below followings:

(1) It must be kept in a dry place and away from dust and rubbish.

(2) The relative humidity of the storage is 0~95% without freeze.

(3) The storage shall be away from corrosive gas, and avoid exposure to direct sunlight, heat or moisture.

(4) The proper temperature of the storage is -26℃~65℃.

In order to maintain the inverter's function, do not store it too long. It is necessary to electrify once per year if have stored for a long time. Each electrifying times should be 5 hours at least. Moreover, importing the voltage need to use the transformer adjust it from lower to upper slowly.

Chapter 3
Installation of the frequency inverter

※3-1 Installation environment and requirement

The installation environment will directly affect the inverter's life and function. If this inverter used in an improper environment which not follow User's Manual's specification, it would cause the inverter's damage.

Series 2200A are wall-mounted inverters. Therefore, to make the cooling system reach the best effect, the inverter should be installed vertically and keep the air circulation well.

The inverter shall be installed as below conditions:

(1) The environmental temperature is -10℃ ~ +40℃;

(2) The relative humidity is 0~90% without freeze;

(3) Avoid exposure to direct sunlight;

(4) Away from any corrosive gas, heat or moisture;

(5) Away from any dust, floating fiber, cotton wool or metal particle;

(6) Away from any radioactive substances or inflammable materials;

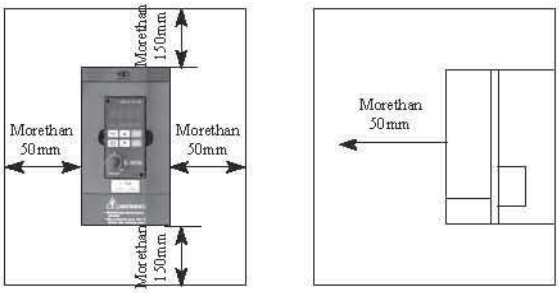
(7) Away from any electromagnetic interference source (such as an electric welding machine or a large-power machine);

(8) The installation platform shall be firm without any vibration; if vibration would unavoidable, please attach some vibration absorbing pads to reduce it;

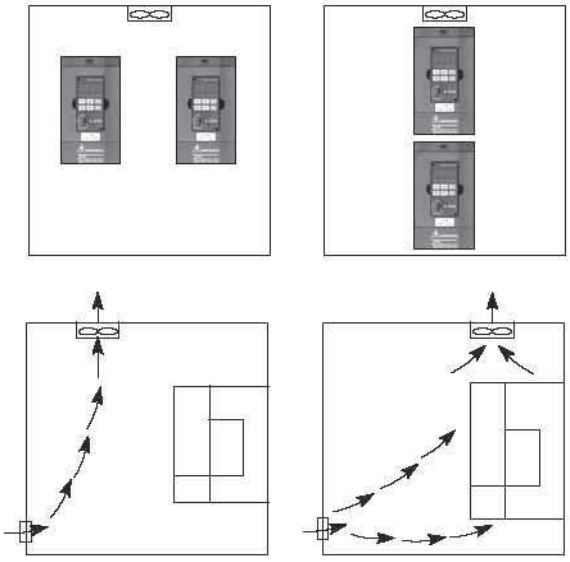
(9) The inverter shall be installed in a place with favorable air ventilation and access for inspection and maintenance, and also it shall be installed on a firm and noninflammable material away from any heating unit (such as a braking resistor, etc.);

(10) There shall be enough space for the installation of the inverter especially for the installation of several inverters which shall be well-arranged and equipped with a heat emitting fan to control the environmental temperature under 45℃.

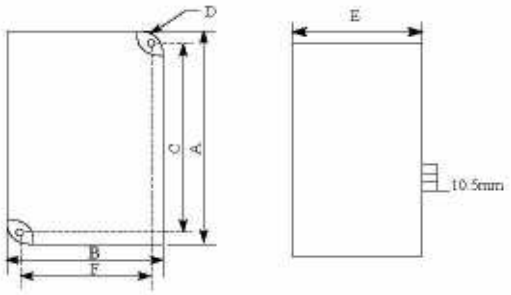
① Installation of one single inverter:



② Several inverters installed in one controlling cabinet



3-2 External and installation dimensions of the frequency inverter



3-3 Keyboard base (External control box) bore dimension

Dimension of the keyboard for one single-phase 220V/0.4~1.5KW plastic shell Type A inverter: 70mm×36mm

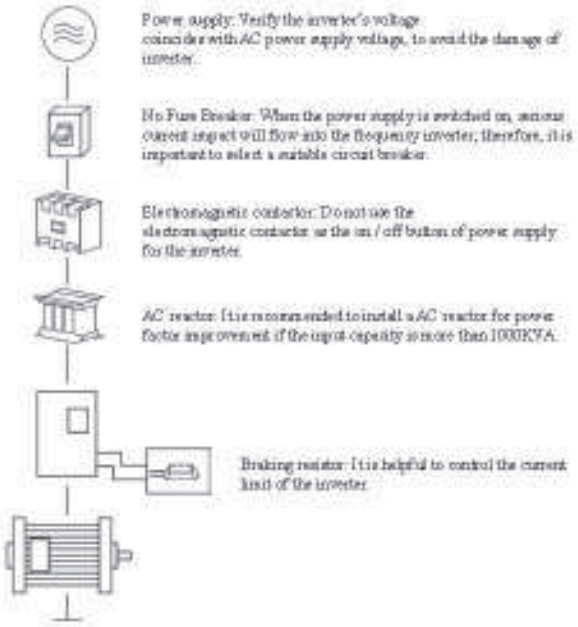
Unit: mm

Moder	A	B	C	D	E	F
HC1C'00D423BK	142.0	85.0	130	5.0	112	73
HC1C'0D7523BK	142.0	85.0	130	5.0	112	73
HC1C'01D523BK	142.0	85.0	130	5.0	112	73
HC1C'0D7543BK	151	100	139.6	5.2	111.7	88.6
HC1C'01D543BK	151	100	139.6	5.2	111.7	88.6
HC1C'02D243BK	151	100	139.6	5.2	111.7	88.6

Chapter 4 Wiring

Wiring for the inverter includes the major loop part and the control part.

4-1 Main loop wiring



4-1-1 External components description

(1) AC power supply

The power supply should follow the specification of the User's Manual.

(2) No Fuse Breaker

When the voltage supply is over low or there is a short circuit at the input side, the circuit breaker can supply a protection; the circuit breaker can be switched off to isolate the inverter from the power supply before inspection, maintenance or shutdown.

(3) Electromagnetic contactor

It facilitates controlling the power on and off of the inverter and improves operating safety.

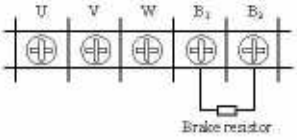
(4) AC reactor

a: To inhibit higher harmonic waves and protect the inverter;

b: To improve the power factor.

(5) Braking resistor

In order to avoid the over-voltage on the DC circuit of the inverter and improve the braking capacity of the built-in brake unit as the motor braked. And the wiring method for the braking resistor of an inverter is 1.5KW (including 1.5KW plastic shell Type A) as below:



4-1-2 Main loop wiring notices

(1) The wire specification shall comply with the Electric Code;

(2) Please do not connect the AC line to the output terminals (U, V, W) of the inverter or it will be damaged;

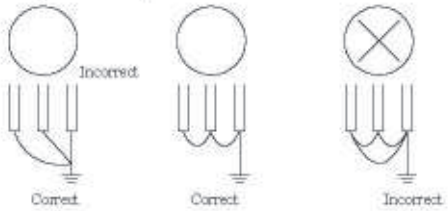
(3) Please use isolating lines and wire barrel for the power line as much as possible, and correctly earth the isolating layer or both of the wire barrel;

(4) The inverter shall be separately earthed rather than with an electric welding machine, a big power motor or a high current load;

(5) The earth terminal E⏚ shall be earthed in a correct way (the earth impedance is 100Ω below);

(6) The earth line shall comply with the electric technical specification, and the length shall be as small as possible;

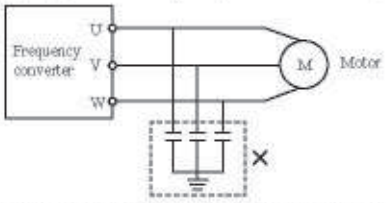
(7) When several inverters are commonly earthed, pay attention do not to create any earth loop, as below:



(8) The power and control line of the major loop must be distributed separately, any parallel lines must be isolated more than 10cm, and any cross lines must be distributed perpendicularly, the control line can not be placed with the power line in a same wire casing , otherwise, there will cause interference;

(9) Generally the distance between the inverter and the motor shall be 30m below, if the distance is too far, there would cause problems by the parasitic capacitance and over; furthermore, it will bring a fault or irregularity to inverter. The distance between the inverter and the motor shall not exceed 100m, and a filter shall be equipped to the output side for decreasing the carrier frequency when the distance is too far;

(10) The output side of the inverter should not be equipped with any absorbing capacity or other capacity-resistance unit;



(11) Please make sure all terminals of the major loop are tightened, between a wire and terminal are connected in good condition, and make sure they will not be loosened because of vibration or without short circuit will any spark generated.

(12) To reduce the interference, it is recommended to equip a surge absorber to each electromagnetic contactor, relay and any other element in the surrounding circuit of the inverter.

4-1-3 Recommending equipment specifications

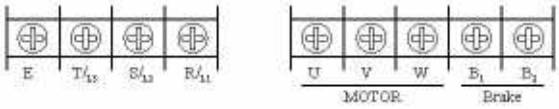
Type of frequency inverter	Voltage input	Motor equipped (KW)	Major loop wire diameter (m^2)	Air-break switch (A)	Electromagnetic contactor (A)
HC1C+00D423BK	220V	0.4	2.5	16	12
HC1C+0D7523BK	220V	0.75	2.5	16	12
HC1C+01D523BK	220V	1.5	2.5	32	18
HC1C+0D7543BK	380V	0.75	2.5	16	12
HC1C+01D543BK	380V	1.5	2.5	16	12
HC1C+02D243BK	380V	2.2	2.5	16	12

*The data of the table above are only for reference.

4-1-4 Main loop terminals and description

The major loop terminals are accessible when the shell of the frequency inverter is removed.

1. For a single-phase 220V/0.4~1.5KW plastic shell Type A frequency inverter, the major loop terminals are arranged as below:

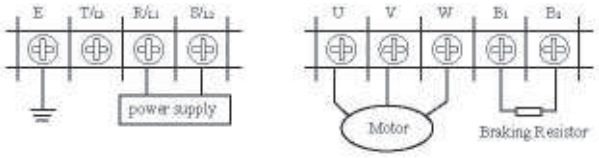


4-1-4-1 Main loop terminals and description

Name	Function description
E ⏚	Earth terminal
R/L1 S/L2	Power input
U, V, W	Connected to a three-phase AC motor
B1, B2	Connected to a braking resistor (optional)

Wiring example:

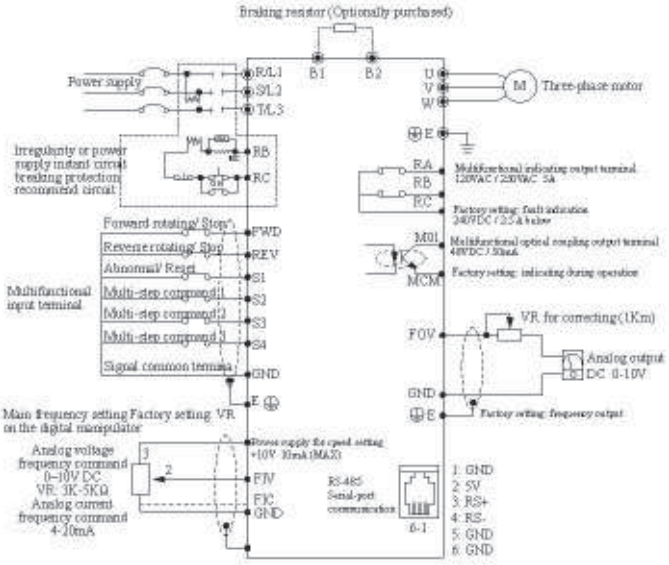
1. The following is an example for the wiring of a single-phase 220V/0.4~1.5KW plastic shell Type A frequency inverter:



4-2 Control terminal

4-2-1 Basic wiring diagram

Type of 1.5KW below (including 1.5KW plastic shell Type A)

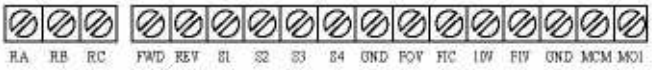


Notice: 3-phase input 220V R, S, T/ single-phase input 220V R, S

◉ Major loop terminal ● Control loop Please only use coated shielding wire!

4-2-2 Control terminal arrangement

Single-phase 0.4KW~1.5KW



4-2-3 Control terminal description

Terminal name	Function description	Note
FWD	Forward rotating command input (multifunctional input terminal)	Multifunctional input terminals S1-S4, FWD, and REV can be set through parameters P3.15-P3.20;valid when the terminal is closed with GND
REV	Reverse rotating command input (multifunctional input terminal)	
S1	Reset at irregularity	
S2	Multi-step command 1	
S3	Multi-step command 2	
S4	Multi-step command 3	
FOV	Analog voltage output terminal	0-10V
10V	Power supply for speed setting	
FIV	Analog voltage command input terminal	0-10V
FIC	Analog current command input terminal	0-20mA
GND	Signal input common terminal	
MCM	Optical coupling output common terminal	
M01	Multifunctional optical coupling output terminal	
RA	Relay output terminal (Normally open)	
RB	Relay output terminal (Normally closed)	
RC	Relay output terminal RA, RB common terminal	

4-2-4 Control loop wiring notice

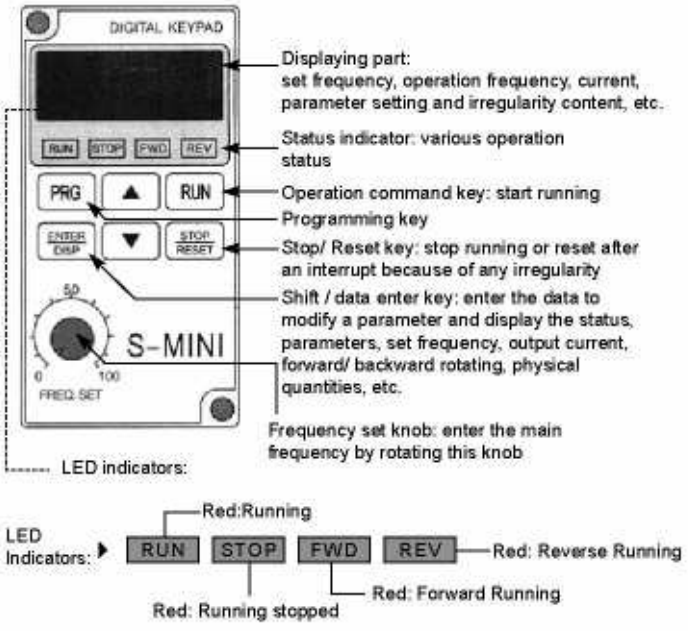
(1) Please separate the control signal line from the major loop line and any other power line or power supply line in wiring;

(2) As interference will cause a improper operation, please use 0.5-2mm of twisted screening line or twin-wire shielded line;
(3) Please confirm the allowable condition for the terminal before wiring, such as: power supply or maximum allowable current, etc;
(4) Please correctly set the earth terminal E, and make sure the earth impedance is 100Ω below;
(5) Please correctly select all fittings such as a potentiometer or a voltmeter to the terminal as per the specification;
(6) Please carefully check after wiring and before switching on the power supply.

Chapter 5
Manipulator and running description

The digital manipulator is located at the center of the frequency inverter, and it is divided into two parts: displaying part and key control part. The displaying part indicates the parameter setting and different operating status, and the key control part is the communication channel between the user and the frequency inverter.

5-1 Digital manipulator



5-1-1 Key function description

Key name	Function description
PRG	Function selecting key, for select a function menu
▲ ▼	Figure modifying key, for modify a function code and parameter
ENTER DISP	Shift key or enter key Shift to an another digit or switch to another display by short-pressing, confirm a setting by long-pressing
	Turn to another frequency by rotating the potentiometer when the frequency is set to be controlled by the manipulator potentiometer
RUN	Command for running
STOP RESET	Command for stopping (applicable in the manipulator controlled status) or reset after an fault

5-1-2 LED indicator light description

	Display item	Description
1	F00.0	Frequency setting after the power supply is switched on
2	H00.0	Actual running frequency
3	A00.0	Current for motor running
4	Frd rEu	Motor rotating direction

* The above display items can be switched and read by short pressing the ENTER DISP key on the main menu.

5-2 Digital manipulator operating method

(1) Parameter setting <e.g.: modifying the validly setting of F1.04 reverse running>

Step	Key name	Display	Description
1	Switch on the power supply	STOP FWD F00.0	① Display the frequency setting (initial display). ② The frequency inverter is standing by.
2	Press PRG	STOP FWD P000	Enter the parameter setting status, the first digit will flicker (the digit is modifiable).
3	Press ▲ for four times	STOP FWD P004	The digit is modified into "4" from "0".
4	Short press ENTER DISP for twice	STOP FWD P004	Shift leftward for two digits and the third digit will clicker.
5	Press ▲ for once	STOP FWD P104	The digit is modified into "1" from "0"
6	Long press ENTER DISP	STOP FWD 0001	Enter the parameter setting interface.
7	Press ▲ ▼	STOP FWD 0000	Modified "1" into "0".
8	Long press ENTER DISP	STOP FWD P105	Confirm and finish the modification for F1.04.
9	Press PRG	STOP FWD F00.0	Return back to the initial display.

Note:

1. Pressing PRG can interrupt the modification and return back to the main display interface.
2. When a modification is confirmed, An Err may be displayed to show the parameter modification is failed.

(2) Different status display and inquiry

Parameter set: the frequency for the startup and shutdown (P102=0) of the frequency inverter controlled by the manipulator is given by the potentiometer of the manipulator (P101=3).

Step	Key name	Display	Description
1	Switch on the power supply	STOP FWD F00.0	Set the frequency displaying state.
2	Rotate 	STOP FWD F05.0	Set the frequency into 5.0Hz.
3	Press RUN	RUN FWD F05.0	The frequency inverter will be started in forward running.
4	Press ENTER DISP	RUN FWD F05.0	Switch to the actual running frequency display.
5	Rotate 	RUN FWD H15.0	Modify the set frequency, and the actual running frequency is modified into 15Hz from 5Hz.
6	Press ENTER DISP for once	RUN FWD A00.0	Switch to the current display when the current output is 0A.
7	Press ENTER DISP for once	RUN FWD Frd	Switch to the setting interface (press to switch the rotating direction)
8	Press RUN for once	RUN FWD P000	Switch to the parameter setting status.
9	Press ▲ for once	RUN FWD P006	Select parameter code P006 to be modified.
10	Long press ENTER DISP	RUN FWD 022.8	P006 content: the current temperature of the frequency inverter is 22.8℃.
11	Press PRG for twice	RUN FWD F15.0	Return back to the main display, the set frequency is 15Hz.
12	Press STOP RESET	STOP FWD F15.0	During the frequency inverter is decelerating before stop, the key will flicker and then the and keys will turn on, and the set frequency displayed is 15Hz

Note: The set frequency, running frequency, output current and running speed of the frequency inverter can be monitored by switching keys during operation, and the main display can be modified by P000 setting as per the practical requirement, and meanwhile the related content can be monitored by the user through P001-P018.

Chapter 6
Table of functional parameters

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Data display	P000	Select and set the current display	0-32	1	1	39
	P001	Frequency setting	Read only			40
	P002	Frequency output	Read only			40
	P003	Current output	Read only			40
	P004	Rotating speed	Read only			40
	P005	DC bus voltage	Read only			40
	P006	Temperature of the frequency inverter	Read only			40
	P007	PID display	Read only			41
	P010	Fault record 1	Read only			41
	P011	Fault record 2	Read only			41
	P012	Fault record 3	Read only			41
	P013	Fault record 4	Read only			41
	P014	Set frequency at the latest fault	Read only			41
	P015	Frequency output at the latest fault	Read only			41
	P016	Current output at the latest fault	Read only			41
	P017	Voltage output at the latest fault	Read only			41
	P018	DC voltage at the latest fault	Read only			41

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Basic running parameter group	P100	Main frequency setting	0.0- Upper limit of the frequency	0.1	0.0	42
	P101	Frequency setting selection	0: Digital frequency setting mode 1: Analog voltage setting mode 2: Analog current setting mode 3: Keyboard potentiometer setting mode 4: UP/DOWN mode 5: RS485 communication frequency setting	1	0	43
	P102	Running setting selection	0: Keyboard 1: IO terminal 2: Communication	1	0	45
	P103	STOP key validity setting	0: STOP key invalid 1: STOP Key valid	1	1	47
	P104	Reverse running validity setting	0: Reverse running disabled 1: Reverse running enabled	1	1	48
	P105	Maximum running frequency	Minimum running frequency ~ 400Hz	0.1	50.0	49
	P106	Minimum running frequency	0.0 ~ Maximum running frequency	0.1	0.0	49
	P107	Accelerating time 1	0 ~ 999.9S	0.1	Variable	49
	P108	Decelerating time 1	0 ~ 999.9S	0.1	Variable	49
	P109	V/F maximum voltage	V/F intermediate voltage ~ 500.0V	0.1	400.0	50
	P110	V/F reference frequency	V/F intermediate frequency ~ maximum running frequency	0.1	50.0	50
	P111	V/F intermediate voltage	V/F minimum voltage ~ V/F maximum voltage	0.1	Variable	50
	P112	V/F intermediate frequency	V/F minimum frequency ~ V/F reference frequency	0.1	2.5	50
	P113	V/F minimum voltage	0 ~ V/F intermediate voltage	0.1	Variable	50

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Basic running parameter group	P114	V/F minimum frequency	0 ~ V/F intermediate frequency	0.1	1.25	50
	P115	Carrier frequency	1.0K ~ 15.0K	0.1	Variable	53
	P116	Automatic carrier wave regulation	Reserved	1	0	
	P117	Parameter initialization	8: Initialize the parameter	1	0	54
	P118	Parameter locking	0: Parameter unlocked 1: Parameter locked	1	0	54
Basic parameter setting	P200	Startup mode option	0/1 ~ routine startup/ speed checking before startup	1	0	54
	P201	Shutdown mode option	0/1~ decelerating/ free stop	1	0	55
	P202	Startup frequency setting	0.1 ~ 10.0Hz	0.1	0.5	56
	P203	Shutdown frequency setting	0.1 ~ 10.0Hz	0.1	0.5	57
	P204	Startup DC braking current	0 ~ 150% nominal current of the motor	1%	100%	57
	P205	Startup DC braking time	0 ~ 25.0S	0.1	0	57
	P206	Shutdown DC braking current	0 ~ 150% nominal current of the motor	1%	100%	58
	P207	Shutdown DC braking time	0 ~ 25.0S	0.1	0	58
	P208	Automatic torque compensation	0 ~ 20.0%	1	0	58
	P209	Motor nominal voltage	0 ~ 500.0V	0.1	380.0	59
	P210	Motor nominal current	0 ~ system set current	0.1	Variable	59
	P211	Motor no-load current ratio	0 ~ 100%	0.1	40%	59

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Basic parameter setting	P212	Motor nominal rotating speed	0 ~ 6000r/min	1	1420	59
	P213	Motor pole number	0 ~ 20	2	4	59
	P214	Motor nominal speed drop	0 ~ 10.0Hz	0.1	2.5	59
	P215	Motor nominal frequency	0 ~ 400.0Hz	0.1	50.0	60
	P216	Stator resistance	0 ~ 100.00Ω	0.1	0	60
	P217	Rotor resistance	0 ~ 100.00Ω	0.1	0	60
	P218	Rotor self inductance	0 ~ 1.000H	0.1	0	60
	P219	Rotor mutual inductance	0 ~ 1.000H	0.1	0	60
	P220	Torque compensation filter time	0 ~ 10.00S	0.1	0.1	
Input / output application group	P300	FIV minimum voltage input	0 ~ FIV maximum voltage	0.1	0	61
	P301	FIV maximum voltage input	FIV minimum voltage ~ 10V	0.1	10.0	61
	P302	FIV filter time input	0 ~ 25.0S	0.1	1.0	61
	P303	FIC minimum current input	0 ~ FIC maximum current	0.1	4.0	62
	P304	FIC maximum current input	FIC minimum current input ~ 20mA	0.1	20.0	62
	P305	FIC filter time input	0 ~ 25.0S	0.1	1.0	62
	P306	FOV minimum voltage output	0 ~ FOV maximum voltage	0.1	0	63
	P307	FOV maximum voltage output	FOV maximum voltage output ~ 10V	0.1	10.0	63
	P308	Reserved				

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Input/ output application group	P309	Reserved				
	P310	Analog quantity lowest frequency	0 ~ 400.0	0.1Hz	0.0	64
	P311	Analog quantity lowest direction	0/1	1	0	64
	P312	Analog quantity highest frequency	0 ~ 400.0	0.1Hz	50.0	64
	P313	Analog quantity highest direction	0/1	1	0	64
	P314	Analog quantity reverse selection	0/1	1	0	64
	P315	Input terminal FWD (0~32)	0: invalid 1: inching 2: inching forward running 3: inching reverse running 4: forward/ reverse 5: running 6: forward running 7: reverse running	1	6	66
	P316	Input terminal REV (0~32)	8: stop 9: multi-step speed 1st digit selected 10: multi-step speed 2nd digit selected	1	7	66
	P317	Input terminal S1 (0~32)	11: multi-step speed 3rd digit selected 12: multi-step speed 4th digit selected	1	18	66
	P318	Input terminal S2 (0~32)	13: accelerating or decelerating 1st digit selected 14: accelerating or decelerating 2nd digit selected 15: frequency progressive increasing signal (UP) 16: frequency progressive decreasing signal (DOWN) 17: Emergency stop signal	1	9	60

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Input/ output application group	P319	Input terminal S3 (0 ~ 32)	18: Fault reset signal 19: PID controlled operation 20: PLC controlled operation 21: Timer 1 startup signal 22. Timer 2 startup signal 23: Counter pulse signal 24: Counter reset signal 25: Memory clear 26: Winding start	1	10	66
	P320	Input terminal S4 (0 ~ 32)		1	11	66
	P321	Reserved				
	P322	Reserved				
	P323	Output signal M01 (0~32)	0: Invalid 1: Running 2: Frequency reached 3: Fault 4: Zero speed 5: Frequency 1 reached 6: Frequency 2 reached 7: Accelerating 8: Decelerating 9: Low voltage indication 10: Timer 1 reached 11: Timer 2 reached 12: Stage completion indication 13: Process completion indication 14: PID upper limit 15: PID lower limit 16: 4-20mA disconnected 17: Overload detecting 18: Exceeding torque detecting 26: Winding counter reached 27: Setting counter reached 28: Intermediate counter reached 29: Constant pressure water supply	1	1	72

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Input/ output application group	P323	Output signal M01 (0~32)	"1" Switched "0" Non-switched	1	1	72
	P324	Reserved				72
	P325	Alarm output terminal RB, BA, RC (0 ~ 32)		1	3	72
	P326	Output terminal FOV (0 ~ 7)	0: Output frequency 1: Output current 2: DC voltage 3: AC voltage	1	0	76
	P327	Reserved				
Auxiliary application group	P400	Inching frequency setting	0.0 ~ maximum running frequency	0.1	5.0	77
	P401	Accelerating time 2	0 ~ 999.9	0.1s	10.0	78
	P402	Decelerating time 2	0 ~ 999.9	0.1s	10.0	78
	P403	Accelerating time 3	0 ~ 999.9	0.1s	20.0	78
	P404	Decelerating time 3	0 ~ 999.9	0.1s	20.0	78
	P405	Accelerating time 4/ inching accelerating time	0 ~ 999.9	0.1s	2.0	78
	P406	Accelerating time 4/ inching decelerating time	0 ~ 999.9	0.1s	2.0	78
	P407	Counter designated value	0 ~ 65000	1	100	78
	P408	Counter intermediate value	0 ~ 65000	1	50	78
	P409	Accelerating torque limited level	0 ~ 200%	1%	150%	78
	P410	Constant torque limited level	0 ~ 200%	1%	00	79
	P411	Deceleration over-voltage protection selecting	0/1	1	1	80

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Auxiliary application group	P412	Automatic voltage regulation selecting	0 ~ 2	1	1	81
	P413	Automatic energy-save selecting	0 ~ 100%	1%	00	81
	P414	Braking tube action voltage	Variable	0.1	Variable	81
	P415	Braking tube action ratio	40 ~ 100%	1	50%	81
	P416	Option of restart after a failure of power supply	0 ~ 1	1	0	83
	P417	Allowable duration of power supply failure	0 ~ 10s	1	5.0s	84
	P418	Over-speed startup torque limited level	0 ~ 200%	1	150%	84
	P419	Over-speed start up time	0 ~ 25.0s	1	10.0	84
	P420	Times of restart after failure	0 ~ 5	1	0	85
	P421	Duration of restart after failure	0 ~ 100	2	2	85
	P422	Over-torque action selecting	0 ~ 3	1	0	85
	P423	Over-torque detection level	0 ~ 200%	1	00	86
	P424	Over-torque detection time	0 ~ 20.0s	0.1	00	86
	P425	Frequency 1, reached frequency setting	0.0 ~ Upper limit frequency	0.1	100	86
	P426	Frequency 2, reached frequency setting	0.0 ~ Upper limit frequency	0.1	5.0	87

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Auxiliary application group	P427	Timer 1 setting	0 ~ 10.0s	0.1	0	87
	P428	Timer 2 setting	0 ~ 100s	1	0	87
	P429	Constant speed torque limit time	0 ~ 999.9s	0.1	Variable	87
	P430	Frequency reached hysteretic breadth	0.0 ~ 2.0	0.1	0.5	87
	P431	Hopping frequency 1	0.0 ~ Upper limit frequency	0.1	0	87
	P432	Hopping frequency 2	0.0 ~ Upper limit frequency	0.1	0	88
	P433	Hopping frequency hysteretic breadth	0.0 ~ 2.0	0.1	0.5	88
	P500	PLC memory mode/ Winding memory	0 ~ 1	1	0	88
	P501	PLC startup mode	0 ~ 1	1	0	89
	P502	PLC operation mode	0: Stop after a cycle of PLC operation 1: PLC pause mode, stop after a cycle of PLC operation 2: PLC cycle operation 3: PLC pause mode, cycle operation 4: Operate in the last frequency after a cycle of PLC operation	1	0	89
	P503	Multi-step speed frequency 1/ Initial preparing frequency	0.0 ~ maximum running frequency	0.1	10.0	90
	P504	Multi-step speed frequency 2/ Winding start frequency	0.0 ~ maximum running frequency	0.1	15.0	90

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Auxiliary application group	P505	Multi-step speed frequency 3/ Winding end frequency	0.0 ~ maximum running frequency	0.1	20.0	90
	P506	Multi-step speed 4	0.0 ~ maximum running frequency	0.1	25.0	90
	P507	Multi-step speed 5	0.0 ~ maximum running frequency	0.1	30.0	90
	P508	Multi-step speed 6	0.0 ~ maximum running frequency	0.1	35.0	90
	P509	Multi-step speed 7	0.0 ~ maximum running frequency	0.1	40.0	90
	P510	Multi-step speed 8	0.0 ~ maximum running frequency	0.1	45.0	90
	P511	Multi-step speed 9	0.0 ~ maximum running frequency	0.1	50.0	90
	P512	Multi-step speed 10	0.0 ~ maximum running frequency	0.1	50.0	90
	P513	Multi-step speed 11	0.0 ~ maximum running frequency	0.1	50.0	91
	P514	Multi-step speed 12	0.0 ~ maximum running frequency	0.1	50.0	91
	P515	Multi-step speed 13	0.0 ~ maximum running frequency	0.1	50.0	91
	P516	Multi-step speed 14	0.0 ~ maximum running frequency	0.1	50.0	91
	P517	Multi-step speed 15	0.0 ~ maximum running frequency	0.1	50.0	91
	P518	PLC operation time 1/ winding time	0 ~ 9999	1s	100	91
	P519	PLC operation time 2	0 ~ 9999	1s	100	91

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Auxiliary application group	P520	PLC operation time 3	0 ~ 9999	1s	100	91
	P521	PLC operation time 4	0 ~ 9999	1s	100	91
	P522	PLC operation time 5	0 ~ 9999	1s	100	91
	P523	PLC operation time 6	0 ~ 9999	1s	0	91
	P524	PLC operation time 7	0 ~ 9999	1s	0	91
	P525	PLC operation time 8	0 ~ 9999	1s	0	91
	P526	PLC operation time 9	0 ~ 9999	1s	0	91
	P527	PLC operation time 10	0 ~ 9999	1s	0	91
	P528	PLC operation time 11	0 ~ 9999	1s	0	91
	P529	PLC operation time 12	0 ~ 9999	1s	0	91
	P530	PLC operation time 13	0 ~ 9999	1s	0	91
	P531	PLC operation time 14	0 ~ 9999	1s	0	91
	P532	PLC operation time 15	0 ~ 9999	1s	0	91
	P533	PLC operation direction	0 ~ 9999	1s	0	92
	P534	Winding function enabled	0: ON/OFF 1: Enabled		0	
	P600	PID enable mode	0: PID disabled 1: PID enabled 2: PID operation, enabled when the external terminal is valid		0	95
	P601	PID operation mode	0: PID negative feedback mode 1: PID positive feedback mode	1	0	95

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Auxiliary application group	P602	PID target value option	0: Select numerical target value 1: Select FIV as the target value 2: Select FIC as the target value	1	0	96
	P603	PID feedback value option	0: Select FIV as the feedback value 1: Select FIC as the feedback value 2: Select FIV-FIC differential value as the feedback value 3: Select FIC-FIV differential value as the feedback value	1	0	96
	P604	PID numerical target value	0.0 ~ 100.0%	0.1%	0.0%	97
	P605	PID alarm upper limit	0 ~ 100.0%	1%	100%	98
	P606	PID alarm lower limit	0 ~ 100.0%	1%	0%	98
	P607	PID, P value	0.0 ~ 200.0%	0.1%	100%	99
	P608	PID, I value	0 ~ 200.0s 0	0.1s	0.3s	99
	P609	PID, D value	0.0 ~ 20.0s 0	0.1s	0.0	99
	P610	PID step width	0.0 ~ 1.0Hz	0.1	0.5Hz	99
	P611	PID sleep frequency	0.0 ~ 120.0Hz <0.0HZ> 0.0Hz Sleeping function disabled	0.1	0.0Hz	99
	P612	PID sleep duration	0 ~ 200s	1s	10s	99
	P613	PID sleep awaking value	0 ~ 100%	1%	0	99
	P614	PID indication corresponded value	0 ~ 1000	1	1000	100
	P615	PID indication digit	1 ~ 5	1	1	100

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Auxiliary application group	P616	PID indication decimal digit	0 ~ 4	1	1	101
	P617	PID upper limit frequency	0 ~ Maximum running frequency	0.1	48.0	101
	P618	PID lower limit frequency	0 ~ Maximum running frequency	0.1	20.0	101
	P619	PID working mode	0: keep running after PID started 1: After PID started, working in the minimum running frequency when the feedback reaches P605; PID is calculated and called out when the feedback is decreased to P606	1	0	101
Communication data group	P700	Communication data rate	0: 4800 1: 9600 2: 19200 3: 38400		0	102
	P701	Communication data mode	0: 8N1 FOR ASC 1: 8E1 FOR ASC 2: 801 FOR ASC 3: 8N1 FOR RTU 4: 8E1 FOR RTU 5: 801 FOR RTU		0	103
Advanced application parameter group	P702	Communication local address	0 ~ 240	1	0	103
	P800	Advanced application parameter lock	0: locked 1: unlocked	1	0	109
	P801	System 50HZ & 60HZ setting	0 ~ 50Hz, 1 ~ 60Hz	1	0	109
	P802	Constant torque and variable torque option	0: Constant torque 1: Variable torque	0.1	Variable	110

Parameter group	Function code	Name	Setting range	Min. unit	Initial value	Reference page
Advanced application parameter group	P803	Over-voltage protection level setting	Variable	0.1	Variable	110
	P804	Low-voltage protection level setting	Variable	0.1	Variable	110
	P805	Over-temperature protection level setting	40 ~ 120℃	0.1	85 / 95℃	
	P806	Indicate current filter time setting	0 ~ 10.0	0.1	2.0	110
	P807	0-10V analog output lower correction factor	0 ~ 9999	1	-	111
	P808	0-10V analog output higher correction factor	0 ~ 9999	1	-	111
	P809	0-20mA analog output lower correction factor	0 ~ 9999	1	-	111
	P810	0-20mA analog output higher correction factor	0 ~ 9999	1	-	111
	P811	Reserved				111
	P812	UP/DOWN frequency memory option	0: Memory 1: No memory	1	-	111

Chapter 7
Detailed descriptions of functional parameters

7-1 Monitor parameters

P0.00	Display option setup		Default: 00
	Setting range (00 ~ 32)	00	Display frequency setup
		01	Display frequency output
		02	Display current output
		03	Display rotation rate speed
		04	Display main loop
		05	Display temperature of inverter module
		06	Display record of recent error (1)
		07	Display record of last error (2)
		08	Display error status (3)
		09	Display error status (4)
		10	Display the setup frequency at which the last error takes place
		11	Display the output frequency at which the last error takes place
		12	Display the output current at which the last error takes place
		13	Display the output voltage at which the last error takes place
		14	Display the DC voltage of main loop when the last error takes place
		15	Display the temperature of inverter module when the last error takes place

The initial display on the frequency can be set through P000 according to the user's requirement for monitoring.
E.g.: If the rotating speed is required to be monitored through the main display, P0.00 can be set to 03, and then the rotating speed will be displayed on the main display. The default for this parameter is 00, so the frequency will be displayed after the power supply is switched on.

P001	Set frequency	Default
	Display the set frequency of the inverter	

The set frequency of the inverter can be monitored by checking the content of this parameter.

P002	Output frequency	Default
	Display the actual output frequency of the inverter	

The actual output frequency of the frequency inverter can be monitored by checking the content of Parameter P002.

P003	Output current
	Display the actual output current of the frequency inverter

The actual output current of the frequency inverter can be monitored by checking the content of Parameter P003.

P004	Rotating speed	Default
	Display the actual rotating speed of the motor	

The actual rotating speed of the motor can be monitored by checking the content of Parameter P004.

P005	DC bus voltage	Default
	Display the DC bus voltage on the major loop of the frequency inverter	

The DC bus voltage on the major loop of the frequency inverter can be monitored by checking the content of Parameter P005.

P006	Frequency inverter temperature	Default
	Display the actual temperature of the frequency inverter module	

The actual temperature of the frequency inverter module can be monitored by checking Parameter P006 so that the user can make determination for the operation of the frequency inverter.

P010	Fault record 1
P011	Fault record 2
P012	Fault record 3
P013	Fault record 4
	Record the last four faults of the frequency inverter

The last four faults can be inquired through P010~P013 so that the user can make determination for the operation of the frequency, find out the reason of the fault and eliminate the incipient fault.

P014	Set frequency at the last fault
P015	Output frequency at the last fault
P016	Output current at the last fault
P017	Output voltage at the last fault
P018	DC voltage at the last fault
	Display the details of the last fault:
	The real-time set frequency, actual output frequency, actual output current, actual output voltage and DV voltage on the major loop of the frequency; therefore, it can be inquired separately.

The details of the last fault including the frequency set, actual output frequency, actual output current, actual output voltage and DV voltage on the major loop of the frequency can be monitored by checking P014~P018 that the user can analyze the reason of the fault and eliminate it as soon as possible or supply effective reference to the maintenance personnel.

For the Series HC1-C$^+$ frequency inverter, the main display can be selecting by setting, the corresponding content can be directly

monitored through P001~P018, or monitored by directly switching through ENTER/DISP.

As defined by the manipulator, the corresponding content can be monitored in four alternating status through the switching key "ENTER/DISP". The table below shows an example that the main display is the set frequency:

Step	Key name	Display	Description
1	Switch on the power supply	STOP FWD F50.0	① The frequency inverter is standing by. ② The main display is the set frequency.
2	Press RUN	RUN FWD F50.0	Start up the frequency. ① The frequency inverter is running, and the indicator of RUN turns on. ② The main display is the set frequency. ③ The indicator of FWD turns on and the frequency is in forward running.
3	Press ENTER/DISP for once	RUN FWD H50.0	Switch the display to the actual output frequency status. ① The frequency inverter is in forward running. ② The actual output frequency is 50.0Hz.
4	Press ENTER/DISP for once	STOP FWD A00.0	Switch the display to the actual output current, and the actual output current is 0A.
5	Press ENTER/DISP for once	RUN FWD Frd	Display the rotating direction of the motor.

7-2 Basic operating parameters

P100	Main frequency setting			Default 0.0Hz
	Setting range	0.0 ~ Frequency upper limit	Unit	0.1

The running frequency is set by P100 when the setting of P101 is "0", i.e. frequency setting option is set to digital frequency setting. The set frequency can be modified by the content of Parameter

P100 or through Key [▲] or Key [▼] to further modify the running frequency. When the set frequency is modified by the content of Parameter P100, the modification can be memorized after shutdown or a power failure; when the set frequency is modified through Key [▲] or Key [▼], the modification will not be memorized after shutdown or a power failure. When the value of P100 is memorized, the frequency inverter will be running in the set value of P100.

P101	Frequency setting option			Default: 0
	Setting range	0 ~ 5	Unit	1
	Setting content	0: Digital frequency setting mode 1: Analog quantity voltage setting mode 2: Analog quantity current setting mode 3: Keyboard potentiometer setting mode 4: Up/Down mode 5: RS485 communication setting mode		

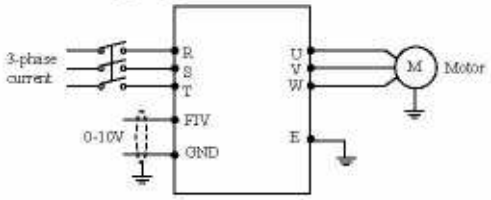
The frequency setting option is the source for select the running frequency of the frequency inverter.

0: Digital frequency setting mode

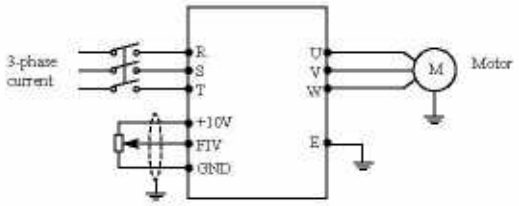
The running frequency of the inverter is set by P100, generally the running frequency can be modified by Key [▲] or Key [▼], please read the description of P100 for details.

1: Analog quantity voltage setting mode

The running frequency of the inverter is set by an external voltage signal (0-10V) which is input into the frequency inverter through the FIV terminal. The external voltage signal can be input in two modes: a 0-10V signal is directly input or output through the potentiometer, please read the wiring diagram as below.



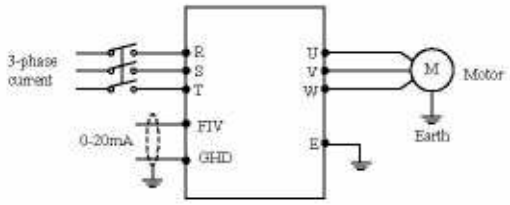
Note: A 0-10V signal is directly input by FC through FIV to control the running frequency of the frequency inverter.



Note: An FIV voltage signal is input through an external potentiometer (10KΩ) to control the running frequency of the frequency inverter.

2. Analog quantity current setting mode

The set frequency of the frequency inverter is input by an external current signal (0-20mA) and is controlled by the external terminal FIC.



3. Keyboard potentiometer setting

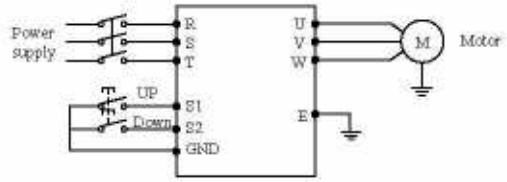
The operation of an HC1-C+ frequency inverter can be more conveniently controlled by the user through the potentiometer knob on the manipulator.

Rotate: to modify the running frequency.

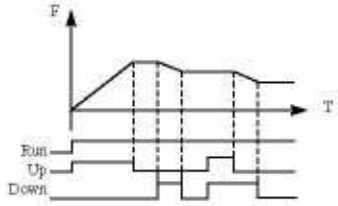
4: Up/Down setting

The running frequency is controlled by external terminals Up/Down which can be freely selected by Parameters P315~P320. The Up/

Down function can be assigned to any of the terminals, when the UP function turns valid, the frequency will be increased, and when the DOWN function turns valid, the frequency will be decreased, and when the UP and DOWN terminals turn valid at the same time, the frequency will be maintained and unchanged.



Parameter: P317=5, the UP function is assigned to Terminal S1; P101=4, frequency setting mode is set to Up/Down mode; F318=16, the Down function is assigned to Terminal S2.



P102	Frequency setting option			Default
	Setting range	0 ~ 2	Unit	1
	Setting content	0: Manipulator 1: IO terminals 2: RS485		

The running setting options are the source for setting the running signal.

0: Manipulator

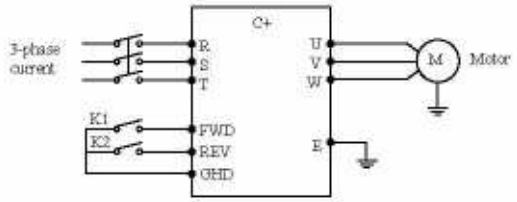
The running signal is input through the manipulator, the running of the frequency inverter can be controlled by Key RUN on the manipulator, and stopped by Key STOP RESET.

1: IO port

The running command is input through the IO port, and the external terminals can freely set, in which, forward running is assigned to the FWD terminal while reversing is assigned to the REV terminal in factory setting.

IO terminals can be set into two control modes: a two-wire mode and a three-wire mode.

① Two-wire mode

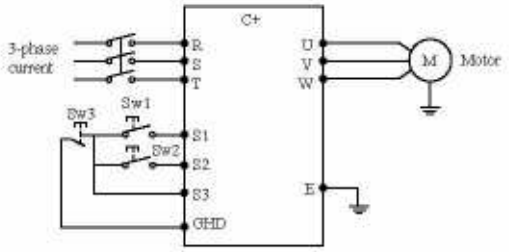


Parameter: P315=6; P316=7

Action description:

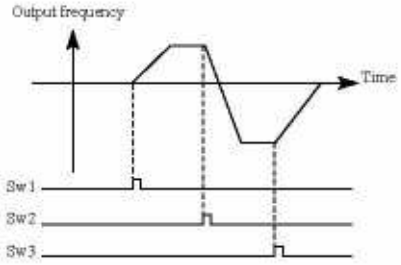
Switch and state		Frequency state
K1	K2	
ON	OFF	Forward running
OFF	OFF	Running stopped
OFF	ON	Reverse running
ON	ON	Original running state maintained

② Three-wire mode



S1, S2 and S3 are selected as the input terminals for the external signal.

Parameter: P317=6, forward running is assigned to S1
P318=7, reverse running is assigned to S2
P319=8, running stopped is assigned to S3
P102=1, input through external terminals



2. RS485 setting

The running command of the frequency inverter is inputted by the serial port which is a command from an upper computer that can be sent to the frequency inverter.

P103	Key STOP validity setting			Default: 1
	Setting range	0 ~ 1	Unit	1
	Setting content	0: Key STOP invalid 1: Key STOP valid		

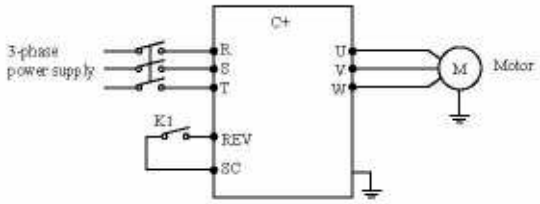
When the running set option "1" or "2" is selected, i.e. when the running command is from an external terminal or the RS485 serial port, the validity of the Key STOP/RESET on the manipulator can be set to prevent any improper operation.

When P103 is set to "0", i.e. when the Key STOP is invalid, the frequency inverter can not be stopped by the Key STOP.

When P103 is set to "1", i.e. when the Key STOP is valid, the frequency inverter can be stopped by the Key STOP.

Notice: When the frequency inverter is be restarted after it is

stopped by the Key STOP, it needs to deactivate the running signal before restarting.



Step	Key and state	Description
1	K1 is closed	The frequency inverter is started up in reverse running.
2	(K1 is still closed) Press Key STOP	The frequency inverter is shut down.
3	K1 is opened	The running signal is deactivated.
4	K1 is closed	The frequency inverter is started up in reverse running.

P104	Reverse running validity setting		Default: 1	
	Setting range	0 ~ 1	Unit	1
	Setting content	0: Reverse running disabled 1: Reverse running enabled		

For many mechanical devices, only forward running is allowable while reverse running is not allow, otherwise it will cause a mechanical fault or accident, therefore, the matched device can be set to rotate in one direction by this parameter.

0: Reverse running disabled

The motor is stopped from reverse running, when reverse running is disabled by P104, the FWD/REV switch will be invalid.

1: Reverse running enabled

The motor is allowed for reverse running, and the FWD/REV switch is valid.

P105	Maximum running frequency		Default: 50.0
	Setting range	Minimum running frequency ~ 400.0	

The running frequency range for the frequency inverter is 0.1~400.0Hz, so the frequency inverter is liable to be brought into high-speed running, as a motor or any other mechanical device is generally running in 50Hz, it is liable to cause a mechanical fault or accident when the machine is running beyond the range.

The maximum running frequency of the motor can be set by this parameter to protect the motor and any other device from any mechanical loss or any other accident because of over-speed running. To eliminate the potential danger, the user can set the maximum running frequency of inverter according to the technical requirement in practical production and prevent any improper operation.

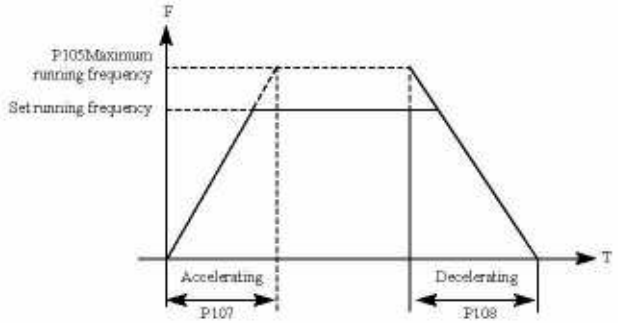
P106	Minimum running frequency		Default: 0.0
	Setting range	0.0 ~ Maximum running frequency	

Some machines are limited by techniques; therefore, they can not be operated in a low speed, and it is liable to cause any improper operation in speed control, especially in controlling the frequency of the potentiometer

The minimum running frequency can be set by this parameter. When the frequency signal is lower than the minimum frequency, the frequency will output as per the minimum frequency, i.e. the frequency inverter can only operated between the minimum running frequency and the maximum running frequency to prevent any improper operation and protect the motor from overheat because of an excessively lower running frequency.

P107	Accelerating time 1		Default: *
P108	Decelerating time 1		Default: *
	Setting range	0 ~ 999.9	

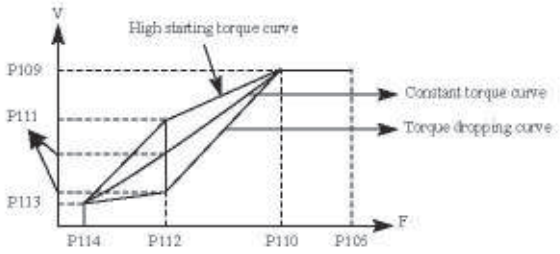
The accelerating time means the duration from 0.0Hz to the maximum running frequency, and the decelerating time means the duration from the maximum running frequency to 0.0Hz.



In general running, the default accelerating or decelerating time for the frequency inverter is the first accelerating or decelerating time, switching to another accelerating or decelerating time can be realized through external multifunctional terminals correspondingly.

P109	V/F maximum voltage	Default: variable
	Setting range	V/F intermediate voltage ~ 500.0
P110	V/F reference frequency	Default: 50
	Setting range	V/F intermediate frequency ~ maximum running frequency
P111	V/F intermediate voltage	Default: Variable
	Setting range	V/F minimum voltage ~ V/F maximum voltage
P112	V/F intermediate frequency	Default: 2.5
	Setting range	V/F minimum frequency ~ V/F reference frequency
P113	V/F minimum voltage	Default: Variable
		0 ~ V/F intermediate voltage
P114	V/F minimum frequency	Default: 1.25
		0 ~ V/F intermediate frequency

This group of parameters P109~P114 determines the V/F curve of the frequency inverter which can be set to comply with the load.
Constant torque curve: it is suitable for a constant torque load. The output voltage is linear with the output frequency.
Torque dropping curve: it is suitable for a fan, a pump or any other machine that the torque load is changed. The load is small at starting up and increase with speed rising.
High starting torque curve: it is suitable for a machine with large inertia and high starting torque. The load is large at starting up and then decreased to a fixed value.



P109 V/F maximum voltage:
V/F maximum voltage shall be set according to the nameplate parameter of the motor, generally it is set to the nominal running voltage of the motor, and the set value shall be properly increased when there is a long distance between the motor and the frequency inverter.

P110: V/F reference frequency
The V/F reference frequency shall be set according to the nominal running voltage frequency of the motor, and generally it is not allow modifying the V/F reference frequency setting, otherwise the motor may be damaged.

P111: V/F intermediate voltage

The V/F intermediate voltage shall be set according to the load, with improper setting it will bring heavy loading to current insufficient output torque to the motor, even activate the protection for the frequency inverter. By increasing the set value of P111, the output torque and the output current can increase together; please monitor the output current when setting P111, the general requirement for setting is: the frequency can be successfully start up, and the current must be controlled within the allowable range for the frequency inverter during starting up. When this parameter have modified, the setting value shall be slowly increase from lower to higher till the requirement is satisfied. It should not enlarge the jump; otherwise, it will activate the protection of the frequency inverter or cause some fault.

P112: V/F intermediate frequency

V/F intermediate frequency determines the intermediate point of the V/F curve. If the setting is improper, the starting torque of the frequency inverter would insufficient or the overloaded current protection will be activated, and generally it is not recommended to modify the setting of parameter.

P113: V/F minimum voltage

The V/F minimum voltage is correlated to the starting torque. Properly increasing the set value can enlarge the starting torque but may also cause an overloaded current, and generally it is not recommended to modify the setting of P113.

P114: V/F minimum frequency

The V/F minimum frequency determines the starting point of the V/F curve, and it is the lowest starting frequency on the V/F curve. The V/F curve varies with the load, and the V/F curve has been well-adjusted in factory setting according to the power stage, and the detailed defaults are as follows:

parameter / Model	F1.07	F1.08	F1.11	F1.15
HC1C00D4BK	7	7	15	10
HC1C0D75BK	8	8	14	10
HC1C01D5BK	9	9	14	9

P115	Carrier frequency			Default: 5.0
	Setting range	1.0 ~ 15.0	Unit	1

The carrier frequency determines the ON/OFF frequency of the power module inside the inverter, the factory setting is different for inverter and power because the carrier frequency is correlated to the noise, heat effect and interference.

Carrier frequency P115	Noise	Heat production	Interference to the environment
Lower ↓ Higher	Higher ↓ Lower	Lower ↓ Higher	Lower ↓ Higher

The table above shows that higher carrier wave will bring lower noise but higher heat production and interference to the environment.

Therefore, when the device is required running without any noise, the P115 set value shall be increased, and the maximum load capacity of the frequency inverter will be decreased a little.

If there is a long distance between the motor and the frequency inverter, the P115 set value shall be decreased, and the leakage current of the motor will be reduced.

When the environmental temperature is high and the motor is running heavy loading, the P115 set value shall be decreased to improve the thermal characteristic of the frequency inverter. The factory setting for P115 of the inverter is detailed as the table specially attached for P115.

P117	Parameter initialization	Default: 0
	Setting range: 0 ~ 8	Unit: 1
	Setting content	8: Initialize the parameter

When the parameter is incorrectly set, P117 can set to "08" reset all parameters, and when they are set to the initial factory set values, they can be reset according to the actual situation.

Notice: when the parameter lock is valid, i.e. when P118=1, no parameter can be initialized or modified unless the parameter lock is deactivated.

P118	Parameter locking	Default: 0
	Setting range: 0 ~ 1	Unit: 1
	Setting content	0: unlocked 1: locked

All parameters can be locked by P118 to prevent any irrelevant personnel from modifying the parameter setting of the frequency inverter, and avoid any improper operation.

When P118 is valid, i.e. and all parameters are locked, no parameter can be modified except this parameter and the main frequency.

P200	Startup mode option			Default: 0
	Setting range	0 ~ 1	Unit	1
	Setting content	0: Start up in the startup frequency 1: Over-speed startup		

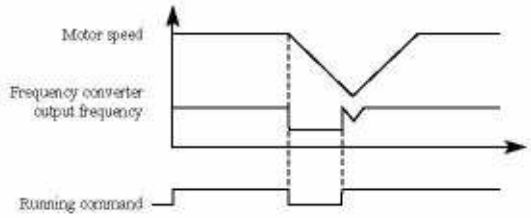
The Series HC1-C+ frequency inverter has two startup modes which can be freely set by the user through Parameter P200 according to the actual situation of the device.

0: Start up in the startup frequency

To most of the loading, as there is no special requirement for the startup, the frequency inverter is start up in the startup frequency, i.e. and the routine mode.

1: Over-speed startup

The over-speed startup is suitable for the restarting after reset because fault or restart after shutdown, in such situation, the frequency inverter can automatically detect and comply with the running speed and direction of the motor directly start up for an unstopped motor according to the detected result.



Notice: When the frequency inverter start up in the over-speed startup mode, it will make a speed tracing from higher to lower in the set frequency, and there will be a high current or overloaded current at startup, it is necessary to pay attention to the current level setting (i.e. 4.09 setting) according to the load inertia.

Moreover, when the set value of 4.09 is excessively low, there may have a slow tracing startup. During tracing, the frequency will stop tracing if the current becomes higher than the current tracing level, and tracing will restart as the current has fallen down into the allowable range.

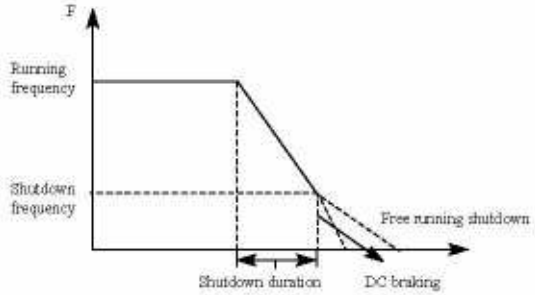
P201	Shutdown mode option			Default: 0
	Setting range	0 ~ 1	Unit	1
	Setting content	0: Decelerating shutdown 1: Free running shutdown		

A suitable shutdown mode can be selected by the user according to the actual load.

0: Decelerating shutdown

When a shutdown command is received by the frequency inverter,

the frequency inverter will gradually decrease the output to the shutdown frequency as per the decelerating time set.

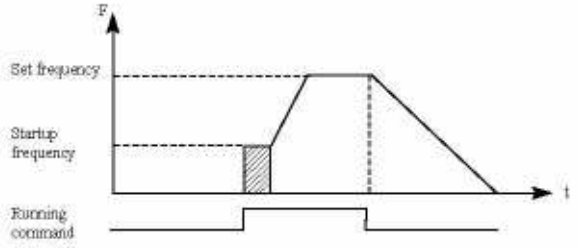


1: Free running shutdown

When a shutdown command is received by the frequency inverter, it will stop outputting, and then freely run till it is stopped automatically.

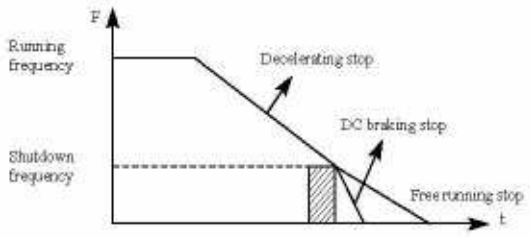
P202	Startup frequency setting			Default: 0.5
	Setting range	0.1 ~ 10.0	Mini. unit	0.1

The startup frequency is the initial frequency of the frequency inverter, for a device of large inertia and heavy load which is required to be started up in a large torque, properly increasing the startup frequency will facilitate it too, but excessively higher startup frequency will activated the overloaded current protection.



P203	Shutdown frequency setting			Default: 0.5
	Setting range	0.1 ~ 10.0	Unit	0.1

When a shutdown command is received by the frequency inverter, the frequency inverter will start to decelerate and stop running. It will gradually decrease the output to the shutdown frequency within the set time, and then stop after free running or by DC braking as per the set value.



When the DC braking stop is invalid, the frequency inverter will select free running stop, as a result, the output and the frequency inverter will stop with running free.

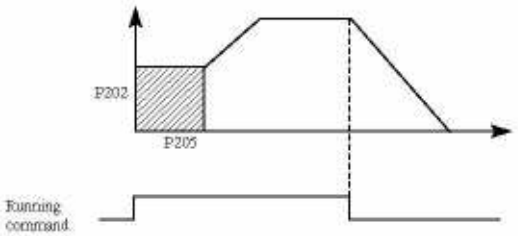
P204	Startup DC braking current			Default: 100
	Setting range	0 ~ 150	Unit	1
P205	Startup DC braking time			Default: 0
	Setting range	0 ~ 25	Unit	0.1

Startup DC braking is applicable for the situation such as a static fan or a mobile load, as the load and the motor at the free running state before the frequency inverter started up and the running direction is undetermined, it is liable to activate the overloaded current protection at startup; therefore, DC braking is applied before startup that the load is at the static state before startup, and it can stop the overloaded current protection from being activated.

Startup DC braking current is the percentage of the nominal current of the frequency inverter, and the braking torque is variable with the

set value of P204 which shall be set from lower to higher according to the actual load till torque is obtained enough.

Startup DC braking time is the duration of DC braking, when it is set to "0" and the DC braking is invalid at startup.



P206	Shutdown DC braking current			Default: 100
	Setting range	0 ~ 150	Unit	1
P207	Shutdown DC braking time			Default: 0
	Setting range	0 ~ 250	Unit	1

Shutdown DC braking is applicable for the situations with high requirement for braking.

Shutdown DC braking is the percentage of the nominal current of the frequency inverter, and a different torque can be obtained by modifying this parameter.

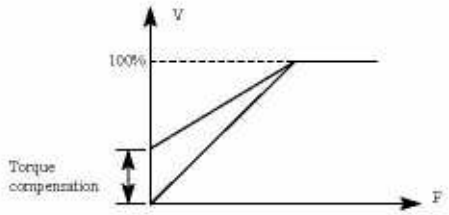
Shutdown DC braking time is the duration of the DC braking state, and the DC braking is invalid when the set value of this parameter is "0".

Please see the description of P203, P204 and P205 for details.

P208	Automatic torque compensation			Default: 5%
	Setting range	0.1 ~ 20%	Unit	0.1

By modifying Parameter P208, the voltage can be boosted and a larger torque can be obtained.

Notice: If the torque is excessively enlarged, the motor will be overheating, so the voltage shall be properly boosted according to the actual load.



P209	Motor nominal voltage			Default: Variable
	Setting range	0 ~ 500	Unit	0.1
P210	Motor nominal voltage			Default: *
	Setting range		Unit	0.1
P211	Motor no-load current ratio			Default: 40%
	Setting range	0 ~ 100	Unit	1
P212	Motor nominal rotating speed			Default: 1420
	Setting range	0 ~ 6000	Unit	1
P213	Motor pole number			Default: 4
	Setting range	0 ~ 10	Unit	1
P214	Motor nominal speed drop			Default: 2.5
	Setting range	0 ~ 100	Unit	0.1

The above parameter group shows the nameplate parameters of the motor, and they shall be set as per the nameplate content.

P209 Motor nominal voltage

The motor nominal voltage shall be set as per the voltage on the nameplate.

P210 Motor nominal current

The motor nominal current shall be set as per the value on the nameplate. If the output current gets higher than the nominal current of the motor during running, the protection for the frequency inverter will be activated to protect the motor.

P211 Motor no-load current ratio

The set value of motor no-load current ratio will affect the quantity of speed drop compensation, and the no-load current is the percentage of motor current.

P212 Motor nominal speed

The set value of P212 is response to the rotating speed at 50Hz and is correlated to the speed display, and generally it is set as per the nameplate value.

The actual rotating speed of the motor can be displayed when the value of P212 is set to the actual rotating speed at 50Hz.

P213 Motor pole number

The motor pole number can be set as per the nameplate content.

P214 Motor nominal speed drop

A larger load will bring a larger speed drop when a motor is driven by the frequency inverter, and the frequency can be compensated by P214 as to reduce the speed drop and make the motor run in a closer synchronous speed.

P215	Motor nominal frequency			Default: 50Hz
	Setting range	0.0 ~ 400.0	Unit	0.1
P216	Stator resistance			Default: 3.0
	Setting range	0 ~ 100.0	Unit	0.1
P217	Rotor resistance			Default: 4.5
	Setting range	0 ~ 100.0	Unit	0.1
P218	Rotor self inductance			Default: 1.0
	Setting range	0 ~ 650.0	Unit	0.1
P219	Rotor mutual inductance			Default: 0.2
	Setting range	0 ~ 1.0	Unit	0.1

The above parameters are motor parameters.

P215 Motor nominal frequency

The motor nominal frequency shall be set as per the nameplate

content for the motor.

P216 Stator resistance

P217 Rotor resistance

P218 Rotor self inductance

P219 Rotor mutual inductance

The above parameters shall be set as the actual situation of the motor.

7-3 Input & output application

P300	FIV minimum voltage input Default: 0			
	Setting range	0 ~ FIV maximum voltage input	Unit	0.1
P301	FIV maximum voltage input Default: 10.0			
	Setting range	FIV minimum voltage input ~ 10.0	Unit	0.1
P302	FIV input filter time Default: 1.5			
	Setting range	0 ~ 25.0	Unit	1

P300 FIV minimum voltage input

The FIV minimum voltage input is response to the lowest frequency of the analog quantity, and a voltage signal lower than this set value will be invalid.

P301 FIV maximum voltage input

The FIV maximum voltage input is response to the highest frequency of the analog quantity, and a voltage signal higher than the set value of P301 will be treated as the set value.

The set value of P300 and P301 determine the voltage range applicable for the upper computer of different outputs. Furthermore, a signal of 1V below is liable to cause any improper operation upon because of interference; it can be avoided by P300 setting to enhance the resistance against such interference.

P302 input filter time

The set value of input filter time is correlated to the frequency

inverter's speed in responding to the analog quantity changing, and larger set value of P302 will make the frequency inverter slower to the changing of the analog quantity.

P303	FIC minimum current input			Default: 0
	Setting range	0 ~ FIC maximum current input	Unit	0.1
P304	FIC maximum current input			Default: 20.0
	Setting range	FIC minimum current input ~ 20.0	Unit	0.1
P305	FIC input filter time			Default: 1.5
	Setting range	0 ~ 25.0	Unit	1

P303: FIC minimum current input

The FIC minimum current input is response to the lowest frequency of the analog quantity, and a current signal lower than the set value of P303 will be an invalid signal for the frequency inverter.

P304: FIC maximum current input

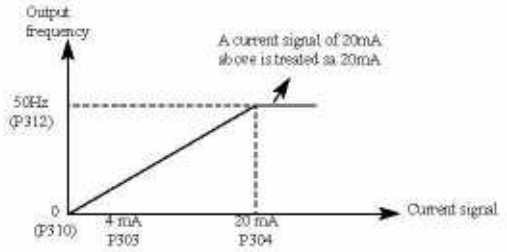
The FIC maximum current input is response to the highest frequency of the analog quantity, and a voltage signal higher than the set value of P304 will be treated as the set value.

P305: FIC input filter time

The set value of FIC input filter time is correlated to the frequency inverter's speed in responding to the analog quantity changing, and a larger set value of P305 will make the frequency inverter slower in responding to the changing of the analog quantity, but the output of the frequency inverter will be stable.

The related parameters can be referred to the description for P300~P302. If the external input signal is a voltage signal, the corresponding parameters are P300~P302; if the external input signal is a current signal, the corresponding parameters are P303~P305.

E.g.: if the output signal from the upper computer is a signal of 4-20mA, the corresponding frequency shall be 0-50Hz.



Parameters: P303=4; P304=20; P310=0; P312=50

P306	FOV minimum voltage output		Default: 0	
	Setting range	0 ~ FOV maximum voltage	Unit	0.1
P307	FOV maximum voltage output		Default: 10.0	
	Setting range	FOV maximum voltage output ~ 10V	Unit	0.1

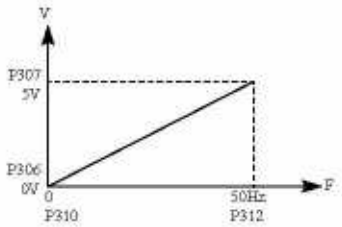
The set values of P306 and P307 determines the range of voltage output from the FOV terminal.

P306: the FOV minimum voltage output is response to the lowest frequency of the analog quantity.

P307: the FOV maximum voltage output is response to the highest frequency of the analog quantity, and voltmeter in various ranges of measurement can be conveniently connected by modifying the set values of P306 and P307.

E.g.: For a 0-5V input frequency meter in the range of 0~50Hz used for monitoring the output frequency of the frequency inverter,

The set values are: P306=0; P307=5



P310	Analog quantity lowest frequency			Default: 0.0
	Setting range	0.0 ~ 400.0	Unit	0.1
P311	Analog quantity lowest direction			Default: 0
	Setting range	0 ~ 1	Unit	1
	Setting content	0: Positive direction 1: Negative direction		
P312	Analog quantity highest frequency			Default: 50
	Setting range	0.0 ~ 400.0	Unit	0.1
P313	Analog quantity highest direction			Default:
	Setting range	0 ~ 1	Unit	1
		0: Positive direction 1: Negative direction		
P314	Analog quantity reverse selectio n			Default: 0
	Setting range	0 ~ 1	Unit	1
	Setting content	0: negative bias Voltage nonreversible 1: negative bias voltage reversible		

The parameter group of P310~P314 determines the running state in the analog quantity including the running frequency and direction, etc. Various control curves can be freely combined as per the actual running situation.

P310: Analog quantity lowest frequency

The analog quantity lowest frequency determines the lowest running frequency in the analog quantity, and is response to the minimum voltage (current) input of the analog quantity.

P311: Analog quantity lowest direction

The analog quantity lowest direction determines the running state at the lowest frequency, i.e. forward running or reverse running.

P312: Analog quantity highest frequency

The analog quantity highest frequency determines the highest

running frequency in the analog quantity, and is response to the maximum voltage (current) input of the analog quantity.

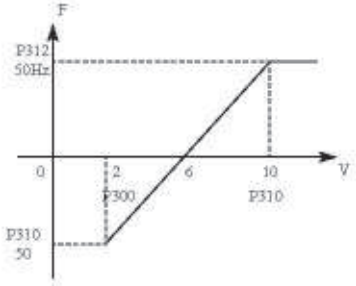
P313: Analog quantity highest direction

The analog quantity highest direction determines the running state at the highest frequency, i.e. forward running or reverse running.

P314: Analog quantity reversing selection

The analog quantity reversing selection determines the running state at negative bias voltage in the analog quantity, and a satisfying curved can be combined by the user upon the above parameters.

E.g. 1: When a 2-10mA signal is output from the upper computer to control the frequency running in forward at 50Hz or reverse at 50Hz.



Note:

P300=2, FIV minimum voltage input: 2V (A signal of 2V below will be an invalid signal for the frequency inverter);

P301=10, FIV maximum voltage input: 10V (A signal of 10V above will be treated at 10V);

P310=50, Analog quantity lowest frequency: 50Hz;

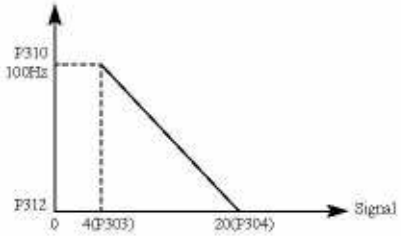
P311=1, Analog quantity lowest direction: 1 (Reverse running);

P312=50, Analog quantity highest frequency: 50Hz;

P313=0, Analog quantity highest direction: 0 (Forward running);

P314=1, Analog quantity reverse selection: 1 (Negative bias voltage reversible).

Notice: the FWD/REV switching command is valid in any curve which will be reversed at switching, as below shows:



Parameters:

P303=4, FIC minimum current input;

P304=20, FIC maximum current input;

P310=100.0, Analog quantity lowest frequency;

P311=0, Analog quantity lowest direction (Forward running);

P312=0, Analog quantity highest frequency

P314=0, Analog quantity highest direction (Forward running);

A special reversed curve can be combined by P310~P314.

Note: An input signal of 4mA below will be an invalid signal for the frequency inverter.

P315	Multifunctional input terminal --- FWD Terminal			Default: 6
P316	Multifunctional input terminal --- REV Terminal			Default: 7
P317	Multifunctional input terminal --- S1 Terminal			Default: 18
P318	Multifunctional input terminal --- S2 Terminal			Default: 9
P319	Multifunctional input terminal --- S3 Terminal			Default: 10
P320	Multifunctional input terminal --- S4 Terminal			Default: 11
	Setting range	0 ~ 32	Unit	1
	Setting content	0: invalid 1: inching 2: inching forward running 3: inching reverse running 4: forward/ reverse 5: running 6: forward running 7: reverse running 8: stop 9: multi-step speed option 1 10: multi-step speed option 2		

	Setting content	11: multi-step speed option 3 12: multi-step speed option 4 13: accelerating or decelerating option 1 14: accelerating or decelerating option 2 15: frequency progressive increasing signal UP 16: frequency progressive decreasing signal DOWN 17: Free stop 18: Reset at fault 19: PID controlled operation 20: PLC controlled operation 21: Timer 1 startup 22. Timer 2 startup 23: Counter pulse input 24: Counter reset 25: Memory clear 26: Winding start

0: Invalid

Set an empty terminal without function.

1: Inching

Set to inching which is often used in normal operation, and generally it is inching in 5Hz.

2: Inching forward running

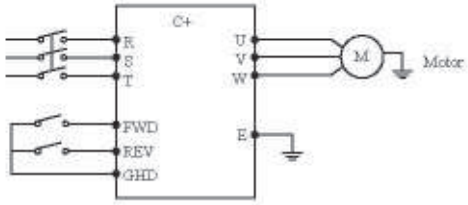
Set to inching forward running.

3: Inching reverse running

Set to inching reverse running.

4: Forward/ reverse

Set to FWD/REV switching, and running in reverse when the defined terminal is valid.



Parameters: P102=1; P315=6; P316=7

Terminal state		Running state
FWD	REV	
ON	OFF	Forward running
OFF	On	Reverse running
OFF	OFF	Running stopped

5: Running

Set the terminal as the running signal input.

6: Forward running

Set the terminal as the forward running signal input, and the frequency inverter will be running in forward when the defined terminal is valid.

7: Reverse running

Set the terminal as the reverse running signal input, and the frequency inverter will be running in reverse when the defined terminal is valid.

8: Stop

Set the terminal as the stop signal input, and the frequency inverter will be decelerated and stopped when the defined terminal is valid.

9: Multi-step speed 1

10: Multi-step speed 2

11: Multi-step speed 3

12: Multi-step speed 4

15 multi-step speeds can be combined by multi-step speed 1, 2, 4 and 4, and the actual multi-step speed is determined by the states of multi-step speed 1, 2, 4 and 4.

Multifunctional terminals				State and description
Multi-step speed 1	Multi-step speed 2	Multi-step speed 3	Multi-step speed 4	
0	0	0	0	Determined by the main frequency P100 or the potentiometer

Multifunctional terminals				State and description
Multi-step speed 1	Multi-step speed 2	Multi-step speed 3	Multi-step speed 4	
1	0	0	0	Multi-step speed 1 (P503)
0	1	0	0	Multi-step speed 2 (P504)
1	1	0	0	Multi-step speed 3 (P055)
0	0	1	0	Multi-step speed 4 (P506)
1	0	1	0	Multi-step speed 5 (P507)
0	1	1	0	Multi-step speed 6 (P508)
1	1	1	0	Multi-step speed 7 (P509)
0	0	0	1	Multi-step speed 8 (P510)
1	0	0	1	Multi-step speed 9 (P511)
0	1	0	1	Multi-step speed 10 (P512)
1	1	0	1	Multi-step speed 11 (P513)
0	0	1	1	Multi-step speed 12 (P514)
1	0	1	1	Multi-step speed 13 (P515)
0	1	1	1	Multi-step speed 14 (P516)
1	1	1	1	Multi-step speed 15 (P517)

Note:

0: Terminal valid; 1: Terminal invalid

13: Accelerating or decelerating option 1

14: Accelerating or decelerating option 2

Four accelerating or decelerating durations can be combined by Accelerating or decelerating option 1 and 2.

Multifunctional terminals		Accelerating or decelerating state and result
Accelerating or decelerating option 1	Accelerating or decelerating option 2	
0	0	Accelerating or decelerating duration 1 (P107, P108)
1	0	Accelerating or decelerating duration 1 (P401, P402)

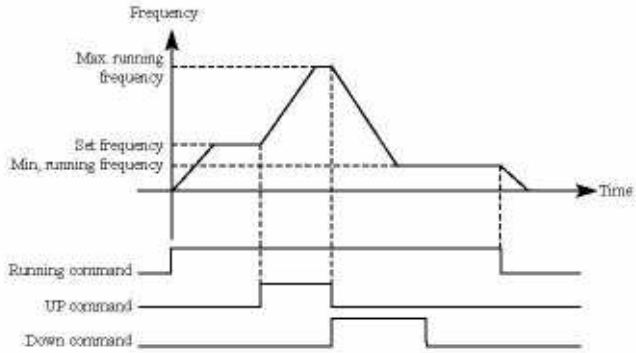
Multifunctional terminals		Accelerating or decelerating state and result
Accelerating or decelerating option 1	Accelerating or decelerating option 2	
0	1	Accelerating or decelerating duration 1 (P403, P404)
1	1	Accelerating or decelerating duration 1 (P405, P406)

15: Frequency progressive increasing signal (UP signal)

When this terminal is valid, the frequency will increase a uniform speed till it is increased to the maximum running frequency.

16: Frequency progressive decreasing signal (DOWN signal)

When this terminal is valid, the frequency will decrease in a uniform speed till it is decreased to the minimum running frequency.



Notice: When frequency is modified by UP or DOWN, the modified frequency will not be memorized after reset because power failure and the frequency inverter can still memorize the set value of P100.

17: Free stop

When this terminal is valid, the frequency inverter will stop outputting, then it will freely run and stop.

18: Reset at fault

The frequency inverter can be reset after a failure passed this setting, and the function will be as well as the Key RESET on the manipulator.

19: PID controlled operation

PID will enable as this contact is closed, and the set value of P601 is 2, i.e. in PID controlling operation, PID is invalid when this contact is opened.

20: PLC controlled operation

PLC function will enable when this contact is closed.

21: Timer 1 startup

22. Timer 2 startup

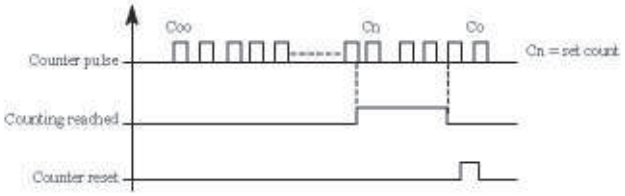
The timer will enable to start timing when this contact is closed, and when it reaches the set value, the corresponding multifunctional contact will act.

23: Counter pulse input

A pulse signal of 250Hz below can be input through this terminal.

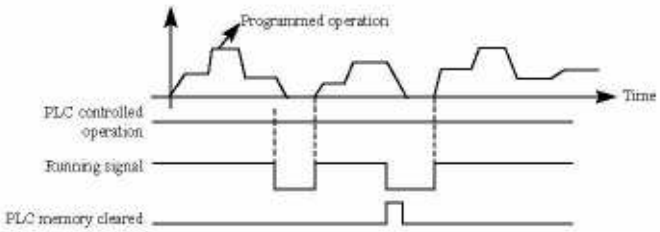
24: Counter reset

The counter can be reset and cleared through this terminal.



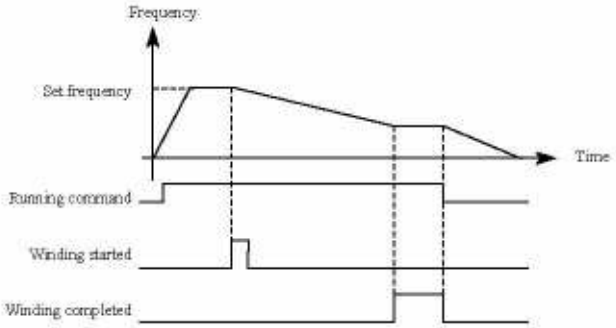
25: PLC memory clear

In PLC controlled operation, the frequency inverter will automatically memorize the state of a fault or failure of power supplying, and the operation will restart after the frequency inverter recovered from the fault. When the memory clear is enabling, the program can reset and restart from the beginning.



26: Winding start

Winding will start when this contact is closed.



Note:

① Winding start is enable and winding is started;

② Winding is completed, the frequency inverter will output as per the frequency completion of winding, and response to the completed winding and the multifunctional output terminal will act.

③ The frequency inverter stops running, and the multifunctional terminal will automatically reset when the winding is completed.

P323	Output terminal M01			Default: 01
P324				
P325	Output terminal RA, RB and RC			Default: 03
	Setting range	0 ~ 32	Unit	1

	Setting content	0: Invalid 1: Running 2: Frequency reached 3: Fault 4: Zero speed 5: Frequency 1 reached 6: Frequency 2 reached 7: Accelerating 8: Decelerating 9: Low voltage indication 10: Timer 1 reached 11: Timer 2 reached 12: Stage completion indication 13: Process completion indication 14: PID upper limit 15: PID lower limit 16: 4-20mA disconnected 17: Overload detecting 18: Over torque detecting 26: Winding counter reached 27: Setting counter reached 28: Intermediate counter reached

0: Invalid

Set an empty terminal to prevent any improper operation.

1: Running

The terminal is defined running, and it will act when there is any output from the frequency inverter or give a running command.

2: Frequency reached

This contact will act when the frequency has reached the set value.

3: Fault

This contact will act when an irregularity is detected by the frequency inverter, and this contact can be used for alarming.

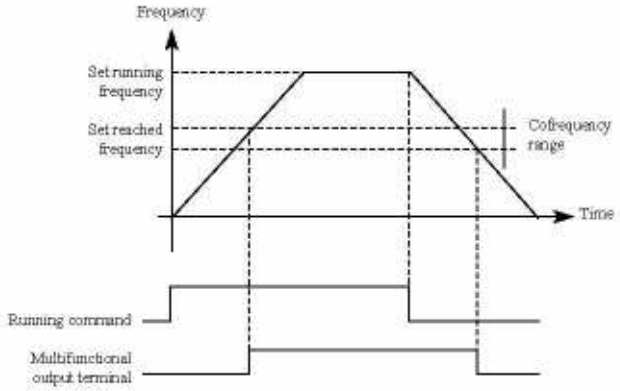
4: Zero speed

This contact will act when the output frequency of the frequency inverter is lower than the startup frequency.

5: Frequency 1 reached

6: Frequency 2 reached

This contact will act when the frequency has reached the set value.

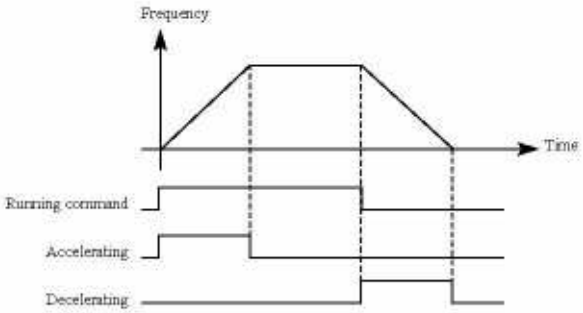


7: Accelerating

This contact will act when the frequency at the accelerating state.

8: Decelerating

This contact will act when the frequency at the decelerating state.



9: Low voltage alarm

This contact will act and warning when the frequency inverter has detected that DC bus is lower than the set value; moreover, the set value of low voltage warning can be set through the advanced parameter group.

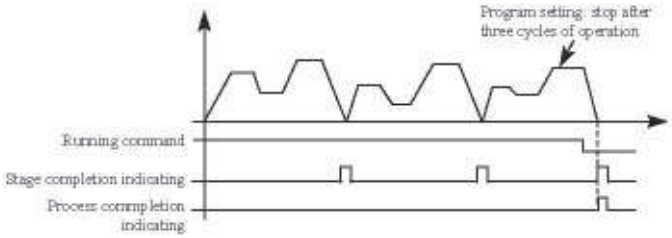
10: Timer 1 reached

11: Timer 2 reached

This contact will act when the frequency inverter has reached the set value, and it will be reset when the timer start signal is deactivated.

12: Stage completion indication

When the frequency inverter is in programmed operation, a pulse will be output from the multifunctional output terminal at the completion of each stage.



13: Process completion indication

When the frequency inverter is in programmed operation, a pulse will be output at the completion of all stages. This pulse can be used as warning signal to inform the operation of giving a startup signal for the next program.

14: PID upper limit

This contact will act when the PID feedback quantity is larger than the upper limit of the set value. Generally it is used for warning output or emergency shutdown to avoid any accident.

15: PID lower limit

This contact will act when the PID feedback quantity is smaller than the lower limit of the set value.

This contact will act and warn when the FIC input signal is disconnected.

17: Overload detecting

This contact will act when a motor overload is detected by the frequency inverter.

18: Exceeding torque detecting

This contact will act when an exceeding torque is detected by the frequency inverter.

26: Winding completed

This contact will act when the winding is completed, and it will be reset after the frequency inverter has stopped. Please refer to the description for the winding start multifunctional input terminal.

27: Setting counter reached

This contact will act when the count value has reached the set value (P425) if an external counter is activated for the frequency inverter.

28: Intermediate counter reached

This contact will act when the count value has reached the set value (P426) if continually performed for the frequency inverter.

P326	Output terminal FOV			Default: 0
	Setting range	0 ~ 7	Unit	1
	Setting content	0: Output frequency 1: Output current 2: DC voltage 3: AC voltage		

P326: Output terminal FOV

A 0-10V voltage can be output through the FOV terminal, and the output can be set within 0-10V through P303 and P307, and it response to the output frequency, output current, DC voltage and AC voltage, etc.

0: Output frequency

The current (voltage) output is response to the minimum running frequency – the minimum running frequency.

1: Output current

The current (voltage) output is response to 0 – 2×nominal current of

the frequency inverter.

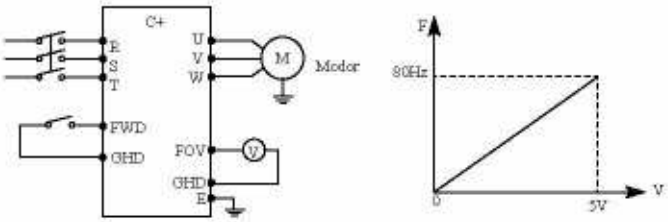
2: DC voltage

The current (voltage) output is response to response to 0 – 1000V.

3: AC voltage

The current (voltage) output is response to 0 – 510V.

E.g.: if a 0-5V frequency meter is used to monitor the frequency output, the minimum running frequency of the frequency inverter is set to 0.0Hz, and the maximum running frequency is 80Hz.



Parameters:

P105=0.0, maximum running frequency

P106=0.0, minimum running frequency

P306=0.0, FOV minimum voltage output

P307=5.0, FOV maximum voltage output

7-4 Auxiliary function application

P400	Inching frequency setting			Default: 5.0
	Setting range	0.0 ~ maximum running frequency	Unit	0.1

JOG frequency setting is generally applicable to test run; JOG operation can only be realized via external terminal, which can be freely selected.

If JOG is activated, other instructions shall not be accepted; when JOG is released, the inverter shall pull up. The JOG Acc/Dec Rate shall be default as the fourth time of Acc/Dec of the inverter.

Control privilege class: JOG → External multi-speed → PLC running

mode → PID mode → Pyramidal wave running mode → Winding → Conversion setting mode.

Simultaneous input of multiple control mode, running by lowest grade.

P401	Acceleration time 2			Default 10.0
P402	Deceleration time 2			Default 10.0
P403	Acceleration time 3			Default 20.0
P404	Deceleration time 3			Default 20.0
P405	Acceleration time 3			Default 2.0
P405	Deceleration time 3			Default 2.0
	Setting range	0-999.9	Minimal unit	0.1

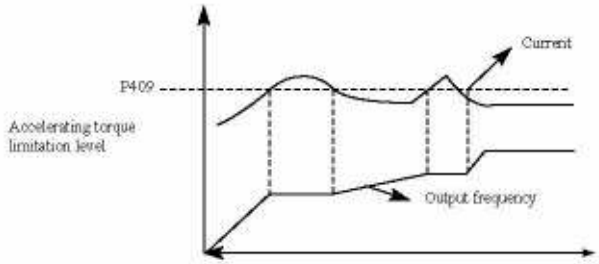
HC1-C+ series inverter is set with totally 4 Acc/Dec times. Generally, the inverter is defaulted as the First Acc/Dec time, and the JOG is defaulted as the Fourth Acc/Dec time. The user may select the Acc/Dec time as required. While external controlling multi speed, the external terminal status will determine the Acc/Dec time; while choosing internal multi speed, simple PLC may be used to select different Acc/Dec times.

P407	Designated value of counter		Default 100
P408	Intermediate value of counter		Default 50
	Setting range	0-9999	Minimal unit 1

HC1-C+ series inverter is designed with two groups of counters, which can accept pulsing signal below 250Hz by multifunctional terminal; when the counter reaches setting value, the multifunctional output terminal will be activated; the counter input terminal reset signal by the counter; the counter reset and clear; the counter restart counting; the pulsing signal may use approaching closing and photo-electric closing as the input signal.

P409	Accelerating torque limitation level			Default 150
	Setting range	0-200	Unit	1

While accelerating of inverter, the output current of inverter may be too high above protection range of the inverter because of load and Acc/Dec; P409 may be used to set the limitation level of exceeding current; when the current reach the setting value, the inverter shall stop accelerating, and it shall continue accelerating after the current revert back below setting value.

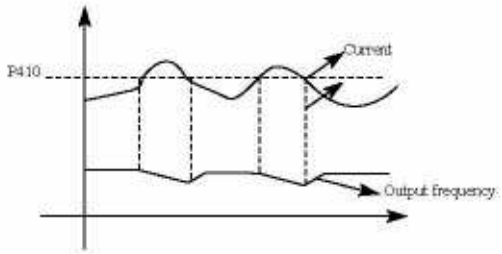


100% current is the rated current of inverter. When P409 is set as 0, the accelerating torque limitation is null and of no protection function.

P410	Constant torque limitation level			Default 00
	Setting range	0-200	Unit	1

During constant running of inverter, the output current of convert may change without a certain limitation because of fluctuation of load. The inverter may trip protection for over current. P410 may be used to set constant torque limitation level. When the current exceed the P410 setting value, the inverter will automatically reduce the input frequency. When the current revert return to normal condition, the inverter will restart accelerating to the setting frequency (100% current is the rated current of inverter).

When P410 is set as 0, the constant torque limitation level is null without protecting function.

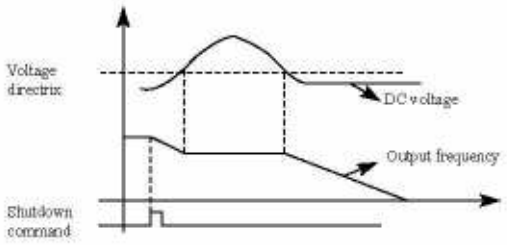


P411	Deceleration overpressure protection option Default 1			
	Setting range	0-1	Unit	
	Setting content	0: null; 1: valid 0: Null		

During deceleration of inverter, the dc bus pressure of inverter may increase because fast deceleration. When the overpressure prevention option is null, and without the action made by against increase of DC bus pressure, it may finally lead to overpressure protection of the inverter.

1: valid

The overpressure prevention option is valid. When the inverter is shut down, it may stop deceleration first for the pressure reaches the setting value. The inverter may continue decelerating when the current bus reverts back within bounds.



P412	Automatic stabilization option			Default 1
	Setting range	0-2	Unit	1
	Setting content	0: null; 1: valid; 2: null at deceleration		

Operation of the motor with unstable input power will increase the temperature of motor and lead to damage of insulation and unstable output torque.

0: null. Automatic stabilization option is null. The output pressure of inverter is fluctuated.

1: Automatic pressure is valid.

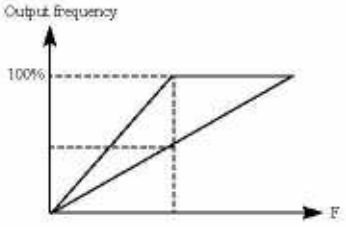
When automatic stabilization function is chosen, the inverter shall automatically output stable pressure with unstable input power supply.

2: Null deceleration. When this function is selected, it will enhance the brake function of inverter.

P413	Automatic energy saving option			Default: 0.0
	Setting range	0-100	Unit	1
P414	Brake pipe operation voltage Default: single-phase AC220V 375.0			
	Setting range	Single phase: AC220V: 360.0~400.0V	Unit	0.1
P415	Brake pipe operation			Default: 6
	Setting range	40-100	Unit	0.1

P413 automatic energy saving option:

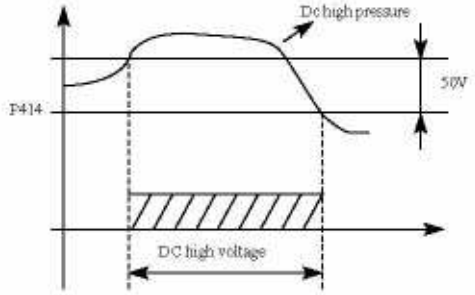
When the automatic energy saving option is constantly speed running, the best voltage value may be calculated as per load condition to supply the load for the purpose of energy saving.



Note: This function is not applicable to the operation with frequently changing load or nearly full load.

P414 and P415 are only applicable to inverter of interior braking unit, but ineffective to the exterior braking unit.

These two parameters above have set the dc high pressure and brake action rate of internal wall of inverter. The operation voltage of P414 brake pipe has been set through this parameter. When the dc high pressure of inverter is higher than the setting value of P414, the interior brake unit will operate and release energy via brake resistance to make the dc voltage drop. When the dc voltage drops to a value, the interior brake unit will shut down.



It is necessary to pay attention on the parameter setting. Too high setting value may lead to over high dc voltage and protection of inverter; with too low setting value, the brake resistance will generate too high heat value.

Operation rate of P415 brake pipe

Operation rate of brake pipe is applicable to the average voltage value applied to the brake resistance in operation of brake unit. The voltage of brake resistance is a voltage pulse width modulation wave, its duty ratio is equal to break operation rate and reaches operation rate of blanked-off pipe. With large ratio, energy shall be released faster, and its power will be consumed resistance.

P416	Power-off restart option			Default: 0
	Setting range	0-1	Unit	1
	Setting content	0: null, not restart after instantaneous stop; 1: valid, frequency tracking start		

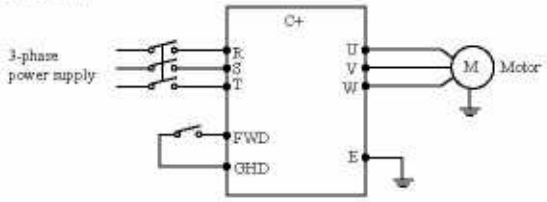
0: Null

Power-off restart is null. After power-off, the inverter shall automatically clear the operating instruction. When the power is on, it needs to start by normal power-on operation.

Frequency tracking start

Power-off restart is valid. After the inverter is allowed to power down, the operating instruction is retained for a certain time (within the allowed power-off time). After power-on, the inverter will start as frequency tracking mode. If power-down time is longer than the permitted time, the inverter shall clear the operation instruction. After power-on, it needs to be started by normal power-on operation.

Note: In application of valid power-off restart, please be careful as the inverter may start suddenly. Besides, while using a terminal to control the inverter to start or stop, it is necessary to be careful on the external terminal status. After power-off, as the external terminal is still in connecting status, the inverter may start suddenly when it is power on.



Example: Using K1 to control operation of inverter

When K1 is connected, the inverter operates; when K1 is disconnected, the inverter shut down. After power-off, K1 is still connected. After power-on, it is dangerous because the inverter

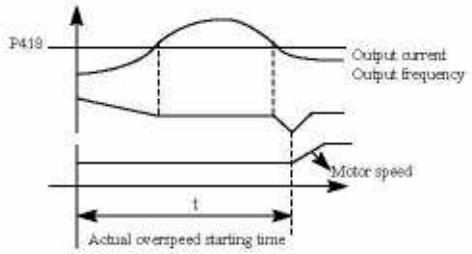
would suddenly start. Please use other controlling method like triple-connection method.

P417	Permitted power-off time			Default 5.0
	Setting range	0-10.0	Unit	0.1

P417 has set the permitted power-off time. If the power-off time exceeds the setting value, the power-off restart will be null.

P418	Current limitation level for runway start			Default 150
	Setting range	0-200	Unit	1

When the inverter starts to run, the inverter will track downward from the setting frequency with highest speed. The output current of inverter may increase rapidly and possibly exceed the setting protection value of inverter. In such situation, the inverter will stop tracking and make the output current of inverter drop to normal level. The inverter continues tracking. The 100% setting value of this parameter is rated current of the inverter. The protection value for inverter tracking may be set by means of P418.



P419	Runway start time			Default 5
	Setting range	0—10	Unit	0.1

When the inverter takes runway start, the inverter tracks downward with the highest speed, and finishes tracking within the setting time. If tracking is not finished within the setting time, the inverter will protects.

P420	Failure restart times			Default 0
	Setting range	0-5	Unit	1
P421	Failure restart time			Default 2
	Setting range	0-100	Unit	1

After occurrence of irregularity (such as current and overpressure, etc), the inverter may automatically reset (valid when P420 is not 0). After the setting time of P421, the inverter will start according to the setting start mode (P200).

After started, if no irregularity happened within 60s, the inverter would automatically reset P420. After started, if any irregularity happened within 60s, the inverter would record the times. When the times or irregularity reaches the setting value of P420, the inverter shall stop outputting and no longer execute automatic reset and restart function. The inverter can be restarted only through normal starting mode.

Note: If the "failure restart times" is set as 0, it is null. When the "failure restart times" is valid, the inverter may start suddenly and can be very dangerous. Please be careful while using this function.

P422	Over torque action			Default: 0
	Range	0—3	Minimum unit	1
00	Content	0: Frequency reached, the inverter begins detecting over torque and keeps running. 1: Frequency reached, the inverter begins detecting over torque and keeps running. 2: In running, the inverter detects over torque, and continues running. 3: In running, the inverter detects over torque, and continues running.		

Note: 0: When the inverter reaches setting frequency, the inverter shall start detecting the over torque; when the inverter detecting reaches the over torque, the inverter continues operating and does not detect the over torque in acceleration.

1: When the operating frequency reaches the setting frequency, the

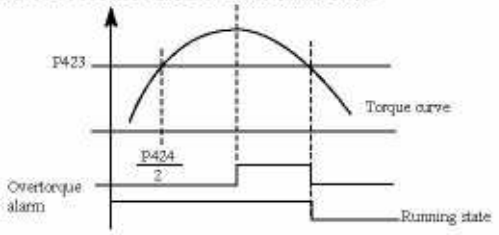
inverter starts detecting the over torque; when the inverter detecting reaches the over torque it will shut down.

2: When the operation starts, the inverter starts detecting the over torque; when the detecting reaches the over torque, the inverter does not make disposal but continues operating.

3: When the operation starts, the inverter starts detecting the over torque; when the detecting reaches the over torque, the inverter shuts down.

P423	Over torque detecting level			Default 0
	Setting range	0-200	Unit	
P424	Over torque detecting time			Default 0
	Setting range	0-200	Unit	1

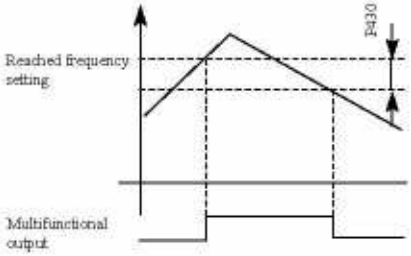
When the output current of inverter exceeds the setting value of P423 (namely the over torque detecting level), the inverter starts calculating the over torque time. When the lasting time exceeds half of setting time of P424 (over torque detecting time), the corresponding multifunctional terminal operates, the over torque gives alarm, and the inverter continues operating. If the lasting time exceeds the setting value of P424, the inverter protects and operates as per operation of P424, giving failure information. When the over torque detecting level is set as 0, the over torque detecting is null, and 100% is the rated current of inverter.



P425	Reaching frequency one	Default 100		
	Setting range	0: Maximal operation frequency	Unit	0.1

P426	Over torque detecting time		Default 5.0	
	Setting range	0: Maximal operation	Unit	0.1

H220 series set that when two groups of frequencies reach, and the operation frequency reaches, setting values of P425 and P426, the corresponding multifunctional terminals will operate. The frequency reaches one hysterics, set by P430.



P427	No.1 timer			Default 0
	Setting range	0.0-999.9s	Unit	0.1
P428	No.2 timer			Default 0
	Setting range	0.0-999.9s	Unit	0.1

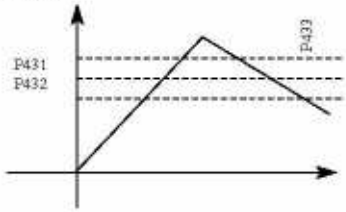
HC1-C$^+$ series have two timers of normal type. When the time comes to the setting value (by P427 and P428), the corresponding multifunctional terminal operates, and the time starting is controlled by external multifunctional input terminal.

With two timers some simple program operations are available.

P429	Constant torque limitation time			Default 0.5
	Setting range	0.0-999.9s	Unit	0.1
P430	Frequency reaching the ring width			Default 0.5
	Setting range	0.0-2.0	Unit	0.1
P431	Hopping frequency One			Default 0
	Setting range	0.0- frequency upper limit	Unit	0.1

P432	Hopping frequency Two			Default 0
	Setting range	0.0 - frequency upper limit	Unit	0.1
P433	Hopping frequency hysterics width			Default 0
	Setting range	0.0-2.0	Unit	0.1

For mechanical and other reasons, the inverter may induce vibration in certain frequency during operation. In order to avoid the vibration point, setting of 431-P433 can be used to leap over the vibration frequency. HC1-C+ is set with two hopping frequencies for convenience of users. The hopping width can be freely set with P433, as below shows:



7-5 Application functions

P500	PLC memorizing mode			Default 0
	Setting range	0-1	Unit	1
	Setting content	1: memorize.	0: not memorize	

Program operation pause function and program operation memorizing can be realized by means of P500.

0: not memorize

During the operation of PLC program, P500 chooses "not memorize". In case of shutdown for failure or other reasons, the inverter does not memorize the status before shutdown. After restarted, the operation starts from the original state.

1: Memorize

During the operation of PLC program, P500 chooses "memorize".

In case of shutdown for failure or other reasons, the inverter memorizes the status before shutdown. After restarted, the inverter continues operating as per the program. Note: the inverter cannot be powered off.

After shutdown, power-off and power-on, the inverter does not memorize the status before shutdown. After restarted the inverter starts program operation from the original state.

P501	PLC starting mode			Default 0
	Setting range	0-1	Mini. Unit	1
	Setting content	0: null (PLC not started). 1: valid (PLC started)		

P501 determines operating mode of the inverter:

When P501=0 and "PLC not started" is chosen, the inverter operates as normal mode.

When P201=1 and "PLC started" is chosen, the inverter chooses program operation.

In the "start" status of PLC, there are many operation instructions. When various instructions are given, the inverter chooses the maximum to execute the priority.

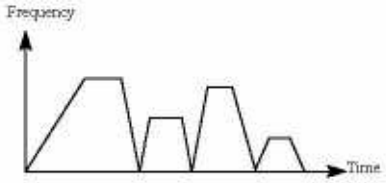
Priority level	Priority	Item
High Low	1	JOG
	2	External multi-speed
	3	Internal multi-speed
	4	PID
	5	Triangle wave
	6	Winding
	7	Setting mode of frequency conversion

P502	PLC memorizing mode			Default 0
	Setting range	0-4	Unit	1

	Setting content	0: PLC stops after a cycle's operation. 1: PLC pausing mode, stop after a cycle's operation. 2: PLC circular operation. 3: PLC pausing mode, circular operation. 4: After a cycle's operation, PLC continues operating with the final operating frequency.

PLC operating mode determines whether the internal multi-speed operation status is one cycle or circular operation. P502 is only valid when PLC in started.

PLC pausing model operation refers that, during operation of internal multi-speed operation, after finishing of each speed, decelerate and stop first, then accelerate to next speed, execute next speed operation, and then next speed operation, show as below.



The user may freely select proper operating mode as per actual condition.

P503	Multi-speed frequency 1	Default 20.0
P504	Multi-speed frequency 2	Default 10.0
P505	Multi-speed frequency 3	Default 20.0
P506	Multi-speed frequency 4	Default 25.0
P507	Multi-speed frequency 5	Default 30.0
P508	Multi-speed frequency 6	Default 35.0
P509	Multi-speed frequency 7	Default 40.0
P510	Multi-speed frequency 8	Default 45.0
P511	Multi-speed frequency 9	Default 50.0
P512	Multi-speed frequency 10	Default 10.0

P513	Multi-speed frequency 11	Default 10.0
P514	Multi-speed frequency 12	Default 10.0
P515	Multi-speed frequency 13	Default 10.0
P516	Multi-speed frequency 14	Default 10.0
P517	Multi-speed frequency 15	Default 1.0
	Setting range	0.0: Maximal operating frequency
	unit	0.1

Parameters P503-P517 has set fifteen speed frequencies of multi-speed operation. For the relationship between multi-speed and external terminal, please refer to the instruction in multi-speed One, Two, Three and Four in the multi-functional input terminal.

P518	PLC Operating time 1	Default 100
P519	PLC operating time 2	Default 100
P520	PLC operating time 3	Default 100
P521	PLC operating time 4	Default 100
P522	PLC operating time 5	Default 100
P523	PLC operating time 6	Default 0
P524	PLC operating time 7	Default 0
P525	PLC operating time 8	Default 0
P526	PLC operating time 9	Default 0
P527	PLC operating time 10	Default 0
P528	PLC operating time 11	Default 0
P529	PLC operating time 12	Default 0
P530	PLC operating time 13	Default 0
P531	PLC operating time 14	Default 0
P532	PLC operating time 15	Default 0

PLC operating time determines the operating time of each speed of the internal multi-speed. The operating speed of each speed is response to reach speed.

P533	PLC operating direction			Default 0
	Setting range	0-9999	Mini. unit	1

P533 has set the direction of each speed operation.

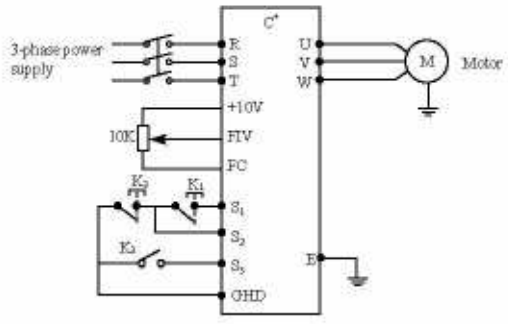
Setting mode of operating direction: By binary system 16-bit mode, then convert to decimal system value. Each bit determines the operating direction of corresponding speed. Define 0 as "forward" and 1 as "reverse". This parameter setting is only valid when PLC is started.

Example: There is a five-speed of circular operation with the following requirements:

Item	Operating frequency	Operating direction	Operating time
Basic frequency	Potentiometer adjustable	Forward	
First speed	20.0	Reverse	20
Second speed	60.0	Forward	25
Third speed	40.0	Reverse	30
Fourth speed	15.0	Forward	20

Two buttons are used, one for operating and one for stopping. The basic frequency is required to use adjustable potentiometer.

Wiring Diagram



Parameter setting:

Setting of PLC operating direction: (by P533)

4th speed	3rd speed	2nd speed	1st speed	Basic freq	
4	3	2	1	0	→ Position (bit)
0	1	0	1	0	→ Direction conversion (0: forward; 1: reverse)
0x24	1x23	2x22	1x21	0x20	→ Convert to decimal system value

Binary system 01010 converted to decimal system value:

It can be determined that P533=10.

Parameter is set as

P101=3 (keyboard potentiometer setting mode: controlled by the potentiometer).

P102=1 (operation setting selection: multifunctional terminal input)

P105=60 (maxima operating frequency is set as 60Hz)

P107=10 P108=10 (Acc/Dec time: 10s)

P317=6 S1 terminal is defined as "forward"

P318=8 S2 terminal is defined as "stop"

P319=20 S3 terminal is defined as "PLC in Operation"

P500=1 PLC program memorizing

P501=1 PLC started

P502=0 PLC stops after a cycle's operation

P503=20 1st speed is defined as 20Hz

P504=60 2nd speed is defined as 60Hz

P505=40 3rd speed is defined as 40Hz

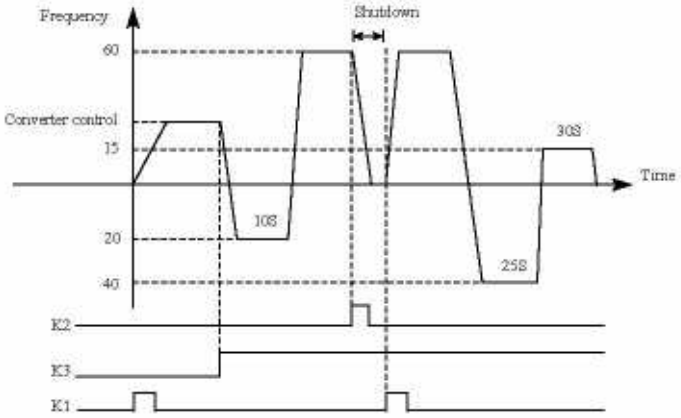
P506=15 4th speed is defined as 15Hz

P518=10 Operating time of first speed: 10s

P519=20 Operating time of second speed: 20s

P520=25 Operating speed of third speed: 25s

P521=30 Operating speed of fourth speed: 30s



Note for operation:

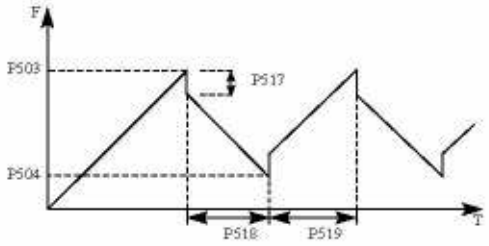
① Press K1 inverter to start operation, the operating frequency is given by the potentiometer

② Press K3 to let PLC starts operating. From the first speed, execute as per presetting program PLC program operation automatically shuts down after finished a cycle

③ If any failure occurs in program operation leading to shutdown of inverter, press K1 after failure recovery, and the inverter will continue operating as per the program.

④ If P500 is set as 1, the program does not memorize and operates from the original status. Triangle wave function:

For traversing function of chemical fiber and chemical fiber



Instructions:

1. Frequency of each turning point is determined by P503 and P504
2. Jumping frequency is determined by P517
3. Operating time is determined by P518 and P519
4. P535 starts this function

7-6 Auxiliary application functions (PID)

P600	PID starting mode			Default 0
	Setting range	0-1	Unit	1
	Setting content	0: null, PID not started. 1: valid PLC started. 2: PID condition started		

0: null,

Namely PID not start, and PID function not execute.

1: valid,

Namely the PID is started, and does not need the external terminal to determine, PID always valid. 2: PID in operating condition. In valid status of PID operation of external terminal, PID is started and executed PID function.

P601	PID operating mode			Default 0
	Setting range	0-1	Unit	1
	Setting content	0: minus feedback mode. 1: plus feedback mode		

0: minus feedback mode

When feedback value is different with target value, feedback value is larger than target value and P601=0, choose the minus feedback mode, and the inverter decelerates; whereas, when feedback value is smaller than target value, the inverter accelerates.

1: Plus feedback mode

Plus feedback mode is opposite to minus feedback mode. When minus feedback value is larger than the target value and P601=1,

choose plus feedback mode, and the inverter accelerates; whereas, when the feedback value is smaller than target value, the inverter decelerates.

P602	PID target value option			Default 0
	Setting range	0-2	Unit	1
	Setting content	0: select the number as target value. 1: select FIV as target value. 2: select FIC as target value.		

The setting target value of P602 HC1-C has three sources. The target can be set by inverter, external terminal, pressure and current input, etc.

0: select number as target value.

The target value is set by P604.

1: select FIV as target value.

The target value is determined by FIV terminal with pressure signal. FIV terminal can also be used to determine the target value with potentiometer.

2: select FIC as target value.

The target value is determined by FIC terminal with current signal.

P603	PID feedback value option			Default 0
	Setting range	0-2	Unit	1
	Setting content	0: select FIV as feedback value. 1: select FIC as feedback value. 2: select FIV-FIC difference as feedback value. 3: select FIC-FIV difference as feedback value.		

Note: P603 parameter setting: select PID feedback channel

0: select FIV as feedback value,

Namely select FIV as feedback channel and the feedback is voltage signal.

1: select FIC as feedback value,

Select FIC as feedback channel and feedback is current signal.

2: select FIV-FIC difference as feedback value,

Select FIV-FIC difference as feedback value, and select FIV and FIC as feedback channels.

3: select FIC-FIV difference as feedback value,

And select FIC and FIV and feedback channels.

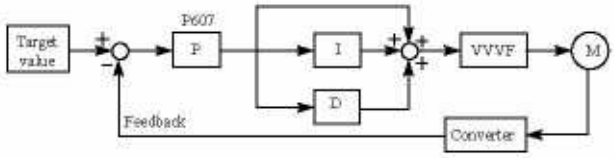
P604	PID number target value			Default 50
	Setting range	0.0-100%	Unit	0.1
	Setting content	0: select FIV as feedback value		

Number target value 100% is response to the voltage of analog quantity + 10v.

PID closed-loop control is generally used in process control with slow changing physical quantity, such as pressure and temperature control. Feedback signal is generally taken from temperature transducer and voltage transducer, etc. In PID control, the feedback signal input channel is analog quantity current signal 4-20mA or 0-10V with two routes for setting option.

PID closed-loop control is valid when multifunctional input PID is started.

PID control diagram:



General regulating method of PID control:

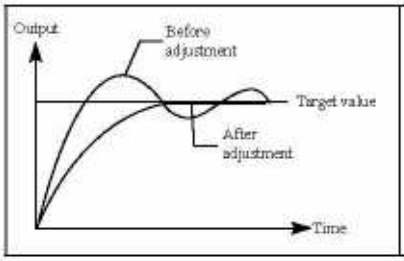
(1) Choose the proper transducer. Output specification of transducer: 4-20mA or 0-10V standard signal.

(2) Set the proper target value.

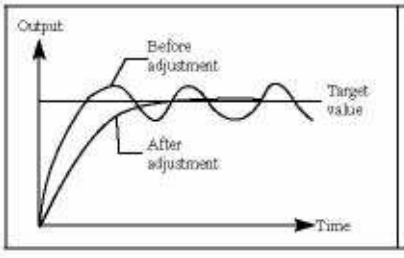
(3) In case of no vibration in output, increase the proportionality constant P;

(4) In case of no vibration in output, reduce the integration time Ti;

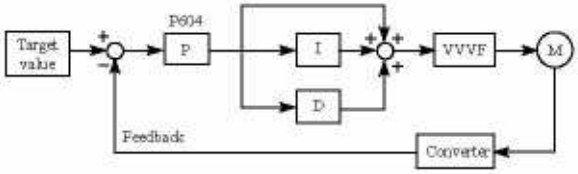
(5) In case of no vibration in output, increase the derivative time Td;



1. Restraint output from exceeding specific value
a: Reduce the derivative time (D value)
b: Reduce the integration time (I value)



2. Restraint output vibration
a: Reduce the derivative time (D value) or set it as 0
b: Reduce the proportionality constant (P value)



P605	PID upper limit warning value			Default 100
	Setting range	0.0-100%	Unit	0.1

PID upper limit warning value is applicable to irregular warning. When PID feedback signal value is larger than PID upper limit warning value, the corresponding multifunctional output operates and informs the user to dispose. The inverter does not shut down.

P606	PID lower limit warning value			Default 200%
	Setting range	0.0-100%	Unit	0.1

PID lower limit is also applicable to irregular warning of machine. When PID feedback value is smaller than lower limit setting value,

the corresponding multifunction output operates and acts as warning. In this case the inverter does not shut down.

P607	PID P value			Default 0
	Setting range	0-200%	Unit	0.1

P value (proportionality constant) has set error value plus. If I value and D value is set as 0, P value is only for ratio control.

P608	PID I value			Default 0.3s
	Setting range	0.0-200.0S	Unit	0.1s

I value (integration time) has set affecting speed of PID operation. The larger I value is; the lower affecting speed is. When I value is set low, as the affecting speed is high, there will be vibration. When I value is set as 0, it means shutdown.

P609	PID D value			Default 0
	Setting range	0.0-20.0	Unit	0.1

D value (derivative time) has set the attenuation of PID operation. The larger D value is, the more apparent attenuation is. When D value is set as 0, it means shutdown.

P610	Step length of PID operation			Default 0.5
	Setting range	0.0-1.0HZ	Unit	0.1

PID calculates once per 10ms. Each calculation comes to a frequency FHz. F610 has set the maximum of frequency increment. When the calculated frequency increment value exceeds P610 setting value, the setting value is taken.

P611	PID stand-by frequency			Default 0.0
	Setting range	0.0-Maximal operating frequency	Unit	0.1
P612	PID stand-by duration			Default 20
	Setting range	0-200	Unit	1
P613	PID wake-up value			Default 00%
	Setting range	0.0-100%	Unit	1

P6.11 PID stand-by frequency

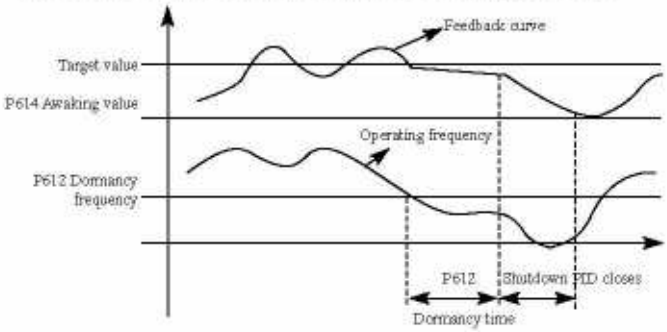
P6.11 must reach minimum frequency in PID stand-by. When running frequency is less than value of P6.11, PID stand by duration will begin counting.

P6.12 PID stand-by duration

When the running duration of inverter is more than stand-by frequency of the value (stand-by duration) P6.12, inverter will be stand-by. Then stop outputting, and disconnected with PID, besides, monitoring the feedback of 6.13 PID.

P6.13 PID wake-up value.

Inverter continues monitoring PID feedback in stand-by. When it detects feedback values less than wake-up value (P6.13), PID function will be take action, and then inverter will begin to start.



Example: Target value is 60% (0-100% is corresponding to 0-10V), wake-up value is 80%, which is actually corresponding to 0-10V, then actual wake-up value is 60%×80%=48% (response to0-10V).

P614	PID display corresponding value			Default 1000
	Setting range	0-9999	Unit	1
P615	PID display digit			Default 4
	Setting range	1-4	Unit	1
	1: 1 digit displayed. 3: 3 digits displayed.		2: 2 digits displayed. 4: 4 digits displayed	

P616	Decimal place displayed		Default 2	
	Setting range	0-4	Unit	1
	Setting content	0: digit after the decimal not displayed. 1: 1 digit after decimal displayed. 2: 2 digits after decimal displayed. 3: 3 digits after decimal displayed. 4: 4 digits after decimal displayed		

P614 PID display corresponding value. P614 setting value is response to+10V analog quantity voltage. If P614 is set as 200, it means the maximal is 200 response to+10V voltage. P645 has set the displayed digital. 0 means no feedback value is displayed. The user may choose displayed digit as required. P616 PID displays decimal digit. P616 has set how many digits after decimal is displayed. Example: Four digits are required to be displayed, to one digit after decimal. The setting target value is 50%. PID displays the corresponding value is 200, so the display value is 200×50%=100.0. The display value is 100.0. This parameter group is convenient for user's monitoring and directly viewed.

Parameter P614=200; P615=4; P616=1

P617	PID upper limit frequency		Default 48.0	
	Setting range	PID lower limit frequency: maximal operating frequency	Unit	0.1
P618	PID lower limit frequency		Default 20	
	Setting range	0-PID upper limit frequency	Unit	0.1
P619	PID working mode		Default 0	
	Setting range	0: PID keeps working after starting. 1: After starting of PID, when feedback reaches P605, work with minimal operating frequency; when feedback drops to P606, PID resume calculating.	Unit	1

P617 PID upper limit frequency

When PID starts and the inverter is operating, if the output frequency (FOUT) is larger than the parameter P617 and lasting time is higher than 1 minute, the multifunction output sign: 29

(constant voltage water supply) is 1, it means TSC. If P325 is set as 29, the relay contacts RA and RC pull in.

P618 PID lower limit frequency

When PID starts and the inverter is operating, if the output frequency (FOUT) is smaller than parameter P618 and lasting time is higher than 1 minute. The multifunctional output sign -29 (constant voltage water supply) is 0, it means no TSC. If P325 is set as 29, the relay contacts RA and RC are disconnected.

Application example: With P617 and P618 constant voltage water supply can be realized, one for frequency conversion and one for power frequency. P325 is set as 29, the circuit breaker contacts RA and RC controls operation with power frequency.

Operation process: When the conversion output frequency reaches P617 and lasts for more than 1 minute, the relay contacts RA and RC will pull in. Power frequency motor operates to increase the water pressure. When the conversion operation output frequency reduces to P618 and lasts for more than 1 minute, the relay contacts RA and RA are disconnected, and the power frequency motor shuts down.

P619 PID working mode

Setting as 0: After PID is started, real time reading the target value and feedback value for PID calculation. Real time changes the operating frequency.

Setting as 1: After PID is started, real time reading the target value and feedback value for PID calculation. Real time changes the operating frequency. When the frequency reaches P605, PID does not calculate but work with the minimal operating frequency. When feedback falls to P606, PID resumes calculating.

7-7 Communication parameters

P700	Communication data velocity			Default 0
	Setting range	0-3	Unit	1
	Setting content	0: 4800bps 2: 19200bps	1: 9600bps 3: 38400bps	

P700 is used for setting the transmission speed of serial communication. Note that while using serial communication portal, it is necessary to ensure that the two sides of communication have the same transmission speed.

P701	Communication data mode			Default 0
	Setting range	0-5	Unit	1
	Setting content	0: 8N1 For ASCII 2: 8E1 For ASCII 4: 8O1 For RTU		1: 8O1 For ASCII 3: 8N1 For RTU 5: 8E1 For RTU

P701 has set the format of communication data. See the communication instruction for details.

P702	Local communication address			Default 0
	Setting range	0-240	Unit	1

Inverter communicates via serial port. Each inverter must have an address. P702 is used to define the address of each inverter. HC1-C$^+$ series inverter can mostly control communication among 240 units.

When P702 is set as 0, the communication function is null.

HC1-C$^+$ Series MODBUS Communication Protocol

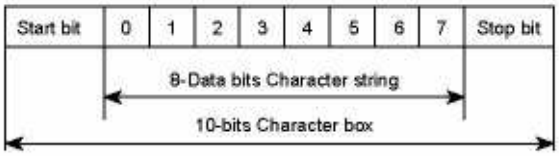
HC1-C$^+$ series communication protocol is of MODBUS ASCII (American standard code for information inter change) mode: each byte is composed of two ASCII characters, such as: the numerical value is 54Hex then the representation mode of ASCII is "54" which is respectively composed of "5" (35Hex), 4 (34Hex).

1. Definition of coding

Communication protocol belongs to hexadecimal; each hexadecimal character represents the following information.

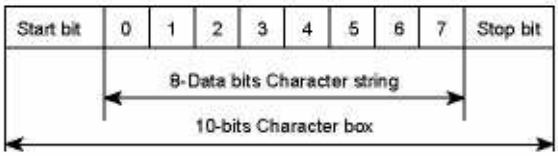
Character	"0"	"1"	"2"	"3"	"4"	"5"	"6"	"7"
ASCII code	30H	31H	32H	33H	34H	35A	36A	37A
Character	"8"	"9"	"A"	"B"	"C"	"D"	"E"	"F"
ASCII code	38A	39H	41H	42H	43A	44A	45H	46H

2. Character structure 10-bit character box (For ASCII) Data pattern: 8N1 (For ASCII)

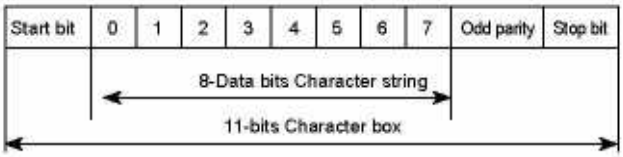


10-bit character box (For RTU)

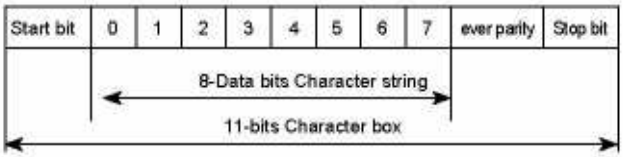
Data pattern:8N1 (For RTU)



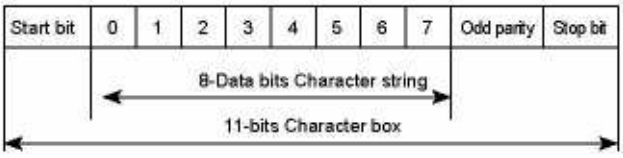
Data pattern: 801For ASCII



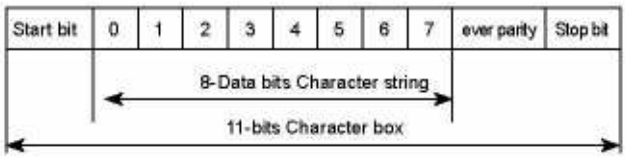
Data pattern: 8E1For ASCII



Data pattern: 8O1For RTU



Data pattern: 8E1For RTU



3. Communication data structure Data format frame ASCII mode:

RTU mode:

STX	Start character: (3AH)
Address Hi	Mailing address: 8-bit address is composed of two ASCII codes
Address Lo	
Function Hi	Function code: 8-bit function code is composed of two ASCII codes
Function Lo	
DATA(n -1)	Data content: data content of n×8-bit is composed of 2n ASCII codes n≤16, maximum 32 ASCII codes
……	
DATA 0	
LRC CHK Hi	LRC check code: 8-bit check code is composed of two ASCII codes
LRC CHK Lo	
END Hi	Final character: END Hi=CR (0DH), END Lo=LF (0AH)
END Lo	

START	Maintain that no input signal is larger than or equals to 10ms
Address	Mailing address: 8-bit binary address
Function	Function code: 8-bit binary address
DATA(n -1)	Data content: n×8-bit data, n=16,
……	
DATA 0	
CRC CHK Low	LRC check code: 16-bit CRC check code is combined by two 8-bit binary systems
CRC CHK High	
END	Maintain that no input signal is larger than or equals to 10ms

Mailing address

00H: all drive's broadcast

01H: inverter for 01 address

0FH: inverter for 15 addresses

10H: inverter for 16 address and so forth..., the maximum can reach 240.

Function code and data content (Data Characters)

03H: read out the content of register

06H: read in a WORD to the register, function code 03H; Read out the content of register.

For example: for the drive's address 01H, read out two data contents continuously existing in the register as follows: initial register address 2102H

ASCII mode:

Inquiry message character string format: response message character string format:

STX	':'
Address	'1'
	'0'
Function	'0'
	'3'
Starting address	'2'
	'1'
	'0'
	'2'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
LRC Check	'D'
	'7'
END	CR
	LF

STX	':'
Address	'0'
	'1'
Function	'0'
	'3'
Starting address	'0'
	'4'
Content of staring address 2102H	'1'
	'7'
	'7'
	'0'
Content of staring address 2102H	'0'
	'0'
	'0'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

RTU mode:

inquiry message format: influence message format:

Address	01H
Function	03H
Starting address	21H
	02H
Number of data (count by word)	00H
	02H
CRC CHK Low	6FH
CRC CHK High	F7H

Address	01H
Function	03H
Number of data (count by byte)	04H
Content of data address 8102H	17H
	70H
Content of data address 8103H	00H
	00H
CRC CHK Low	FEH
CRC CHK High	5CH

Function code 06H: write a WORD to the register.

For example: for drive's address 01H, write 6000 (1770H) to the setup parameter 0100H inside the drive.

ASCII mode:

Inquiry message character string format: influence message character string format:

STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'1'
	'0'
	'0'
Data content	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'1'
	'0'
	'0'
Data content	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

RTU mode:

Inquiry message format: influence message format:

Address	01H
Function	06H
Data address	01H
	00H
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

Address	01H
Function	06H
Data address	01H
	00H
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

Check code of ASCII mode (LRC Check)

Check code (LRC Check) is the value added from Address to Data Content. For example, the check code of the inquiry message in the 3.3.1: 01H+03H+21H+02H+00H+02H=29H, then choose the complement code of 2, which equals to D7H.

Check code of RTU mode (CRC Check)

Check code is from Address to Data content. Its operational rule is as follows:

Step 1: order 16-bit register (CRC register) = FFFFH

Step 2: Exclusive OR: do Exclusive OR operation with the first message order of 8-bit byte and low bit 16-bit CR register, and then store the results inside the CRC register.

Step 3: Shift right one bit of CRC register, and fill 0 to the high-order.

Step 4: Check the value which has been right shifted, if it is 0, store the new value of Step 3 into the CRC register; otherwise, do Exclusive OR operation with A001H and CRC register and store the result in the CRC register.

Step 5: repeat step 3 ~ step 4, and calculate all the 8-bits.

Step 6: repeat step 2 ~ step 5, adopt the message order of the next 8-bit until the completion of calculation of all message orders. Finally, the obtained check code of CRC register must be exchange placed in the check code of message order.

Below is calculation example of the CRC check code by using C

```
programming languages:
message order pointer
message order length
unsigned int crc_chk (unsigned char*data , unsigned char length)
Int j;
unsigned int reg_crc = OXfff
while (length --)
reg_crc =*data + +
for(j=0;j < 8;j + +) {
if(reg_crc&0x01) {*LSB(b0) = 1 */
reg_crc = ( reg_crc > > 1) ^ 0Xa001
} else {
reg_crc = reg_crc > > 1;
}
}
return reg_crc; //finally, return the value of CRC register
}
```

7-8 Advanced application parameters

P800	Advanced application parameter lock			Default: 1
	Setting range	0-1	Unit	1
	Setting contents	0: locked 1: unlocked		

Lock advanced application parameter groups by setting up P800 to avoid improper operation and the occurrence negative effects.

P801	System 50Hz/60Hz			Default: 0
	Setting range	0-1	Unit	1
	Setting contents	0: 50Hz	1: 60Hz	

In accordance with the condition of electric grid, 50 or 60Hz system can be set up through this parameter.

P802	Selection of constant torque and variable torque			Default: 0
	Setting range	0-1	Unit	1
	Setting contents	0: constant torque 1: variable torque		

Through the setting of P820, the switch of constant torque and variable torque can be realized to adapt to different loads; protect registration and change relevant parameters during switch process.

P803	Setting of overvoltage protective level Default: single phase AC220V 375.0			
	Setting range	Single-phase AC220V: 370.0V~420.0V	Unit	0.1

P803 can set up over-voltage protective level, and during moderating process, the inverter can easily jump over-voltage protection under the condition of high electric grid; in regard to the above conditions, the protective level can be properly enhanced to ensure the normal running of inverter.

P804	S Setting of low-voltage protective level			Default: 200
	Setting range	Single-phase 175V ~ 225V	Unit	0.1v

P804 has set voltage protective level, and the inverter can easily jump low-voltage protection under the condition of low electric grid; therefore, in order to protect the normal running of inverter, the setting value of P804 can be properly reduced.

P805 can set the over-temperature protective level of the inverter, the protective grade can be properly enhanced to ensure the normal condition of inverter under high temperature environment. However, too high temperature can leads to the damage of the module, to increase the heat dissipation effect is required to lower the temperature.

P806	Time setting of filtering of current show			Default: 2.0
	Setting range	0-100	Unit	0.1

The setting of this parameter is related to the stable condition of the current show. In general conditions, do not change the parameter, if

the setting value is too small, the current show shall fluctuate.

P807	Correction factor of 0-10V low-end analog output			Default: *
	Setting range	0-9999	Unit	1
P808	Correction factor of 0-10V high-end analog output			
	Setting range	0-9999	Unit	1
P809	Retain			
P810	Retain			

The above parameters are set up and used by factories, please do not change them; otherwise, the inverter may not work properly.

P812	UP/DOWN frequency memory selection			Default: 0
	Setting range	0: memory 1: memory not	Unit	0.1

P812 UP/DOWN frequency memory selection

When selecting the "UP/DOWN method" as frequency setting, if the parameter setting is 0, then when it stops, the set frequency shall be retained; if the parameter setting is 1, then when it stops, the set frequency shall be cleared.

Chapter 8 Maintenance, fault diagnosis and solutions

Please maintain the inverter regularly to keep it in normal condition

8-1 Daily checking items

Whether the motor has unusual sound and vibration or not
Whether the motor has abnormal heating or not
Whether the power wire or motor has damages or not
Whether the terminal and the connecting wire have wire break and loose contact phenomenon
If there is any dust or iron filling inside the inverter
If the inverter fan works under normal condition
If the environment temperature and humidity are in normal condition; if the installation environment and ventilation are fine
If the radiator has dust and sundries in it
If the current output of the inverter and the current show are in normal condition
If the inverter has unusual sounds or vibration during its running process

8-2 Maintenance and checking notice

(1) Please cut off power supply during maintenance and check process
(2)Carry out the check and maintenance only after the extinguishing of the high-pressure indicator by cutting off the power supply of the inverter
(3) Please do not leave any configurations, such as screws inside the inverter during the maintenance and check process to avoid the

short circuit of the circuit board

(4) Please keep the inverter clean and avoid the intrusion of moisture

(5)During the examination and repair process, do not allocate the flat cables mistakenly, otherwise, it shall cause the shutdown or damages to the inverter.

8-3 Regular checking items

Check items	Check contents	Countermeasures
Install segment, screw and plug in	Whether the spare parts are loose or not	Screw down
Radiation fin	If there are any dust piles	Dry compressed air (4-6kg cm) blow off
Cooling fan	If there are any unusual sounds or vibration, and if the accumulated working time is more than 20000 hours	Replace
Circuit board	Whether there are some piles of dust and rust or not	Dry compressed air (4-6kg cm) blow off or contact experts
Electrolytic capacitor	If it is in abnormal condition, such as color change, foreign odor and plumping up	Replace
Motor	If the vibration and heating up of it are normal and if it has noises or foreign odor	Overhaul or replace

8-4 Regularly replacement

The inverter is composed of many components. According to the conditions of usage, some parts should be maintained and repaired to ensure the normal running of the inverter; and according to the life-span of the components, some of them must be replaced regularly to ensure the steady and long-term operation of the inverter. Please refer to the following table for the reference time of replacing some of the components.

Name of component	Replace cycle	Disposal scheme
Cooling fan	Three to five years	Replace (decide after check)
Electrolytic capacitor	Five years	Replace (decide after check)
Fuse	Ten years	Replace (decide after check)
Relay		Decide after check

The replace cycle of the above components is calculated under the following operational environments:

(1) The annual average ambient environment is 30℃, and make sure that there are no corrosive gas, combustible gas, dust and water drops and etc in the environment;

(2) The load factor is bellow 80%;

(3) The average working hour is bellow 12

8-5 Protective information, fault diagnosis and remove

HC1-C+ series inverter has perfect protective functions, such as under-voltage, over-voltage, over-current, over-load, overheating, short circuit to earth and inter-phase short circuit; when the inverter go wrong, there must be some reasons for it, so please investigate the causes and eliminate all the troubles and then restart the inverter. Please contact our company if you have some any problems.

Fault code	Fault contents	Fault reason	Solution
OC1/ UC1	Over current in accelerating	1: The acceleration time is too short 2: The curve configuration of V/F is improper 3:Motor and motor wire short circuit to earth 4: The setting value of torque lifting is too large 5: The voltage of the electric grid is too low 6:Direct start-up of the motor during over-run process	1: Prolong the acceleration time 2:Set the V/F curve correct 3:Check the insulation conditions of the motor and motor wires 4:Decrease the setting value of the torque lifting 5: Check the condition of electric grid 6: Check loads 7: Set up tracking startup

Fault code	Fault contents	Fault reason	Solution
OC1/ UC1	Over current in accelerating	7:The configuration of the inverter is not qualified 8: The inverter goes wrong	8: Increase the capacitance of the inverter 9: Send for repair
0C3/ UC3	Over current in running	1: The insulation of motor and its output line is not well 2: The fluctuation of load is large or there is slight block phenomenon 3: The electric grid has fluctuation and its voltage is low 4:The capacitance configuration of the inverter is improper 5: If there are any high-power motors started in the system which may cause the voltage decrease of the electric grid 6: If there are any interference sources that may interfere the inverter	1: Check the insulation condition of the motor and its output line 2: Check the load condition to see if there are any block and bad lubrication phenomenon 3: Check the voltage of the electric grid 4: The capacitance of the inverter is a little small, so increase the capacitance 5: Increase the capacitance of the transformer 6: Deal with the interference sources
OC2/ UC2	Over current in decelerating	1: The deceleration time is too short 2: The capacitance configuration of the inverter is improper 3: If there are any interference sources	1: Prolong the deceleration time 2: Increase the capacitance of the inverter 3: Deal with the interference sources
OC2/ UC2	Over current in decelerating	1: Two short deceleration time 2: Capacitance configuration of the inverter is improper 3: If there are any interference sources	1: Prolong the deceleration time 2: Increase the capacitance of the inverter 3: Deal with the interference sources
0C0/ UCO	Over current in shutdown	1: The inverter goes wrong	1: Contact someone for repair

Fault code	Fault contents	Fault reason	Solution
OU0	Over voltage in shutdown	1: Two short deceleration time 2: Capacitance configuration of the inverter is improper 3: If there are any interference sources	1: Check the power supply voltage 2: Send for repair
OU1	Over voltage in accelerating	1: Power supply is abnormal 2: The configuration of the peripheral circuit is improper (such as, use air break switch to control the startup and shutdown of the inverter) 3:The inverter goes wrong	1:Check the power supply voltage 2:Do not use the air break switch of the power supply to control the start-up of the inverter 3: Send for repair.
OU3	Over voltage of the inverter during running	1: The power supply voltage is abnormal 2: There are energy feedback loads 3: The configuration of the braking resistance is improper	1: Check the power supply voltage 2: Install braking units and braking resistance 3: Re-confirm the configuration of the resistance
OU2	Over voltage during decelerating	1: Two short deceleration time 2: The power supply voltage is abnormal 3: The load inertia is large 4: The configuration of the braking resistance is improper 5: The configuration of the braking parameter is improper	1: Prolong deceleration time 2: Check the power supply condition 3: Install braking units and braking resistance 4:Reconfigure the braking resistance 5: Configure the parameter correct, such as the actuating voltage of the braking pipe
LU0	Low voltage and under voltage in standby	1: The power supply voltage is abnormal 2: Default phase	1: Check the power supply voltage 2: Check the power supply and air break switch if they are lack of phase

Fault code	Fault contents	Fault reason	Solution
LU1 LU3 LU2	Low voltage in accelerating, running, or decelerating	1: The power supply voltage is abnormal 2: Default phase 3:There is heavy load startup inside the electric grid	1: Check the power supply voltage 2: Check the external configuration if there are default phases which are caused by poor contacts 3: Please use the separate power supply Solution
OL0 OL1 OL2 OL3	The inverter is overload Type A inverter: 150% 60S	1: The load is heavy 2: Too short acceleration time 3:The torque lifting is too large 4: The configuration of V/F curve is improper 5 : The voltage of the electric grid is too low 6: Start the inverter directly when the motor is not stopped 7: the load has fluctuations or block phenomenon	1: Reduce the loads or replace the inverter with larger capacitance 2: Prolong acceleration time 3: Reduce the torque lifting 4: Reconfigure the V/F curve 5: Check the voltage of the electric grid and increase the capacitance of the inverter 6: Adopt tracking start-up method 7: Check the load condition
OTO Not running Over torque of motor OT1 In accelerating OT2 In Deceleration process OT3 Running	Motor overload	1: The load is too large 2: Too short acceleration time 3: The configuration of protective level of motor is too small 4: The configuration of V/F curve is improper 5: The torque lifting is too large 6: The insulation of the motor is not very well 7: The configuration of the motor is too small	1: Reduce the loads 2: Prolong the acceleration time 3: Enlarge the protective level 4: Configure the V/F curve properly 5: Reduce the setting value of the torque lifting 6: Check the insulation condition of the motor and replace the motor 7: Choose larger inverter and motor

Fault code	Fault contents	Fault reason	Solution
OH0 Not running OH1 In accelerating OH2 In decelerating OH3 Running	Inverter is over heating	1:The cooling fan is damaged 2: The air channel of The radiator is jammed 3: The environmental temperature is too high 4: The ventilation environment for the inverter is not well 5: The installation space for the inverter is too small or its installation position is improper	1: Replace the cooling fan 2:Clean the air channel of the radiator 3: Improve the ventilation condition and reduce the carrier wave frequency 4: Improve the ventilation condition. 5:Change the installation position and improve the ventilation condition
ES	Emergency shutdown	1: The inverter is on emergency shutdown condition	1: Start the inverter as per the initial start-up procedure after all emergencies were removed
CO	Communication goes wrong	1: Bad connection of the communication wire 2: Improper setting of the communication parameter 3: The data transfer format is wrong	1:Check the connecting wires 2:Reconfigure the parameters 3:Check the data transfer format
20	4-20mA wire break	1: The terminal is loose and the contact of the input signal wire is not well	1: Check the connecting wire and link the break wires
Pr	Parameter is configured wrong	1: The setting of the parameter is wrong	1: Set the Parameter correct
Err	Wrong parameter groups	1: The parameter does not exist or the parameter is set up by the factory	1: Quit the setting of this parameter

8-6 Remove regular error

(1) The parameters cannot be set up

Reasons and disposal scheme:

a: Parameter locking, set up P118 as 0, unlock, and then set up other parameters

b: The communication of the operator is abnormal, refit the exerciser and check the connecting wire to see if there are any line breaking conditions

c: This parameter cannot be set up during the running of the inverter, please set up the parameter during shutdown process

(2) Press the running button(external control), the motor does not rotate

Reasons and disposal scheme

a: The setting up of the running mode is wrong, check the P102 to see if it is set up as 1

b: The frequency instruction is not given or the given frequency is smaller than the startup frequency

c: The external connecting wire is wrong, please check it

d: The definition of the inverter input terminal is wrong, and it also doesn't match along with the external connecting wire, please check the parameters of P315-P322

e: The startup button goes wrong and the control wire has breaks, please check the control wire and button

f: The inverter is in protective condition and hasn't been restored, please restore the inverter first and then start it.

g: The motor wires have not been connected or miss phase, please check the connecting wire of the motor.

h: The motor goes wrong, check the motor to see if it has troubles.

I: The inverter goes wrong, check the inverter to see if it has troubles.

(3) The motor is over-heating Reasons and disposal scheme

a: The environmental temperature is too high, please improve the environment and atmospheric conditions to reduce the environment temperature.

Bathe load is too large and the actual load has exceeded the rated torque of the motor, please increase the capacitance of the motor
c: The insulation of the motor declines, please replace the motor.
d: The distance between the inverter and the motor is too long, please reduce the distance and refit the alternating current reactor
e: The voltage endurance of the motor inter-phase is not enough, and the switch action of the inverter can make the coil winding of the motor produce surge voltage. Generally speaking, the maximum surge voltage can reach three times of the input power voltage of the inverter, so special motor is recommended for you.
f: The motor runs in low-speed condition, please change speed reducing ratio and make it run at higher rotating speed.
(4) The motor has vibration or unusual sounds
Reasons and disposal scheme
1) The motor has block and bad lubrication phenomenon; please check the load of the machinery
2) The motor resonance phenomenon, please adjust the carrier wave, change speed reducing ratio and avoid resonance frequency as well as refit anti-vibration gasket.
(5) The motor cannot reverse
Reasons and disposal scheme
1) The reversion of the motor is prohibited, please relieve the reversion
(6) The rotation direction of the motor is reverse Reasons and disposal scheme
1) Exchange any two of the output terminals U, V, W of the inverter
2)The running control signal is reverse, if it is originally rotated forward, now it can be set up backward rotated
(7) The startup of the inverter can interrupt other devices Reasons and disposal scheme
Reason: interference of the inverter:
Schemes:

a: Reduce the carrier wave frequency
b: Fit filter at the power input end of the inverter
c: Fit filter at the power output side of the inverter
d: Let the inverter and motor correctly grounded
e: Lay the major loop lines and other signal lines separately
f: The control line should adopt shielded line and cover the metal tubes on the cables
g: Install magnet ring at the lead-in line side and lead-out line side

8-7 Interference solution

The common interference conditions have two types: the first type is inverter's interference to other devices and instruments, and please refer to the specifications in the item (7) of 8-6; the other type is interferences to inverter, which cause the improper operation of the inverter. The occurrence of the interference must have interference source and channel. The interference channel of the inverter is consistent with that of ordinary electromagnetism and is mainly divided into three parts: electromagnetic radiation, conduction and inductive coupling.

(1) Electromagnetic radiation
The electromagnetic radiation to the surrounding electronic equipments can be solved through shielding.
(2) Conduction
The interference source makes the direct-driven motor produce electromagnetic noise which can conduct and disturb the power supply and conduct to other equipments through electric grid. Wave filtering can be adopted to solve the problem.
(3) Inductive coupling
Two adjacent circuits together can produce inductive coupling which can produce interference voltage and current and then form interference source.
Solutions to the interferences

(1) Separation

Separate the interference source and the parts which can be easily interfered from the circuits. Induct meter is a strong interference source, which has been specified in the instructions for inverter. Induct meter and inverter should not use the same power supply.

(2) Wave filtering

The setting of wave filtering use to inhibit the interfering signal from conducting and disturbing the power supply and motor by power supply line through the inverter. Particular way is: install filter, reactor and magnet ring at the input and output side.

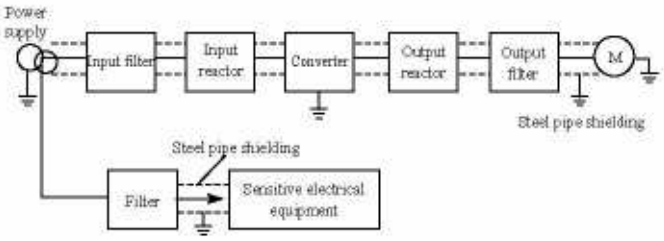
(3) Shielding

In general condition, the inverter adopts iron case for shielding to avoid the leakage of the electromagnetic interference; the output line adopts steel pipe for shielding; the control line adopts shielding line; and align the power supply lines and control lines separately.

(4) Grounding

Good grounding can, to a largest extent, prevent the intrusion of external interferences, control internal coupling and improve the capacity of resisting interference of the system.

The diagram bellow shows the measures adopted for resisting the interferences of the rotational system of the inverter:



Chapter 9 External fittings selection

9-1 Applicability of external fittings

Name	For general use
Leakage switch	Protect connection of the inverter for convenience, installation and maintenance
Electromagnetic contactor	Guarantee switching power supply of inverter from damage.
Surge absorber	Absorb surge electric currency from electromagnetic contact and relay
Isolation transformer	Insulate input and output of the inverter for reducing disturbance
Alternating current reactor	To protect the inverter and restrain high frequency wave and prevent surge voltage impact.
Braking resistance and braking units	Absorb regenerated energy
Noise wave filter	Reduce the electromagnetic interference from the inverter
Magnetic loop	Reduce the electromagnetic interference from the inverter

Calculation of braking resistance:

The braking resistance value is related to the direct current voltage during the braking of the inverter. For the power grade of the 380 V, the direct current voltage is 800V-820V during braking process; and for the power grade of 220 V, the direct current voltage is 400V.

In addition, the braking resistance is related to the braking torque Mbr%. Different barking torque has different braking resistance value. And the calculation formula is as follows:

$$R=\frac{Udc \times \%}{P \times Mbr\% \times \eta(FC) \times \eta(Motor)}$$

Including: Udc ---braking direct current voltage

Pm ---motor power

Mbr ---braking torque

η motor--- electrical efficiency

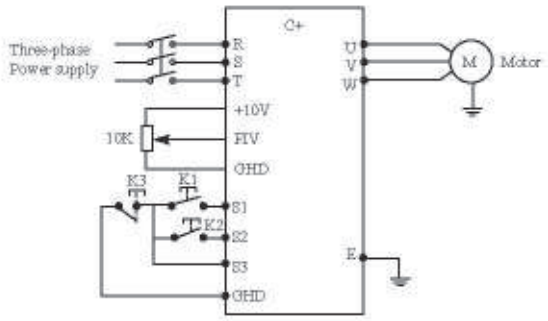
η inverter---efficiency of the inverter

The brake power is related to the braking torque and braking frequency. According to the above table, the braking torque is 125% and the frequency is 10%. Because the load condition is different, the data in the table is just for refe rence.

Appendix I Simple application examples

I. Use external terminals (three-wire system) to control the running of the inverter, use the external terminals forward and reverse switch and use potentiometer to control the frequency of the inverter.

a: Basic patch diagram:



b: Parameter setting and instructions:

P101=1 setting method of analog quantity voltage
(external terminal potentiometer)

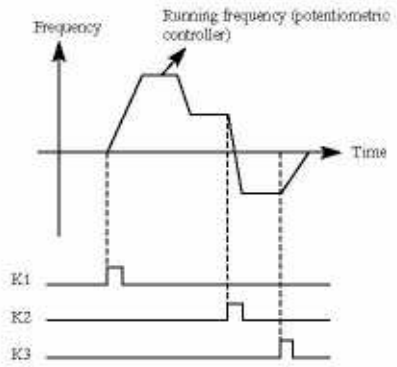
P 102=1 External terminal control

P 317=6 Define S1 terminal as forward rotation

P 318=7 Define S2 terminal as reverse rotation

P 319=8 Define S3 terminal as shutdown

c: action specifications



K1 Forward rotation

K2 Forward rotation

K3 Shutdown

Running frequency, potentiometer controller

Inverter	Braking resistance		Braking unit	Braking torque	Motor equipped
	Power W	Built-in Ω			
HC1C00D4BK	80	200	Built-in	125	0.4
HC1C0D75BK	100	100	Built-in	125	0.75
HC1C01D5BK	300	70	Built-in	125	1.5

Data address: function description of 2000H and 2001H

Data address	Bit address	Contents	Read / write
2000H	BIT0 ~ BIT1	00B: No operation 01B: Shutdown 10B: Start-up 11B: JOG Start-up	Write
	BIT2 ~ BIT3	00B: No operation 01B: Reverse-direction instruction 10B: Forward direction instruction 11B: Change direction	Write
	BIT4	0B: No operation 1B: Fault reset	Write
	BIT5 ~ BIT15	Retain	
2001H	BIT0 ~ BIT15	Communication frequency instruction 0~400.0 Two decimal points (P101=5 only this data is effective)	Write

Take ASCII mode as example:

Set first: P101 = 5 (frequency source);

P102 = 2(control method);

P700 = 1(baud rate 9600);

P701= 0 (8N1 FOR ASCII)

P702= 1 (address)

1. Set up frequency:

Write 50.0HZ (1F4H) for 2001H unit

HEX which receives characters: 3A 30 31 30 36 32 30 30 31 30 31 46 34 E3 43 0D 0A

2. Give running instructions

Write 02H for 2000H unit

Send characters: ":010620000002 D7"CR LF

HEX which sends characters: 3A 30 31 30 36 32 30 30 30 30 30 32 44 37 0D 0A

HEX which receives characters: 3A 30 31 30 36 32 30 30 30 30 30 30 32 44 37 0D 0A

3. Give stop instruction
Write 01H for 2000H unit
Send characters: "010620000001 D8"CR LF
HEX which sends characters: 3A 30 31 30 36 32 30 30 30 30 30 30 31 44 38 0D 0A
HEX which receives characters: 3A 30 31 30 36 32 30 30 30 30 30 30 31 44 38 0D 0A
Including the calculation reference specification LRC of "44 38"
Examples of RTU mode:
Set first: P101 = 5 (frequency source)
P102 = 2(control method);
P700 = 1(baud rate 9600);
P701= 0 (8N1 FOR ASCII)
P702= 1 (address)
Control with RTU method:
1. Set frequency first:
Write 50.0HZ (1F4H) for 2001H unit
Send: 01 06 2001 01 F4 CRCL CRCH
2. Give running instruction
Write 02H for 2000 H unit
Send: 06 2000 00 02 CRCL CRCH
3. Give stopping instruction
Write 01H for 2000H unit
Send: 06 2000 00 02 CRCL CRCH
Set acceleration time F1.07=20.0S
Write 200 (C8H) for 107(6BH)
Send: 01 06 00 6B 00 C8 CRCL CRCH

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