Thank you for using H3000 series multifunctional, high performance, universal frequency converter made by Hui Ling Automatic Equipment Co. Ltd.

In order to make full use of the converter's functions and ensure user safety, please read this instruction carefully before installing, operating, maintaining and checking the converter.

This instruction divides safety cautions into Danger and Warning, please pay special attention to the symbols "Danger" and "Warning" and their relevant contents.

The symbol "Danger" indicates incorrect operations, which can cause death or serious injury to personnel.

The symbol "Warning" indicates incorrect operations, which can cause personnel injury or the converter and mechanical system fault, as determined by different situations, the caution affairs may lead to serious consequence.

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

Please notice that this operation instruction shall be delivered to the end user, and be kept appropriately for further use of inspecting and maintaining.

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

Table of Contents

Chapter 1 Safety Cautions

1-1 Verification on receiving

⚠ Warning

All the products have gone through strictly checking and testing before delivery, but because of transportation, please verify:

- Whether the converter is distorted or damaged during transportation, don not install the damaged converter, and it may cause personnel injury, please inform our agent in time.
- Whether the package is integrated, accessories and user's instruction are contained, especially the user's instruction and guarantee card, please keep them appropriately for further maintenance reference.
- Whether the product is the one ordered, and whether there are any unusual phenomena inside and outside the converter.

1-2 Moving and installation

⚠ Warning

- When moving the product, please use proper moving tools to prevent the converter damaging.
- When moving the converter, please fasten the converter's bottom, directly holding the cover plate may lead to dropping and cause personnel injury or converter damage.
- Please do not install the converter to a combustible substance, directly installing the convert to the combustible substance or near to combustible material may cause fire accident.
- Please verify whether the installation direction of the converter is correct.
- Please choose a safe location to install the converter, and the operation environment is shown as follows.

Ambient temperature: - 10 -40 〈non-freezing〉.

Ambient humidity: max. 95% relative humidity 〈non-condensing〉

Ambient environment: indoors,〈no corrosive gases, combustible gases, oil mists and dust allowed, free from direct sunlight〉.

Altitude: lower than 1000m〈deration is needed above 1000m〉

Vibration: max. 0.5G

- Please make sure that the mounted substance can carry the converter's weight and prevent it from falling, and make sure that the installation site is safe and reliable. Do not allow children and unauthorized personnel to approach the converter.
- Please make sure that the screws are fixed, fastened and locked firmly in accordance with the stipulations of the user's instruction, to prevent the convert falling.
- During installation, prevent screws, wire pieces and other electricity conductive material entering the converter, otherwise the converter may be damaged, or a serious accident may take place.
- If two and more converters are installed in one control cabinet, please install them according to the instructions in the user's instruction, and it is required to keep enough space and install extra cooling fans to keep the air in the cabinet flowing freely to keep the temperature inside the cabinet lower than 40 . Overheating may cause converter fault, fire or other accidents. +
- The converter shall be installed by professional personnel.

1-3 Wire laying, wire connecting

▲ Warning

- Please do not damage the wires, to let the wires bear weight or be clamped may damage the wires and cause an electric shock.
- Do not install the phase-shifting capacitor, surge absorber or radio noise filter to the converter's output terminal, otherwise it may cause the converter fault.
- Do not install switch devices like the air switch and contactor to the output terminal of the converter, if it is for technology demand, please ensure that the converter does not have output during switch.
- Please lay the power wire and pilot wire separately to prevent interference.

Danger

- Please ensure that the power is turned off before connecting wires.
- The wiring work shall be done by qualified electricians.
- Please lay the wires in accordance with the specifications stipulated in the user's instruction.

- The grounding connection shall be done correctly and in accordance with relative regulations in the user's instruction, otherwise it may cause an electric shock or fire.
- Please use independent power supply for the converter; never use the same power supply with strong interference equipment like electric welder.
- Please do not touch the bottom plate with wet hand; otherwise you may get an electric shock.
- Please do not directly touch the terminals, do not connect the converter's input, output cables to the cover panel, otherwise you may get an electric shock.
- Please make sure that the voltage of the power supply and the voltage of the converter are same, otherwise it may cause the converter fault or personnel injury.
- Please make sure that the power supply are connected to the R·S·T terminal not to the U.V.W terminal, otherwise it may cause the converter's internal fault.
- Please do not conduct pressure resistance test to the converter, otherwise it may cause the converter's internal fault.
- Please install accessories as brake units, brake resistors in accordance with the regulations of the user's instruction; otherwise it may cause the converter fault or fire.
- Please ensure that the screws of the terminals are firmly locked, otherwise it may cause the converter fault.

1-4 Power-on, commissioning

▲ Warning

- Please ensure that the front cover is installed before the power is turned on, during the power transmission, please do not remove the cover.
- Please ensure that the power cables and signal cables are connected correctly, otherwise it may cause the converter damage.
- Please ensure all the parameters are set correctly before commissioning.
- Before commissioning, please ensure it can not cause machine damage to start up the equipment, it is recommended to undertake test runs with idle load.
- Please provide an emergency stop switch when the stop function setting is ineffective.
- Do not use electromagnetic contactor to start up and shut down the converter, otherwise it may affect the converter's service life.

Danger

- When fault restart function is set, please do not approach the equipment, because the equipment may automatically restart after the running stops.

- Please verify the use range of motors and machines, exceeding their use range can cause motor and machine fault.
- Please do not change the converter's parameter settings randomly during running.
- Please do not touch the heat sink and brake resistor, otherwise you may get burned.
- Do not use a wet hand to touch bottom plate to operate switches and keys; otherwise you may get an electric shock or injury.
- Please do not connect or remove the motor during the converter's running, otherwise it may cause converter protection or fault.

1-5 Check and maintenance

⚠ Warning

- Please ensure that the power is turned off and the power indicating light is off before checking and maintaining, otherwise, you may get an electric shock.
- Before checking and maintaining, in order to prevent the converter from damage caused by static electricity, please touch a nearby metal substance with your hand to eliminate the static electricity.
- Please do not use megohmmeter (insulation resistance) to test the control circuit of the converter.

Danger

- Only authorized professional personnel can undertake the checking, maintenance and replacement of the components, no other persons are allowed.
- Please undertake the checking, maintenance and replacement of the components according to the appointed methods in the user's instruction, strictly prohibit modifying by your own idea, if you do so, you may get an electric shock and injury or the converter may get damaged.

1-6 Exception Handling

Danger

- When the converter protection is turned on, please follow fault displays of the converter, to find out causes and eliminate the fault, then reset the converter, restart it, if the existing fault is not eliminate, to reset and restart the converter can cause a converter or mechanical fault.

- When the converter fault occurs, please do not deal with it by your own, and contact our company and our dealer.

1-7 Scrapping Handling

⚠ Warning

After the converter is scrapped, please dispose it as industrial rubbish, do not burn it.

Chapter 2 Product Introduction

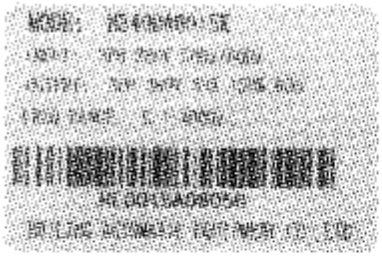
2-1 Unpacking inspection

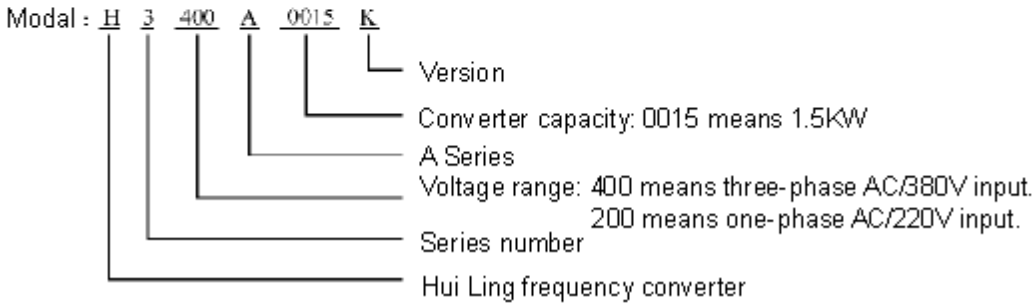
Upon unpacking, please confirm the following:

- Check whether the model and product of the converter are in accordance with your order.
- Check whether the converter is damaged and relevant accessories are complete.

If any missing or unconformity occurs, please contact the supplier.

2-2 Frequency converter model description





2-3 Product specifications

Items		H3000A
Input	Rated voltage, frequency	Three-phase 380V 50/60Hz; one-phase 220V 50/60Hz
	Allowed voltage range	380V: 330~440V; one-phase 220V: 170V~240V
Output	Voltage	380V: 0~380V; one-phase 220V: 0~220V
	Frequency	0.10~400.0Hz
Control mode		Space vector, V/F control
Display		Five-digit nixie tube display, indicator light display; displaying setup frequency, output frequency, output current, DC bus voltage, module temperature, running state, fault
Control characteristics	Output frequency range	0.10Hz~400.00Hz
	Frequency setup definition	Digital setting: 0.01 Hz, analog setup: 0.1% of maximum output frequency
	Output frequency accuracy	0.01Hz
	V/F control	Discretionarily setting V/F curve to meet various load requirements.
	Torque control	Automatic self-lifting: to determine the torque lifting automatically according to the load condition; instruction-lifting: 0.0~20.0% torque lifting can be set.
	Multifunctional input terminal	Eight multifunctional input terminals, realizing functions as 15 section speed control, program running, 4-section speed-up/speed-down switch, UP/DOWN function, and emergency stop
	Multifunctional output terminal	Three multifunctional output terminals, realizing functions as indicating running, zero speed, external abnormity and program running, and alarm output
	Acceleration/deceleration time setup	0~600s acceleration/deceleration time can be respectively set.
Other functions	PID control	Internal PID control
	RS485	Standard RS485 communication function (MODBUS)
	Frequency setup	Analog value 0~10V, 0~20mA, manipulator direct setup, determined by RS485 and determined by up/down
	Multi-section	Eight multifunctional input terminals, 15 section speed can be set
	Automatic voltage regulation	Selecting automatic voltage regulation function if needed
	Counter	A pair of internal counters

Items		H3000A
Protection function	Overload protection	Constant torque 150% 1 minute, blowing machine 120% 1 minute
	Over voltage protection	Over voltage protection can be set.
	Under voltage protection	Under voltage protection can be set.
	Other protections	Overheat protection, short-circuit protection, over current protection and parameter lock
Environment	Environment temperature	-10 to 40 (non-freezing)
	Environment humidity	Max. 95% (non-condensing)
	Altitude	Lower than 1000m
	Vibration	Max. 0.5G
Structure	Cooling	Forced air cooling
	Protection level	IP 20
Installation	Mode	Below 132KW wall mounted 110, 132, 160KW wall mounted or in cabinet Above 160KW in cabinet

2-4 Product series models

Model	Input	Output power	Capacity KVA	Output current (A)	Overload capacity (60s) (A)	Applicable motor KW
H3200A00D4K	One and three phase 220V·50/60Hz	0.4	1.0	2.5	3.75	0.4
H3200A0D75K	One and three phase 220V·50/60Hz	0.75	2.0	5.0	7.5	0.75
H3200A01D5K	One and three phase 220V·50/60Hz	1.5	2.8	7.0	10.5	1.5
H3200A02D2K	One and three phase 220V·50/60Hz	2.2	4.5	11	16.5	2.2
H3400A0D75K	Three-phase 380V·50/60Hz	0.75	2.2	2.7	4.05	0.75
H3400A01D5K	Three-phase 380V·50/60Hz	1.5	3.2	4.0	6	1.5
H3400A02D2K	Three-phase 380V·50/60Hz	2.2	4.0	5.0	7.5	2.2
H3400A03D7K	Three-phase 380V·50/60Hz	3.7	6.8	8.6	12.9	3.7
H3400A05D5K	Three-phase 380V·50/60Hz	5.5	10	12.5	18.75	5.5
H3400P07D5K		7.5	14	17.5	21	7.5

Model	Input	Output power	Capacity KVA	Output current (A)	Overload capacity (60s) (A)	Applicable motor KW
H3400A07D5K	Three-phase 380V·50/60Hz	7.5	14	17.5	26.25	7.5
H3400P0011K		11	19	24	28.8	11
H3400A0011K	Three-phase 380V·50/60Hz	11	19	24	36	11
H3400P0015K		15	26	30	36	15
H3400A0015K	Three-phase 380V·50/60Hz	15	26	30	45	15
H3400P0018K		18.5	32	40	48	18.5
H3400A0018K	Three-phase 380V·50/60Hz	18.5	32	40	60	18.5
H3400P0022K		22	37	47	56.4	22
H3400A0022K	Three-phase 380V·50/60Hz	22	37	47	70.5	22
H3400P0030K		30	52	65	78	30
H3400A0030K	Three-phase 380V·50/60Hz	30	52	65	97.5	30
H3400P0037K		37	64	80	96	37
H3400A0037K	Three-phase 380V·50/60Hz	37	64	80	120	37
H3400P0045K		45	72	90	108	45
H3400A0045K	Three-phase 380V·50/60Hz	45	72	90	135	45
H3400P0055K		55	84	110	132	55
H3400A0055K	Three-phase 380V·50/60Hz	55	84	110	165	55
H3400P0075K		75	115	152	182.4	75
H3400A0075K	Three-phase 380V·50/60Hz	75	115	152	228	75
H3400P0090K		90	135	176	211.2	90
H3400A0090K	Three-phase 380V·50/60Hz	90	135	176	264	90
H3400P0110K		110	160	210	252	110
H3400A0110K	Three-phase 380V·50/60Hz	110	160	210	315	110
H3400P0132K		132	193	255	306	132
H3400A0132K	Three-phase 380V·50/60Hz	132	193	255	382.5	132
H3400P0160K		160	230	305	366	160
H3400A0160K	Three-phase 380V·50/60Hz	160	230	305	457.5	160
H3400P0185K		185	260	340	408	185
H3400A0185K	Three-phase 380V·50/60Hz	185	260	340	510	185
H3400P0200K		200	290	380	456	200

Model	Input	Output power	Capacity KVA	Output current (A)	Overload capacity (60s) (A)	Applicable motor KW
H3400A0200K	Three-phase 380V·50/60Hz	200	290	380	570	200
H3400P0220K		200	320	425	510	200
H3400A0220K	Three-phase 380V·50/60Hz	220	320	425	637.5	220
H3400P0250K		250	365	480	576	220
H3400A0250K	Three-phase 380V·50/60Hz	250	365	480	720	250
H3400P0280K		280	427	560	672	280
H3400A0280K	Three-phase 380V·50/60Hz	280	427	560	840	280
H3400P0300K		300	450	580	672	300
H3400A0300K	Three-phase 380V·50/60Hz	300	450	580	870	300
H3400P0315K		315	460	605	726	315
H3400A0315K	Three-phase 380V·50/60Hz	315	460	605	726	315

2-5 Product storage

The frequency converter must be put in the packaging box before installation, if the converter is not used for the moment, during the storage, please pay attention that:

The product must be placed in a location that is dry and without any dust and dirt.

The relative humidity of the environment is within 0~95%, and without condensing.

The storage temperature of the environment must be within the range of -26 to +65 .

There are no corrosive gases and liquids in the storage environment, and the product is free from direct sunlight.

It is better not to store the converter for a long time, long term storage can lead to the deterioration of the electrolytic capacitor, if it is necessary to store the converter for a long time, please notice that make sure the converter is electrified at least once no less than 5 hours per year, upon operation, to use voltage regulator to input current, the voltage increases gradually to the rated voltage.

Chapter 3 Installation of the Frequency Converter

3-1 Installation environment and requirements

The installation environment of the converter has direct effect on the converter's service life and its usage of normal functions, if the converter is used in an environment that does not accord with the allowed range of the operation instruction, and it may lead to the converter protection or fault.

H3000A series converter shall be mounted on the wall, please install it vertically to promote air convection, cooling effect.

About the converter's installation environment, please ensure it is in accordance with

(1) Environment temperature from -10 to +40

(2) Environment humidity 0~95% without condensing

(3) Free from direct sunlight

(4) The environment does not contain corrosive gases and liquids

(5) The environment does not contain dust, floating fiber, floc and metal dust.

(6) Far away from radioactive materials and combustible substances

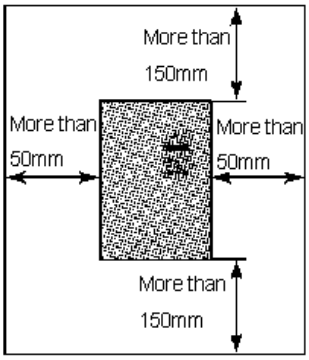
(7) Far away from electromagnetic interference sources (as welder, high-powered machines)

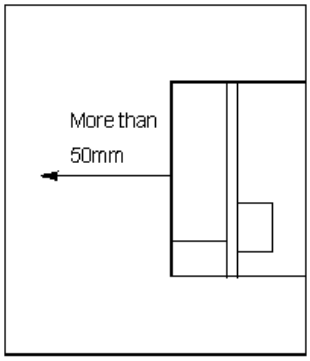
(8) The installation surface shall be firm, without vibration, the vibration can not be avoided, please add anti-vibration spacer to reduce vibration.

(9) Please install the converter to a location where it is good for ventilation, inspection and maintenance, and to the solid incombustible substance and apart from heating unit (as brake resistor).

(10) Preserve enough space for converter installation, especially for multiple converters installation, please pay attention to the laying position of the converter, and install an extra cooling fan to keep the environment temperature lower than 45 .

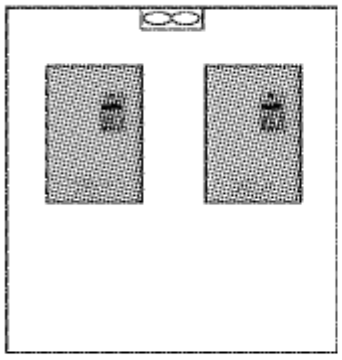
Single frequency converter installation



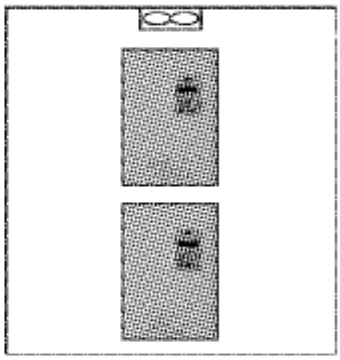


Multiple converters installed in one control cabinet.

Please pay attention: When installed, the converters shall be placed in parallel

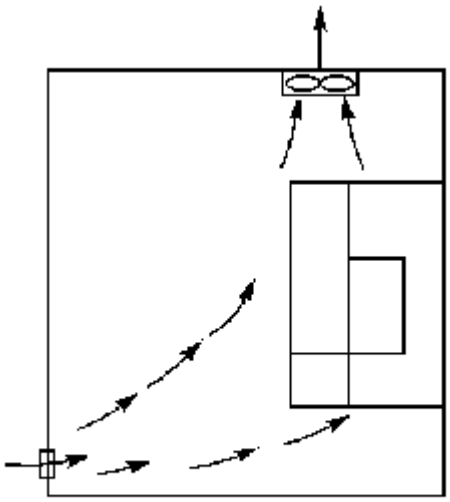


Favorable placing

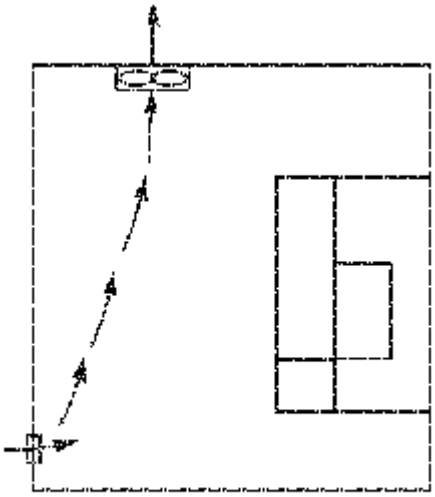


Unfavorable placing

If multiple converters are installed in one control cabinet, please make sure that there is enough space, and meanwhile the air convection in the cabinet and the installation of the cooling fun.

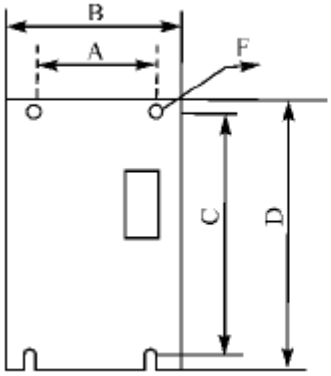


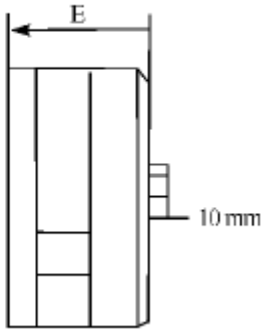
Correct installation position of the fan

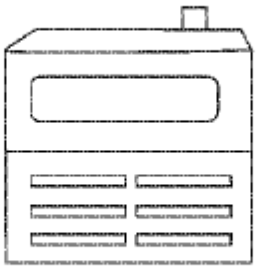


Incorrect installation position of the fan

3-2 The outline of the converter and installation size







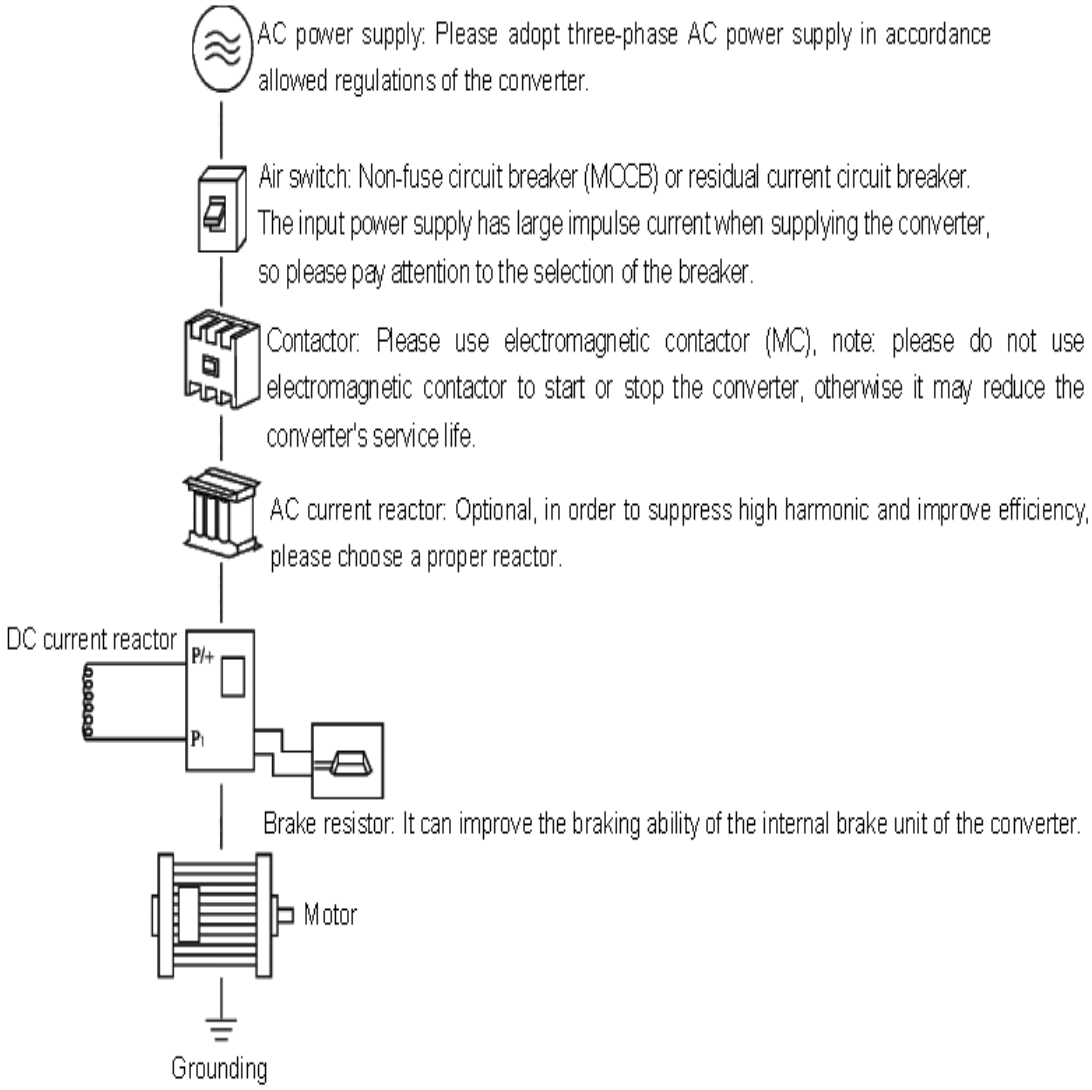
Unit: mm

Model	A	B	C	D	E	F
H3400A0D75K	105	120	208	225	149	5
H3400A01D5K	105	120	208	225	149	5
H3400A02D2K	105	120	208	225	149	5
H3400A03D7K	105	120	208	225	149	5
H3400A05D5K/P07D5K	213	228	330	347	196	6
H3400A07D5K/P0011K	213	228	330	347	196	6
H3400A0011K/P0015K	213	228	330	347	196	6
H3400A0015K/P0018K	213	228	330	347	196	6
H3400A0018K/P0022K	147	250	460	480	246	9
H3400A0022K/P0030K	147	250	460	480	246	9
H3400A0030K/P0037K	197	310	482	500	260	9
H3400A0037K/P0045K	197	310	482	500	260	9
H3400A0045K/P0055K	240	360	620	650	280	9
H3400A0055K/P0075K	240	360	620	650	280	9
H3400A0075K/P0090K	260	420	775	800	334	11
H3400A0090K/P0110K	260	420	775	800	334	11
H3400A0110K/P0132K	360	552	840	875	410	13
H3400A0132K/P0160K	360	552	840	875	410	13
H3400A0160K/P0185K	360	552	840	875	410	13

Chapter 4 Wiring

The wiring of the frequency converter can be divided into main loop and control loop.

4-1 Main loop wiring



4-1-1 External components description

(1) AC power supply

Please supply power with the appointed power supply in the operation instruction.

(2) Non-fuse circuit breaker: (MCCB)

When the power supply voltage is low or the input terminal short circuit occurs, the breaker can provide protection, during inspection, maintenance or the converter is not running, you can cut off the breaker to separate the converter from the power supply.

(3) Electromagnetic contractor

The contractor can turn on and turn off the power of the converter to ensure safety.

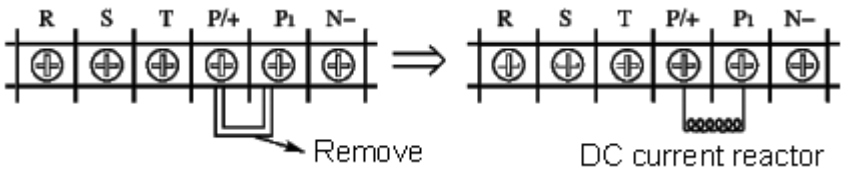
(4) AC current reactor

a: The reactor can suppress high harmonic to protect the converter.

b: To improve the power efficiency.

(5) DC current reactor

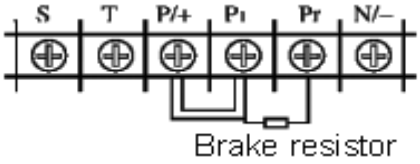
The DC current reactor has the same function as AC current reactor, please in advance remove the connecting sheet between P1 and P/+, shown as following figures:



(6) Brake resistor

When the motor is in brake state, the resistor can avoid DC loop high voltage of the converter, and improve the braking ability of the internal brake unit.

In H3000A series, below 11KW (including 11KW) the brake unit is internal, 15KW has two models, one with internal brake unit and the other without brake unit, when you order the product please confirm it, the figure of the brake resistor connection:



To select the brake resistor, please refer to section 2, chapter 9: Brake resistor configuration.

4-1-2 Main loop wiring notices

(1) Specifications of the circuit in wiring shall be in accordance with the regulations of electrical code;

(2) Please do not connect the AC to the output terminal (u, v, w) of the converter; otherwise it may cause the converter damage;

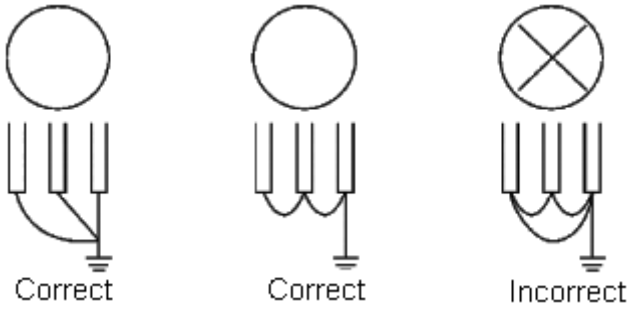
(3) Please use shielding cable and conduit, and connect the two ends of the shielding layer or conduit to ground;

(4) The converter's grounding shall not share with the welder, high-powered motor or high current load, please connect it to the ground independently;

(5) Please adopt a third way to connect the grounding terminal E⏚ to the ground (the grounding impedance is lower than 100);

(6) Please use the grounding cable according to the regulations of the electric equipment technology, the shorter of the cable the better;

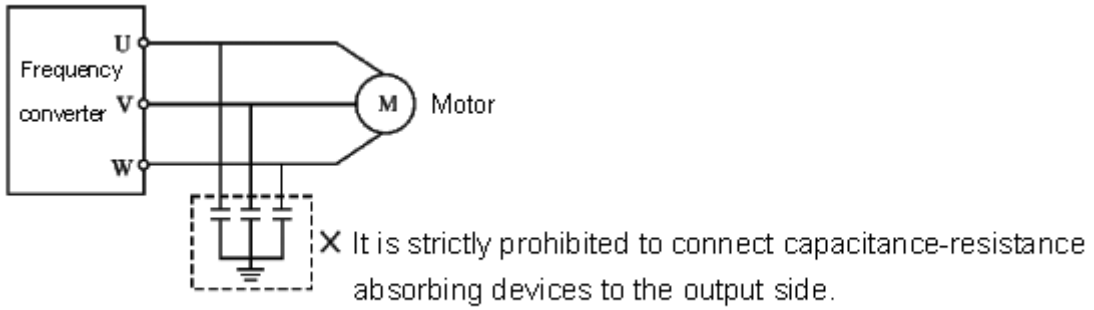
(7) If there is more than one converter connecting to the ground, please make sure that it does not form grounding loop, shown as following figures:



(8) The main loop power cable and control cable must be laid separately, to keep minimum 10cm distance in parallel, and to keep them perpendicular in intersection, and do not put the control cable and power cable in a same wire casing, otherwise it may cause interference;

(9) Generally, the distance between the converter and the motor shall be shorter than 30 meters, if the distance is too long, the impulse current caused by the parasitic capacitance can lead to over current protection, or false operation, which may cause the converter fault or running abnormity of the equipment, and the maximum distance between the converter and the motor shall not be over 100 meters, in the long-distance connection, please choose to configure filter in the output terminal, and meanwhile reduce carrier frequency;

(10) Do not add absorption capacitance or other capacitance-resistance absorbing devices to the output terminal (u, v, w) of the converter.



(11) Please confirm that the main loop terminal is locked firmly, and the lead wire and terminals have proper contact, to prevent loosening caused by vibration and creating spark, leading to the short circuit;

(12) In order to reduce interference, the surge absorber is recommended to connect to the coil of electromagnetic contactor and relay in the converter's surrounding circuit.

4-1-3 Recommended equipment specifications

Frequency converter model	Input voltage	Installed Motor KW	Main loop cable diameter mm^2	Air circuit breaker A	Electromagnetic contractor A
H3200A00D4K	220V	0.4	2.5	16	12
H3200A0D75K	220V	0.75	2.5	16	12
H3200A01D5K	220V	1.5	2.5	32	18
H3200A02D2K	220V	2.2	4	32	18
H3400A0D75K	380V	0.75	2.5	16	12
H3400A01D5K	380V	1.5	2.5	16	12
H3400A02D2K	380V	2.2	2.5	16	12
H3400A03D7K	380V	3.7	2.5	16	12
H3400A05D5K	380V	5.5	4	32	18
H3400A07D5K	380V	7.5	6	40	30
H3400A0011K	380V	11	6	63	35
H3400A0015K	380V	15	10	63	35
H3400A0018K	380V	18.5	10	100	80

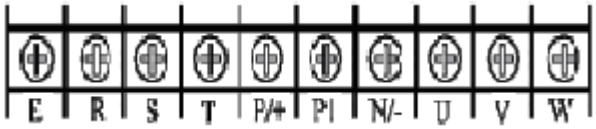
Frequency converter model	Input voltage	Installed Motor KW	Main loop cable diameter mm^2	Air circuit breaker A	Electromagnetic contractor A
H3400A0022K	380V	22	16	100	80
H3400A0030K	380V	30	25	160	100
H3400A0037K	380V	37	25	160	100
H3400A0045K	380V	45	35	200	180
H3400A0055K	380V	55	35	200	180
H3400A0075K	380V	75	70	250	180
H3400A0090K	380V	90	70	310	
H3400A0110K	380V	110	95	400	
H3400A0132 K	380V	132	150	400	
H3400A 0160K	380V	160	185	600	

*The above data are for reference only.

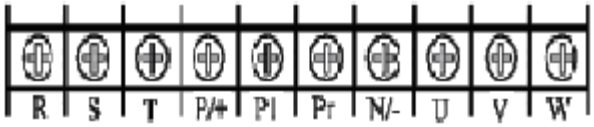
4-1-4 Main loop terminals and description

If you open the converter's outer casing, you can see the main loop terminals.

1. Model A, P with three-phase 380V/18.5~160KW and steel casing, the arrangement of main loop terminals is shown below:



2. Model A with three-phase 380V/5.5~15KW and plastic casing, and model P with 7.5~18.5KW and plastic casing, the arrangement of main loop terminals is shown below:



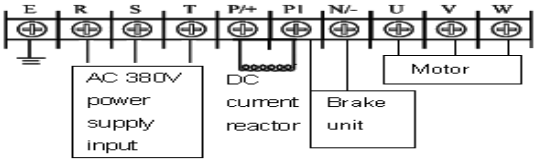
3. Model A with three-phase 380V/0.75~3.7KW, the arrangement of main loop terminals is shown below:

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

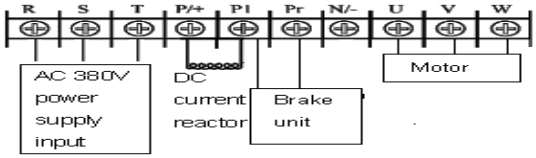
Name	Function description
E ⏚	Grounding terminal
R, S, T	Power supply input terminal, to select any of two terminals to connect
P/+	DC voltage positive terminal
P1	Remove the connecting sheet between P1 and P/+ to connect DC reactor.
Pr	The brake resistor can be connected between P1 and Pr (applicable on 15KW below models)
N/-	DC voltage negative terminal, the brake unit can be connected between P1 and N/- (applicable on 15KW above models)
U, V, W	Connect three-phase AC motor

Cable connection examples

1. Model A with three-phase 380V/18.5~160KW and steel casing, the cable connection is shown as below:

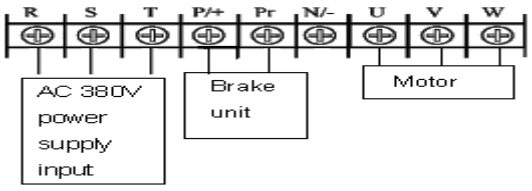


2. Model A with three-phase 380V/5.5~15KW and plastic casing, the cable connection is shown as below:



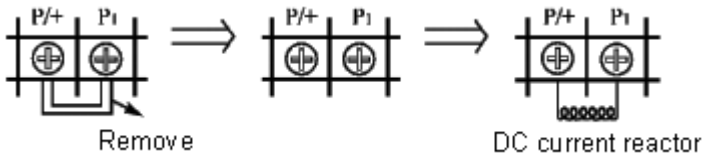
Note: The grounding terminal is on the casing next to the main loop terminal, and it is a screw hole on the steel plate marked with ⏚;

3. Model A with three-phase 380V/0.75~3.7KW, the cable connection is shown as below:



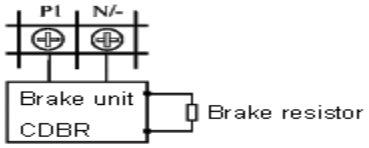
Note: The grounding terminal is on the casing next to the main loop terminal, and it is a fix screw on the casing marked with ⏚;

4. DC current reactor connection



a. remove the short connecting sheet b. connect DC reactor between P/+ and P1

④ Method to connect brake unit (applicable on 15KW above machines including 15KW steel casing model)

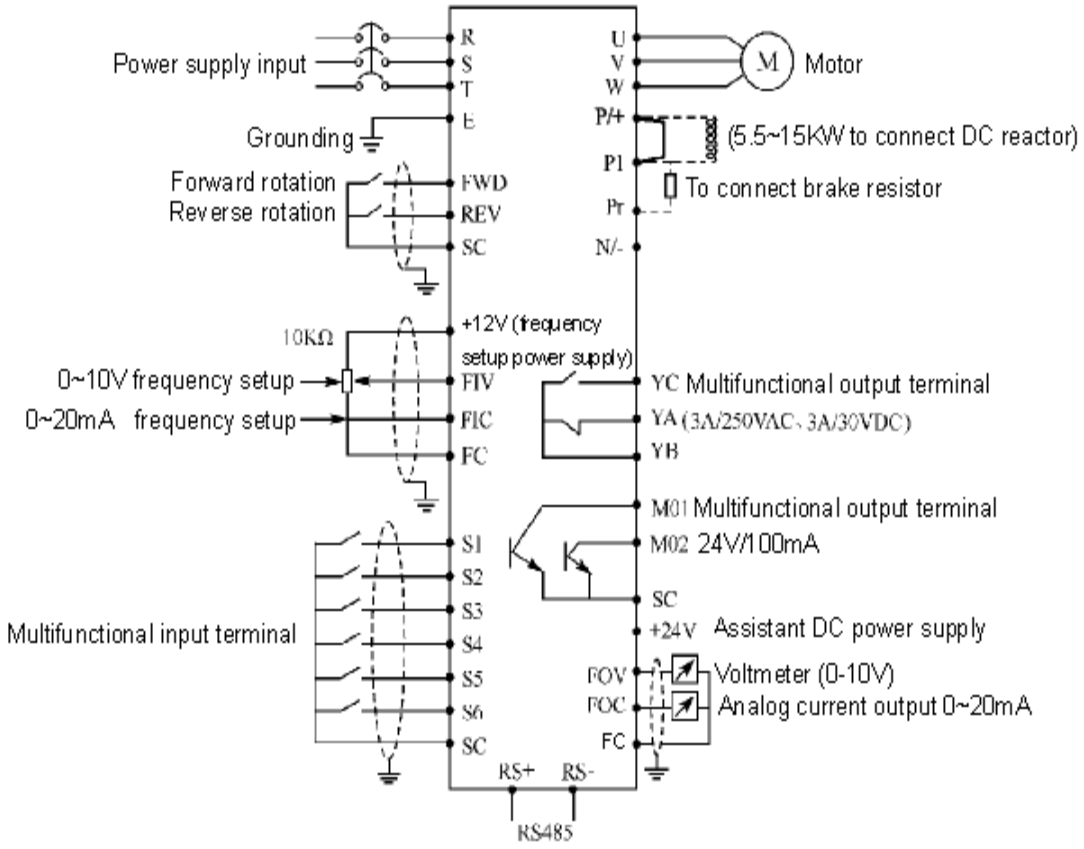


Due to different definitions of the brake unit terminal given by different producers, please refer to relative instructions when using it.

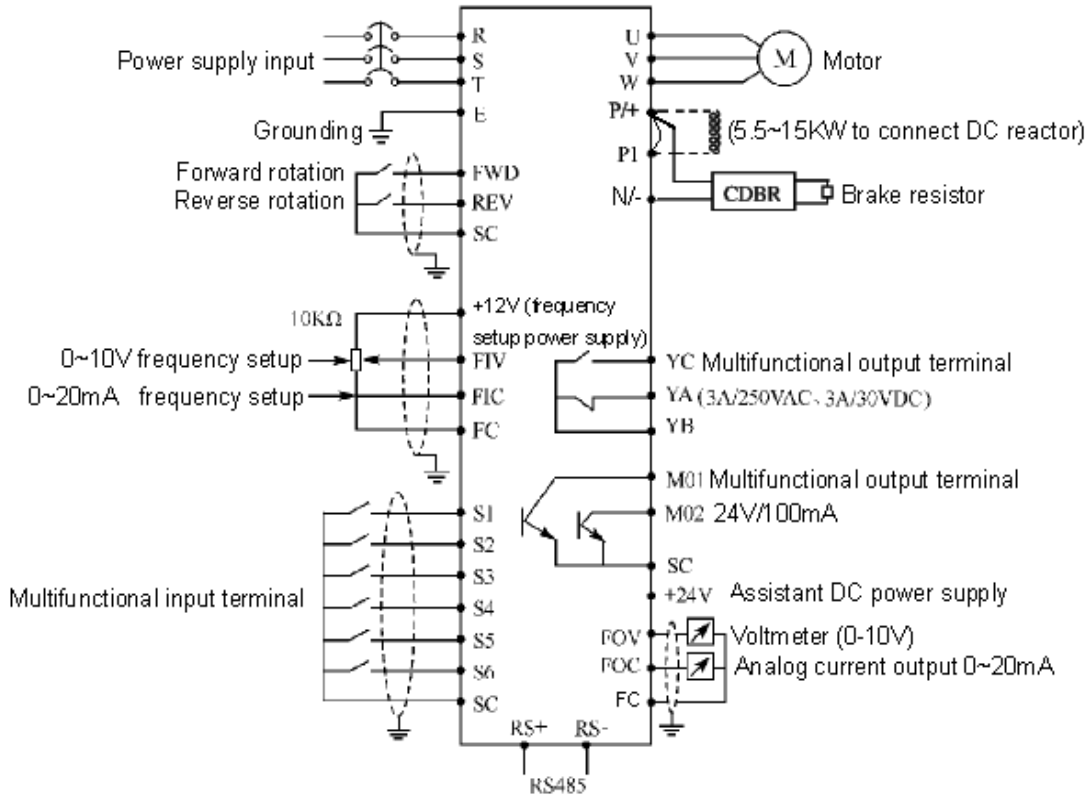
4-2 Control terminal

4-2-1 Basic wiring diagram

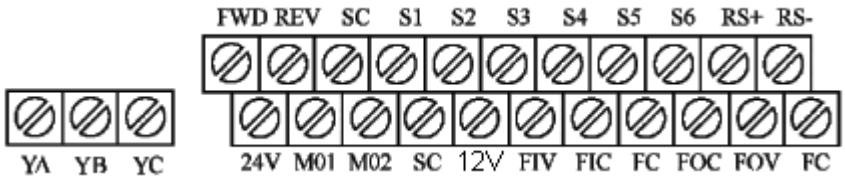
(1) Models below 15KW (including 15KW plastic casing model A)



(2) 15KW above models (including 15KW steel casing)



4-2-2 Control terminals arrangement (0.4~315KW)



4-2-3 Control terminal description

Terminal name	Function description	Note
FWD	Forward rotation command input terminal (multifunctional input terminal)	Multifunctional input terminals as S1-S6, FWD and REV can be set in detail through parameters F3.15-F3.22, and the setup is effective when the terminals and SC is closed.
REV	Reverse rotation command input terminal (multifunctional input terminal)	
S1	Multifunctional input terminal 1	
S2	Multifunctional input terminal 2	
S3	Multifunctional input terminal 3	
S4	Multifunctional input terminal 4	
S5	Multifunctional input terminal 5	
S6	Multifunctional input terminal 6	
24V	Assistant DC power supply, it supply 24V power for external devices	Max 100mA current
M01	Multifunctional output terminal (optical coupling)	Max 24V DC/100mA
M02	Multifunctional output terminal (optical coupling)	
12V	Power supply for frequency setup	
FIV	Analog voltage command input terminal	0~10V (it is recommended to use 10K potentiometer.)
FIC	Analog current command input terminal	0~20mA
FOV	Analog voltage output terminal	0~10V
FOC	Analog voltage output terminal	0~20mA
FC	Analog signal shared terminal	
SC	Digital signal shared terminal	
YC	Multifunctional output terminal (normally closed)	250V AC/3A, 30V DC/3A
YA	Multifunctional output terminal (normally closed)	
YB	Multifunctional YA, YB output contact shared terminal	
RS+, RS-	RS485 communication port	

4-2-4 Control loop wiring notices

(1) Please separate the control signal cable from the main loop cable, power cables and power supply cable during wiring.

(2) In order to prevent the interference that can cause false operation, please use glue shielding cable or two-ply shielding cable, whose specifications are 0.5-2mm^2.

(3) Please confirm the allowed requirements for using different terminals, requirements as: Power supply, maximum allowed current

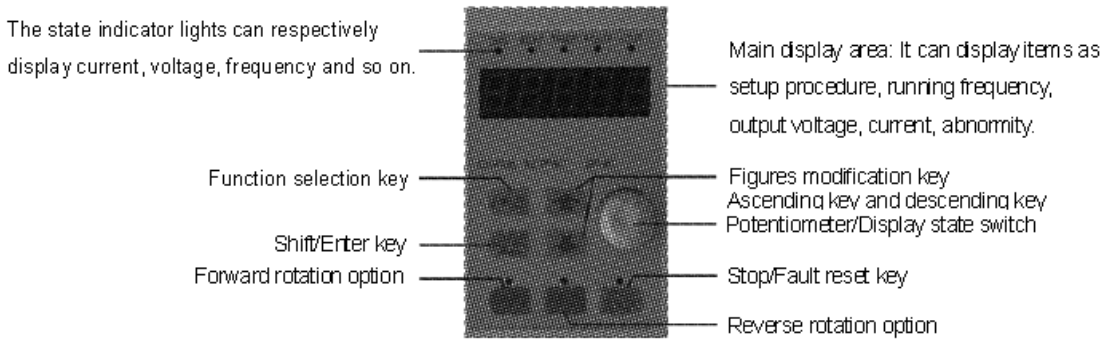
(4) Please connect the grounding terminal E to the ground correctly; the grounding impedance is lower than 100 .

(5) Please select accessories correctly according to the requirements as potentiometer, voltmeter and input current of different terminals.

(6) Please check it correctly and confirm there is no mistake after wiring.

Chapter 5 Running

5-1 Digital manipulator



5-1-1 Key function description

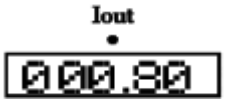
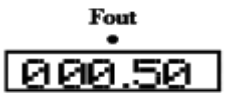
Key name	Function description
	Function selection key, to select and use function menu
	Figures modification key, to modify function code and parameter
	Shift key or Enter key Quick press to switch figures, press-and-hold to confirm setup

Key name	Function description
	①Potentiometer of manipulator, when the frequency is set up as controlled by potentiometer of manipulator, to rotate the potentiometer to get different frequency. ②Display switch, to press gently to display different monitor information
	Stop command key (applicable on manipulator control state), fault reset key
	Forward rotation command key
	Reverse rotation command key

5-1-2 LED indicator light description

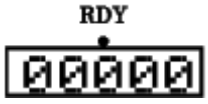
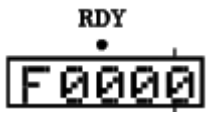
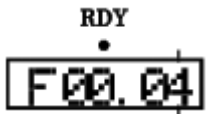
Indicator light name	Indicator light state	Description
DRV	Lighted	The frequency converter is on running state.
RDY	Lighted	The converter is on standby state.
FREF	Lighted	Display area displays setup frequency.
Fout	Lighted	Display area displays output frequency.
Iout	Lighted	Display area displays output current.
FWD	Lighted	The frequency converter is in forward rotation state.
REV	Lighted	The frequency converter is in revense rotation state.
STOP	Lighted	The frequency converter is in stop and no output state.

5-1-3 Displays description

	Display	Description
1		Display: Setup frequency 50.00Hz
2		Display: Output current 0.8A
3		Display: Output frequency 0.5Hz
4		Display: Parameter F1.50
5	END	Display: Parameter setup modified and confirmed successfully
6	OC 1	Display: Fault code, over current during acceleration

5-2 Digital manipulator operation instruction

(1) Parameter setup, 〈taking modifying F1.04 reverse valid setup as example〉

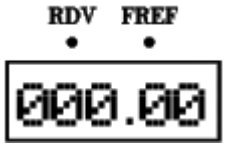
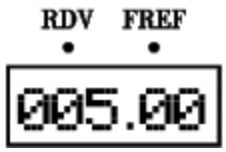
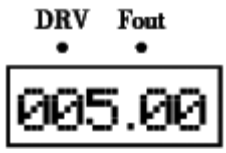
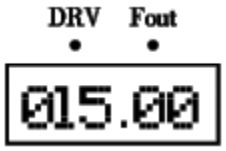
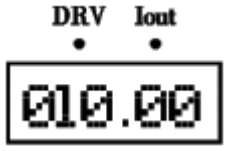
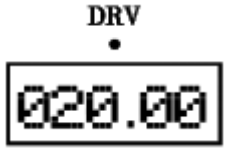
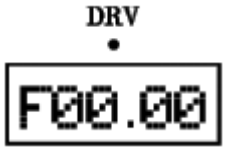
Program	Key name	Display	Description
1	Power on		To display setup frequency picture (initializing picture) The converter is on standby state.
2	Press 		To get into parameter setup state, and the first letter blinks (meaning modifiable item)
3	Press  4 times		The value “0” has been changed to “4”.

Program	Key name	Display	Description
4	Quickly press 2 times (quick press means shift.)	RDY F00.04	The flashing is shifted 2 positions to the left. Note: Quick pressing means the pressing time is within 2 seconds.
5	Press 1 time	RDY F01.04	The value "0" has been changed to "1".
6	Press and hold	RDY 00001	Display: "1"
7	Press	RDY 00000	To change "1" to "0"
8	Press and hold	After flashing END, it displays F01.05 F01.05	To confirm that the value F1.04 has been modified
9	Press PRG	RDY 00000	To return to the original display picture

Notice: Press PRG to abandon modification and directly return to the main picture state.

(2) Different state displays and inquiry

Assume that the parameter is set up: The manipulator control the converter to start and stop (F1.02=0), and the frequency is given by the potentiometer of the manipulator (F1.01=3).

Program	Key name	Display	Description
1	Power on		Setup frequency display state
2	Rotate 		Setup frequency 5.0Hz
3			Forward running of the frequency is turned on.
4	Press  1 time		To shift to actual running frequency display picture
5	Rotate 		To modify setup frequency, the actual running frequency has been changed from 5Hz to 15Hz
6	Press  1 time		To shift to output current display picture, the output current now is 10.00A
7	Press  1 time		To shift to output voltage state, the actual output voltage now is 20.00
8	Press  2 times		To shift to parameter setup state

Program	Key name	Display	Description
9	Press	DRV F00.04	To select code F00.04 for modifying access parameter
10	Press and hold	DRV 0140.0	To display F00.04 which means the running rotation speed is 15Hz
11	Press	DRV FREF 0015.00	To return to main display picture, the setup frequency is 15Hz
12	Press	RDY FREF 015.00	To stop the converter, the setup frequency is 15Hz

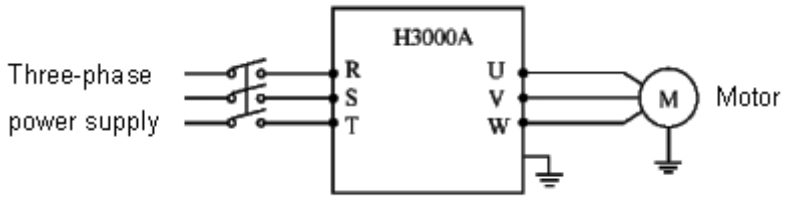
Notice: Through shift key you can monitor setup frequency, running frequency, output current, output voltage during the running of the converter, the display of the main picture can be customized by your actual need, and you can modify it through F0.00 setup, at the same time you can monitor relative display contents through F0.01-F0.18.

5-3 The converter simple running and its relative items

5-3-1 Setup, installation and wiring

According to detailed requirements to conduct installation and wiring

The figure below is the simplest wire connection for running.



5-3-2 Wiring inspection

According to the wiring requirements of the converter, to check whether there are errors, after confirming there is no mistake, turn on the power supply to set up parameters.

5-3-3 Parameter setup of the converter

The basic parameter setup of the running of converter must have frequency setup and running signal source setup, for they can start the converter on one hand, and indicate the running speed of the converter on the other hand.

Set up parameter F1.01 and F1.02 according to the requirements, about the setting-up method, see section 5-2.

5-3-4 Running

Confirm that there is no mistake in wiring and parameter setup according to the requirements

Assume F1.01=3 (the frequency source coming from the potentiometer of manipulator)

F1.02=0 (the running signal source coming from the manipulator)

Press FWD to start the converter, then to rotate the potentiometer, the converter accelerates gradually.

Press STOP to stop the converter

Notice: Observe the running state of the motor during running, if an abnormity occurs, please stop running immediately (to press STOP key) and turn off the power and check it.

Chapter Six Table of Functional Parameters

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory Set Value	Page number
Display	F0.00	The screen displays option setup	0-32	1	1	42
	F0.01	Frequency setup	Read only			43
	F0.02	Output frequency	Read only			43
	F0.03	Output current	Read only			43
	F0.04	Rotation rate	Read only			43
	F0.05	Voltage of dc bus	Read only			44
Parameters for basic running	F0.06	Temperature of frequency converter	Read only			44
	F0.07	PID display	Read only			44
	F0.10	Fault record 1	Read only			44
	F0.11	Fault record 2	Read only			44
	F0.12	Fault record 3	Read only			44
	F0.13	Fault record 4	Read only			44
	F0.14	The setup frequency in last fault	Read only			44
	F0.15	The output frequency in last fault	Read only			44
	F0.16	The output current in last fault	Read only			44
	F0.17	The output voltage in last fault	Read only			44
	F0.18	The output dc voltage in last fault	Read only			44
	F1.00	Setup of dominant frequency	0.00-uppper frequency	0.01	0.00	46
	F1.01	Options for frequency setup	0: digital frequency setup 1: Analogue voltage setup 2: Analogue current setup 3. Keyboard POT setup 4 UP/DOWN setup 5: RS485 communication frequency setup	1	0	47

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory Set Value	Page number
	F1.02	Options for running setup	0: Keyboard 1: IO terminal 2: Communication	1	0	49
	F1.03	Setup when stop key is valid	0: Stop key is invalid 1: Stop key is valid	1	1	52
	F1.04	Setup for restpination	0: Restpination prohibited 1: Restpination allowed	1	1	53
	F1.05	Maximum running frequency	Minimum running frequency ~ 400.00Hz	0.01	0.00	53
Parameters for basic running	F1.06	Minimum frequency of running	0.00 ~ maximum running frequency	0.01	0.00	53
	F1.07	Acceleration time 1	0 ~ 6000.0S	0.1	Changing	53
	F1.08	Deceleration time 1	0 ~ 6000.0S	0.1	Changing	53
	F1.09	VF maximum voltage	VF intermediate voltage ~ 500.0 V	0.1	400.0	54
	F1.10	VF fundamental frequency	VF intermediate frequency ~ maximum running frequency	0.01	50.00	54
	F1.11	VF intermediate voltage	VF minimum voltage ~ VG maximum voltage	0.1	Changing	54
	F1.12	VF intermediate frequency	VF minimum frequency ~ VF fundamental frequency	0.01	2.50	54
	F1.13	VF minimum voltage	0~VF intermediate voltage	0.1	15.0	54
	F1.14	VF minimum frequency	0~VF intermediate frequency	0.01	1.25	54
	F1.15	Carrier frequency	1.0K-15.0K	0.1	Changing	57
	F1.16	Automatic carrier line up	Reserve	1	0	*
	F1.17	Initialization of parameters	8: Initialization of factory set value	1	0	58

	F1.18	Locked up of parameters	0: Unlocking of parameters 1: Locked up of parameters	1	0	58

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory Set Value	Page number
	F2.00	Options of start mode	0/1 regular start/start after inspection	1	0	58
	F2.01	?Options for stop mode	0/1 ~ slow down/automatic stop	1	0	59
	F2.02	Setup of start frequency	0.10 ~ 10.00Hz	0.01	0.5	60
	F2.03	Setup of stop frequency	0.10 ~ 10.00Hz	0.01	0.5	61
	F2.04	Current for dc braking in start	0~150% pole rated current	1%	100%	
	F2.05	Time for direct braking in start	0 ~ 25.0S	0.1	0	62
	F2.06	Current of dc braking in stop	0~150% pole rated current	1%	100%	62
	F2.07	Time for dc braking in stop	0 ~ 25.0S	0.1	0	62
	F2.08	Automatic torque compensation	0 ~ 20.0%	1	5%	62
	F2.09	Rated voltage of motor	0 ~ 500.0V	0.1	380.0	63
	F2.10	Rated current of motor	0 setup current of system	0.1	Changing	63
	F2.11	No load current ratio of motor	0-100%	0.1	40%	63
	F2.12	Rated rotation rate of motor	0-6000r/min	1	1420	63
	F2.13	Number of poles	0-20	1	4	63
	F2.14	Rated slip of motor	0~10.00Hz	0.01	2.50	63
	F2.15	Rated frequency of motor	0-400.00	0.01	50.00	64
	F2.16	Resistance of stator	0-100ohm	0.01	0	64
	F2.17	Resistance of rotor	0-100ohm	0.01	0	64
	F2.18	Self inductance of rotor	0-1.000H	0.01	0	64
	F2.19	Mutual inductance of rotor	0-1.000H	0601	0	
Input and output application	F3.00	FIV minimum voltage input	0~FIV maximum voltage	0.1	0	65
	F3.01	FIV maximum voltage input	FIV minimum voltage~10V	0.1	10.0	65
	F3.0 2	FIV input filter time	0~25.0S	0.1	1.0	65
	F3.03	FIC minimum current input	0~FIC maximum current	0.1	0	65
	F3.04	FIC maximum current input	FIC minimum current input~20mA	0.1	20.0	65
	F3.05	FIC input filter time	0~25.0S	0.1	1.0	65
	F3.06	FOV minimum voltage output	0~FOV maximum voltage	0.1	0	66

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory Set Value	Page number
	F3.07	FOV maximum voltage output	FOV maximum voltage output~10V	0.1	10.0	66
Input and output application	F3.08	FOC minimum current output	0~FOC maximum current	0.1	0	67
	F3.09	FOC maximum current output	FOC minimum current~20mA	0.1	20.0	67
	F3.10	Frequency of low analogue	0~600.00		0.00	68
	F3.11	Direction of low analogue	0/1	1	0	68
	F3.12	Frequency of high analogue	0~600.00	0.01HZ	50.00	68
	F3.13	Direction of high analogue	0/1	1	0	68
	F3.14	Options for restpination of analogue	0/1	1	0	68
	F3.15	Input terminal FOR (0~32)	0: Invalid 1: Inching 2: Inching corotation 3: Inching restpination 4: Corotation/ restpination 5: Running 6: Corotation 7: Restpination	1	6	68
	F3.16	Input terminal REV (0~32)	8: Stop 9: Multi-section speed terminal 1 10: Multi-section speed terminal 2 11: Multi-section speed terminal 3 12: Multi-section speed terminal 4 13: 13: Acc/De terminal 1 14: 13: Acc/De terminal 2 15: Frequency increase signal (UP) 16: Frequency decrease signal (DOWN) 17: Emergency stop signal	1	7	71
	F3.17	Input terminal S1 (0~32)		1	1	71
	F3.18	Input terminal S2 (0~32)		1	18	71

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory Set Value	Page number
	F3.19	Input terminal S3 (0~32)	18: Fault reset signal 19: PID in running	1	15	71
	F3.20	Input terminal S4 (0~32)	20: PLC in running 21: Start signal for timer 1	1	16	71
	F3.21	Input terminal S5 (0~32)	22: Start signal for timer 2 23: Counter pulse signal	1	8	71
	F3.22	Input terminal S6 (0~32)	24: Counter reset signal 25: Memory clear 26: Start winding movement	1	9	71
	F3.23	Output terminal M01 (0~32)	0: Invalid	1	01	76
	F3.24	Output terminal M01 (0~32)	1: In running	1	02	76
	F3.25	Alarm output terminal FABC (0~32)	2: Frequency reached 3: Fault 4: Zero speed 5: Frequency 1 reached 6: Frequency 2 reached 7: Acc 8: De 9: Indication for low voltage 10: Timer 1 reached 11: Timer 2 reached 12: Indication for completion of phase 13: Indication for completion of procedure 14: PID larger than?? 15: PID smaller than ?? 16: 4-20mA disconnection 17: Detection of overload 18: Examination for over torque 26: Completion of winding 27: Counter reached 28: Intermediate counter reached	1	03	76
	F3.26	Output terminal FOV (0~32)	0: Frequency output 1: current output	1	0	79
	F3.27	Output terminal FOC (0~7)	2: Dc voltage 3: Ac voltage	1	1	79

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory set value	
Secondary application	F4.00	Moving point frequency setup	0.00 ~ maximum running frequency	0.01	5.00	81
	F4.01	Acceleration time 2	0~6000.0S	0.1S	10.0	81
	F4.02	Deceleration time 2	0~6000.0S	0.1S	10.0	81
	F4.03	Acceleration time 3	0~6000.0S	0.1S	20.0	81
	F4.04	Deceleration time 3	0~6000.0S	0.1S	20.0	81
	F4.0 5	Acceleration time 4/moving point acceleration time	0~6000.0S	0.1S	2.0	81
	F4.06	Deceleration time 4/moving point deceleration time	0~6000.0S	0.1S	2.0	81
	F4.07	Designated value of counter	0~65000	1	100	81
	F4.08	Intermediate value of counter	0~65000	1	50	81
	F4.09	Limitation for acceleration torque	0~200%	1%	150%	82
	F4.10	Limitation for torque of constant speed	0~200%	1%	00	82
	F4.11	Options for preventing over voltage in deceleration	0/1	1	1	83
	F4.12	Options for automatic voltage regulation	0~1	1	1	84
	F4.13	Options for automatic energy saving	0~100%	1%	00	84
	F4.14	Actuating voltage of brake-pipe	Guaranteed level of low voltage	0.1	800.0	84
	F4.15	Actuating ratio of brake-pipe	40~100%	1	50%	84
	F4.16	Options for restart after power off	0~1	1	0	85
	F4.17	Time for power off allowed	0~10S	1	5.0S	86
	F4.18	Limitation of torque during racing start	0~200%	1	150%	87
	F4.19	Time for racing start	0~10	1	50	87
	F4.20	Times for restart after fault	0~5	1	0	87
	F4.21	Time for restart after fault	0~100	2	2	87
	F4.22	Options for actuating in over torque	0~3	1	0	88
	F4.23	Chances of detection of over torque	0~200%	1	00	88
	F4.24	Time of detection of over torque	0~20.0S	0.1	00	88

Parameter	Function code	Name	Explanation for setting range	Smallest unit	Factory set value	Page number
Secondary application	F4.25	Frequency 1 reaches the value set	0.00-upper frequency	0.01	100	89
	F4.26	Frequency 2 reaches the value set	0.00-upper frequency	0.01	5.0	89
	F4.27	Setup of timer 1	0~6000.0S	0.1	0	89
	F4.28	Setup of timer 2	0~6000.0S	1	0	89
	F4.29	Time for torque of constant speed	0~6000.0S	0.1	Changing	90
	F4.30	Frequency reaches the width of ring	0.00-2.00	0.01	0.50	90
	F4.31	Jump frequency 1	0.00-upper frequency	0.01	0	90
	F4.32	Jump frequency 2	0.00-upper frequency	0.01	0	90
	F4.33	Jump frequency reach width of ring	0.00-2.00	0.01	0.50	90
	F5.00	PLC memory mode	0~1	1	0	91
	F5.01	PLC start mode	0~2	1	0	91
	F5.02	PLC running mode	0: PLC stops after operating for a cycle 1: PLC stop mode, it stops after operating for a cycle 2: PLV circular running 3: PLC stop mode, circular running mode 4: PLC operates at the last frequency after operating for a cycle.	1	0	92
	F5.03	Multi-section speed terminal 1	0.00 ~ maximum running frequency	0.01	10.0	93
	F5.04	Multi-section speed terminal 2	0.00 ~ maximum running frequency	0.01	15.00	93
	F5.05	Multi-section speed terminal 3	0.00 ~ maximum running frequency	0.01	20.00	93
	F5.06	Multi-section speed terminal 4	0.00 ~ maximum running frequency	0.01	25.00	93
	F5.07	Multi-section speed terminal 5	0.00 ~ maximum running frequency	0.01	30.00	93
	F5.08	Multi-section speed terminal 6	0.00 ~ maximum running frequency	0.01	35.00	93
	F5.09	Multi-section speed terminal 7	0.00 ~ maximum running frequency	0.01	40.00	93
	F5.10	Multi-section speed terminal 8	0.00 ~ maximum running frequency	0.01	45.00	93
	F5.11	Multi-section speed terminal 9	0.00 ~ maximum running frequency	0.01	50.00	93

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory set value	Page number
	F5.12	Multi-section speed terminal 10	0.00 ~ maximum running frequency	0.01	10.00	93
	F5.13	Multi-section speed terminal 11	0.00 ~ maximum running frequency	0.01	10.00	93
	F5.14	Multi-section speed terminal 12	0.00 ~ maximum running frequency	0.01	10.00	93
	F5.15	Multi-section speed terminal 13	0.00 ~ maximum running frequency	0.01	10.00	93
	F5.16	Multi-section speed terminal 14	0.00 ~ maximum running frequency	0.01	10.00	93
	F5.17	Multi-section speed terminal 15	0.00 ~ maximum running frequency	0.01	10.00	93
	F5.18	PLC running time	0~65000	1S	100	93
	F5.19	PLC running time	0~65000	1S	100	93
	F5.20	PLC running time	0~65000	1S	100	93
	F5.21	PLC running time	0~65000	1S	100	93
	F5.22	PLC running time	0~65000	1S	100	93
	F5.23	PLC running time	0~65000	1S	0	93
Secondary application	F5.24	PLC running time	0~65000	1S	0	93
	F5.25	PLC running time	0~65000	1S	0	93
	F5.26	PLC running time	0~65000	1S	0	94
	F5.27	PLC running time	0~65000	1S	0	94
	F5.28	PLC running time	0~65000	1S	0	94
	F5.29	PLC running time	0~65000	1S	0	94
	F5.30	PLC running time	0~65000	1S	0	94
	F5.31	PLC running time	0~65000	1S	0	94
	F5.32	PLC running time	0~65000	1S	0	94
	F5.33	PLC running direction	0~32767	1	0	94
	F6.0	PLD start mode	0: PLD prohibited 1: PLD open 2: Conditional running of PLD. PLD is open when external terminal is valid.	1	0	97

	Parameters	Function code	Name	Smallest unit	Factory set value	Page number
	F6.01	PID running mode	0: Negative feedback mode of PID 1: Negative and positive feedback mode of PID	1	0	97
	F6.02	Options for PID target value	0: Select figure as target value 1: Pick up FOV as target value 2: Pick up FOC as target value	1	0	98
	F6.03	Options for PLD feedback value	0: Pick up FOV as feedback value 1: Pick up FOC as feedback value 2: Pick up balance of FOV_FOC as feedback value	1	0	98
	F6.04	PID figure target value	0.0~100.0%	0.1%	0.0%	99
	F6.05	Upper limit value for PID alarm	0~100.0%	1%	100%	100
	F6.06	Lower limit value for PID alarm	0~100.0%	1%	0%	101
	F6.07	Value for P of PID	0.0~２00.0%	０.１%	１００%	１０１
	F6.08	Value for I of PID	0.0~200.0 S 0 is the value when it is closed	0.1s	0.1s _	１０１
	F6.09	Value for D of PID	0.00.0~20.00 S 0 is when it is closed	0.1s	０.０	１０１
	F6.10	Step of each PID actuating	0.00~1.00Hz	0.01	0.10Hz	101
	F6.11	PID sleep frequency	0.00~120.0Hz (0.00Hz) 0.00Hz means sleep function is closed	0.01	0.00Hz	102
	F6.12	Time when PID sleep is active	0~200s	1S	10s	102
	F6.13	Value for awaken PID from sleep	0~100%	1%	0	102
	F6.14	Corresponding value of PID display	0~10000	1	1000	103
	F6.15	Number of bits of PID display	1~5	1	1	103
	F6.16	Number of bits of decimal figure of PID display	0~4	1	1	103
	F6.17	Water supply by constant voltage, when output frequency is larger than this frequency, the mark is 1.	0~maximum running frequency	0.01	48.00	
	F6.18	Water supply by constant voltage, when output frequency is smaller than this frequency, the mark is 0.	0~maximum running frequency	0.01	20.00	
	F6.19	PID work mode	0: Always in work mode (valid when PID is open) 1: When feedback reaches upper limit (F6.05), it will work at minimum running frequency. When feedback reaches lower running frequency, PID will begin to work.	1	0	

Parameters	Function code	Name	Explanation for setting range	Smallest unit	Factory set value	Page number
Parameter system	Function code	Name	Explanation for setting range	Smallest unit	Factory Set Value	Page number
Parameters of communication	F7.00	Speed for communication data	0: 4800 1: 9600 2: 19200 3: 38400		0	104
	F7.01	Mode of communication data	0: 8N1 FOR ASC 1:8E1 FPR ASC 2:8O1 FOR ASC 3:8N1 FOR RTU 4:8E1 FOR RTU 5:8O1 FOR RTU		0	104
	F7.02	Address of communication machine	0~240	1	0	104
Parameters for advanced application	F8.00	Locked up of parameters for superior applications	0: Locked 1: Unlocked	1	0	111
	F8.01	Setup of system at 50Hz or 60Hz	0~50Hz 1~60Hz	1	0	111
	F8.02	Option of constant torque or changing torque	0: Constant torque 1: Changing torque	1	0/1	111
	F8.03	Setup of guaranteed level of over voltage	760.0~820.0V	1	800.0	111
	F8.04	Setup of guaranteed level of low voltage	380.0~450.0V	1	400.0	112
	F8.05	Setup of guaranteed level of over temperature	40~120	1	85/95	112
	F8.06	Setup of displaying current filter time	0~10.0	0.1	2.0	112
	F8.07	0-10V analogue output of low calibration coefficient	0-65535	1	-	112
	F8.08	0-10V analogue output of high calibration coefficient	0-65535	1	-	112
	F8.09	0-20mA analogue output of low calibration coefficient	0-65535	1	-	112
	F8.10	0-20mA analogue output of high calibration coefficient	0-65535	1	-	112
	F8.11	Compensation frequency point in dead zone	0~maximum running frequency function; it will be within compensation zone if smaller than this frequency, it will not in dead zone of compensation if it is larger than this frequency.	0.01	0.00	
	F8.12	Options for UP/DOWN frequency memory	0: Remember UP/DOWN frequency, it will be remembered after stop. 1: UP/DOWN frequency will not be remembered. It will return to 0 after stop.	1	0	

Chapter Seven Detailed Explanation of Functional Parameters

7-1 Parameters for monitoring

F0.00	Display option setup		factory set value 00
	Setting range 00-32	00	Display frequency setup
		01	Display frequency output
		02	Display current output
		03	Display rotation rate output
		04	Display main loop
		05	Display temperature of frequency converter module
		09	Display record of recent faults (1)
		10	Display record of last fault (2)
		11	Display fault status (3)
		12	Display fault status (4)
		13	Display the setup frequency at which the last fault occurs
		14	Display the output frequency at which the last fault occurs
		15	Display the output current at which the last fault occurs
		16	Display the output voltage at which the last fault occurs
		17	Display the dc voltage of main loop when the last fault occurs
		18	Display the temperature of frequency converter module when the last fault occurs

User can set the initial image of frequency converter as the image which the user desires most through F0.00 setup so as to make monitoring more convenient.

For example, if the user wants to monitor rotation rate by main display image, the user can make the image display rotation rate by setting F0.00 as 03. The factory set value of this parameter is 00, therefore, when the power is on, it directly displays frequency setup.

F0.01	Frequency setup factory set value
	It displays the current frequency of frequency converter.

You can monitor the current frequency setup of frequency converter by examining the content of this parameter.

F0.02	Output frequency factory set value
	It displays the actual output frequency of frequency converter.

You can monitor the actual output frequency of frequency converter by examining parameter F0.02.

F0.03	Current output factory set value
	It displays the actual output current of frequency converter.

You can monitor the actual output current by examining parameter F0.03.

F0.04	Rotation rate factory set value
	It displays the actual rotation rate of motor.

You can monitor the actual rotation rate of motor by examining parameter F0.04.

F0.05	Voltage of dc bus factory set value
	It displays the voltage of dc bus in main loop of frequency converter.

You can monitor the actual voltage of dc bus of main loop in frequency converter by examining parameter F0.05.

F0.06	Temperature of frequency converter factory set value
	It displays the actual temperature of frequency converter module.

You can monitor the actual temperature of frequency converter module by examining parameter F0.06, which will help you make judgment on the running condition of frequency converter.

F0.10	Fault record 1
F0.11	Fault record 2
F0.12	Fault record 3
F0.13	Fault record 4
	It records the latest four faults of frequency converter.

You can check the conditions of latest four faults by examining F0.10 to F0.13. These four parameters can help user make judgment on the running condition of frequency converter and find the cause of production fault and eliminate hidden trouble.

F0.14	The frequency at which the last fault occurs
F0.15	The output frequency in last fault.
F0.16	The output current in last fault
F0.17	The output voltage in last fault
F0.18	The dc voltage in last fault
	They display the detailed status when the latest fault occurs. You can check the actual setup frequency, actual output frequency, actual output voltage, actual output voltage, and dc voltage of main loop in frequency converter by examining these parameters respectively.

You can check the detailed state when the latest fault occurs by examining the content of F0.14-F0.18. You can examine the setup frequency, actual output frequency, and actual output current

And actual output voltage, dc voltage of main loop. According to the above data, you can analyze the cause of fault and find a solution quickly, which will help maintenance personnel in repair work.

What is more important, for H3000 series frequency converter, you cannot only use setup mode and free option for main image to monitor relevant content, you can also examine relevant content by directly switching in manipulator.

When the manipulator is set into one of the following four conditions, you can check relevant content by pressing switch key. Take setup frequency as main image, like the following table.

Procedure	Press key	Display	Explanation
1	Turn on power		□ Frequency converter is in standby mode. □ The main image displays setup frequency. FREE light is on, which means that the main image is displaying setup frequency
2	Press FWD		Start frequency converter □ Frequency converter is in running and DRV light is on. □ The image displays setup frequency. Corotation light is on; frequency converter is in corotation state.
3	Press it for once		Switch display image; stop switching when actual output frequency is displayed. Frequency converter is in corotation running state. □ The actual output frequency is 50.00Hz. □ Fout light is on.

Procedure	Press key	Display	Explanation
4	Press it for once		Switch display image; stop switching when actual output current is displayed. □ The actual current output is 2.5A □ Iout light is on, which means that the current image displays actual output current.
5	Press it for once		Switch display image; stop switching when actual output voltage is displayed. □ The current actual output voltage is 380V.
6	Press it for one		Switch to main image □ Return to main image which displays setup frequency. □ The setup frequency is 50.00Hz

7-2 Parameters for basic running

F1.00	Setup of dominant frequency factory set value 0.00Hz			
	Setting range	0.00-uppper frequency	Unit	0.01

When F1.02 is set as 0, it is frequency setup option. When the setup mode is figure digital frequency, the running frequency of frequency converter is decided by F1.00.

During running, you can change frequency by modifying the content of parameter F1.00 or by pressing upward key or downward key to change frequency. If you change frequency by modifying F1.00, when the converter stops running or when power is off, the modified content can be remembered.

If you change frequency by pressing upward or downward key, when the converter stops running or power is off, the modified content will not be remembered; instead the original F1.00 will be remembered. When the converter is started next time, it will operate at the original value of F1.00.

F1.01	Frequency setup options factory set value 0			
	Setting range	0-5	Unit	1
	Setup content	0: Digital frequency setup 1: Analogue voltage setup 2: Analogue current setup 3. Keyboard POT setup 4 UP/DOWN setup 5: RS485 communication setup		

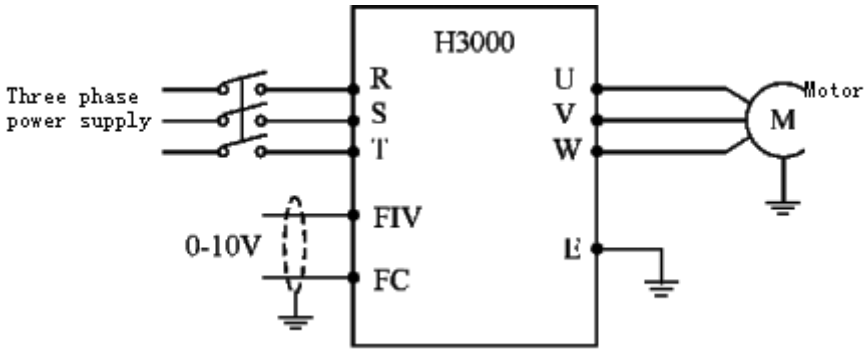
Frequency setup option can be used to pick up running frequency of frequency converter.

0: Digital frequency setup

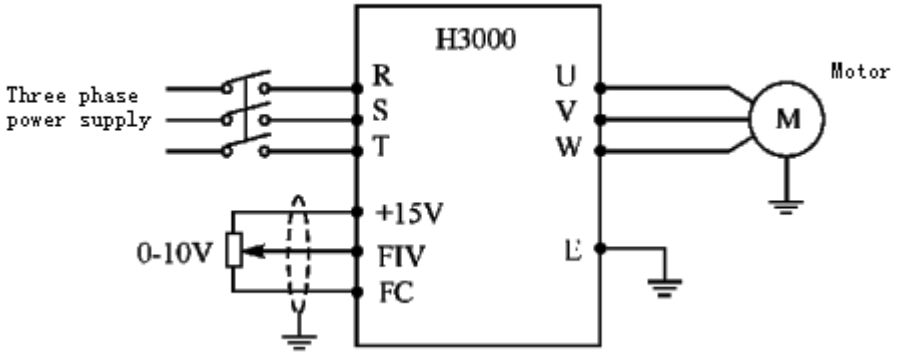
The running frequency of frequency converter is decided by F1.00. Generally speaking, you can change running frequency by pressing the upward or downward key on manipulator. Refer to F1.00 for details.

1: Analogue voltage setup

The running frequency of frequency converter is decided by external voltage signal (0-10V), which is put into frequency converter through FIV terminal. There are two modes of external voltage signal: one is designated signal ranging from 0 to 10V; the other is designated by POT. Refer to the following diagram for connection method.



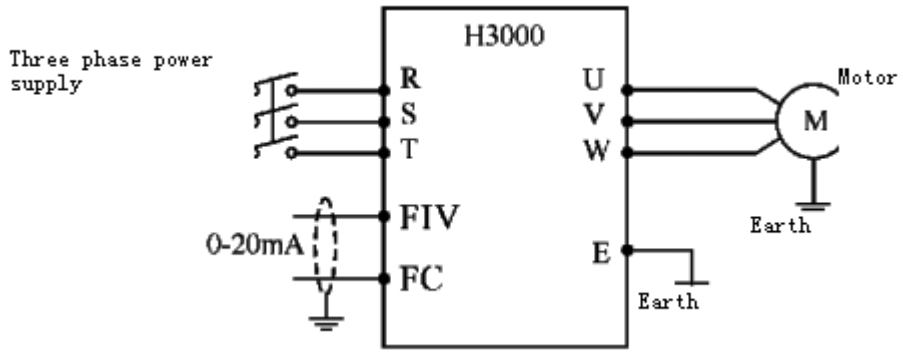
Explanation: control the running frequency of frequency converter by directly designating signals ranging from 0 to 10V by FIV or FC.



Explanation: control running frequency of frequency converter by FIV voltage signal sent by external POT (10Kohm)

2: Analogue current setup

The running frequency of frequency converter is decided by external current signal (0-20mA). Control the running frequency of frequency converter by external terminal FIC.



3: Keyboard POT setup

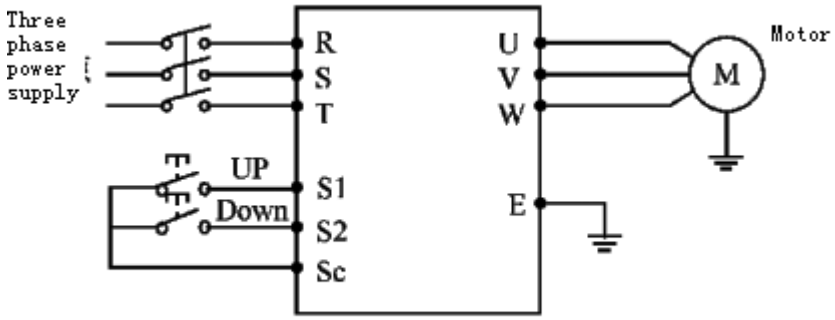
You can control the running of H3400 frequency converter by the POT knob in manipulator, which is very convenient. Pay attention to the POT knob in manipulator which enables you to switch between monitoring images. Be careful while using it.

Turn: change runing frequency button: switch between monitoring images

4 UP/DOWN setup

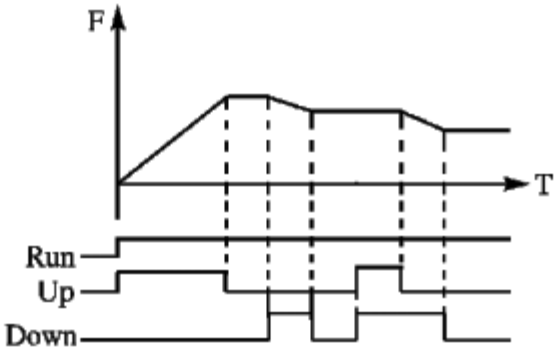
The running frequency of frequency converter is controlled by external terminals UP/DOWN. External terminals can have parameters. Pick up one terminal from F3.15 to F3.22 and prepare this terminal for UP/DOWN function. When UP is

Valid, the frequency will go up. When DOWN is valid, the frequency will go down. When UP and DOWN are both valid, the frequency will remain the same.



Parameter: F3.17=15, S1 terminal is in UP mode.

F.18=16, S2 terminal is in DOWN mode.



Explanation: when Up is valid (Up is connected), frequency will go up.

When Down is valid (Down is connected), frequency will go down.

F1.02	Running setup options		factory set value	
	Setting range	0-2	Unit	1
	Setup content	0: Manipulator 1: IO terminal 2: RS485		

Running setup options are used to set signal source.

0: Manipulator

Manipulator sends running signal. The running of frequency converter can be controlled by the FWD key (corotation) and REW (restpination) key in manipulator of frequency converter. Press stop key to stop running of frequency converter.

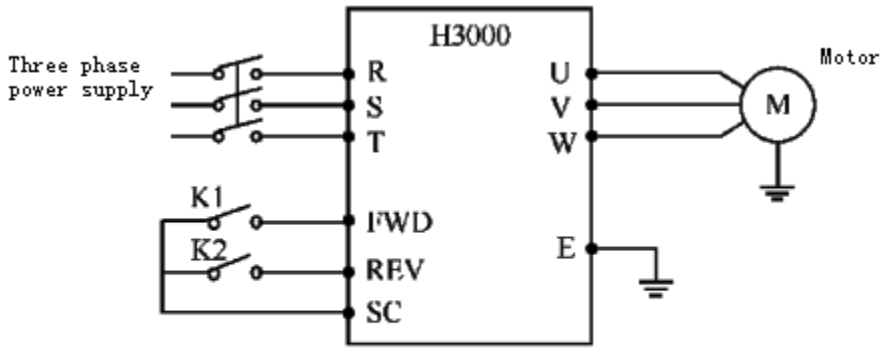
Procedure	Press key	Display	Explanation
1	Turn on power		Presume □ the frequency is set at 10.0Hz
2			□ Frequency converter is in running mode. □ Frequency converter is in corotation □ The running frequency is 10.00Hz
3			□ Frequency converter is in restpination running mode. □ Switch between corotation and restpination of frequency converter □ The running frequency is 10.00Hz
4			□ Frequency converter stops running □ Frequency converter is in standby mode.

1: IO terminal

IO terminal sends running command. You can setup external terminal at your own will. The factory setup of FED terminal is corotation and the factory setup of REW is restpination.

You can form two-wire-system or three-wire-system control mode by using IO terminal.

Two-wire-system mode



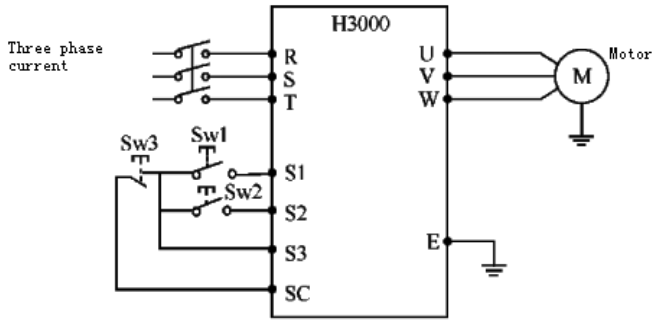
Parameter: F3.15=6

F3.16=7

Actuating explanation:

Shape and condition		Condition of frequency converter
K1	K2	
ON	OFF	Corotation
OFF	OFF	Stop
OFF	ON	Restpination
ON	ON	Keep the original running condition

□ Three-wire-system mode



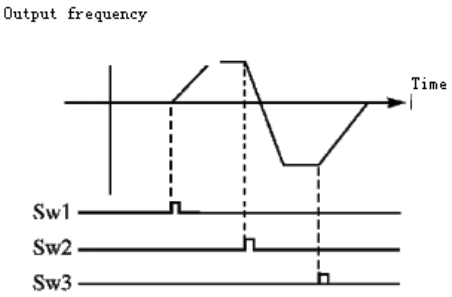
Use S1, S2, or S3 as input terminal for external signal

Parameter: F3.17=6 S1 is in corotation

F3.18=7 S2 is in restpination

F3.19=9 S3 is in stop mode

F1.02=1 external terminal input



2: RS485

Serial interface sends running command to frequency converter. Frequency converter can receive command from upper computer by serial interface.

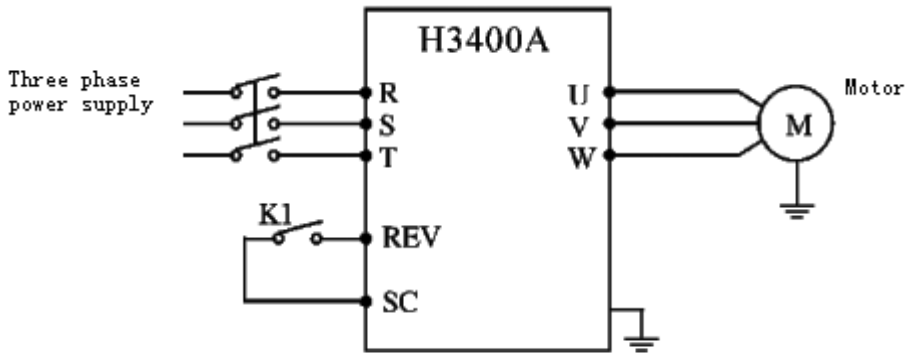
F1.03	Setup of stop key	factory set value 1		
	Setting range	0-1	Unit	1
	Setup content	0: stop key is invalid 1: stop key is valid		

When the running setup option is 1 or 2, that is when the running command comes from external terminal or RS485, you can choose to set the stop key on manipulator as invalid or valid so as to prevent false running.

When F1.03 is set at 0, that is when the stop key is invalid, stop key cannot stop running of frequency converter.

When F1.03 is set at 1, that is when stop key is valid, stop key can stop running of frequency converter.

Attention: when you stop frequency converter by pressing stop key, you have to contact running signal if you want to re-start frequency converter, then start frequency converter.



Procedure	Key and state	Explanation
1	K1 connected	Restpination of frequency converter is started
2	(K1 not connected) press stop key	Frequency converter stops
3	K1 disconnected	Running signal is removed
4	K1 connected	Restpination of frequency converter is started

F1.04	Setup of restpination		factory set value	
	Setting range	0-1	Unit	1
	Setup content	0: Restpination prohibited 1: Restpination allowed		

Many machineries and devices only allow rotation of single direction and prohibit restpination; or else, mechanical fault or accident may occur. You can set a machine in single rotation mode by dealing with this parameter.

0: Restpination prohibited

Restpination of motor is prohibited. When F1.04 is set at restpination prohibited, switch between corotation and restpination is invalid.

1: Restpination allowed

Motor allows restpination, switch between corotation and restpination is valid.

F1.05	Maximum running frequency	factory set value 50.00
	Setting range	Minimum running frequency ~ 400.00Hz

The running range of frequency converter is between 0.1~400.00Hz. Therefore, frequency converter can easily enter high speed running. Generally, motor and other machineries operate at the frequency of 50Hz. Running beyond that limit can easily cause mechanical fault or accident.

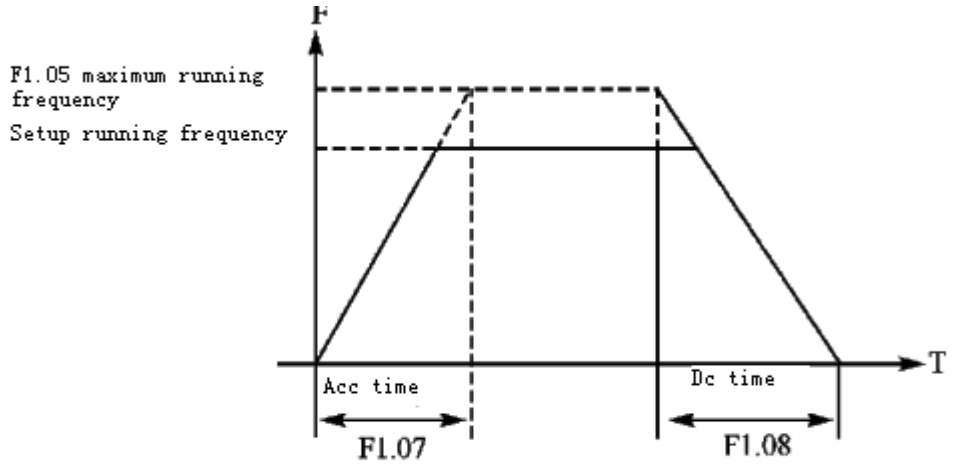
You can limit the maximum running frequency of motor by dealing with this parameter so as to prevent motor from operating at speed which is too high, so as to avoid mechanical wear and prevent hidden trouble. You can set a maximum running frequency for frequency converter according to actual need in production and technics so as to prevent false running.

F1.06	Minimum running frequency	factory set value 0.00
	Setting range	0.00 ~ maximum running frequency

Some machineries and devices cannot operate at rotation rate which is below a certain limit due to requirements in technics. Due speed running process, false operation is apt to occur, especially when POT is used to control frequency. You can put a limit to the minimum running frequency by dealing with this parameter. If the setup frequency signal is below that limit, the frequency converter will still output minimum frequency. Frequency converter operates at frequency between minimum running frequency and maximum running frequency, which can prevent false actuating and prevent overheat of motor caused by low running frequency.

F1.07	Acc time	factory set value
F1.08	Dc time	factory set value
	Setting range	0.1~6000.0

Acc time refers to the time for frequency converter to reach the maximum running frequency from 0.00Hz. Dc time refers to the time for frequency converter to lower to minimum running frequency from maximum running frequency.



In general running, the default acc time or dc time of frequency converter is the primary acc time or dc time. When other acc time or dc time is needed, you can set external terminal into corresponding state.

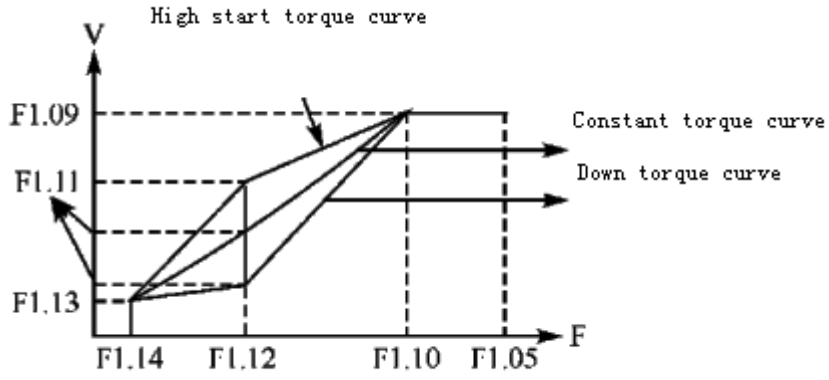
F1.09	V/F maximum voltage factory set value		
	Setting range	V/F intermediate voltage~500.00	Smallest unit 0.01
F1.10	V/F fundamental frequency factory set value 50		
	Setting range	V/F intermediate frequency ~ maximum running frequency	Smallest unit 0.01
F1.11	V/F intermediate voltage factory set value		
	Setting range	V/F minimum voltage ~ V/F maximum voltage	Smallest unit 0.1
F1.12	V/F intermediate frequency factory set value 2.5		
	Setting range	V/F minimum frequency ~ V/F fundamental frequency	Smallest unit 0.01
F1.13	V/F minimum voltage factory set value 15		
	Setting range	0.0 ~ V/F intermediate voltage	Smallest unit 0.1
F1.14	V/F minimum frequency factory set value 1.25		
	Setting range	0.0 ~ V/F intermediate frequency	Smallest unit 0.01

The team of parameters from F1.09 to F1.14 determines the V/F curve of frequency converter. Set corresponding V/F curves according to different loads.

Constant torque curve: applicable for constant torque load, output voltage and output frequency are in linear relation.

Down torque curve: applicable for double torque load, like fan and pump. Load is low in starting; load will increase with the increase of rotation rate.

High start torque curve: applicable for heavy and high start machineries. After starting, load will quickly decrease to a certain value.



F1.09: V/F maximum voltage, V/F maximum voltage can be set according to the parameter of motor brand. Generally, it will be set at the rated voltage of motor. When motor is very near to frequency converter, usually within 30m, it should be set at a higher value.

F1.10: V/F fundamental frequency

V/F fundamental frequency, please set it at the running voltage frequency of motor. Generally, do not change V/F fundamental frequency setup; or else, it is very likely to damage motor.

F1.11: V/F intermediate voltage

Set V/F intermediate voltage according to the specific load. Improper setup can cause over current of motor or insufficient torque output, or even cause frequency converter protection. Increasing the value of F1.11 can increase output torque, at the same time, output current will increase. Please monitor output current while changing the value of F1.11. The general requirement for setup is like the following: frequency converter can start smoothly. During starting, the current must be within the limit of frequency converter. While changing the value of it, adjust the value slowly until the one you want is reached. Do not try to increase the value by a wide margin; or else, it can cause frequency converter protection or fault.

F1.12: V/F intermediate frequency

V/F intermediate frequency determines the intermediate point of V/F curve. Improper setup can cause insufficient torque or over current protection of frequency converter. Generally, do not change the setup value of this parameter while using.

F1.13: V/F minimum voltage

V/F minimum voltage setup is relevant to start torque to a certain extend. Increasing the value of this parameter properly can increase the torque of starting, it can also cause over current. Generally, do not change the value of F1.13.

F1.14: V/F minimum frequency

V/F minimum frequency determines the initial point of V/F curve, it is the minimum value, in V/F curve, at which frequency converter starts.

Different loads have different V/F curves. According to the actual situation, the factory adjusts the V/F curve setup properly for frequency converters of different power sections. Refer to the following table for the specific factory set value of each model of frequency converter.

parameter / Model	F1.07	F1.08	F1.11	F1.15
H3200A00D4K	7	7	15	10
H3200A0D75K	8	8	14	10
H3200A01D5K	9	9	14	9
H3200A02D2K	10	10	13	9
H3400A0D75K	8	8	27	10
H3400A01D5K	9	9	26	9
H3400A02D2K	10	10	25	8
H3400A03D7K	12	12	24	8
H3400A05D5K	15	15	23	7
H3400A07D5K	18	18	22	6
H3400A0011K	20	20	22	5
H3400A0015K	22	22	20	5
H3400A0018K	28	28	20	4
H3400A0022K	30	30	19	4

parameter / Model	F1.07	F1.08	F1.11	F1.15
H3400A0030	35	35	18	4
H3400A0037K	38	38	18	4
H3400A0045K	40	40	17	4
H3400A0055K	45	45	17	3
H3400A0075K	50	50	16	3
H3400A0090K	60	60	16	2
H3400A0110K	80	80	15	2
H3400A0132K	100	100	15	2
H3400A0160K	120	120	14	1
H3400A0185K	150	150	13	1
H3400A0200K	200	200	12	1
H3400A0220K	200	200	12	1
H3400A0250K	220	220	12	1
H3400A0280K	250	250	12	1
H3400A0300K	280	280	11	1

F1.15	Carrier frequency factory set value
	Setting range 1-15 unit 1

Carrier frequency decides the on and off frequency of power module within frequency converter. The factory setups of frequency converters with different frequencies are different because carrier frequency is affected by noise, heat effect and disturbance.

Carrier frequency F1.15	Noise	Heat rate	Effect on environment
Small-great	Great-small	Small-great	Small-great

Judging from the content of the above table, higher carrier frequency, lower noise, and higher heat rate will cause greater effect on environment.

Therefore, when the environment demands running without noise, you shall increase the value of F1.15, the maximum load of frequency converter will decrease to a certain extend. For site in which motor is far from frequency converter, you shall lower the value of F1.15 so as to lower power leakage of wires and wire and ground.

When the temperature of environment is quite high and load of motor is quite high, you shall lower the value of F1.15 to change the thermal property of frequency converter. Refer to table in F1.14 for the factory set of F1.15.

F1.17	Initialization of parameters factory set value 0	
	Setting range 0-8	Unit 1
	Setup content	8: Initialization of parameters

When the parameter setup is not proper or when false running leads to improper setup of parameter, you can set F1.17 at 08 to restore all parameters to the factory set value, and then you can set them again according to actual need.

Attention: when locked up of parameters is valid, that is when F1.18=1, you cannot carry out initialization of parameters and change them. Please unlock first, and then set these parameters.

F1.18	Initialization of parameters factory set value 0	
	Setting range 0-1	Unit 1
	Setup content	0: Unlocked 1: Locked

You can lock up parameter by dealing with F1.18 to prevent irrelevant personnel from changing the setup of parameters by improper running.

When F1.18 is valid, that is when parameters are locked; other parameters cannot be changed, except for this parameter and dominant frequency setup.

7.3 Parameters of basic applications

F2.00	Options of start mode factory set value 0			
	Setting range	0-1	Smallest unit	1
	Setup content		0: Start at start frequency 1; Racing start	

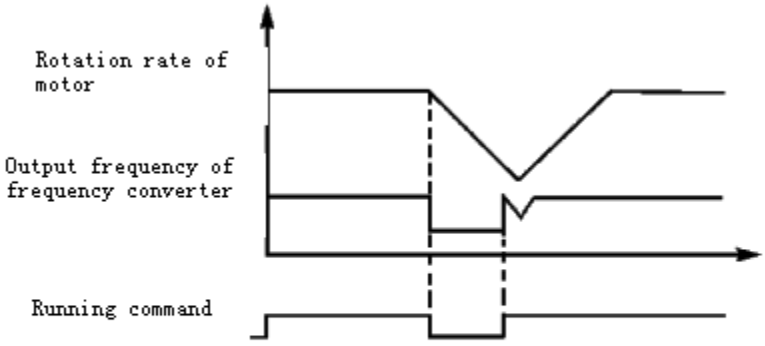
There are two start modes for H3000 series frequency converter. You can choose from the two by setup of parameter F2.00 and the condition of machinery.

0: Start at start frequency

Most loads do not have special requirement in start. Generally, start the machine at start frequency, the regular start mode.

1: Racing start

Racing start is applicable for start after fault reset or stop. Under such a situation, while racing start, frequency converter can automatically decide the rotation rate and rotation direction of motor. According to the result of measurement and follow-up, direct start the motor which is not stopped.



Attention: when frequency converter starts in racing start mode, frequency converter will have speed follow-up in the sequence of high to low frequency. High current is likely in start, it is also possible to have over current. Therefore, you need to have over current level setup (4.09 setup). The specific value depends on the load.

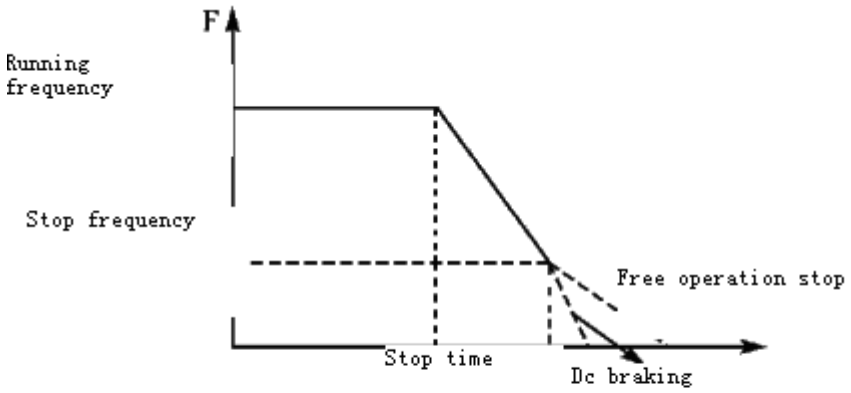
In addition, when the value of 4.09 is too low, it can cause slowness in follow-up and start. In the follow-up process, when there is over current which exceeds the over current follow-up level, frequency converter will stop follow-up. Once the current decreases below the level, frequency converter will resume follow-up again.

F2.01	Options of stop mode	factory set value 0		
	Setting range	0-1	Unit	1
	Setup content	0: De stop 1: Free running stop		

You can choose a suitable stop mode according to the actual load.

0: De stop

Once frequency converter receives stop command, it will carry out deceleration according to the deceleration time and decrease output gradually until the output frequency reaches the frequency for stop.



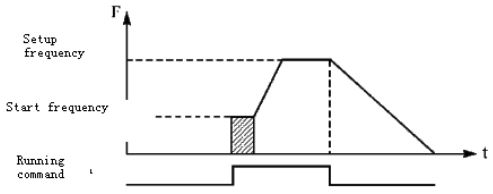
With regard to stop mode after stop frequency is reached, you can choose dc braking and other options. If you do not choose dc braking, it will stop in free running stop mode.

1: Free running stop

When frequency converter receives stop command, it will stop frequency output and it will have free running with load until it stops.

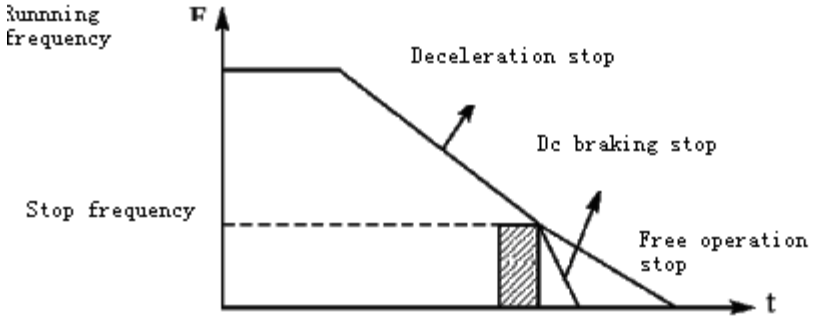
F2.02	Start frequency setup factory set value 0.5			
	Setting range	0.10-10.00	Unit	0.01

Start frequency is the initial frequency when frequency converter starts. For inertia, heavy load, and device which demands large torque, increasing start frequency can get them started easily; however, if the start frequency is set at a value too high, it may cause over current protection.



F2.03	Stop frequency setup factory set value 0.5			
	Setting range	0.10-10.00	Unit	0.01

When frequency converter receives stop command, it begins to carry out deceleration and decreases output gradually according to the fixed time until the stop frequency is reached, then it will have free running stop or dc braking stop according to the setup.



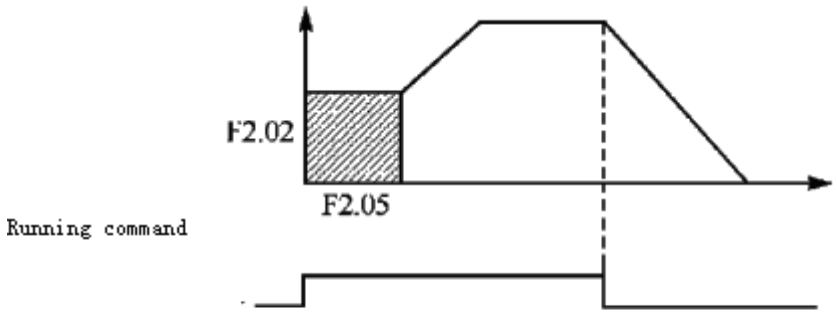
When dc braking is invalid, frequency converter decreases rotation rate until stop frequency is reached; frequency converter will stop output and stop in free running stop mode.

F2.04	Dc braking current in start factory set value 100			
	Setting range	0-150	Unit	1
F2.05	Dc braking time in start factory set value 0			
	Setting range	0-250	Unit	1

Dc braking in start is applicable for fan in stop mode and moving load. Because before frequency converter starts, motor is in free running mode and the rotation direction is not specified. It is easy to activate over current protection in start. Therefore, before start, you shall open dc braking to let load stay in stop mode, then start frequency converter, this procedure can prevent over current protection.

Dc braking current in start is the ratio of rated current of frequency converter, adjusting F2.04 can have different braking torques. While setting value of parameter, you can adjust it from low to high until a sufficient braking torque is reached according to the actual load.

Dc braking time is the period dc braking lasts. When it is 0, dc braking is invalid.



F2.06	Dc braking current in stop factory set value 100			
	Setting range	0-150	Unit	1
F2.07	Dc braking time in stop factory set value 0			
	Setting range	0-250	Unit	1

Dc braking in stop is applicable for site which has strict requirement on braking.

Dc braking current in stop is the ratio of rated current of frequency converter. Adjusting this parameter can have different braking torques.

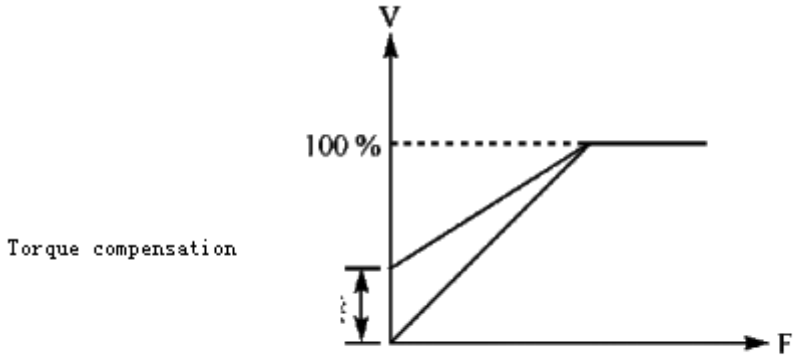
Dc braking time in stop is the period dc braking mode lasts. When it is 0, dc braking is invalid.

Refer to the explanations of F2.03, F2.04 and F2.05 for relevant details.

F2.08	Automatic torque compensation factory set value 5%			
	Setting range	0.1-20%	Unit	0.1

Adjusting parameter F2.08 can increase voltage and obtain higher torque.

Attention: increasing torque by a great margin can cause heating of motor. Whiling setting, increase voltage by a proper margin according to the actual load.



F2.09	Rated voltage of motor factory set value 380.00V			
	Setting range	0-500.00	Unit	0.01
F2.10	Rated current of motor factory set value *			
	Setting range		Smallest unit	0. 1
F2.11	Rated no load current of motor factory set value 40			
	Setting range	0-100	Unit	1
F2.12	Rated rotation rate of motor factory set value 1420			
	Setting range	0-6000	Unit	1
F2.13	Relative number of motor factory set value 4			
	Setting range	0-10	Unit	1
F2.14	Rated slip of motor factory set value 2.5			
	Setting range	0-100	Unit	0. 1

The above group of parameter is the parameters on motor nameplate. Please follow the nameplate while setting parameters.

F2.09 Rated voltage of motor

Please set rated voltage of motor according to voltage value on nameplate.

F2.10 Rated current of motor

Please set rated current of motor according to the current value on nameplate. If the running current exceeds the value of rated current, frequency converter will activate protection to protection motor.

F2.11 Rated no load current of motor

The value of rated no load current of motor can affect slip compensation. Rated no load current is the percentage of motor current.

F2.12 Rated rotation rate of motor

The value of parameter F1.12 is the rotation rate at 50Hz. It is related to rotation rate display. Generally, it shall be set according to the value on nameplate.

To display the actual rotation rate of motor, you can set parameter F2.12 at the actual rotation rate at 50Hz.

F2.13 Number of pole pairs of motor

Set the number of pole pairs of motor by adjusting this parameter according to the value on nameplate

F2.14 Rated slip of motor

When frequency converter drives motor, slip will increase with the increase of load. Adjusting F2.14 can set compensation rate and decrease slip and let motor approach simultaneous rotation rate.

F2.15	Rated frequency of converter factory set value 50Hz			
	Setting range	0.00-400.00	Unit	0.01
F2.16	Resistance of stator factory set value 0			
	Setting range	0-100.00	Unit	0.01
F2.17	Resistance of rotor factory set value 0			
	Setting range	0-100.00	Unit	0.01
F2.18	Self inductance of rotor factory set value 0			
	Setting range	0-1.000	Unit	0.001
F2.19	Mutual inductance of rotor factory set value 0			
	Setting range	0-1.000	Unit	0.001

The above parameters are parameters of motor.

F2.15 Rated frequency of motor

Please set rated frequency of motor according to motor nameplate.

F2.16 Resistance of stator

F2.17 Resistance of rotor

F2.18 Self inductance of rotor

F2.19 Mutual inductance of rotor

Set the above parameters according to the actual condition of motor.

7.3Parameters for i nput and output application

F3.00	FIV minimum voltage input factory set value 0			
	Setting range	0~FIV maximum voltage input	Unit	0.1
F3.01	FIV maximum voltage input factory set value 10.0			
	Setting range	FIV minimum voltage input~0	Unit	0.1
F3.02	FIV input filter time factory set value 1.0			
	Setting range	0-25.0	Unit	1

F3.00 FIV minimum voltage input

FIV minimum voltage input value is related to frequency of low analogue. Voltage command below this value is deemed as invalid command.

F3.01 FIV maximum voltage input

FIV maximum voltage input value is related to frequency of high analogue. For voltage higher than this value, the machine will still operate at this value.

The value of F3.00 and that of F3.01 decide the range of input voltage, applicable for upper computer with different outputs. Due to disturbance and other reasons, false running is apt to occur while dealing with signal no more than 1V. Set F3.00 to avoid signal below 1V so as to improve the anti-disturbance capacity.

F3.02 Input filter time

Value of input filter time decides the response speed of frequency converter to analogue change. With the increase of value of F3.02, the frequency converter will get slower for responding to analogue change.

F3.03	FIC minimum current input factory set value 0			
	Setting range	0~FIC maximum current input	Unit	0.1
F3.04	FIC maximum current input factory set value 20.0			
	Setting range	FIC minimum current input-20.0	Unit	0.1
F3.05	FIC input filter time factory set value 1.0			
	Setting range	0-25.0	Unit	0.1

F3.03: FIC minimum current input

FIC minimum current input is related to frequency of low analogue. Frequency converter will deem current signal below value of F3.03 as invalid.

F3.04: FIC maximum current input

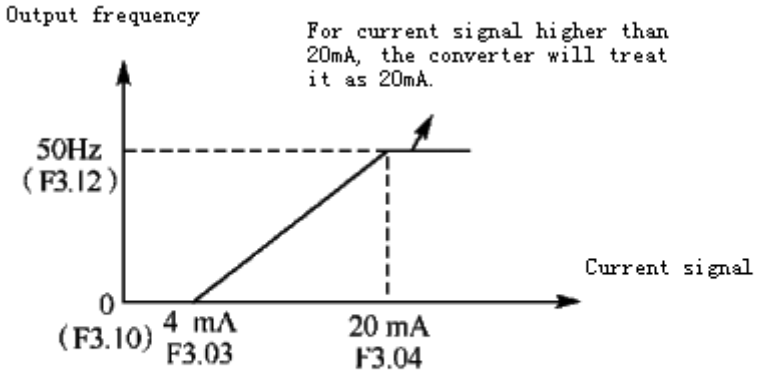
FIC maximum current input is related to frequency of high analogue. For current command higher than value of F3.04, frequency converter will operate at the value.

F3.05: FIC input filter time

FIC input filter time decides how fast frequency converter responds to analogue change. With the increase of value of F3.05, frequency converter will respond more and more slowly to analogue change. The output of frequency converter will be relatively stable.

Refer to explanations of F3.00 to F3.02 for relevant parameters. If the external input is voltage signal, refer to F3.00-F3.02. If the external input is current signal, refer to F3.03-F3.05.

For example, if the output signal of upper computer is 4-20mA, the corresponding frequency shall be within the range of 0–50Hz.



Parameters: F3.03=4 F3.04=20 F3.10= 0 F3.12= 50

F3.06	FOV minimum voltage output factory set value 0			
	Setting range	0-FOV maximum voltage output	Unit	0.1
F3.07	FOV maximum voltage output factory set value 10.0			
	Setting range	FOV minimum voltage output-10.0	Unit	0.1

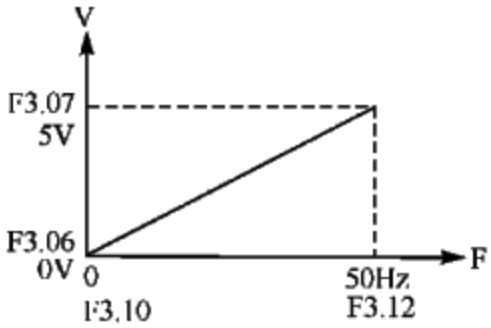
The value of F3.06 and that of F3.07 decide the range of output voltage of FOV terminal.

F3.06 FOV minimum voltage output is related to frequency of low analogue.

F3.07 FOV maximum voltage output is related to frequency of high analogue. You can connect voltmeters of various measurement ranges by setting parameter F3.06 and F3.07.

For example, use a frequency meter with input voltage of 0-5V and measurement range of 0-50Hz to monitor the output frequency of frequency converter.

Then you need to set them like the following: F3.06-F3.07=5.



F3.08	FOC minimum current output factory set value 0			
	Setting range	0-FOC maximum current output	Unit	0.1
F3.09	FOC maximum current output factory set value 20.0			
	Setting range	FOC minimum current output-20.0	Unit	0.1

F3.08 and F3.09 decides the range of output current of FOC terminal. F3.08 and F3.09 correspond to frequency of low analogue and frequency of high analogue respectively. Refer to explanations of F3.06 and F3.07 for relevant parameters.

F3.10	Frequency of low analogue factory set value 0.00			
	Setting range	0.0-600.00	Unit	0.01
F3.11	Direction of low analogue factory set value 0			
	Setting range	0-1	Unit	1
	Setup content	0: Positive direction 1: Negative direction		
F3.12	Frequency of high analogue factory set value 50			
	Setting range	0.00-600.00	Unit	0.01
F3.13	Direction of high analogue factory set value 0			
	Setting range	0-1	Unit	1
	Setup content	0: Positive direction 1: Negative direction		
F3.14	Analogue restpination options factory set value 0			
	Setting range	0-1	Unit	1
	Setup content	0: No restpination at negative bias voltage 1: Restpination allowed at negative bias voltage		

The parameter group of F3.10-F3.14 decides the running condition of analogue, including running frequency and direction. According to actual need of user, they can form various control curves.

F3.10 Frequency of low analogue

Frequency of lower analogue decides the running frequency of low analogue, corresponding to analogue minimum voltage (current) input.

F3.11 Direction of lower analogue

Direction of lower analogue decides the running condition at low frequency, whether it is corotation or restpination.

F3.12 Analogue high-end frequency

Analogue high-end frequency determines high-end running frequency, and is corresponding to analogue maximum voltage (current) input.

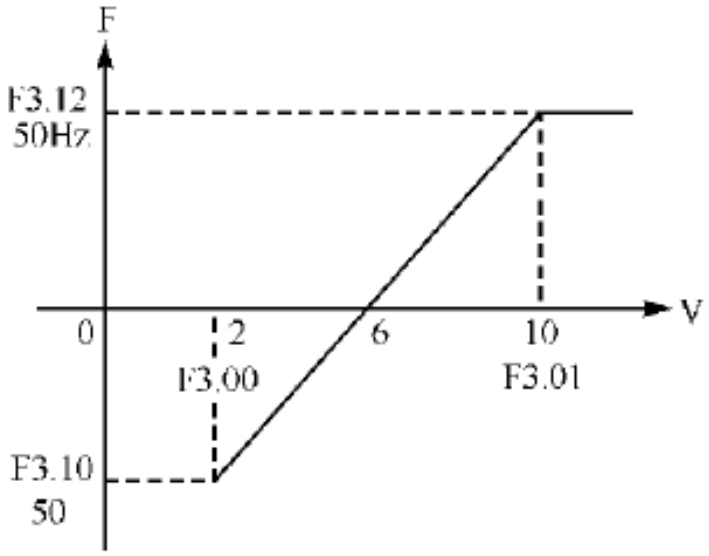
F3.13 Analogue high-end direction

Analogue high-end direction determines whether the running status of high-end frequency is corotation or restpination.

F3.14 Analogue restpination selection

Analogue restpination selection determines running status of analog negative bias voltage, satisfied curve needed by customer can be constituted by using above parameter.

Example 1: upper computer exports 2-10 V signal to control frequency converter, 50Hz restpination to 50Hz corotation running.



Introduction: F3.00=2 FIV minimum voltage input: 2V (frequency converter regards signals below 2V as invalid signals);

F3.01=10 FIV maximum voltage input: 10V (signals over 10V are regarded and handled as 10V);

F3.10=50 Analogue low-end frequency: 50Hz;

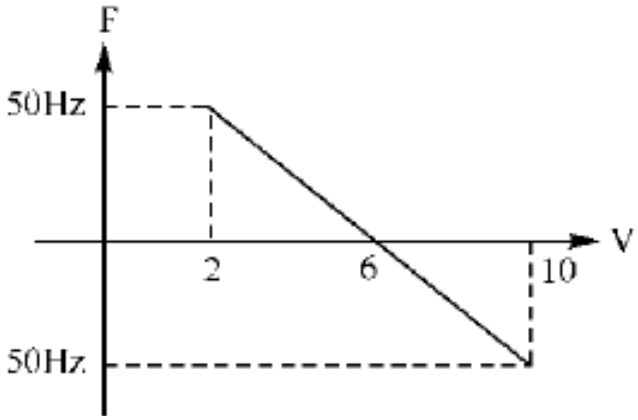
F3.11=1 Analogue low-end direction: 1 (restpination);

F3.12=50 Analogue high-end frequency: 50Hz;

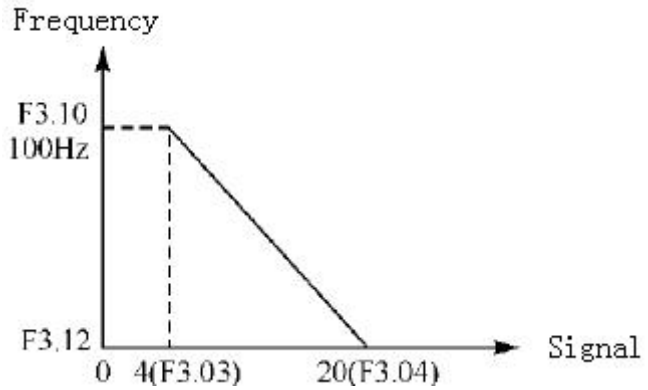
F3.13=0 Analogue high-end direction: 0 (corotation);

F3.14=1 Analogue restpination selection: 1 (negative bias voltage can be revensed).

Attention: In various curves, switching instructions of corotation and restpination remain effective, when corotation and restpination are switched, the curve will be revensed, and the diagram of curve is as follows:



Example 2, upper computer exports 4-20mA, and controls running of frequency converter Running frequency is 100Hz-0Hz



Parameter: F3.3=4 FIC minimum current input

F3.04=20 FIC maximum current input

F3.10=100.00 analogue low-end frequency

F3.11=0 analogue low-end direction (corotation)

F3.12=0 analogue high-end frequency

F3.14=0 analogue high-end direction (corotation)

Special inverted curve can be constituted by using F3.10-F3.14.

Introduction: signal input below 4mA is regarded as invalid signal by frequency converter.

F3.15	Multifunction input terminal---FWD terminal			Ex factory value 6
F3.16	Multifunction input terminal---REV terminal			Ex factory value 7
F3.17	Multifunction input terminal---S1 terminal			Ex factory value 1
F3.18	Multifunction input terminal---S2 terminal			Ex factory value 18
F3.19	Multifunction input terminal---S3 terminal			Ex factory value 15
F3.20	Multifunction input terminal---S4 terminal			Ex factory value 16
F3.21	Multifunction input terminal---S5 terminal			Ex factory value 8
F3.22	Multifunction input terminal---S6 terminal			Ex factory value 9
	Preset range	0-32	Unit	1
	Preset content	0: Invalid 1: Inching motion 2: Inching motion corotation 3: Inching motion restpination 4: Corotation/ restpination 5: Running 6: Corotation 7: Restpination 8: Stop 9: Multi-speed selection one 10: Multi-speed selection two 11: Multi-speed selection three 12: Multi-speed selection four 13: Accelerate/ decelerate selection one 14: Accelerate/ decelerate selection two 15: Frequency increasing signal Up 16: Frequency decreasing signal Down 17: Free stopping 18: Fault reset 19: PID put into running 20: PLC put in 21: Timer 1 start up 22: Timer 2 start up			

		23: Counter pulse input 24: Counter reset 25: PLC memory removal 26: Winding action begins

0: Invalid

Set as empty terminal, no function

1: Inching motion

Set as inching motion (inching), usually used in trial running, common inching is operated by 5Hz,

2: Inching motion corotation

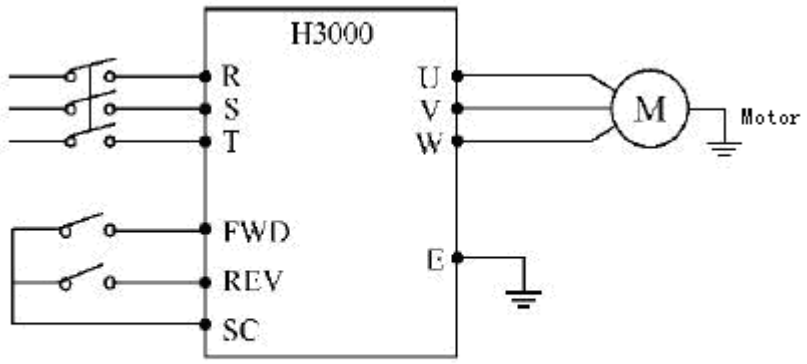
Set as inching motion running

3: Inching motion restpination

Set inching motion restpination

4: Corotation/ restpination

Set as corotation/ restpination switching, when the terminal is defined to be valid, running status revenses



Parameter: F1.02=1, F3.15=6, F3.16=4

Terminal status		Running condition
FWD	REV	
ON	OFF	Corotation
ON	ON	Restpination
OFF	OFF	Stopping

5: Running

Set terminal as running signal.

6: Corotation

Define terminal to be corotating, when terminal is defined as valid, frequency converter corotates

7: Restpination

Define terminal to be revensing, when terminal is defined as valid, frequency converter revenses

8: Stopping

Define terminal to be stopping, when terminal is valid, frequency converter decelerates and stops

9: Multi-speed one

10: Multi-speed two

11: Multi-speed three

12: Multi-speed four

15-speed can be integrated by multi-speed one, two, three and four, the concrete speed is determined by status of multi-speed one, two, three and four.

Multi-function terminal				Status and explanation
Multi-speed one	Multi-speed two	Multi-speed three	Multi-speed four	
0	0	0	0	Primary frequency, Primary frequency is determined by F1.00 or potentiometer
1	0	0	0	Multi-section speed terminal one (F5.03)
0	1	0	0	Multi-section speed terminal two (F5.04)
0	0	1	0	Multi-section speed terminal three (F5.05)
0	0	0	1	Multi-section speed terminal four (F5.06)
1	1	0	0	Multi-section speed terminal five (F5.07)
1	0	1	0	Multi-section speed terminal six (F5.08)
1	0	0	1	Multi-section speed terminal seven (F5.09)
0	1	1	0	Multi-section speed terminal eight (F5.10)
0	1	0	1	Multi-section speed terminal nine (F5.11)
0	0	1	1	Multi-section speed terminal ten (F5.12)
1	1	1	0	Multi-section speed terminal eleven (F5.13)
1	1	0	1	Multi-section speed terminal twelve (F5.14)
1	0	1	1	Multi-section speed terminal thirteen (F5.15)
0	1	1	1	Multi-section speed terminal fourteen (F5.16)
1	1	1	1	Multi-section speed terminal fifteen (F5.17)

Chapter Seven Specification of Function Parameter

Remark: 0: terminal invalid 1: terminal invalid

13: accelerate/ decelerate selection one

14: accelerate/ decelerate selection two

Four kinds of accelerate/ decelerate times can be combined by accelerate/ decelerate selection one, two.

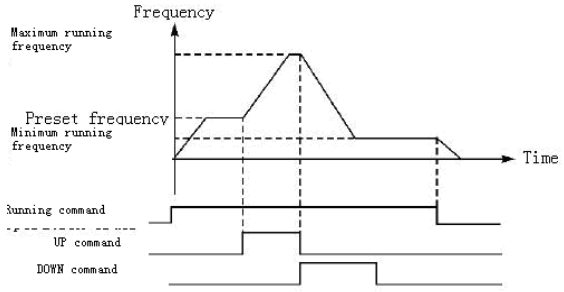
Multi-function terminal		Accelerate/ decelerate status and result
Accelerate/ decelerate selection one	Accelerate/ decelerate selection two	
0	0	Accelerate/ decelerate time one (F1.07, F1.08)
1	0	Accelerate/ decelerate time two (F4.01, F4.02)
0	1	Accelerate/ decelerate time three (F4.03, F4.04)
1	1	Accelerate/ decelerate time four (F4.05, F4.06)

15. Frequency is increasing signal (Up signal)

When this terminal is valid, the frequency increases at a uniform speed, until operative frequency is highest.

16. Frequency is decreasing signal (Down signal)

When this terminal is valid, the frequency decreases at a uniform speed, until operative frequency is lowest.



Attention: After up or down is used to alter frequency and electric power is turned off and it is reset again, the frequency after alteration is not memorized, and the frequency converter still memorizes the set value of F1.00.

17: Free stop

When terminal is valid, frequency converter stops exporting and free running stops.

18. Fault reset

When frequency converter fails, resetting may be carried out through this setting, whose

function is the same as that of RESET key on the manipulator.

19. PID put into running

When this contact closes, PID opens, when F6.01 is set as 2, that is when PID condition operates; PID is invalid when this contact is disconnected.

20. PLC put into running

When this contact closes, PLC function starts up, and corresponding PLC function opens.

21. Timer 1 starts up

22. Timer 2 starts up

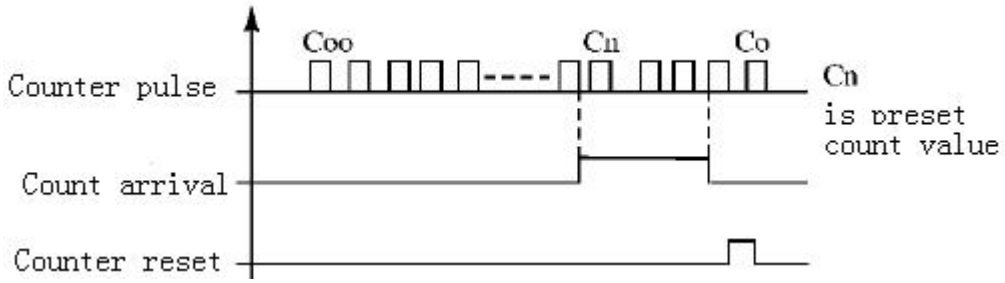
When this contact closes, timer starts up and begins timing, when the timer reaches set value, corresponding multifunction exports contacting action.

23. Counter pulse input

This terminal may accept pulse signals of no more than 250 Hz.

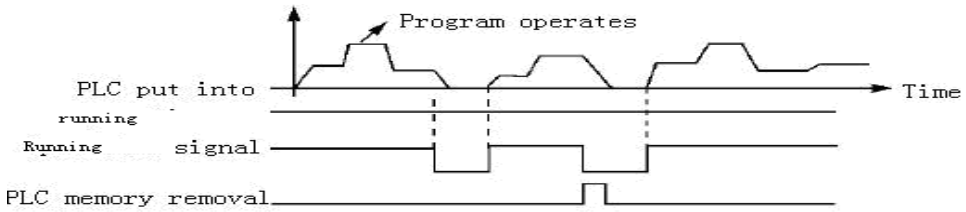
24. Counter resetting

The counted values may be reset and cleared through this terminal.



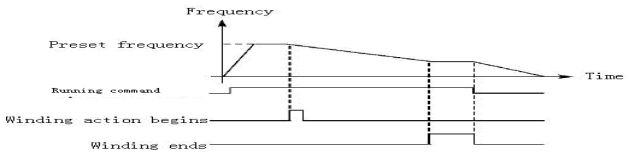
25. PLC memory removal

In the running process of PLC program, owing to fault or stopping, frequency converter will record status of the program automatically, after the fault is cured and the frequency converter is switched on again, the frequency converter will continue running according to the program, when memory removal is valid, program may be reset, and frequency converter operates from the beginning.



26. Winding action begins

When this contact is activated, winding begins.



Introduction: Winding action is activated, and winding begins;

 Winding ends, frequency converter exports according to frequency upon completion of winding, corresponding winding ends, and multifunction exports terminal action;

 Frequency converter stops, terminal exported by multifunction is reset automatically upon completion of winding.

F3.23	Export terminal M01		Ex-factory value 01	
F3.24	Export terminal M02		Ex-factory value 02	
F3.25	Export terminal YA, YB, YC		Ex-factory value 03	
	Preset range	0-32	Unit	1
	Preset content	0: Invalid 1: In running 2: Fault arrival 3: In fault 4: Zero-speed 5: Frequency 1 arrival 6: Frequency 2 arrival 7: Accelerating 8: Decelerating 9: Low-voltage alarming 10: Timer 1 arrival 11: Timer 2 arrival 12: Stage completion indication 13: Process completion indication 14: PID upper limit 15: PID lower limit 16: 4-20mA disconnection 17: Overload detection 18: Over torque detection 26: Winding ends 27: Set counter arrival 28: Middle counter arrival		

0: Invalid

Set as empty terminal, prevent false running.

1. In running

Terminal is defined to be in running, when frequency converter is ordered to export or operate, this terminal acts.

2. Frequency arrival

When frequency arrives at preset value, this contact acts

3. In fault

When frequency converter detects abnormal existing, this contact acts, this contact may be utilized for alarming.

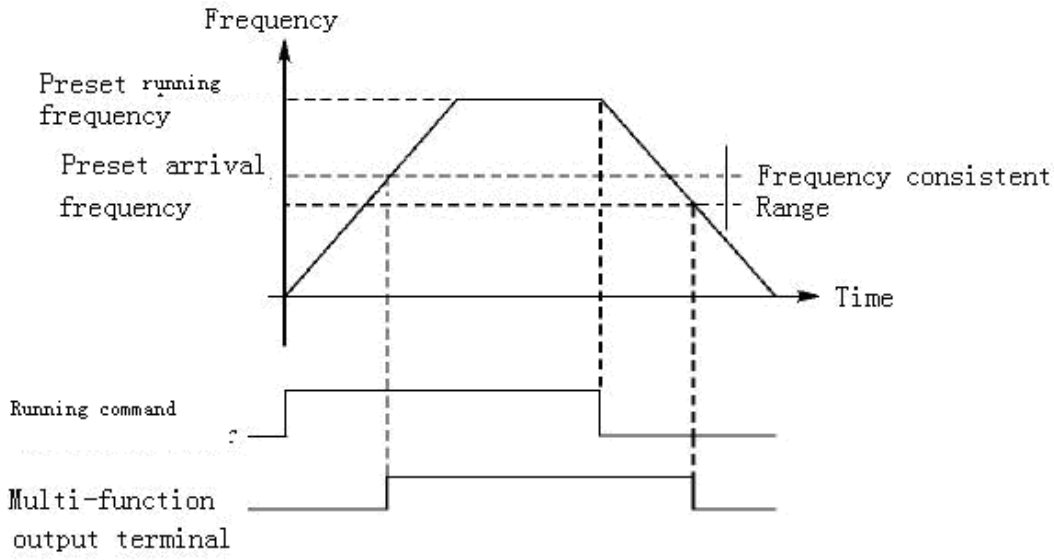
4. Zero-speed

When frequency exported by frequency converter is less than start-up frequency, this contact acts.

5. Frequency 1 arrival

6. frequency 2 arrival

When frequency arrives at preset value, this contact acts.

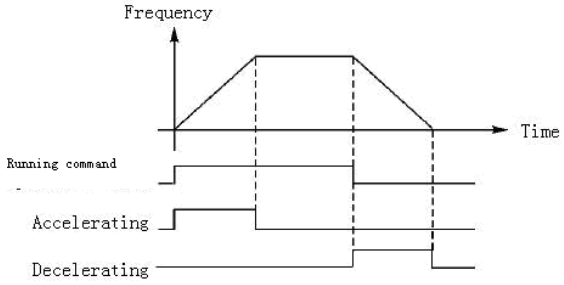


7: Accelerating

When frequency converter is in the status of accelerating, this contact acts.

8: Decelerating

When frequency converter is in the status of decelerating, this contact acts.



Convert

9. Low-voltage alarming

When frequency converter detects that DC bus is lower than preset value, this contact acts and alarms, low-voltage alarming preset value can be set through advanced application parameter group.

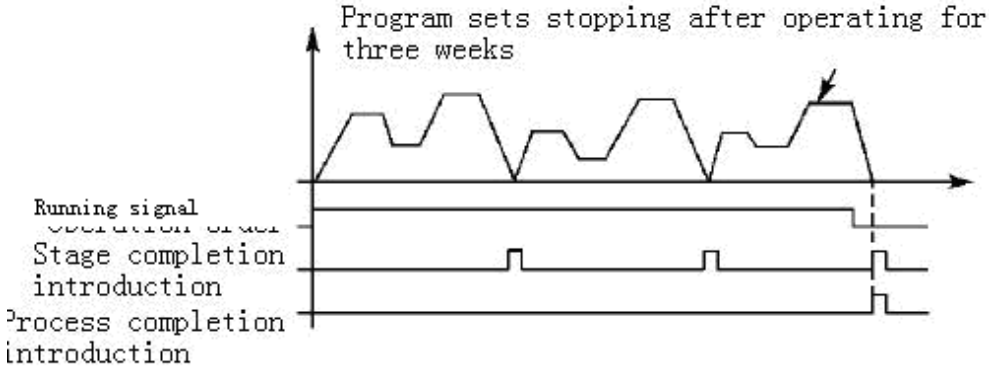
10: Timer 1 arrival

11: Timer 2 arrival

When frequency converter arrives at preset value, this contact acts, when timer start-up signal is removed, this contact is reset.

12: Stage completion indication

When implementation program of frequency converter runs; after completion of each stage, multi-function output contact exports a pulse.



13. Process completion indication

When implementation program of frequency converter runs and all procedures completes, a pulse is exported, this pulse can be used as alarming signal to notify running personnel, or as start-up signal of the next procedure.

14. PID upper limit

When PID feedback quantity exceeds preset value of upper limit, this contact acts, it is usually taken as alarming output, or emergent stopping to prevent accident.

15: PID lower limit

When PID feedback quantity is lower than preset value, this contact acts.

16: 4-20mA disconnection

When FIC input signal is disconnected, this contact acts and alarms.

17: Overload detection

When frequency converter detects that motor overloads, this contact acts.

18: Over torque detection

When frequency converter detects over torque, this contact acts.

26: Winding ends

When winding action ends, this contact acts, when frequency converter stops, winding ends and contact is reset, please refer to Start-up introduction of winding of multi-function input terminal.

27: Set counter arrival

When frequency converter implements external counter, and when count value arrives at preset value (F4.25), this contact acts.

28: Middle counter arrival

When frequency converter counts, if count value arrives at preset value (F4.26), this contact acts.

F3.26	Output terminal FOV			Ex-factory value 0
	Preset range	0-7	Minimum unit	1
F3.27	Output terminal FOC			Ex-factory value 1
	Preset content	0: Output frequency 1: Output current 2: Direct voltage 3: Alternating voltage		

F3.26 output terminal FOV

FOV terminal may export 0-10V voltage, output may be preset in range of 0-10V through F3.06 and F3.07 and being corresponding to output frequency, output current, direct voltage, alternating voltage and so on.

F3.27 output terminal FOC

FOC terminal may export 0-20m current, output range may be preset by F3.08 and F3.09 and being corresponding to output frequency, output current, direct voltage, alternating voltage and so on.

0: Output frequency:

Current (voltage) output is corresponding to minimum running frequency---maximum running frequency.

1: Output current

Current (voltage) output is corresponding to 0---2×frequency converter rated current.

2: Direct voltage

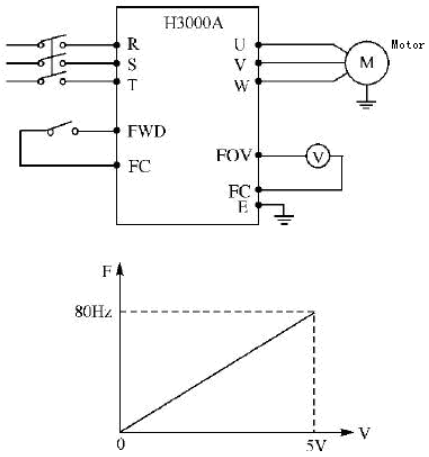
Current (voltage) output is corresponding to 0---1000V.

3: Alternating voltage

Current (voltage) output is corresponding to 0---510V.

For example: select a frequency meter of 0-5V, supervise output frequency, preset the minimum running frequency of frequency converter as 0.00Hz, the highest running frequency is 80Hz.

Then:



Parameter: F1.05=80.00 Maximum running frequency

F1.06=0.00 Minimum running frequency

F3.06=0.00 FOV minimum voltage output

F3.07=5.00 FOV maximum voltage output

7.4 Secondary application group

F4.00	Inching motion frequency preset 5.00			Ex-factory value
	Preset range	0.00---maximum running frequency	Unit	0.01

Inching motion frequency preset is usually applied to trial run, inching motion running can only be achieved through external terminal, and external terminal can be selected freely.

When inching motion function is achieved, other instruction can not be accepted, and after inching motion is let go, frequency converter decelerates and stops, inching motion accelerate/ decelerate tacitly approve the fourth accelerate/ decelerate time of frequency converter.

Control priority level:

Inching motion→ external multi-speed→PLC running means→ PID means→ triangular wave running means→ winding→ frequency conversion preset means.

Several control ways input simultaneously, and operate by highest priority level.

F4.01	Accelerate time 2			ex-factory value 10.0
F4.02	Decelerate time 2			ex-factory value 10.0
F4.03	Accelerate time 3			ex-factory value 20.0
F4.04	Decelerate time 3			ex-factory value 20.0
F4.05	Accelerate time 4			ex-factory value 2.0
F4.06	Decelerate time 4			ex-factory value 2.0
	Preset range	0-6000.0	Minimum unit	0.1

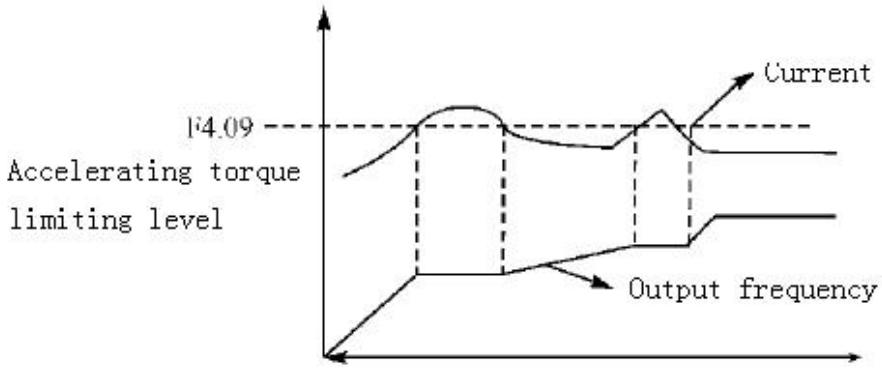
H3000 series frequency converters preset four accelerate/ decelerate times, usually, frequency converter tacitly approves the first accelerate/ decelerate time, and inching motion tacitly approves the fourth accelerate/ decelerate time, users may selection accelerate/ decelerate time freely according to their own needs, in external control of multi-speed, status of external terminal determines accelerate/ decelerate times, when internal multi-speed is selected, different accelerate/ decelerate times may be selected through simple PLC.

F4.07	Designated value of counter			ex-factory value 100
F4.08	Middle value of counter			ex-factory value 50
	Preset range	0-6500	unit	1

H3000 series frequency converter designs 2 groups of counters, pulse signal less than 250Hz may be accepted through multi-function terminal, when count value reaches preset value, corresponding multi-function output terminal acts, input terminal of counter resets signal through counter, counter resets and begins counting again, pulse signal may use proximity switch and photoelectric switch as input signals.

F 4.09	Accelerating torque limiting level			Ex-factory value 150
	Preset range	0-200	Unit	1

In the accelerating process of frequency converter, for reasons including overloading and accelerating/ decelerating, output current of frequency converter may be relatively large and beyond the protection range of frequency converter, limiting level of overage current may be set through F4.09, when current reaches set value, frequency converter will stop accelerating, and when current is below the set value, frequency converter continues accelerating.

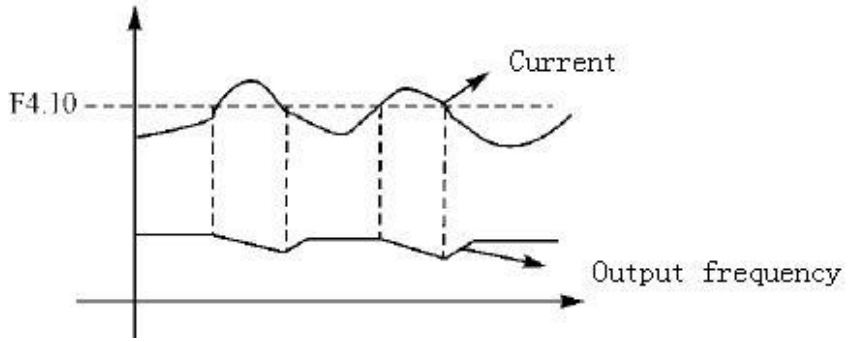


100% current is the rated current of frequency converter, when F4.09 is set to be 0, then accelerating torque limit is invalid, and it does not have protecting function.

F4.10	Constant-speed torque limiting level			Ex-factory value 00
	Preset range	0-200	Unit	1

In the constant-speed running of frequency converter, load fluctuates, therefore output current of frequency converter changes, if there is no certain limitation, frequency converter may jump protection because the current is too large, constant-speed torque limiting level may be set through F4.10, when the current exceeds F4.10 preset value, frequency converter will reduce output frequency automatically, and when current goes back to natural level, frequency converter accelerates newly to preset frequency (100% current is rated current of frequency converter).

When F4.10 is set to be 0, constant-speed torque limiting level is invalid and cannot protect.



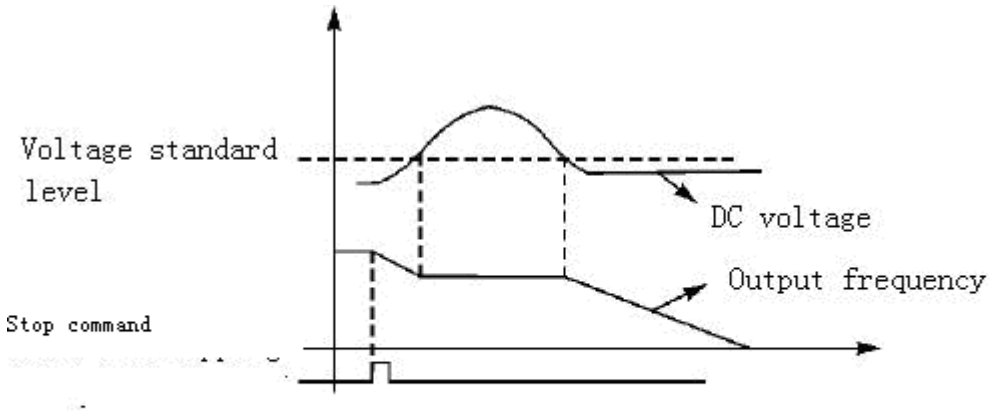
F4.11	Deceleration over-voltage prevent selection			Ex-factory value 1
	Preset range	0-1	Unit	
	Preset content	0:Invalid 1:Valid		

0: Invalid

In the process of decelerating of frequency converter, owing to the decelerating is too rapid, the dc-bus voltage of frequency converter may increase, when over-voltage prevention selection is invalid, frequency converter does not carry out measures to dc-bus voltage increasing, and frequency converter over-voltage protection may be caused finally.

1: Valid

Over-voltage prevention selection is valid, in the stopping process of frequency converter, when voltage reaches preset value, frequency converter stops decelerating first, until dc-bus voltage returns to allowable value, frequency converter continue decelerating.



F 4.12	Automatic voltage regulation selection			Ex-factory value 1
	Preset range	0-2	Unit	1
	Preset content	0: Invalid 1: Valid 2: Invalid when decelerating		

When motor runs under the condition that input electric source is instable, temperature of the machinery will increase, insulation will be damaged, and output torque will be instable.

0: Invalid

Select automatic voltage regulation to be invalid, frequency converter output voltage fluctuates.

1: Automatic voltage regulation is valid.

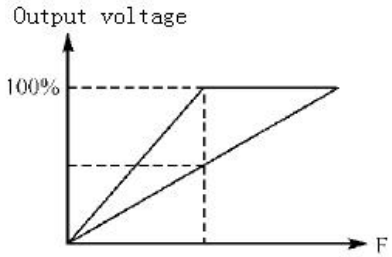
Automatic voltage regulation function is selected, and under the condition that input electric source is instable, frequency converter exports stable voltage automatically.

2: Invalid when decelerating: when this function is selected, braking function of frequency converter can be strengthened.

F 4.13	Automatic energy-saving selection			Ex-factory value 0.0
	Preset range	0-100	Minimum unit	1
F 4.14	Brake-pipe action voltage			Ex-factory value 800
	Preset range	Low-voltage protection---high-voltage protection	Unit	
F 4.15	Brake-pipe action proportion			Ex-factory value 50
	Preset range	40-100	Unit	1

F4.13 Automatic energy-saving selection

In constant-speed running of automatic energy-saving selection, best voltage value may be calculated by loading condition and provided to load, in order to achieve the target of energy-saving.



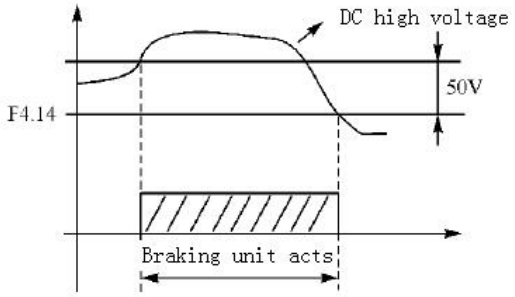
Attention: for running that load changes frequently or is almost at full load, this function is not applicable.

F4.14 and F4.15 are only useful for frequency converter with built-in braking units, and are invalid for frequency converter with external braking units.

The two parameters above set internal DC high voltage standard level and ratio of braking action of frequency converter.

F.14 Brake-pipe action voltage

Through this parameter, brake-pipe action voltage is set, when frequency converter DC high voltage is higher than set value of F4.14, built-in braking unit acts, through braking resistance, energy is released, and DC voltage falls back, when DC voltage falls to a certain value, built-in braking unit closes.



Pay attention when setting the parameter, if it is set too high, DC voltage may be too high, and frequency converter protection may be caused, if it is too low, calorific value of braking resistance may be too high.

F4.15 Ratio of brake-pipe action

When ratio of brake-pipe action is applicable to braking unit action, average voltage put on the braking resistance, and voltage on braking resistance, are voltage pulse-width modulation wave, duty ratio is equal to ratio of braking action, and is equivalent to ratio of switching tube action, if the ratio is big, energy releasing will be rapid and power consumed on resistance will be big.

F 4.16	Power fault restart selection			Ex-factory value 0
	Preset range	0-1	Unit	1
	Preset content	0: Invalid: no restart after instant power fault 1: Valid: frequency tracking start-up		

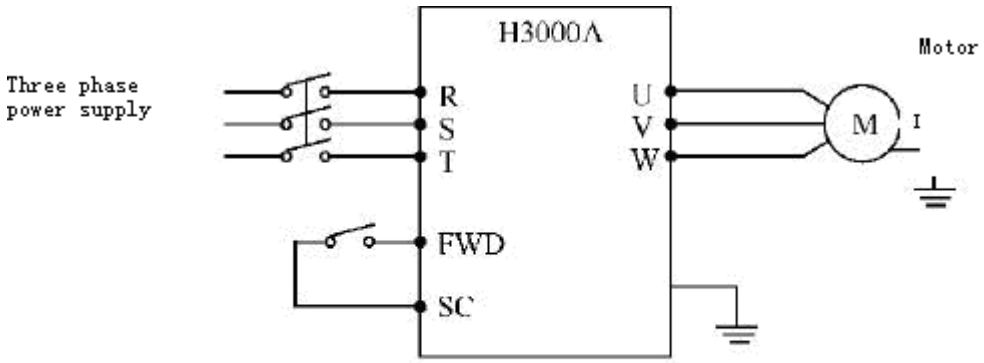
0: Invalid

Power fault restart is invalid, after power fault, frequency converter removes running orders automatically. After power is recovered, it should be started by ordinary start-up means.

1: Frequency tracking start-up

Power fault restart is valid, after frequency converter is allowed to be down, running orders are kept in a period of time (within the time of allowable power fault), after electricity is obtained, frequency converter is started according to frequency tracking means, if time of power down exceeds allowable time, frequency converter removes running orders, and after electricity is obtained, it should be started by ordinary start-up means.

Attention: when valid power fault restarting is used, frequency converter will start-up suddenly, please pay attention to safety, besides, when a terminal is used to control start-up and stopping of frequency converter, external terminal status must be paid attention to, after power fault, external terminal is still closed, so frequency converter will start suddenly after electricity is on, please be careful.



For example: Use K1, control running of frequency conversion

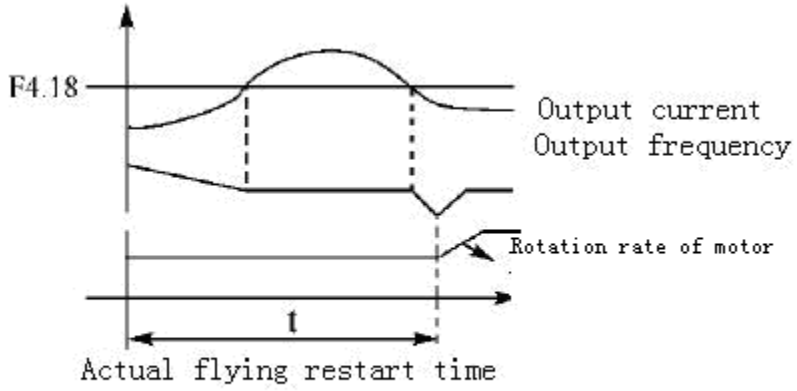
K1 closes, frequency conversion operates, K1 is cut off, frequency converter stops, when power fault, K1 remains closed, when power is on, frequency converter starts up suddenly, it is very dangerous, please use other controlling methods, such as three-wire system connection method.

F4.17	Allowable time of power fault			Ex-factory value 5.0
	Preset range	0-10.0	Minimum unit	0.1

F4.17 sets allowable time of power fault, if time of power fault exceeds set value, power fault restart is invalid.

F4.18	Flying restart current limiting level		Ex-factory value 150	
	Preset range	0-200	Minimum unit	1

When frequency converter implements flying restart, frequency converter tracks downwards from preset frequency by highest speed, output current of frequency converter increases relatively rapid and may exceeds protection unit preset by frequency converter, at this time, frequency converter stops tracking, and output current of frequency converter falls back to common, frequency converter continues tracking, preset value 100% of this parameter is rated current of frequency converter, and protection unit when frequency converter tracks may be set through F4.18.



F4.19	Flying restart time			Ex-factory value 5
	Preset range	0-10	Unit	

When frequency converter implements flying restart, frequency converter tracks downwards by highest speed, and completes tracking in preset range of time, if it is not completed within preset time, frequency converter protects.

In graphic illustration of F4.18, when t value > F4.19 preset value, frequency converter protects.

F4.20	Fault restart number of times			Ex-factory value 0
	Preset range	0-5	Unit	1
F4.21	Fault restart time			Ex-factory value 2
	Preset range	0-100	Unit	1

After abnormity (such as current, over-voltage and so on) occurs, frequency converter resets automatically (valid when non-zero as set by F4.20), after the period of time set by F4.21, frequency converter starts up according to preset start-up means (F2.00).

After start-up, if no abnormity happens within 60 seconds, frequency converter resets F4.20 automatically, after start-up,

if abnormity happens again within 60 seconds, frequency converter records number of times, and when number of times of abnormities reach set value of F4.20, frequency converter stops exporting, and does not implement automatic reset or restart again, frequency converter restart needs to be implemented by common start-up procedure.

Attention: when times of fault restart are set to be zero, fault restart is invalid, when fault restart function is valid, frequency converter will start suddenly, this is very dangerous, so when this function is used, please pay attention to safety.

F4.22	Over torque action selection		Ex-factory 0	
	Preset range	0-3	Minimum unit	1
	Preset content	0: frequency arrives, frequency converter begins detecting, over torque, frequency converter continues operating 1: frequency arrives, frequency converter begins detecting, over torque, frequency converter stops operating 2: In running, frequency converter detects over torque, over torque, frequency converter continues operating 3: In running, frequency converter detects over torque, over torque, frequency converter stops operating		

Introduction: 0: when running frequency reaches preset frequency, frequency converter begins detecting over torque, when frequency converter detection reaches over torque, frequency converter continues operating, and does not detect accelerating over torque.

1: When running frequency reaches preset frequency, frequency converter begins to detect over torque, when frequency converter detects over torque, frequency converter stops.

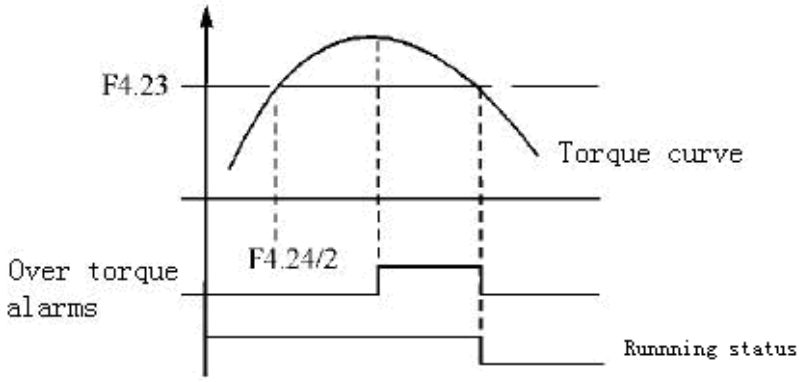
2: Running begins, frequency converter begins to detect over torque, when over torque is detected; frequency converter does not handle it and continues operating.

3: Running begins, frequency converter begins to detect over torque, when over torque is detected, frequency converter stops.

F4.23	Over torque detection level 0			Ex-factory
	Preset range	0-200	Minimum	1
F4.24	Over torque detection time Ex-factory 0			
	Preset range	0-200	Minimum	1

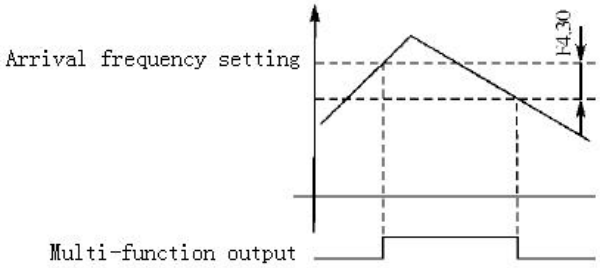
When output current of frequency converter exceeds preset value of F4.23---over torque detection level, frequency converter begins to calculate over torque time,

when the duration exceeds half of preset value of F4.24 (over torque detection time), corresponding multi-function terminal acts, over torque alarms, frequency conversion continues operating, if the duration exceeds preset value of F4.24, frequency converter protects, handles according to preset action of F4.22, and reveals fault information. When over torque detection level is set to be zero, over torque detection is invalid, and 100% is frequency converter rated current.



F4.25	Frequency one arrives at preset frequency value 100			Ex-factory
	Preset range	0-Maximum running frequency	Minimum unit	0.1
4.26	Frequency two arrives at preset frequency value 5.0			Ex-factory
	Preset range	0-maximum preset frequency	Unit	0.1

H3000A series sets two groups of frequencies to arrive, when running frequency arrives at preset value of F4.25 and F4.26, corresponding multi-function output terminal acts. Arrival width of frequency is a hysteresis loop, which is set by F4.30.



F4.27	No. 1 timer			Ex-factory value 0
	Preset range	0.0-6000.0S	Minimum unit	0.1
F4.28	No. 2 timer			Ex-factory value 0
	Preset range	0.0-6000.0S	Minimum unit	0.1

H3000 series have two timers, which are common timers, when time of the timers reaches preset value (set by F4.27 and F4.28), corresponding multi-function terminal acts, and timers start-up is controlled by external multi-function input terminal.

Some simple program actions may be made by using the two timers.

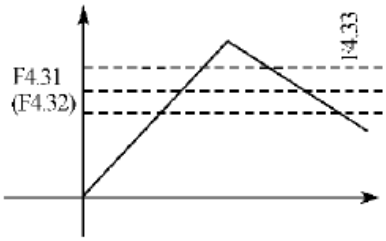
F4.29	Constant-speed torque limiting time			Ex-factory value 0.50
	Preset range	0-6000.0S	unit	0.1

F4.30	Width of arrival of frequency at hysteresis loop			Ex-factory value 0.50
	Preset range	0.00-2.00	unit	0.01

This parameter sets frequency arrival width, for details, refer to F4.25-F426 introductions.

F4.31	Jump frequency one			Ex-factory value 0
	Preset range	0.00-frequency upper limit	unit	0.01
F4.32	Jump frequency two			Ex-factory value 0
	Preset range	0.00-frequency upper limit	unit	0.01
F4.33	Jump frequency hysteresis loop width			Ex-factory value 0.50
	Preset range	0.00-2.00	unit	0.01

Owing to machinery reason and other reasons, in running of frequency converter, resonance may be caused at a certain frequency, in order to avoid resonance point, resonance frequency may be overleaped through setting of F4.31-F4.33 to achieve the purpose of avoiding resonance, H3000A sets two jump frequencies totally. To provide convenience for customer usage, jump broad width may be set freely through F4.33 as follows:



7.5 Application function group

F5.00	PLC memory means			Ex-factory value 0
Preset range	0-1	Unit	1	
	Preset content	1: Memorize 2: Do not memorize		

Program running pause function may be achieved through F5.00 to achieve program running memory.

0: Do not memorize

In the operative process of PLC program, F5.00 selects not to memorize, when machinery stops because of fault and other reasons, frequency converter does not memorize status before the stopping, and after restart, running begins from initial state.

1: Memorize

In the running of PLC program, F5.00 selects to memorize, when it stops because of fault and some other reasons, frequency converter memorizes status before running, and after restart, frequency converter continues operating according to program, attention: power to frequency converter cannot be cut off.

Stopping, power break down and power on, frequency converter does not memorize status before power break down, after restart, frequency converter operates according to program from initial state.

F5.01	PLC start-up means			Ex-factory value 0
	Preset range	0-1	Minimum unit	1
	Preset content	0: Invalid (PLC does not start) 1: Valid (PLC starts)		

F5.01 determines running mode of frequency converter:

F5.01=0, select PLC not to start, frequency converter operates by common means.

When F5.01=1, select PLC to start, frequency converter selection program operates.

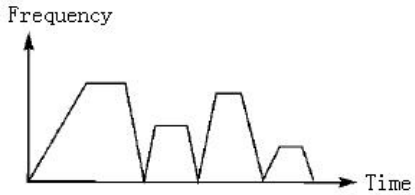
Under the status of PLC start-up, when various running orders and programs are given, frequency converter selects highest level to implement according to priority levels from high to low.

Precedence level	Priority level	Item
High	1	Inching motion
	2	External multi-speed
	3	Internal multi-speed
	4	PID
	5	Triangular wave
	6	Winding
low	7	Frequency conversion preset means

F5.02	PLC running mode			Ex-factory value 0
	Preset range	0-4	Unit	1
	Preset content	0: PLC stops after operating for one week 1: PLC pause means, stops after operating for one week 2: PLC cycle running 3: PLC pause means cycle running 4: After operating for one week, PLC continues operating by ultimate running frequency		

PLC running mode determines running status of internal multi-speed---operating for one week, or cycle running, F5.02 is only valid when PLC starts up.

PLC pause mode running means, in the running process of internal multi-speed, after completion of each speed, it decelerates and stops, and then it accelerates to the next speed, and implements running of the next speed as follows:



Users may select proper running mode freely according to actual conditions.

F5.03	Multi-section speed terminal 1		Factory default 10.0	
F5.04	Multi-section speed terminal 2		Factory default 15.0	
F5.05	Multi-section speed terminal 3		Factory default 20.0	
F5.06	Multi-section speed terminal 4		Factory default 25.0	
F5.07	Multi-section speed terminal 5		Factory default 30.0	
F5.08	Multi-section speed terminal 6		Factory default 35.0	
F5.09	Multi-section speed terminal 7		Factory default 40.0	
F5.10	Multi-section speed terminal 8		Factory default 45.0	
F5.11	Multi-section speed terminal 9		Factory default 50.0	
F5.12	Multi-section speed terminal 10		Factory default 10.0	
F5.13	Multi-section speed terminal 11		Factory default 10.0	
F5.14	Multi-section speed terminal 12		Factory default 10.0	
F5.15	Multi-section speed terminal 13		Factory default 10.0	
F5.16	Multi-section speed terminal 14		Factory default 10.0	
F5.17	Multi-section speed terminal 15		Factory default 10.0	
	Setting range	0.00 ----- Maximum running frequency	Unit	0.01

F5.03 ----- F5.17 are 15 vary rated frequency in the running. The varying rated is related to external end, and please consult varying rated instruction 1, 2, 3, 4 of multifunctional end.

F5.18	PLC running duration 1	Factory default 100
F5.19	PLC running duration 2	Factory default 100
F5.20	PLC running duration 3	Factory default 100
F5.21	PLC running duration 4	Factory default 100
F5.22	PLC running duration 5	Factory default 100
F5.23	PLC running duration 6	Factory default 0
F5.24	PLC running duration 7	Factory default 0
F5.25	PLC running duration 8	Factory default 0

F5.26	PLC running duration 9	Factory default 0		
F5.27	PLC running duration 10	Factory default 0		
F5.28	PLC running duration 11	Factory default 0		
F5.29	PLC running duration 12	Factory default 0		
F5.30	PLC running duration 13	Factory default 0		
F5.31	PLC running duration 14	Factory default 0		
F5.32	PLC running duration 15	Factory default 0		
	Setting range	0 ----- 65000	Unit	1

PLC running duration determines internal controlling varying rated running duration for each segment, and the running duration for each segment is corresponding to its rate.

F5.33	PLC running duration 15	Factory default 0		
	Setting range	0 ----- 32767	Unit	1

F5.33 setting running direction of each segment

Method of setting running direction:

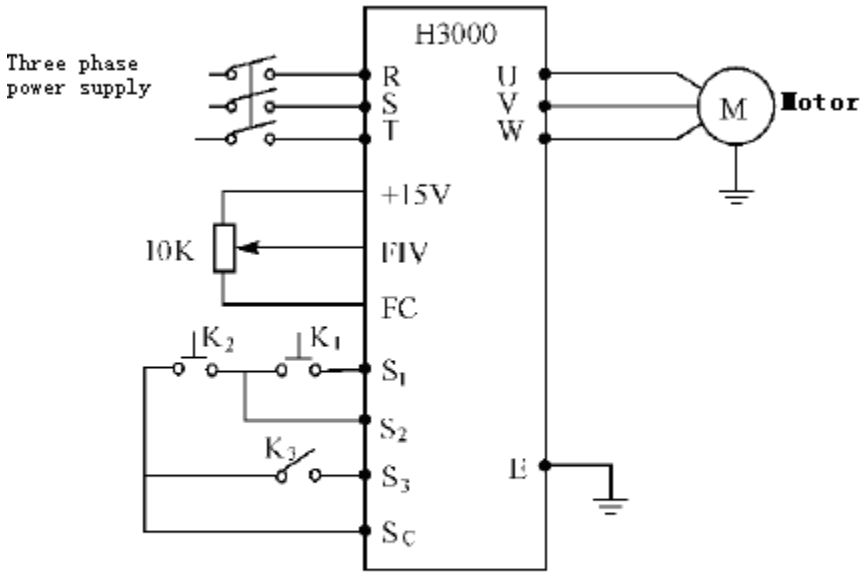
The way of setting running direction: by means of 16-bit binary system, and then transfer to decimal system value; every bit decides the corresponding running direction: 0 is running forward and 1 is running backward, and this parameter is only valid when the PLC is on.

For example: there is a five-segment rate, the circling running is required as follow:

Items	Running frequency	Running direction	Running duration
Dominant frequency	Potentiometer is adjustable	Forward	
Segment 1	20.0	Backward	20
Segment 2	60.0	Forward	25
Segment 3	40.0	Backward	30
Segment 4	15.0	Forward	20

Two buttons, one is for running, the other one is for ceasing; the main frequency requires adjustable potentiometer.

(1) Connection illustration



(2) Parameter setting

PLC running direction setting: (F5.33 setting)

Rate of segment 1	Rate of segment 2	Rate of segment 3	Rate of segment 4	Dominant frequency	
4	3	2	1	0	→ position (bit)
0	1	0	1	0	→ turning direction <0 is forward, 1 is backward
0×2^4	1×2^3	0×2^2	1×2^1	0×2^0	→ transfer to decimal system

The binary system number 01010 is transferred to decimal system number: $1\times2^1+1\times2^3+8=10$

Define to: F5.33=10

The parameter defines to:

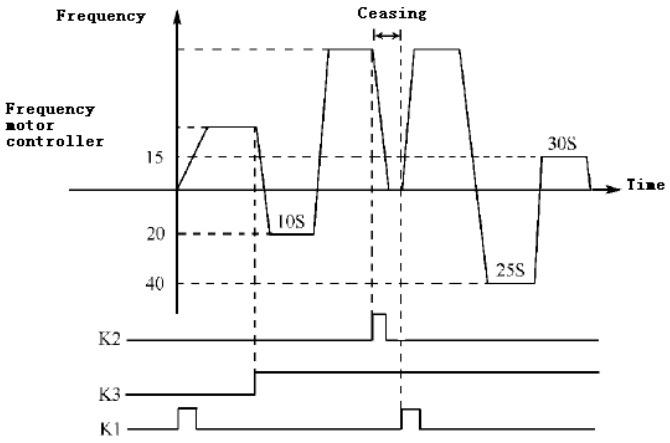
F1.01=3 (Keyboard potentiometer setting mode: dominant frequency is controlled by potentiometer)

F1.02=2 (Running setting option: multifunctional end input)

F1.05=60 (The maximum running frequency is 60HZ)

F1.07=10 F1.08=10 (accelerate/decelerate duration 10S)

F3.14=6	(S1 end is running forward)
F3.18=8	(S2 end is ceasing)
F3.19=20	S3 end is PLC starting to running
F5.00=1	PLC programming memory
F5.01=1	PLC is on
F5.02=0	PLC running one circle and then ceasing
F5.03=1	Segment 1 rated 20Hz
F5.04=60	Segment 1 rated 60Hz
F5.05=40	Segment 1 rated 40Hz
F5.06=15	Segment 1 rated 15Hz
F5.18=10	Segment 1 rated running duration is 10s
F5.19=20	Segment 1 rated running duration is 20s
F5.20=25	Segment 1 rated running duration is 25s
F5.21=30	Segment 1 rated running duration is 30s



Action instruction: □ Press K1 to startup the transducer, and the potentiometer will set running frequency.

□ Press K3, PLC to startup, and from the segment 1

PLC program running one circle and then ceasing

□ If the program is running, press K_3, or if there is a fault, and the transducer is ceasing, when the fault is solved, press K_1 and the transducer will running forward as the program.

□ If F5.00 is 1 and the program is not memory, so the running will start from the very beginning.

7.6 Seondary application group (PID)

F6.00	PID startup mode		Factory set value 0	
	Setting range	0-1	Unit	1
	Setup content	0: Invalid PID does not start up 1: Valid PID does start up 2: PID starts up on condition		

0: Invalid
PID does not start up and does not play PID function.
1: Valid
PID starts up, and keeps being valid without external end input.
2: PID starts up on condition; PID will start and be functional in the condition of external end PID running validly.

F6.01	PID startup mode		Factory set value 0	
	Setting range	0-1	Unit	1
	Setup content	0: Invalid negative feedback mode 1: Valid positive feedback mode		

1: Positive feedback mode

Positive feedback mode is contrary to negative feedback mode; in case feedback value is more than target value through comparison, and F6.01 = 1 is set, the frequency converter will decelerate if choosing positive feedback mode; similarly, in case the feedback value is less than target value, the frequency converter will accelerate by the target value

F6.02	PID target value selection 0			Factory set value:
	Setting range	0-2	Unit	1
	Setup content	0: Select numeric target value 1: Select FOV as target value 2: Select FOC as target value		

F6.02 sets the source of target value, H3000 could select three ways of source, and target could set, through frequency converter, external terminal, voltage, current input, etc.

0: Select numeric target value.

Target value is to be given by F6.04.

1: Select FOV as target value.

Target value is to be given by voltage signal via FOV, and also could be given by utilizing FOV terminal-special potentiometer.

2: Select FOC as target value.

Target value is to be given by current signal via FOC.

F6.03	PID target value selection 0			Factory set value:
	Setting range	0-2	Unit	1
	Setup content	0: Select FOV as feedback value 1: Select FOC as feedback value 2: Select the difference between FOV and FOC as feedback value 3: Select the difference between FOC and FOV as feedback value		

Notes: F6.03 parameter setting: Select PID feedback channel

0: Select FOV as feedback value

Namely, select FOV as feedback channel, to be fed back as voltage signal

1: Select FOC as feedback value

Select FOC as feedback channel, to be fed back as current signal

2: Select the difference between FOV and FOC as feedback value

Select the difference between FOV and FOC as feedback value, and select each of them as feedback channel

3: Select the difference between FOC and FOV as feedback value

Select FOC and FOV as feedback channel

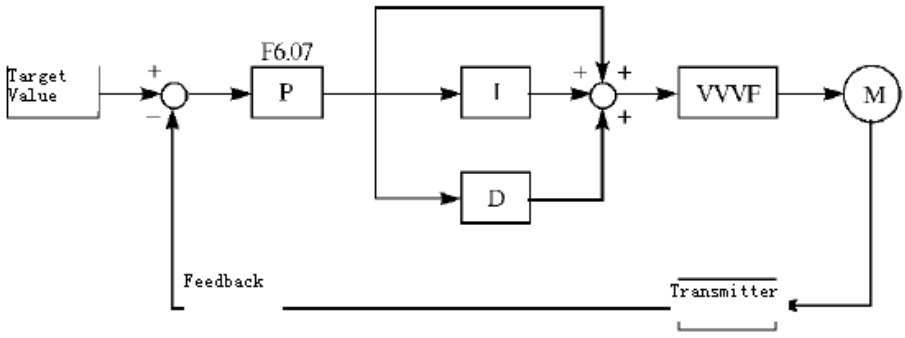
F6.03	PID numeric target value 0			Factory set value:
	Setting range	0-2	Unit	1
	Setup content	0: Select FOV as feedback value		

Numerical target value is completely corresponding to analogue plus 10V voltage.

PID closed-loop control is generally used to control the process with dull change in physical quantity, such as control of pressure, temperature, etc.; feedback signal is generally gotten from temperature transmitter, pressure transmitter, etc., in case of PID control, the feedback signal input in channel is analogue current signal 4 – 20mA or 0 – 10V, with two channels available for setting and selection.

PID closed-loop control is active in case of activating multi-functional input PID.

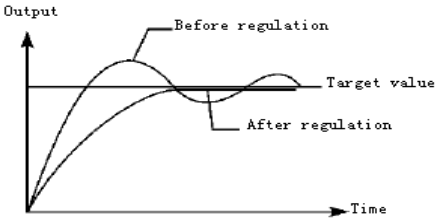
Block diagram of PID control:

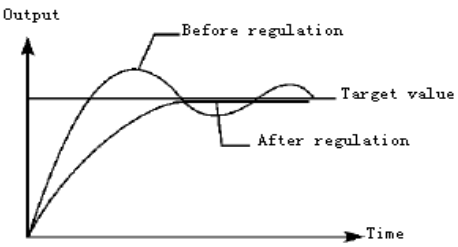


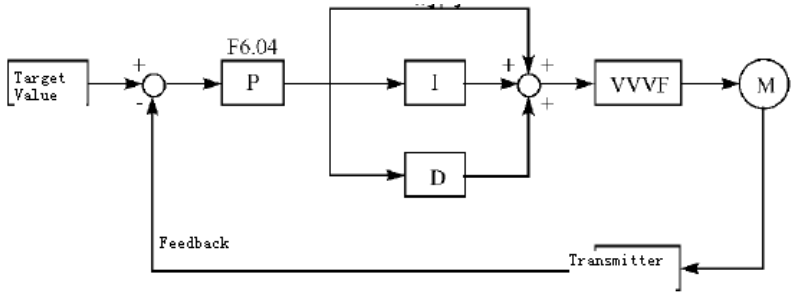
General regulation method for PID control:

(1) Select transmitter correctly, for which the standard signal of 4 – 20mA or 0 – 10V shall be selected as output specification;

(2) Set target value correctly;
(3) Increase proportionality constant (P), in case of non-oscillating output;
(4) Decrease integration time (Ti), in case of non-oscillating output;
(5) Increase derivative (Td), in case of non-oscillating output;

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

	2. Restraint output from oscillating a: Decrease derivative time (D value) or set it as 0 b: Decrease the value of proportionality constant (P)



F6.05	PID upper alarm value			Factory set value: 0
	Setting range	0.0 – 100%	Unit	0.1

PID upper alarm value is applicable for abnormality alarming; in case PID feedback signal value is more than PID upper alarm value, the corresponding multi-functional output action informs users of handling, without shutting down frequency converter.

F6.06	PID lower alarm value			Factory set value: 0
	Setting range	0.0 – 100%	Unit	0.1

PID lower alarm value is applicable for alarming machine abnormality; in case PID feedback value is less than the lower setting value, the corresponding multi-functional output terminal action is used for alarming, without shutting down frequency converter in this case.

F6.07	PID P value 100%			Factory set value:
	Setting range	0.0 – 200%	Unit	0.1

P value (proportionality constant) sets error value gain, and is only used for proportional control if the value of I and D is set as 0.

F6.08	PID I value			Factory set value: 10.0
	Setting range	0.0 – 200.0S	Unit	0.1

I value (integration time) sets the response speed of action; the more I value is, the slower the response speed is; in case I value is set minor, oscillation will occur due to rapid response, while in case I value is set as 0, it indicates shut-down.

F6.09	PID D value 0			Factory set value:
	Setting range	0.00 – 20.0	Unit	0.01

D value (derivative time) sets the attenuation of PID action, the more D value is, the more obvious the attenuation effect is; in case D value is set as 0, it indicates shut-down.

F6.10	PID action step-length			Factory set value: 0.10
	Setting range	0.00 – 1.00HZ	Unit	0.01

PID figures once every 10ms, and is able to figure out a frequency increment (□FHz) every time, while F6.10 sets the maximum value of frequency increment, so if the figured frequency increment exceeds the setting value of F6.10, the setting value shall prevail.

F6.11	PID sleep frequency			Factory set value: 0.00
	Setting range	0.00 – 120.00HZ	Unit	0.01
F6.12	PID sleep duration			Factory set value: 10.0
	Setting range	0.0 – 200.0	Unit	0.1
F6.10	PID sleep wake-up value			Factory set value: 00%
	Setting range	0.0 – 100%		

F6.11 PID sleep frequency.

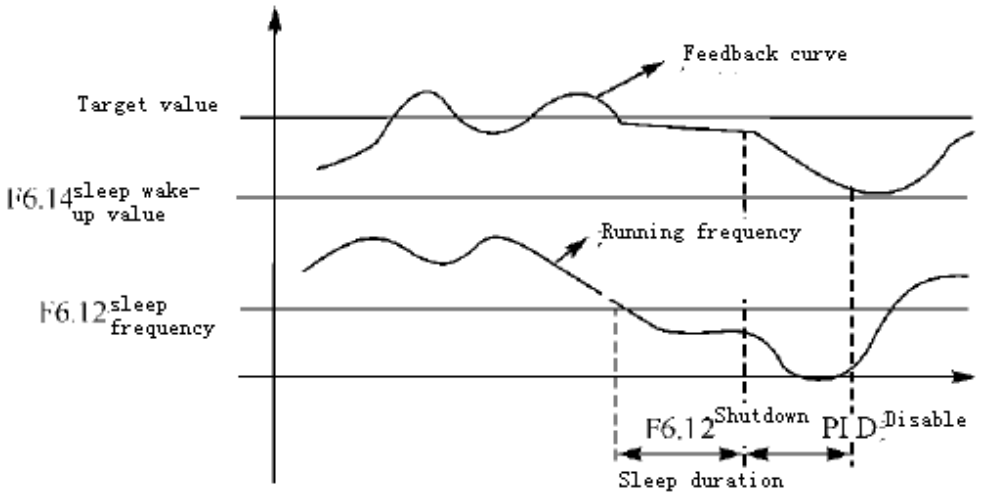
F6.11 sets the minimum frequency that must be achieved in case PID sleeps, in case the running frequency is less than the setting value of F6.11, it begins to time the sleep duration.

F6.12 PID sleep duration.

F6.12 PID sleep duration sets to enter into sleep mode, while frequency converter is required to run duration under sleep frequency, in case the running duration of frequency converter under sleep frequency exceeds the setting value (sleep duration) of F6.12, frequency converter enters into sleep mode, stops output, and disable PID, but still monitors 6.13 PID feedback

F6.13: PID sleep wake-up value.

After entering into sleep mode, frequency converter still monitors PID feedback, in case frequency converter detects that feedback value is less than sleep wake-up value (F6.13 setting), PID function will be activated, and then frequency converter starts.



In case target value is 60% (0 – 100% is corresponding to 0 – 10V), and the wake-up value is 80%, which is actually corresponding to 0 – 10V, then the actual wake-up value is 60% × 80% = 48% (corresponding to 0 – 10V).

F6.14	PID corresponding value of display			Factory set value: 1000
	Setting range	0 – 1000	Unit	1
F6.15	PID digit of display			Factory set value: 4
	Setting range	0 – 5	Unit	1
	0: Not display PID feedback value 1: Display 1 digit 2: Display 2 digits		3: Display 3 digits 4: Display 4 digits 5: Display 5 digits	
F6.16	PID decimal digit of display			Factory set value: 1
	Setting range	0 – 4	Unit	1
	Setup content	0: Not display after decimal point 1: Display 1 digit after decimal point 2: Display 2 digits after decimal point 3: Display 3 digits after decimal point 4: Display 4 digits after decimal point		

F6.14 PID corresponding value of display.

F6.14 setting value is corresponding to + 10V analog voltage.

If F6.14 is set as 200, then it indicates that full span is 200, corresponding to + 10V voltage.

F6.15 sets the digit displayed.

0 indicates not displaying feedback value; users could select the digit displayed according to practical situation.

F6.16 PID decimal digit of display.

F6.16 sets the digit displayed after decimal point.

For example: Four-digit display is required, with 1 digit displayed after decimal point, target value is set as 50%, and PID corresponding value of display is 200.

Then, the display value is 200 × 50% = 100.0, and the parameter group is convenient for users to monitor quite directly.

Parameter: F6.14 = 200; F6.15 = 4; F6.16 = 1.

7-7 Communication parameter group

F7.00	Rate of communication data			Factory set value: 0
	Setting range	0 – 3	Unit	1
	Setup content:	0: 4800bps 1: 9600bps 2: 19200bps 3: 38400bps		

F7.0 is used to set the transfer rate for serial communication; note: in case of adopting serial communication, the same transfer rate must be guaranteed for both parties in communication

F7.01	Pattern of communication data 0			Factory set value:
	Setting range	0 – 5	Unit	1
	Setup content	0: 8N1 For ASCII 1: 8O1 For ASCII 2: 8E1 For ASCII 3: 8N1 For RTU 4: 8O1 For RTU 5: 8E1 For RTU		

F7.01 sets the format of communication data; for details, please see relevant communication specification.

F7.02	Local IP address of communication 0			Factory set value:
	Setting range	0 – 240	Unit	1

Multiple frequency converters communicate through serial port, and each frequency converter must have an address, which will be defined through F7.02; communication control could be conducted among 240 H3000 series frequency converters.

In case F7.02 is set as 0, communication function is invalid.

H3000 series MODBUS communication agreement

H3000 series communication agreement in is MODBUS ASCII (Americom standard code for information inter change) mode: Each byte consists of 2 ASCII characters, for example: The expression for the numerical value of 54Hex ASCII is that "54" consists of "5" (35Hex) and 4(34 Hex).

1. Definition of coding

Communication agreement belongs to hexadecimal system, of which each character represents the following information.

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

2. Character structure

10 – bit character box (For ASCII)

Data pattern: 8N1 For ASCII

Start bit	0	1	2	3	4	5	6	7	Stop bit
	8 – Data bits character string								
10 – bits character box									

10 – bit character box (For RTU)

Data pattern: 8N1 For RTU

Start bit	0	1	2	3	4	5	6	7	Stop bit
	8 – Data bits character string								
10 – bits character box									

Data pattern: 8O1 For ASCII

Start bit	0	1	2	3	4	5	6	7	Odd parity	Stop bit
	8 – Data bits character string									
11 – bits character box										

Data pattern: 8E1 For ASCII

Start bit	0	1	2	3	4	5	6	7	even parity	Stop bit
	8 – Data bits character string									
11 – bits character box										

Data pattern: 8O1 For RTU

Start bit	0	1	2	3	4	5	6	7	Odd parity	Stop bit
	8 – Data bits character string									
11 – bits character box										

Data pattern: 8E1 For RTU

Start bit	0	1	2	3	4	5	6	7	even parity	Stop bit
	8 – Data bits character string									
11 – bits character box										

3. Structure of communication data

Data format box

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ASCII mode:

STX	Start character = ':'(3AH)
Address Hi	Communication address:
Address Lo	8-bit address consists of 2 ASCII codes
Function Hi	Function code:
Function Lo	8-bit function code consists of 2 ASCII codes
DATA (n-1)	Data characters:
……	n × 8-bit data content consists of 2n ASCII codes
DATA 0	n ≤ 16, with the maximum of 32 ASCII codes
LRC CHK Hi	LRC Check:
LRC CHK Lo	8-bit LRC Check consists of 2 ASCII codes
END Hi	End character:
END Lo	END Hi = CR (0DH), END Lo = LF (0AH)

RTU mode:

START	Keep that zero-input signal is more than or equal to 10 ms
Address	Communication address: 8-bit binary address
Function	Function code: 8-bit binary address
DATA (n-1)	Data characters:
……	n × 8-bit data, n = 16
DATA 0	
CRC CHK Low	CRC Check:
CRC CHK High	16-bit CRC Check consists of 2 8-bit binary systems
END	Keep that zero-input signal is more than or equal to 10 ms

Communication Address

00H: All driver Broadcasts

01H: For frequency converter with 01st address

0FH: For frequency converter with 15th address

10H: For frequency converter with 16th address, by analogy, the maximum could reach 240.

Function code and Data Characters

03H: Read out the content of temporary storage

06H: Write a WORD into temporary storage; Function code 03H: Read out the content of temporary storage.

For example: Driver address 01H, reads out the data characters in 2 successive temporary storages as follows: Initial temporary storage address 2102H

ASCII mode:

Format of enquiry message character string:

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

Format of response message character string:

STX	':'
Address	'0'
	'1'
Function	'0'
	'3'
Number of data (count by byte)	'0'
	'4'
Content of starting address 2102H	'1'
	'7'
	'7'
	'0'
Content of address 2103 H	'0'
	'0'
	'0'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

RTU mode:

Format of enquiry message:

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

Format of response message:

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 into temporary storage.

For example: Driver address 01H, writes 6000 (1770H) into the internal setting parameter 0100H of driver.

ASCII mode:

Format of enquiry message character string:

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

Format of response message character string:

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:

Format of enquiry message:

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

Format of response message:

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

LRC Check of ASCII mode

LRC Check is the value added from Address to Data Content. For example, the LRC Check of the above 3.3.1 enquiry message is as: 01H + 03H + 21H + 02H + 00H + 02H = 29H, then the complement of 2 (D7H) is taken.

CRC Check of RTU mode

CRC Check is from Address to Data content, and its running rule is as follows:

Step 1: Make 16-bit temporary storage (CRC temporary storage) = FFFFH.

Step 2: Exclusive OR first 8-bit byte message instruction and low 16-bit CRC temporary storage: Perform Exclusive OR, and store the result into CRC temporary storage.

Step3: Move CRC temporary storage one more bit, and fill 0 into high bit position.

Step 4: Check right shift value, if being 0, store the new value for step 3 into CRC temporary storage, otherwise in case of Exclusive OR A001H and CRC temporary storage, store the result into CRC temporary.

Step 5: Repeat Step 3 ~ Step 4, and operate completely for 8-bit.

Step 6: Repeat Step 2 ~ Step 5, and take the message instruction for next 8-bit, till all message instructions are operated completely. Finally, the value gotten of CRC temporary storage is CRC Check. It is noteworthy that, CRC Check must be placed into the check mode of message instruction interchangeably.

The following is the example of CRC Check running written in C language:

unsigned char * data ←//Message instruction pointer

unsigned char length ←//Length of message instruction

```
unsigned int crc_chk(unsigned char* data,unsigned char length)
{
  int j;
  unsigned int reg_crc=0Xffff;
  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 feedback the value of CRC
                                   temporary storage
    }
```

7 – 8 Group of Advanced applicable parameter

F8.00	Lock-in of advanced applicable parameter 0			Factory set value:
	Setting range	0 – 1	Unit	1
	Setup content	0: Lock 1: Un lock		

Lock the group of advanced applicable parameter through F8.00 setting, to avoid misrunning, which may result in negative consequences.

F8.01	System 50Hz/60Hz setting 0			Factory set value:
	Setting range	0 – 1	Unit	1
	Setup content	0: 50Hz 1: 60Hz		

50Hz/60Hz system could be set via the parameter based on the condition of electric network.

F8.02	Selection of constant and variable torque 0			Factory set value:
	Setting range	0 – 1	Unit	1
	Setup content	0: Constant torque 1: Variable torque		

Through setting F8.02, it could realize constant torque, or variable torque switch-over, which is applicable to different loads, while protection level and relevant parameter vary accordingly at the same time of switching.

F8.03	Setting of over-voltage protection level 0			Factory set value:
	Setting range	760 – 820	Unit	1

F8.03 sets over-voltage protection level; it is liable for frequency converter to trip out over-voltage protection in decelerating process on condition of over-high electric network; for the above situation, the protection level could be improved appropriately, to guarantee the normal running of frequency converter.

F8.04	Setting of low-voltage protection level Factory set value: 400.0			
	Setting range	380 – 450	Unit	1

F8.04 sets voltage protection level; it is liable for frequency converter to trip out low-voltage protection on condition of too-low electric network, thus the setting value of F8.04 could be reduced appropriately, to guarantee the normal running of frequency converter.

F8.05	Setting of excess-temperature protection level Factory set value: 85			
	Setting range	40 – 120	Unit	1

F8.05 sets the excess-temperature protection level of frequency converter; in high temperature environment, the protection level could be improved appropriately, to guarantee the normal running of frequency converter; however, too high setting will result in module damage, so the only solution is to improve the effect of heat elimination, so as to achieve the goal of cooling-down.

F8.06	Setting display of current filtering time Factory set value: 2.0			
	Setting range	0 – 100	Unit	1

This parameter setting is relevant to the stabilization of current display, and shall not be modified in general situation; if the setting is too small, current display will fluctuate.

F8.07	0 – 10V Analog output low-end correction factor Factory set value: *			
	Setting range	0 – 65535	Unit	1
F8.08	0 – 10V Analog output high-end correction factor Factory set value: *			
	Setting range	0 – 65535	Unit	1
F8.09	0 – 20mA Analog output low-end correction factor Factory set value: *			
	Setting range	0 – 65535	Unit	1
F8.10	0 – 20mA Analog output high-end correction factor Factory set value: *			
	Setting range	0 – 65535	Unit	1

The above parameters are factory default settings, thus shall not be corrected, otherwise it will cause off-normal running of frequency converter.

Chapter 8 Caring, Maintenance, Fault Diagnosis and Countermeasure

Please keep regular caring and maintenance of the transducer in order to preserve it in the normal condition.

8-1 Daily checking items

(1) Whether the motor has abnormal sound and vibrating.
(2) Whether the motor has abnormal heating.
(3) Whether there is any breakage on power supply wire and machine electrical wire.
(4) Whether there is any phenomenon of loose, broken wire and bad connection of the end and connective wire.
(5) Whether there is any dust and slag inside the transducer.
(6) Whether the fan of transducer is abnormal.
(7) Whether the air temperature and humidity is abnormal and whether the installation place is good condition and aeration.
(8) Whether there is any dust and block in the radiator.
(9) Whether there is any abnormal of the transducer output electric current and displayed current.
(10) Whether there is any abnormal sound or vibrating phenomenon.

8-2 Maintenance and checking notice

(1) When taking care and maintenance, please make sure the power supply is off.
(2) When cutting off the power supply, the display will disappear; carry out checking and maintenance till the internal high pressure instructive light goes off.
(3) During the process of checking and maintenance, notice not to leave screw and other fittings in the transducer in order to avoid short circuit.
(4) Please keep the transducer clean and keep it from humid air.
(5) During the checking and mending, please notice not to mismatch the wires, otherwise it will lead the transducer not working or broken down.

8-3 Regular checking items

Checking items	Checking content	Countermeasure
Installation end, screw, connector plug	Whether there is any loose	Screw fasten
Radiator	Whether there is any dust	Blow off with dry compressed air (4-6kgcm2)
Cooling fan	Whether there is any abnormal sound and vibration, and whether working duration is over 20,000 hours	Replace
Pinboard	Whether there is any dust and rust	Blow off with dry compressed air (4-6kgcm2) or contact the factory
Electrolysis capacitor	Whether there is any abnormal such as color change, strange smell and plump up	Replace
Electromotor	Whether the vibration is abnormal, whether the heat raising is normal and whether there is any noise or strange smell.	Check or replace

8-4 Regular replacing of transducer fittings

The transducer is made up by many parts, in accordance with using condition, some of which need care and maintenance in order to ensure the transducer functional. To keep the transducer working normally in a long term, some fittings need to be replaced regularly according to their working life, and the referenced replace time is as follow:

Fitting's name	Replace period	Handling measure
Cooling fan	3-5 years	Replace (to decide after checking)
Electrolysis capacitor	5 years	Replace (to decide after checking)
Fuse	10 years	Replace (to decide after checking)
Relay	---	To decide after checking

The hereinbefore fittings' replace circle is reckoned in the following environment:

(1) The annual average surrounding temperature is 30□, and there is no corrosive gas, flammable gas, oil fog, dust, drips, or etc;

(2) The load fact is below 80%;
(3) The average working time is below 12 hours.

8-5 Protective information, fault diagnosis and remove.

The H3000 series transducer has comparably complete protective functions, which protect the transducer from over voltage, over currency, over load, over heat, short circuit to the ground, interphase short circuit and etc. When the transducer conks out, there must be some reason; please find the reason out and remove the fault; after handling the fault implement startup again; if there is any question, please contact us in time.

Fault code	Fault content	Possible reason for the fault	Handling measure
OC1	Over currency when accelerating	1: Accelerate duration is too short 2: V/F curve is inconsequently set 3: Muter, motor wire is short circuit to the ground 4: The torsion lift is set over large 5: The electric net voltage is over low 6: Directly start up the running motor 7: The transducer is inconsequently set 9: The transducer fails	1: Extend the accelerate duration 2: Correctly set V/F curve. 3: Check the insulation of motor and motor wire. 4: Reduce the value of torsion lift. 5: Check the electric net 6: Check the load 7: Set track startup 8: Enlarge capacity of transducer 9: Sent for repairing
OC3	Over currency in running	1: The bad insulation of motor and motor wire 2: Fluctuation of load is over or slight blocking 3: Fluctuation of electric net and the voltage is low 4: Transducer capacity is inappropriately set 5: Whether there is a large power motor starting up and leads the electric net voltage goes down 6: Whether there is a disturbing resource to disturb transducer	1: Check the insulation of motor and motor wire 2: Check whether there is any change or blocking or bad lubrication in loading condition 3: Check electric net voltage 4: Enlarge the capacity of transducer if it is too small 5: Resolve capacity of transformer 6: Resolve disturbing resource
OC2	Over current in deceleration	1: Decelerate duration is too short 2: Transducer capacity is inappropriately set 3: Whether there is any disturbing	1: Extend decelerate duration 2: Enlarge transducer capacity 3: Resolve disturbing resource

Fault code	Fault content	Possible reason for the fault	Handling measure
OU0	Over voltage when stopping	1: The decelerate duration is short 2: Transducer capacity incorrectly set 3: Disturbing	1: Check the power supply voltage 2: Sent for repairing
OC0	Over currency when stopping	1: Transducer fault	1: Sent for repairing
OU1	Over voltage when accelerating	1: Abnormal power supply 2: Peripheral circuitry is incorrectly set (switch control on or off, etc.) 3: Transducer fault	1: Check the power supply voltage 2: Do not use power supply switch to control the transducer on or off 3: Sent for repairing
OU2	Over voltage when running	1: Power supply voltage abnormal 2: Energy feedback load 3: Braking resistance incorrectly set	1: Check the power supply voltage 2: Install braking unit and resistance 3: Affirm resistance setting again
OU3	Over voltage when decelerating	1: Decelerate duration is too short 2: Power supply voltage abnormal 3: Over load 4: Braking resistance incorrectly set 5: Braking parameter is incorrectly set	1: Extend decelerate duration 2: Check the power supply voltage 3: Check braking unit and resistance 4: Set braking resistance over again 5: Correctly set parameter, e.g. braking tube voltage, etc.
LU0	Low voltage when standing by	1: Power supply voltage abnormal 2: Phase missing	1: Check the power supply voltage 2: Check power supply and switch whether there is phase missing
LU1 LU2 LU3	Low voltage when accelerating Low voltage when running Low voltage when decelerate	1: Power supply voltage abnormal 2: Phase missing 3: There is large load power start up in the electric net	2: Check whether peripheral setting bad connection leads phase missing 3: Please use independent power supply
Fb0 Fb1 Fb2 Fb3	The fuse is broken down	1: The transducer fault	1: Sent for repairing

Fault code	Fault content	Possible reason for the fault	Handling measure
OL0 not in running OL1 in acc OL2 in dc OL3 in running	Transducer over load	1: Over load 2: Accelerate duration is too short 3: Torsion lifting is too fast 4: V/F curve incorrectly set 5: Low voltage of electric net 6: Before motor stops, transducer starts up 7: Fluctuation or blocking in loading	1: Reduce load or replace larger capacity transducer 2: Extend accelerate duration 3: Reduce torsion lifting rate 4: Set V/F curve over again 5: Check electric net voltage; increase transducer capacity 6: Adopt track startup mode 7: Check load condition
OT0 not in running and not reach over torque OT1 in acc OT2 in dc OT3 in running	Motor over load	1: Over load 2: Accelerate duration is too short 3: Motor protection setting is too small 4: V/F curve is incorrectly set 5: Torsion lifting is too fast 6: Bad motor insulation 7: Motor setting is too small	1: Reduce load 2: Extend accelerate duration 3: Extend protection setting 4: Correctly set V/F curve 5: Reduce torsion lifting rate 6: Check motor insulation and replace motor 7: Use larger transducer and motor
OH0 not in running OH1 in acc OH2 in dc OH3 in running	Transducer over heat	1: Radiator fan is broken down 2: Radiator fan pipe is blocked 3: The surrounding temperature is high 4: Bad aeration 5: Installation space is too small or location is wrong	1: Replace radiator fan 2: Clean up wind pipe and radiator 3: Improve aeration condition and reduce wave frequency 4: Improve aeration condition and strengthen air convection 5: Improve installation location and aeration condition
ES	Emergent halt	1: Transducer is in emergent halt condition	1: After settling emergent halt, start up as regular procedure
OC	Wrong communication	1: Communication line connects badly 2: Communication parameter is incorrectly set 3: Transmission format is wrong	1: Check connection line 2: Set parameter over again 3: Check data transmission format
20	4-20mA wire broken	1: The end is loose; signal input line is bad connected	1: Check connective line and link the broken down ones

Fault code	Fault content	Possible reason for the fault	Handling measure
Pr	Parameter setting mistake	1: Parameter setting is wrong	1: Set correct parameter
Err	Wrong parameter group	1: The parameter does not exist or the factory sets the parameter	1: Quit this parameter

8-6 Familiar fault handling

(1) The parameter cannot be set

Reason and solution:

a: Lock the parameter, and set F1.18 as 0, and then set other parameters.

b: Running machine communicates abnormally. Reinstall the running machine and check whether the connective line is broken down.

c: Machine is running, and the parameter cannot be set. Please stop the machine and set.

(2) Press execute (external key) but the motor does not run

Reason and solution:

a: Running method is wrong, and check whether F1.02 is set as 1.

b: Frequency order is not given or the frequency is below the startup frequency.

c: Peripheral connection mistake, and check peripheral connection.

d: The definition of transducer input end is wrong, and do not match peripheral connection. Check 3.15-F3.22 parameter.

e: Startup button fault and controlling wire is broken. Check controlling wire and button.

f: Transducer is in protective condition and is not reset. Reset and then startup.

g: Motor connection is not connected or phase missing, etc. Check motor connection.

h: Motor fault, and check whether the motor is broken down.

i: Transducer fault, and check the mistake of transducer.

(3) Motor over heat

Reason and solution:

a: Surrounding temperature is too high. Please improve the condition and aeration, and reduce the temperature.

b: The load is too large, and the actual load is over the motor rating torsion. Enlarge the motor capacity.

c: The insulation of motor declines. Replace the motor.

d: The distance between transducer and motor is too long. Please reduce the distance and install anti-alternating current machine.

e: Voltage resistance between motor phases is not sufficient, and the act of switching the transducer will generate impact voltage in motor loop. Usually the maximal impact voltage will reach 3 times of transducer input power supply voltage, and the specialized motor is recommended.

f: When the motor is running in a low speed, change the decelerate rate, and make the motor running in a high speed.

(4) Machine vibration or abnormal sound

Reason and solution:

a: Blocking or bad lubrication of the machine, check machine load.

b: The machine has a sympathetic vibration phenomenon. Adjust the carrier wave, change decelerate rate, avoid sympathetic vibration frequency and install shock absorption level up.

(5) The motor does not allow restpination.

Reason and solution:

a: Restpination is forbidden. Release the forbiddance.

(6) Motor allows restpination.

Reason and solution:

a: Exchange any two of the transducer output ends U, V, W.

b: Reverse the running controlling signal. If the original signal is positive, set it negative now.

(7) Transducer starts up and disturbs other settings

Reason and solution

Reason: transducer disturbing

Solution:

a: Reduce carrier frequency

b: Install filter on the transducer power supply input end

c: Install filter on the transducer power supply output end

d: Correctly grounding of motor and transducer

e: Separate the main circuit connection and other signal connection

f: Controlling connection adopts shield connection, and cable should be covered metal tube

g: The ends of connection input and output should be installed magnetic loop

8-7 Disturbance solution

The usual disturbance includes two kinds: one is the transducer disturbs other equipment and instrument, which refers to 8-6; the other is the transducer is disturbed and generate wrong actions.

To generate a disturbance, there must be disturbing resource and method. The disturbing method of transducer is the same with other electromagnetic disturbing method, which is mainly referred to electromagnetic radiation, transmission, inductance coupling.

(1) Electromagnetic radiation

Generate electromagnetic radiation to the surrounding electron and electronic equipment. The method of shield can be adopted as the solution.

(2) Transmission

To generate electromagnetic noise to directly driving motor and transmit disturbance to power supply, and transmit it to other device through electronic net. Filter wave may be adopted to solve the concrete problems.

(3) Inductance coupling

To generate inductance coupling to other connections and form disturbance source through inducting disturbing voltage and currency.

The concrete solution for disturbance

(1) Insulation

Separate the disturbing resource from those easily affected parts. Electric welding machine is a strong disturbing resource, and in the use of transducer, it is clearly explained that the electric welding machine and transducer cannot share the same power supply.

(2) Wave filter

The filter is installed for restraining the disturbing signal to be transmitted from the transducer to power supply and motor through power supply wire transmission. The concrete solution is to add filter, reactor or magnetic loop at the input and output ends.

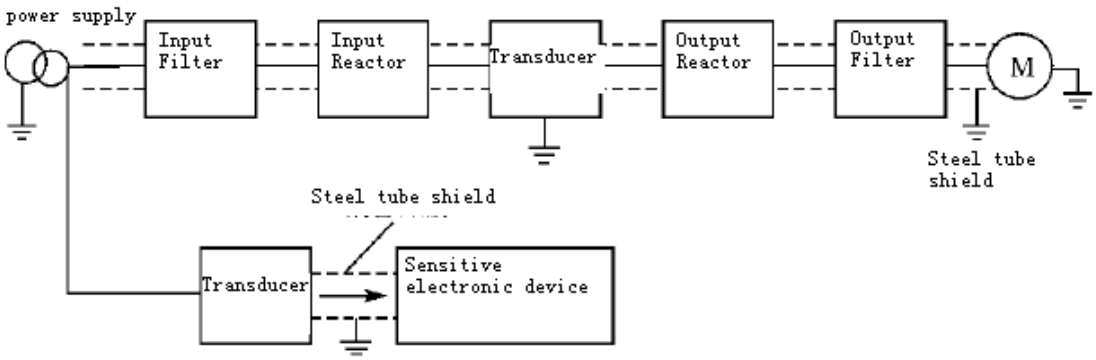
(3) Shield

Usually the transducer adopts steel shell shield not to let the electromagnetic disturbance leak; the output wire adopts steel tube shield; control wire adopts shield wire; power supply wire is separated from control wire, etc.

(4) Grounding

The good grounding may significantly prevent the inbreak of external disturbance, restrain internal coupling and raise the system capability of anti-disturbance.

The following illustration is the transducer transmission system's countermeasure of anti-disturbance:



Chapter 9 External Fittings Selection

9-1 External fittings' purpose

Name	Purpose
Switch and creepage switch	To protect connections of the transducer for convenient installation, protection and maintenance.
Magnetic contactor	Conveniently switching the power supply of transducer to guarantee safety.
Surge absorber	To absorb surge currency generated from electromagnetic contact and switch the relay.
Isolating transformer	To insulate the input and output of transducer in order to reduce disturbance.
DC reactor	To protect the transducer and restrain high frequency wave.
AC reactor	To protect the transducer, restrain high frequency wave and prevent surge voltage impact.
Braking resistance and braking unit	To absorb the regenerate energy.
Noise wave filter	To reduce the disturbance generated by transducer.
Magnetic loop	To reduce the disturbance which is generated by transducer

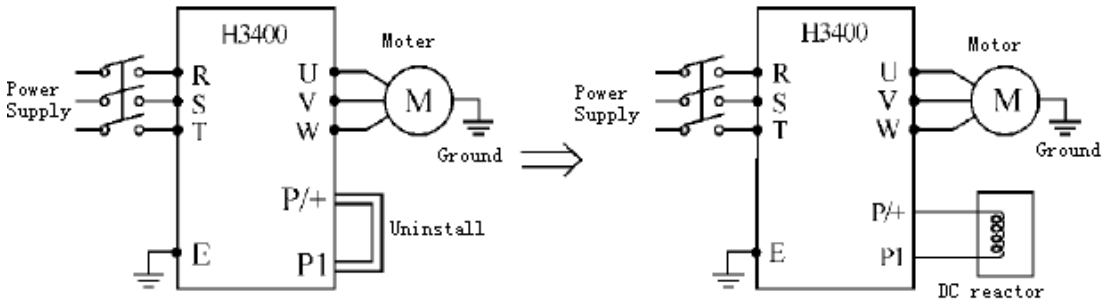
9-2 Collocation

9-2-1 DC reactor

Transducer type	Matching power	DC reactor parameter	
		Rated currency (A)	Inductance value (mH)
H3400A0037K	37	100	0.7
H3400A0045K	45	120	0.58
H3400A0055K	55	146	0.47
H3400A0075K	75	200	0.35

Transducer type	Matching power	DC reactor parameter	
		Rated currency (A)	Inductance value (mH)
H3400A0090K	90	240	0.29
H3400A0110K	110	290	0.24
H3400A0132K	132	330	0.215
H3400A0160K	160	395	0.177
H3400A0200K	200	495	0.142
H3400A0220K	220	557	0.126
H3400A0280K	280	700	0.10
H3400A0300K	300	800	0.08
H3400A0315K	315	800	0.08

Install connection:

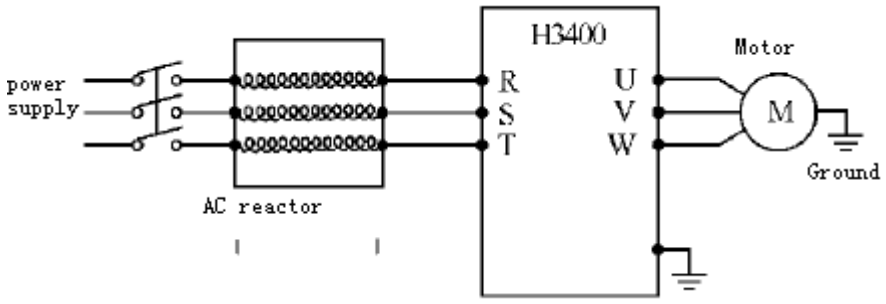


9-2-2 AC reactor

Transducer type	Matching power	AC reactor parameter	
		Rated currency (A)	Inductance value (mH)
H3400A0011K	11	24	0.52
H3400A0015K	15	34	0.397

Transducer type	Matching power	AC reactor parameter	
		Rated currency (A)	Inductance value (mH)
H3400A0018K	18.5	38	0.352
H3400A0022K	22	50	0.26
H3400A0030K	30	60	0.24
H3400A0037K	37	75	0.235
H3400A0045K	45	91	0.17
H3400A0055K	55	112	0.16
H3400A0075K	75	150	0.112
H3400A0090K	90	180	0.10
H3400A0110K	110	220	0.09
H3400A0132K	132	265	0.08
H3400A0160K	160	300	0.07
H3400A0200K	200	360	0.06
H3400A0220K	220	400	0.05
H3400A0280K	280	560	0.03
H3400A0300K	300	640	0.0215
H3400A0315K	315	640	0.0215

Installation:



9-2-3 Braking resistance

Transducer Type	Braking resistance		Braking Unit CDBR	Braking Torsion (10% ED)	Applicable Motor (KW)	Remark
	Power W	Resistance value Ω				
H3200A00D4K	80	200	Embedded	125	0.4	
H3200A0D75K	100	200	Embedded	125	0.75	
H3200A01D5K	300	100	Embedded	125	1.5	
H3200A02D2K	300	70	Embedded	125	2.2	
H3400A0D75K	80	750	Embedded	125	0.75	
H3400A01D5K	300	400	Embedded	125	1.5	
H3400A02D2K	300	250	Embedded	125	2.2	
H3400A03D7K	400	150	Embedded	125	3.7	
H3400A05D5K	500	100	Embedded	125	5.5	
H3400A07D5K	1000	75	Embedded	125	7.5	
H3400A0011K	1000	50	Embedded	125	11	
H3400A0015K	1500	40	Embedded	125	15	Plastic shell
H3400A0015K	1500	40	4030×1	125	15	Steel shell
H3400A0018K	4800	32	4030×1	125	18.5	
H3400A0022K	4800	27.2	4030×1	125	22	
H3400A0030K	6000	20	4030×1	125	30	
H3400A0037K	9600	16	4045×1	125	37	
H3400A0045K	1600	13.6	4045×1	125	45	
H3400A0055K	6000×2	20×2	4045×2	125	55	
H3400A0075K	9600×2	13.6×2	4045×2	125	75	
H3400A0090K	9600×3	20×3	4045×3	125	90	
H3400A0110K	9600×4	20×3	4045×3	125	110	
H3400A0132K	9600×4	13.6×4	4045×4	125	132	

Transducer Type	Braking resistance		Braking Unit CDBR	Braking Torsion (10% ED)	Applicable Motor (KW)	Remark
	Power W	Resistance value Ω				
H3400A0160K	9600×5	13.6×4	4045×4	125	160	
H3400A0185K	9600×5	13.6×5	4045×5	125	185	
H3400A0200K	9600×5	13.6×5	4045×5	125	200	
H3400A0220K	9600×5	13.6×5	4045×5	125	220	
H3400A0300K	9600×6	13.6×6	4045×6	125	315	

Calculate of braking resistance value:

The braking resistance value is related to the DC currency when the transducer braking. To a 380V power supply, the braking DC voltage is 800V-820V, and to 220V system, the DC voltage is 400V.

Moreover, the braking resistance value is related to braking torsion Mbr%, and to the different braking torsion the braking resistance values are different, and the calculation formula is as follow:

$$R = \frac{U_{dc}^2 \times 100}{P_{Moter} \times M_{br}\% \times \eta_{Transducer} \times \eta_{Motor}}$$

Thereinto: U_{dc}——Braking DC voltage ;

P_{Motor}——Motor power ;

M_{br}——Braking Torsion ;

η_{Motor}——Motor efficiency;

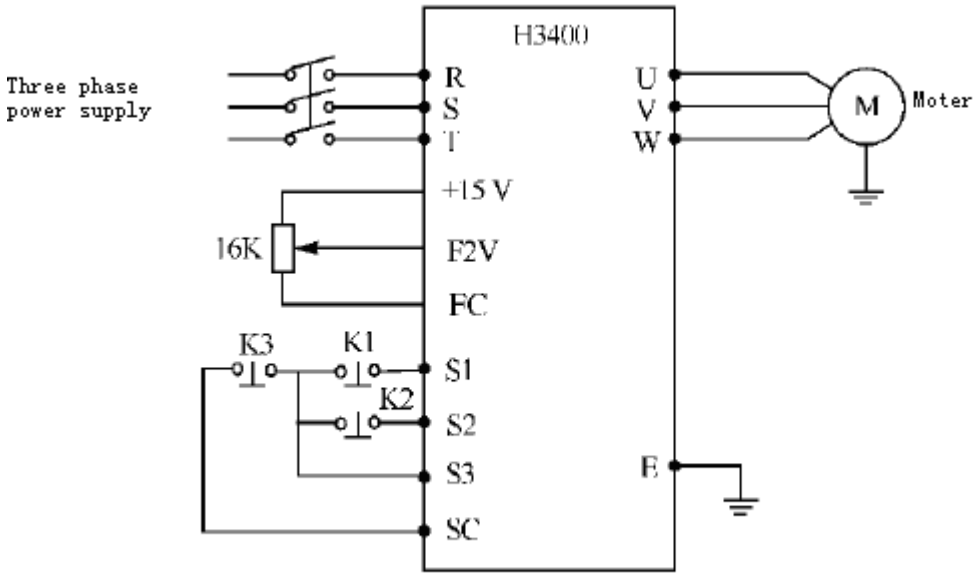
$\eta_{Transducer}$——Transducer efficiency。

The braking power is related to braking torsion and braking frequency; the foregoing illustration gives the braking torsion as 125% and the frequency is 10%, and according to the different loading situations, the numbers in the illustration are for reference.

Appendix 1 Simple Application Example

1. To use the external end (three phases) to control the transducer running, and use external end to switch the rotation forward or backward; the potentiometer controls the transducer frequency.

   a: Basic connection illustration:



   b: Parameter setting and instruction:

   F1.01=1 simulant voltage setting measure (external end potentiometer)

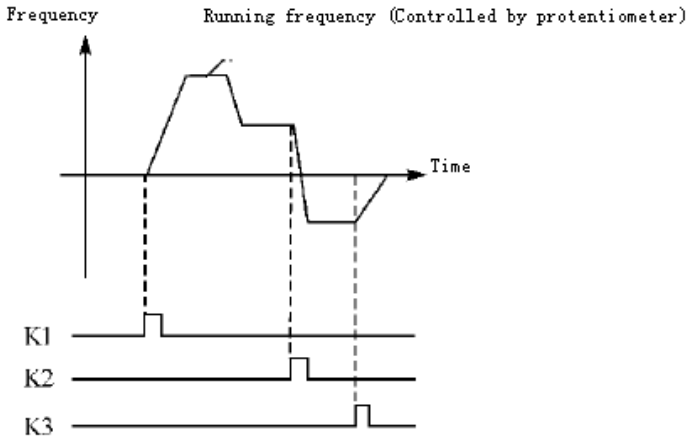
   F1.02=1 external end controlling

   F3.17=6 define the end S1 turning forward

   F3.18=7 define the end S2 turning backward

   F3.19=8 define the end S3 ceasing

   c: Action instruction:



K1 Turing forward

K2 Turing forward

K3 Machine ceasing

Running frequency is controlled by potentiometer.