Haitec-GR®

H3000 系列

使用说明书

Thank you for choosing the general-purpose inverter of H3000 series of multi-functions and high performance made by GUANG ZHOU HAITEC TRANSMISSION EQUIPMENT Co. Ltd.

Incorrect handing might cause an unexpected fault. Before using the inverter, always read this instruction manual and the instruction manual packed with the product carefully to use the equipment to its optimum.

Do not attempt to install, operate, maintain or inspect the inverter until you have read through instruction manual and appended documents carefully and can use the equipment correctly. Do not use the inverter until you have a full knowledge of the equipment, safety information and instructions. In this instruction manual the safety instruction levels are classified into “Danger” and “Warning”, please pay special attention to the symbols “Danger ” and “Warning” and their relevant contents.

“Danger” Assumes that incorrect handing may cause hazardous conditions,resulting in death or severe injury.

“Warning” Assumes that incorrect handing may cause hazardous conditions,resulting in medium or slight injury,or may cause physical damage only.

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

Please read carefully the operation manual before putting the inverter to use so as to correctly install and operate the inverter, give full play to its functions and ensure the safety. Please keep the operation manual handy for future reference, maintenance, inspection and repair.

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

TABLE OF CONTENTS

Chapter 1 Safety Cautions.....1

1-1 Confirmation on receiving 1

1-2 Transportion and installation 1

1-3 Wiring and Junction 3

1-4 Power-on, Test operation.....4

1-5 Inspection and Maintenance.....5

1-6 Emergency stop.....5

1-7 Disposing of the inverter.....6

Chapter 2 Product Introduction 7

2-1 Unpacking Confirmation 7

2-2 Inverter model description 7

2-3 Product Specifications 8

2-4 Product series models 10

2-5 Product storage 12

Chapter 3 Installation of the Inverter.....13

3-1 Installation environment and requirements 13

3-2 Inverter outline dimension drawings 15

Chapter 4 Wiring.....17

4-1 Main Circuit Wiring 18

4-1-1 Peripheral Devices Description 18

4-1-2 Main Circuit Wiring Notice 19

4-1-3 Peripheral Devices Specifications 20
4-1-4 Specification of main circuit terminal 21
4-2 Control circuit terminal 24
4-2-1 Basic wiring diagram 24
4-2-2 Control terminals layout (0.4~450kW) 25
4-2-3 Control circuit terminals description 25
4-2-4 Wiring instructions 27

Chapter 5 Operation 28
5-1 Operation panel 28
5-1-1 Key function description 28
5-1-2 LED indicator light description 29
5-1-3 Displays description 29
5-2 Operation panel operation instruction 30
5-3 The inverter simple running and its relative items 32
5-3-1 Setup, installation and wiring 32
5-3-2 Wiring inspection 32
5-3-3 Parameter setup of the inverter 32
5-3-4 Running 32

Chapter 6 Table of Function Parameters 34

Chapter 7 Detailed Explanations of Functional Parameters 47
7-1 Parameters for monitoring 47
7-2 Basic parameters 50
7-3 Parameters of basic applications 62
7-4 Parameters for input and output application 68

7-5 Secondary application group 84
7-6 Special operation (PLC Control) 94
7-7 Special operation (PID Control) 100
7-8 Initial settings and specifications of RS-485 communication 107
7-9 Advanced application parameters.....113

Chapter 8 PRECAUTIONS FOR MAINTENANCE AND INSPECTION 116
8-1-1 Daily inspection.....116
8-1-2 Periodic inspection.....117
8-1-3 Daily and periodic inspection 117
8-2 Replacement of parts.....118
8-3 Trouble shooting 118
8-3 Check first when you have troubles.....122
8-4 Inverter-generated noises and their reduction techniques.....124

Chapter 9 Peripheral Devices Selection.....126
9-1 Peripheral Devices Description.....126
9-2 Applied DC reactor Specification 127
9-3 Applied AC reactor Specification.....127
9-4 Applied Braking resistor Specification.....128
Appendix 1 Simple Application Example.....131

Chapter 1 Safety Cautions

1-1 Confirmation on receiving

⚠ Warning

The inverter has been strictly and well packed before ex-work . Inconsideration of various factors during the transportation special attention should be paid to the following points before the assembly and installation. If there is anything abnormal please notify the dealer or the relevant people of our company.

- Check if the inverter has got any damage or deformation during the transportation and handling.
- Check if there is one piece of H3000 series inverter and one copy of the instruction manual available when unpacking it.
- Check the information on the nameplate to see if the specifications meet your order (Operating voltage and KVA value).
- Check if there is something wrong with the inner parts, wiring and circuit board.
- Check if each terminal is tightly locked and if there is any foreign article inside the inverter.
- Check if the operator buttons are all right.
- Check if the optional components you ordered are contained.
- Check if there is a certificate of qualification and a warranty card.

1-2 Transportion and installation

⚠ Warning

- When carrying products, use correct lifting gear to prevent injury.

Operation Instruction of H3000 Series Inverter

- Do not stack the inverter boxes higher than the number recommended.
- Ensure that installation position and material can withstand the weight of the inverter. Install according to the information in the instruction manual.
- Do not install or operate the inverter if it is damaged or has parts missing.
- When carring the inverter, do not hold it by the front cover or setting dial. It may fall or fail.
- Do not stand or rest heavy objects on the product.
- Check the inverter mounting orientation is correct.
- Prevent other conductive bodies such as screws and metal fragments or other flammable substance such as oil from entering the inverter.
- As the inverter is a precision instrument, do not drop or subject it to impact.
- Use the inverter under the following enviromental conditions. Otherwise, the inverter may be damaged.

Ambient temperature: －10℃~40℃ 〈non-freezing〉.
Ambient humidity: 95% RH or less 〈non-condensing〉
Ambient environment: indoors〈free from corrosive gas,flammable gas,oil mist,dust and dirt, free from direct sunlight〉
Vibration: max. 0.5G

- Please make sure that the screws are fixed, fastened firmly in accordance with the stipulations of the instruction manual, to prevent the inverter falling.
- If two or more inverters are installed in a control cabinet, please install them according to the information in the instruction manual, 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 inverter fault, fire or other accidents.
- Due to the inverter of akind of electrical and electronic product it must be installed, tested and adjusted with parameters by specialized engineering persons of motors.

1-3 Wiring and Junction

⚠ Warning

- Please do not damage the wires. Let the wires bear weight or be clamped may damage the wires and cause an electric shock.
- Do not install a power factor correction capacitor or surge suppressor/radio noise filter (capacitor type filter) on the inverter output side.
- Do not install switch devices such as the air switch and contactor on the inverter output side, if it is for technologic demand, please ensure that the inverter is switching without output.
- Wrong wiring might lead to damage of the inverter.The control signal lines must be kept fully away from the main circuit to protect them from noise.

Danger

- Please ensure that the power is off before junction.
- The wiring work shall be done by qualified electricians.
- Please wire the wires in accordance with the specifications stipulated in the instruction manual.
- The grounding connection shall be done correctly and in accordance with relative regulations in the instruction manual, otherwise it may cause an electric shock or fire.
- Please use independent power supply for the inverter, 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 touch the terminals directly, do not connect the inverter’s input or output terminals to the inverter's shell, otherwise you may get an electric shock.
- Please make sure that the voltage of the power supply and the voltage of the inverter are same, otherwise it may cause the inverter fault or personnel injury.
- The power supply cables must be connected to R,S,T. Never connect the power

cable to the U,V,W of the inverter.Doing so will damage the inverter.

- Please do not conduct pressure resistance test to the inverter, otherwise it may cause the inverter's internal fault.
- Please install accessories such as brake units, brake resistors in accordance with the regulations of the instruction manual, otherwise it may cause the inverter fault or fire.
- Please ensure that the screws of the terminals are firmly locked, otherwise it may cause the inverter fault.

1-4 Power-on, Test operation

⚠ Warning

- While power is on or when the inverter is running ,do not open the front cover. Otherwise you may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- Before starting operation , confirm and adjust the parameters. A failure to do so may cause some machines to make unexpected motions.
- It is recommended to undertake test runs with no load.
- Please provide an emergency stop switch when the "stop" function setting is unavailable.
- Do not use the inverter input side magnetic contactor to start/stop the inverter,otherwise it may affect the life of the inverter.

Danger

- When fault restart function is set, please do not approach the equipment because the equipment may automatically restart after the running stop.
- Make sure that the specification and rating match the system requirements. Exceeding their use range can cause motor and machine fault.

- Please do not change the parameter settings of inverter casually during running.
- While power is on or for some time after power-off, do not touch the inverter as it is hot and you may get burnt.
- Perform setting dial and key operations with dry hands to prevent an electric shock. Otherwise you may get an electric shock.
- Please do not link or withdraw motors during the inverter running, otherwise it may cause inverter protection or fault.

1-5 Inspection and Maintenance

⚠ Warning

- Please ensure that the power supply and the power indicating light is off before inspecting and maintaining. Otherwise you may get an electric shock.
- For prevent damage due to static electricity,touch nearby metal before touching this product to eliminate static electricity from your body.
- Do not carry out a megger (insulation resistance) test on the control circuit of the inverter.

Danger

- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Please do check, maintenance and replacement of the components according to the appointed methods in the instruction manual, strictly prohibit modifying by yourself . If you do so, you may get an electric shock and injury or the inverter may get damaged.

1-6 Emergency stop

Danger

- Provide a safty backup such as an emergency brake which will prevent the machine and equipment from hazardous conditions if the inverter fails.

- When the braker on the inverter input side trips, check for the wiring fault (short circuit), damage to internal parts of the inverter, etc. Identify the cause of the trip, then remove the cause and power on the breaker.
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation.

1-7 Disposing of the inverter

⚠ Warning

Treat as industrial waste.Do not burn it up!

Chapter 2 Product Introduction

2-1 Unpacking Confirmation

In unpacking, please confirm the following:

- Check whether the model type of the inverter is in accordance with your order.
- Check whether the inverter is damaged and related accessories are included.

If you find an omission or disagreement, please contact the suppliers.

2-2 Inverter model description

Model: H 3 400 A 0055 K3052

- K3052: Hardware Version
- 0055: Inverter capacity:0055 means 55KW
- A: A: Constant torque; p: Variable torque
- 400: Voltage range: 400 means three-phase AC/380V input; 200 means one-phase/three-phase AC/220V input;
- 3: Series number
- H: Haitec Inverter

2-3 Product Specifications

Items		H3000
Power Supply	Rated voltage, Frequency	Three-phase 380V 50/60Hz ; One-phase 220V 50/60Hz
	Voltage Range	380V: 330~440V; 220V: 170V~240V
Output	Voltage Range	380V: 0~380V; 220V: 0~220V
	Frequency Range	0.10~400.00Hz
Control method		V/F control , Space vector control,
Indication		Operating status/Alarm definition/interactive guidance: eg, frequency setting, the output frequency/current, DC bus voltage, the temperature and so on.
Control Specifications	Output Frequency Range	0.10Hz~400.00Hz
	Frequency Setting Resolution	Digital input : 0.01 Hz, analog input : 0.1% of maximum output frequency
	Output Frequency Accuracy	0.01Hz
	V/F Control	Setting V/F curve to satisfy various load requirements.
	Torque Control	Auto increase: auto raise torque by loading condition; Manual increase:enable to set 0.0~20.0% of raising torque.
	Multifunctional Input Terminal	Eight multi-function input terminals, realizing functions including fifteen section speed control, program running, four-section acceleration/deceleration speed switch, UP/DOWN function and emergency stop and other functions
	Multifunctional Output Terminal	3 multi-function output terminals for displaying of running, zerospeed , counter, external abnormity, program operat ion and other information and warnings.
	Acceleration/ deceleration Time Setting	0~6000s acceleration/deceleration time can be set individually.

Items		H3000
Other Functions	PID Control	Built-in PID control
	RS485	Standard RS485 communication function (MODBUS)
	Frequency Setting	Analog input:0 to 10V, 0 to 20mA can be selected; Digital input: Input using the setting dial of the operation panel or RS485or UP/DOWN.
	Multi-speed	Eight multifunction input terminals, 15 section speed can be set
	Automatic voltage regulation	Automatic voltage regulation function can be selected
	Counter	Built-in 2 group of counters
Protection/Warning Function	Overload	150%, 60second (Constant torque);120%,60second (variable torque)
	Over Voltage	Over voltage protection can be set.
	Under Voltage	Under voltage protection can be set.
	Other Protections	Overheat ,output shortcircuit , over current, and parameter lock and so on.
Environment	Ambient Temperature	-10℃ to 40℃ (non-freezing)
	Ambient Humidity	Max. 95% (non-condensing)
	Altitude	Lower than 1000m
	Vibration	Max. 0.5G
Structure	Cooling Mode	Forced air cooling
	Protective Structure	IP 20
Installation	Mode	Below 90KW : Wall Mounted 110~ 200KW :Wall Mounted or In Cabinet Above 220KW : I n Cabinet

2-4 Product series models

Model	Input	Output Power	Capacity KVA	Output Current (A)	Overload Capacity (60s) (A)	Application Motor kW
H3200A00D4K	One or three phase 220V•50/60Hz	0.4	1.0	2.5	3.75	0.4
H3200A0D75K	One or three phase 220V•50/60Hz	0.75	2.0	5.0	7.5	0.75
H3200A01D5K	One or three phase 220V•50/60Hz	1.5	2.8	7.0	10.5	1.5
H3200A02D2K	One or 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	Three-phase 380V•50/60Hz	7.5	14	17.5	21	7.5
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

Model	Input	Output Power	Capacity KVA	Output Current (A)	Overload Capacity (60s) (A)	Application Motor kW
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	225	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
H3400A0200K	Three-phase 380V•50/60Hz	200	290	380	570	200
H3400P0220K		220	320	425	510	220
H3400A0220K	Three-phase 380V•50/60Hz	220	320	425	637.5	220
H3400P0250K		250	365	480	576	250
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	696	300
H3400A0300K	Three-phase 380V•50/60Hz	300	450	580	870	300
H3400P0315K		315	460	605	786.5	315
H3400A0315K	Three-phase 380V•50/60Hz	315	460	605	907.5	315
H3400P0345K		345	516	680	884	345

Model	Input	Output Power	Capacity KVA	Output Current (A)	Overload Capacity (60s) (A)	Application Motor kW
H3400A0345K	Three-phase 380V•50/60Hz	345	516	680	1020	345
H3400P0375K		375	562	740	962	375
H3400A0375K	Three-phase 380V•50/60Hz	375	562	740	1110	375
H3400P0400K		400	600	790	1027	400
H3400A0400K	Three-phase 380V•50/60Hz	400	600	790	1125	400
H3400P0415K		415	632	820	1066	415
H3400A0415K	Three-phase 380V•50/60Hz	415	632	820	1230	415
H3400P0450K		450	638	840	1092	450
H3400A0450K	Three-phase 380V•50/60Hz	450	638	840	1260	450
H3400P0475K		475	714	940	1222	475

2-5 Product storage

The inverter must be put in the packaging box before installation.If the inverter is not used for the moment, during the storage, please pay attention those as below:

1. The products must be placed in the location with dry and without dust and dirt.
2. The relative humidity of the environment is within 0~95%, and without condensing.
3. The storage temperature of the environment must be within the range of -26℃ to +65℃.
4. There are no corrosive gas and liquids in the storage environment, and the product is away from direct sunlight.

It is better not to store the inverter for long time. Long time storage of the inverter will lead to the deterioration of electrolytic capacity. If it needs to be stored for a long time make sure to power it up one time within a year and the power-up time should be at least above five hours. When powered up the voltage must be increased slowly with a voltage regulator to the rated voltage value.

Chapter 3 Installation of the Inverter

3-1 Installation environment and requirements

Environment of installation has direct effect on the inverter's life. If the inverter is used in the environment that does not accord with the allowed range of the operation instruction, and may lead to the inverter protection or fault.

About the inverter's installation environment, please ensure it is in accordance with the following condition:

(1) Environment temperature from -10℃ to +40℃

(2) Environment humidity 0~95% without condensing

(3) Away from direct sunlight

(4) The environment does not contain corrosive gas and liquid

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

(6) Far away from radioactive materials and combustible substances

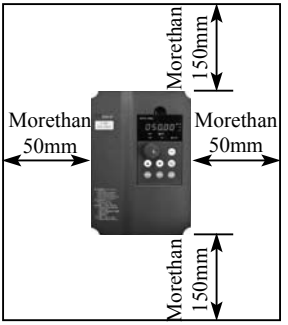
(7) Far away from electromagnetic interference sources (as welder, high-powered machines)

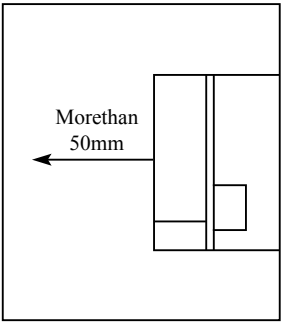
(8) The installation surface shall be firm. Without vibration, the vibration cannot be avoided, please add anti-vibration spacer to reduce vibration.

(9) Please install the inverter to a location where it is good for ventilation, inspection and maintenance, and away from heating unit (as brake resistor).

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

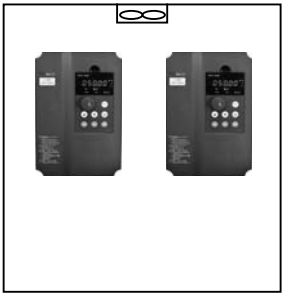
① Single inverter installation





② Multiple inverters installed in one control cabinet.

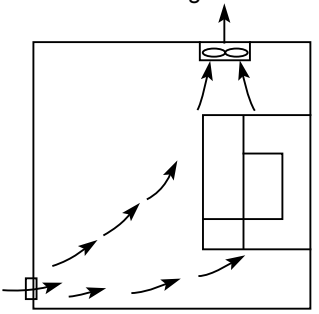
Please pay attention: When encasing the multiple inverters,install them in paralled as a cooling measure.



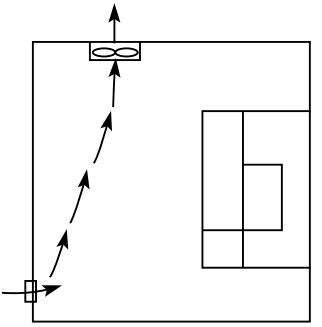
Favorable placing

Unfavorable placing

③ If multiple inverters are installed in one control cabinet, please leave enough clearances and take cooling measure.

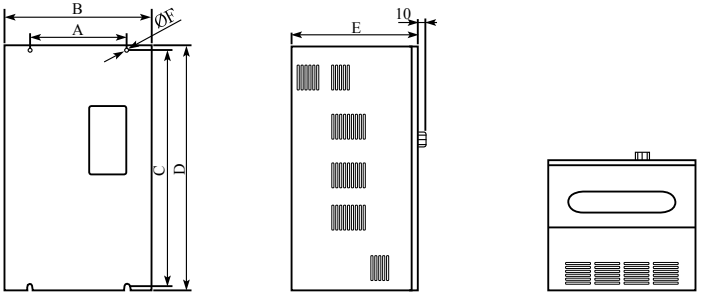


Correct installation position of the fan



Incorrect installation position of the fan

3-2 Inverter outline dimension drawings



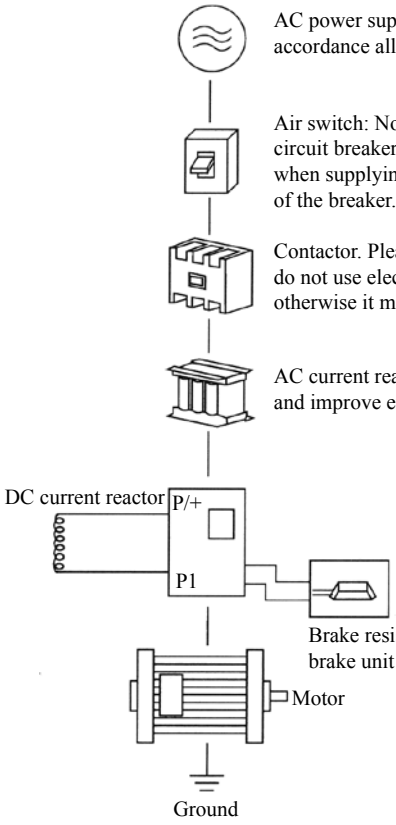
Unit: mm

Model	A	B	C	D	E	F
H3200A0D4K~H3200A02D2K	117	125	162	170	140	5
H3200A03D7K	105	120	208	225	149	5
H3400A0D75K~H3400A02D2K	117	125	162	170	140	5
H3400A03D7K	105	120	208	225	149	5
H3400A05D5K/P07D5K	168	185	248	260	170	6.5
H3400A07D5K						
H3400A0011K/P0011K/P0015K	213	228	330	347	196	6
H3400A0015K/P0018K						
H3400A0018K/P0022K	147	250	460	480	246	9
H3400A0022K/P0030K						
H3400A0030K/P0037K	197	310	482	500	260	9
H3400A0037K/P0045K						
H3400A0045K/P0055K	240	360	620	650	280	9
H3400A0055K/P0075K						
H3400A0075K/P0090K	260	420	775	800	334	11
H3400A0090K/P0110K						

Model	A	B	C	D	E	F
H3400A0110K/P0132K	360	552	840	875	410	13
H3400A0132K/P0160K						
H3400A0160K/P0185K						
H3400A0185K/P0200K	360	552	975	1000	410	13
H3400A0200K/P0220K						
H3400A0220K/P0250K	400	600	370	1850	600	15
H3400A0250K/P0280K						
H3400A0280K/P0300K	470	700	355	1850	600	16
H3400A0300K/P0315K						
H3400A0315K/P0345K						
H3400A0345K/P0375K	670	900	355	2030	600	16
H3400A0375K/P0400K						
H3400A0400K/P0415K						
H3400A0415K/P0450K						
H3400A0450K/P0475K						

Chapter 4 Wiring

The wiring of the inverter can be divided into main circuit and control circuit.



4-1 Main Circuit Wiring

4-1-1 Peripheral Devices Description

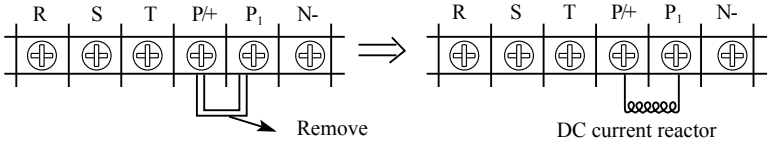
(1) AC power supply
Use within the permissible power supply specifications of the inverter.

(2) Moulded case 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 inverter is not running, you can cut off the breaker to separate the inverter from the power supply.

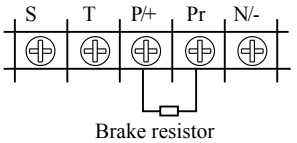
(3)Magnetic contractor(MC)
The contractor can turn on and turn off the power of the inverter to ensure safety.

(4) AC current reactor
a: Suppress high harmonic to protect the inverter.
b: Improve the power efficiency.

(5) DC current reactor
The DC current reactor has the same function as AC current reactor. Please remove the jumper across terminals P1 - P/+ and connect the DC reactor.



(6) Brake resistor
When the motor is braking, the resistor can avoid DC bus high voltage of the inverter, and improve the braking ability of the internal brake unit.
15KW or less the brake unit is built-in, please confirm it.



To select the brake resistor, please refer to section 4, chapter 9: Appiled Braking resistor speeification.

4-1-2 Main Circuit Wiring Notice

The H3000 series is a highly reliable product, but incorrect peripheral circuit making or operation/handing method may shorten the product life or damage the product.

Before starting operation , always recheck the following items.

(1) Use crimping terminals with insulation sleeve to wire the power supply and motor.

(2) Application of supply power to the output terminals (U,V,W)of the inverter will damage the inverter . Never perform such wiring.

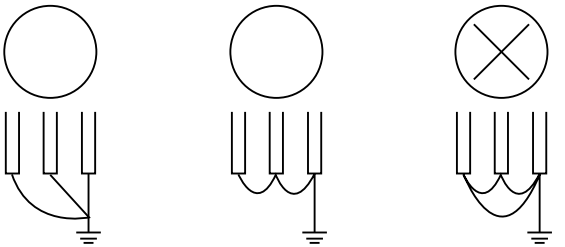
(3) After wiring, wire offcuts must not be left in the inverter.
Wire offcuts can cause an alarm ,failure or malfunction . Always keep the inverter clean . When drilling mounting holes in an enclosure etc., take are not to allow chips and other foreign matter to enter the inverter.

(4) This inverter must be earthed . Earthing must conform to the requirements of national and local safety regulations and electrical codes .

(5) Use the thickest possible earth cable.

(6) The grounding point should be as near as possible to the inverter , and the ground wire length should be as short as possible.

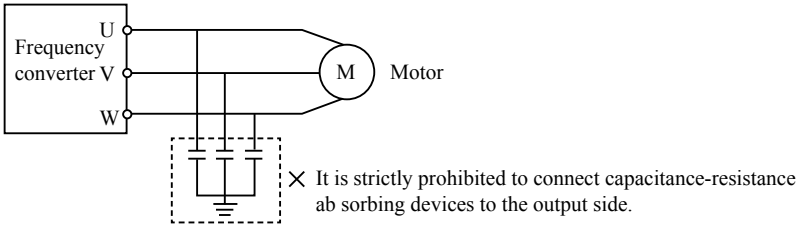
(7) Where possible , use independent earthing for the inverter . If independent earthing is impossible , use joint earthing (Ⅰ , Ⅱ) where the inverter is connected with the other equipment at an earthing point . Joint earthing as in (Ⅲ) must be avoided as inverter is connected with the other equipment by a common earth cable .



(8) To prevent a malfunction due to noise , keep the signal cables more than 10 cm away from the power cables .

(9)The overall wiring length should be 100 m maximum.
Especially for long distance wiring , the fast-response current limit function may be reduced or the equipment connected to the inverter output side may malfunction or become faulty under the influence of a charging current due to the stray capacity of the wiring .therefore,note the overall wiring length

(10) Do not install a power factor correction capacitor,surge suppressor or radio noise filter on the inverter output side.



(11) Before starting wiring or other work after the inverter is operated , wait for at least 10 minutes after the power supply has been switched off , and check that there are no residual voltage using a tester or the like . The capacitor is charged with high voltage for some time after power off and it is dangerous.

(12) Electromagnetic wave interference
The input/output(main circuit)of inverter includes high frequency components, which may interfere with the communication devices (such as AM radios)used near the inverter. In this case,set the EMC filter valid to minimize interference.

(13)Across P/+ and PR terminals,connect only an external regenerative brake discharge resistor.Do not connect a mechanical brake.

4-1-3 Peripheral Devices Specifications

Check the motor capacity of the inverter you purchased . Appropriate peripheral devices must be selected according to the capacity . Refer to the following list and prepare appropriate peripheral devices:

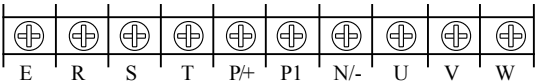
Applicable Inverter Type	Input voltage	Motor Output (kW)	Main Circuit Cable Type (mm^2)	Breaker Selection (A)	Input Side Magnetic contractor (A)
H3200A00D4K	220V	0.4	2.5	16	12
H3200A0D75K	220V	0.75	2.5	16	12
H3200A01D5K	220V	1.5	2.5	32	18
H3200A02D2K	220V	2.2	4	32	18
H3400A0D75K	380V	0.75	2.5	16	12
H3400A01D5K	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
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.

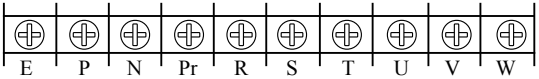
4-1-4 Specification of main circuit terminal

For different models, the arrangement of main circuit terminals is shown below:

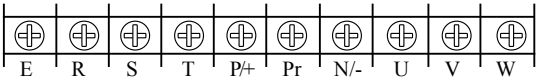
1. Model A, three-phase 380V/18.5~160kW with metal cover:



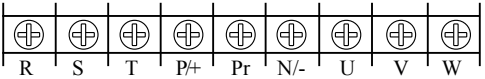
2. Model A (380V/11--15kW) with plastic cover, and model P (11—18.5kW) with plastic cover:



3.Model A (380V/5.5~7.5kW) with plastic cover, and model P (7.5kW) with plastic cover:



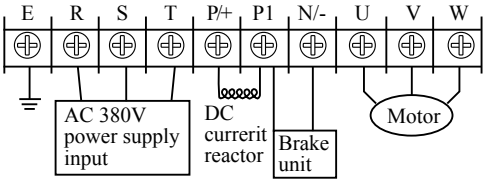
4. Model A, three-phase 380V/0.75~3.7kW:



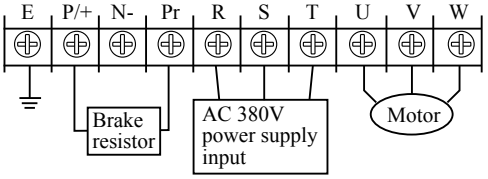
Terminal Symbol	Terminal Name	Description
R,S,T	AC power input	Connect to the commercial power supply.
U,V,W	Inverter output	Connect a three-phase motor.
P/+,N/-	Brake unit connection	Connect the brake unit,power regeneration common inverter, high power factor inverter or power regeneration inverter.
P/+,P1	DC reactor connection	For A18.5kw or more , romove the jumper across terminals P/+--P1 and connect DC reactor (For the A200kw or more ,a DC reactor is supplied as standard.)
P1,Pr	Brake resistor connection	Connect brake resistor.
⏚ E	Earth (ground)	For earthing (grounding) the inverter chassis . Must be earthed (grounded).

Cable connection examples

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

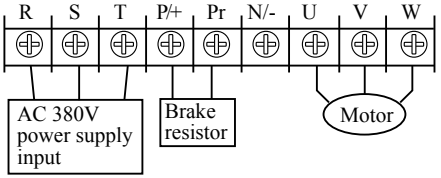


2. Model A with three-phase 380V/11~15kW and plastic casing, the cable connection is shown as below:



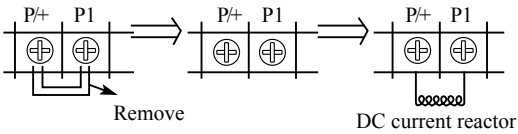
Note: The grounding terminal is on the casing next to the main circuit terminal, and it is a fix screw on the casing steel marked with ⏚;

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



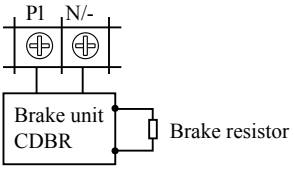
Note: The grounding terminal is on the casing next to the main circuit terminal, and it is a fixed screw on the casing marked with ⏚;

4. DC reactor connection



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

④ Method of connect brake unit (apply to 18.5kW or more.)

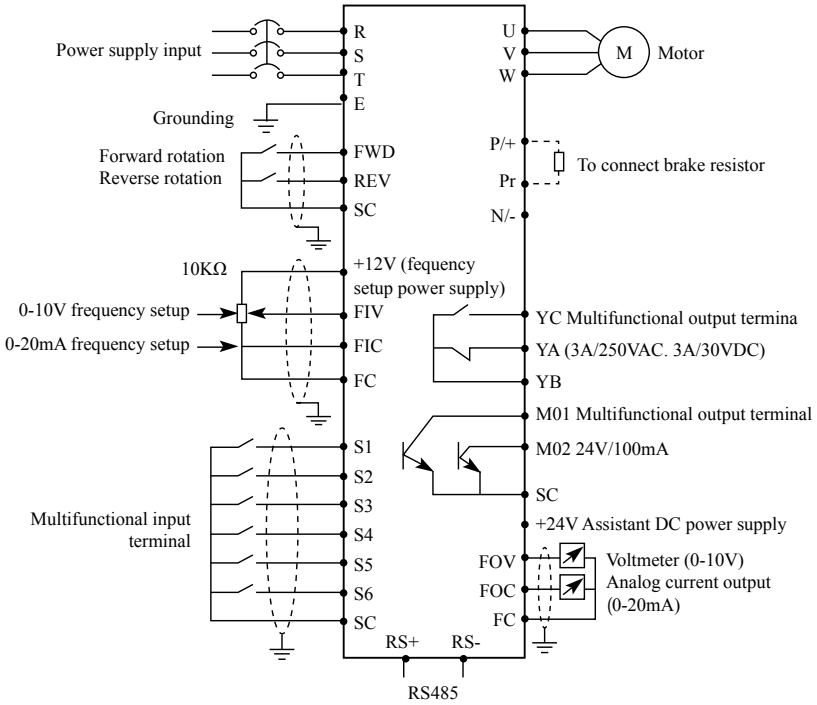


Due to different definitions of the brake unit terminal given by different producers, please refer to relative instructions when using it.

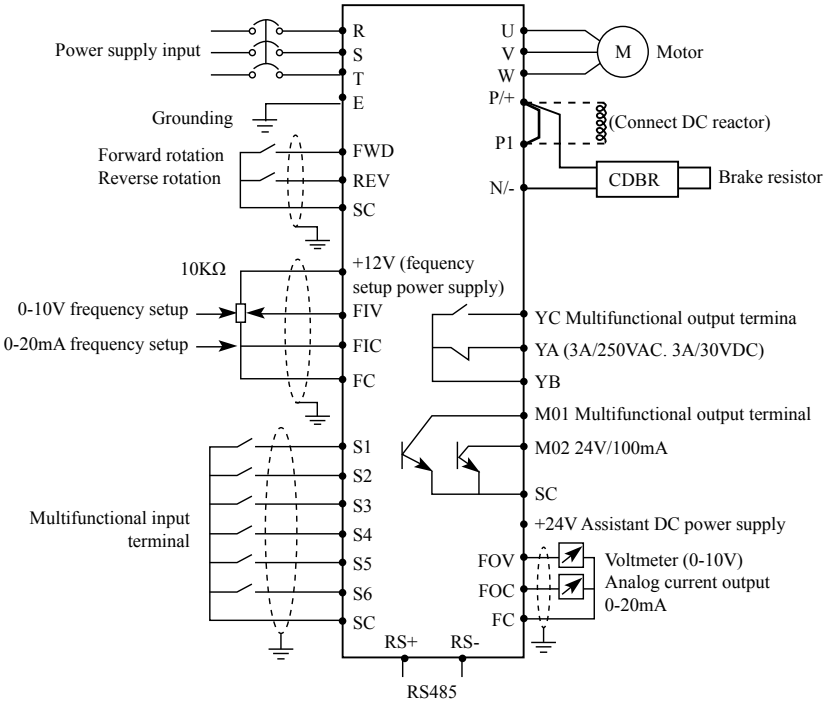
4-2 Control circuit terminal

4-2-1 Basic wiring diagram

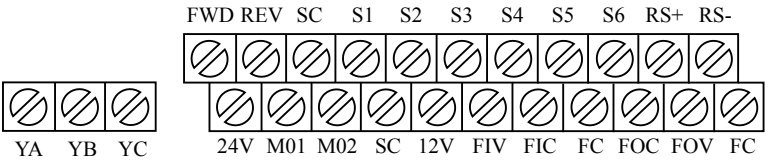
(1) Apply to 15kW or less



(2) Apply to 18.5kW or more



4-2-2 Control terminals layout (0.4~450kW)



4-2-3 Control circuit terminals description

Indicates that terminal functions can be selected using F3.15 to F3.29.(I/O terminal function selection)

(1) Input signals

Type	Terminal Symbol	Terminal Name	Description	Refer to page
Contact input	FWD	Forward rotation start	Turn on the FWD signal to start forward rotation and turn it off to stop.(multifunctional input terminal)	35
	REV	Reverse rotation start	Turn on the REV signal to start reverse rotation and turn it off to stop.(multifunctional input terminal)	35
	S1		multifunctional input terminal 1	35
	S2		multifunctional input terminal 2	35
	S3		multifunctional input terminal 3	35
	S4		multifunctional input terminal 4	35
	S5		multifunctional input terminal 5	35
	S6		multifunctional input terminal 6	35
Frequency setting	+10V	Frequency setting power supply	Frequency setting power supply.(FIV,FIC)	36
	FIV	Frequency setting(voltage)	Inputting 0 to 10VDC provides the maximun output frequency at 10V and makes input and output proportional.	36
	FIC	Frequency setting(current)	Inputting 0 to 20mADC provides the maximun output frequency at 20mA and makes input and output proportional.	36
	FC	Frequency setting common	Common terminal for terminals FIV,FIC,+10V , and analog output terminal FOV,FOC	36

(2) Output signals

Type	Terminal Symbol	Terminal Name	Description	Refer to page
Contact output	MO1	Multifunction output terminal (optical coupling)	Permissible load 24VDC 0.1A	36
	MO2	Multifunction output terminal (optical coupling)	Permissible load 24VDC 0.1A	36
Contact output	YA	Relay out 1	Abnormal:No conduction across YA-YB(AcrossYB-YCcontinuity),Nor-mal:No conduction across YC-YB (Across YB-YA continuity) . Contact capacity:250VAC/3A,30VDC/3A	36
	YB			
	YC			

Type	Terminal Symbol	Terminal Name	Description	Refer to page
Contact output	KA	Relat out 2	1changeover contact output. Contact capacity:250VAC/3A,30VDC/3A	36
	KB			
	SC	Common terminals	Common terminal for terminals FWD,REV,S1~S6,MO1,MO2	36
Analog output	FOV	Analog voltage output	Output signal 0 to 10VDC,permissible load current 1mA.The output signal is proportional to the output frequency.	36
	FOC	Analog current output	Output signal 0 to20mADC.The output signal is proportional to the output frequency.	36

(3)Communication

RS485	RS+	Frequency setting(current)	With the RS+,RS-,connector,communication can be made through RS486.	36
	RS_	Frequency setting common		36

4-2-4 Wiring instructions

(1) Use shielded or twisted cables for connection to the control circuit terminals and run them away from the main and power circuits (including the 200V relay sequence circuit).

(2) Use two or more parallel micro-signal contacts or twin contacts to prevent a contact faults when using contact inputs since the control circuit input signals are micro-currents.

(3) Do not apply a voltage to the contact input terminals of the control circuit .

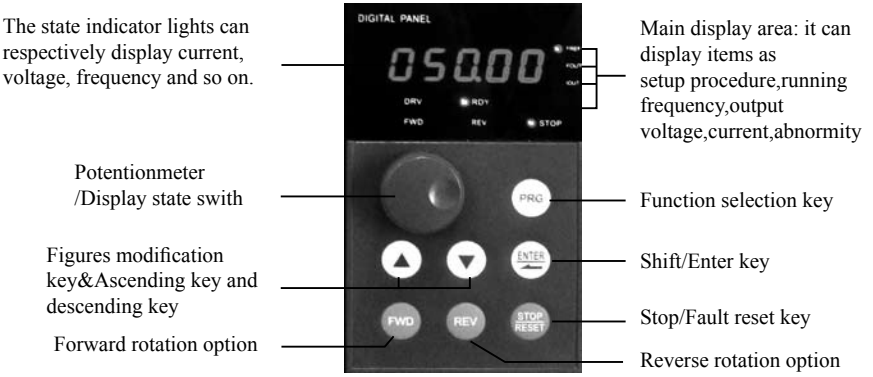
(4) Always apply a voltage to the alarm output terminals (YA,YB,YC,MO1,MO2) via a relay coil ,lamp , etc.

(5) It is recommended to use the cables of 0.75m m^2 gauge for connection to the control circuit terminals.

(6) The wiring length should be 30m maximum.

Chapter 5 Operation

5-1 Operation panel



5-1-1 Key function description

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

Key Symbol	Function description
	① Potentiometer of Keypad, when the frequency is set up as controlled by potentiometer of Keypad, to rotate the potentiometer to get different frequency. ② Display switch, to press gently to display different monitor information

STOP/RESET	Stop command key (application on Keypad control state), fault reset key
FWD	Forward rotation command key
REV	Reverse rotation command key

5-1-2 LED indicator light description

Indicator light Symbol	Indicator light state	Description
DRV	Lighted	The inverter is on running state.
RDY	Lighted	The inverter 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 inverter is in forward rotation state.
REV	Lighted	The inverter is in reverse rotation state.
STOP	Lighted	The inverter is stopped and no output.

5-1-3 Displays description

Item	Display	Description
1	FREF 050.00	Display: Setup frequency 50.00Hz
2	Iout 000.80	Display: Output current 0.8A
3	Fout 000.50	Display: Output frequency 0.5Hz
4	F01.05	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 Operation panel operation instruction

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

Program	Key name	Display	Description
1	Power on	RDY 00000	① To display frequency setting picture (initializing picture) ② The inverter is on standby state.
2	Press PRG	RDY F0000	To enter the parameter setup state, and the first letter blinks (means modifiable item)
3	Press ▲ 4 times	RDY F00.04	The value “0” has been changed to “4”.
4	Quickly press ENTER 2 times (quick press means shift.)	RDY F00.04	The flashing is shifted 2 positions to the left. Note: “Quick press” means press time within 2 seconds.
5	Press ▲ 1 time	RDY F01.04	The value “0” has been changed to “1”.
6	Press and hold ENTER	RDY 00001	Display: “1”
7	Press ▲ ▼	RDY 00000	To change “1” to “0”
8	Press and hold ENTER	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 Keypad control the inverter to start and stop (F1.02=0), and the frequency is given by the potentiometer of the Keypad (F1.01=3).

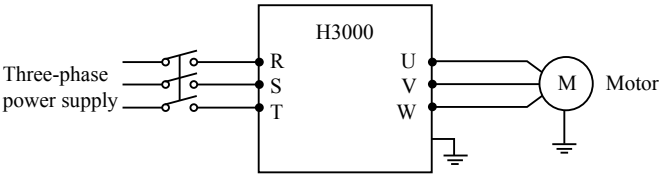
Program	Key name	Display	Description
1	Power on	RDV FREF 000.00	Frequency setting display state
2	Rotate 	RDV FREF 005.00	Frequency setting 5.0Hz
3		RDV FREF 005.00	Forward running of the frequency is turned on.
4	Press  1 time	RDV Fout 005.00	To shift to actual output frequency display picture
5	Rotate 	RDV Fout 015.00	To modify frequency setting, the actual output frequency has been changed from 5Hz to 15Hz
6	Press  1 time	RDV Iout 010.00	To shift to output current display picture, the output current now is 10.00A
7	Press  1 time	DRV 020.00	To shift to output voltage state, the actual output voltage now is 20.00
8	Press  2 times	DRV F00.00	To shift to parameter setup state
9	Press 	DRV F00.04	To select code F00.04 for modifying access parameter
10	Press and hold 	DRV 0140.00	To display F00.04 which means the running rotation speed is 15Hz
11	Press 	RDV FREF 0015.00	To return to main display picture, the frequency setting is 15Hz
12	Press 	RDV FREF 015.00	To stop the inverter, the frequency setting is 15Hz

Notice: Through shift key you can monitor frequency setting, output frequency, output current, output voltage during the running of the inverter, 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 inverter simple running and its relative items

5-3-1 Setup, 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 inverter, 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 inverter

The basic parameter setup of the running of inverter must have frequency setting and running signal source setup, for they can start the inverter on one hand, and indicate the running speed of the inverter 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 Keypad)

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

Press FWD to start the inverter, then to rotate the potentiometer, the inverter accelerations gradually.

Press STOP to stop the inverter

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 6 Table of Function Parameters

This chapter explains the “PARAMETERS” for use of this product.
Aways read this instructions before use.

Parameter list

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
Monitor functions	F0.00	Main display data selection	0-32	1	1	47
	F0.01	Display the set frequecy.	Read only	-----	-----	48
	F0.02	Display the output frequency	Read only	-----	-----	48
	F0.03	Display the output current	Read only	-----	-----	48
	F0.04	Display the motor speed.	Read only	-----	-----	48
	F0.05	Display the DC bus voltage value.	Read only	-----	-----	48
	F0.06	Display the temperature of inverter .	Read only	-----	-----	48
	F0.07	Display PID	Read only	-----	-----	49
	F0.10	Alarm record 1	Read only	-----	-----	49
	F0.11	Alarm record 2	Read only	-----	-----	49
	F0.12	Alarm record 3	Read only	-----	-----	49
	F0.13	Alarm record 4	Read only	-----	-----	49
	F0.14	The frequency setting in the last alarm.	Read only	-----	-----	49
	F0.15	The output frequency in last alarm .	Read only	-----	-----	49

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
Monitor functions	F0.16	The output current in last alarm .	Read only	-----	-----	49
	F0.17	The output voltage in last alarm .	Read only	-----	-----	49
	F0.18	The output DC bus voltage in last alarm .	Read only	-----	-----	49
	F1.00	Digital frequency setting	0.00—Maximum frequency	0.01	0.00	50
	F1.01	Frequency setting selection	0: Digital frequency setting (F1.00) 1: Analog voltage (0—10VDC) 2: Analog current (0—20mADC) 3. Setting dial (Operation panel) 4 UP/DOWN frequency setting 5: RS485 communication frequency setting	1	0	51
Basic functions	F1.02	Start signal selection	0: Operation panel (FWD/REV/STOP) 1: I/O terminal 2: Communication (RS485)	1	0	53
	F1.03	“stop” key lock operation selection	0: “Stop”key lock mode invalid 1: “Stop” key lock mode valid	1	1	56
	F1.04	Reverse rotation prevention selection	0: Reverse rotation disallowed 1: Reverse rotation allowed	1	1	57
	F1.05	Maximum frequency	Minimum frequency~400.00Hz	0.01	0.00	57
	F1.06	Minimum frequency	0.00~maximum frequency	0.01	0.00	57

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
Basic functions	F1.07	Acceleration time 1	0~6000.0s	0.1	Depends on models	58
	F1.08	Deceleration time 1	0~6000.0s	0.1		58
	F1.09	V/F maximum voltage	V/F intermediate voltage ~500.0 V	0.1	400.0	58
	F1.10	V/F base frequency	V/F intermediate frequency ~ max. frequency	0.01	50.00	58
	F1.11	V/F intermediate voltage	V/F minimum voltage ~ V/F maximum voltage	0.1	Changing	58
	F1.12	V/F intermediate frequency	V/F minimum frequency ~ V/F base frequency	0.01	2.50	58
	F1.13	V/F minimum voltage	0~V/F intermediate voltage	0.1	15.0	58
	F1.14	V/F minimum frequency	0~V/F intermediate frequency	0.01	1.25	59
	F1.15	Carrier frequency	1.0K-15.0K	0.1	Changing	61
	F1.16	Automatic carrier line up	Reserved	1	0	*
	F1.17	Initialization of parameters	8: Initialization of Factory Setting	1	0	62
	F1.18	Parameter lock	0: Unlock parameters 1: Lock up parameters	1	0	62
Basic functions	F2.00	Start mode selection	0: regular start 1: restart after inspection	1	0	62
	F2.01	Stop mode selection	0 : deceleration to a stop 1: coasting	1	0	63
	F2.02	Starting frequency	0.10~10.00Hz	0.01	0.5	64
	F2.03	Stopping frequency	0.10~10.00Hz	0.01	0.5	64
	F2.04	DC injection brake operation current (start)	0~150% rated motor current	1%	100%	65
	F2.05	DC injection brake operation time (start)	0~25.0S	0.1	0	65

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
Basic functions	F2.06	DC injection brake operation current (stop)	0~150% rated motor current	1%	100%	65
	F2.07	DC injection brake operation time (stop)	0~25.0S	0.1	0	65
	F2.08	Torque boost	0~20.0%	1	5%	66
	F2.09	Rated motor voltage	0~500.0V	0.1	380.0	66
	F2.10	Rated motor current	0 -- current of system	0.1	Changing	66
	F2.11	No load current ratio of motor	0-100%	0.1	40%	66
	F2.12	Rated motor rotation speed	0-6000r/min	1	1420	66
	F2.13	Number of motor poles	0-20	1	4	66
	F2.14	Rated motor slip	0~10.00Hz	0.01	2.50	67
	F2.15	Rated motor frequency	0-400.00 Hz	0.01	50.00	67
	F2.16	Resistance of stator	0-100Ω	0.01	0	67
	F2.17	Resistance of rotor	0-100Ω	0.01	0	68
	F2.18	Self inductance of rotor	0-1.000H	0.01	0	68
	F2.19	Mutual inductance of rotor	0-1.000H	0601	0	68
I/O functions	F3.00	FIV minimum voltage input	0~FIV maximum voltage	0.1	0	68
	F3.01	FIV maximum voltage input	FIV minimum voltage~10V	0.1	10.0	68
	F3.0 2	FIV input filter time	0~25.0S	0.1	1.0	68
	F3.03	FIC minimum current input	0~FIC maximum current	0.1	0	69
	F3.04	FIC maximum current input	FIC minimum current input~20mA	0.1	20.0	69
	F3.05	FIC input filter time	0~25.0S	0.1	1.0	69

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
I/O functions	F3.06	FOV minimum voltage output	0~FOV maximum voltage	0.1	0	70
	F3.07	FOV maximum voltage output	FOV maximum voltage output~10V	0.1	10.0	70
	F3.08	FOC minimum current output	0~FOC maximum current	0.1	0	71
	F3.09	FOC maximum current output	FOC minimum current~20mA	0.1	20.0	71
	F3.10	Frequency of low analog	0~600.00		0.00	71
	F3.11	Direction of low analog	0/1	1	0	71
	F3.12	Frequency of high analog	0~600.00	0.01HZ	50.00	71
	F3.13	Direction of high analog	0/1	1	0	71
	F3.14	Analog input reverse selection	0/1	1	0	71
	F3.15	Input terminal FWD (0~32)	0: Invalid 1: Jog 2: Jog Forward 3: Jog reverse 4: Forward/ reverse 5: Run 6: Forward 7: Reverse	1	6	71
	F3.16	Input terminal REV (0~32)	8: Stop 9: Multi-speed 1 10: Multi-speed 2 11: Multi-speed 3 12: Multi-speed 4 13: Accleration/ Deceleration terminal 1 14: Accleration/ Deceleration 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

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
I/O functions	F3.19	Input terminal S3 (0~32)	18:Inverter reset signal 19: PID in running 20: PLC in running 21: Start signal for timer 1 22: Start signal for timer 2 23: Counter pulse signal 24: Counter reset signal 25: Memory clear 26: Start winding operation	1	15	71
	F3.20	Input terminal S4 (0~32)		1	16	71
	F3.21 (0~32)	Input terminal S5		1	8	71
	F3.22 (0~32)	Input terminal S6		1	9	71
	F3.23	Output terminal M01 (0~32)	0: Invalid 1: In running 2: Frequency reached 3: Alarm 4: Zero speed 5: Frequency 1 reached 6: Frequency 2 reached 7: Accleration 8: Deceleration 9: Indication for under voltage 10: Timer 1 reached 11: Timer 2 reached 12: Indication for completion of phase 13:Indication for completion of procedure 14: PID maximum 15: PID minimum 16: 4-20mA disconnection 17: Overload 18: Over torque 26: Winding operation completed 27: Counter reached 28: Intermediate counter reached 29:Water supply by constant voltage "1" turn on "0" turn off	1	01	80
	F3.24	Output terminal M01 (0~32)		1	02	80
	F3.25	Alarm output terminal YA,YB,YC (0~32) Add:KA,KB F3.28 (0~32)		1	03	80

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
	F3.26	Output terminal FOV (0~7)	0: Frequency output 1: current output 2: Dc bus voltage 3: Ac voltage 4: Pulse output ,1pulse/ Hz 5: 2pulses/Hz 6: 3 pulses/Hz 7: 6 pulses/Hz	1	0	83
	F3.27	Output terminal FOC (0~7)		1	1	83
Secondary application	F4.00	Jog frequency setting	0.00~maximum frequency	0.01	5.00	84
	F4.01	Acceleration time 2	0~6000.0S	0.1S	10.0	85
	F4.02	Deceleration time 2	0~6000.0S	0.1S	10.0	85
	F4.03	Acceleration time 3	0~6000.0S	0.1S	20.0	85
	F4.04	Deceleration time 3	0~6000.0S	0.1S	20.0	85
	F4.0 5	Acceleration time 4/Jog acceleration time	0~6000.0S	0.1S	2.0	85
	F4.06	Deceleration time 4/Jog deceleration time	0~6000.0S	0.1S	2.0	85
	F4.07	Designated value of counter	0~65000	1	100	85
	F4.08	Intermediate value of counter	0~65000	1	50	85
	F4.09	Limitation of acceleration torque	0~200%	1%	150%	85
	F4.10	Limitation of constant speed torque	0~200%	1%	00	86
	F4.11	Over voltage prevention selection in deceleration	0/1	1	1	86

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
Secondary application	F4.12	Automatic Voltage regulation selection	0~2	1	1	87
	F4.13	Automatic-energy-saving selection	0~100%	1%	00	87
	F4.14	DC Braking voltage	Depends on models	0.1	800.0	87
	F4.15	Braking duty	40~100%	1	50%	87
	F4.16	Restart after instant power off	0~1	1	0	89
	F4.17	Allowable time of power cut	0~10s	1	5.0S	90
	F4.18	Flank restart Current limited level	0~200%	1	150%	90
	F4.19	Flank restart time	0~10s	1	50	90
	F4.20	Fault restart times	0~5s	1	0	90
	F4.21	Delay time for restart after fault	0~100	2	2	87
	F4.22	Over torque action	0~3	1	0	91
	F4.23	Over torque detection level	0~200%	1	00	91
	F4.24	Over torque detection time	0~20.0S	0.1	00	91
	F4.25	Reaching Frequency 1	0.00~maximum frequency	0.01	100	92
	F4.26	Reaching Frequency 2	0.00~maximum frequency	0.01	5.0	92
	F4.27	Timer 1 setting	0~6000.0S	0.1	0	92
	F4.28	Timer 2 setting	0~6000.0S	1	0	92

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
Secondary application	F4.29	Constant-speed torque limiting time	0~6000.0S	0.1	Changing	93
	F4.30	Width of arrival of frequency in hysteretic loop	0.00-2.00	0.01	0.50	93
	F4.31	Jump frequency 1	0.00~maximum frequency	0.01	0	93
	F4.32	Jump frequency 2	0.00~maximum frequency	0.01	0	93
	F4.33	Jump frequency hysteresis loop width	0.00-2.00	0.01	0.50	93
	F4.34	UP/DOWN frequency step	0~10.00Hz	0.01	0.1	
	F4.35	UP/DOWN frequency Memory options	0: memory 1: No Memory	1	0	
	F5.00	PLC memory mode	0~1	1	0	94
	F5.01	PLC starting mode	0~1	1	0	94
	F5.02	PLC running mode	0: PLC stops after running for one cycle 1: PLC stop mode, it stops after running for one cycle 2: PLC cycle running 3: PLC stop mode, cycle running mode 4: PLC operates at the last frequency after running for one cycle.	1	0	95
	F5.03	Multi-speed 1	0.00~maximum frequency	0.01	10.0	95
	F5.04	Multi-speed 2	0.00~maximum frequency	0.01	15.00	95
	F5.05	Multi-speed 3	0.00~maximum frequency	0.01	20.00	95
	F5.06	Multi-speed 4	0.00~maximum frequency	0.01	25.00	96

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
	F5.07	Multi-speed 5	0.00~maximum frequency	0.01	30.00	96
	F5.08	Multi-speed 6	0.00~maximum frequency	0.01	35.00	96
	F5.09	Multi-speed 7	0.00~maximum frequency	0.01	40.00	96
	F5.10	Multi-speed 8	0.00~maximum frequency	0.01	45.00	96
	F5.11	Multi-speed 9	0.00~maximum frequency	0.01	50.00	96
PLC operation	F5.12	Multi-speed 10	0.00~maximum frequency	0.01	10.00	96
	F5.13	Multi-speed 11	0.00~maximum frequency	0.01	10.00	96
	F5.14	Multi-speed 12	0.00~maximum frequency	0.01	10.00	96
	F5.15	Multi-speed 13	0.00~maximum frequency	0.01	10.00	96
	F5.16	Multi-speed 14	0.00~maximum frequency	0.01	10.00	96
	F5.17	Multi-speed 15	0.00~maximum frequency	0.01	10.00	96
	F5.18	PLC operation time 1	0~65000s	1S	100	96
	F5.19	PLC operation time 2	0~65000s	1S	100	96
	F5.20	PLC operation time 3	0~65000s	1S	100	96
	F5.21	PLC operation time 4	0~65000s	1S	100	96
	F5.22	PLC operation time 5	0~65000s	1S	100	96
	F5.23	PLC operation time 6	0~65000s	1S	0	96
	F5.24	PLC operation time 7	0~65000s	1S	0	96
	F5.25	PLC operation time 8	0~65000s	1S	0	96
	F5.26	PLC operation time 9	0~65000s	1S	0	96

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
	F5.27	PLC operation time 10	0~65000s	1S	0	96
	F5.28	PLC operation time 11	0~65000s	1S	0	96
	F5.29	PLC operation time 12	0~65000s	1S	0	97
	F5.30	PLC operation time 13	0~65000s	1S	0	97
	F5.31	PLC operation time 14	0~65000s	1S	0	97
	F5.32	PLC operation time 15	0~65000s	1S	0	97
	F5.33	PLC operation direction	0~32767	1	0	97
	F6.00	PID starting mode	0: PID disable 1: PID start 2: PID start by external terminal	1	0	100
PID operation	F6.01	PID operation mode selection	0: Negative feedback mode 1: Positive feedback mode	1	0	101
	F6.02	PID action set point	0: figure mode (F6.04) 1: FIV 2: FIC	1	0	101
	F6.03	PID feedback value selection	0: FIV 1: FIC 2: FIV - FIC 3: FIC - FIV	1	0	101
	F6.04	PID figure target value setting	0.0~100.0%	0.1%	0.0%	102
	F6.05	PID upper limit alarm value	0~100.0%	1%	100%	103
	F6.06	PID lower limit alarm value	0~100.0%	1%	0%	104
	F6.07	PID proportional band	0.0~200.0%	0.1%	100%	104
	F6.08	PID integral time	0.0~200.0 S . 0 means closed	0.1s	0.1s	104
	F6.09	PID differential time	0.00.0~20.00 S . 0 means closed	0.1s	0.0	104
	F6.10	PID action step-lergth	0.00~1.00Hz	0.01	0.10Hz	104

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
PID operation	F6.11	PID standby frequency	0.00~120.0Hz (0.00Hz) 0.00Hz means sleep function is closed	0.01	0.00Hz	105
	F6.12	PID standby duration	0~200s	1S	10s	105
	F6.13	PID wake-up value	0~100%	1%	0	105
	F6.14	PID corresponding value of display	0~10000	1	1000	106
	F6.15	PID diqit of display	1~5	1	1	106
	F6.16	PID decimal digits of display	0~4	1	1	106
	F6.17	PID upper limit frequency	0~max. frequency	0.01	48.00	
	F6.18	PID lower limit frequency	0~max. frequency	0.01	20.00	
	F6.19	PID working mode	0: Always work (PID function open) 1: When feedback reaches upper limit (F6.05), it will work at Min-frequency. When feedback reaches lower limit(F6.06), PID will begin to work.	1	0	
RS-485 Communication	F7.00	Communication speed	0: 4800bps 1: 9600 bps 2: 19200 bps 3: 38400 bps		0	107
	F7.01	Communication mode	0: 8N1 FOR ASC 1:8E1 FPR ASC 2:8O1 FOR ASC 3:8N1 FOR RTU 4:8E1 FOR RTU 5:8O1 FOR RTU			107
	F7.02	Communication address	0~240	1	0	107
	F8.00	Advanced application parameter lock	0: Locked 1: Unlocked	1	111	113

Function	Parameters	Name	Setting Range	Minimum Setting increments	Initial value	Refer To Page
Advanced application	F8.01	System 50Hz/ 60Hz setting	0~50Hz 1~60Hz	1	0	113
	F8.02	Constant torque or variable torque selction	0: Constant torque 1: Variable torque	1	0/1	114
	F8.03	Over-voltage protection setting	changing	1	changing	114
	F8.04	Under-voltage protection setting	changing	1	changing	114
	F8.05	Over-temperature protection setting	40~120℃	1	85/95℃	114
	F8.06	Current display filter time	0~10.0	0.1	2.0	114
	F8.07	0-10V analogue output low end calibration coefficient	0-65535	1	-	112
	F8.08	0-10V analog output high end calibration coefficient	0-65535	1	-	112
	F8.09	0-20mA analogue output low end calibration coefficient	0-65535	1	-	112
	F8.10	0-20mA analog output high end calibration coefficient	0-65535	1	-	112
	F8.11	Compensation frequency point for dead time	0.00~maximum frequency	0.01	0.00	
	F8.12	UP/DOWN frequency Memory options	0: memory 1: No Memory	1	0	

Chapter 7

Detailed Explanations of Functional Parameters

7-1 Parameters for monitoring

Parameters	Name	Setting Range	Descrption
F0.00	Main display data selection (Initial value: 00) Setting range (00-32)	00	Displays the set frequency
		01	Displays the inverter output frequency
		02	Displays the inverter output current
		03	Displays the motor speed
		04	Displays the DC bus voltage
		05	Displays the inverter temperature
		09	Displays record of last faults (1)
		10	Displays record of last faults (2)
		11	Displays record of last faults (3)
		12	Displays record of last faults (4)
		13	Displays the recently set frequency of the inverter when the fault occured
		14	Displays the recently output frequency of the inverter when the fault occured
		15	Displays the recently output current of the inverter when the fault occured
		16	Displays the recently output voltage of the inverter when the fault occured
		17	Displays the recently DC bus voltage of the inverter when the fault occured
		18	Displays the recently temperature of the inverter when the fault occured

Operation Instruction of H3000 Series Inverter

User can set the initial display of the inverter through parameter F0.00 .

For example, in order to monitor rotation speed through the operation panel , user can set parameter F0.00 to “03”.

Initial value of F0.00 is “00”, therefore , if not been changed, inverter will display the set frequency .

F0.01	Display the set frequency
	It displays the set frequency of inverter.

You can monitor the set frequency of inverter by examining the content of this parameter.

F0.02	Display the output frequency
	It displays the present output frequency of inverter.

You can monitor the present output frequency of the inverter by examining parameter F0.02.

F0.03	Display the output current
	It displays the output current of inverter.

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

F0.04	Display the motor speed
	It displays the actual rotation speed of motor.

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

F0.05	Display the DC bus voltage value
	It displays the voltage of DC bus in main circuit of inverter.

You can monitor the actual voltage of DC bus by examining parameter F0.05.

F0.06	Display temperature of inverter
	It displays the actual temperature of inverter.

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

F0.10	Alarm record 1
F0.11	Alarm record 2
F0.12	Alarm record 3
F0.13	Alarm record 4
	It records the latest four faults of inverter.

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 inverter and find the cause of fault and eliminate hidden trouble.

F0.14	Displays the recently set frequency of the inverter when the fault occured
F0.15	Displays the recently output frequency of the inverter when the fault occured
F0.16	Displays the recently output current of the inverter when the fault occured
F0.17	Displays the recently output voltage of the inverter when the fault occured
F0.18	Displays the recently DC bus voltage of the inverter when the fault occured
	They display the detailed status when the latest fault occurs. You can check the actual frequency setting, actual output frequency, actual output voltage, and dc voltage of main circuit in inverter by examining these parameters respectively.

You can check the detailed status when the latest fault occurs by examining the content of F0.14--F0.18. You can examine the frequency setting, actual output frequency, and actual output current, actual output voltage, DC bus voltage of main circuit. 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.

For H3000 series inverter, you can use parameter “F.00” to set the main display data. It’s also possible to monitor the data directly through the parameters “F0.01~F0.18”.

You may monitor the data by pressing the switching key as shown in below table:

Procedure	Press key	Display	Explanation
1	Turn on power	RDV FREF 0015.00	① Inverter is in standby mode. ② The keypad displays frequency setting. FREE light is on, which means that the keypad is displaying frequency setting
2	Press FWD	RDV FREF 0015.00	Start inverter ① Inverter is in running and DRV light is on. ② The image displays frequency setting. Forward light is on; inverter is in Forward state.
3	Press for once	RDV FREF 0015.00	Switch display; stop switching when actual output frequency is displayed. Inverter is in Forward running state. ② The actual output frequency is 15.00Hz. ③ Fout light is on.
4	Press for once	RDV Iout 010.00	Switch display; stop switching when actual output current is displayed. ① The actual current output is 10A ② Iout lamp is on, which means that the current image displays actual output current.
5	Press for once	DRV 0140.00	Switch display; stop switching when actual output voltage is displayed. ① The actual output voltage is 140V.
6	Press for once	DRV 020.00	Switch to keypad ① Return to keypad which displays frequency setting. ② The frequency setting is 20.00Hz

7-2 Basic parameters

F1.00	Digital frequency setting		(Initial value: 0.00Hz)	
	Setting range	0.00-Maximum frequency	Unit	0.01

When F1.01 is set to 0, inverter works in Digital frequency setting mode. The frequency value is set by F1.00.

During running, you can change frequency by modifying the content of parameter F1.00 or by pressing " ▲ " key or " ▼ " key to change frequency. If you

change frequency by modifying F1.00, when the inverter stops running or when power is off, the modified content can be remembered.

If you change frequency by pressing " ▲ " key or " ▼ " key, when the inverter stops running or power is off, the modified content will not be remembered;

instead the original F1.00 will be remembered. When the inverter is started next time, it will operate at the original value of F1.00.

F1.01	Frequency setting selection			Initial value : 0
	Setting range	0-5	Unit	1
	Explanation	0: Digital frequency setting (F1.00) 1: Analog voltage (0—10VDC) 2: Analog current (0—20mADC) 3. Setting dial (Operation panel) 4. UP/DOWN frequency setting 5: RS485 communication frequency setting		

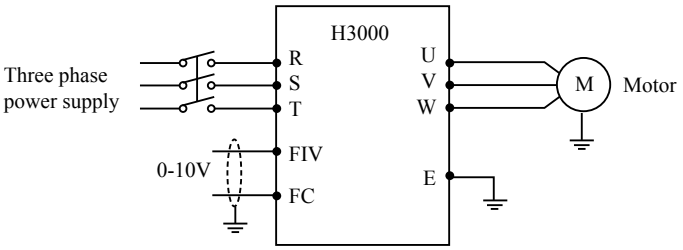
Frequency setting selection can be used to decide the output frequency of inverter.

0: Digital frequency setting

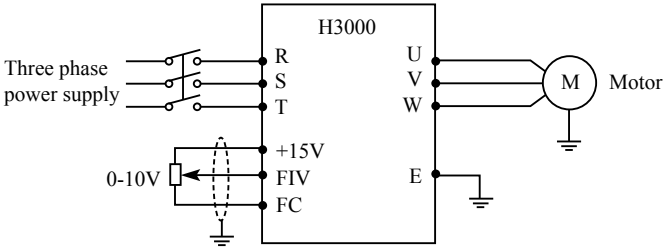
The output frequency of inverter is decided by F1.00. Generally speaking, you can change output frequency by pressing the " ▲ "or " ▼ " key on Keypad. Refer to F1.00 for details.

1: Analog voltage mode (0~10VDC)

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



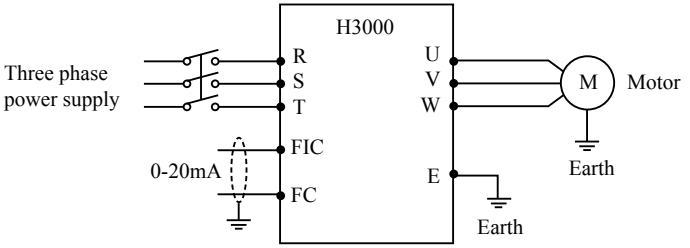
Explanation: control the output frequency through terminal FIV/ FC (0~10V).



Explanation: control output frequency of inverter by FIV voltage signal sent by external POT (10k Ω)

2: Analog current mode (0~20mA DC)

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



3: Setting dial mode (Operation panel)

You can control the running of H3400 series inverter by the POT knob on Keypad.

Pay attention to the POT knob in Keypad which enables you to switch between monitoring images.

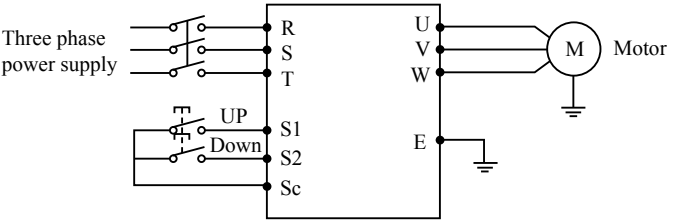
Turn the : change the output frequency

Press the : switch the display

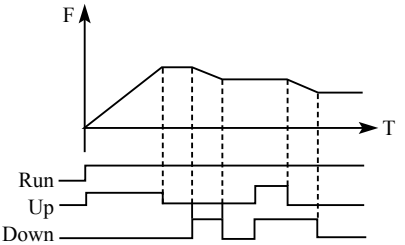
4 UP/DOWN setting mode

The output frequency of inverter is controlled by external UP/DOWN terminals.

External terminals can be selected from F3.15 to F3.22 , been selected one of external terminals as UP/DOWN . 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 will be set in UP mode.
F3.18=16, S2 terminal will be set in DOWN mode.



Explanation: when UP is valid (UP is closed), frequency will go up .
When DOWN is valid (DOWN is closed), frequency will go down .

F1.02	Start signal selection			Initial value : 0
	Setting range	0-2	Unit	1
	Explanation	0: Operation panel (FWD/REV/STOP) 1: I/O terminal 2: Communication (RS485)		

Start signal selection are used to set running signal source.

0: Operation panel (FWD/REV/STOP)
Operation panel gives the running signal. The running of inverter can be controlled

by the " FWD " key (Forward) and " REV " (reverse) key on the operation panel.

Press " STOP RESET " key to stop running of inverter.

Procedure	Press key	Display	Explanation
1	Power ON	DRV 010.00	① the set frequency is 10.0Hz
2	FWD	DRV 010.00	① Inverter is in running mode. ② Inverter is in forward running mode. ③ The output frequency is 10.00Hz
3	REV	DRV 010.00	① Inverter is in reverse running mode. ② Switch between forward and reverse of inverter ③ The output frequency is 10.00Hz
4	STOP RESET	DRV 010.00	① Inverter stops running ② Inverter is in standby mode.

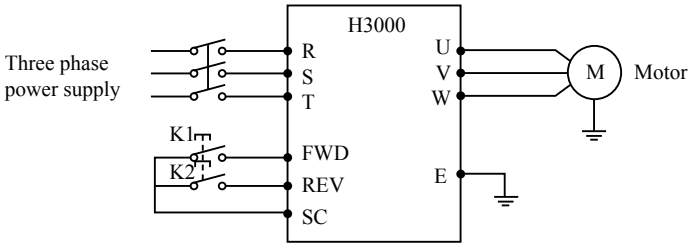
1: I/O terminal

In the initial setting ,the forward/reverse rotation signals are used as start and stop signals .Turn on either of the forward and reverse rotation signals to start the motor in the corresponding direction . If both are turned off (or on) during operation , the inverter decelerates to a stop (or Keep the original running condition)

You can make two-wire type or three-wire type control mode by using I/O terminal

① Two-wire type

A two-wire type connection is shown below :



Parameter: F1.02=1 F3.15=6 F3.16=7

Operation Instruction of NT3000 Series Inverter

Actuating explanation:

Input Status		Status of inverter
K1	K2	
ON	OFF	Forward
OFF	OFF	Stop
OFF	ON	Reverse
ON	ON	Keep the original running condition

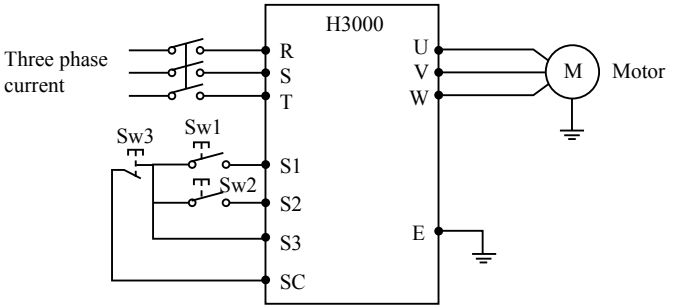
② Three-wire type

A three-wire type connection is shown below.

The start self-holding selection becomes valid when the STOP signal is turned on. In this case, the forward/reverse rotation signal functions only as a start signal.

If the start signal(S1/S2) is turned on and then off, the start signal is held and makes a start. When changing the direction of rotation, turn S1(S2) on once and then off.

The stop the inverter, turning off the STOP signal once decelerates it to a stop.



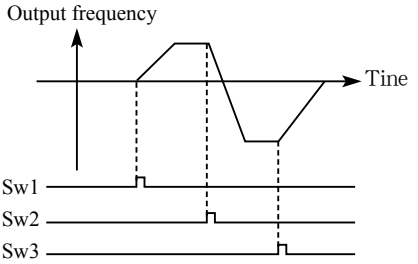
Use S1, S2, or S3 as input terminal for external signal

Parameter: F3.17=6 S1 is in forward

F3.18=7 S2 is in reverse

F3.19=9 S3 is in stop mode

F1.02=1 external terminal input



2: RS485 mode

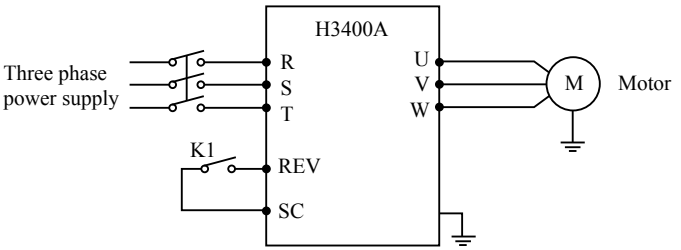
Inverter can receive command and exchange data with computer by serial communication.

F1.03	“stop” key lock operation selection			Initial value : 1
	Setting range	0-1	Unit	1
	Explanation	0: “Stop”key lock mode invalid 1: “Stop” key lock mode valid		

The “STOP"key operation of the operation panel can be made invalid to prevent unexpected stop.

Set “0” in F1.03,then press “ENTER” for 2s to make the “STOP” key operation invalid, and “STOP” key can not stop running of inverter

Set “1” in F1.03,then press “ENTER” for 2s to make the “STOP” key operation valid, and “STOP” key can stop running of inverter



Procedure	Input	Explanation
1	K1 close	Reverse of inverter is started
2	(K1 open) press stop key	Inverter stops
3	K1 open	Running signal is removed
4	K1 close	Reverse of inverter is started

F1.04	Reverse prevention setting		Initial value : 1	
	Setting range	0-1	Unit	1
	Explanation	0: Reverse prohibited 1: Reverse allowed		

Many devices only allow rotation in single direction. In this case, you can set the machine in single rotation mode by this parameter.

0: Reverse prohibited

Reverse of motor is prohibited. When F1.04 is set at reverse prohibited, switch between Forward and reverse is invalid.

1: Reverse allowed

Reverse of motor is enabled, switching between forward and reverse is valid.

F1.05	Max. frequency	Initial value: 50.00
	Setting range	Min. output frequency ~ 400.00Hz

The output frequency range of inverter is 0.1~400.00Hz. Therefore, inverter can drive the motor higher than 50/60Hz, which could cause mechanical damage or accident.

This parameter is to limit the inverter output frequency in order to prevent motor operating at too higher speed.

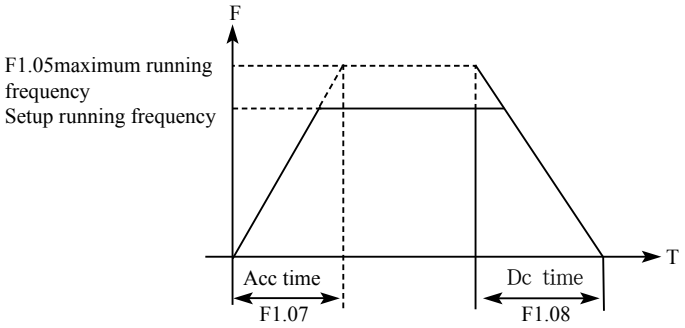
F1.06	Min. frequency	Initial value : 0.00
	Setting range	0.00 ~ max. frequency

This parameter is to set the minimum output frequency of the inverter. If the setting frequency is lower than the Min. frequency, inverter will output on the Min. frequency. In some application, this function could avoid motor overheating due to

the low speed operation.

F1.07	Acc time	Initial value : change
F1.08	Dec time	Initial value : change
	Setting range	0.1~6000.0s

Acc time refers to the time for inverter to reach the max. frequency from 0.00Hz. Dec time refers to the time for inverter to lower to 0.00Hz from max. frequency.



The Default Acc/Dec time is the primary Acc time/ Dec. time. Other Acc time or Dec time can be selected via external terminal.

F1.09	V/F maximum voltage		Initial value : 380
	Setting range	V/F intermediate voltage~500.00	Unit 0.01
F1.10	V/F fundamental frequency		Initial value : 50
	Setting range	V/F intermediate frequency ~ max. frequency	Unit 0.01
F1.11	V/F intermediate voltage		Initial value : change
	Setting range	V/F minimum voltage ~ V/F maximum voltage	Unit 0.1
F1.12	V/F intermediate frequency		Initial value : 2.5
	Setting range	V/F minimum frequency ~ V/F fundamental frequency	Unit 0.01
F1.13	V/F minimum voltage		Initial value : 15
	Setting range	0.0 ~ V/F intermediate voltage	Unit 0.1

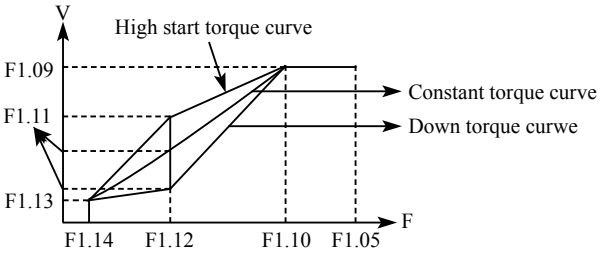
F1.14	V/F minimum frequency		Initial value : 1.25
	Setting range	0.0 ~ V/F intermediate frequency	Unit 0.01

Parameters from F1.09 to F1.14 determine the V/F curve of inverter. Set corresponding V/F curves according to different loads.

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

Down (variable) torque curve: application for variable torque load, like fan and pump. Load will increase with the increase of rotation speed.

High start torque curve: application for heavy load and load need high starting torque.



F1.09: V/F maximum voltage, V/F maximum voltage can be set according to the motor connected. Generally, it will be set at the rated voltage of motor. When motor is very near to inverter, 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 setting; 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 inverter protection. Increasing the value of F1.11 can increase output torque and output

current. Please monitor output current while changing the value of F1.11. While changing the value of F1.11, adjust the value slowly until the necessary output torque is reached. Too higher setting may cause inverter 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 inverter. 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, it's not necessary to 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.

Please refer to the following table for the specific Default setting of each model:

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

parameter / Model	F1.07	F1.08	F1.11	F1.15
H3400A0022K	30	30	19	4
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 Setting
	Setting range 1-15 unit 1	

Carrier frequency decides the switching frequency of internal power module. The factory setting of inverters with different capacity are different because will affect motor noise, motor heating and disturbance.

Carrier frequency F1.15	Motor Noise	Motor Heating	Disturbance
Small → Big	Big → Small	Small → Big	Small → Big

Therefore, when the environment demands running without noise, you shall increase the value of F1.15, the maximum load of inverter will decrease.
If motor is far from inverter, you shall lower the value of F1.15 so as to lower the leakage current between wires and wire to ground.

When the environment temperature or motor load is high, you shall lower the

value of F1.15 to reduce the heating of the inverter. Refer to table in F1.14 for the factory set of F1.15.

F1.17	Initialization of parameters	Initial value : 0
	Setting range 0-8	Unit: 1
	Explanation	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 Setting, 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	Initial value : 0
	Setting range 0-1	Unit: 1
	Explanation	0: Unlocked

1: Locked

You can lock the parameter by F1.18 to prevent unexpected change of the inverter setup.

When F1.18 is valid, all the other parameters except F1.00 (main frequency setting) cannot be changed.

7-3 Parameters of basic applications

F2.00	Start mode selection			Initial value : 0
	Setting range	0-1	Unit	1
	Explanation		0: Start at start frequency 1: Tracing start	

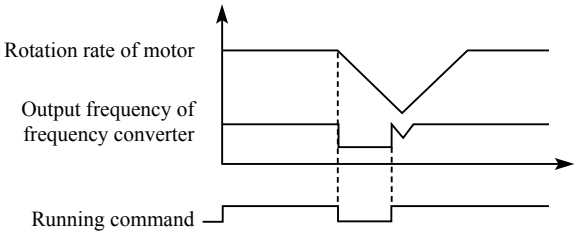
There are two start modes for H3000 series inverter. You can choose from the two by setup of parameter F2.00 and the condition of machinery.

0: Start at start frequency

Most loads do not have special requirement in start. Inverter output from the start frequency.

1: Tracing start

Tracing start is application for start after fault reset or instantaneous power failure. Using tracing start function, inverter can automatically detect the rotation speed and rotation direction of motor, the output the starting frequency and voltage accordingly.



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

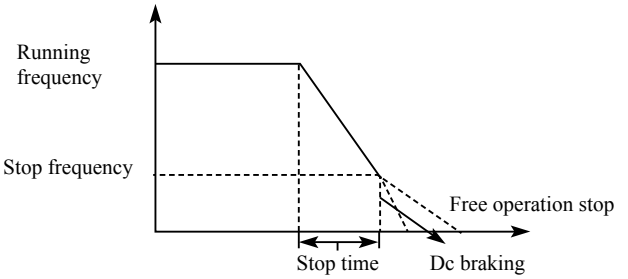
In addition, when the value of 4.09 is too low, it may lead to a long start time. If over current in the speed tracing, inverter will pause the speed tracing.

F2.01	Stop mode selection			Initial value : 0
	Setting range	0-1	Unit	1
	Explanation	0: Deceleration to stop 1: Coasting stop		

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

0: Deceleration to stop

Once inverter receives stop command, it will reduce the output frequency according to the deceleration time.



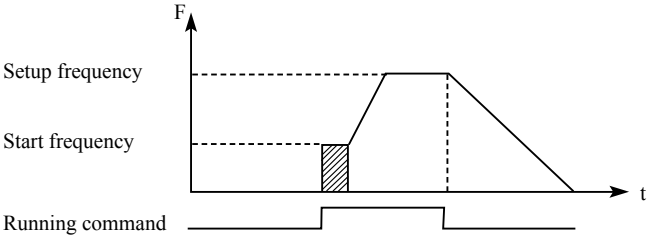
With regard to stop mode after stop frequency is reached, you can choose DC injection brake and other options. If you do not choose DC injection braking, it will stop in coasting stop mode.

1: Coasting stop

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

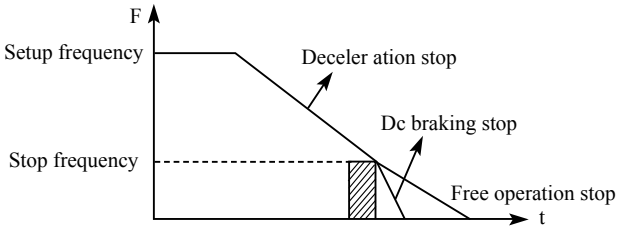
F2.02	Start frequency setting			Initial value : 0.5
	Setting range	0.10-10.00	Unit	0.01

Start frequency is the initial frequency when inverter starts. For device with heavy load or requires large starting torque, increasing start frequency can make start easier. However, if the start frequency is too high, it may cause over current protection.



F2.03	Stop frequency setting		Initial value : 0.5Hz	
	Setting range	0.10-10.00Hz	Unit	0.01Hz

When inverter receives stop command, it reduce the output frequency until the stop frequency, then it will start coasting stop or DC injection brake stop according to the setting .

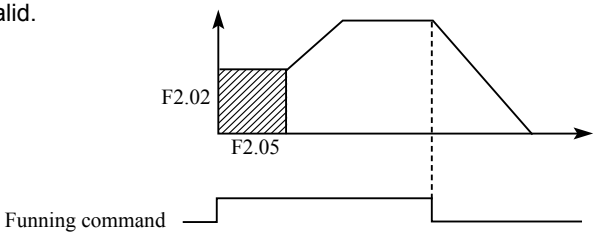


F2.04	Dc braking current in start Initial value : 100			
	Setting range	0-150	Unit	1
F2.05	Dc braking time in start Initial value : 0			
	Setting range	0-250	Unit	1

Dc braking in start is application for fan in stop mode and moving load. Because before inverter starts, motor is in free running mode and the rotation direction is unknown. It is easy to cause over current protection in start. Therefore, before start, you shall use DC injection brake to stop the motor in advance.

Dc braking current in start is the ratio of rated current of inverter, 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 injection brake lasts. When it is 0, DC injection brake is invalid.



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

Dc braking in stop is application for load which has requirement on braking.

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

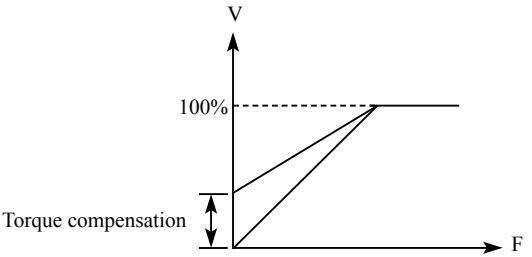
Dc braking time in stop is the period DC injection brake mode lasts. When it is 0, DC injection brake is invalid.

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

F2.08	Torque boost		Initial value : 5%	
	Setting range	0.1-20%	Unit	0.1

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

Attention: Too big setting may cause motor overheating. Increase the setting step by step until you get the requested starting torque.



F2.09	Rated motor voltage		Initial value :	380.00V
	Setting range	0-500.00	Unit	0.01
F2.10	Rated Motor current		Initial value :	*
	Setting range		Unit	0. 1
F2.11	No load current ratio of motor		Initial value :	40
	Setting range	0-100	Unit	1
F2.12	Rated motor rotation speed		Initial value :	1420
	Setting range	0-6000	Unit	1
F2.13	Numher of motor poles		Initial value :	4
	Setting range	0-10	Unit	1

F2.14	Rated motor slip		Initial value : 2.5	
	Setting range	0-100	Unit	0. 1

Please set above parameters according to the motor rating.

F2.09 Rated voltage motor
Please set rated voltage of motor according to voltage value on motor nameplate.

F2.10 Rated motor current
Please set rated current of motor according to the current value on nameplate. If the running current exceeds the value of rated current, inverter will trip to protect the motor.

F2.11 No load current ratio 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 motor rotation speed
The value of parameter F1.12 is the rotation speed at 50Hz. It is related to rotation speed display. Generally, it shall be set according to the value on nameplate.

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

F2.13 Number of motor poles
Set the number of pole pairs of motor by adjusting this parameter according to the value on nameplate

F2.14 Rated motor slip
When inverter drives motor, slip will increase when load increase. Adjusting F2.14 can compensation the slip and make motor speed close to the synchronization speed.

F2.15	Rated motor frequency		Initial value : 50Hz	
	Setting range	0.00-400.00	Unit	0.01
F2.16	Resistance of stator		Initial value : 0	
	Setting range	0-100.00	Unit	0.01

F2.17	Resistance of rotor		Initial value : 0	
	Setting range	0-100.00	Unit	0.01
F2.18	Self inductance of rotor		Initial value : 0	
	Setting range	0-1.000	Unit	0.001
F2.19	Mutual inductance of rotor		Initial 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.

7-4 Parameters for input and output application

F3.00	FIV minimum voltage input		Initial value : 0	
	Setting range	0~FIV maximum voltage input	Unit	0.1
F3.01	FIV maximum voltage input		Initial value : 10.0	
	Setting range	FIV minimum voltage input~0	Unit	0.1
F3.02	FIV input filter time		Initial 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 lowest analogue input. 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 highest analogue input. 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.

F3.02 Input filter time

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

F3.03	FIC minimum current input		Initial value : 0	
	Setting range	0~FIC maximum current input	Unit	0.1
F3.04	FIC maximum current input		Initial value : 20.0	
	Setting range	FIC minimum current input-20.0	Unit	0.1
F3.05	FIC input filter time		Initial 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 lowest analogue input. Inverter will deem current signal below value of F3.03 as invalid.

F3.04: FIC maximum current input

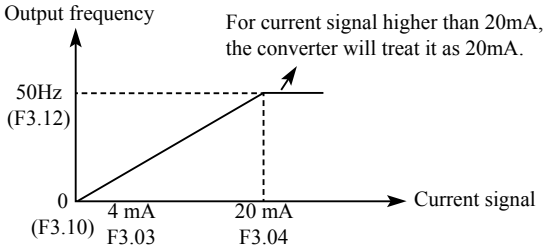
FIC maximum current input is related to frequency of highest analogue input. For current command higher than value of F3.04, inverter will operate at the value.

F3.05: FIC input filter time

FIC input filter time decides how fast inverter responds to analogue change. With the increase of value of F3.05, inverter will respond more and more slowly to analogue change. The output of inverter 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		Initial value : 0	
	Setting range	0-FOV maximum voltage output	Unit	0.1
F3.07	FOV maximum voltage output		Initial value : 10.0	
	Setting range	FOV minimum voltage output-10.0	Unit	0.1

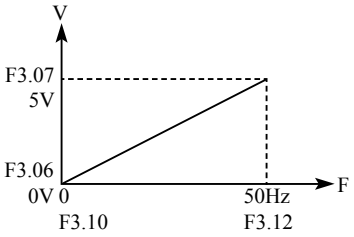
The value of F3.06 and that of F3.07 decide the range of output voltage of FOV terminal.

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

F3.07 FOV maximum voltage output is related to frequency of highest analogue output. 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 inverter.

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



F3.08	FOC minimum current output		Initial value : 0	
	Setting range	0-FOC maximum current output	Unit	0.1
F3.09	FOC maximum current output		Initial 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 lowest analogue output and frequency of highest analogue output respectively. Refer to explanations of F3.06 and F3.07 for relevant parameters.

F3.10	Frequency of low analog		Initial value : 0.00	
	Setting range	0.0-600.00	Unit	0.01
F3.11	Direction of of low analog		Initial value : 0	
	Setting range	0-1	Unit	1
	Explanation	0: Positive direction 1: Negative direction		
F3.12	Frequency of high analog		Initial value : 50	
	Setting range	0.00-600.00	Unit	0.01
F3.13	Direction of high analog		Initial value : 0	
	Setting range	0-1	Unit	1
	Explanation	0: Positive direction 1: Negative direction		
F3.14	Analogue reverse options		Initial value : 0	
	Setting range	0-1	Unit	1
	Explanation	0: No reverse at negative bias voltage 1: Reverse allowed at negative bias voltage		

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

F3.10 Frequency of low analog

Frequency of lower analogue decides the output frequency of lowest analogue

input, corresponding to analogue minimum voltage (current) input.

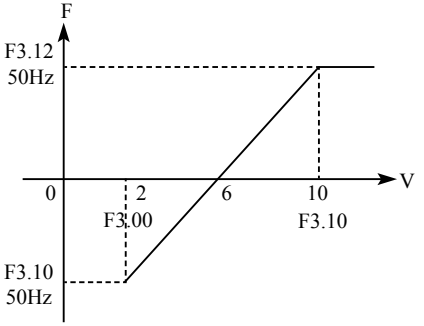
F3.11 Direction of low analog
Direction of lower analogue decides the running condition at low frequency, whether it is Forward or reverse.

F3.12 Frequency of high analog
Analogue high-end frequency determines high-end output frequency, and is corresponding to analogue maximum voltage (current) input.

F3.13 Direction of high analog
Analogue high-end direction determines whether the running status of high-end frequency is forward or reverse.

F3.14 Analog input reverse selection
Analogue reverse 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 output 2-10 V signal to control inverter, 50Hz reverse to 50Hz forward running.



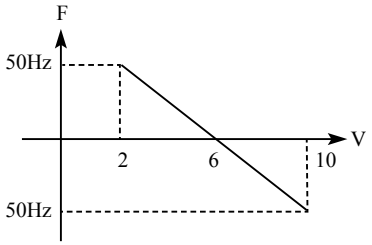
Introduction: F3.00=2 FIV minimum voltage input: 2V (inverter regards signals below 2V as invalid signals);

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

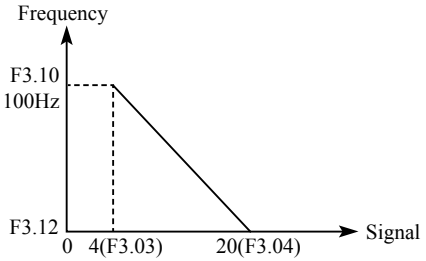
F3.10=50 Analogue low-end frequency: 50Hz;

F3.11=1 Analogue low-end direction: 1 (reverse);
F3.12=50 Analogue high-end frequency: 50Hz;
F3.13=0 Analogue high-end direction: 0 (Forward);
F3.14=1 Analogue reverse selection: 1 (negative bias voltage can be reversed).

Attention: In various curves, switching instructions of forward and reverse remain effective, when forward and reverse are switched, the curve will be reversed, and the diagram of curve is as follows:



Example 2, upper computer output 4-20mA, and controls running of inverter Output 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 (Forward)
F3.12=0 analogue high-end frequency
F3.14=0 analogue high-end direction (Forward)

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

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

F3.15	Multifunction input terminal---FWD terminal		Default value 6	
F3.16	Multifunction input terminal---REV terminal		Default value 7	
F3.17	Multifunction input terminal---S1 terminal		Default value 1	
F3.18	Multifunction input terminal---S2 terminal		Default value 18	
F3.19	Multifunction input terminal---S3 terminal		Default value 15	
F3.20	Multifunction input terminal---S4 terminal		Default value 16	
F3.21	Multifunction input terminal---S5 terminal		Default value 8	
F3.22	Multifunction input terminal---S6 terminal		Default value 9	
	Range	0-32	Unit	1
	Settings	0: Invalid 1: Jog 2: Jog Forward 3: Jog reverse 4: Forward/ reverse 5: Running 6: Forward 7: Reverse 8: Stop 9: Multi-speed selection 1 10: Multi-speed selection 2 11: Multi-speed selection 3 12: Multi-speed selection 4 13: Acceleration/ deceleration selection 1 14: Acceleration/ deceleration selection 2 15: Frequency increasing signal Up 16: Frequency decreasing signal Down 17: Coasting stop 18: Fault reset 19: PID function enable 20: PLC function enable 21: Timer 1 start up 22: Timer 2 start up 23: Counter pulse input 24: Counter reset 25: PLC memory clear 26: Winding operation start		

0: Invalid

Set as empty terminal, no function

1: Jog

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

2: Jog Forward

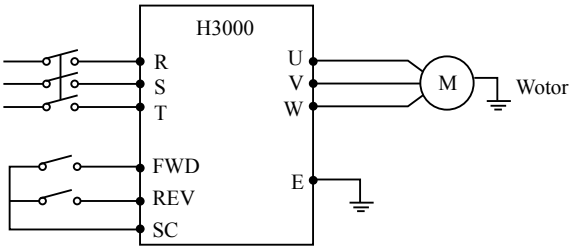
Set as JOG forward.

3: Jog reverse

Set as JOG reverse.

4: Forward/ reverse

Set as forward/ reverse switching, when the terminal is defined to be valid, running status reverse.



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

Terminal status		Running condition
FWD	REV	
ON	OFF	Forward
ON	ON	Reverse
OFF	OFF	Stop

5: Running

Set terminal as running signal.

6: Forward

When terminal is valid, motor run forward.

7: Reverse

When terminal is valid, motor run reverse.

8: Stop

When terminal is valid, motor run reverse.

9: Multi-speed 1

10: Multi-speed 2

11: Multi-speed 3

12: Multi-speed 4

15-speed can be selected by terminal multi-speed 1, 2, 3 and 4 as below table:

Multi-function terminal				Status and explanation
Multi-speed 1	Multi-speed 2	Multi-speed 3	Multi-speed 4	
0	0	0	0	Primary frequency, Primary frequency is determined by F1.00 or potentiometer
1	0	0	0	Multi-speed 1 (F5.03)
0	1	0	0	Multi-speed 2 (F5.04)
0	0	1	0	Multi-speed 3(F5.05)
0	0	0	1	Multi-speed 4 (F5.06)
1	1	0	0	Multi-speed 5 (F5.07)
1	0	1	0	Multi-speed 6 (F5.08)
1	0	0	1	Multispeed 7(F5.09)
0	1	1	0	Multi-speed 8 (F5.10)
0	1	0	1	Multi-speed 9 (F5.11)
0	0	1	1	Multi-speed 10 (F5.12)
1	1	1	0	Multi-speed 11 (F5.13)
1	1	0	1	Multi-speed 12 (F5.14)
1	0	1	1	Multi-speed 13 (F5.15)
0	1	1	1	Multi-speed 14 (F5.16)
1	1	1	1	Multi-speed 15 (F5.17)

Remarks: 0: terminal invalid 1: terminal invalid

13: acceleration/ deceleration selection 1

14: acceleration/ deceleration selection 2

4 kinds of acceleration/ deceleration times can be selected by acceleration/ deceleration selection terminal 1and 2.

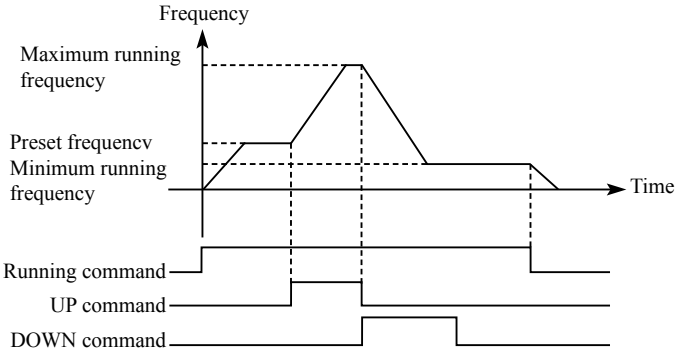
Multi-function terminal		Acceleration/ deceleration status and result
Acceleration/ deceleration selection 1	Acceleration/ deceleration selection 2	
0	0	Acceleration/ deceleration time 1 (F1.07, F1.08)
1	0	Acceleration/ deceleration time 2 (F4.01, F4.02)
0	1	Acceleration/ deceleration time 3 (F4.03, F4.04)
1	1	Acceleration/ deceleration time 4 (F4.05, F4.06)

15. Frequency increasing signal (Up signal)

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

16. Frequency decreasing signal (Down signal)

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



Attention: Inverter will not memorize the frequency setting changed by “UP” and “DOWN” signal. When power is turned off and reset again, inverter still memorizes the set value in F1.00.

17: Coasting stop
When this terminal is valid, inverter coasting to stop.

18. Fault reset
Reset the inverter when alarm occurs, this terminal function is same to that of the RESET key on the Keypad.

19. PID function enable
When this contact closes, PID function is enabled. When F6.01 is set as 2, PID is invalid when this contact is disconnected.

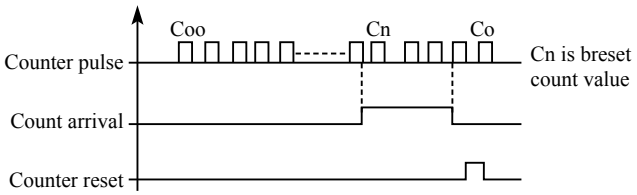
20. PLC function enable
When this contact closes, PLC function starts up, and corresponding PLC function opens.

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 output contacting action.

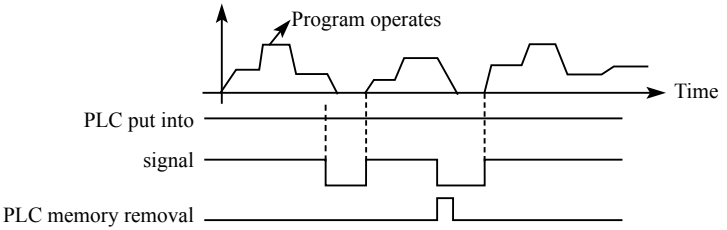
23. Counter pulse input
This terminal may accept pulse signals of no more than 250 Hz.

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



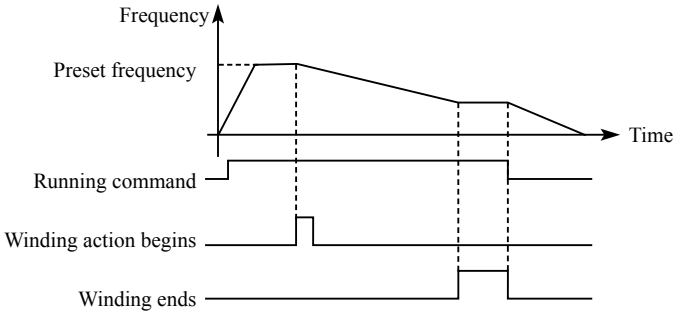
25. PLC memory removal

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



26. Winding function enable

When this signal is valid, winding function is enabled.



Introduction:

① Winding function is activated, and winding begins;

② Winding operation complete, inverter output according to the frequency that winding is completed. The multifunction terminal output the winding complete signal;

③ Inverter stops, the winding complete signal reset.

F3.23	Output terminal M01		Default value 01	
F3.24	Output terminal M02		Default value 02	
F3.25	Output terminal YA, YB, YC		Default value 03	
	Range	0-32	Unit	1
	Setting	0: Invalid 1: In running 2: Frequency reached 3: In fault 4: Zero-speed 5: Frequency 1 reached 6: Frequency 2 reached 7: Accelerating 8: Decelerating 9: Under voltage 10: Timer 1 reached 11: Timer 2 reached 12: Indication for completion of phase 13: Indication for completion of procedure 14: PID upper limit 15: PID lower limit 16: 4-20mA cable open 17: Overload 18: Over torque 26: Winding function complete 27: Counter reached 28: Intermediate counter reached		

0: Invalid

Set as invalid terminal, prevent false operation.

1. In running

Terminal is defined to be in running, when inverter is output, this terminal is ON.

2. Frequency reached

When frequency arrives at setting value, this contact is ON

3. In fault

When inverter detects abnormal existing, this contact is ON.

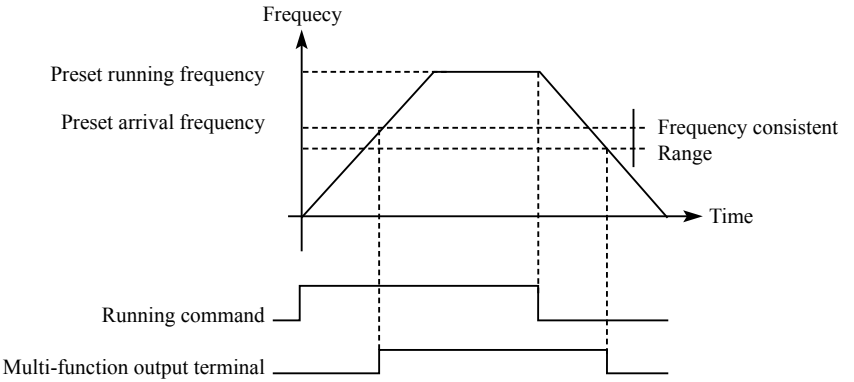
4. Zero-speed

When frequency output by inverter is less than start-up frequency, this contact is ON.

5. Frequency 1 reached

6. frequency 2 reached

When frequency arrives at setting value, this contact is ON.

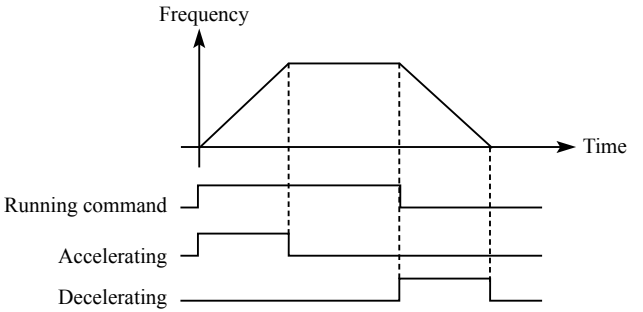


7: Accelerating

When inverter is in the status of accelerating, this contact is ON.

8: Decelerating

When inverter is in the status of decelerating, this contact is ON.



9. Under voltage alarming

When inverter detects that DC bus voltage is lower than setting value, this contact is ON and alarm. Under voltage alarming setting value can be changed through

advanced application parameter group.

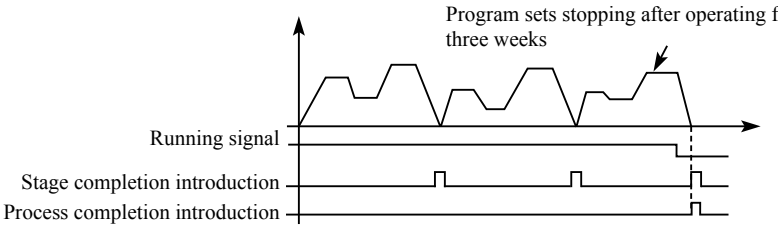
10: Timer 1 reached

11: Timer 2 reached

When inverter arrives at setting value, this contact is ON, when timer start-up signal is removed, this contact is reset.

12: Stage completion indication

In the PLC operation mode, inverter output this pulse signal when inverter finished a section of program.



13. Process completion indication

In the PLC operation mode, inverter output this pulse signal when inverter finished the entire program.

14. PID upper limit

When PID feedback quantity exceeds setting value of upper limit, this contact is ON.

15: PID lower limit

When PID feedback quantity is lower than setting value, this contact is ON.

16: 4-20mA cable open

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

17: Overload detection

When inverter detects that motor overloads, this contact is ON.

18: Over torque detection

When inverter detects over torque, this contact is ON.

26: Winding function complete
When winding function is complete, this contact is ON. When inverter stops, this contact is reset.

27: Set counter reached
When inverter implements external counter, and when count value arrives at setting value (F4.25), this contact is ON.

28: Middle counter reached
When inverter counts, if count value arrives at setting value (F4.26), this contact is ON.

F3.26	Output terminal FOV			Default value 0
	Setting range	0-7	Unit	1
F3.27	Output terminal FOC			Default value 1
	Setting	0: Output frequency 1: Output current 2: Direct voltage 3: Alternating voltage		

F3.26 output terminal FOV
FOV terminal may output 0-10V voltage, output may be setting 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 output 0-20m current, output range may be setting 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 Min. output frequency~max. frequency.

1: Output current
Current (voltage) output is corresponding to 0~2×inverter rated current.

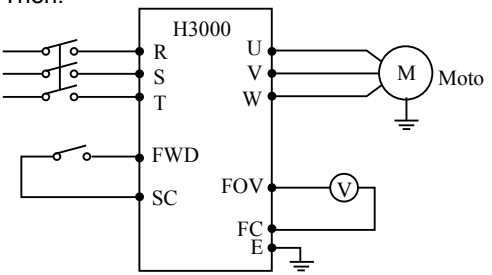
2: Direct voltage

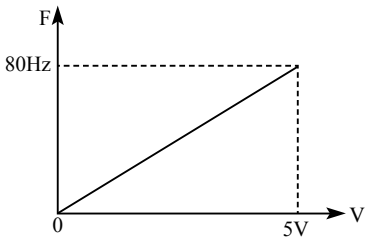
Current (voltage) output is corresponding to 0~1000V.

3: Alternating voltage
Current (voltage) output is corresponding to 0~510V.

For example: select a frequency meter of 0~5V, supervise output frequency, setting the Min. output frequency of inverter as 0.00Hz, the highest output frequency is 80Hz.

Then:





Parameter: F1.05=80.00 Max. frequency
F1.06=0.00 Min. output frequency
F3.06=0.00 FOV minimum voltage output
F3.07=5.00 FOV maximum voltage output

7-5 Secondary application group

F4.00	Jog frequency setting		Default value 5.00	
	Range	0.00---max. frequency	Unit	0.01

Jog frequency setting is usually applied to trial run. This function can only be through external terminal.

When JOG function is achieved, other instruction is invalid. When JOG signal is open, inverter decelerate to stop, JOG acceleration/ deceleration time is set in the 4th acceleration/ deceleration parameter.

Control priority level:
Jog→ external multi-speed→PLC operation means→ PID means→ triangle wave (traverse function) → winding→ frequency conversion setting means.

F4.01	Acceleration time 2		Default value 10.0	
F4.02	Decelerate time 2		Default value 10.0	
F4.03	Acceleration time 3		Default value 20.0	
F4.04	Decelerate time 3		Default value 20.0	
F4.05	Acceleration time 4		Default value 2.0	
F4.06	Decelerate time 4		Default value 2.0	
	Range	0-6000.0s	Unit	0.1

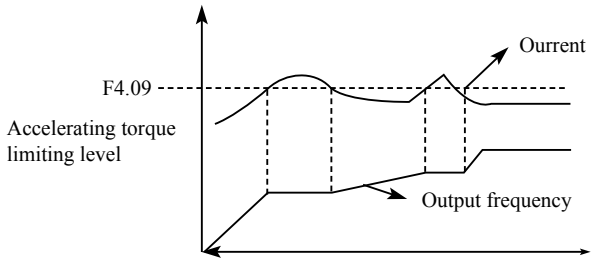
H3000 series inverters can set 4 acceleration/ deceleration time. For normal operation, the default selection is the acceleration/ deceleration time 1. For JOG operation, the default selection is acceleration/ deceleration time 4.

F4.07	Setting value of counter			Default value 100
F4.08	Middle value of counter			Default value 50
	Range	0-6500	unit	1

H3000 series inverter designs 2 groups of counters, pulse signal less than 250Hz can be accepted through multi-function terminal, when count value reaches setting value, corresponding multi-function output terminal is ON, input terminal of counter resets signal through counter, counter resets and begins counting again.

F4.09	Acceleration torque limiting level			Default value 150
	Range	0-200	Unit	1

Parameter F4.09 is the torque limit level during acceleration. When output current reaches the setting value, inverter will stop accelerating, and when current is below the set value, inverter resume the accelerating.

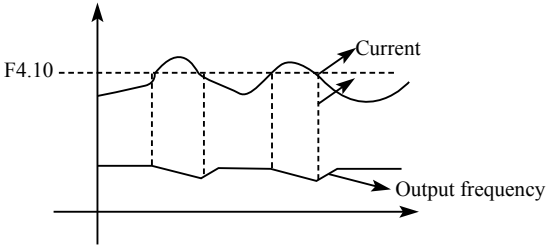


100% current is the rated current of inverter, when F4.09 is set to be 0, then accelerating torque limit is invalid, and it does not have protecting function.

F4.10	Constant-speed torque limiting level			Default value 00
	Range	0-200	Unit	1

Parameter F4.09 is the torque limit level during constant speed. When output current reaches the setting value, inverter automatically reduce the output frequency in order to reduce the load. When the output current drops, inverter increase output frequency to the setting (100% current is rated current of inverter).

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



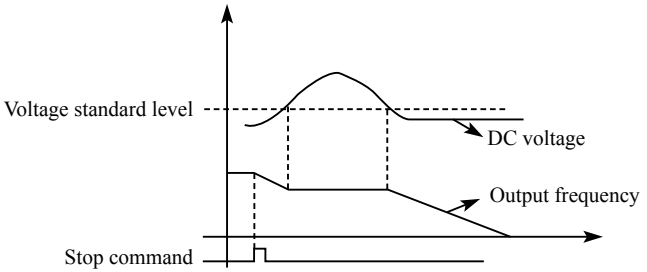
F4.11	Deceleration over-voltage prevention selection			Default value 1
	Range	0-1	Unit	
	Settings	0:Invalid 1:Valid		

0: Invalid

During deceleration, the DC-bus voltage may increase, when over-voltage prevention selection is invalid, inverter may trip for over voltage.

1: Valid

During deceleration, when DC-bus voltage reaches the setting value, inverter will stop the deceleration procedure. When DC-bus voltage returns to allowable value, inverter will resume the deceleration.



F4.12	Automatic voltage regulation selection			Default value 1
	Range	0-2	Unit	1
	Settings	0: Invalid 1: Valid 2: Invalid when decelerating		

If the input voltage is not stable, temperature of the machinery will increase, insulation may be damaged, and output torque will be instable.

0: Invalid
Select automatic voltage regulation to be invalid, inverter 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, inverter output stable voltage automatically.

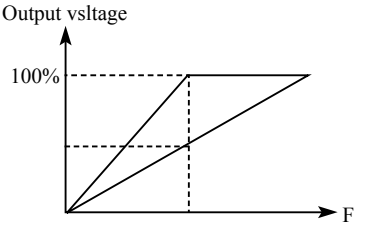
2: Invalid when decelerating: when this function is selected, braking function of inverter can be strengthened.

F4.13	Automatic energy-saving selection			Default value 0.0
	Range	0-100	Unit	1
F4.14	DC Braking voltage	Default value:650V for H3400 / 375V for H3200		
	Range	H3400 series: 650V~800V H3200 series: 360V~400V	Unit	1
F4.15	Braking duty			Default value: 50
	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 best energy-saving.

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

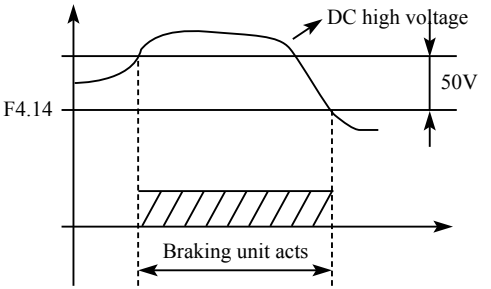


F4.14 and F4.15 are only useful for inverter with built-in braking units, and are invalid for inverter with external braking units.

The two parameters adjust internal DC braking voltage level and braking ratio of inverter.

F.414 DC Braking voltage

When inverter DC high voltage is higher than set value of F4.14, built-in braking unit is ON. Energy is released through braking resistor, then DC voltage falls back, when DC voltage falls to a certain value, built-in braking unit stop.



If F4.14 is too high, DC voltage may be too high and may cause inverter protection.

If F4.14 is too low, braking resistor maybe too hot.

F4.15 Braking duty

This parameter decides the working duty of the braking resistor. Higher duty needs high power of braking resistor.

F4.16	Restart after instant power off			Default value 0
	Range	0-1	Unit	1
	Settings	0: Invalid: no restart after instant power failure 1: Valid: frequency tracing start-up		

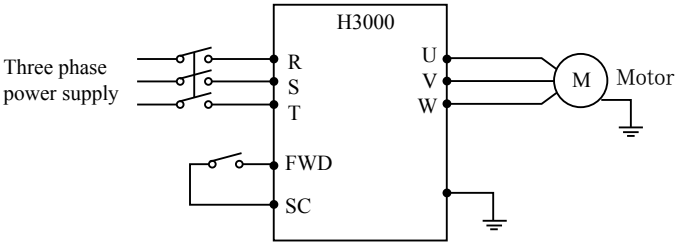
0: Invalid

Inverter clears the running command after power failure. After power is recovered, inverter will not start automatically.

1: Frequency tracing enable

When power is shut-off in short time, inverter keeps the running command as effective. When power is recovered in time, inverter will tracing the motor speed and resume output.

Attention: when instant power failure restarting is enabled, inverter may start the motor automatically. Please take care of the safety when use this function.



Example:

Use K1 (FWD), control running of inverter.

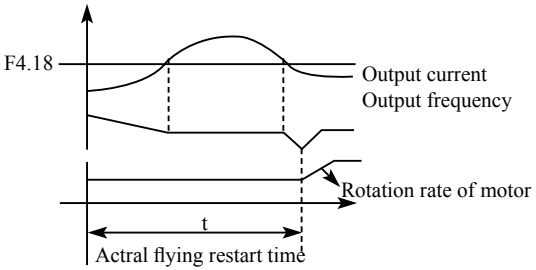
K1 closes, frequency conversion operates, when K1 is cut off, inverter stops. When power is shut off and K1 remains closed, if power is on, inverter starts up suddenly and it may be very dangerous. Please use other control methods, such as three-wire system connection method.

F4.17	Allowable time of power off			Default value 5.0
	Range	0-10.0	unit	0.1

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

F4.18	Flank restart current limiting level			Default value 150
	Range	0-200	Unit	1

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



F4.19	Flank restart time		Default value 5
	Range	0-10	Unit

When inverter enabled the flying restart function, inverter tracing motor speed downwards within the setting time. If it is not completed within setting time, inverter protects.

In above example, when t value > F4.19 setting value, inverter protects.

F4.20	Fault restart times		Default value 0	
	Range	0-5	Unit	1

F4.21	Delay time for restart after fault			Default value 2
	Range	0-100	Unit	1

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

After start-up, if no alarm happens within 60 seconds, inverter resets F4.20 automatically, after start-up,

If alarm happens again within 60 seconds, inverter records number of alarms, and when number of alarms reaches set value of F4.20, inverter stops output.

Attention: If F4.20=0, fault restart is invalid.

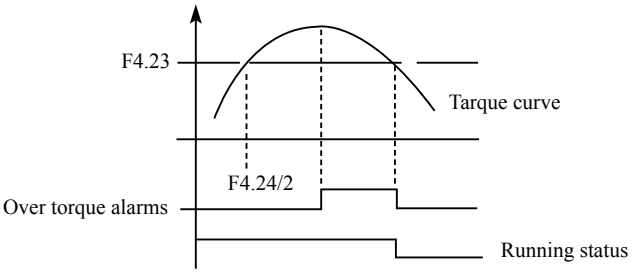
When fault restart function is valid, motor may start suddenly, so when this function is used, please pay attention to safety.

F4.22	Over torque action			Default 0
	Range	0-3	unit	1
	Settings	0: Inverter start detecting over torque only in constant speed, inverter continues operation during over torque 1: Inverter start detecting over torque only in constant speed, inverter stop during over torque 2: Inverter always detecting over torque, inverter continues operation during over torque 3: Inverter always detecting over torque, inverter stop during over torque		

F4.23	Over torque detection level			Default 0
	Range	0-200%	Minimum	1
F4.24	Over torque detection time		Default 0	
	Range	0-200s	Minimum	1

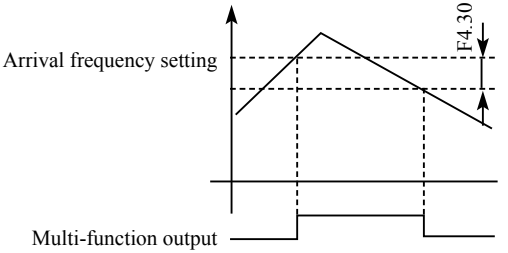
When output current of inverter exceeds setting value of F4.23, inverter start calculate the over torque time. When the duration exceeds half of setting value of F4.24, inverter output pre-alarm signal. Inverter continues output until the over torque time exceeds F4.24 setting, and then inverter protects and output alarm signal.

If F4.23=0. over torque detection is invalid, and 100% is inverter rated current.



F4.25	Reaching frequency 1			Default value 100
	Range	0-Max. frequency	Unit	0.1
F4.26	Reaching frequency 2			Default value 5.0
	Range	0- Max. frequency	Unit	0.1

H3000A series sets two groups of frequencies arrive, when output frequency arrive the setting value of F4.25 and F4.26, corresponding multi-function output terminal is ON. Frequency arrive width is of a hysteresis loop, which is set by F4.30.



F4.27	No. 1 timer		Default value 0	
	Range	0.0-6000.0s	Unit	0.1
F4.28	No. 2 timer		Default value 0	
	Range	0.0-6000.0s	Unit	0.1

H3000 series have two timers, when time of the timers reaches setting value (set by F4.27 and F4.28), corresponding multi-function terminal is ON.

Timer start is controlled by external multi-function input terminal.

Some simple program may be made by using these two timers.

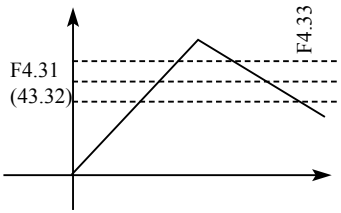
F4.29	Constant-speed torque limiting time			Default value 0.50
	Range	0-6000.0S	unit	0.1

F4.30	Width of arrive of frequency in hqsteretic loop			Default value 0.50
	Range	0.00-2.00	unit	0.01

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

F4.31	Jump Frequency 1		Default value 0	
	Range	0.00-frequency upper limit	unit	0.01
F4.32	Jump Frequency 2		Default value 0	
	Range	0.00-frequency upper limit	unit	0.01
F4.33	Jump frequency hysteresis loop width		Default value 0.50	
	Range	0.00-2.00	unit	0.01

If machine resonance occurred at a certain frequency, we can use the frequency jump function to skip the resonance point. H3000A support 2 jump frequencies by parameter F4.31 and F4.32. Frequency jump hysteresis loop width can be set through F4.33 as below:



7.5 Special operation (PLC Control)

F5.00	PLC memory mode			Initial value: 0
Range	0-1	Unit	1	
	Content:	0: Do not remember 1: Remember		

0: Do not remember

In the operational process of PLC program, F5.00 will choose not to remember. When machinery stops because of fault or other reasons, inverter will not remember status before the stopping. After restart, running begins from initial state.

1: Remember

In the running of PLC program, F5.00 will select to remember. When it stops because of fault or other reasons, inverter will remember status before stopping. After restart, inverter will continue operating according to program. Attention: power cannot be cut off.

Stop,power cut and power on, inverter will not remember status before power cut off. After restarting, inverter will run according to initial state of program.

F5.01	PLC start mode		Initial value: 0	
	Range	0-1	Unit	1
	Content:	0: Invalid (PLC can not start) 1: Valid (PLC start)		

F5.01 determines PLC start mode of inverter.

F5.01=0, means PLC is invalid.The inverter is operated by common mode.

When F5.01=1, PLC will start. The inverter select PLC program to run.

Under the status of PLC start, when various running orders and programs, inverter will choose the highest level to run according to priority level.

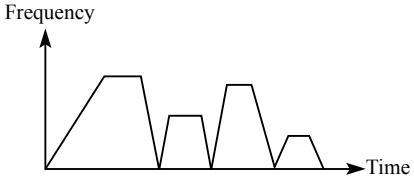
Precedence level	Priority level	Item

High→ low	1	Jog
	2	External multi-speed
	3	Internal multi-speed
	4	PID
	5	Triangular wave
	6	Winding
	7	Inverter setting mode

F5.02	PLC running mode			Initial value:0
	Range	0-4	Unit	1
	Content:	0: PLC stop running after a week 1: PLC pause mode, stop running after a week 2: PLC cycle running 3: Cycle running of PLC pause mode 4: After running for a week, PLC continues running by the end of running frequency		

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

PLC pause mode means that when completing every speed in the running process of internal multi-speed, the speed will be down, stop, and accelerate to the next speed. The illustration is as below:



Users may select proper running mode according to actual conditions.

F5.03	Multi-speed 1	Initial value: 10.0
F5.04	Multi-speed 2	Initial value: 15.0
F5.05	Multi-speed 3	Initial value: 20.0

F5.06	Multi-speed 4			Initial value: 25.0
F5.07	Multi-speed 5			Initial value: 30.0
F5.08	Multi-speed 6			Initial value: 35.0
F5.09	Multi-speed 7			Initial value: 40.0
F5.10	Multi-speed 8			Initial value: 45.0
F5.11	Multi-speed 9			Initial value: 50.0
F5.12	Multi-speed 10			Initial value: 10.0
F5.13	Multi-speed 11			Initial value: 10.0
F5.14	Multi-speed 12			Initial value: 10.0
F5.15	Multi-speed 13			Initial value: 10.0
F5.16	Multi-speed 14			Initial value: 10.0
F5.17	Multi-speed 15			Initial value: 10.0
	Setting range	0.00 ----- Max. frequency	Unit	0.01

F5.03 ----- F5.17 are set of 15 speed of rated frequency in the running. Regarding relationship multi speed and external terminal please refer to rated instruction 1,2,3,4 of multifunctional terminal.

F5.18	PLC operation time 1	Initial value: 100
F5.19	PLC operation time 2	Initial value: 100
F5.20	PLC operation time 3	Initial value: 100
F5.21	PLC operation time 4	Initial value: 100
F5.22	PLC operation time 5	Initial value: 100
F5.23	PLC operation time 6	Initial value: 0
F5.24	PLC operation time 7	Initial value: 0
F5.25	PLC operation time 8	Initial value: 0
F5.26	PLC operation time 9	Initial value: 0
F5.27	PLC operation time 10	Initial value: 0
F5.28	PLC operation time 11	Initial value: 0

F5.29	PLC operation time 12			Initial value: 0
F5.30	PLC operation time 13			Initial value: 0
F5.31	PLC operation time 14			Initial value: 0
F5.32	PLC operation time 15			Initial value: 0
	Setting range	0 ----- 65000	Unit	1

PLC operation time 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 operation time 15			Initial value: 0
	Setting range	0 ----- 32767	Unit	1

F5.33 setting running direction of each segment

Method of setting running direction:

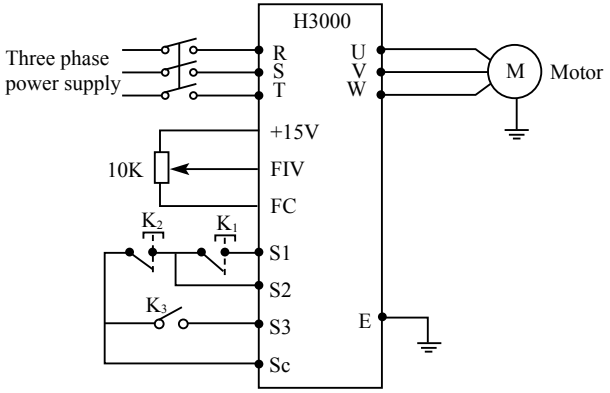
The way of setting running direction: by means of 16-bit binary system, and then transfer to decimal system value; every bit decides the corresponding running direction: 0 is running forward and 1 is running backward, and this parameter is only valid when the PLC is on.

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

Items	Output frequency	Running direction	Running duration
Dominant frequency	Potentiometer is adjustable	Forward	
Segment 1	20.0	Reverse	20
Segment 2	60.0	Forward	25
Segment 3	40.0	Reverse	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 operation 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	→ run direction <0 is forward, 1 is Reverse
0×24	1×23	0×22	1×21	0×20	→ transfer to decimal system

The binary system number 01010 is transferred to decimal system number: 1×21+1×23+8=10

Define to: F5.33=10

The parameter defines to:

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

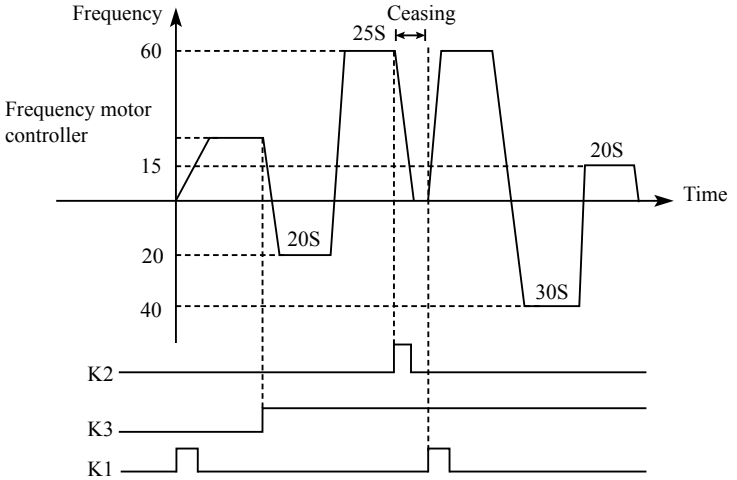
F1.02=2 (Running setting option: Multifunction end input)

F1.05=60 (The max. frequency is 60HZ)

F1.07=10 F1.08=10 (acceleration/deceleration time 10S)

F3.14=6 (S1 end is running forward)

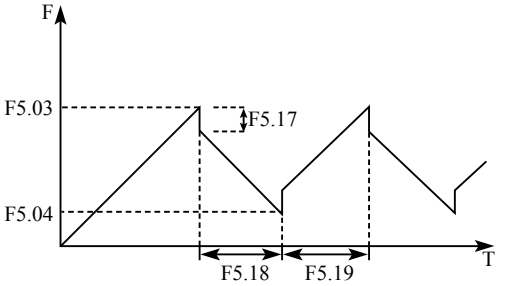
F3.18=8 (S2 end is ceasing)
F3.19=20 S3 end is PLC starting to running
F5.00=1 PLC programming memory
F5.01=1 PLC is on
F5.02=0 PLC operation one circle and then ceasing
F5.03=1 Segment 1 rated 20Hz
F5.04=60 Segment 1 rated 60Hz
F5.05=40 Segment 1 rated 40Hz
F5.06=15 Segment 1 rated 15Hz
F5.18=10 Segment 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: ① Press K1 to startup the inverter and the potentiometer will set output frequency.
② Press K3, PLC to startup, and from the segment 1 PLC program running one circle and then ceasing
③ If the program is running, press K3, or if there is a fault, and the inverter is ceasing, when the fault is solved, press K1

and the inverter will running forward as the program.

④ If F5.00 is 1 and the program is not memory, so the running will start from the very beginning.



7-7 Special operation (PID Control)

The inverter can be used to exercise process control, e.g. flow rate,air volume or pressue.

The terminal FIV/FIC input signal or parameter setting is used as a set point and the terminal FIV/FIC input signal also can used as a feedback value to constitute a feedback system for PID control.

F6.00	PID starting mode			Initial value: 0
	Setting range	0-1	Unit	1
	Content:	0: PID disable 1: PID start 2: PID start by external terminal		

0: PID disable

PID can not use.

1: PID start

PID is working despite the external signal input, and keeps being valid without external input.

2: PID starts up on condition; PID will start when certain external input is ON.

F6.01	PID operation mode selection			Initial value: 0
	Setting range	0-1	Unit	1
	Content:	0: Negative feedback mode 1: Positive feedback mode		

0: Negative feedback mode

If feedback value(F6.03)>setting value(F6.02), inverter decrease output frequency

If feedback value(F6.03)<setting value(F6.02), inverter increase output frequency

1: Positive feedback mode

If feedback value(F6.03)>setting value(F6.02), inverter decrease output frequency

If feedback value(F6.03)<setting value(F6.02), inverter increase output frequency

F6.02	PID action set point			Initial value:0
	Setting range	0-2	Unit	1
	Content:	0: figure mode (F6.04) 1: FIV 2: FIC		

0: Select figure mode as the set point (F6.04)

Set the set value (F6.04) from the operation panel or parameter unit.

1: FIV

Terminal FIV input is the set point (0—10DCV).

2: FIC.

Terminal FIC input is the set point (0—20mA).

F6.03	PID feedback value selection			Initial value:0
	Setting range	0-3	Unit	1
	Content:	0: FIV 1: FIC 2: FIV-FIC		

3: FIC-FIV

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

0:FIV

Input the signal from the detector (measured value signal (0—10DCV))

1:FIC

Input the signal from the detector (measured value signal (0—20mA))

2:FIV-FIC

Input the signal from the detector (measured value signal)

3: FIC-FIV

Input the signal from the detector (measured value signal)

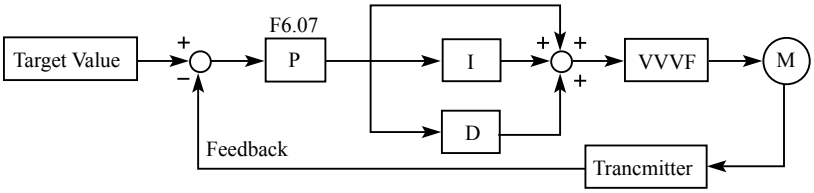
F6.04	PID figure target value setting			Initial value:0
	Setting range	0.0-100%	Unit	0.01
	Content:	Select FIV as feedback value		

100% setting is corresponding to analog input 10V voltage.

PID closed-loop control is widely used to control the process such as pressure and temperature.

Feedback signal is given from temperature transmitter or pressure transmitter. In case of PID control, the channel of feedback signal input is of analog signal (4 – 20mA or 0 – 10V). There are two channels available for setting.

Block diagram of PID control:



General regulation method for PID control:

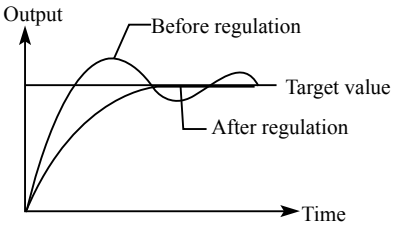
(1) Select sensor/transmitter correctly, for which the standard signal of 4 – 20mA or 0 – 10V shall be selected as output specification.

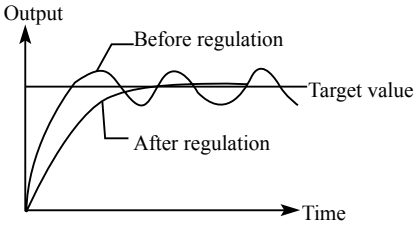
(2) Set PID action set point correctly.

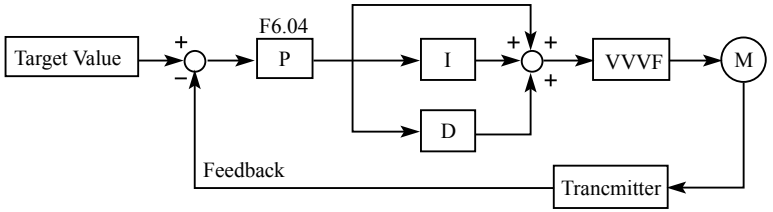
(3) Increase proportional constant (P), in case of non-oscillating output.

(4) Decrease integration time (Ti), in case of non-oscillating output.

(5) Increase differential (Td), in case of non-oscillating output.

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

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



F6.05	PID upper limit alarm value			Initial value :100
	Setting range	0.0 – 100%	Unit	0.1

Set the upper limit value. If the feedback value exceeds the setting , the alarm signal is output. The maximum input (20mA/10V) of the measured value (Terminal FIVFIC) is equivalent to 100%.

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

Set the lower limit value. If the feedback value falls below the setting range , the alarm signal is output. The maximum input (20mA/10V) of the measured value (Terminal FIVFIC) is equivalent to 100%.

F6.07	PID proportional band			Initial value :100%
	Setting range	0.0 – 200%	Unit	0.1

If the proportional band is narrow (parameter setting is small), the manipulated variable varies greatly with a slight change of the measured value. Hence, as the proportional band narrows, the response sensitivity (gain) improves but the stability deteriorates, e.g.hunting occurs.

F6.08	PID integral time			Initial value : 0.3s
	Setting range	0.0 – 200.0S	Unit	0.1

For deviation step input, time(Ti) required for only the integal (I) action to provide the same manipulated variable as that for the proportional (P) action. As the integral time decreases, the set point is reached earlier but hunting occurs more easily.

F6.09	PID differential time			nitial value :0
	Setting range	0.00 – 20.0	Unit	0.01

For deviation lamp input, time (Td) required for providing only the manipulated variable for the proportional (P) action. As the differential time increases, greater response is made to a deviation change.

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

PID is figured out once every 10ms. Frequency increment will be figured out (△FHz) every time. While frequency increment is more than value of F6.10 in maximum of frequency increment, F6.10 will work.

F6.11	PID standby frequency			Initial value : 0.00
	Setting range	0.00 – 120.00HZ	Unit	0.01
F6.12	PID standby duration			Initial value : 10.0
	Setting range	0.0 – 200.0	Unit	0.1
F6.13	PID wake-up value			Initial value: 0.0%
	Setting range	0.0 – 100%		

F6.11 PID standby frequency.

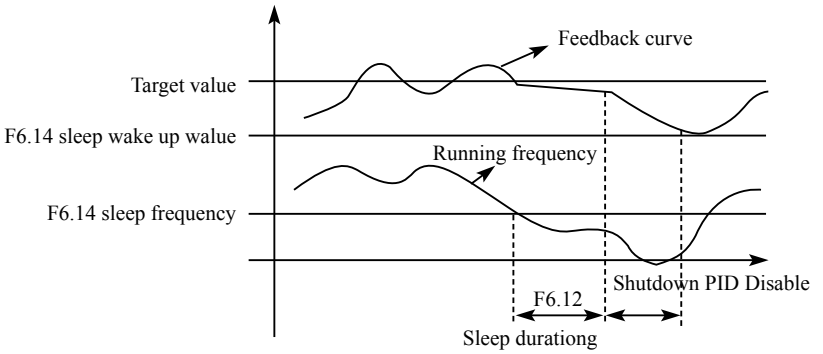
F6.11 must reach minimum frequency in PID standby. When running frequency is less than value of F6.10 standby duration will begin counting.

F6.12 PID standby duration.

When running duration of inverter is more than standby frequency the value (standby duration) of F6.12, the inverter will be standby. Then stop output, and disconnect with PID, but monitor the feedback of F6.13 PID.

F6.13: PID wake-up value.

When the inverter detects that feedback value less than wake-up value (F6.13), PID function will be taken action, and then inverter will start.



Example: PID action set point 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			Initial value : 1000
	Setting range	0 – 1000	Unit	1
F6.15	PID digit of display			Initial 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			Initial value : 1
	Setting range	0 – 4	Unit	1
	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 display.

0 indicates not displaying feedback value. Users may select the digit displayed according to actual need.

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.

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

7-8 Initial settings and specifications of RS-485 communication

Used to perform required setting for communication between the inverter and personal computer.

F7.00	RS-485 Communication speed			Initial value : 0
	Setting range	0 – 3	Unit	1
	Content:	0: 4800bps 2: 19200bps		1: 9600bps 3: 38400bps

For example, the communication speed is 19200bps when the setting value is “2”.

F7.01	Communication mode			Initial value : 0
	Setting range	0 – 5	Unit	1
	Content:	0: 8N1 For ASCII 2: 8E1 For ASCII 4: 8O1 For RTU		1: 8O1 For ASCII 3: 8N1 For RTU 5: 8E1 For RTU

F7.01 sets the format of communication data. Please see related communication specification in detail.

F7.02	RS-485 communication station			Initial value : 0
	Setting range	0 – 240	Unit	1

Each inverter must have a station number, which will be defined through F7.02. Communication control of inverter can connect with 240 others.

If F7.02 is set to “ 0 “ ,means communication function is invalid.

H3000 series MODBUS communication protocol

H3000 series communication agreement is with MODBUS ASCII (American standard code for information inter change) mode: Each byte consists of 2 ASCII characters, for example: The expression of 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”
ASCII code	30H	31H	32H	33H	34H	35A	36A	37A
Character	“8”	“9”	“A”	“B”	“C”	“D”	“E”	“F”
ASCII code	38A	39H	41H	42H	43A	44A	45H	46H

2. Character structure

10 – Bit character box (For ASCII)

Data pattern: 8N1 For ASCII

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

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 inverter with 01st address
0FH: For inverter with 15th address
10H: For inverter 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

Function code 06H: Write a WORD into temporary storage.

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

ASCII mode:

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

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

LRC Check of ASCII mode

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 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

7-9 Advanced application parameters

```
unsigned int crc_chk (unsigned char*data, unsigned char length)
{
  int j;
  unsigned int reg_crc=OXffff;
  while( 1ength--) {
    reg_crc^=*data;
    for (j = 0; j<8; j              ) {
      if (reg_crc & Ox01) {  /*LSB (b0) =1 */
      reg_ere= (reg_crc>>1) ^OXa001;
    }else{
      reg_cre=reg_crc>>1;
          }
        }
        retum reg_crc;    //Finally feedback the value of CRC temporary storage
      }
```

F8.00	Advanced application parameter lock			Initial value: 1
	Setting range	0 – 1	Unit	1
	content	0: Lock 1: Unlock		

If F8.00 is set to “0”,you can not use the advanced parameters.

F8.01	System 50Hz/60Hz selection			Initial value: 0
	Setting range	0 – 1	Unit	1
	content	0: 50Hz 1: 60Hz		

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

F8.02	constant and variable torque selection			Initial value : 0
	Setting range	0 – 1	Unit	1
	content	0: Constant torque 1: Variable torque		

For fan and pump load, you can select “variable torque” for better energy saving.

F8.03	Overvoltage protection setting			Initial value: change
	Setting range	760 – 820	Unit	1

F8.03 sets DC-bus overvoltage protection level. This function could be used to avoid over voltage protection during deceleration.

F8.04	Undervoltage protection setting			Initial value: change
	Setting range	380 – 450	Unit	1

F8.04 sets voltage protection level.

If the input voltage is low, inverter is easy to trip for undervoltage. This function could be used to avoid inverter protection undervoltage .

F8.05	Over temperature protection setting			Initial value: change
	Setting range	40 – 120	Unit	1

F8.05 sets the over temperature protection level of inverter. In high temperature environment, the protection level could be improved appropriately, to guarantee the normal running of inverter. However, too high setting value will result in IGBT damage, so the only solution is to improve the effect of heat elimination, so as to achieve the goal of cooling-down.

F8.06	Current display filter time			Initial 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. If the setting is too small, current display will fluctuate.

F8.07	0-10V analogue output low end calibration coefficient Initial value : *			
	Setting range	0 – 65535	Unit	1
F8.08	0-10V analog output high end calibration coefficient Initial value : *			
	Setting range	0 – 65535	Unit	1
F8.09	0-20mA analogue output low end calibration coefficient Initial value : *			
	Setting range	0 – 65535	Unit	1
F8.10	0-20mA analog output high end calibration coefficient Initial value: *			
	Setting range	0 – 65535	Unit	1

The above parameters are factory default setting, normally shall not be adjusted, otherwise it may cause abnormal operation.

Chapter 8 PRECAUTIONS FOR MAINTENANCE AND INSPECTION

The inverter is a static unit mainly consisting of semiconductor devices. Daily inspection must be performed to prevent any fault from occurring due to the adverse effects of the operating environment. Such as temperature, humidity, dust, dirt and vibration,changes in the parts with time, service life,and other factors.

• Precautions for maintenance and inspection

For some short time after the power is switched off, a high voltage remains in the somoothing capacitor. When accessing the inverter for inspection,wait for at least 10 minutes after the power supply has been switched off, and then make sure that the voltage across the main circuit terminals P/+--N/- of the inverter is not more than 30VDC using a tester,etc.

8-1-1 Daily inspection

Basically, check for the following faults during operation.

(1) Motor operation fault

(2) Improper installation environment

(3) Cooling system fault

(4) Unusual vibration and noise

(5) Unusual overheat and discoloration

During operation, check the inverter input voltages using a tester.

8-1-2 Periodic inspection

Check the areas inaccessible during operation and requiring periodic inspection.

Consult us for periodic inspection.

(1) Check for cooling system fault …… Clean the air filter,etc.

(2) Tightening check and retightening……The screws and bolts may become loose due to vibration,temperature changes, etc.

(3) Check the conductors and insulating materials for corrosion and damage.

(4) Measure insulation resisitance.

(5) Check and change the cooling fan and rely.

8-1-3 Daily and periodic inspection

Inspection item	Description	Corrective Action at Alarm Occurrence
Surrounding environment	Check the ambient temperature, humidity, dirt, corrosive gas, oil mist, etc.	Improve environment
Overall unit	Check for unususal vibration and noise	Check alarm location and retighten
Power supply voltage	Check that the main circuit voltages and control voltages are normal.	Inspect the power supply
General	1. Check with megger(across main circuit terminals and earth terminal). 2. check for loose screws and bolts. 3. check for overheat traces on the parts. 4. check for stain	Cnotact thr manufacturer Retighten Contact the manufacturer Clean
Aluminum electrolytic capacitor	1. check for liquid leakage in a capacitor and deformation trance 2. Visual check and judge by the life check of the control circuit capacitor.	Contact the manufacturer
Cooling system	Air filter, fan,etc.	Clean
Load motor	Check for vbration and abnormal increase in operation noise	Stop the device and contact the manufacturer

8-2 Replacement of parts

The inverter consists of many electronic parts such as semiconductor devices.

The following parts may deteriorate with age because of their structures or physical characteristics

leading to reduced performance or fault of the inverter. For preventive maintenance, the parts must

be replaced periodically.

Use the life check function as a guidance of parts replacement.

Part name	Standard replacement interval	Description
Cooling fan	3-5 years	Replace (as required)
Smoothing capacitor	5 years	Replace (as required)
Fuse (18.5kw or more)	10 years	Replace (as required)
Relays	---	as required

Replacement years for when the yearly average ambient temperature is 40℃ (Without corrosive gas, flammable gas, oil mist, dust and dirt etc.)

8-3 Trouble shooting

When an alarm (major failures) occurs in the inverter, the protective function is activated bringing the inverter to an alarm stop and the operation panel dispay automaitically changes to any of the following error (alarm)indications.

If your fault does not correspond to any of the following errors or if you have any other problem, please contact your sales representative.

• Alarm display…….. when the protective function is activated, the operation panel display automatically switches to the above indication.

• Resetting method……when the protective function is activated, the inverter output is kept stopped. Unless reset, therefore, the inverter cannot restart.

• When the protective function is activated, take the corresponding corrective

action,then reset the inverter, and resume operation.

Not doing so may lead to the inverter fault and damage.

List of alarm display

Operation Panel Indication	Name	Possible fault reason	Corrective action
OC0	Over current during stop	1: Inverter fault	Please contact your sales representative.
OC1	Over current during acceleration	1: Acceleration time is too short 2: V/F curve is not set correctly 3: Motor or motor wire have short circuit to the ground 4: The torque boost is set too fast 5: The input voltage is too low 6: Directly start up the running motor 7: The inverter setting is not correct 9: The inverter fails	1: Increase acceleration time 2: Correctly set V/F curve. 3: Check the insulation of motor and motor wire. 4: Reduce the value of torque boost. 5: Check input voltage 6: Check the load 7: Set tracing startup 8: Enlarge capacity of inverter 9: Sent for repairing
OC2	Over current during deceleration	1: Decelerate time is too short 2: Inverter capacity is inappropriately set 3: Whether there is any disturbing	1: Increase deceleration time 2: Enlarge inverter capacity 3: Solve disturbing resource
OC3	Over current during constant speed	1: The insulation of motor and motor wire is not good 2: Load fluctuation 3:Fluctuation of input voltage and the voltage is low 4: Inverter capacity is inappropriately set 5: Whether there is a large power motor starting up and leads the input voltage goes down 6: Whether there is a disturbing resource to disturb inverter	1: Check the insulation of motor and motor wire 2: Check load situation and mechanical lubrication 3: Check input voltage 4: Enlarge the capacity of inverter 5: Increase capacity of transformer 6: Solve disturbing resource

Operation Panel Indication	Name	Possible fault reason	Corrective action
OU0	Over voltage during stop	1: The deceleration time is short 2: Inverter capacity incorrectly set 3: Disturbing	1: Check the power supply voltage 2: Sent for repairing
OU1	Over voltage during acceleration	1: Abnormal power supply 2: Peripheral circuitry is incorrectly set (switch control on or off, etc.) 3: Inverter fault	1: Check the power supply voltage 2: Do not use power supply switch to control the inverter on or off 3: Sent for repairing
OU2	Over voltage during deceleration	1: Power supply voltage abnormal 2: Energy feedback load 3: Braking resistor incorrectly set	1: Check the power supply voltage 2: Install braking unit and resistance 3: Affirm resistance setting again
OU3	Over voltage during constant speed	1: Decelerate time is too short 2: Power supply voltage abnormal 3: Over load 4: Braking resistor incorrectly set 5: Braking parameter is incorrectly set	1: Increase deceleration time 2: Check the power supply voltage 3: Check braking unit and resistance 4: Set Braking resistor over again 5: Correctly set parameter, e.g. braking tube voltage, etc.
LU0	Under voltage during stop	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	Under voltage during acceleration	1: Power supply voltage abnormal 2: Phase missing 3: There is large load power start up in the input	2: Check whether peripheral setting bad connection leads phase missing 3: Please use independent power supply
LU2	Under voltage during deceleration		
LU3	Under voltage during constant speed		

Operation Panel Indication	Name	Possible fault reason	Corrective action
Fb0 Fb1 Fb2 Fb3	Fuse broken	1: The inverter fault	Please contact your sales representative.
OL0 during stop OL1 during acceleration OL2 during deceleration OL3 during constant speed	Inverter overload	1: Overload 2: Acceleration time is too short 3: Torque boost is too fast 4: V/F curve incorrectly set 5: Under voltage of input 6: Before motor stops, inverter starts up 7: Fluctuation or blocking in loading	1: Reduce the load weight or replace larger capacity inverter. 2: Increase acceleration time 3: Reduce torque boost rate 4: Set V/F curve over again 5: Check input voltage, increase inverter capacity 6: Adopt tracing startup mode 7: Check load condition
OT0 during stop OT1 during acceleration OT2 during deceleration OT3 during constant speed	Motor overload	1: The motor for use under overload 2: Acceleration time is too short 3: Motor protection setting is too small 4: V/F curve is incorrectly set 5: Torque boost is too fast 6: Bad motor insulation 7: Motor setting is too small	1: Reduce the load weight. 2: Increase acceleration time 3: Increase protection setting 4: Correctly set V/F curve 5: Reduce torque boost rate 6: Check motor insulation and replace motor 7: Use larger inverter or motor
OH0 during stop OH1 during acceleration OH2 during deceleration OH3 during constant speed	Inverter overheat	1: Cooling fan broken 2: Heatsink clogging 3: The ambient temperature is high	1: Replace the cooling fan. 2: Clean thr heatsink 3: Set the ambient temperature to within the specifications.
ES	Emergency stop	1: Inverter is in Emergency stop condition	1: After release Emergency stop, start up as regular procedure

Operation Panel Indication	Name	Possible fault reason	Corrective action
CO	Communication error	1: Communication line connection has problem 2: Communication parameter is incorrectly set 3: Transmission format is wrong	1: Perform wiring of the RS-485 terminals properly. 2: Set parameter over again 3: Check data transmission format
20	4-20mA wire broken	1: Terminal is loose; signal input line is bad connected	1: Perform wiring of the 4-20mA terminals properly.
Operation Panel Indication	Name	Possible fault reason	Corrective action
Pr	Parameter write error	Parameter setting is wrong	After stopping operation, make parameter setting.
Err	Wrong parameter group	The parameter does not exist or the factory setting parameter	Quit this parameter

8-3 Check first when you have troubles

If the causes is still unknown after every check, it is recommended to initialize the parameters (initial value) then reset the required parameter values and check again.

(1) Parameter write cannot be performed

Causes and corrective actions :

a: Check F1.18 parameter write selection.

b: Check F1.01Frequency setting/F1.02 Operation mode setting selection.

c: Make sure that operation is not being performed. Please stop the inverter and set.

(2) Motor does not rotate as commanded

Causes and corrective actions:

a: Check that the F1.02 Operation mode selection setting is correct.

b: Check that the starting frequency setting is not greater than the running frequency.

c: Check the main circuit and control circuit.

d: Check that the output stop signal or reset signal is not on.

e: Check that F1.04 Reverse rotation prevention selection is not selected.
f: Check that frequency setting of each running frequency (such as multi-speed operation) are not zero.
g:Check that especially the F1.05 Maximum frequency setting in not zero.
h: Check that the F4.00 Jog frequency setting is not lower than the F2.02 starting frequency setting.
i: Check that the load is not too heavy.

(3) Motor generates heat abnormally
Causes and corrective actions:
a: Check that the load is not too heavy. Lighten the load.
b: Is the fan for the motor is running ? (check for accumulated dust.)
c: Check that the F2.08 Torque boost setting is correct.
d: Was the motor type set? Check the setting of F2.09 to F2.19 applied motor.
e: When using any other manufacturer's motor ,perform offline auto tuning.

(4) Motor generates abnormal noise
Causes and corrective actions:
a: No carrier frequency noises (metallic noises) are generated.
Check the setting of F1.15 applied motor.
b: Check for any mechanical looseness.
c: Contact the motor manufacturer.

(5) Motor rotates in opposite direction
Causes and corrective actions:
a: Check that the phase sequence of output terminals U,V and W is correct.
b: Check that the start signals (forward rotation, reverse rotation)are connected properly.

(6) Speed does not increase
Causes and corrective actions:
a: Check that the maximum frequency (F1.05)setting is correct. (If you want to run the motor at 120Hz or more, set F1.05 High speed maximum frequency.)
b: Check that the load is not too heavy. (In agitators, etc, load may become heavier in winter.)

c: Check that the brake resistor is not connected to terminals P/+--P/- accidentally.

(7) Inverter may interfere with other devices.
Causes and corrective actions:

The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices used near the inverter. In this case ,set EMC filter valid to minimize interference.

a: Decrease carrier frequency (F1.15).
b: Install a noise filter on the inverter output side to reduce the electromagnetic nois generated from the inverter.
c: Install a noise filter on the inverter input side.
d: For reduction of induction noise from the power line of the inverter,it is recommended to wire the earth cable by returning it to the earth terminal of the inverter.
e: To prevent a malfunction due to noise , keep the signal cables more than 10cm away from the power cables.
f: Control circuit cable should use shielded cable, and the cable should be installed in metal tube

8-4 Inverter-generated noises and their reduction techniques

Some noises enter the inverter to malfunction it and others are radiated by the inverter to malfunction peripheral devices. Though the inverter is designed to be insusceptible to noises, it handles low-level signals, so it requires the fllowing basic techniques. Also, since the inverter chops outputs at high carrier frequency, that could generate noises. If these noises cause peripheral devices to malfunction, measures should be taken to suppress noises. These techniques differ slightly depending on noise propagation paths.

① Basic techniques

- Do not run the power cables (I/O cables) and signal cables of the inverter in parallel with each other and do not bundle them.
- Use twisted pair shielded cables for the detector connection and control signal

cables, and connect the sheathes of the shield cables to terminal SC.

• Earth the inverter, motor, etc, at one point.

② Techniques to reduce noises that enter and malfunction the inverter

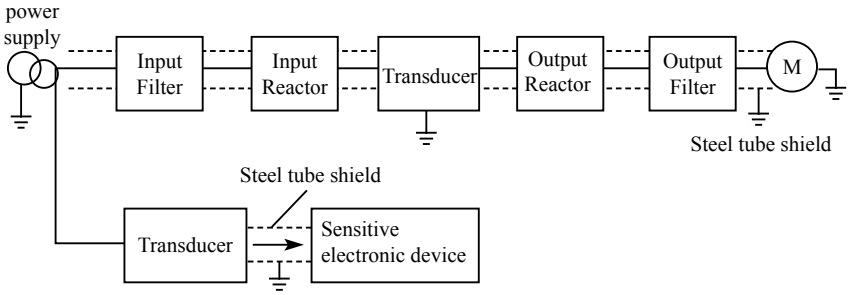
When devices that generate many noises (which use magnetic contactors, magnetic brakes, many relays, for example) are installed neat the inverter and the inverter may be malfunctioned by noises, the following measures must be taken:

• Provide surge suppressors for devices that generate many noises to suppress noises.

• Fit data line filters to signal cables.

• Earth the shields of the detector connection and control signal cables with Cable clamp metal.

③ Noise reduction examples



Chapter 9 Peripheral Devices Selection

Check the motor capacity of the inverter you purchased. Appropriate peripheral devices must be selected according to the capacity. Refer to the following list and prepare appropriate peripheral devices:

9-1 Peripheral Devices Description

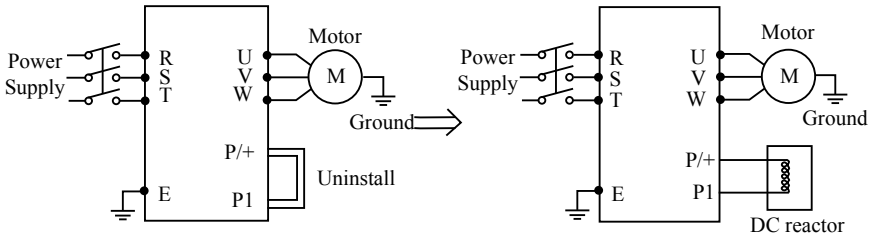
Peripheral Devices Name	Description
Moulded case circuit break (MCCB) or earth leakage circuit break (ELB),fuse	The breaker must be selected carefully since an In-rush curreH flows in the inverter at power on.
Magnetic coHactor (MC)	Install the MC to ensure safety. Do not use this MC to start and stop the inverter. Doing so will cause the inverter life to be shorten.
AC/DC Reactor	Reactor (option) should be used when power harmonics measures are taken, the power factor is to be improved or thr inverter is installed near a large power supply system (1000KVA or more). The inverter may be damaged if you do not use reactors. Select the reactor according to the model. For the 160KW or less, remove the jumpers across terminals P/+--P/- to connect to the DC reactor. For the 185KW or more , a DC reactor is supplied. Please always install the reactor.
Noise filter	Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the rang from about 1MHz to 10MHz. When more wires are passed throug, a more effective result can be obtained.
Brake resistor and brake unit	To improve the brake capability at deceleration.
Ferrite ring	To reduce the disturbance which is generated by inverter

9-2 Applied DC reactor Specification

Applicable Inverter Type	Motor Output (kW)	DC Reactor Selection	
		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
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:

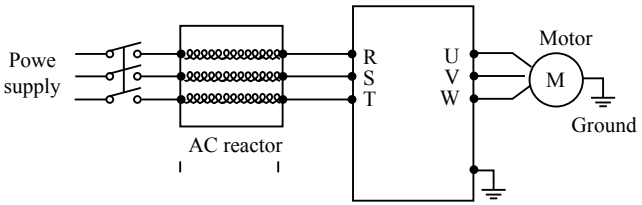
9-3 Applied AC reactor Specification



Applicable Inverter Type	Motor Output (kW)	AC Reactor Selection	
		Rated currency (A)	Inductance value (mH)
H3400A0011K	11	24	0.52
H3400A0015K	15	34	0.397
H3400A0018K	18.5	38	0.352
H3400A0022K	22	50	0.26

Applicable Inverter Type	Motor Output (kW)	AC Reactor Selection	
		Rated currency (A)	Inductance value (mH)
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:



9-4 Applied Braking resistor Specification

Applicable Inverter Type	Brake resistor		Brake Unit CDBR	Brake Torque (10% ED)	Motor Output (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	

Applicable Inverter Type	Brake resistor		Brake Unit CDBR	Brake Torque (10% ED)	Motor Output (kW)	Remark
	Power (W)	Resistance value Ω				
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	
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 resistor value:

The Braking resistor value is related to the DC currency when the inverter braking. For 380V power supply, the braking DC voltage is 800V-820V, and for 220V system, the DC voltage is 400V.

Moreover, the Braking resistor value is related to braking torque Mbr%, and to the differeH braking torque the Braking resistor values are differeH, and the

calculation formula is as follow:

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

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

P_{Motor}——Motor power;

M_{br}——Braking torsion;

η_{Motor}——Motor dfficiency;

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

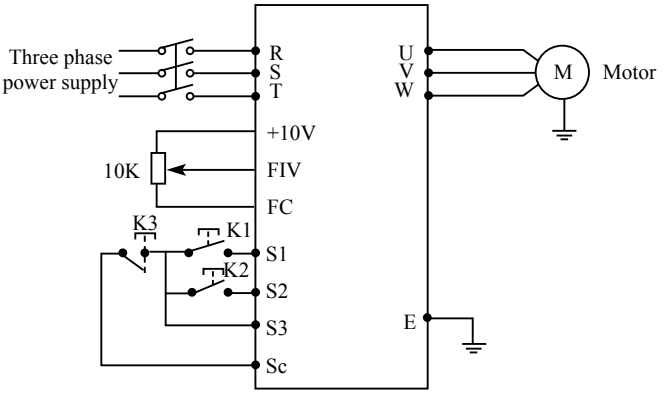
The braking power is related to braking torque and braking frequency. the foregoing illustration gives the braking torque as 125% and the frequency is 10%, and according to the differeH loading situations, the numbers in the illustration are for reference.

Appendix 1 Simple Application Example

Three-wire Type Connnecton Example

A three-wire type connection is shown below:

A: Basic connection illustration:



B: Parameter setting and instruction:

F1.01=1 Analog voltage input as frequency setting (external potentiometer)

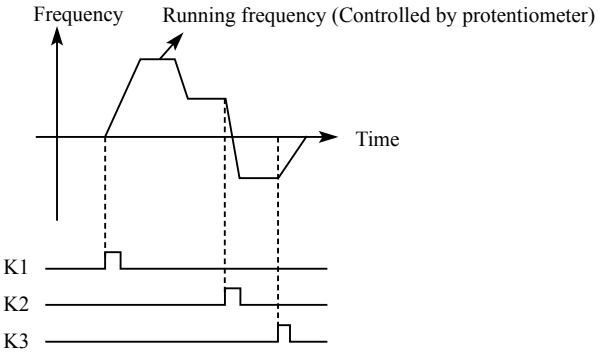
F1.02=1 External terminal control

F3.17=6 The forward rotation start signal is assigned to the terminal S1.

F3.18=7 The reverse rotation start signal is assigned to the terminal S2.

F3.19=8 The stop signal is assigned to the terminal S3.

C: Action instruction:



K1 forward rotation

K2 reverse rotation

K3 Stop

Output frequency is controlled by potentiometer.

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GUANG ZHOU HAITEC TRANSMISSION EQUIPMENT CO.,LTD

2010.8

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