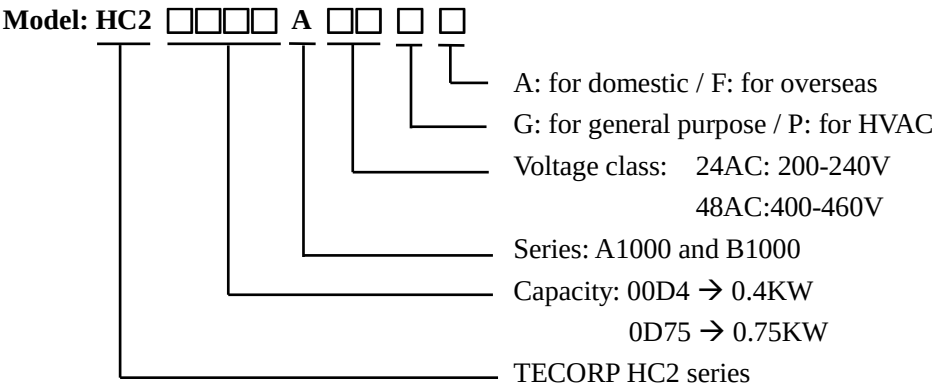
TABLE OF CONTENTS

1. INTRODUCTION

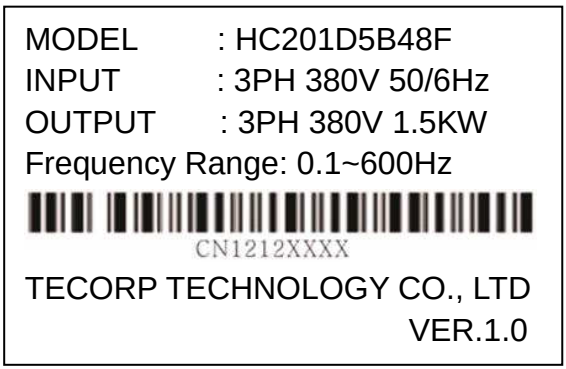
1.1 Product Specification

Items		B1000 / A1000
Input	Rated Voltage Freuqency	Single / Three-phase AC220V / 47-63Hz Three-Phase AC400V / 47-63Hz
	Voltage Allowable Range	220V / 400V ±15%
Output	Output Voltage Range	0~rated input voltage
	Out Frequency Range	0~600Hz
Technical	Control Mode	B1000:Sensroless vector control A100: V/F control
	Overload Capacity	B1000 / A1000G: 150% in 60s A1000P: 120% in 60s
	Start Torque	B1000: 0.5Hz / 150% A1000: 1Hz / 150%
	Adjustment Ratio	1: 100
	Speed Control Accuracy	B1000: ±0.5% at maximum speed A1000: ±1% at maximum speed
	Carrier Frequency	0.5K ~ 15.0KHz
Terminal	Programming Digital Input	4 terminals
	Programming Analog Input	FIV: 0~10V or 0~20mA input FIC:0~10V input
	Coupling /Relay Output	1 set
	Analog Output	1 set, option of 0 or 4~20mA / 0~10V
Function	Frequency Setting	Digital, Analog, Series serial port, Multi-speed, PID
	PID Function	Built in
	Multi-speed Frequency	8 speeds
	Adjustable Frequency	Stable frequency
	Off Power	Continue running in power off instantly
	Jog Key Function	User definition
	Voltage Adjustment	Auto maintain the output voltage stable
	Failure protection	25 types: over current, over voltage, low voltage, over heat , short phase, etc

1.2 Model Description



1.3 Name Plate



A1000

Model Code	Rated Input Capacity (KW)	Rated Input Current (A)	Rated Output Current (A)	Motor Suitable (KW)
single/three-phase220V ±15%				
HC20D75A24-G HC201D5A24-P	0.75/1.5	8.2/14.2	4.5/7	0.75/1.5
HC201D5A24-G HC202D2A24-P	1.5/2.2	14.2/18.4	7/10	1.5/2.2
HC202D2A24-G HC203D7A24-P	2.2/3.7	18.4/21	10/16	2.2/3.7

Model Code	Rated Input Capacity (KW)	Rated Input Current (A)	Rated Output Current (A)	Motor Suitable (KW)
three-phase220V ±15%				
HC203D7A24-G HC205D5A24-P	3.7/5.5	21/26	16/24	3.7/5.5
HC205D5A24-G HC207D5A24-P	5.5/7.5	26/35	24/33	5.5/7.5
HC207D5A24-G HC20011A24-P	7.5/11	35/46	33/47	7.5/11
HC20011A24-G HC20015A24-P	11/15	46/62	47/65	11/15
HC20015A24-G HC20018A24-P	15/18.5	62/76	65/80	15/18.5
HC20018A24-G HC20022A24-P	18.5/22	76/90	80/90	18.5/22
HC20022A24-G HC20030A24-P	22/30	90/105	90/136	22/30
HC20030A24-G HC20037A24-P	30/37	105/140	136/152	30/37
HC20037A24-G HC20045A24-P	37/45	140/160	152/176	37/45
HC20045A24-G HC20055A24-P	45/55	160/210	176/210	45/55
HC20055A24-G HC20075A24-P	55/75	210/290	210/305	55/75
HC20075A24-G HC20090A24-P	75/90	290/330	305/340	75/90
three-phase380V ±15%				
HC20D75A48-G HC201D5A48-P	0.75/1.5	3.4/5.0	2.5/3.7	0.75/1.5
HC201D5A48-G HC202D2A48-P	1.5/2.2	5.0/5.8	3.7/5	1.5/2.2

Model Code	Rated Input Capacity (KW)	Rated Input Current (A)	Rated Output Current (A)	Motor Suitable (KW)
HC202D2A48-G HC203D7A48-P	2.2/3.7	5.8/10	5/8.6	2.2/3.7
HC203D7A48-G HC205D5A48-P	3.7/5.5	10/15	8.6/12.5	3.7/5.5
HC205D5A48-G HC207D5A48-P	5.5/7.5	15/20	12.5/17.5	5.5/7.5
HC207D5A48-G HC20011A48-P	7.5/11.0	20/26	17.5/24	7.5/11.0
HC20011A48-G HC20015A48-P	11.0/15.0	26/35	24/33	11.0/15.0
HC20015A48-G HC20018A48-P	15.0/18.5	35/38	33/40	15.0/18.5
HC20018A48-G HC20022A48-P	18.5/22	38/46	40/47	18.5/22.0
HC20022A48-G HC20030A48-P	22/30	46/62	47/65	22.0/30.0
HC20030A48-G HC20037A48-P	30/37	62/76	65/80	30.0/37.0
HC20037A48-G HC20045A48-P	37/45	76/90	80/90	37.0/45.0
HC20045A48-G HC20055A48-P	45/55	90/105	90/110	45.0/55.0
HC20055A48-G HC20075A48-P	55/75	105/140	110/152	55.0/75.0
HC20075A48-G HC20090A48-P	75/90	140/160	152/176	75.0/90.0
HC20090A48-G HC20110A48-P	90/110	160/210	176/210	90.0/110.0
HC20110A48-G HC20132A48-P	110/132	210/240	210/255	110.0/132.0
HC20132A48-G HC20160A48-P	132/160	240/290	255/305	132.0/160.0

B1000

Model Code	Rated Input Capacity (KW)	Rated Input Current (A)	Rated Output Current (A)	Motor Suitable (KW)
three-phase220V ±15%				
HC20D75B24	0.75	8.2	4.5	0.75
HC201D5B24	1.5	14.2	7	1.5
HC202D2B24	2.2	18.4	10	2.2
HC203D7B24	3.7	21	16	3.7
HC205D5B24	5.5	26	24	5.5
HC207D5B24	7.5	35	33	7.5
HC20011B24	11.0	46	47	11.0
HC20015B24	15.0	62	65	15.0
HC20018B24	18.5	76	80	18.5
HC20022B24	22.0	90	90	22.0
HC20030B24	30	105	136	30
HC20037B24	37	140	152	37
HC20045B24	45	160	176	45
HC20055B24	55	210	210	55
HC20075B24	75	290	305	75
three-phase380V ±15%				
HC20D75B48	0.75	3.4	2.5	0.75
HC201D5B48	1.5	5.0	3.7	1.5
HC202D2B48	2.2	5.8	5	2.2

Model Code	Rated Input Capacity (KW)	Rated Input Current (A)	Rated Output Current (A)	Motor Suitable (KW)
HC203D7B48	3.7	10	8.6	3.7
HC205D5B48	5.5	15	12.5	5.5
HC207D5B48	7.5	20	17.5	7.5
HC20011B48	11.0	26	24	11.0
HC20015B48	15.0	35	33	15.0
HC20018B48	18.5	38	40	18.5
HC20022B48	22.0	46	47	22.0
HC20030B48	30.0	62	65	30.0
HC20037B48	37.0	76	80	37.0
HC20045B48	45.0	90	90	45.0
HC20055B48	55.0	105	110	55.0
HC20075B48	75.0	140	152	75.0
HC20090B48	90.0	160	176	90.0
HC20110B48	110.0	210	210	110.0
HC20132B48	132.0	240	255	132.0

1.4 Installation of AC motor drive

1.4.1 Installation environment and requirements

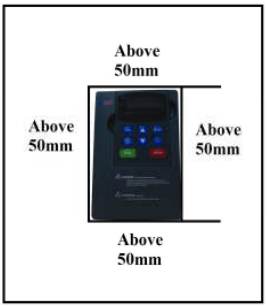
Environment of installation has direct effect on the life span and usage of AC motor drive. If AC motor drive is used in the environment that does not accord with allowed range of the operational instruction, and may lead to AC motor drive protection or fault.

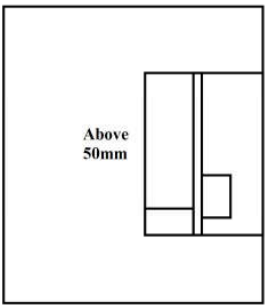
AC motor drive shall be mounted on the wall. Please install it vertically for convection, and heat venting.

About AC motor drive's installation environment, please ensure it is in accordance with:

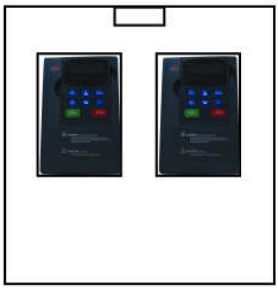
(1) Environment temperature from -10℃ to +40℃.
(2) Environment humidity 0~95% without condensing.
(3) Away from direct sunlight.
(4) The environment does not contain corrosive gas and liquid.
(5) The environment does not contain dust, floating fiber, flock and metal dust.
(6) Far away from radioactive 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 AC motor drive in the location where it is good for ventilation, inspection and maintenance, in the incombustible substance of solid and apart from heating unit (as break resistor).
(10) Preserve enough space for AC motor drive installation, especially for multiple AC motor drive installation. Please pay attention to the position of AC motor drive, and install an extra heat sink to keep environment temperature lower than 45℃.

(1) Single AC motor drive installation:

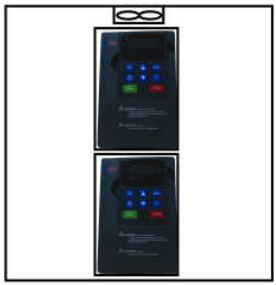




(2) Multiple AC motor drives installed in one control cabinet. Please pay attention: When installed (1), AC motor drive shall be placed in parallel.

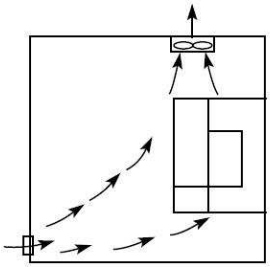


Correct arrangement

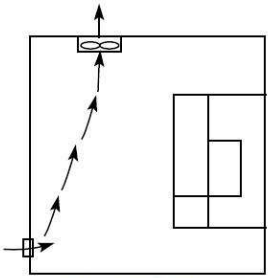


Incorrect arrangement

(3) If multiple AC motor drives are installed in one control cabinet. Please make sure that there is enough space, and mean while the air convection in the cabinet and the installation of heat sink.



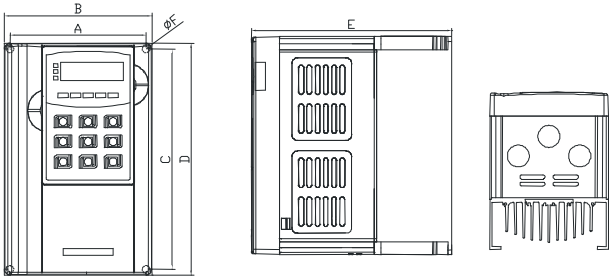
Correct installation



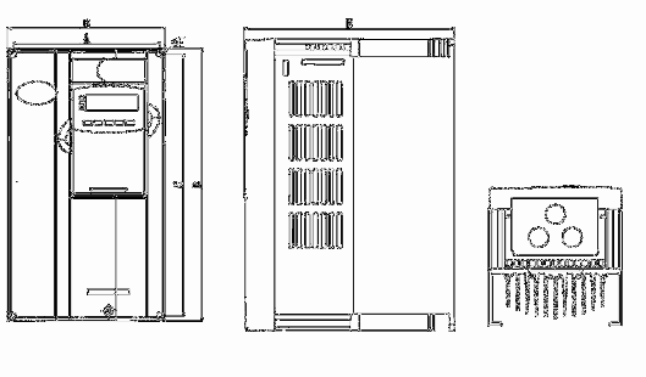
Incorrect installation

1.4.2 The outline and installation size

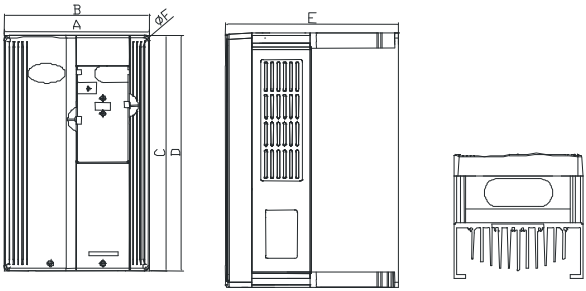
A1000, B1000 0.4~2.2 KW



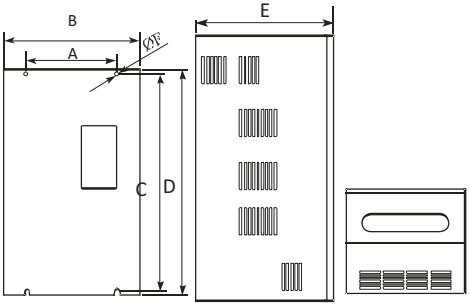
A1000, B1000 3.7~5.5KW



A1000, B1000 7.5~11KW



A1000, B1000 15KW and above



A1000 installing dimension

Model	A	B	C	D	E	ΦF
Wall hang of installation						
HC20D75A24-G HC201D5A24-P	104	118	169	185	160	Φ6
HC201D5A24-G HC202D2A24-P	104	118	169	185	160	Φ6
HC202D2A24-G HC203D7A24-P	138	151	244	260	160	Φ6
HC203D7A24-G HC205D5A24-P	138	151	244	260	160	Φ6
HC205D5A24-G HC207D5A24-P	183	200	303	323	183	Φ6
HC207D5A24-G HC20011A24-P	183	200	303	323	183	Φ6
HC20011A24-G HC20015A24-P	226	250	384	403.8	240	Φ8
HC20015A24-G HC20018A24-P	226	250	384	403.8	240	Φ8
HC20018A24-G HC20022A24-P	197	310	440	460	260	Φ13
HC20022A24-G HC20030A24-P	197	310	440	460	260	Φ13
HC20030A24-G HC20037A24-P	240	360	620	650	280	Φ13
HC20037A24-G HC20045A24-P	240	360	620	650	280	Φ13
HC20045A24-G HC20055A24-P	260	420	775	800	334	Φ13
HC20055A24-G HC20075A24-P	260	420	775	800	334	Φ13
HC20075A24-G HC20090A24-P	360	552	840	875	410	Φ13

Model	A	B	C	D	E	ΦF
HC20D75A48-G HC201D5A48-P	104	118	175	185	160	Φ6
HC201D5A48-G HC202D2A48-P	104	118	175	185	160	Φ6
HC202D2A48-G HC203D7A48-P	104	118	175	185	160	Φ6
HC203D7A48-G HC205D5A48-P	138	151	244	260	160	Φ6
HC205D5A48-G HC207D5A48-P	138	151	244	260	160	Φ6
HC207D5A48-G HC20011A48-P	183	200	303	323	183	Φ6
HC20011A48-G HC20015A48-P	183	200	303	323	183	Φ6
HC20015A48-G HC20018A48-P	226	250	384	403.8	240	Φ8
HC20018A48-G HC20022A48-P	226	250	384	403.8	240	Φ8
HC20022A48-G HC20030A48-P	226	250	384	403.8	240	Φ8
HC20030A48-G HC20037A48-P	197	310	440	460	260	Φ13
HC20037A48-G HC20045A48-P	197	310	440	460	260	Φ13
HC20045A48-G HC20055A48-P	240	360	620	650	280	Φ13
HC20055A48-G HC20075A48-P	240	360	620	650	280	Φ13
HC20075A48-G HC20090A48-P	260	420	775	800	334	Φ13
HC20090A48-G HC20110A48-P	260	420	775	800	334	Φ13

Model	A	B	C	D	E	ΦF
HC20110A48-G HC20132A48-P	Please contact the agent for more information					
HC20132A48-G HC20160A48-P						

B1000 installing dimension

Model	A	B	C	D	E	ΦF
Wall hang of installation						
HC20D75B24	104	118	175	185	160	Φ6
HC201D5B24	104	118	175	185	160	Φ6
HC202D2B24	138	151	244	260	160	Φ6
HC203D7B24	138	151	244	260	160	Φ6
HC205D5B24	183	200	303	323	183	Φ6
HC207D5B24	183	200	303	323	183	Φ6
HC20011B24	226	250	384	403.8	240	Φ8
HC20015B24	226	250	384	403.8	240	Φ8
HC20018B24	197	310	440	460	260	Φ13
HC20022B24	197	310	440	460	260	Φ13
HC20030B24	240	360	620	650	280	Φ13
HC20037B24	240	360	620	650	280	Φ13
HC20045B24	260	420	775	800	334	Φ13
HC20055B24	260	420	775	800	334	Φ13
HC20075B24	360	552	840	875	410	Φ13
HC20D75B48	104	118	175	185	160	Φ6
HC201D5B48	104	118	175	185	160	Φ6
HC202D2B48	104	118	175	185	160	Φ6
HC203D7B48	138	151	244	260	160	Φ6
HC205D5B48	138	151	244	260	160	Φ6
HC207D5B48	183	200	303	323	183	Φ6
HC20011B48	183	200	303	323	183	Φ6
HC20015B48	226	250	384	403.8	240	Φ8
HC20018B48	226	250	384	403.8	240	Φ8

Model	A	B	C	D	E	ΦF
HC20022B48	226	250	384	403.8	240	Φ8
HC20030B48	197	310	440	460	260	Φ13
HC20037B48	197	310	440	460	260	Φ13
HC20045B48	240	360	620	650	280	Φ13
HC20055B48	240	360	620	650	280	Φ13
HC20075B48	260	420	775	800	334	Φ13
HC20090B48	260	420	775	800	334	Φ13
HC20110B48	Please contact the agent for more information					

The hole size of the operation panel tray

5.5KW and under: 141.5mm×79.5mm

3.7KW and: 99.5mm×56mm

1.5 Wiring

WARNING

- Wiring must be performed by the person certified on electrical working.
- Forbid testing insulation of cable to connect AC motor drive with high-voltage insulation devices.
- Cannot install AC motor drive until discharging completely after the power supply switches off for 5 minutes.
- Be sure to have the terminal grounded.

(220V class: the ground resistance shall be 1000 or less, 380V class: the ground resistance shall be 100 or less. Otherwise, it might cause an electrical damage.)

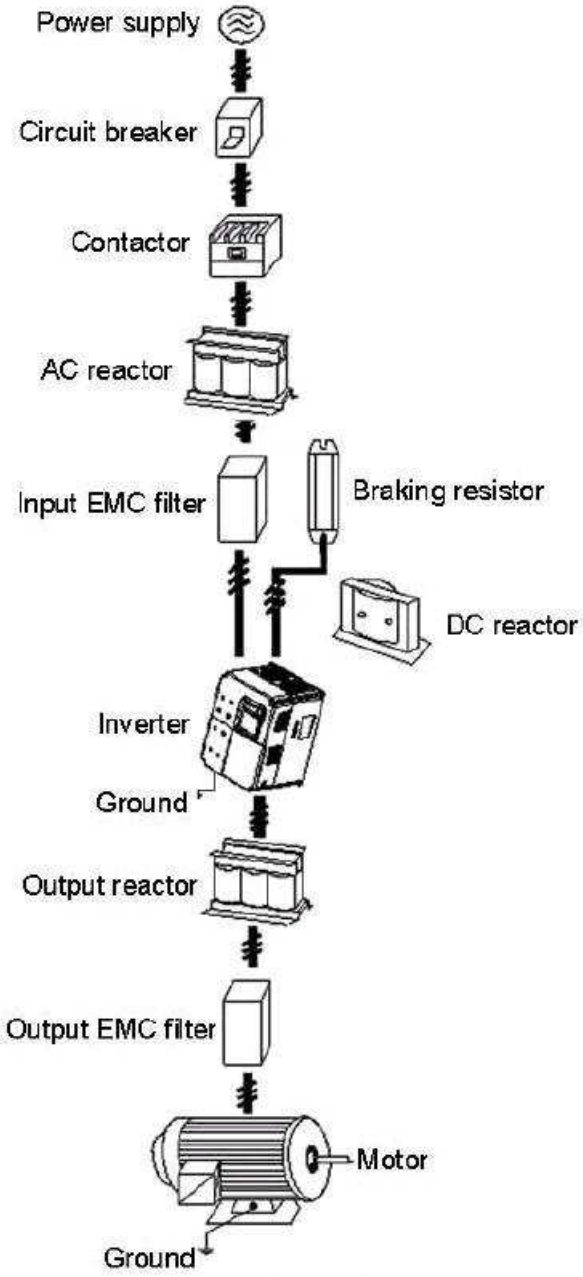
- Connect the input terminals (R, S, T) and the output terminals (U, V, W) correct. Otherwise it will cause damage to the internal part of AC motor drive.
- Do not wire and operate the AC motor drive by wet hands. Otherwise there is a risk of electrical shock.

CAUTION

Be sure that voltage of the main AC power supply meets the rated voltage of the AC motor drive. Injury or fire may occur if the voltage is not proper.

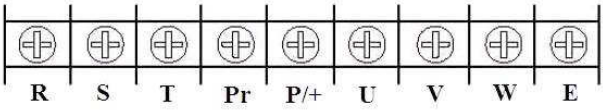
Be sure to connect the power supply cables and motor cables tight.

1.5.1 Peripheral Device:

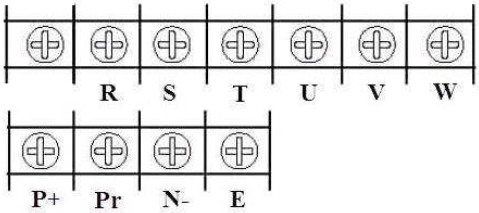


1.5.2 Main Circuit Terminals

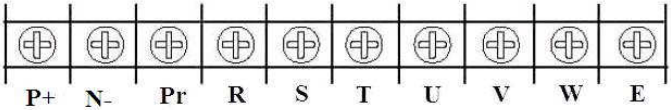
A1000, B1000 0.75~2.2KW



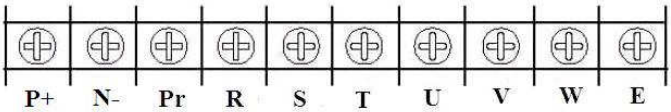
A1000, B1000 3.7~5.5KW



A1000, B1000 7.5~11KW



A1000, B1000 15KW~132KW

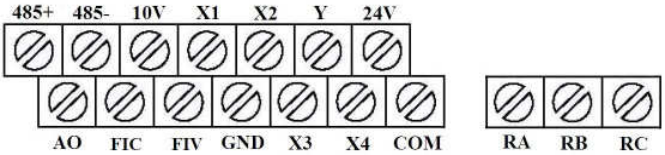


The main circuit terminals are summarized according to the terminal symbols in the following table. Please connect terminals proper for your purpose.

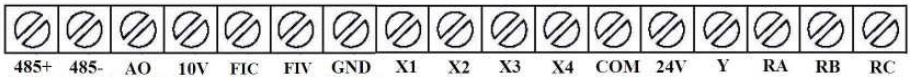
Terminal Symbol	Function Description
R. S. T	Terminals of 3 phase AC input
P, N/-	Spare terminals of external braking unit
P. Pr	Spare terminals of external braking resistor
P1. P/+	Spare terminals of external DC reactor
U. V. W	Terminals of 3 phase AC output
E	Grounding terminal

1.5.3 Control Circuit Terminals

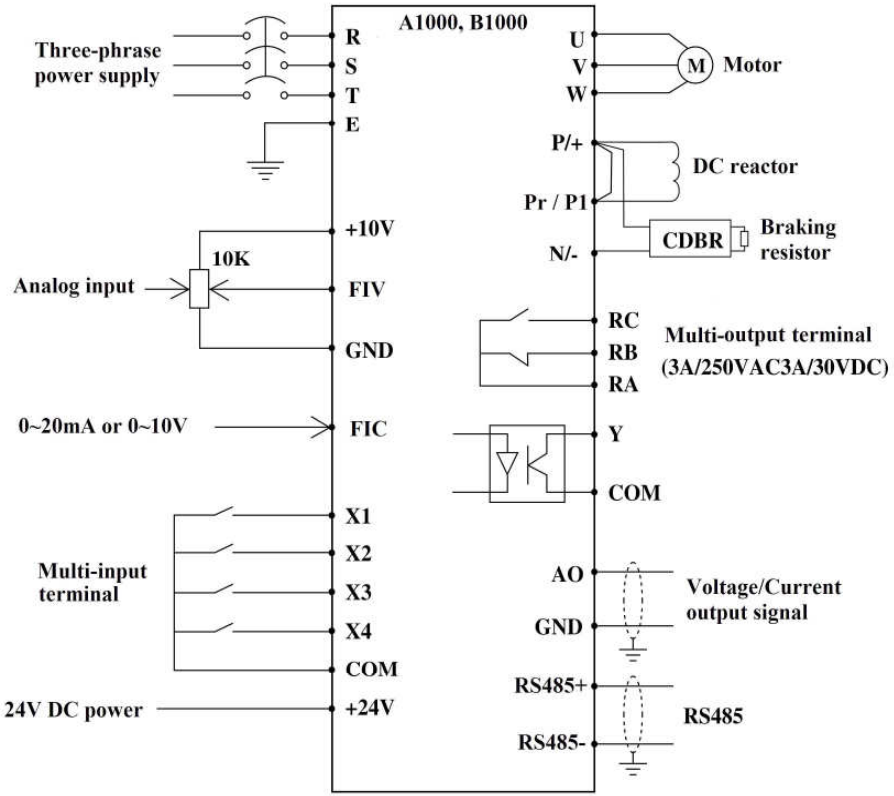
0.4~2.2KW



3.7 KW and above

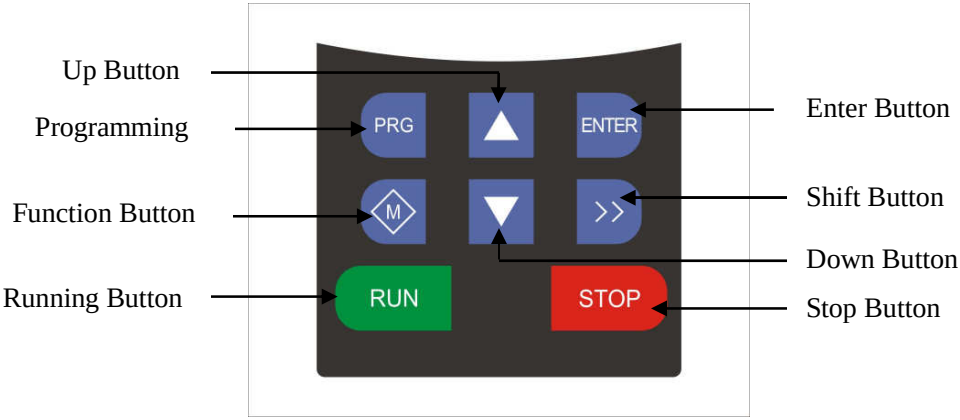


1.5.4 Typical Wiring Diagram



2. OPERATION

2.1 Operation Panel



Operation Panel Diagram

2.2 Button Function

Button	Name	Description
PRG	Programming	Enter or quit the first menu, delete the parameters.
ENTER	Enter	Progress enters the menu to confirm parameter of setting.
▲	UP	Increase data figure or parameter.
▼	DOWN	Decrease data figure or parameter.
>>	Shift	In stop and running status, cyclically select to display parameters. In revising parameters, shift to figure position of parameters.

	Running	Run by mode of the operation panel.
	Stop/Reset	In running status, press this button to stop running but be restricted by F7.04. In alarming status, it can be reset, not restricted by F7.04.
	Function	It is determined by F7.03. 0: Jog running. 1: Switch for Forward / Reverse. Button JOG can realize a switch of frequency direction. Notice: The drive will not save the switch status when the power is off. The drive will run according to value of F0.10. The value of F0.10 will be saved when the power is off. 2: Clear value of UP/DOWN.

2.3. Indicator

1) Function

Name	Description
FWD/REV	Light off: forward running Light on: reverse running
LOCAL/REMOT	Light off: control by operation panel Flickering: control by terminal Light on: control by protocol

2) Unit

Symbol	Description
Hz	Frequency unit
A	Current unit
V	Voltage unit

3) Digital display

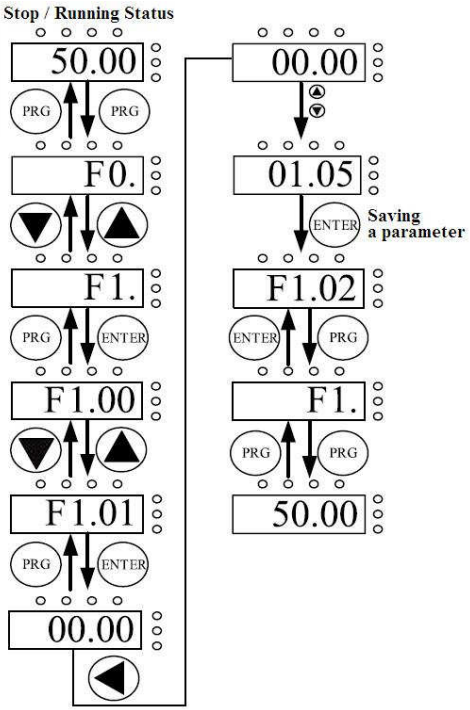
5 digit LED can display all kinds of monitoring data and alarming codes such as setting frequency, output frequency, etc.

2.4 Operation Process

2.4.1 Parameter Setting

There are three groups of the menu:

1. Parameter (first-level)
2. Parameter (second-level)
3. Function value (third-level)



Remarks:

Press both the (PRS) and the ENTER can return to the second-level menu from the third-level menu.

The difference is pressing (PR) will save the setting parameters to the control panel. Then return to the second-level menu with shifting to the next parameter automatically while pressing the ENTER will directly return to the second-level menu without saving the parameters, and keep staying at the current parameter.

In the third-level menu, if the parameters have no flickering, it means parameter cannot be modified. The possible reasons could be:

1) This parameter is not modifiable parameter, such as actual detected parameter, operation records and so on.
2) This parameter is not modifiable in running status, but in stop status.

2.4.2 Fault Reset

If the AC motor drive has fault, it will get the prompt related fault information. User can use SOP or according to terminals determined by F5 Group to reset the fault. After fault resetting, the AC motor drive is on stand-by status. If user does not reset the AC motor drive when it is on fault status, the AC motor drive will be in operation protection status, and unable to run.

2.4.3 Auto Tuning

If "Sensorless Vector Control" mode is selected, the motor nameplate parameters must be input proper for auto tuning. The performance of vector control depends on those parameters. So to achieve excellent performance should obtain the exact parameters. Procedure of the auto tuning is as follows:

Firstly, set mode of the operation source for 0 (F0.01). Secondly input following parameters according to the actual motor parameters:
F2.01: rated power
F2.02: rated frequency
F2.03: rated speed
F2.04: rated voltage
F2.05: rated current

Notice: The motor should be uncoupled with the load; otherwise the motor parameters obtained by auto tuning may not be correct. Set F0.12 for 1, and for the detailed process of the motor auto tuning, please refer to the description of F0.12. And then press RUN on the operation panel, the AC motor drive will automatically calculate the following parameters of the motor:
F2.06: stator resistance
F2.07: rotor resistance
F2.08: stator and rotor inductance
F2.09: stator and rotor mutual inductance
F2.10: current without loading
It is finished for the motor auto tuning

2.4.4 Password Setting：

The drive offers user's password of protection function. When F7.00 is set for non-zero, the figure will be the user's password. It will be effective 1 minute after setting. If pressing the PRG again to try to access the menu for setting, "0.0.0.0.0" will be displayed, and the operator must input correct user's password, otherwise will be unable to access. If it is necessary to cancel the password protection function, just set F7.00 for zero.

2.5 Running Status

2.5.1 Power-on

When sending power to the AC motor drive, LED will display "00000". After the process is completed, the AC motor drive is on stand-by status.

2.5.2 Stand-by

In stop or running status, function parameters can be displayed. Parameter display can be selected by F7.06 and F7.07 according to binary bits. For the detailed description of each bit, please refer to the description of F7.06 and F7.07.

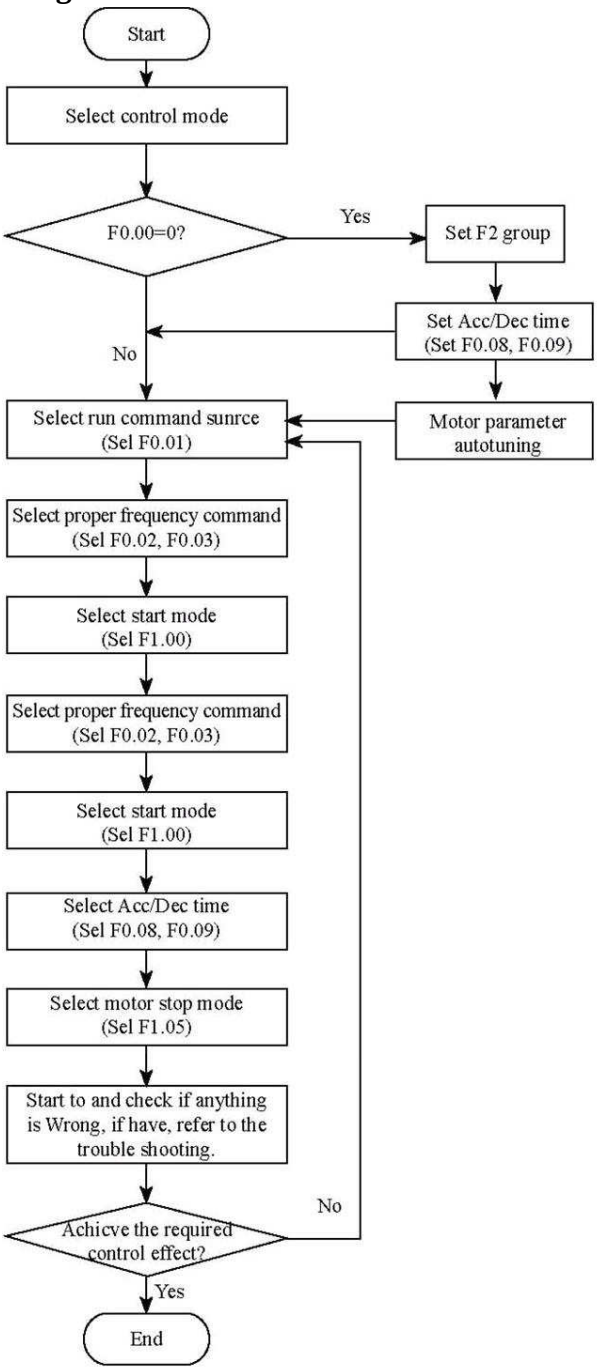
2.5.3 Operation

In running status, there are fourteen running parameters: output frequency, setting frequency, DC bus voltage, output voltage, output current, output power, output torque, PID setting, PID feedback, ON-OFF input status, open collector output status, length value, count value, step number of PLC and multistep speed, voltage of FIV, voltage of FIC and step number of multi-step speed. Display can be determined by the bit option of F7.06 (converted into binary system).

2.5.4 Fault

Series A1000, B1000 of AC motor drive offer variety of fault information. For details, please refer to the fault and the trouble shooting.

2.6 Quick Testing



3. FUNCTION DESCRIPTION

Group F0 Basic Function

Parameter	Description	Setting Range
F0.00	**Control mode**	**0～2【0】**

0: V/F control: It is suitable for application of general purpose such as pumps, fans etc.

1: Sensorless vector control: It is widely used to the application which requires high torque in low speed, higher speed accuracy, and quicker dynamic response, such as machine tool, injection molding machine, centrifugal machine and wiredrawing machine, etc. Notice: the performance will be much better after auto turning (Group F3).

2: Torque control: It is suitable for the application with low accuracy torque control, such as wired-drawing. In torque control mode, the speed of motor is determined by load. The rate of ACC/DEC has nothing to do with the value of F0.08 and F0.09 (or F8.00 and F8.01).

Parameter	Description	Setting Range
F0.01	**Command source**	**0～2【0】**

The control commands of AC motor drive include: start, stop, forward run, reverse run, jog, and fault reset and so on.

0: Operation panel (LED extinguished)

Both (RUN) and (STOP key are used for running command control. If Multifunction key JoG) is set as FWD/REV switching function (F7.03 is set for 1), it will be used to change the rotating orientation. In running status, pressing (RUN) and (STOP) in the same time will make the AC motor drive smoothly stop.

1: Terminal (LED flickering)

The operation, including forward run, reverse run, forward jog, reverse jog etc. can be controlled by multifunctional input terminals.

2: Serial port (LED lights on)

The operation of AC motor drive can be controlled by the host through the serial port

Parameter	Description	Setting Range
F0.02	UP/DOWN button setting	0～3【0】

0: User can adjust the setting frequency by UP/DOWN. The value of UP/DOWN will be saved when getting power off.

1: User can adjust the setting frequency by UP/DOWN, but the value of UP/DOWN will not be saved when getting power off.

2: User cannot adjust the setting frequency by UP/DOWN. The value of UP/DOWN will be cleared if F3.05 is set for 2.

3: User can only adjust the setting frequency by UP/DOWN when the drive is running. The value of UP/DOWN will be cleared when the drive is stopped.

Parameter	Description	Setting Range
F0.03	Frequency Command	0～6【0】

0: Operation panel

1: FIV 2: FIC 3: FIV+FIC

The setting frequency is set by analog input. The drive provides 2 analog input terminals. FIV is 0~10V of voltage input terminal, while FIC is 0~10V of voltage input or 0~20mA of current input. Voltage input or current input of FIC can be selected by Jumper J3.

Notice: When FIC is set for 0~20mA of current input, the corresponding voltage range is 0~5V. For detailed relationship between analog input voltage and the frequency, please refer to description of F5.07~F5.11. And 100% of FIV is corresponding to maximum frequency (F0.04).

4: Multi-step speed

The setting frequency is determined by FA group. The selection of steps is determined by combination of multi-step speed terminals.

Notice: Multi-step speed mode will have priority in setting frequency if F0.03 is not set for 4. In this case, the only from step 1 to 15 are available. If F0.03 is set for 4, step 0 to step 15 will be available. Jog has the highest priority.

5: PID Control

The setting frequency is the result of PID adjustment. For details, please refer to description of F9 group.

6: Serial port:

The setting frequency is set by RS485. For details, please refer to description of the protocol.

Parameter	Description	Setting Range
F0.04	**Maximum frequency**	**F0.05～600.00【50.00HZ】**

It used to the maximum frequency of the drive. It is also the basic of setting frequency and acceleration/deceleration.

Parameter	Description	Setting Range
F0.05	**High frequency limit**	**F0.06～F0.04【50.00HZ】**

The value has to be equal to or less than the maximum frequency.

Parameter	Description	Setting Range
F0.06	**Lower frequency limit**	**0.00～F0.05【0.00HZ】**

It will be running by the lower frequency limit when the setting frequency is less than the lower frequency limit.

※ Maximum frequency ≥ High frequency limit ≥ lower frequency limit

Parameter	Description	Setting Range
F0.07	**Operational panel setting frequency**	**F0.05～F0.06【50.00HZ】**

When F0.03 is set for 0, the value of this parameter is the original setting frequency.

Parameter	Description	Setting Range
F0.08	**Acceleration time 1**	**1～3600.0【by model】**
F0.09	**Deceleration time 1**	**1～3600.0【by model】**

Acceleration time is speed time from 0 Hz to the maximum frequency (F0.04). Deceleration time is speed time from the maximum frequency (F0.04) to 0 Hz. Please refer to the following:

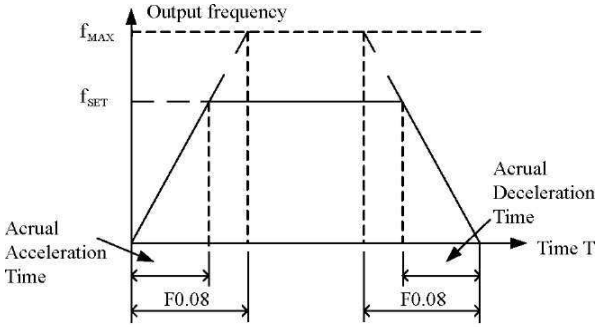


Illustration: Acceleration and Deceleration Time

When the setting frequency is equal to the maximum frequency (F0.04), the actual acceleration and deceleration time will be equal to value of F0.08 and F0.09 respectively. When the setting frequency is less than the maximum frequency, the actual acceleration and deceleration time will be less than value of F0.08 and F0.09 respectively. The actual acceleration (deceleration) time = F0.08 (F0.09) * the setting frequency / the maximum frequency.

The drive drive has 2 groups of acceleration and deceleration time.

※ 1st group: F0.08, F0.09 / 2nd group: F8.00, F8.01

Parameter	Description	Setting Range
F0.10	**Running direction**	**0～2【0】**

0: Forward direction. It runs according to the actual direction.

1: Reverse direction. It changes opposite direction of the motor.

Notice: It is prohibited from changing when the drive has been adjusted.

2: Prohibited from reversing.

Parameter	Description	Setting Range
F0.11	**Carrier frequency**	**1K～15K【by model】**

The advantages of high carrier frequency: more proper electricity current curve, less harmonic and less noise of motor.

The weaknesses of high carrier frequency: bigger loss of switching, higher temperature, influence ability of the output , more leakage of electricity current, more interference and the drive should drop less one level in use (increase 1K carrier, get less 20% in level).

Adopting low carrier frequency will get the contrary situation. Too much lower carrier frequency will cause to get oscillation on torque.

The drive has reasonable adjustment when it is produced out. In general, it is not necessary to adjust this parameter.

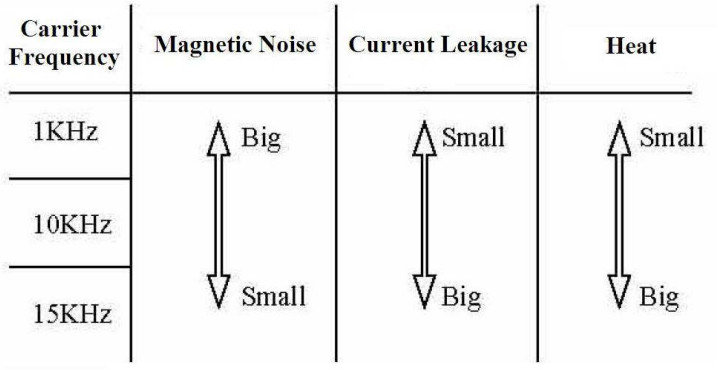


Illustration: Effect of carrier frequency

Capacity	Maximum	Minimum	Default
1.5～11KW	15	0.5	8KHz
15～55KW	8	0.5	4KHz
75～160KW	6	0.5	2KHz

Parameter	Description	Setting Range
F0.12	**Reset parameters**	**0～2【0】**

0: No action

1: All the parameters to default

2: Clear the recent record of failure

Notice: After setting, the value will auto be 0. It is not effective for F2 group.

Parameter	Description	Setting Range
F0.13	**AVR mode**	**0～2【1】**

0: No action

1: Effective

2: Effective for deceleration only

AVR (Auto Voltage Regulation) function ensures the output voltage of drive stable no matter how DC bus voltage changes. In deceleration, if AVR function is disabled, the deceleration time will be short but the current will be big. If AVR function is enabled all the time, the deceleration time will be long but the current will be little.

Parameter	Description	Setting Range
F0.14	**User passwords**	**0～65535**

This parameter will be effective that you set it for figures of non-zero.
00000: This value will be clear the user passwords you set before, and make it ineffective. Resetting to default value will be clear the user passwords. It will take effect in minute after quit status of editing parameters. If you press PRG to enter status of editing parameters, the display will show “0.0.0.0.0.” Users cannot see and set parameters until entering the correct passwords. So please keep user passwords that you set in mind.

Group F1 Start/Stop Function

Parameter	Description	Setting Range
F1.00	**Start running mode**	**0～2【0】**

0: Immediate running, start running from the start frequency.
1: Running after DC braking. Do DC braking according to F1.03 and F1.04, then start running from the start frequency. It is suitable for little inertia loading, which may cause reversed running.
2: Running after tracking speed. The drive will calculate speed and direction ahead of running in the preset speed. It realizes that the motor smoothly runs without shock, which is applicable to instant stop and restart of heavy loading.

Parameter	Description	Setting Range
F1.01	**Start frequency**	**0.00～10.00Hz【0.5Hz】**
F1.02	**Start frequency time**	**0.0～50.0s【0.0s】**

The drive will be running on the start frequency (F1.01) in start frequency time (F1.02). Then it will accelerate to the target frequency in acceleration time. If the target frequency is less than the start frequency, the drive will be in stop status. This parameter is not restricted by the lower frequency limit.

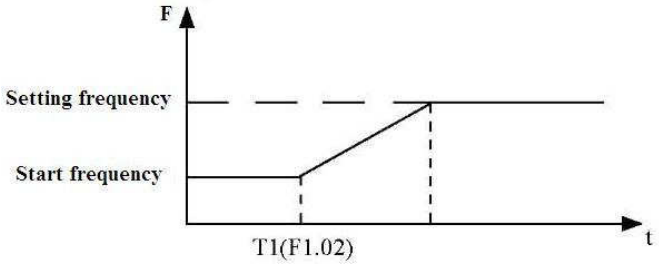


Illustration: Start frequency

Parameter	Description	Setting Range
F1.03	**Braking current before running**	**0.0～150.0%【0.0%】**
F1.04	**Braking time before running**	**0.0～50.0s【0.0s】**

F1.03 is to do DC braking before running. The value of DC current is percentage of rated current of the drive.

F1.04 is braking time before running. If setting for 0, DC braking is not effective. The more DC current, the bigger braking torque it is.

Parameter	Description	Setting Range
F1.05	**Stop mode**	**0～1【0】**

0: Decelerate to stop

In effect of the stop command, the drive decreases the output frequency until 0 according to the acceleration/deceleration time.

1: Coast to stop

In effect of the stop command, the drive stops outputting right away. The motor will coast to stop by the mechanical inertia.

Parameter	Description	Setting Range
F1.06	**Start frequency of DC braking**	**0.00～F0.04【0.0Hz】**
F1.07	**Waiting time before DC braking**	**0.0～50.0s【0.0s】**

F1.08	**DC braking current**	**0.0～150.0%【0.0%】**
F1.09	**DC braking time**	**0.0～50.0s【0.0s】**

Start frequency of DC braking: Start the DC braking when the output frequency reaches the start frequency determined by F1.06.

Waiting time before DC braking: stop outputting before DC braking. The DC braking will be started after the waiting time. It used to prevent over-current fault caused by DC braking at high speed.

DC braking current: the value of F1.08 is the percentage of rated current of the drive. The more DC current, the bigger braking torque it is.

DC braking time: the time used to run DC braking. If the time is 0, the DC braking will be ineffective.

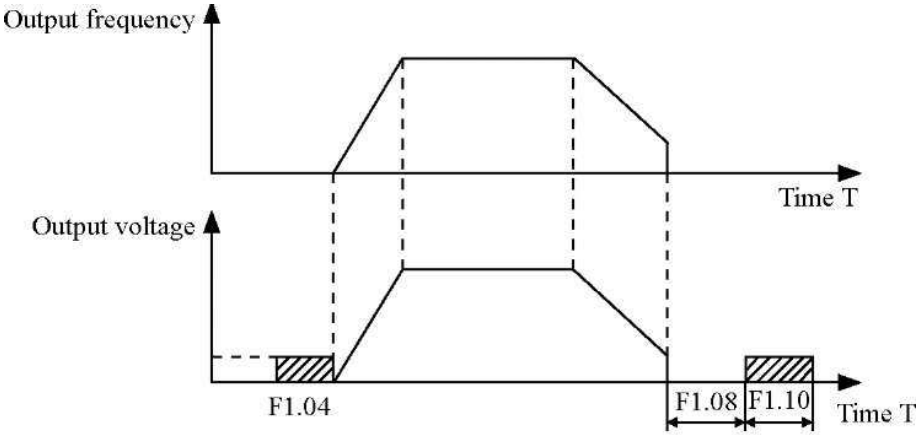


Illustration: DC braking

Parameter	Description	Setting Range
F1.10	**Interval time between forward and reverse**	**0.0～3600.0【0.0s】**

Setting the interval time is as follows:

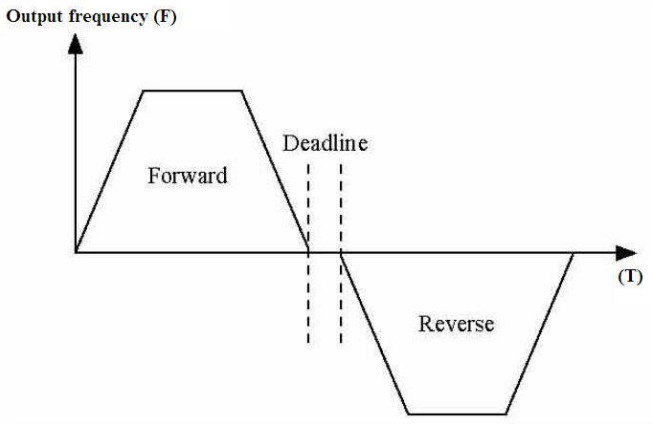


Illustration: FWD/REV deadline

Parameter	Description	Setting Range
F1.11	**Terminal function detection**	**0～1【0】**

When the running command is from the terminal, the drive will auto detect the terminal status in running.

0: Terminal ineffective: when sending power to the drive, it will not runn by terminal.

1: Terminal effective: when sending power to, it will runn by terminal.

Parameter	Description	Setting Range
F1.12	**Polar mode of input/output terminal**	**0x00～0x3FF【0】**

This parameter defines positive/negative logic:

Positive logic: effective connection to XI terminal and the corresponding common terminal.

Negative logic: ineffective connection to XI terminal and the corresponding common terminal.

For example, take X1~X4 as positive, Y is positive logic. RO is negative logic. So the status of X4~X1 is 0000, corresponding to 0 in hexadecimal. And LED will display 0; the status of RO and Y is 0010, corresponding to 2 in hexadecimal. Therefore parameter F1.12 should be set for 20.

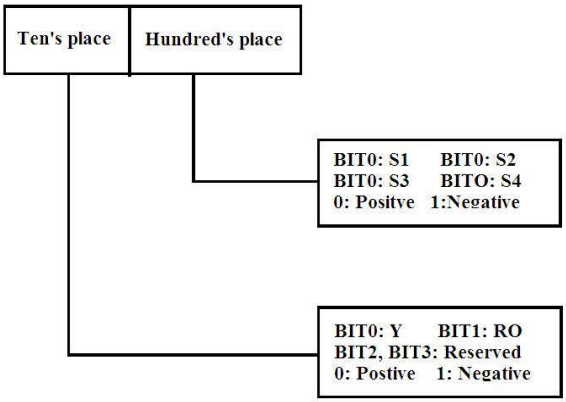


Illustration: Positive / Negative logic

Group F2 Motor Function

Parameter	Description	Setting Range
F2.00	Model mode	0～2【by model】

0: constant torque

1: variable torque (for fan & pump)

Parameter	Description	Setting Range
F2.01	Rated capacity of motor	0.4～900KW【by model】
F2.02	Rated frequency of motor	0.01～F0.04【50.00Hz】
F2.03	Rated speed of motor	1～36000rpm【by model】
F2.04	Rated voltage of motor	0～460V【by model】
F2.05	Rated current of motor	0.1～2000.0A【by model】

Notice: please set the parameters according to the nameplate of motor. The best performance and auto tuning is based on the exact parameters of motor.

In order to keep good performance, please be sure that the drive matches the motor in level. The bigger difference, the less performance it will be.

Notice: Reset the rated capacity (F2.01), which will make F2.06～F2.10 default.

Parameter	Description	Setting Range
F2.06	Motor auto tuning	0～2【0】

0: No action

1: Rotated auto tuning

Before auto tuning, please input parameter of the motor nameplate (F2.01~F2.05) and the motor needs to be in stop status without loading. Otherwise the result of auto tuning could be incorrect.

Set the proper acceleration and deceleration time (F0.08 and F0.09) according to inertia of the motor before auto tuning. Otherwise it may cause over-current and over-voltage in auto tuning.

The operational process is as follows:

A: Set F0.12 for 1, then press the ENTER. LED will be displaying "-TUN-" and flickering. During "-TUN-" is flickering, press the PRG to quit the auto tuning.

B: Press the RUN to start the auto tuning. LED will be displaying "TUN-0".

C: A few seconds later, the motor will start to run. LED will be displaying "TUN-1" and "RUN" light will be flickering.

D: A few minutes later again, LED will be displaying "-END-". That means the auto tuning is finished. And please return to the stop status.

E: In auto tuning, press STOP to stop the auto tuning.

Notice: Only the operational panel can control the auto tuning. F0.12 will be reset to 0 automatically when the auto tuning is finished or cancelled.

2: Static auto tuning

If it is difficult to disconnect the load, the static auto tuning is recommended. The operation process is the same as rotated auto tuning except Step C.

Notice: the mutual inductance and current without loading will not be detected by static auto tuning if user should input suitable value according to experience. Please note that the value will all be zero after it has been done inputting. Resetting the vaules to default will not affect Group F2.

Parameter	Description	Setting Range
F2.07	**Stator resistance of motor**	**0.001～65.535Ω【by model】**
F2.08	**Rotor resistance of motor**	**0.001～65.535Ω【by model】**
F2.09	**Leakage inductance**	**0.1～6553.5mH【by model】**
F2.10	**Mutual inductance**	**0.1～6553.5mH【by model】**
F2.11	**Current of idel loading**	**0.1～655.35A【by model】**

After auto tuning, the value of F2.06~F2.10 will auto be updated.

Notice: Do not change these parameters. Otherwise it may deteriorate control performance of the drive.

Group F3 Vector Function

Parameter	Description	Setting Range
F3.00	**Speed proportional gain 2**	**0～100【20】**
F3.01	**Speed integral time 1**	**0.01～10.00s【0.5s】**
F3.02	**Switch low frequency**	**0.00～F3.05【5.0Hz】**
F3.03	**Speed proportional gain 2**	**0～100【25】**
F3.04	**Speed integral time 2**	**0.01～10.00s【1.0s】**
F3.05	**Switch high frequency**	**F3.02～F0.04【10.0Hz】**

The above parameters are applicable for vector control. Less than 1 in switch low frequency (F3.02), parameter FI will be between F3.03 and F3.04. The value of Parameter FI can gain by the following curve of both parameters:

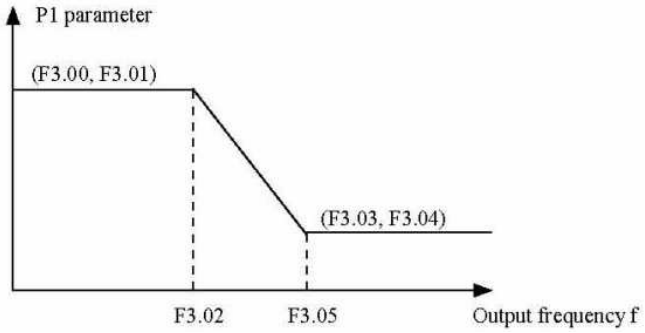


Illustration: P1 parameter

Speed proportional gain and speed integral time are adjusting speed response of vector control. Increase the proportional gain or decrease the integral time can speed up the response. However, too much proportional gain or too less integral time will be prone to have the drive oscillate. Too less proportional gain will also be prone to have the drive oscillate, and could have speed slip.

Parameter FI and the drive inertia have close relationship. So parameter FI needs adjusting for every different application.

Parameter	Description	Setting Range
F3.06	**VC slip compensation**	**50%～200%【100%】**

This parameter used to adjust the slip frequency of vector control and improve precision of the speed control. Properly adjusting this parameter can effectively restrain from speed slip.

Parameter	Description	Setting Range
F3.07	Torque limit	0.0～200.0%【150.0%】

It set rated output current of 100.0% corresponding drive.

Group F4 V/F control

Parameter	Description	Setting Range
F4.00	V/F curve	0～1【0】

0: Linear V/F curve. It is applicable to normal constant torque load.

1: Multi-point V/F curve. The curve will be subject to F4.01~F4.06.

2: Liner curve with 1.3 time of stepping down.

3: Liner curve with 1.7 time of stepping down.

4: Liner curve with 2 times of stepping down.

2~4 are applicable to variable torque load.

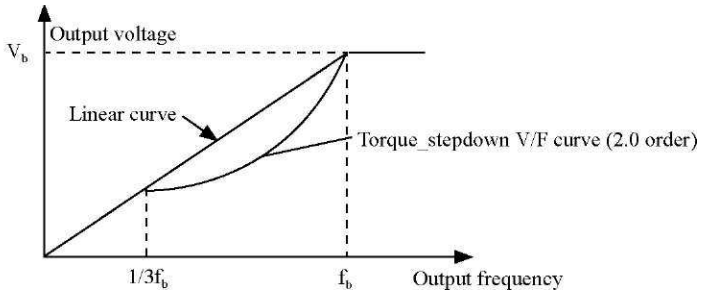


Illustration: V/F curve

Parameter	Description	Setting Range
F4.01	V/F frequency point 1	0.0Hz～F4.03【12.5】
F4.02	V/F voltage point 1	0.0%～100.0%【25%】 (Rated voltage of motor)
F4.03	V/F frequency point 2	F4.01～F4.05【25】
F4.04	V/F voltage point 2	0.0%～100.0%【50%】 (Rated voltage of motor)

F4.05	**V/F frequency point 3**	**F4.03～F2.02【37.5】**
F4.06	**V/F voltage point 3**	**0.0%～100.0%【75%】(Rated voltage of motor)**
F4.07	**Torque boost**	**0.0～30.0%【1.0%】**
F4.08	**Torque boost cut-off**	**0.0～50%【20.0%】**

Torque boost will take effect when the output frequency is less than cut-off frequency of torque boost (F4.02). Torque boost can improve torque performance of V/F control at low speed. The value of torque boost should be determined by the load. The heavier the load, the larger the value it will be.

Notice: F4.01 should not be too large, otherwise the motor would be over heat or the drive would be tripped by over-current or over load.

If F4.01 is set for 0, the drive will auto boost the output torque according to the load. Please refer to the following diagram.

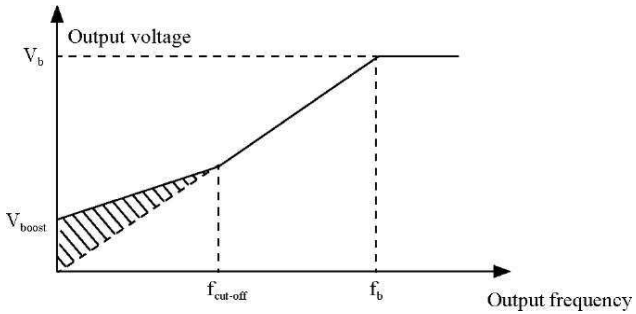


Illustration: Manual torque rising

Parameter	Description	Setting Range
F4.09	**V/F slip compensation**	**0.0～200%【0.0%】**

It enables to compensate V/F control for speed change when the motor is running, which will improve intensity of motor. This value should be set for the rated slip frequency of motor. The equation is the following:

F4.03=fb~n*p/60

Fb is rated motor frequency corresponding to Parameter F2.02, n is rated motor speed corresponding to Parameter F2.03, and p is motor pole.

Parameter	Description	Setting Range
F4.10	Energy saving mode	0～1【0】

It will auto detect the loading current when the motor is running idle or with light loading to save energy.

Notice: it will take good effect to pump& fan machines.

F5 Input terminal group

Parameter	Description	Setting Range
F5.00	X1 Terminal	0～25【12】
F5.01	X2 Terminal	0～25【13】
F5.02	X3 Terminal	0～25【14】
F5.03	X4 Terminal	0～25【7】
F5.04	X5 Terminal	0～25【0】
F5.05	X6 Terminal	0～25【0】
F5.06	X7 Terminal	0～25【25】

Those parameters are used to the functions corresponding to multi-function input terminal.

0: No function

1: Forward running (FWD)

2: Reverse running (REV)

3: 3-wire running control

Please refer to description of F5.15.

4: Forward jogging

5: Reverse jogging

Please refer to description of 8.02 and F8.04.

6: Coast to stop

It will block the output commands right away. For big inertia and no requirement of stop time, please use this.

7: Failure reset

It used to remotely reset failure. The function is the same as STOP button.

8: External failure input

The drive gives an alarm and stops when getting a failure.

9: Frequency increase (UP)

10: Frequency decrease (DOWN)

11: Clear the setting frequency of UP/DOWN to 0

The above 3 functions used to adjust the given frequency

12, 13, 14：Multi-speed terminal1~3

By those 3 terminals, the drive can set 8 speeds.

Speed terminal 3	Speed terminal 2	Speed terminal 1
Bit 2	Bit 1	Bit 0

15: Acceleration/deceleration time

Speed time of the terminal is corresponding to:

OFF status: F0.08, F0.09

ON sates: F8.00, F8.01

16: Pause PID function

It makes PID pause to keep the drive outputting the present frequency.

17: Pause traverse

It makes the drive pause outputting, then go on to run the present frequency when it is off.

18: Reset traverse

The setting frequency is reset to the middle frequency.

19: Hold acceleration and deceleration

The drive will not receive any external signal except stop command for keeping the present frequency.

20: Disable torque control

The drive is switch from torque mode into speed mode.

21: Setting UP/DOWN frequency temporarily clear to zero

It will clear the setting UP/DOWN frequency temporarily to zero, which makes the given frequency reset to the other given freueqncy from frequency command.

22: stop by DC braking

It makes the drive stop by DC braking in deceleration. The braking status is set by 1.07~F1.09.

23: Signal input of Counter

24: Clear counter signal to zero

25: Input PUL (for terminal X7 only)

Parameter	Description	Setting Range
F5.07	PUL filter switch number of times	1～10【5】
F5.08	PUL input minimum frequency	0.0～20.0KHz【0】
F5.09	PUL rate corrsponding minimum frequency value	0.0～100.0%【0】
F5.10	PUL rate corrsponding maximum frequency value	0.0～50.0KHz【50KHz】
F5.11	PUL corrsponding value for max.	0.0～100.0%【100%】
F5.12	PUL input filter time	0.0～100.0s【0.1s】
F5.13	Given value of counter	0～65535【0】

PUL means “high speed pulse “

PUL input filter time: When the time is increased, the drive will enhance anti-disturbance.

Parameter	Description	Setting Range
F5.14	Clear the counter to zero	0～1【0】

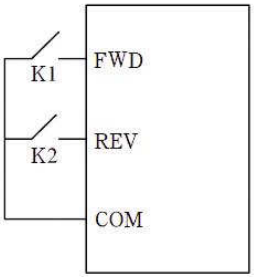
0: No clear 1: Clear to zero when the counter reaches the targeted value

Parameter	Description	Setting Range
F5.15	Control mode	0～3【0】

This parameter defines four different control modes that control the drive operation through external terminals.

0: Two-wire control mode

1: Integrate START/STOP command with run direction



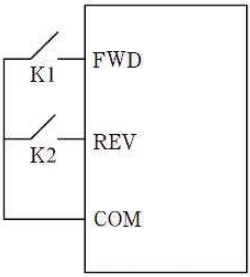
K1	K2	Command
OFF	OFF	STOP
ON	OFF	FWD
OFF	ON	REV
ON	ON	STOP

Illustration: 2-wire control model 1

1: Two-wire control mode

2: START/STOP command is determined by FWD terminal.

Run direction is determined by REV terminal.

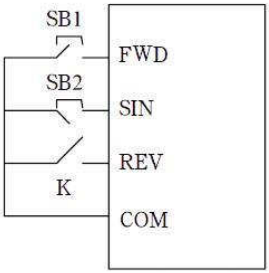


K1	K2	Command
OFF	OFF	STOP
ON	OFF	FWD
OFF	ON	STOP
ON	ON	REV

Illustration: 2-wire control model 2

2: Three-wire control 1

This mode enables SIN to make running commands from terminal FWD and the running direction from terminal REV.



K	Command
OFF	FWD
ON	REV

Illustration: 3-wire control model 1

※ K: Switch for forward/reverse;SB1: Running button;SB2: Stop button

3: Three-wire control 2

This mode enables SIN to make running commands from SB1 or SB3. And both control the running direction in the same time. Also, it makes stop commands from SB2.

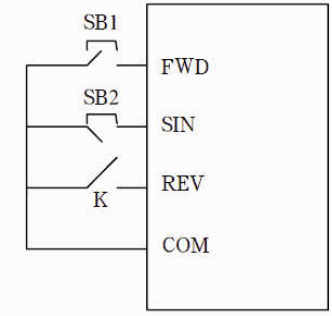


Illustration: 3-wire control model 2

※ SB1: Forward running button;SB2: Stop button;SB3: Reverse running button

Tip: For two-wire control mode, terminal FWD/REV will still be effective when the drive is stopped by a stop command from another source. It will not run until triggering FWD/REV.

Parameter	Description	Setting Range
F5.16	**Terminal UP/DOWN changing frequency rate**	**0.01～50.00【0.5Hz/s】**

It used to adjust ratio of setting frequency by terminal UP/DOWN.

Parameter	Description	Setting Range
F5.17	**FIV lower limit**	**0.00～10.00【0.00V】**
F5.18	**Value of FIV lower limit**	**-100～100.0【0.0%】**
F5.19	**FIV high limit**	**0.00～10.00【10.00V】**
F5.20	**Value of FIV high limit**	**-100～100.0【100.0%】**
F5.21	**FIC input filter time**	**0.00～10.00【0.10s】**
F5.22	**FIC lower limit**	**0.00～10.00【0.00V】**
F5.23	**Value of FIC lower limit**	**-100～100.0【0.0%】**
F5.24	**FIC high limit**	**0.00～10.00【10.00V】**
F5.25	**Value of FIC high limit**	**-100～100.0【100.0%】**
F5.26	**FIC input filter time**	**0.00～10.00【0.10s】**

The analog input FIV ranging from 0V~10V can only provide voltage input. For different application, the corresponding value of 100.0% analog setting is different. For details, please refer to description of each application.

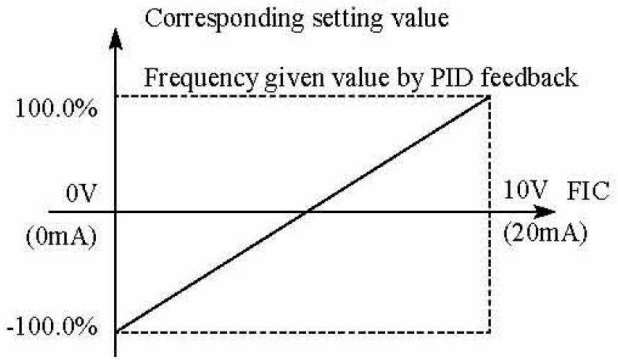


Illustration: Relation between FIV and corresponding settings

Input FIV filter time: adjust sensitivity of analog input. Proper adjustment will enhance anti-interference but reduce sensitivity of analog output.

FIC function is similar to FIV. Analog FIC can provide input 0~10V or 0~20mA, When FIC adopts 0～20mA, corresponding voltage of inputting 20mA will be 5V.

Group F6 Output Terminal

Parameter	Description	Setting Range
F6.00	**Percentage of output DO**	**0.0～200.0%【0.0%】**
F6.01	**Output Y mode**	**0～10【1】**
F6.02	**Relay output A mode**	**0～10【3】**
F6.03	**Relay output B mode**	**0～10【3】**

0: No output

1: The drive runs forward. The signal is ON when the frequency is outputting.

2: The drive runs reverse. The signal is ON when the frequency is outputting.

3: Failure output. The signal is ON when the drive get failed.

4: FDT arrival. Please refer to Parameter F8.13, F8.14.

5: Frequency arrival. Please refer to parameter F8.15.

6: In Zero speed. The output frequency and the given frequency is zero in the same time, the signal will be 0.

7: Pulse arrival of designated figure: When a figure is reach the setting value of F8.22, the signal will be ON.

8: Length arrival. When the actual detected length is more than the value of

F8.19, the signal will be ON.

9~10: Reserved

Parameter	Description	Setting Range
F6.04	Output AO1 mode	0～11【0】
F6.05	Output AO2 mode	0～11【2】

The standard of analog output is from 0~20mA or 0~10V, which can output current or voltage by Jumper J4. Range of the corresponding value is as follows:

Value	Function	Range
0	Running frequency	0～Maximum output frequency
1	Setting frequency	0～Maximum output frequency
2	Running speed	0～Twice rated motor speed
3	Output current	0～Twice rated drive current
4	Output voltage	0～1.5 time of rated drive voltage
5	Output capacity	0～2 times of rated motor capacity
6	Output torque	0～2 times of rated motor current
7	Input analog FIV	0～10V
8	Input analog FIC	0～10V/0～20mA
9	PUL input frequency	
10	PID given value	
11	PID feedback value	

Parameter	Description	Setting Range
F6.06	Output AO1 lower limit	0.0～100.0%【0.0%】
F6.07	Correspond AO1 to lower limit	0.00～10.00【0.00V】
F6.08	Output AO1 high limit	0.0～100.0【100.0%】
F6.09	Correspond AO1 to high limit	0.00～10.00【10.00V】
F6.10	Output AO2 lower limit	0.0～100.0%【0.0%】
F6.11	Correspond AO2 to lower limit	0.00～10.00【0.00V】
F6.12	Output AO2 high limit	0.0～100.0【100.0%】
F6.13	Correspond AO2 to high limit	0.00～10.00【10.00V】

The value will be the lower limit/the high limit when it is less than the lower or

more than the upper. 1mA is almost equal to 0.5V.

F7 Display interface

Parameter	Description	Setting Range
F7.00	Display language	0～1【0】

0: Chinese

1: English

Parameter	Description	Setting Range
F7.01	Parameter copy	0～2【0】

0: No function.

1: Upload all the parameters to the keypad

2: Download all the parameters from the keypad

Please note that it will auto come back to zero when uploading or downloading.

Parameter	Description	Setting Range
F7.02	M button mode	0～2【0】

The JOG is multi-function button, which can be defined by parameter setting.

0: Jog running.

1: Switch for Forward / Reverse. Button JOG can realize a switch of frequency direction.

Notice: The drive will not save the switch status when the power is off. The drive will run according to value of F0.10. The value of F0.10 will be saved when the power is off.

2: Clear value of UP/DOWN.

Parameter	Description	Setting Range
F7.03	STOP/RST button mode	0～3【0】

This parameter defines mode of STOP function.

0: Effective for the operational panel.

1: Effective for both operational panel and terminal.

2: Effective for both operational panel and protocol.

3: Effective for all control modes.

For failure reset, STOP is effective for all the condition.

Parameter	Description	Setting Range
F7.04	**Operation panel display**	**0～3【0】**

0: Display on an external operation panel.

1: Display on both the original and an external operation panel.

2: Display on both the original and an external operation panel but the buttons are effective for original operation panel only.

3: Display on both the original and an external operation panel and all the buttons are effective for both the original and an external operation panel.

Parameter	Description	Setting Range
F7.05	**Display parameter in running status**	**0～0x7FFF【00FF】**

When the drive is running, this parameter will display the running status. If Bit is 0, the parameter will not be displayed; If Bit is 1, the parameter will be displayed. Press SHIFT to scroll through these parameters in right order. Setting this parameter F7.06 should be input by hexadecimal.

Display content of each bit as below:

BIT15	**BIT14**	**BIT13**	**BIT12**	**BIT11**	**BIT10**
Torque value	Present speed of multi-speed	Analog FIC value	Analog FIV value	Output terminal status	Input terminal status
BIT9	**BIT8**	**BIT7**	**BIT6**	**BIT5**	**BIT4**
Feedback PID value	Given PID value	Output torque	Output capacity	Running speed	Output current
BIT3	**BIT2**	**BIT1**	**BIT0**		
Output voltage	DC voltage	Setting frequency	Running frequency		

Input/output terminal status displays in decimal. For example, the input status displays 3, that means X1, X2 are close, other terminals are off. Please refer to description of F7.18, F7.19.

Parameter	Description	Setting Range
F7.06	**Display parameter in stop status**	**0～0x3FF【0FF】**

This setting is the same as F7.06 but only in stop status.

Display content of each bit as below:

BIT9	BIT8	BIT7	BIT6	BIT5	BIT4
Torque value	Present speed of multi-speed	Analog FIC value	Analog FIV value	Feedback PID value	Given PID value
BIT3	**BIT2**	**BIT1**	**BIT0**		
Output terminal	Input terminal status	DC voltage	Setting frequency		

Parameter	Description	Setting Range
F7.07	**Temperature of rectifier**	**0～100.0℃**
F7.08	**Temperature of IGBT**	**0～100.0℃**
F7.09	**Software version**	
F7.10	**Accumulated running time**	**0~65535 hours**

Those parameters can only be read.

Temperature of rectifier: Indicates the temperature of rectify module. Overheat protection point of different drives may be different.

Temperature of IGBT: Indicates the temperature of IGBT module.Overheat protection point of different drives may be different.

Software version: Indicates the present software version of DSP.

Accumulated running time: Display accumulated running time of the drive.

Parameter	Description
F7.11	**Failure of the previous second**
F7.12	**Failure of the previous first**
F7.13	**Failure of the present time**

0: No fault

1: IGBT Ph-U faulty (OU1)

2: IGBT Ph-V faulty (OU2)

3: IGBT Ph-W faulty (OU3)

4: Over-current in acceleration (OC1)

5: Over-current in deceleration (OC2)

6: Over-current in constant speed (OC3)

7: Over-voltage in acceleration (OV1)
8: Over-voltage in deceleration (OV2)
9: Over-voltage in constant speed (OV3)
10: Undervoltage (UV)
11: Over-load of motor (OL1)
12: Over-load of drive (OL2)
13: Short of input phase (LPI)
14: Short of output phase (LPO)
15: Over-heat of rectify (OH1)
16: Over-heat of IGBT (OH2)
17: External fault (OUt)
18: Serial port fault (E485)
19: Current detection (EtI)
20: Auto-tuning fault (AtE)
21: EEFROM fault (EEP)
22: PID feedback fault (EPID)
23: Braking unit fault (Ebr)
24: Reserved

Parameter	Description
F7.14	**Running frequency of the present failure**
F7.15	**Output current of the present failure**
F7.16	**DC voltage of the present failure**
F7.17	**Input terminal status of the present failure**
F7.18	**Output terminal status of the present failure**

The value in decimal records the present status of all the terminals. The terminal is ON, the bit will be 1. So if it is OFF, that will be 0. The proper order is:

Bit 3	Bit 2	Bit 1	Bit 0
X3	**X2**	**X1**	**X1**
		R0	**Y**

Group F8 Advanced function

Parameter	Description	Setting Range
F8.00	Acceleration time 2	0.0～3600.0s【by Model】
F8.01	Deceleration time 2	0.0～3600.0s【by Model】
F8.02	Acceleration time 3	0.0～3600.0s【by Model】
F8.03	Deceleration time 3	0.0～3600.0s【by Model】
F8.04	Acceleration time 4	0.0～3600.0s【by Model】
F8.05	Deceleration time 4	0.0～3600.0s【by Model】

For details, please refer to description of F0.08, F0.09 and parameter group F5.

Parameter	Description	Setting Range
F8.06	Jog frequency	0.00～F0.04【5.00Hz】
F8.07	Jog acceleration time	0.0～3600.0s【by Model】
F8.08	Jog deceleration time	0.0～3600.0s【by Model】

Parameter	Description	Setting Range
F8.09	Skip frequency	0.00～F0.04【0.00Hz】
F8.10	Skip frequency bandwidth	0.00～F0.04【0.00Hz】

When the setting frequency is in the bandwidth of skip frequency, the actual running frequency is boundary of skip frequency. This function can skip a resonance point of the motor. If skip frequency is set for 0, the function will not work.

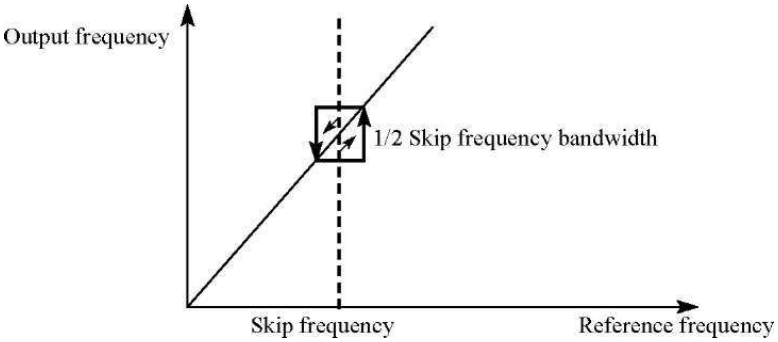


Illustration: Skip frequency

Parameter	Description	Setting Range
F8.11	Traverse frequency bandwidth	0.0～100.0%【0.0%】
F8.12	Sudden frequency bandwidth	0.0～50.0%【0.0%】
F8.13	Rise time of traverse	0.1～3600.0s【5.0s】
F8.14	Fall time of traverse	0.1～3600.0s【5.0s】

The traverse function is applied to such textile and fiber industry as applications of swaying and rolling function.

The traverse function is making the output frequency traverse up/down around the center. Trail of the running frequency in the time table shows as below:

When F8.07 is set for 0, the bandwidth will be 0. That means the traverse will not work.

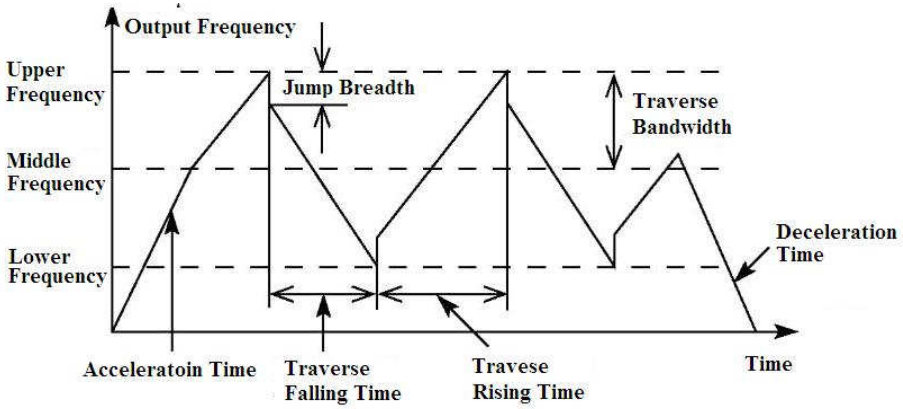


Illustration: Traverse working

Traverse frequency bandwidth: Limit of traverse frequency.

Traverse frequency corresponding to the center frequency: Traverse AW = Center frequency * traverse bandwidth F8.07.

Sudden frequency = Traverse AW× Sudden frequency bandwidth F8.08.

Rise time of traverse: Time of the lowest to the highest in traverse.

Fall time of traverse: Time of the highest to the lowest in traverse.

Parameter	Description	Setting Range
F8.15	Number of auto reset times	0～3【0】
F8.16	Auto reset interval	0.1～100.0s【1.0s】

Number of auto reset times: It is set number of times to auto reset when the drive gets an alarm.

Auto reset interval: Interval time from getting an alarm to auto reset.

Parameter	Description	Setting Range
F8.17	**FDT level detection**	**0.00～F0.04【50.00Hz】**
F8.18	**FDT lag detection**	**0.0～100.0%【5.0%】**

When the output frequency is beyond a certain setting frequency, FDT level detection will output a signal of ON/OFF until the output frequency drops to the setting frequency. (FDT level ~ FDT lag) as follows:

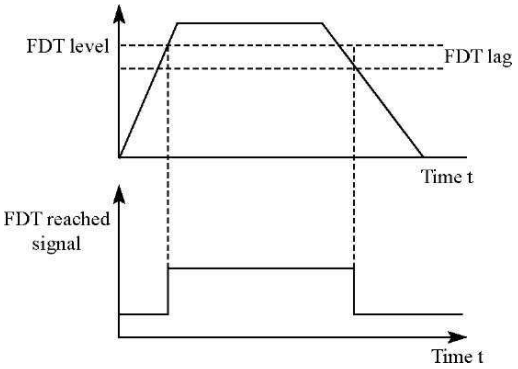


Illustration: FDT level and lag

Parameter	Description	Setting Range
F8.19	**Detected range of frequency arrival**	**0.0～100.0%【0.0%】**

When the output frequency is in the detected range of setting frequency, it will output a signal of ON/OFF as follows:

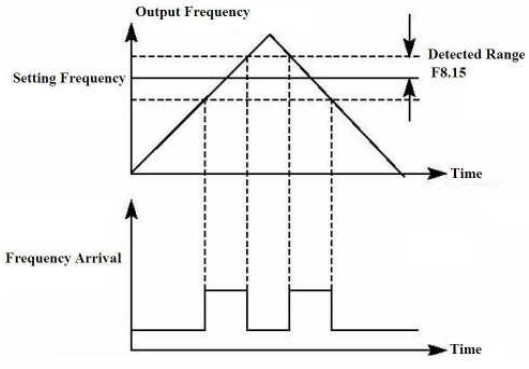


Illustration: Frequency arrival

Parameter	Description	Setting Range
F8.16	DC voltage of Braking threshold	115～140%【380V:130%】【220V:120%】

Appropriated adjustment will effectively brake with loading.

Parameter	Description	Setting Range
F8.21	Speed coefficient	0.1～999.9%【100.0%】

Motor speed = 120 * Running frequency * F8.17 / motor pole. This parameter used to correct error on the scale, not take effect to the actual speed.

Group F9 PID Control

PID control used to control programs in common. It has given value of feedback signal and target value to do proportional, integral and differential for output frequency adjustment, which makes the controlled value stable on target value in a feedback system. It is applied to control of flow, pressure and temperature.

The principle of control is as follows:

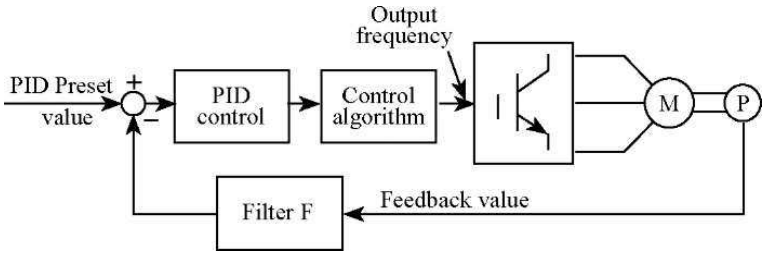


Illustration: PID control

Parameter	Description	Setting Range
F9.00	PID source	0～4

0: given by the operation panel (F9.01).

1: given by analog FIV.

2: given by analog FIC.

3: given by remote serial port.

4: given by multi-section.

When the frequency source is optional for OID, F0.03 will be 5 by setting. This parameter determines a source of PID target value.

The PID target value is corresponding to the feedback value during 0~100.0%.

Parameter	Description	Setting Range
F9.01	Preset PID of the operation panel	0.0～100.0%【0.0%】

When F9.00 = 0, commands will be given by the operation panel. The datum value is the feedback value.

Parameter	Description	Setting Range
F9.02	PID feedback source	0～3【0】

This parameter is option for PID feedback source.

0: Analog FIV feedback.

1: Analog FIC feedback.

2: FIV and FIC feedback.

3: Remote serial port feedback.

Notice: the given source and the feedback source cannot be the same, otherwise PID will not work.

Parameter	Description	Setting Range
F9.03	PID output feature	0～1【0】

0: Positive PID output. When the feedback value is more than the given PID value, the output frequency will decrease for PID balance, such as wrapping up of tension control.

1: Negative PID output. When the feedback value is more than the given PID value, the output frequency will increase for PID balance, such as wrapping down of tension control.

Parameter	Description	Setting Range
F9.04	Proportional Gain (Kp)	0.00～100.00【0.10】
F9.05	Integral time (Ti)	0.01～10.00s【0.10s】
F9.06	Differential time (Td)	0.00～10.00s【0.00s】

Proportional gain (Kp): It determines strength of PID control. The more Kp value, the strength will be bigger. This parameter is 100, that means bias 100% between the feedback value and the given value will be the maximum frequency

for frequency adjustment bandwidth. (Ignore integral and differential)
Integral time (Ti): It determines adjustment speed of PID control between the feedback value and the given value. The less Ti value, the strength will be bigger. This parameter is 100, that means bias 100% between the feedback value and the given value will be the maximum frequency (F0.04) for frequency adjustment bandwidth. (Ignore proportional gain and differential)

Differential time (Td): It determines change speed of PID control between the feedback value and the given value. The more Td value, the strength will be bigger. This parameter is 100, that means change ratio 100% of the given value will be the maximum frequency (F0.04) for frequency adjustment bandwidth. (Ignore proportional gain and integral)

How to Adjust PID control proper:
1. Set F0.03 for 5 (PID control).
2. Increase proportional gain (Kp) as far as possible without oscillation.
3. Decrease integral time (Ti) as far as possible without oscillation.
4. Increase differential time (Td) as far as possible without oscillation.
5. Decrease proportional gain (Kp) Increase integral time (Ti) and decrease differential time (Td) if overshooting.

Parameter	Description	Setting Range
F9.07	**Sampling Circle (T)**	**0.01～100.00s【0.50s】**
F9.08	**PID bias limit**	**0.0～100.0%【100.0%】**

Sampling Circle (T): it is for feedback value. It will figure out once in sampling circle. The bigger sampling circle, the response will be slower.
PID bias limit: it is corresponding to the maximum bias value in the range of given value. PID will stop working when the bias is in the range of F9.08. Appropriated adjustment will improve accuracy and stability.

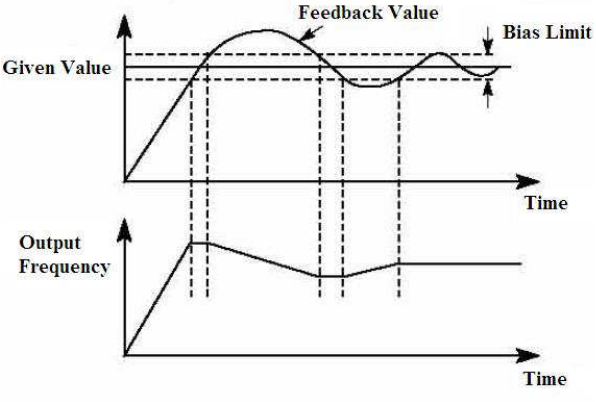


Illustration: Relation between bias limit and output frequency

Parameter	Description	Setting Range
F9.09	**Detection of feedback disconnection**	**0.0～100.0%【0.0%】**
F9.10	**Detected time of feedback disconnection**	**0.0～3600.0s【1.0s】**

When the feedback value keeps less than value of F9.09 in value of F9.10, the drive will make an alarm of disconnected feedback (E0022).

Group FA Simple PLC and Multi-speed

The drive has 16 multi-speeds and 4 groups of acceleration / deceleration. When PLC function gets finished one circle or one section, the digital/relay output terminal will output a signal ON.

Parameter	Description	Setting Range
FA.00	**PLC running mode**	**0~2【0】**
FA.01	**Time unit**	**0: S (second)** **1: M (minute)** **2: H (hour)**

PLC running mode:

0: Stop after one cycle

1: Go on runing the final value after one cycle

2: Continuous cycle

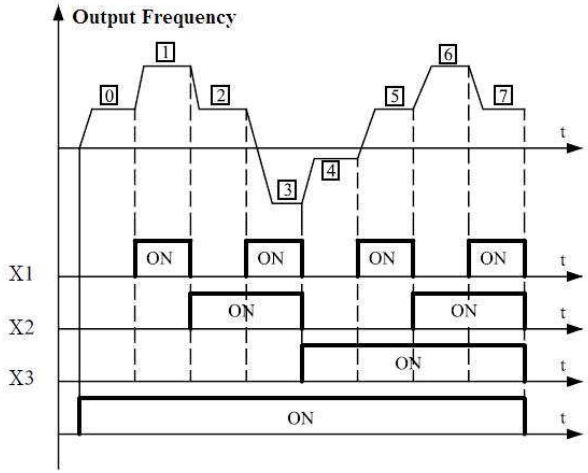
Parameter	Description	Setting Range
FA.02	Multi-speed 1	-100.0～100.0【0.0%】
FA.03	Multi-speed 2	-100.0～100.0【0.0%】
FA.04	Multi-speed 3	-100.0～100.0【0.0%】
FA.05	Multi-speed 4	-100.0～100.0【0.0%】
FA.06	Multi-speed 5	-100.0～100.0【0.0%】
FA.07	Multi-speed 6	-100.0～100.0【0.0%】
FA.08	Multi-speed 7	-100.0～100.0【0.0%】
FA.09	Multi-speed 8	-100.0～100.0【0.0%】
FA.10	Time of Multi-speed 1	0.0～6500.0s【0】
FA.11	Time of Multi-speed 2	0.0～6500.0s【0】
FA.12	Time of Multi-speed 3	0.0～6500.0s【0】
FA.13	Time of Multi-speed 4	0.0～6500.0s【0】
FA.14	Time of Multi-speed 5	0.0～6500.0s【0】
FA.15	Time of Multi-speed 6	0.0～6500.0s【0】
FA.16	Time of Multi-speed 7	0.0～6500.0s【0】
FA.17	Time of Multi-speed 8	0.0～6500.0s【0】

The symbol of multi-speed determines a running direction. Minus means reverse direction. The setting frequency 100.0% is corresponding to the maximum frequency (F0.04).

When X1=X2=X3=OFF, input frequency mode is determined by F0.03.

When X1, X2, X3 will not OFF at all, the multi-speed will work. The function of multi-speed has first priority in frequency working. X1, X2, X3 consist of 8 multi-speeds.

START/STOP of multi-speed is still determined by operation source F0.01.



Relation between the multi speed and X1, X2, X3

X1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
X2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
X3	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Section	1	2	3	4	5	6	7	8

Group Fb Protection

Parameter	Description	Setting Range
Fb.00	**Motor protection from over-load**	**0～2【2】**

0: No protection. The drive will not have protected from over-load.

1: General motor. Run with slip compensation for low speed because the general motor has bad heat sink in low speed. They way the running frequency is adjusted down the protection of 30 HZ.

2: Servo motor. Run without slip compensation for low speed. Heat sink of the servo motor will not take effect by speed, so it is not necessary to have protection in low speed.

Parameter	Description	Setting Range
Fb.01	**Motor protection from over-current**	**20.0～120.0【100.0%】**

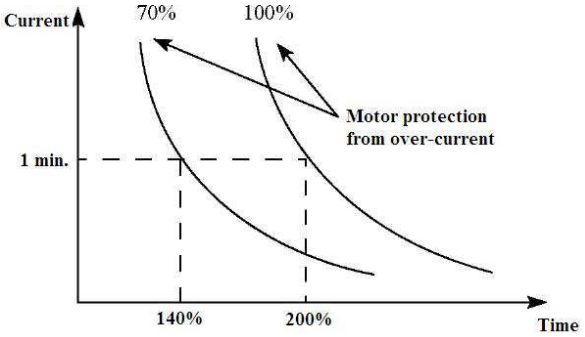


Illustration: Motor protection curve from over-current

Current of motor protection = (rated motor current / rated drive current) ×100%. Please be sure to set this parameter when the bigger drive is installed in the smaller motor.

Parameter	Description	Setting Range
Fb.02	**Frequency point in instant power off**	**70%～110%【80%】**
Fb.03	**Decreased rate of frequency in instant power off**	**0.00～F0.04【0.00Hz】**

0: Disabled.

This parameter enables the drive to run by compensation of low-voltage when DC bus voltage drops beyond Fb.02. The drive can go on running without alarm by decreasing the output frequency and feedback force to the motor.

Notice: When value of Fb.03 is too big, feedback energy of the motor will be too large and may cause over-voltage fault. When Fb.03 is too small, feedback energy of the motor will be too small to reach voltage compensation. So please set Fb.03 according to the loading inertia and the actual load.

Parameter	Description	Setting Range
Fb.04	**Protection in stall to over-load**	**0～1【1】**
Fb.05	**Voltage protection in stall to over-load**	**120～150%** **【380V:130%】** **【380V:120%】**

0: Enabled 1: Disabled

In deceleration, the motor deceleration rate may be lower than the output frequency due to the loading inertia. At this time, the motor will feedback the energy to the drive resulted in rising DC bus voltage. Without measure, the drive will take an alarm due to over-voltage.

In deceleration, the drive detects DC bus voltage and compares with voltage protection in stall to over load. If DC bus voltage goes beyond value of Fb.05, the drive will stop decreasing the output frequency. When DC bus voltage becomes lower than value of Fb.05, the deceleration will go on. As picture shown:

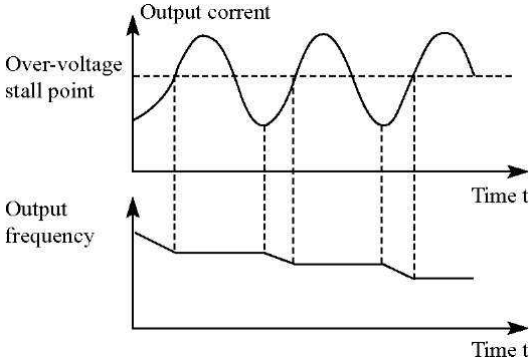


Illustration: Over-current stall

Parameter	Description	Setting Range
Fb.06	**Auto current limit**	**100～200%【160】**
Fb.07	**Decreased rate of current**	**0.00～50.00【10.00Hz/s】**

Fb.06 used to limit current of the drive, which will not get failed due to surge over-current. This function is particularly useful for applications of bigger loading inertia or changeable loading step.

When Fb.06 is much smaller, over-load alarm may occur. If this parameter is much bigger, the frequency will sharply change very much, which makes feedback energy of the motor bigger and may cause over-voltage alarm. This function is always enabled for acceleration or deceleration.

Notice:

1. In process of auto current limit, the output frequency may change. Therefore, it is recommended not to enable this function when the output frequency is

stable.

2. In process of auto current limit, when Fb.06 is much lower, capacity of over-load will be impacted. Please refer to the following picture:

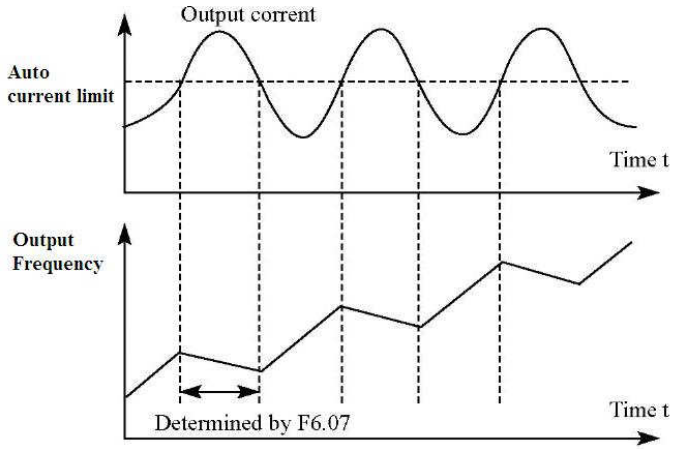


Illustration: Auto current limit

Group FC Serial port

Parameter	Description	Setting Range
FC.00	**Local address**	**0～247【1】**

0: Broadcast address. All the slave address connecting with Modbus will accept this station but not response. The slave address cannot be set for 0.

Parameter	Description	Setting Range
FC.01	**Baud rate**	**0～5【3】**

This parameter defines data format used in protocol.

0: 1200bps 2: 4800bps 4: 19200bps

1: 2400bps 3: 9600bps 5: 38400bps

The baud rate of both mater and slave has to be the same

Parameter	Description	Setting Range
FC.02	**Data format**	**0～17【0】**

This parameter defines data format used in protocol.

0: No check（N，8，1）for RTU.

1: Even check（E，8，1）for RTU.
2: Odd check（O，8，1）for RTU.
3: No check（N，8，2）for RTU.
4: Even check （E，8，2）for RTU.
5: Odd check（O，8，2）for RTU.
6: No check（N，7，1）for ASCII.
7: Even check（E，7，1）for ASCII.
8: Odd check（O，7，1）for ASCII.
9: No check（N，7，2）for ASCII.
10: Even check（E，7，2）for ASCII.
11: Odd check（O，7，2）for ASCII.
12: No check（N，8，1）for ASCII.
13: Even check（E，8，1）for ASCII.
14: Odd check（O，8，1）for ASCII.
15: No check（N，8，2）for ASCII.
16: Even check（E，8，2）for ASCII.
17: Odd check（O，8，2）for ASCII.

Parameter	Description	Setting Range
FC.03	**Response delay time**	**0～200ms【5ms】**

This is the delay time from receiving a signal of an upper controller to responsing the controller. In mode RTU, the actual response delay cannot be less than an interval of 3.5 characters. In mode ASCII, it will be 1ms.

Parameter	Description	Setting Range
FC.04	**Time-out error**	**0.0～100.0s【0.0s】**

When this parameter is set for 0.0s, timeout delay will be disabled.
When this parameter is set for non-zero, the interval time between two serial ports going beyond the value of timeout delay will make an alarm for serial port error (CE). This is for monitoring serial port conditions.

Parameter	Description	Setting Range
FC.05	**Serial port error**	**0～3【1】**

0: Alarm (CE) and coast to stop.

1: Not alarm but go on running.

2: Not alarm and stop by remote serial port.

3: Not alarm and stop by all control modes.

Parameter	Description	Setting Range
FC.06	Serial port response	0～1【0】

0: Response writing/reading commands to all upper controllers.

1: Response to reading commands to all upper controllers. This mode can enhance efficiency in serial port.

Group Fd Other Functions

Parameter	Description	Setting Range
Fd.00	Low frequency level of restrained oscillation	0～500【5】
Fd.01	High frequency level of restrained oscillation	0～500【100】

Most motors might have oscillation at some certain frequencies. Please be caution to adjust both parameters. When Fd.04=0, it will restrain from oscillation. When Fd.00 and Fd.01 are set for less value, the effect will be bigger for restrained oscillation.

Parameter	Description	Setting Range
Fd.02	Restrained oscillation bandwidth	0～10000【5000】

This parameter can restrain oscillation from big sudden voltage.

Parameter	Description	Setting Range
Fd.03	Restrained oscillation bandwidth	0.00～F0.04【12.5Hz】

This parameter sets up the boundary between Fd.00 and Fd.01.

Parameter	Description	Setting Range
Fd.04	Restrained oscillation	0～1【1】

0: Enabled. The drive will restrain from oscillation according to Fd.00 ~ Fd.03.
1: Disabled
This parameter used to V/F control. The general motor will be happened to oscillation very often when it is no load or light load. That way the drive will have over-current.

Parameter	Description	Setting Range
Fd.05	**PWM mode**	**0～2【0】**

0: PWM mode 1: This mode is general mode. There is less notice from the motor in low frequency but more notice in high frequency.
1: PWM mode 2: In this mode, motor will give out less noise but higher temperature. The drive has to be degraded in use if setting this value.
2: PWM mode 3: In this mode, motor will give out more noise but restrain from more oscillation.

Parameter	Description	Setting Range
Fd.06	**Torque mode**	**0～5【0】**
Fd.07	**Setting torque of operation panel**	**-100.0～100.0【50.0%】**

Torque mode Fd.06:
0: Operation panel (Fd.07)
1: Analog FIV
2: Analog FIC
3: Analog FIV+ FIC
4: Mullet-speed
5: Serial port
The value 1~5 is 100% corresponding to twice rated current of the drive.
When the torque control is effective:
If Torque setting > Torque load, the output frequency will increase continuously until reaching the high frequency limit.
If Torque setting < Torque load, the output frequency will decrease continuously until reaching the lower frequency limit.
If Torque setting = Torque load, the drive can run at any frequency between the upper and the lower frequency limit only.

Torque control can be switched to speed control, vice versa.

For example, when torque control is enabled (F0.00=2), torque setting source is FIV, value of multi-terminal X4 is set for 20 (Disable to torque control) When X4 is effective, control mode will switch from torque control into speed control, vice versa.

When the drive is running by torque control mode, F0.08 is disabled, press button STOP, it will auto switch to speed control. When torque setting is positive, the drive will run forward, otherwise it will run reverse.

The 100% of torque setting is corresponding to 100% of F3.07 (Torque limit). For example, if torque setting source is the operation panel (Fd.06=0), Fd.07 = 80% and F3.07 = 90%. The actual torque setting = 80% (Fd.07) * 90% (F3.07) = 72%.

Parameter	Description	Setting Range
Fd.08	**High frequency limit**	**0～4【0】**

Particularly, in torque control, these parameters can the output frequency.

0: Set by the operation panel (F0.05).

1: Set by analog FIV (100% corresponding to the maximum frequency).

2: Set by analog FIC.

3: Set by multi-speed.

4: Set by remote serial port.

Parameter	Description	Setting Range
Fd.09	**Auto current limit**	**0～1【0】**

Acceleration/deceleration will always take auto current limit. So this parameter can only determine if the constant speed take auto current limit.

Fd.09＝0 : Enabled

Fd.09＝1 : Disabled

When this function is enabled, the output frequency could be changed, and take effect to capability of over-load. So it is not appropriated to set this parameter enabled in the application of stable speed.

Parameter	Description	Setting Range
FE.00	**Supplier passwords**	**0~65535**

4. MODBUS Communication Protocol

The drive B1000 has provided RS485 communication protocol, which adopts standard ModBus to proceed with master/slave communication. ModBus format comes in RTU (Remote Terminal Unit) and ASCII (American Standard Code for Information International Interchange)

4.1 RTU mode:

Encoding system: eight-bit and binary and hexadecimal 0～9， A～F
Every eight-big involves two characters in hexadecimal
In RTU mode, interval time should be 3.5 bit byte at least in transmission.

RTU digital frame

Start in 3.5 bit byte at least	Slave address	Function code	Data	Check	End in 3.5 bit byte at least

If a frame is less than 1.5 bit byte, the system will clear that incomplete data. If interval time is less than 3.5 bit byte, the communication function will be failed.

Standard RTU frame:

START	T1-T2-T3-T4 (3.5 bit byte in transmission)
ADDR	0～247（decimal）（0: broadcast address）
CMD	03H：read 0 6H：write
DATA（N-1） … DATA（0）	2*N bit byte

CRC CHK LOW	Check: CRC value（16 bits）
CRC CHK HIGH	
END	T1-T2-T3-T4 (3.5 bit byte in transmission)

4.2 ASCII mode:

Encoding system: hexadecimal 0～9， A～F

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

Bit byte:

11-bit character:

Start bit	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	No parity check Even parity check Odd parity check	Stop bit

10-bit character：

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

In ASCII mode, the Start is （"0x3A"）the Ends is CRLF("0x0D""0x0A")Except the start and the end, other data are in ASCII, which will send 4 bit byte to high, and then send 4 bit byte to low. The data length is 7 or 8 bit byte.

ASCII digital frame

Start "0x3A"	Slave address	Function code	Data	Check	End "0x0D""0x0A

Standard ASCII frame:

START	0x3A
ADDRESS HIGH	8-bit address by 2 ASCII codes
ADDRESS LOW	
FUNCTION HIGH	8-bit address by 2 ASCII codes
FUNNCTION LOW	
DATA（N-1） … DATA（0）	N*8-bit by ASCII codes N<=16, Maximum : 32
LRC CHK LOW	8-bit address by 2 ASCII codes
LRC CHK HIGH	
END HIGH	END Hi=CR（0x0D） END Lo=LF（0x0A）
END LOW	

4.3 Command code

4.3.1 Command code: 03H (00000110) and read N characters
Example 1: Slave address is 01H. The start address is 004 and reads two characters continuously. The frame would be as following:

RTU command code:

START	T1-T2-T3-T4 (3.5 bit byte in transmission)
ADDR	01H
CMD	03H
ADDRESS HIGH	00H
ADDRESS LOW	04H
DATA HIGH	00H
DATA LOW	02H
CRC CHK LOW	85H
CRC CHK HIGH	CAH
END	T1-T2-T3-T4 (3.5 bit byte in transmission)

RTU slave response:

START	T1-T2-T3-T4 (3.5 bit byte in transmission)
ADDR	01H
CMD	03H
BIT BYTE NUMBER	04H
DATA 0004H HIGH	00H
DATA 0004H LOW	00H
DATA 0005H HIGH	00H
DATA 0005H LOW	00H
CRC CHK LOW	43H
CRC CHK HIGH	07H
END	T1-T2-T3-T4 (3.5 bit byte in transmission)

ASCII command code:

START	':'
ADDR	'0'
	'1'
CMD	'0'
	'3'
ADDRESS HIGH	'0'
	'0'
ADDRESS LOW	'0'
	'4'
DATA HIGH	'0'
	'0'
DATA LOW	'0'
	'2'
LRC CHK LOW	'F'
LRC CHK HIGH	'6'
END LOW	CR
END HIGH	LF

ASCII slave response:

START	':'
ADDR	'0'
	'1'
CMD	'0'
	'3'
BIT BYTE NUMBER	'0'
DATA 0004H HIGH	'4'
DATA 0004H LOW	'0'
DATA 0005H HIGH	'0'
DATA 0005H LOW	'0'
BIT BYTE NUMBER	'2'
DATA 0004H HIGH	'0'
DATA 0004H LOW	'0'
DATA 0005H HIGH	'0'
	'0'
LRC CHK Lo	'F'
LRC CHK Hi	'6'
END Lo	CR
END Hi	LF

4.3.2 Command code: 06H (00000110) and write one character

Example 2: Write 5000 (1388H) into address 0008H of slave 02H.

The frame would be as following:

RTU command code:

START	T1-T2-T3-T4 (3.5 bit byte in transmission)
ADDR	02H
CMD	06H
ADDRESS HIGH	00H
ADDRESS LOW	08H
DATA HIGH	13H
DATA LOW	88H

CRC CHK LOW	05H
CRC CHK HIGH	6DH
END	T1-T2-T3-T4 (3.5 bit byte in transmission)

RTU slave response:

START	T1-T2-T3-T4 (3.5 bit byte in transmission)
ADDR	02H
CMD	06H
ADDRESS HIGH	00H
ADDRESS LOW	08H
DATA HIGH	13H
DATA LOW	88H
CRC CHK LOW	05H
CRC CHK HIGH	6DH
END	T1-T2-T3-T4 (3.5 bit byte in transmission)

ASCII command code:

START	':'
ADDR	'0'
	'2'
CMD	'0'
	'6'
ADDRESS HIGH	'0'
	'0'
ADDRESS LOW	'0'
	'8'
DATA HIGH	'1'
	'3'
DATA LOW	'8'
	'8'
LRC CHK LOW	'5'

LRC CHK HIGH	'5'
END LOW	CR
END HIGH	LF

ASCII slave response:

START	':'
ADDR	'0'
	'2'
CMD	'0'
	'6'
ADDRESS HIGH	'0'
	'0'
ADDRESS LOW	'0'
	'8'
DATA HIGH	'1'
	'3'
DATA LOW	'8'
	'8'
LRC CHK LOW	'5'
LRC CHK HIGH	'5'
END LOW	CR
END HIGH	LF

4.3.3 Error Check

The error check has two parts. One is bit byte check (odd/even). The other is whole data check (CRC or LRC).

1. bit bye check:

When data is transferring, the Error check will add one odd/even bit for checking. For the Even check, when the quantity of 1 in data is even, the check address will be 0, otherwise it will be 1. For the Odd check, when the quantity of 1 is odd, the check address will be 0, otherwise it will be 1.

2. CRC check:

The drive adopts insternational standard regulation. The following simple function is for your reference (Language C)

```
unsigned int crc_cal_value(unsigned char *data_value,unsigned char data_length)
{
int i;
unsigned int crc_value=0xffff;

while(data_length--)
{
      crc_value^=*data_value++;
    for(i=0;i<8;i++)
{ if(crc_value&0x0001)crc_value=(crc_value>>1)^0xa001; else
crc_value=crc_value>>1;
    }
}
return(crc_value);
}
```

3. Basic description:

Removing F from the parameters will be the communication address.
For example: Parameter F1.00 is 0100H as the address, and F2.00 is 0200H as the address.

Function	Address	Desription	R/W
Control	1000H	0001H：Forward running	W/R
		0002H：Reverse running	
		0003H：Forward jogging	
		0004H：Reverse jogging	
		0005H：Stop	

		0006H：Free to stop （Emergecy stop）	
		0007H：Reset	
		0008H：Stop jogging	
Status	1001H	0001H：In forward running	R
		0002H：In reverse running	
		0003H：Standby	
		0004H：Failure	
Setting address	2000H	Setting range（-10000～10000） It is percentage of relative value (-100.00%～100.00%）	W/R
Run /Stop	3000H	Running frequency	R
	3001H	Setting frequency	R
	3002H	DC bus voltage	R
	3003H	Output voltage	R
	3004H	Output current	R
	3005H	Running speed	R
	3006H	Output capacity	R
	3007H	Output torque	R
	3008H	PID given value	R
	3009H	PID feedback value	R
	300AH	Input terminal status	R

	300BH	Output terminal status	R
	300CH	Analog AI1 value	R
	300DH	Analog AI2 value	R
	300EH	Reserved	R
	300FH	Reserved	R
	3010H	Reserved	R
	3011H	Reserved	R
	3012H	The present speed in nulti-speed	R
Drive failure address	5000H	The failure address is the same as the failure code but the address is in hexadecimal	R
ModBus address	5001H	0000H：No faulty 0001H：Password error 0002H：Code error 0003H：CRC check error 0004H：Illegal address 0005H：Illegal data 0006H：Setting rejected 0007H：System locked 0008H：EEPROM in saving	R

Notice: The actual data from 5000H as following:

Address	Failule type
0x00	0: No fault
0x01	1: IGBT Ph-U faulty (OU1)

0x02	2: IGBT Ph-V faulty (OU2)
0x03	3: IGBT Ph-W faulty (OU3)
0x04	4: Over-current in acceleration (OC1)
0x05	5: Over-current in deceleration (OC2)
0x06	6: Over-current in constant speed (OC3)
0x07	7: Over-voltage in acceleration (OV1)
0x08	8: Over-voltage in deceleration (OV2)
0x09	9: Over-voltage in constant speed (OV3)
0x0A	10: Undervoltage (UV)
0x0B	11: Over-load of motor (OL1)
0x0C	12: Over-load of drive (OL2)
0x0D	13: Short of input phase (LPI)
0x0E	14: Short of output phase (LPO)
0x0F	15: Over-heat of rectify (OH1)
0x10	16: Over-heat of IGBT (OH2)
0x 11	17: External fault (OUt)
0x 12	18: Serial port fault (E485)
0x 13	19: Current detection (EtI)
0x 14	20: Auto-tuning fault (AtE)
0x 15	21: EEFROM fault (EEP)
0x 16	22: PID feedback fault (EPID)
0x 17	23: Braking unit fault (Ebr)

4.3.4 Error response:

When the drive happened to an error, the command code will be 06 and response. The data address will be 0x5001. For example:

RTU slave response:

START	T1-T2-T3-T4 (3.5 bit byte in transmission)
ADDR	01H
CMD	06H

FAILURE RESET HIGH	50H
FAILURE RESET LOW	01H
ERROR HIGH	00H
ERROR LOW	05H
CRC CHK LOW	09H
CRC CHK HIGH	09H
END	T1-T2-T3-T4 (3.5 bit byte in transmission)

ASCII slave response:

START	':'
ADDR	'0'
	'1'
CMD	'0'
	'6'
FAILURE RESET HIGH	'5'
	'0'
FAILURE RESET LOW	'0'
	'1'
ERROR HIGH	'0'
	'0'
ERROR LOW	'0'

	'5'
LRC CHK LOW	'A'
LRC CHK HIGH	'3'
END LOW	CR
END HIGH	LF

Error code：

Error code	Description
1	Password error
2	Command code error
3	CRC Check error
4	Valild address
5	Valid data
6	Unavailable to revising parameter
7	System locked
8	EEPROM is saving

4. Maintenance and Error Code

Please keep regular maintenance of the drive for normal condition.

5.1 Daily check

(1) Sound and vibration in motor.
(2) Heat on motor.
(3) Completion of power supply wire and machine electrical wire.
(4) Completion of wire and connection of terminal wire.
(5) Cleanliness inside the drive.
(6) Fan of the drive.
(7) Air temperature and humidity of installation.
(8) Cleanliness on radiator.
(9) The drive output electric current and displayed current.
(10) Sound or vibrating in running.

5.2 Check Notice

(1) When maintaining, please make sure the power supply is off.
(2) Cutting off the power supply, wait for internal high pressure instructive light goes off, then check and maintain.
(3) In the process of checking and maintenance, not to leave screws and other fittings in the drive.
(4) Please keep the drive clean and dry.
(5) In checking and mending, please not to mismatch the wires, otherwise it will lead The drive not to work or break down.

5.3 Regular Replacement

The drive is made up by many parts in accordance with conditions, some of which need to maintain for normally working. To keep the drive working normally in a long term, some fittings need to be replaced regularly according to their life. Replacement time for your reference is as follows:

Name	Replacement time
Heat sinker	3 to 5 years
Capacitor	5 years
Fuse	10 years
Relay	---

The replacement time is counted out by the following environment:

(1) Annual average surrounding temperature is 30℃. There is no corrosive gas, flammable gas, oil fog, dust, drips, or etc.

(2) The load is less than 80%.

(3) The average working time is less than 12 hours.

5.4 Regular check

Item	Content	Measure
Terminal, screw, connective plug	Loose	Screw fasten
Radiator	Dust	Blow off with dry compressed air (4-6kgcm2)
Heat sinker	Sound and vibration, and working duration over 20,000 hours	Replace
Circuit board	Dust and rust	Blow off with dry compressed air (4-6kgcm2) or contact maker.
Electrolysis capacitor	Color change, smell and plump up	Replace
Electromotor	Vibration, heat, noise, smell.	Check or replace

5.5 Error Code

Code	Faulty type	Cause	Solution
OC1	Over-current in acceleration	1. Short circuit or grounding faulty on the drive's output. 2. Load is too heavy or Acc. / Dec. time is too short. 3. V/F curve is not proper. 4. Sudden change of load.	1. Check if motor or cable gets damaged, insulated. 2. Increase Acc. /Dec. time or select bigger one capacity of the drive. 3. Adjust V/F curve.
OC2	Over-current in deceleration		
OC3	Over-current in constant speed		
EFI	Detecting current faulty	1. Wires and connectors of the control board are loose. 2. Damaged power supply is fault circuit	Check wires, connectors, power supply and circuit.
OE	External faulty	External input gets fault.	Check external devices
OL1	Over-load of motor	1. The motor is driving too heavy to take at low speed for a long time. 2. Improper V/F curve. 3. Improper protection of the motor. 4. Sudden change of load.	1. Select a motor with variable frequency instead. 2. Adjust V/F curve. 3. Check the parameter of the motor on the drive. 4. Check the load.
OL2	Over-load of drive	1. Load is too heavy or Acc. /Dec. time is too short. 2. Improper V/F curve. 3. Smaller drive's capacity.	1. Increase Acc. / Dec. time or select bigger capacity of the drive. 2. Adjust V/F curve.
POFF	Low voltage	Input voltage is too low.	Check with the power supply.
Un	Low voltage in running		
OV1	Over-voltage in acceleration	1. Dec. time is too short and recovers energy from the motor. 2. Input voltage is too high.	1. Increase Dec. time or connect braking resistors. 2. Decrease input voltage down to rated voltage of the drive.
OV2	Over-voltage in deceleration		
OV3	Over-voltage in constant speed		

Code	Faulty type	Cause	Solution
CO	Serial port faulty	1. Improper speed rate of serial port. 2. Serial port gets error or disconnected on occasion.	1. Set proper speed rate. 2. Press STOP/RST button to reset. 3. Check the wire.
OUt1	IGBT Ph-U faulty	1. Acc. / Dec. time is too short. 2. IGBT module gets fault. 3. Caused by interference. 4. Improper grounding.	1. Increase Acc. / Dec. time. 2. Check external devices and eliminate interference.
OUt2	IGBT Ph-V faulty		
OUt3	IGBT Ph-W faulty		
IVS	Short of input phase	R, S or T phrase is loose.	Check the wires with the power supply.
SPO	Short of output phase	U, V or W phrase is loose.	Check the wires and the motor.
AtE	Auto-tuning faulty	1. Improper setting of the rated motor parameter. 2. Auto tuning overtime.	1. Input value of a name plate on the motor. 2. Check wires with the motor.
EFC	Braking unit faulty	1. Circuit of the braking unit and tube get fault. 2. Resistance which is connected with the braking unit is too low.	1. Check the braking unit. 2. Replace braking tube. 3. Increase resistance.
OH1	Over-heat of rectify	1. Temperature is too high. 2. Ventilation is not good. 3. Cooling fans is damaged. 4. Higher carrier frequency.	1. Replace new cooling units or install more. 2. Clear the ventilation. 3. Lower carrier frequency.
OH2	Over-heat of IGBT		
EEP	EEFROM faulty	Reading / Writing faulty of the control parameters.	Press STOP/RST button to reset.
PIDE	PID feedback faulty	Disconnected PID feedback.	Check the wires and the source.

5. Accessory

Item	Purpose
Braking Resistance and braking unit	Absorb the regenerate energy.
Circuit breaker and connector	Protect connections of the drive from damage.
Input DC reactor	Protect and restrain from high frequency wave.
Output / Input AC reactor	Protect the drive and restrain from high frequency wave and prevent from surge voltage impact.
Noise, Harmonic and sinusoidal wave filter	Reduce the disturbance from controller.

6.1 Braking resistance

Controller Type	Braking resistance		CDBR	Torsion (10% ED)	(KW)
	W	Ω			
HC20D75B24	100	200	Embedded	125	0.75
HC201D5B24	300	100		125	1.5
HC202D2B24	300	70		125	2.2
HC203D7B24	390W	40		125	3.7
HC205D5B24	520W	30		125	5.5
HC207D5B24	780W	20		125	7.5
HC20D75B48	80	750		125	0.75
HC201D5B48	300	400		125	1.5
HC202D2B48	300	250		125	2.2
HC203D7B48	400	150		125	3.7
HC205D5B48	500	100		125	5.5
HC207D5B48	1000	75		125	7.5
HC20011B48	1000	50		125	11
HC20015B48	1500	40		125	15
HC20018B48	4800	32	4030×1	125	18.5
HC20022B48	4800	27.2	4030×1	125	22
HC20030B48	6000	20	4030×1	125	30

Controller Type	Braking resistance		CDBR	Torsion (10% ED)	(KW)
	W	Ω			
HC20037B48	9600	16	4045×1	125	37
HC20045B48	1600	13.6	4045×1	125	45
HC20055B48	6000×2	20×2	4045×2	125	55
HC20075B48	9600×2	13.6×2	4045×2	125	75
HC20090B48	9600×3	20×3	4045×3	125	90

Calculate of braking resistance value:

The braking resistance value is related to the DC currency when AC motor speed controller braking. For 380V power supply, the braking DC voltage is 800V-820V, and for 220V system, the DC voltage is 400V.

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

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

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

P_{Motor} ——Motor power ;

M_{br} ——Braking Torsion ;

η_{Motor} ——Motor efficiency ;

$\eta_{Transducer}$ —Transducer efficiency 。

The braking power is related to braking torsion and braking frequency. The above illustration shows the braking torsion as 125% and the frequency is 10%. The different loading is by situations, the data in the illustration are for reference.

6.2 Circuit Breaker and Connector

220V								
Capacity(KW)	Non-fuse Circuit Breaker				Magnetic Connector			
	No Reactor		Reactor		No Reactor		Reactor	
	Model	Rated current (A)	Model	Rated Current (A)	Model	Rated current (A)	Model	Rated current (A)
0.4	NF32	5	NF32	5	SC-03	11	SC-03	11
0.7	NF32	10	NF32	10	SC-03	13	SC-03	11
1.5	NF32	15	NF32	10	SC-4-0	18	SC-05	13
2.2	NF32	20	NF32	15	SC-N1	26	SC-4-0	18
3.7	NF32	30	NF32	20	SC-N2	35	SC-N1	26
5.5	NF63	50	NF63	40	SC-N2	50	SC-N2	35
7.5	NF12	60	NF125	50	SC-N3	65	SC-N2	50
11	NF12	75	NF125	75	SC-N4	80	SC-N4	80
15	NF25	125	NF125	100	SC-N5	93	SC-N4	80
18.	NF25	150	NF250	125	SC-N5	93	SC-N5	93
22			NF250	150			SC-N6	125
30			NF250	175			SC-N7	152
37			NF250	225			SC-N8	180
45			NF400	250			SC-N1	220
55			NF400	300			SC-N1	300
75			NF400	400			SC-N1	400
90			NF630	500			SC-N1	400
110			NF630	600			SC-N1	600

380V								
Capacity(KW)	Non-fuse Circuit Breaker				Magnetic Connector			
	No Reactor		Reactor		No Reactor		Reactor	
	Model	Rated current (A)	Model	Rated Current (A)	Model	Rated current (A)	Model	Rated current (A)
0.4	NF32	3	NF32	3	SC-03	7	SC-03	7
0.7	NF32	5	NF32	5	SC-03	7	SC-03	7
1.5	NF32	10	NF32	10	SC-05	9	SC-05	9
2.2	NF32	15	NF32	10	SC-4-0	13	SC-4-0	13
3.7	NF32	20	NF32	15	SC-4-1	17	SC-4-1	17
5.5	NF32	30	NF32	20	SC-N2	32	SC-N1	25
7.5	NF32	30	NF32	30	SC-N2	48	SC-N2	32
11	NF63	50	NF63	40	SC-N2	48	SC-N2	48
15	NF12	60	NF63	50	SC-N3	65	SC-N2	48
18.	NF12	75	NF125	60	SC-N3	65	SC-N3	65
22			NF125	75			SC-N4	80
30			NF125	100			SC-N4	80
37			NF250	125			SC-N5	90
45			NF250	150			SC-N6	110
55			NF250	175			SC-N7	150
75			NF250	225			SC-N8	180
90			NF400	250			SC-N1	220
110			NF400	300			SC-N1	300
13			NF400	350			SC-N1	300
16			NF400	400			SC-N1	400
18			NF630	500			SC-N1	400

6.3 DC Reactor

DC Reactor Model for 220V		DC Reactor Model for 380V	
Model (KW)	Number	Model(KW)	Number
0.4	DCL-L 0.4	0.75	DCL-H 0.75
0.75	DCL-L 0.75	1.5	DCL-H 1.5
1.5	DCL-L 1.5	2.2	DCL-H 2.2
2.2	DCL-L 2.2	3.7	DCL-H 3.7
3.7	DCL-L 3.7	5.5	DCL-H 5.5
5.5	DCL-L 5.5	7.5	DCL-H 7.5
7.5	DCL-L 7.5	11	DCL-H 11
11	DCL-L 11	15	DCL-H 15
15	DCL-L 15	18.5	DCL-H 18
18.5	DCL-L 18	22	DCL-H 22
22	DCL-L 22	30	DCL-H 30
30	DCL-L30	37	DCL-H 37
37	DCL-L 37	55	DCL-H 55
55	DCL-L 55	75	DCL-H 75
75	DCL-L 75	90	DCL-H 90
		110	DCL-H 110
		132	DCL-H 132
		160	DCL-H 160
		185	DCL-H 185
		200	DCL-H 200
		220	DCL-H 220
		250	DCL-H 250
		280	DCL-H 280
		300	DCL-H 300
		315	DCL-H 315
		375	DCL-H 375
		415	DCL-H 415

6.4 Input AC Reactor

Input AC Reactor model for 220V		Input AC Reactor model for 380V	
Model(KW)	Number	Model(KW)	Number
0.4	TE-ACL-L 0.4(I)	0.75	TE-ACL-H 0.75(I)
0.75	TE-ACL-L 0.75(I)	1.5	TE-ACL-H 1.5(I)
1.5	TE-ACL-L 1.5(I)	2.2	TE-ACL-H 2.2(I)
2.2	TE-ACL-L 2.2(I)	3.7	TE-ACL-H 3.7(I)
3.7	TE-ACL-L 3.7(I)	5.5	TE-ACL-H 5.5(I)
5.5	TE-ACL-L 5.5(I)	7.5	TE-ACL-H 7.5(I)
7.5	TE-ACL-L 7.5(I)	11	TE-ACL-H 11(I)
11	TE-ACL-L 11(I)	15	TE-ACL-H 15(I)
15	TE-ACL-L 15(I)	18.5	TE-ACL-H 18.5(I)
18.5	TE-ACL-L 18(I)	22	TE-ACL-H 22(I)
22	TE-ACL-L 22(I)	30	TE-ACL-H 30(I)
30	TE-ACL-L 30(I)	37	TE-ACL-H 37(I)
37	TE-ACL-L 37(I)	55	TE-ACL-H 55(I)
55	TE-ACL-L 55(I)	75	TE-ACL-H 75(I)
75	TE-ACL-L 75(I)	90	TE-ACL-H 90(I)
		110	TE-ACL-H 110(I)
		132	TE-ACL-H 132(I)
		160	TE-ACL-H 160(I)
		185	TE-ACL-H 185(I)
		200	TE-ACL-H 200(I)
		220	TE-ACL-H 220(I)
		250	TE-ACL-H 250(I)
		280	TE-ACL-H 280(I)
		300	TE-ACL-H 300(I)
		315	TE-ACL-H 315(I)
		375	TE-ACL-H 375(I)
		415	TE-ACL-H 415(I)

6.5 Output AC Reactor

Output AC Reactor for 220V		Output AC Reactor for 380V	
Model(KW)	Number	Model(KW)	Number
0.4	TE-ACL-L 0.4(O)	0.75	TE-ACL-H 0.75(O)
0.75	TE-ACL-L 0.75(O)	1.5	TE-ACL-H 1.5(O)
1.5	TE-ACL-L 1.5(O)	2.2	TE-ACL-H 2.2(O)
2.2	TE-ACL-L 2.2(O)	3.7	TE-ACL-H 3.7(O)
3.7	TE-ACL-L 3.7(O)	5.5	TE-ACL-H 5.5(O)
5.5	TE-ACL-L 5.5(O)	7.5	TE-ACL-H 7.5(O)
7.5	TE-ACL-L 7.5(O)	11	TE-ACL-H 11(O)
11	TE-ACL-L 11(O)	15	TE-ACL-H 15(O)
15	TE-ACL-L 15(O)	18.5	TE-ACL-H 18.5(O)
18.5	TE-ACL-L 18(O)	22	TE-ACL-H 22(O)
22	TE-ACL-L 22(O)	30	TE-ACL-H 30(O)
30	TE-ACL-L 30(O)	37	TE-ACL-H 37(O)
37	TE-ACL-L 37(O)	55	TE-ACL-H 55(O)
55	TE-ACL-L 55(O)	75	TE-ACL-H 75 (O)
75	TE-ACL-L 75(O)	90	TE-ACL-H 90(O)
		110	TE-ACL-H 110(O)
		132	TE-ACL-H 132(O)
		160	TE-ACL-H 160(O)
		185	TE-ACL-H 185(O)
		200	TE-ACL-H 200(O)
		220	TE-ACL-H 220(O)
		250	TE-ACL-H 250(O)
		280	TE-ACL-H 280(O)
		300	TE-ACL-H 300(O)
		315	TE-ACL-H 315(O)
		375	TE-ACL-H 375(O)
		415	TE-ACL-H 415(O)

6.6 Input 3 Phase Filter

Input 3 Phase Filter for 220V	
Model (KW)	Number
0.4~1.5	NFS32010
2.2~3.7	NFS32020
5.5	NFS32040
7.5~11	NFS32060
15~18.5	NFS32090
22	NFS32130
30~37	NFS32180
40	NFS32220
55	NFS32270
75	NFS32400

Input 3 Phase Filter for 380V	
Model (KW)	Number
0.75~3.7	NFS34010
5.5~7.5	NFS34020
11~15	NFS34040
18.5~22	NFS34060
30~37	NFS34090
40~55	NFS34130
75	NFS34180
90	NFS34220
110	NFS34270
132	NFS34320
150	NFS34400

6.7 Output 3 Phase Filter

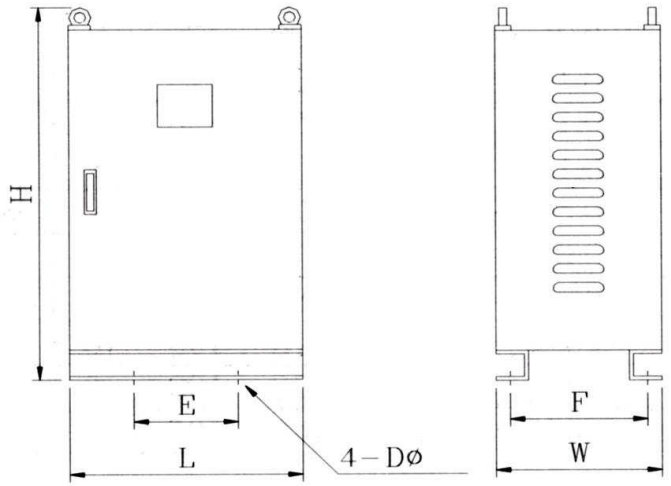
Output 3 Phase Filter for 220V	
Model (KW)	Number
0.4~1.5	RFI 32010
2.2~3.7	RFI 32020
5.5	RFI 32040
7.5~11	RFI 32060
15~18.5	RFI 32090
22	RFI 32130
30~37	RFI 32180
40	RFI 32220
55	RFI 32270
75	RFI 32400

Output 3 Phase Filter for 380V	
Model (KW)	Number
0.75~3.7	RFI 34010
5.5~7.5	RFI 34020
11~15	RFI 34040
18.5~22	RFI 34060
30~37	RFI 34090
40~55	RFI 34130
75	RFI 34180
90	RFI 34220
110	RFI 34270
132	RFI 34320
150	RFI 34400

6.8 Input Harmonic Filter

Confirmed Effectiveness: Total Harmonic Distortion (THDi) = less than 12% (THDi = 8% or 5% is agreed as well); Power Factor Cosθ = more than 0.95

Voltage: 380V									
Product code	Power (KW)	Capacity (KVA)	Size						Weight (Kg)
			L	W	H	D	E	F	
TEHRF94020-12	15	22	450	450	700	14	350	400	80
TEHRF94025-12	18.5	27	450	450	700	14	350	400	85
TEHRF94030-12	22	32	500	500	750	14	400	450	110
TEHRF94040-12	30	43	500	500	750	14	400	450	120
TEHRF94050-12	37	53	500	500	750	14	400	450	130
TEHRF94060-12	45	65	500	500	750	14	400	450	140
TEHRF94075-12	55	81	600	600	850	14	500	550	180
TEHRF940100-12	75	110	600	600	850	14	500	550	190
TEHRF940120-12	90	137	600	600	850	14	500	550	210
TEHRF940150-12	110	165	700	650	900	18	600	600	260
TEHRF940200-12	160	248	750	700	950	18	650	650	350
TEHRF940250-12	185	274	750	700	950	18	650	650	360
TEHRF940300-12	220	329	800	750	950	18	700	700	420
TEHRF940400-12	300	461	900	800	1000	18	800	750	550



6.9 Sinusoidal Wave Filter

Application Range: Frequency drive at output side

Working field: Altitude of less than 1000 meter inside

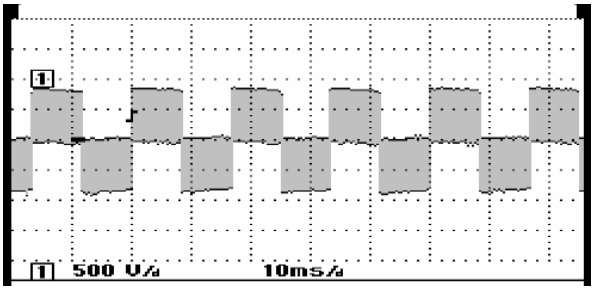
Temperature: Maximum less than 40 degrees, average less than 35 degrees in one whole day

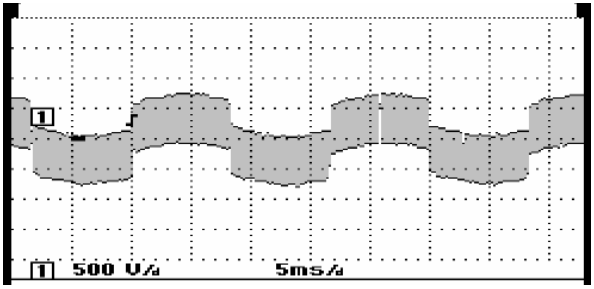
Phase frequency: 3-phase 60Hz

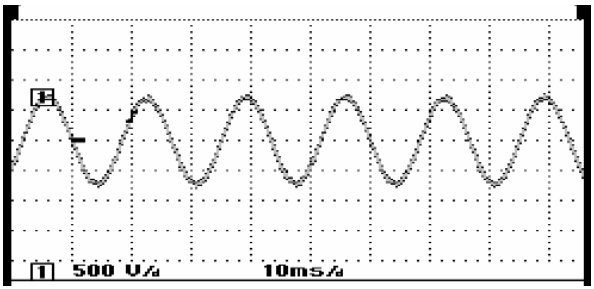
Input voltage: 380 ~ 480V

Carrier frequency: 5 KHz ~ 10 KHz

Functional effectiveness: (1) dv/dv protection (2) Over current protection (3) Reduce noise and temperature of motors (4) Prolong lifetime of motors







Dry H 3-phase 60Hz 440V IP00

Product Code	Power (KW)	Rated Current (A)	Size						Weight (Kg)
			L	W	H	D	E	F	
TESFR44001	0.75	3	175	150	170	6	125	62	4
TESFR44002	1.5	4	175	150	170	6	125	62	4.5
TESFR44003	2.2	6	175	150	170	6	125	62	5
TESFR44005	3.7	10	225	160	190	8	175	62	7.5
TESFR44007	5.5	12	225	170	190	8	175	72	9
TESFR44010	7.5	16	225	170	210	8	175	72	11
TESFR44015	11	24	250	190	220	10	200	94	16
TESFR44020	15	30	250	190	240	10	200	94	19
TESFR44025	18.5	37	275	210	250	10	225	114	26
TESFR44030	22	48	275	210	260	10	225	114	29
TESFR44040	30	60	290	220	280	10	240	124	37
TESFR44050	37	75	290	220	300	10	240	124	42
TESFR44060	45	90	330	240	320	12	280	140	55
TESFR44075	55	115	330	240	350	12	280	140	63
TESFR44100	75	150	360	260	390	12	310	154	84
TESFR44120	90	180	360	260	430	12	310	154	94
TESFR44150	110	220	400	270	490	12	340	164	125
TESFR44200	150	330	450	300	550	14	300	200	170
TESFR44250	185	360	450	300	550	14	300	200	190
TESFR44300	220	440	550	550	500	14	500	500	230
TESFR44400	300	600	550	550	570	14	500	500	290
TESFR44500	373	770	600	600	680	14	550	550	380

7. Parameter List

The drive A1000 and B1000 have 16 groups (F0～FE) of the parameters according to function. Group FE is set by the supplier. Users are not allowed to access it.

The column “Default” is the original factory setting.
The column “Modify” determines if the parameters can be modified or not.
“○”: means that parameter can be modified all the time.
“◎”: means that parameter cannot be modified during the drive is running.
“●”: means that parameter is for read only.
The column “Page” is numbers of all the parameter in order as well as positions of the register in serial port.

Code	Name	Description	Default	Modify	Page
F0 Basic Function					
F0.00	Control mode	0: Sensorless vector control 1: V/F control 2: Torque control	0	◎	0
F0.01	Command source	0: Keypad (LED extinguished) 1: Terminal (LED flickering) 2: Serial port (LED lights on)	0	◎	1
F0.02	UP/DOWN button setting	0: Enabled. The value will be saved when getting power off. 1: Enabled. The value will not be saved when getting power off. 2: Enabled. The value will be cleared if F3.05 is set for 2. 3: Enabled. The value will be cleared when the drive is stopped.	0	○	2

Code	Name	Description	Default	Modify	Page
F0.03	Frequency Command	0: Keypad 1: FIV 2: FIC 3: FIV+FIC 4: Multi-step speed 5: PID control 6: comunication	0	○	3
F0.04	Maximum frequency	10.00～600.00Hz	50.0 Hz	◎	4
F0.05	High frequency limit	F0.06～F0.04	50.0 Hz	○	5
F0.06	Lower frequency limit	0.00Hz～F0.05	0.0 Hz	○	6
F0.07	Operational panel setting frequency	0.0Hz～F0.06	50.0 Hz	○	7
F0.08	Acceleration time 1	0.1～3600.0 S	Model	○	8
F0.09	Deceleration time 1	0.1～3600.0 S	Model	○	9
F0.10	Running direction	0: Forward direction. It runs according to the actual direction. 1: Reverse direction. It changes opposite direction of the motor. 2: Prohibited from reversing.	0	◎	10
F0.11	Carrier frequency	1.0～15.0KHz	Model	○	11
F0.12	Reset parameters	0: No action 1: All the parameters to default 2: Clear the recent record of failure	0	◎	12

Code	Name	Description	Default	Modify	Page
F0.13	AVR mode	0: No action 1: Effective 2: Effective for deceleration only	1	○	13
F0.14	User passwords	0~65535	0	◎	14
F1 Start/Stop Function					
F1.00	Start running mode	0: Immediate running 1: Running after DC braking 2: Running after tracking speed	0	◎	15
F1.01	Start frequency	0.00～10.00Hz	0.5 Hz	○	16
F1.02	Start frequency time	0.0～50.0s	0.0s	○	17
F1.03	Braking current before running	0.0～150.0%	0.0%	○	18
F1.04	Braking time before running	0.0～50.0s	0.0s	○	19
F1.05	Stop mode	0: Decelerate to stop 1: Coast to stop	0	○	20
F1.06	Start frequency of DC braking	0.00～F0.04	0.0 Hz	○	21
F1.07	Waiting time before DC braking	0.0～50.0s	0.0s	○	22
F1.08	DC braking current	0.0～150.0%	0.0%	○	23
F1.09	DC braking time	0.0～50.0s	0.0s	○	24

Code	Name	Description	Default	Modify	Page
F1.10	Interval time between forward and reverse	0.0～3600.0s	0.0s	○	25
F1.11	Terminal function detection	0: Terminal ineffective 1: Terminal effective	0	○	26
F1.12	Polar mode of input/output terminal	0x00～0x3FF	0	○	27
F2 Motor Function					
F2.00	Model mode	0: constant torque (Type G) 1: variable torque (Type F)	Model	◎	28
F2.01	Rated capacity of motor	0.4～900.0 kW	Model	◎	29
F2.02	Rated frequency of motor	0.01Hz～F0.04	50.0 Hz	◎	30
F2.03	Rated speed of motor	0～36000rpm	Model	◎	31
F2.04	Rated voltage of motor	0～460V Rated Motor Voltage	Model	◎	32
F2.05	Rated current of motor	0.1～2000.0A	Model	◎	33
F2.06	Auto tuning	0: No action 1: Auto dynamic tuning 2: Auto static tuning	0	○	34
F2.07	Stator resistance of motor	0.001～65.535Ω	Model	○	35

Code	Name	Description	Default	Modify	Page
F2.08	Rotor resistance of motor	0.001～65.535Ω	Model	○	36
F2.09	Leakage inductance	0.1～6553.5Mh	Model	○	37
F2.10	Mutual inductance	0.1～6553.5mH	Model	○	38
F2.11	Current of idel loading	0.01～655.35A	Model	○	39
F3 Vector Control.					
F3.00	Speed proportional gain 2	0～100	20	○	40
F3.01	Speed integral time 1	0.01～10.00s	0.5s	○	41
F3.02	Switch low frequency	0.00Hz～F3.05	5.0 Hz	○	42
F3.03	Speed proportional gain 2	0～100	25	○	43
F3.04	Speed integral time 2	0.01～10.00s	1	○	44
F3.05	Switch high frequency	F3.02～F0.04	10.0 Hz	○	45
F3.06	VC slip compensation	50%～200%	100%	○	46
F3.07	Torque limit	0.0～200.0% （Rated current of dirve）	150%	○	47

Code	Name	Description	Default	Modify	Page
F4 V/F Control					
F4.00	V/F curve	0: Linear V/F curve. It is applicable to normal constant torque load. 1: Multi-point V/F curve. 2: Liner curve with 1.3 time of stepping down. 3: Liner curve with 1.7 time of stepping down. 4: Liner curve with 2 times of stepping down. 2~4 are applicable to variable torque load.	0	◎	48
F4.01	V/F frequency point 1	0.00 Hz～F4.03	12.5	◎	49
F4.02	V/F voltage point 1	0.0%～100.0% (Rated motor voltage)	25%	◎	50
F4.03	V/F frequency point 2	0.00 Hz～F4.03	25	◎	51
F4.04	V/F voltage point 2	0.0%～100.0% (Rated motor voltage)	50%	◎	52
F4.05	V/F frequency point 3	0.00 Hz～F4.03	37.5	◎	53
F4.06	V/F voltage point 3	0.0%～100.0% (Rated motor voltage)	75%	◎	54
F4.07	Torque boost	0.0%: (Auto) 0.1%～30.0%	0.0%	○	55
F4.08	Torque boost cut-off	0.0%～50.0%（Relative to rated motor frequency）	20.0 %	◎	56
F4.09	V/F slip compensation	0～200.0%	0.0%	○	57
F4.10	Energy saving mode	0: Disable 1: Enable	0	◎	58
F4.11	Reserved			●	59

Code	Name	Description	Default	Modify	Page
F5 Input Terminal					
F5.00~ 5.06	X1 Terminal~ X7 Terminal	0: No function 1: Forward running (FWD)		◎	
		2: Reverse running (REV) 3: 3-wire running control 4: Forwarder jogging 5: Reverse jogging 6: Coast to stop 7: Failure reset 8: External failure input 9: Frequency increase -UP 10: Frequency decrease -DOWN 11: Clear the setting frequency of UP/DOWN to 0 12, 13,14: Multi-speed terminal1~3 15: Acc. /Dec. time 16: Pause PID function 17: Pause traverse 18: Reset traverse 19: Hold acceleration and deceleration 20: Disable torque control 21: Setting UP/DOWN frequency temporarily clear to zero 22: stop by DC braking 23: Input Counter signal 24: Clean counter to zero 25: Disconnect external input 26: Input PUL (For X7 only)	12, 13, 14, 7, 0, 0, 25		
F5.07	Filter PUL switch number of times	1～10	5	◎	

Code	Name	Description	Default	Modify	Page
F5.08	Input PUL minimum frequency	0.0～20.0KHz	0	◎	
F5.09	PUL corrsponding minimum value	0.0～100.0%	0.0%	◎	
F5.10	PUL Input maximum frequency	0.0～20.0KHz	50	◎	
F5.11	PUL Corrsponding maximum value	0.0～100.0%	100%	◎	
F5.12	PULInput filter time	0.0～10.0s	0.1s	◎	
F5.13	Counter value	0～65535	0	○	62
F5.14	Clear the cunter to zero	0: No clear 1: Clear to zero	0	◎	
F5.15	Control mode	0: Two-wire control mode 1: Two-wire control mode 2: Three- wire control 1 3: Three- wire control 2	0	◎	63
F5.16	Terminal UP/DOWN changing frequency rate	0.01～50.00Hz/s	0.50 Hz/s	○	64
F5.17	FIV lower limit	0.00V～10.00V	0.0V	○	65
F5.18	Value of FIV lower limit	-100.0%～100.0%	0.00 %	○	66

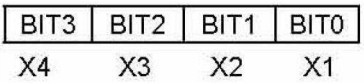
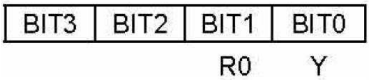
Code	Name	Description	Default	Modify	Page
F5.19	FIV high limit	0.00V～10.00V	10.00 V	○	67
F5.20	Value of FIV high limit	-100.0%～100.0%	100%	○	68
F5.21	FIV input filter time	0.00s～10.00s	0.10s	○	69
F5.22	FIC lower limit	0.00V～10.00V	0.0V	○	70
F5.23	Value of FIC lower limit	-100.0%～100.0%	0.0%	○	71
F5.24	FIC high limit	0.00V～10.00V	10V	○	72
F5.25	Value of FIC high limit	-100.0%～100.0%	100%	○	73
F5.26	FIC input filter time	0.00s～10.00s	0.10s	○	74
F6 Output Terminal					
F6.00	DO output percentage	0.0～200.0% (corresponding to input PUK)	0.0%	○	75
F6.01	Y output mode	0: No output 1: Running forward 2: Running reverse 3: Count arrival 4: Failure output 5: Step complete of PLC 6: FDT output inspection 7: Frequency arrival 8: Zero speed running 9: High limit arrival 10:Lower limit arrival 11~12: Reserved	1	○	70
F6.02	relay output of Group A		3	○	71
F6.03	relay output of Group B		2	○	72

Code	Name	Description	Default	Modify	Page
F6.04 F6.05	Output AO1 /AO2 mode	0: Running frequency 1: Setting frequency 2: Running speed 3: Output current 4: Output voltage 5: Output capacity 6: Output torque 7: Input analog FIV 8: Input analog FIC 9: PUL output frequency 10: PID given value 11: PID feedback	0, 2	○	73
F6.07	Output AO1 lower limit	0.0%～100.0%	0.0%	○	75
F6.08	Corresponding AO1 to lower limit	0.00V～10.00V	0.0V	○	76
F6.09	Output AO1 high limit	0.0%～100.0%	100%	○	77
F6.10	Corresponding AO1 to high limit	0.00V～10.00V	10V	○	78
F6.11	Output AO1 lower limit	0.0%～100.0%	0.0%	○	75
F6.12	Corresponding AO1 to lower limit	0.00V～10.00V	0.0V	○	76
F6.13	Output AO1 high limit	0.0%～100.0%	100%	○	77
F6.14	Corresponding AO to high limit	0.00V～10.00V	10V	○	78

Code	Name	Description	Default	Modify	Page
F7 Display interface					
F7.00	Display language	0: Chinese 1: English	0	◎	
F7.01	Parameter copy	1: Upload the parameters to keypad 2: Download the parameters from keypad	0	◎	
F7.02	M button mode	0: Jog running 1: Switch for Forward / Reverse 2: Clear value of UP/DOWN	0	◎	80
F7.03	STOP/RST button mode	0: Effective for operational panel 1: Effective for both operational panel and terminal 2: Effective for both operational panel and protocol 3: Effective for all control mode	0	○	81
F7.04	Operation panel displa	0: Display on an external operation panel. 1: Display on both the original and an external operation panel. 2: Display on both the original and an external operation panel but the buttons are effective for original operation panel only. 3: Display on both the original and an external operation panel and all the buttons are effective for both the original and an external operation panel.	0	○	
F7.05	Display parameter in running status	BIT0: Running frequency BIT1: Setting frequency BIT2: DC voltage BIT3: Output voltage BIT4: Output current	00FF	○	83

Code	Name	Description	Default	Modify	Page
		BIT5: Running speed BIT6: Output capacity BIT7: Output torque BIT8: Given PID value BIT9: Feedback PID value BIT10: Input terminal status BIT11: Output terminal status BIT12: Analog FIV value BIT10: Input terminal status BIT11: Output terminal status BIT12: Analog FIV value BIT13: Analog FIC value BIT14: Present speed of multi-speed BIT15: Torque value			
F7.06	Display parameter in stop status	BIT0: Setting frequency BIT1: DC voltage BIT2: Input terminal status BIT3: Output terminal status BIT4: Given PID value BIT5: Feedback PID value BIT6: Analog FIV value BIT7: Analog FIC value BIT8: Present speed of multi-speed BIT9: Torque value	0FF	○	
F7.07	Temperature of rectifier	0～100.0℃		●	
F7.08	Temperature of IGBT	0～100.0℃		●	
F7.09	Software version			●	
F7.10	Accumulated running time	0~65535 hours	0	●	

	Name	Description	Default	Modify	Page
F7.11 F7.12 F7.13	Failure of the previous second / first / the present	0: No fault 1: IGBT Ph-U faulty (OU1) 2: IGBT Ph-V faulty (OU2) 3: IGBT Ph-W faulty (OU3)		●	
		4: Over-current in acceleration (OC1) 5: Over-current in deceleration (OC2) 6: Over-current in constant speed (OC3) 7: Over-voltage in acceleration (OV1) 8: Over-voltage in deceleration (OV2) 9: Over-voltage in constant speed (OV3) 10: Undervoltage (UV) 11: Over-load of motor (OL1) 12: Over-load of drive (OL2) 13: Short of input phase (LPI) 14: Short of output phase (LPO) 15: Over-heat of rectify (OH1) 16: Over-heat of IGBT (OH2) 17: External fault (OUt) 18: Serial port fault (E485) 19: Current detection (EtI) 20: Auto-tuning fault (AtE) 21: EEFROM fault (EEP) 22: PID feedback fault (EPID) 23: Braking unit fault (Ebr) 24: Reserved		●	
F7.14	Running frequency of the present failure	0.00Hz	0.0 Hz	●	

Code	Name	Description	Default	Modify	Page
F7.15	Output current of the present failure	0.0A	0.0A	●	
F7.16	DC voltage of the present failure	0.0V	0.0V	●	
F7.17	Input terminal status of the present failure		0	●	
F7.18	Output terminal status of the present failure		0	●	
F8 Advanced function					
F8.00	Acceleration time 2	0.1～3600.0s	Model	○	97
F8.01	Deceleration time 2	0.1～3600.0s	Model	○	98
F8.02	Acceleration time 3	0.1～3600.0s	Model	○	97
F8.03	Deceleration time 3	0.1～3600.0s	Model	○	98
F8.04	Acceleration time 4	0.1～3600.0s	Model	○	97
F8.05	Deceleration time 5	0.1～3600.0s	Model	○	98
F8.06	Jog frequency	0.00～F0.04	Model	○	99
F8.07	Jog acceleration time	0.1～3600.0s	Model	○	100

Code	Name	Description	Default	Modify	Page
F8.08	Jog deceleration time	0.1～3600.0s	Model	○	101
F8.09	Skip frequency	0.00～F0.04	0.0 Hz	○	102
F8.10	Skip frequency bandwidth	0.00～F0.04	0.0 Hz	○	103
F8.11	Traverse frequency bandwidth	0.0～100.0% （Relative to setting frequency）	0.0%	○	104
F8.12	Sudden frequency bandwidth	0.0～50.0%	0.0%	○	105
F8.13	Rise time of traverse	0.1～3600.0s	5.0s	○	106
F8.14	Fall time of traverse	0.1～3600.0s	5.0s	○	107
F8.15	Number of auto reset times	0～3	0	○	108
F8.16	Auto reset interval	0.1～100.0s	1.0s	○	109
F8.17	FDT level detection	0.00～ F0.04	50.0 Hz	○	110
F8.18	FDT lag detection	0.0～100.0%	5.0%	○	111
F8.19	Detected range of frequency arrival	0.0～100.0%	0.0%	○	112

Code	Name	Description	Default	Modify	Page
F8.20	DC voltage of Braking	115.0～140.0%（Standard DC voltage）(380Vseries） 115.0～140.0%（Standard DC voltage）(220V series）	130% 120%	○	113
F8.21	Speed coefficient	Motor speed = 120 * Running frequency * F8.17 / motor pole	100%	○	114
F9 PID Control					
F9.00	PID source	0: given by operation panel (F9.01) 1: given by analog FIV 2: given by analog FIC 3: given by remote serial port 4: given by multi-section	0	○	115
F9.01	Preset PID of the operation panel	0.0%～100.0%.	0.0%	○	116
F9.02	PID feedback source	0: Analog FIV feedback 1: Analog FIC feedback 2: FIV and FIC feedback 3: Remote feedback	0	○	117
F9.03	PID output feature	0: Positive PID output 1: Negative PID output	0	○	118
F9.04	Proportional Gain (Kp)	0.00～100.00	1	○	119
F9.05	Integral time (Ti)	0.01～10.00s	0.1s	○	120
F9.06	Differential time (Td)	0.00～10.00s	0.0s	○	121
F9.07	Sampling Circle (T)	0.01～100.00s	0.10s	○	122
F9.08	PID bias limit	0.0～100.0%	0.0%	○	123

Code	Name	Description	Default	Modify	Page
F9.09	Detection of feedback disconnection	0.0～100.0%	0.0%	○	124
F9.10	Detected time of feedback disconnection	0.0～3600.0s	1.0s	○	125
FA Simple PLC and Multi Speed					
FA.00	PLC Running mode	0: Stop after single circulation 1: Running the latest value after single circulation 2: Continous circulation	0	○	
FA.01	Time unit	Hour-Minute-Second			
FA.02	Multi-speed 1	-100.0～100.0%	0.0%	○	126
FA.03	Multi-speed 2	-100.0～100.0%	0.0%	○	127
FA.04	Multi-speed 3	-100.0～100.0%	0.0%	○	128
FA.05	Multi-speed 4	-100.0～100.0%	0.0%	○	129
FA.06	Multi-speed 5	-100.0～100.0%	0.0%	○	130
FA.07	Multi-speed 6	-100.0～100.0%	0.0%	○	131
FA.08	Multi-speed 7	-100.0～100.0%	0.0%	○	132
FA.09	Multi-speed 8	-100.0～100.0%	0.0%	○	133
FA.10	Multi-speed time 1	0.0～6500.0s	0.0s	○	126
FA.11	Multi-speed time 2	0.0～6500.0s	0.0s	○	127
FA.12	Multi-speed time 3	0.0～6500.0s	0.0s	○	128
FA.13	Multi-speed time 4	0.0～6500.0s	0.0s	○	129
FA.14	Multi-speed time 5	0.0～6500.0s	0.0s	○	130

Code	Name	Description	Default	Modify	Page
FA.15	Multi-speed time 6	0.0～6500.0s	0.0s	○	131
FA.16	Multi-speed time 7	0.0～6500.0s	0.0s	○	132
FA.17	Multi-speed time 8	0.0～6500.0s	0.0s	○	133
Fb Protection					
Fb.00	Motor protection from over-load	0: No protection. 1: General motor. 2: Servo motor	2	◎	134
Fb.01	Motor protection from over-current	20.0%~120.0% (Motor Rated current)	100%	○	135
Fb.02	Frequency point in instant power off	70.0~110.0% (Standard DC Voltage)	80%	○	136
Fb.03	Decreased rate of frequency in instant power off	0.00Hz～F0.04	0.0 Hz	○	137
Fb.04	Protection in stall to over-load	0: ineffective 1: effective	0	○	138
Fb.05	Voltage protection in stall to over-load	110～150% (380VSeries)	130%	○	139

Code	Name	Description	Default	Modify	Page
Fb.06	Auto current limit	100～200%	160% 120%	○	140
Fb.07	Decreased rate of current	0.00～50.00Hz	10.0 Hz	○	141
FC Serial port					
FC.00	Local address	1～247, 0 Broadcast address	1	○	142
FC.01	Baud rate	0: 1200bFs 1: 2400bFs 2: 4800bFs 3: 9600bFs 4: 19200bFs 5: 38400bFs	3	○	143
FC.02	Data format	0: No check（N，8，1）for RTU 1: Even check（E，8，1）for RTU 2: Odd check（O，8，1）for RTU 3: No check（N，8，2）for RTU 4: Even check（E，8，2）for RTU 5: Odd check（O，8，2）for RTU 6: No check（N，7，1）for ASCII 7: Even check（E，7，1）for ASCII 8: Odd check（O，7，1）for ASCII 9: No check（N，7，2）for ASCII 10: Even check（E，7，2）for ASCII 11: Odd check（O，7，2）for ASCII 12: No check（N，8，1）for ASCII 13: Even check（E，8，1）for ASCII 14: Odd check（O，8，1）for ASCII 15: No check（N，8，2）for ASCII 16: Even check（E，8，2）for ASCII 17: Odd check（O，8，2）for ASCII	0	○	144

Code	Name	Description	Default	Modify	Page
FC.03	Response delay time	0～200ms	5ms	○	145
FC.04	Timeout delay	0.0（Disable），0.1～100.0s	0.0s	○	146
FC.05	Serial port error	0: Alarm (CE) and coast to stop 1: Not alarm but go on running 2: Not alarm and stop by remote serial port 3: Not alarm and stop by all control modes	1	○	147
FC.06	Serial port response	0: Response writing/reading commands to all upper controllers 1: Response to reading commands to all upper controllers	0	○	148
Fd Other Functions					
Fd.00	Low frequency level of restrained oscillation	0～500	5	○	149
Fd.01	High frequency level of restrained oscillation	0～500	100	○	150
Fd.02	Restrained oscillation bandwidth	0～100	50%	○	151
Fd.03	Restrained oscillation bandwidth	0.00Hz～F0.04	12.50 Hz	○	152

Code	Name	Description	Default	Modify	Page
Fd.04	Restrained oscillation	0: Enabled / 1: Disabled	1	○	153
Fd.05	PWM mode	0: PWM mode 1 1: PWM mode 2 2: PWM mode 3 (Random)	0	◎	154
Fd.06	Torque mode	0: Operation panel (Fd.07) 1: Analog FIV 2: Analog FIC 3: Analog FIV+ FIC 4: Mullet-speed 5: Serial port	0	○	155
Fd.07	Setting torque of operation panel	-100%～100% （Rated controller current）	50%	○	156
Fd.08	High frequency limit	0: Set by the operation panel (F0.05) 1: Set by analog FIV 2: Set by analog FIC 3: Set by multi-speed 4: Set by remote serial port	0	○	157
Fd.09	Auto current limit	0: Enabled 1: Disabled	0	○	158