400-820-3092
CALL CENTER

Instruction Manual

NTA Inverter

NTA5000 Series 380V Class
3 Phase 0.75~55KW(1.7~110KVA)

Reor
www.reor-electron.com

NTA5000 Instruction Manual

Table of Contents

Quick Start Guide

This guide is to assist in installing and running the inverter to verify that the drive and motor are working properly. Starting, stopping and speed control will be from the keypad. If your application requires external control or special system programming, consult the NTA5000 Instruction Manual supplied with your inverter.

Step 1 Before Starting the Inverter

Please review Preface and Safety Precautions (page 0-1 through 1-3) of the NTA5000 Instruction Manual. Verify drive was installed in accordance with the procedures as described in NTA5000 Ambient Environment and Installation on pages 3-1 through 3-7. If you feel this was abnormal, do not start the drive until qualified personnel have corrected the situation. (Failure to do so could result in serious injury.)

- **Check inverter and motor nameplates to determine that they have the same HP and voltage ratings. (Ensure that full load motor amps do not exceed that of the inverter.)**
- **Remove the terminal cover to expose the motor and power terminals.**
    a. Verify that AC power is wired to L1(R), L2(S) and L3(T). (pages 3-11~3-13)
    b. Verify that Motor leads are connected to U(T1), V(T2) and W(T3). (pages 3-11~3-13)
    (The two leads may need to be reversed if motor rotation is not correct.)

Instructions of operation panel indicator lamps:

1. Four actions of **FUN, Hz/RPM, VOLT, AMP** LED and display of five 7-segment displays, refer to operation description of the keypad.

2. FWD LED: Forward Direction**,** LED action (Flash in stop, Keep Lit in operation).

3. REV LED: Reverse Direction, LED action (Flash in stop, Keep Lit in operation).

Step 2 Apply Power to the Drive

Apply AC power to the Drive and observe Operator.

Five 7-segments Display should read Power Voltage for 3~5 seconds and then read Frequency/Speed '5.00'.

Five 7-segments Display and FWD LED should be flashed all the time.

Step 3 Check Motor Rotations without Load

- **Press RUN key (FWD LED should light), five 7-segment Display should run from 0.00 to 5.00.**
- **Check motor rotation.**

  If it is not correct:

  Press STOP key. Remove AC power. Wait for LED "charge" lamp to extinguish.

  Reverse arbitrary two motor leads of U(T1), V(T2), W(T3).**Restart the drive and check new rotation.**

Step 4 Check Full Speeds at 50Hz/60Hz

- **Frequency/Speed can be changed by pressing the up or down Arrow keys.**

  To move right or left for next digit, press '<' key.

  Press the READ / ENTER key to set the speed.
- **Set frequency up to 50Hz/60Hz in accordance with the above rule.**
- **Press RUN key. Check drives acceleration to full speed.**
- **Press STOP key to stop drive and check deceleration**.

Step 5 Other Operations

Run command selection: F00.03(or F00.04)

Frequency command selection: F00.05(or F00.06)

- Using RUN/STOP key at the operation panel controls the inverter run/stop, the setting frequency of potentiometer at panel, please set parameters F00.03=0, F00.05=1.
- Using an external switch signal, connect them between S1 and the COM terminal toTM2 to control the inverter run/stop, external potentiometer to set up frequency on the 10V, AI1, GND in TM2, set parameters F00.03=1, F00.05=2 can be done, if you want to connect a frequency meter at outside, just connect it to the FM + and GND.

For information, see NTA5000 Instruction Manual.

Please refer to the following pages:

Set Control Mode (Vector, V/F)	F00.00	Page.4-08
Set Motor Rated Current	F06.01	Page.4-15
Set Acceleration Time	F00.09	Page.4-08
Set Deceleration Time	F00.10	Page.4-08
Set Max Speed	F00.07	Page.4-08
Set Min Speed	F00.08	Page.4-08

Chapter 0 Preface

0.1 Preface

To extend the performance of the product and ensure personnel safety, please read this manual thoroughly before using the inverter. Should there be any problem in using the product that cannot be solved with the information provided in the manual, contact your nearest our company's technical or sales representative who will be willing to help you.

Precautions

The inverter is an electrical product. For your safety, there are symbols such as "Danger", "Caution" in this manual as a reminder to pay attention to safety instructions on handling, installing, operating, and checking the inverter. Be sure to follow the instructions for highest safety.

Danger	Indicates a potential hazard that could cause death or serious personal injury if misused.
⚠ Caution	Indicates that the inverter or the mechanical system might be damaged if misused.

Danger

- Do not touch any circuit boards or components after the power is turned off and while the charging indicator is still lit. (The light will fade).
- Do not make any connections when the inverter is powered on. Do not check parts and signals on circuit boards during the inverter operation.
- Do not disassemble the inverter or modify any internal wires, circuits, or parts.
- Connecting the ground terminal of the inverter properly:

  220V class: ground resistance 100Ω or below.

  380V class: ground resistance 10Ω or below.

  Make sure that grounding conductors are adequately sized and are according to your local safety regulations.

⚠ Caution

- Do not perform a voltage test on parts inside the inverter. High voltage will destroy the semiconductor components.
- Do not connect U(T1), V(T2) and W(T3) terminals of the inverter to any AC input power supply.
- CMOS ICs on the inverter's main board are susceptible to static electricity. Do not touch the main circuit board.

0.2 Product Inspection

Our company's inverters have all passed the function test before delivery. Please check the following when you receive and unpack the inverter:

- The models of the inverter are the same as those specified in your purchase order.
- Check for any damages caused by transportation. Please do not apply power.
- Please contact our company's sales representatives if any of the above problems occurred.

Chapter 1 Safety Precautions

1.1 Operation Precautions

1.1.1 Before Power Up

⚠ Caution
The line voltage applied must comply with the inverter's specified input voltage. (See product nameplate)

❗ Danger
Make sure the main circuit connections are correct, L1(R), L2(S) and L3(T) are power-input terminals and must not be mistaken for U(T1), V(T2) and W(T3) . Otherwise, the inverter will damage.

⚠ Caution
• To avoid the front cover from disengaging or other damage, do not carry the inverter by its cover. Support the drive by its heat sink when transporting. Improper handling can damage the inverter or injure personnel, and should be avoided. • To avoid the risk of fire, do not install the inverter on flammable objects. Install on nonflammable objects such as metal surfaces. If several inverters are placed in the same control panel, provide heat extraction means to keep the temperature below 40℃ to avoid overheat or fire hazard. • When removing or installing the operator keypad, turn OFF the power first, and secure the keypad correctly to avoid keypad operation or display failure.

Warning
• This product is sold subject to IEC 61800-3. In a domestic environment this product may cause radio interference in which case the user may be required to apply corrective measures. • Didn't provide the protective function for the motor over temperature.

1.1.2 During Power Up

❗ Danger
• Do not insert or remove input connections to the inverter when powered up to avoid damage to the control board resulting from possible voltage surge due to contact bounce. • When momentary power loss is longer than 2 seconds (the larger of horse power, the longer of time), the inverter does not have enough storage power to control the circuit. Therefore, when the power is re-applied, the operation of the inverter is based on the setup of F00.03 (or F00.04) / F04.09 and the condition of external switch, this is considered to be 'restart' in the following paragraphs. • When the momentary power loss is short, the inverter still has enough storage power to control the circuit. Therefore, when power is re-applied, the inverter will automatically restart depending on the setup of F04.03/F04.04.

- When restarting the inverter, the operation of the inverter is based on the setup of F00.03 (or F00.04)/ F04.09 and the condition of external switch (FWD/REV button). Attention: the start operation has nothing to do with F04.03/F04.04/ F04.06/F04.07:

  1. When F00.03 (or F00.04) =0, the inverter will not automatically run after restart.
  2. When F00.03 (or F00.04) =1 and the external switch (FWD/REV button) is OFF, the inverter will not run after restart.
  3. When F00.03 (or F00.04) =1, the external switch (FWD/REV button) is ON, and F04.09=0, the inverter will run automatically after restart.

  Attention: To ensure safety, please turn off the external switch (FWD/REV button) after power loss, to protect machines from possible damage and potential injury to personnel on sudden resumption of power.

- If F04.09 is set to 0 (direct start up), please refer to the description and warnings for F04.09 to verify the safety of operator and machine.

1.1.3 Before Operation

Danger

Make sure the model and inverter capacity are the same as that set in parameter F12.00.

Caution

On power up the supply voltage set in parameter F05.03 will flash on display for 5 seconds.

1.1.4 During Operation

Danger

Do not connect or disconnect the motor during operation. Otherwise, the over-current will cause the inverter to trip or damage the unit.

Danger

- To avoid electric shock, do not take the front cover off when power is on.
- The motor will restart automatically after stop when auto-restart function is on. In this case, use caution while working near the drive, motor, or driven equipment.
- The stop push button and external stop command have no safety function. For emergency stop, it is necessary to use a correct latch type push button and an appropriate circuit or devices to ensure safety.

⚠ Caution
● Do not touch heat-generating components such as heat sinks and braking resistors. ● The inverter can drive the motor from low speed to high speed. Verify the allowable speed range of the motor and the load before operation. ● Note the settings related to the braking unit. ● Do not check signals on circuit boards while the inverter is running.

⚠ Caution
Allow 5 minutes after disconnecting power before disassembling or checking the components. The power led should not be illuminated.

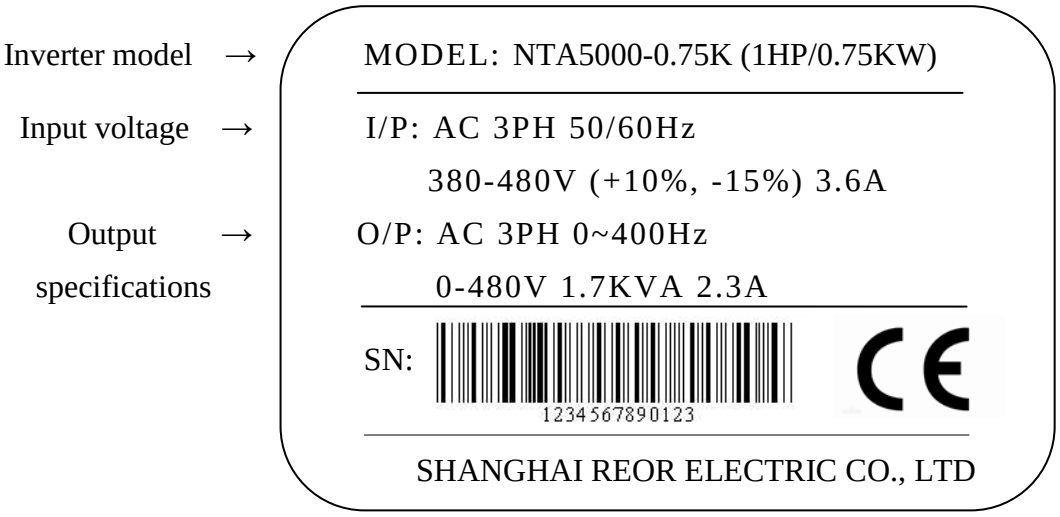
1.1.5 During Maintenance

⚠ Caution
The Inverter can be used in environment in temperature range from -10 °C to +40 °C and relative humidity of 95%RH.

1.1.6 Inverter Disposal

⚠ Caution
● Please dispose of this unit with care as an industrial waste and according to your required local regulations. ● The capacitors of inverter main circuit and printed circuit board are considered as hazardous waste and must not be burnt. ● The plastic enclosure and parts of the inverter such as the top cover board will release harmful gases if burnt.

Chapter 2 Definition of model



NTA5000 Series

NTA 50 00 — 0.75K

Product Brand

Supply Voltage

12: 220V economical inverter
13: 380V economical inverter
50: 380V general inverter
51: 380V high-performance inverter
52: 220V general inverter (developing)

Types of Functions

00: standard type
01: without built-in RS485
02: without displaying operating panel
04: without built-in brake crystal
1x: customize function model

Output Power

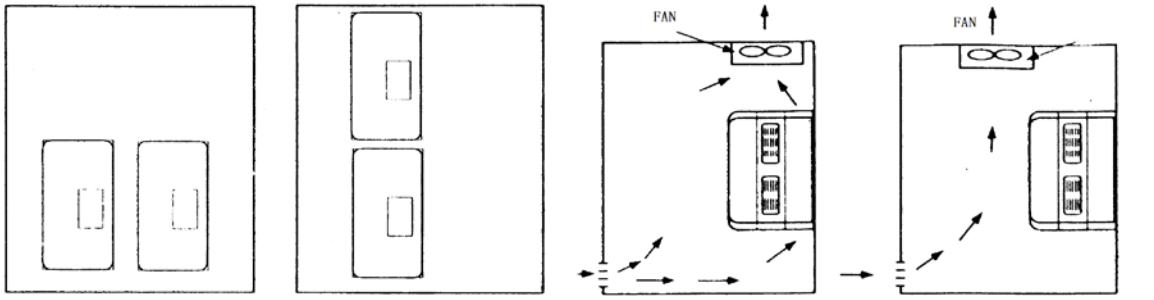
0.4K : output 400W (0.5HP)
0.75K: output 750W (1HP)
1.5K : output 1.5KW (2HP)
2.2K : output 2.2KW (3HP)
3.7K : output 3.7KW (5HP)
5.5K : output 5.5KW (7.5HP)
7.5K : output 7.5KW (10HP)
11K : output 11KW (15HP)
15K : output 15KW (20HP)
18.5K: output 18.5KW (25HP)
22K : output 22KW (30HP)
30K : output 30KW (40HP)
37K : output 37KW (50HP)
45K : output 45KW (60HP)
55K : output 55KW (75HP)

Chapter 3 Ambient Environment and Installation

3.1 Environment

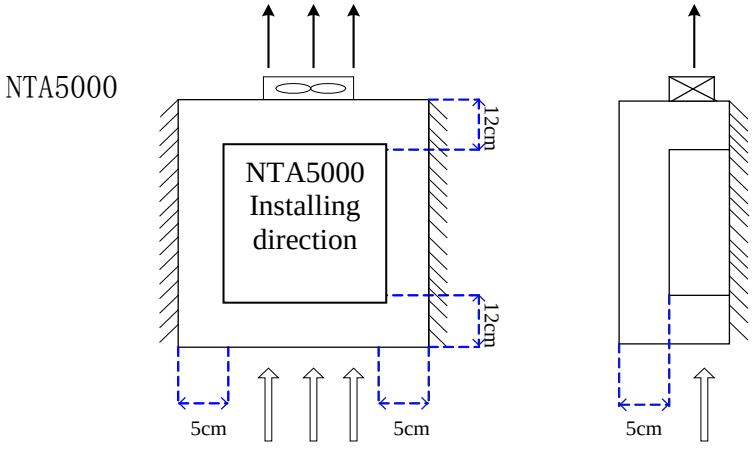
The environment will directly affect the proper operation and the life span of the inverter, so please install the inverter in the environment complying with the following conditions:

- Ambient temperature: -10°C ~+40°C
- Avoid exposure to rain or moisture.
- Avoid direct sunlight.
- Avoid oil mist and salinity.
- Avoid corrosive liquid and gas.
- Avoid dust, lint fibers, and small metal filings.
- Keep away from radioactive and flammable materials.
- Avoid electromagnetic interference (soldering machine, power machine).
- Avoid vibration (stamping, punching machine). Add a vibration-proof pad if the situation cannot be avoided.
- If several inverters are placed in the same control panel, provide heat removal means to maintain temperatures below 40°C.



(Correct configuration) (Incorrect configuration) (Correct configuration) (Incorrect configuration)

- Place the inverter facing forward and its top facing upward to assist with cooling.



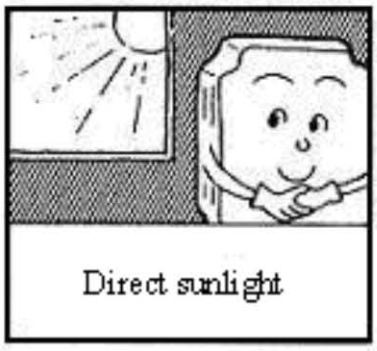
Air convection

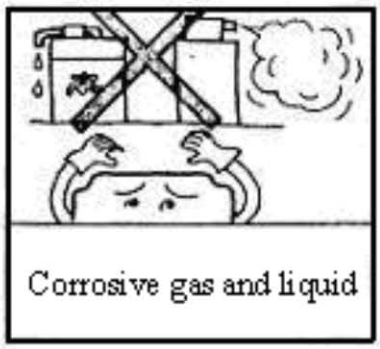
-10°C - +40°C

(a) Front view (b) Side view

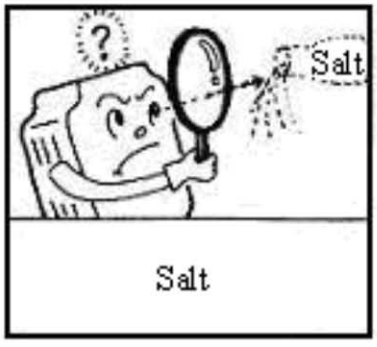
3.2 Environmental precautions

Do not use the inverter in an environment with the following conditions:


Direct sunlight

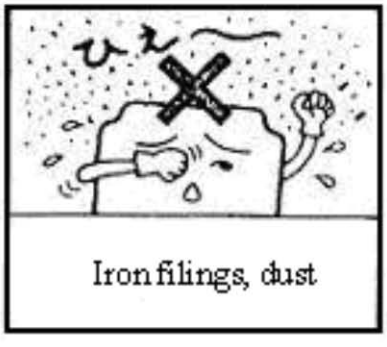

Corrosive gas and liquid

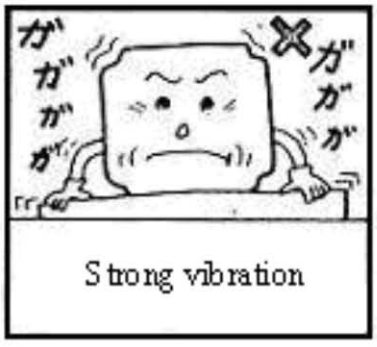
Oil Mist



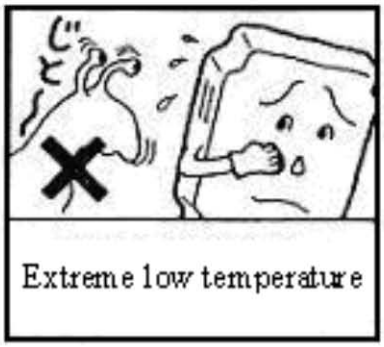
Salt


Wind, rain, and water drops may get into

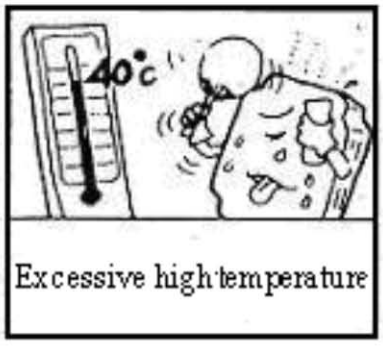

Iron filings, dust



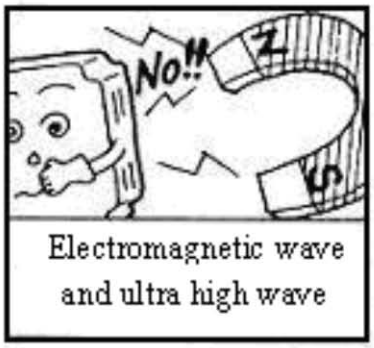
Strong vibration



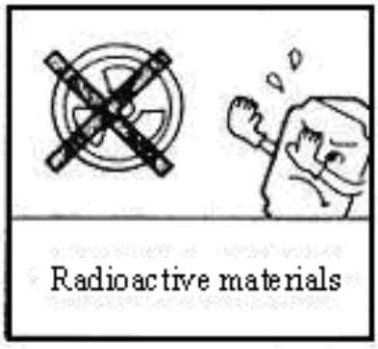
Extreme low temperature

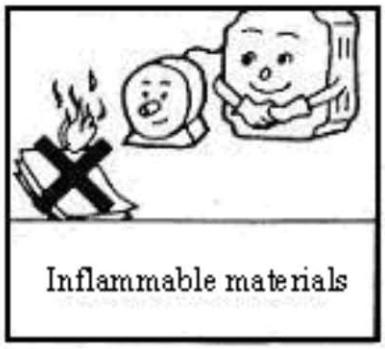


Excessive high temperature



Electromagnetic wave and ultra high wave


Radioactive materials


Inflammable materials

3.3 Electrical Installation

3.3.1 Wiring guidelines

A. Tightening torque:

Required Screwdriver Torques are as listed below:

Tightening torque			
Capacity (KW)	Input Power source	Nominal torque for TM1 terminal	
0.4/ 0.75	200~240V	0.59/0.08 (LBS-FT/KG-M)	7.10/8.20 (LBS-IN/KG-CM)
0.75/ 1.5/ 2.2	380~480V		
1.5/ 2.2	200~240V	1.5/0.21 (LBS-FT/KG-M)	18.00/20.28 (LBS-IN/KG-CM)
3.7/ 5.5/ 7.5/ 11/ 15/ 18.5	380~480V		
22/ 30/ 37	380~480V	1.84/0.3 (LBS-FT/KG-M)	22.1/30 (LBS-FT/KG-CM)
45/ 55	380~480V	4.42/0.66 (LBS-FT/KG-M)	53.1/60 (LBS-FT/KG-CM)

B. Power Cables:

Power cables are connected to TM1 terminal block, terminals are L1(R), L2(S), L3(T), U(T1), V(T2), W(T3), P, Br(R), Choose power cables according to the following criteria:

(1) Use copper wires only. Correct wire diameters should be based on ratings at 105^{o}C.

(2) For rating voltage of wires, the minimum voltage of 220V class type is 300V, and 380 V class type is 600V.

(3) In order to ensure safety, the power cables should be locked by the ‘O’ type terminal.

C. Control Cables:

Control cables are connected toTM2 control terminal block. Choose control cables according to the following criteria:

(1) Use copper wires only. Correct wire diameters should be based on ratings at 105^{o}C.

(2) For rating voltage of wires, the minimum voltage of 220V class type is 300V, and 380 V class type is 600V.

(3) To avoid noise interference, do not route power and control cables in the same conduit or trucking. Where possible use screened / shielded control cables to minimizes electromagnetic interference. To avoid ground loops always earth the shield of control cables at one end only.

D. Nominal electrical specifications of the terminal Block TM1:

Capacity (KW)	Input Power Source	Amps (A)	Volts (V)
0.4/ 0.75	200~240V	15	600
0.75/ 1.5/ 2.2	380~480V		
1.5/ 2.2	200~240V	40	
3.7/ 5.5/ 7.5/ 11/ 15/ 18.5	380~480V	60	
22/ 30/ 37	380~480V	100	
45/ 55	380~480V	150	

Note: Nominal values of input and output signals (TM2) – follow the specifications of class 2 wiring.

Fuse types:

To protect the inverter most effectively, use fuses with current-limit function.

Capacity (KW)	Input Power Source	Fuse types
0.4/ 0.75	200~240V	15A, 600VAC, 100KA I.R.
1.5/ 2.2		20A, 600VAC, 100KA I.R.
0.75	380~480V	5A, 600VAC, 100KA I.R.
1.5		10A, 600VAC, 100KA I.R.
2.2		15A, 600VAC, 100KA I.R.
3.7		20A, 600VAC, 100KA I.R.
5.5/ 7.5		40A, 600VAC, 100KA I.R.
11/ 15/ 18.5		70A, 600VAC, 100KA I.R.
22/ 30		100A, 600VAC, 100KA I.R.
37/ 45		150A, 600VAC, 100KA I.R.
55		200A, 600VAC, 100KA I.R.

Notice:

- **1)** To avoid shock hazards, do not touch any electrical component when the power is applied or within five minutes after the power is disconnected. Any inspection should be performed after the charge indicator goes off.
- **2)** Do not perform wiring on the inverter with power on. Disregard of this notice may result in serious injury.

Note: This product is designed to be used in the second pollution environment or other same environment.

3.3.2 Contactor and Circuit Breaker specification and wiring

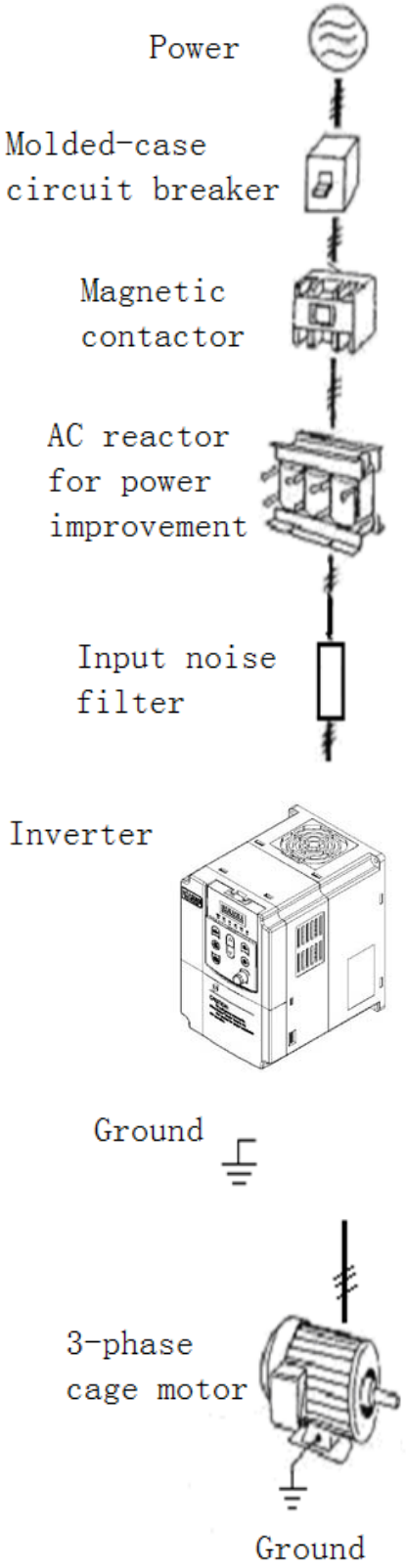
Molded-case circuit breaker/magnetic contactor

- Our company bears no responsibility to service for failures caused by the following conditions:
  (1) A molded-case circuit breaker is not installed, or an improper or overrated breaker is used, between the power source and the inverter.
  (2) A magnetic contactor, a phase capacitor, or a burst absorber is connected between the inverter and the motor.

Model: NTA5000-□□□□	3.7K or below	5.5K	7.5K	11K	15K/ 18.5K	22K	30K	37K	45K	55K
Molded-case circuit breaker	15A	20A	30A	50A	50A	100A	100A	125A	175A	175A
Magnetic contactor (MC)	12A	16A	23A	42A	42A	85A	85A	115A	150A	150A
Main circuit terminals (TM1)	Wire gauge $2.0mm^2$ terminal screw M4	Wire gauge $3.5mm^2$ terminal screw M4		Wire gauge $5.5mm^2$ terminal screw M4	Wire gauge $14mm^2$ terminal screw M6		Wire gauge $30mm^2$ terminal screw M10		Wire gauge $50mm^2$ terminal screw M10	
Control circuit Signal terminals	Wire gauge $0.8mm^2$ (#18AWG), terminal screw M2				Wire gauge $0.8mm^2$ (#18AWG) terminal screw M3					
RY1Signal terminals	Wire gauge $0.85mm^2$ (#18AWG), terminal screw M3									

- Use three-phase squirrel cage induction motor with capacity suitable for the inverter.
- If one inverter is driving several motors, the total current of all motors running simultaneously must be less than the rated current of the inverter, and each motor has to be equipped with a proper thermal relay.
- Do not add capacitive components, such as a phase capacitors, LC or RC, between the inverter and the motor.

3.3.3 Precautions for peripheral applications



Power supply:

- Make sure the correct voltage is applied to avoid damaging the inverter.
- A molded-case circuit breaker or fused disconnect must be installed between the AC source and the inverter.

Molded-case circuit breaker:

- Use a molded-case circuit breaker that conforms to the rated voltage and current of the inverter to control the power ON/OFF and protect the inverter.
- Do not use the circuit breaker as the run/stop switch for the inverter.

Leakage breaker:

- Install a leakage breaker to prevent problems caused by electric leakage and to protect personnel.
- Setting current should be 200mA or above and the operating time at 0.1 second or longer to prevent malfunctions.

Magnetic contactor:

- Normal operations do not need a magnetic contactor. However a contactor has to be installed in primary side when performing functions such as external control and auto restart after power failure, or when using a brake controller.
- Do not use the magnetic contactor as the run/stop switch of the inverter.

AC reactor for power quality improvement:

- When inverters below 220V/380V class 15KW are supplied with high capacity (above 600KVA) power source or an AC reactor can be connected to improve the power performance.

Input noise filter:

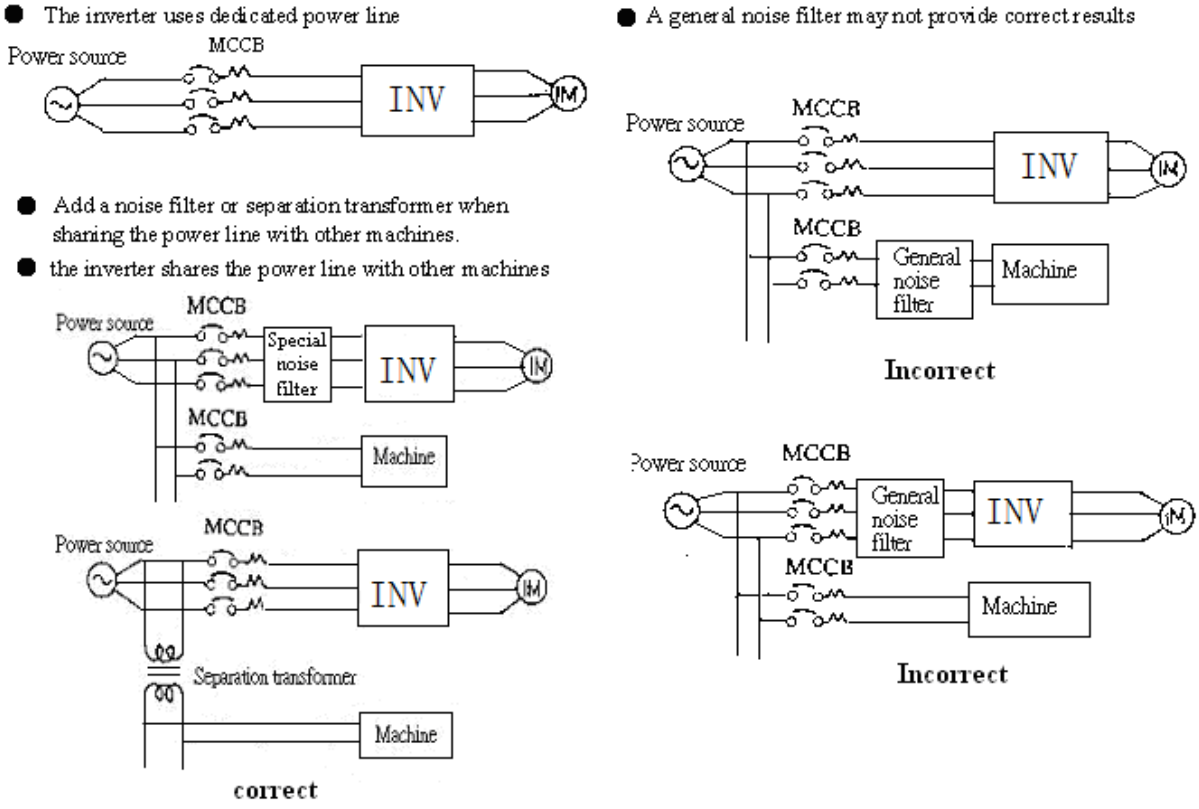
- A filter must be installed when there are inductive loads affecting the inverter.

Inverter:

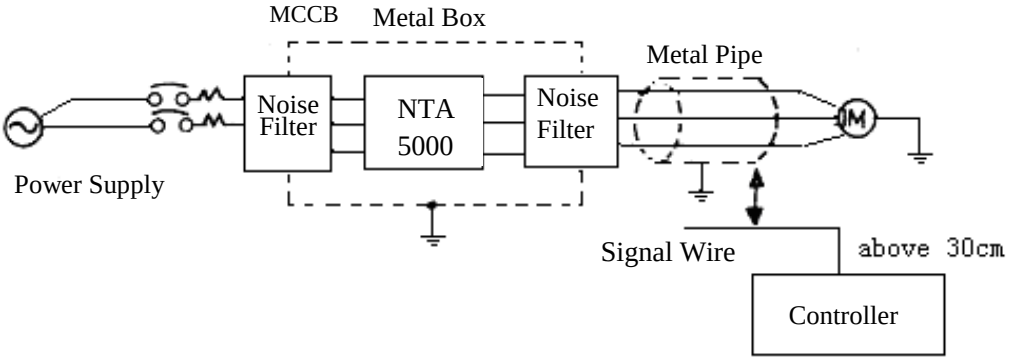
- Input power terminals L1(R), L2(S), and L3(T) can be used in any sequence regardless of phase.
- Output terminals U(T1),V(T2), and W(T3) are connected to U, V, and W terminals of the motor. If the motor is reversed while the inverter is set to run forward, just swap any two terminals of U(T1),V(T2), and W(T3).
- To avoid damaging the inverter, do not connect the input terminals U(T1),V(T2), and W(T3) to AC input power.
- Connect the ground terminal properly. 220V class: ground impedance <100Ω; 380V class: ground impedance <10Ω.

Making external connections should according to the following instructions. Check connections after wiring to make sure all connections are correct. (Do not use the control circuit buzzer to check connections)

(A) Main circuit's wiring must be separated from other high voltage or high current power line to avoid noise interference. Refer to the figures below:



A noise filter in the output of the main circuit can suppress conducted noise. To prevent radiated noise, the wires should be put in a metal pipe and distance from signal lines of other control equipment should be more than 30 cm.



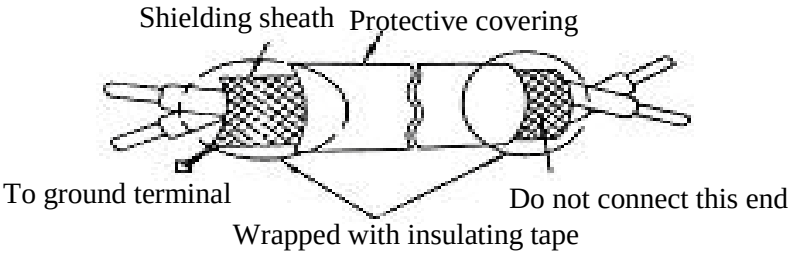
- When the connection between the inverter and the motor is too long, consider the voltage drop of the cables. Phase-to-phase voltage drop (V) = $\sqrt{3}$ ×resistance of wire (Ω/km)×length of line (m)×current×10^{-3}.
- Carrier frequency must be adjusted based on the motor cable length. The longer of the cable, the lower carrier frequency should be.

Cable length between the inverter and the motor	Below 75ft	Below 150ft	Below 300ft	Above 300ft
Recommended carrier frequency	Below 15KHz	Below 12KHz	Below 8KHz	Below 5KHz
Setting of parameter F10.03	15	12	8	5

(B) The control circuit wiring must be separated and routed away from the main circuit control line or other high voltage or current power lines to avoid noise interference.

- To avoid erroneous operation caused by noise interference, shield the control circuit wiring with twisted-wires, and connect the shielded wire to a ground terminal. Refer to the figure below.

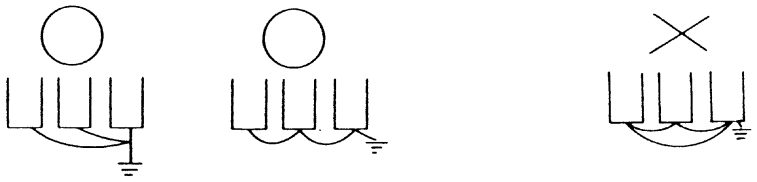
The wiring distance should not exceed 50 meters.



(C) Inverter Ground terminal must be connected to installation ground correctly and according to the required local wiring regulations.

For 200V class ground resistance should be 100Ω or less.
For 400V class ground resistance should be 10Ω or less.

- Ground cable size must be according to the required local wiring regulations. The shorter the better.
- Do not share the ground of the inverter with other high current loads (Welding machine, high power motor). Connect the terminals to their own ground.
- Do not make a loop when several inverters share a common ground point.



(a) Correct (b) Correct (c) Incorrect

(D) To ensure maximum safety, use correct wire size for the main power circuit and control circuit. (According to the required local regulations)

(E) Verify that all wiring is correct, wires are intact, and terminal screws are secured.

3.4 Specifications

3.4.1 Product Specifications

Single / Three phase, 200-240V model

Model: NTA52□□-XXX	**0.4K**	**0.75K**	**1.5K**	**2.2K**	
Horsepower(HP)	0.5	1	2	3	
Max Applicable Motor Output (KW)	0.4	0.75	1.5	2.2	
Rated Output Current(A)	3.1	4.5	7.5	10.5	
Rated Capacity(KVA)	1.2	1.7	2.9	4.0	
Max. Input Voltage	Single/Three Phase: 200~240V +10%-15%, 50/60HZ ± 5%				
Max. Output Voltage	Three Phase: 200~240V				
Input Current(A)	8.5/4.5	12/6.5	16/11	23.9/12.5	
Net Weight (KG)	1.4	1.4	2.5	4.0	
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0	

Three phase, 380 – 480V model

Model: NTA50□□-XXX	**0.75K**	**1.5K**	**2.2K**	**3.7K**	**5.5K**	**7.5K**	**11K**	**15K**
Horsepower(HP)	1	2	3	5	7.5	10	15	20
Max Applicable Motor Output (KW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Rated Output Current(A)	2.3	3.8	5.2	8.8	13.0	17.5	25.0	32.0
Rated Capacity(KVA)	1.7	3.0	4.0	5.9	8.9	11.0	17.0	21.0
Max. Input Voltage	Three phase: 380~480V +10%-15%, 50/60HZ ± 5%							
Max. Output Voltage	Three phase: 380~480V							
Input Current(A)	3.6	5.0	6.5	10.5	14.6	21.0	27.0	35.0
Net Weight (KG)	1.7	1.8	1.8	3.7	3.9	3.9	7.0	7.5
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0

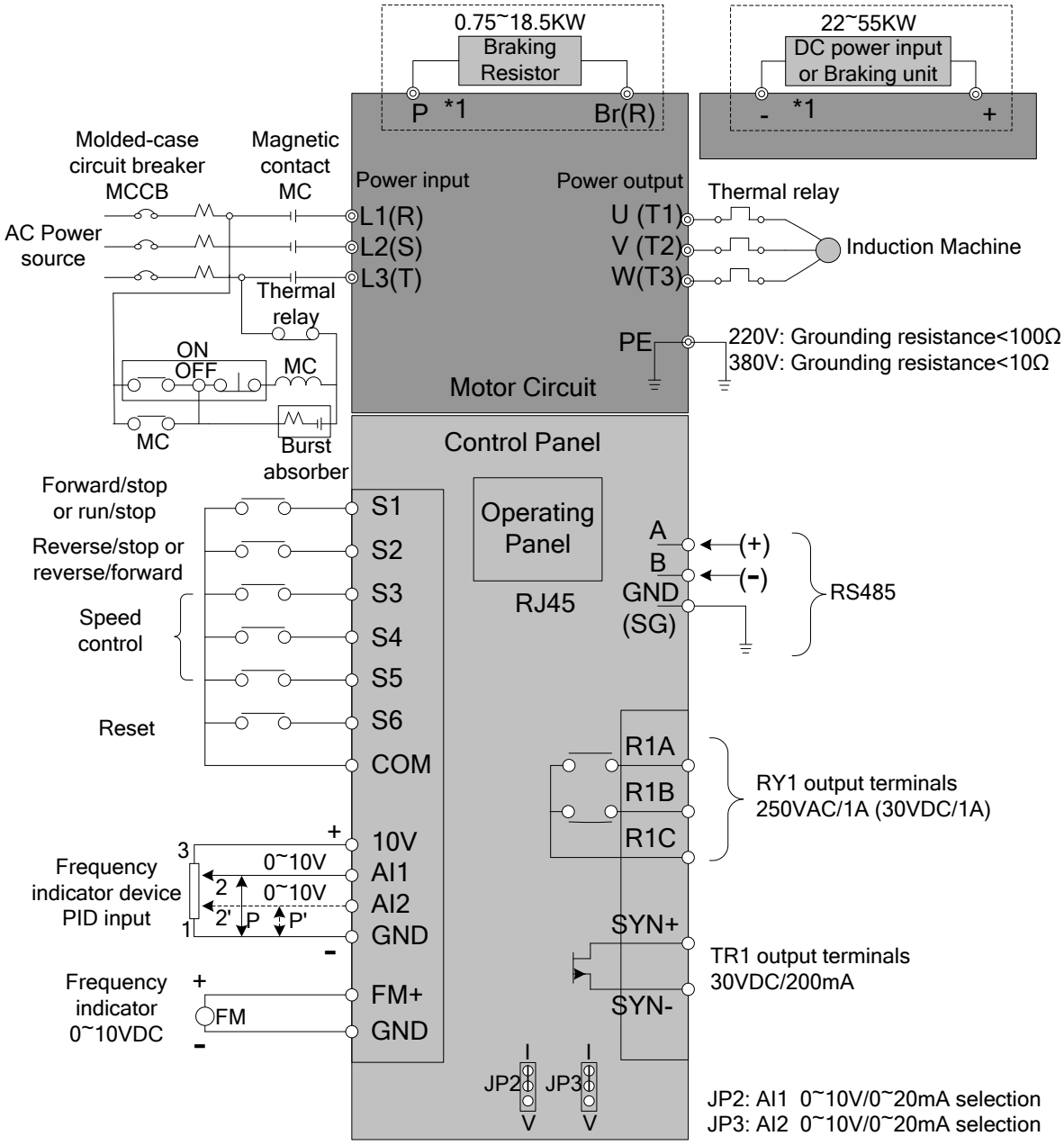
Model: NTA50□□-XXX	**18.5K**	**22K**	**30K**	**37K**	**45K**	**55K**		
Horsepower(HP)	25	30	40	50	60	75		
Max Applicable Motor Output (KW)	18.5	22	30	37	45	55		
Rated Output Current(A)	39.0	48	64	80	96	128		
Rated Capacity(KVA)	26	41	54	68	82	110		
Max. Input Voltage	Three phase: 380~480V +10%-15%, 50/60HZ ± 5%							
Max. Output Voltage	Three phase: 380~480V							
Input Current(A)	40.0	56	75	92	112	142		
Net Weight (KG)	12	13	30	30	46	46		
Allowable momentary power loss time (second)	2.0	2.0	2.0	2.0	2.0	2.0		

3.4.2 General Specifications

Item		NTA5000 Series
Control Mode		V/F or Current Vector Control
Frequency Control	Range	0.01 ~ 400.00 Hz
	Start control torque	150%/1Hz (Vector)
	Speed control range	1:100 (Vector)
	Speed Control Precision	±0.5% (Vector)
	Setting resolution	Digital: 0.01Hz Analog: 0.06Hz/ 60Hz (10bit)
	Keypad setting	Set directly with▲▼ keys or the VR on the keypad
	Display Function	Five digital LED and status indicator; display frequency/ line speed/ DC voltage/ Output voltage/ Current/ Rotation direction/ Inverter parameter/ Fault Log/ Program Version / Heat sink temperature/PID feed back
	External signal setting	External potentiometer (0-10V/0-20mA), Provides up/down controls, speed control or automatic procedure control with multifunctional contacts.
	Frequency Limit Function	Upper/lower frequency limits and three programmable skip frequencies
General Control	Carrier frequency	1 ~ 15kHz
	V/F pattern	18 fixed patterns, 1programable curve
	Acc/Dec control	Two-stage Acc/Dec time (0.1 – 3,600 seconds) and four-stage S curves (refer to descriptions on Group F01 and F10.)
	Multifunction analog output	5 functions (Output Frequency, Frequency Setting, Output Voltage, DC Bus Voltage, Motor Current)
	Multifunction input	30 functions (Forward/Stop Command, Reverse/Stop Command, Jog Command, Emergency Stop, Preset Speed unit…)
	Multifunction output	6 functions (Run, Frequency Reached, Fault, Set Frequency, Frequency Threshold Level 1/ 2…)
	Other Functions	Momentary Power Loss Restart, Speed Search, Overload Detection, 16 preset speeds, Acc/Dec Switch (2 Stages), S Curves, 2/3-wire Control, PID control, torque boost, Slip Compensation, Frequency Upper/ Lower Limit, Auto energy saving, Communication Control, Auto Restart

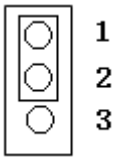
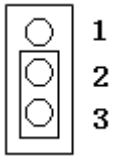
Item		NTA5000 Series
Communication Control		Control by RS485. One-to-one or one-to-many control. Baud rate/stop bit/parity/bit can be set.
Braking Torque		About 20%, the standard model with built-in braking transistor and the specified external braking resistors can provide 100%
Operation temperature		-10~50 °C
Storage temperature		-20~60 °C
Humidity		Humidity:0 – 95% Relative Humidity(Non-condense)
Vibration		1G (9.8m/s2)
Enclosure		IP20
Protection Function	Overload protection	The relays to protect the motor (the curve can be set) and the inverter (150 % / 1min)
	Over Voltage	220v class: DC voltage > 410V. 380V class: DC voltage > 820V.
	Under Voltage	220v class: DC voltage < 190V. 380V class: DC voltage < 380V
	Momentary Power Loss Restart	Restart can be initiated with spin start after momentary power loss in Max 2 second
	Stall Prevention	Stall prevention for acceleration/deceleration/operation
	Short-circuit output terminal	Protection for electronic circuit
	Grounding Fault	Protection for electronic circuit
	Other Function	Heat sink overheat protection, over torque detection, error contact control, reverse limit, prohibit for direct start after power up and error recovery, parameter lock up

3.5 Wiring Diagram



Note *1 Please refer to description of main circuit terminals (P, Br(R)) and specification of braking resistor for value selection.

Descriptions of JUMPER function

Type of external signal	JP2 / JP3	Remarks
	0~20mA analog signal	Effective when External control F00.05/F00.06=2
	0~10VDC analog signal	

3.6 Description of connection terminals

Descriptions of control circuit terminals

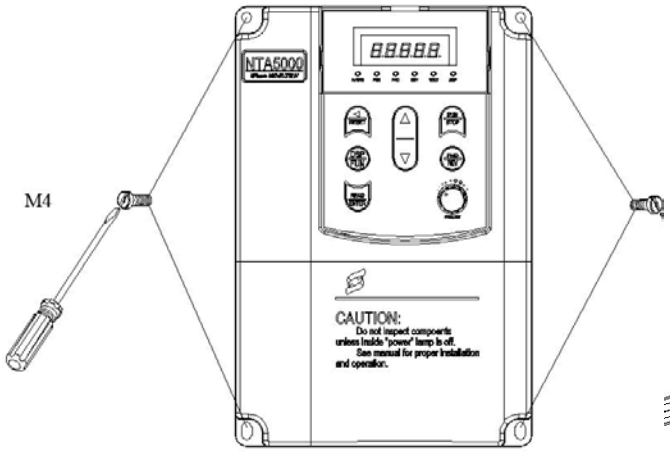
<table>
<tr><th>Symbol</th><th colspan="4">Description</th></tr>
<tr><td>SYN+</td><td>Positive Terminal for Multi-function Output</td><td rowspan="5">Multifunctional Output Terminals</td><td>TR1 Terminal Specification: 30VDC/200mA</td><td rowspan="5">Contact Using Description:
TR1, RY1 16 functions, refer to parameters F01.09/F01.10</td></tr>
<tr><td>SYN-</td><td>Negative Terminal for Multi-function Output</td><td rowspan="4">RY1 Terminal Specification: 250VAC/3A or 30VDC/3A</td></tr>
<tr><td>R1C</td><td>Common contact</td></tr>
<tr><td>R1B</td><td>Normal close contact</td></tr>
<tr><td>R1A</td><td>Normal open contact</td></tr>
<tr><td>10V</td><td colspan="4">Frequency knob (VR) power source terminal (pin 3)</td></tr>
<tr><td>AI1</td><td colspan="4">Analog frequency signal input terminal AI1 (0~10VDC / 0~20mA)</td></tr>
<tr><td>AI2</td><td colspan="4">PID signal input terminal or Bias signal input terminal AI2 (0~10VDC / 0~20mA)</td></tr>
<tr><td>GND</td><td colspan="4">Ground</td></tr>
<tr><td>COM</td><td colspan="4">Common port for digital input signal for S1~S6 input</td></tr>
<tr><td>FM+</td><td colspan="4">The positive multifunction analog output signal for multifunction, 5 functions, refer to parameter F02.12 description (Output Frequency, Frequency Setting, Output Voltage, DC Bus Voltage, Motor Current).
The signal for output terminal is 0-10VDC (below 2mA)</td></tr>
<tr><td>S1</td><td colspan="4" rowspan="6">Multifunction input terminals includes 30 functions, refer to parameter F01.00~F01.05 description (Forward/Stop Command, Reverse/Stop Command, Preset Speed unit 0/1/2/3, Jog Forward Command, Jog Reserve Command, Acc/Dec 2, Emergency Stop, Base Block, Speed Search, Energy Saving(V/F), Main/Alt run Command select, Acc/Dec Disabled, Up Command, Down Command, Main/Alt Frequency Command select, PID Function Disabled, Integration Value Resets to Zero, Reset, KEB function, Auto-run Mode, PID Characteristics select…)</td></tr>
<tr><td>S2</td></tr>
<tr><td>S3</td></tr>
<tr><td>S4</td></tr>
<tr><td>S5</td></tr>
<tr><td>S6</td></tr>
<tr><td>A</td><td colspan="4">(+) RS485 communication applications</td></tr>
<tr><td>B</td><td colspan="4">(-) RS485 communication applications</td></tr>
<tr><td>GND(SG)</td><td colspan="4">Connected to protective ground (RS485 communication applications)</td></tr>
</table>

Descriptions of main circuit terminals

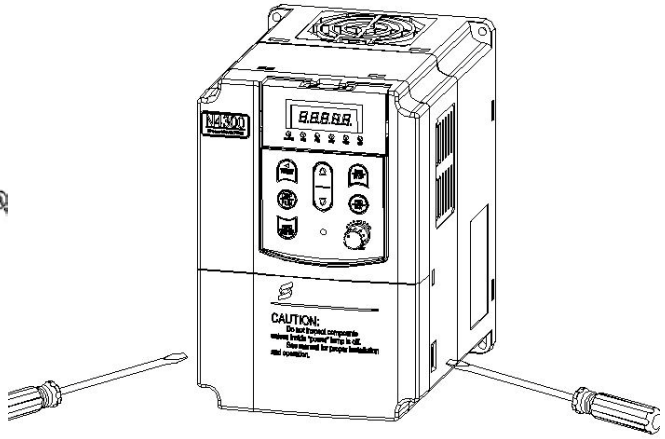
<table>
<tr><th>Symbol</th><th colspan="2">Description</th></tr>
<tr><td>L1 (R)</td><td colspan="2" rowspan="3">Main power input Three-phase: L1(R) / L2(S) / L3(T)</td></tr>
<tr><td>L2 (S)</td></tr>
<tr><td>L3 (T)</td></tr>
<tr><td>BR</td><td rowspan="2">Braking resistor connection terminal: Used in applications when it is required to stop a high inertia load rapidly. (refer to specifications of the braking resistor)</td><td rowspan="2">220V: 0.4KW~2.2KW
380V: 0.75KW~18.5KW</td></tr>
<tr><td>P</td></tr>
<tr><td>-</td><td rowspan="2">‘+’……‘-’: DC power supply input or External braking unit.</td><td rowspan="2">380V: 22KW~55KW</td></tr>
<tr><td>+</td></tr>
<tr><td>U (T1)</td><td colspan="2" rowspan="3">Inverter outputs (connect electric machine)</td></tr>
<tr><td>V (T2)</td></tr>
<tr><td>W (T3)</td></tr>
<tr><td>PE</td><td colspan="2">Connect ground terminal</td></tr>
</table>

3.7 Installing Wiring Diagram

1. Using M4~M5, fixing the inverter.
2. Using tools (flat and not sharp tools, such as **straight screwdriver**) depress two sides hooks of former cover lightly to remove the cover.

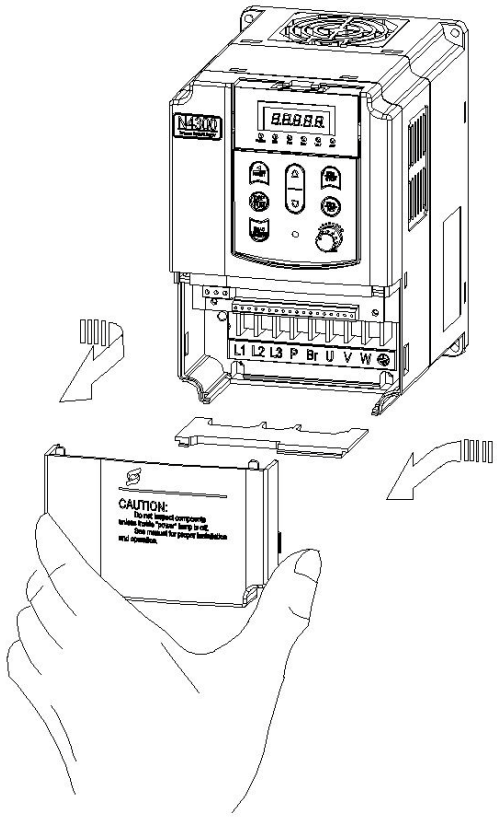


Fixing

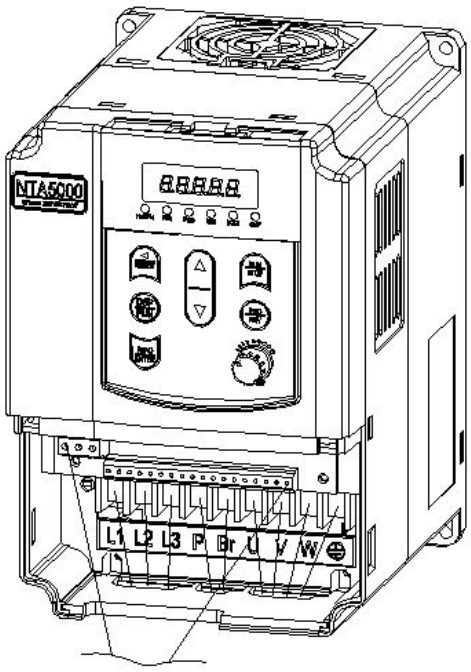


Removing Cover

3. Removing the cover and the board which blocks the wirings.
4. First, connecting the wirings with input, output power and **braking resistor** (braking unit), and using the block board to divide the wirings into three parts to get out from the bottom.
5. Second, wiring the control wirings (input and output) and communication wirings according to the demand, and make the wirings get out from the top of the block board.
6. After checking, reinstalling the inverter cover (please make the hooks align the inverter).



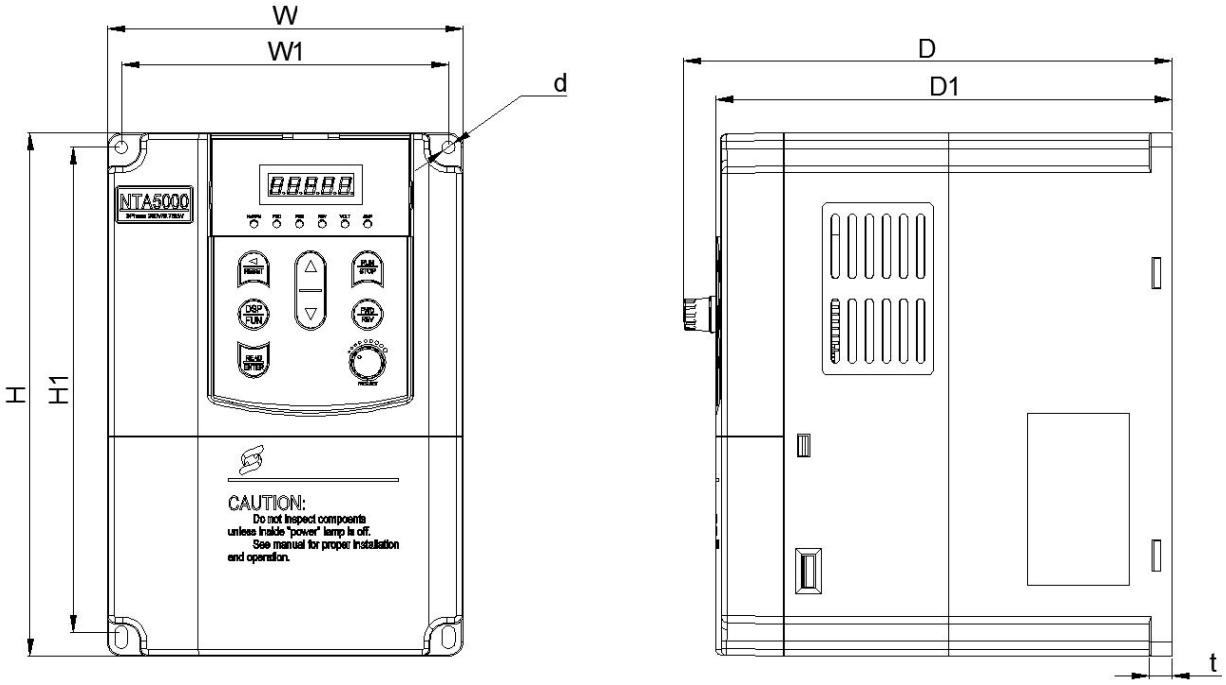
Removing the cover and the blocking board



Wiring and divided by blocking board
(Power wiring is under the control wiring)

3.8 Dimension

Unit(mm)



Model	W	H	D	W1	H1	D1	t	d
NTA5000-0.75K	125	185	172	115	171	160	7.5	M4
NTA5000-1.5K								
NTA5000-2.2K								
NTA5000-3.7K	150	245	188	136	231	176	8.5	M5
NTA5000-5.5K								
NTA5000-7.5K								
NTA5000-11K	217	320	215	204	305	203	12	M5
NTA5000-15K								
NTA5000-18.5K								
NTA5000-22K	270	380	210	250	360	200	1.6	M10
NTA5000-30K								
NTA5000-37K								
NTA5000-45K	313	745	309	220	630	297	1.6	M10
NTA5000-55K								

Chapter 4 Software Index

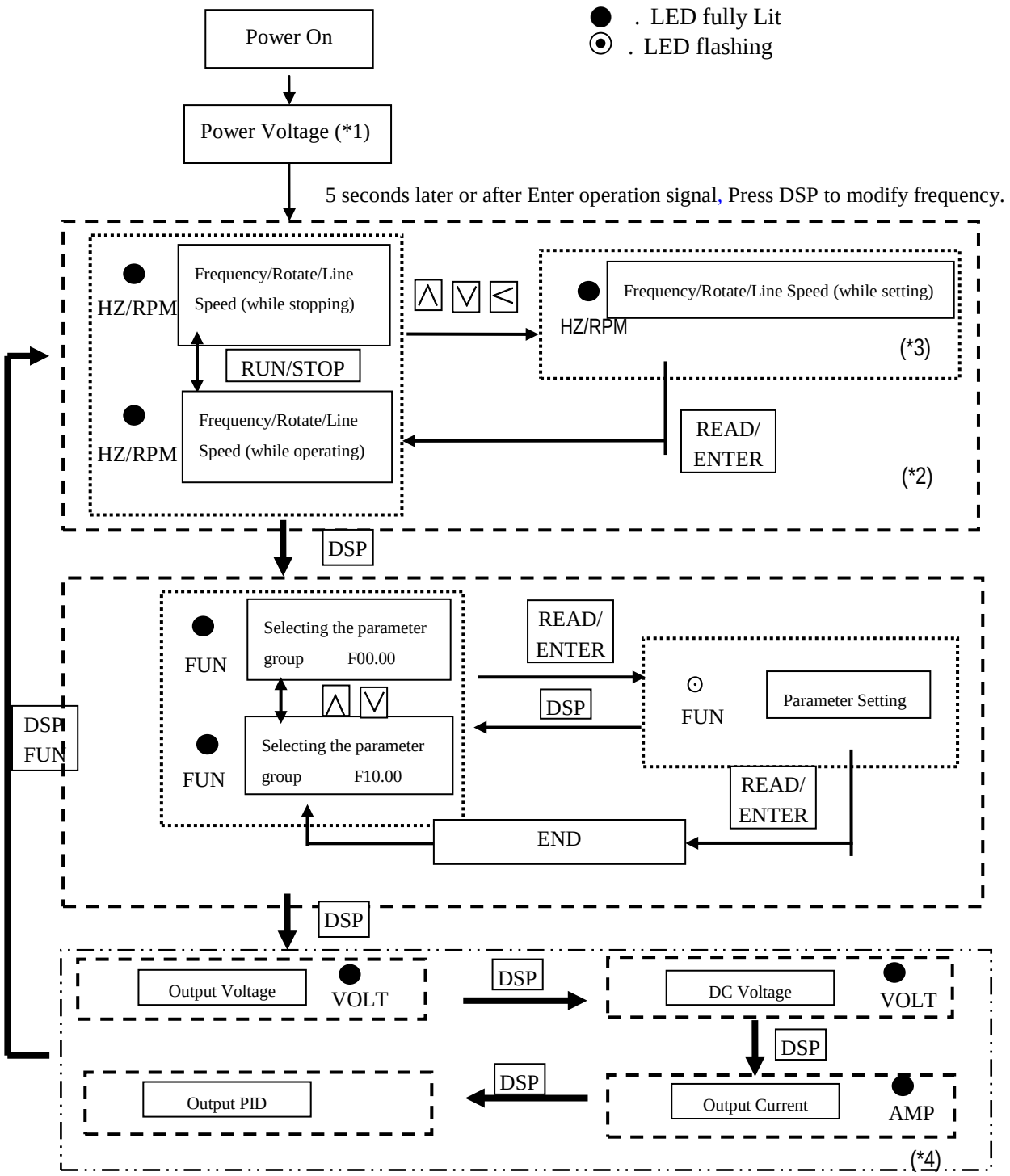
4.1 Keypad Description

4.1.1 Keypad Display and Operation Instruction

1. **FWD LED:** Forward Direction, LED action (Flash while stopped, solid Lit during operation).
2. **REV LED:** Reverse Direction, LED action (Flash while stopped, solid Lit during operation).
3. Four actions of **FUN, Hz/RPM, VOLT, AMP LED**, and display of five 7-segment display. (Refer to operation description of the keypad).

⚠ **Caution**
To avoid keypad damage, do not operate it with a screwdriver or any sharp and hard tool.

4.1.2 Operation Instruction of the keypad



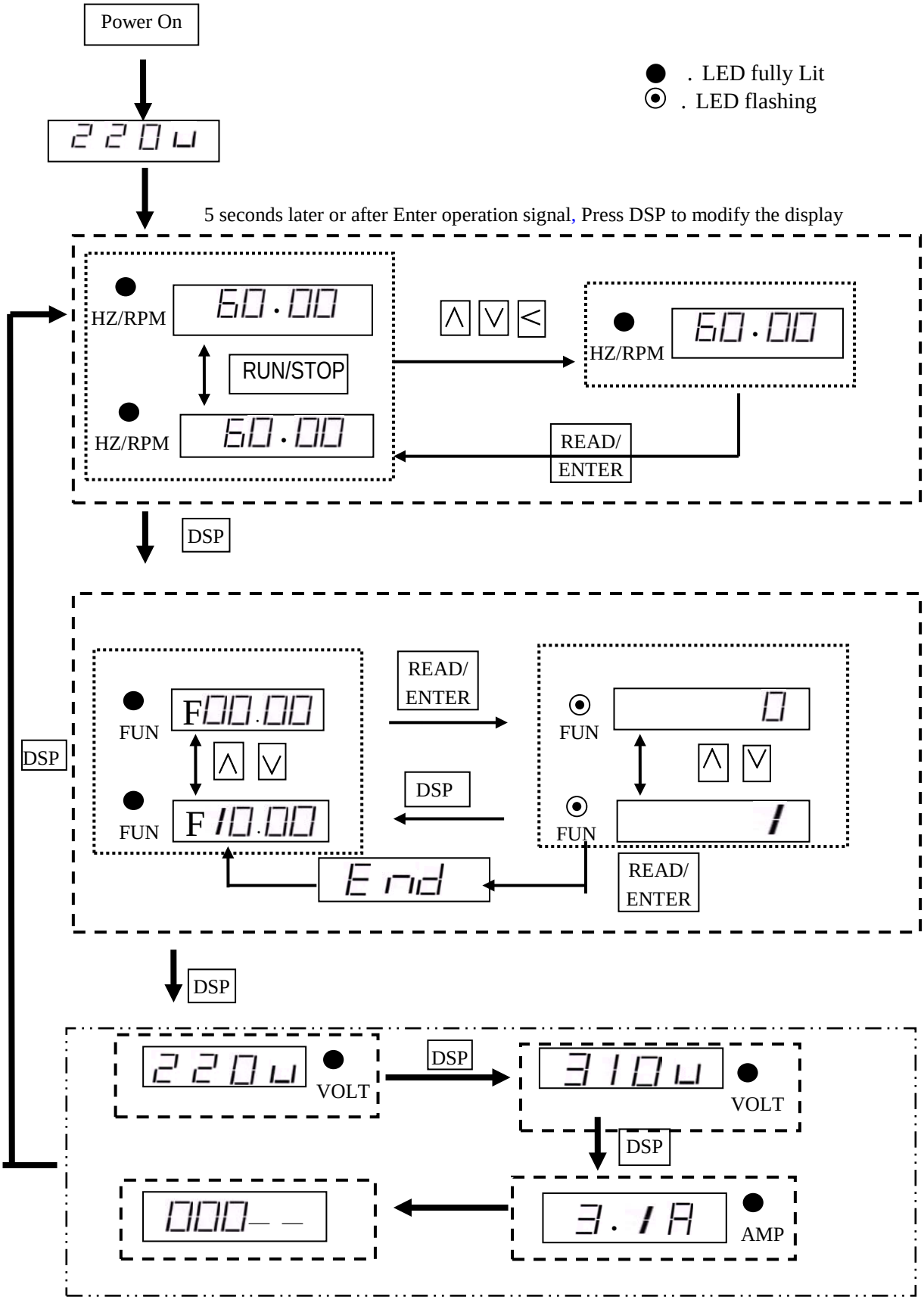
*1. The inverter will flash the current setting of F05.03 (power supply voltage) after power up.

*2. The displaying of frequency or line speed is determined by F11.01 and F11.02.

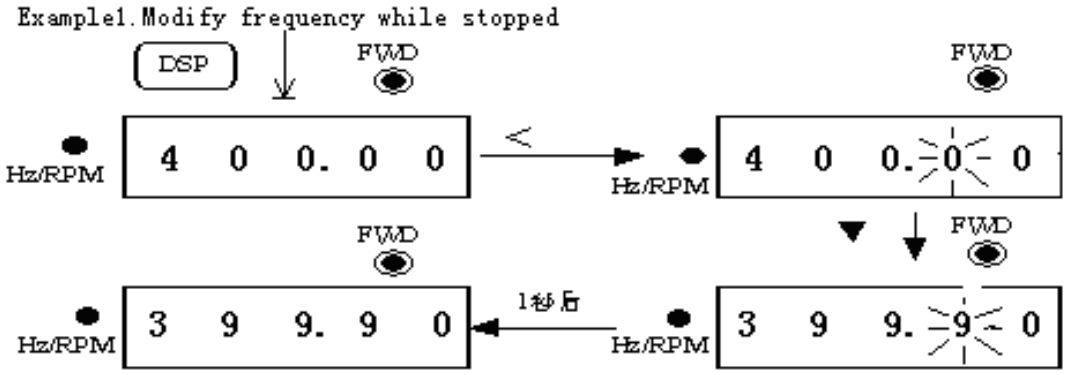
*3. It is not necessary to press ENTER key when stopped for modification. Refer to example 1, 2.

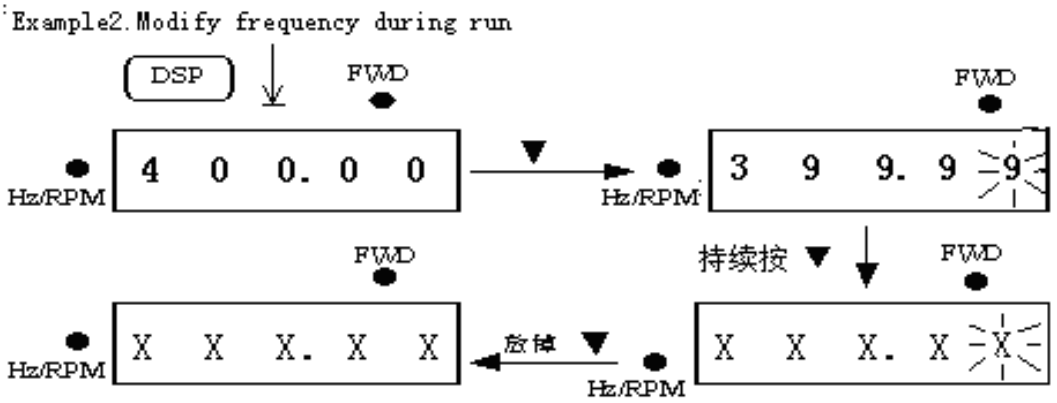
*4. Whether output current, output voltage, DC voltage is displayed or output PID is determined by F11.00 respectively.

4.1.3 Operation Instruction of the LED keypad

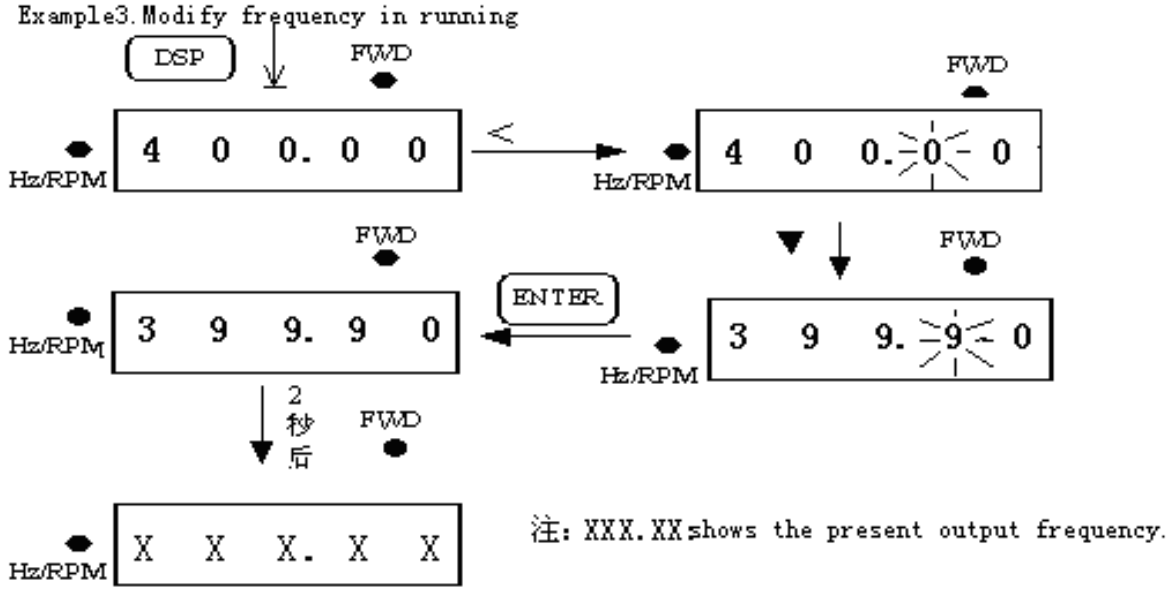


4.1.4 Keypad Operating Example

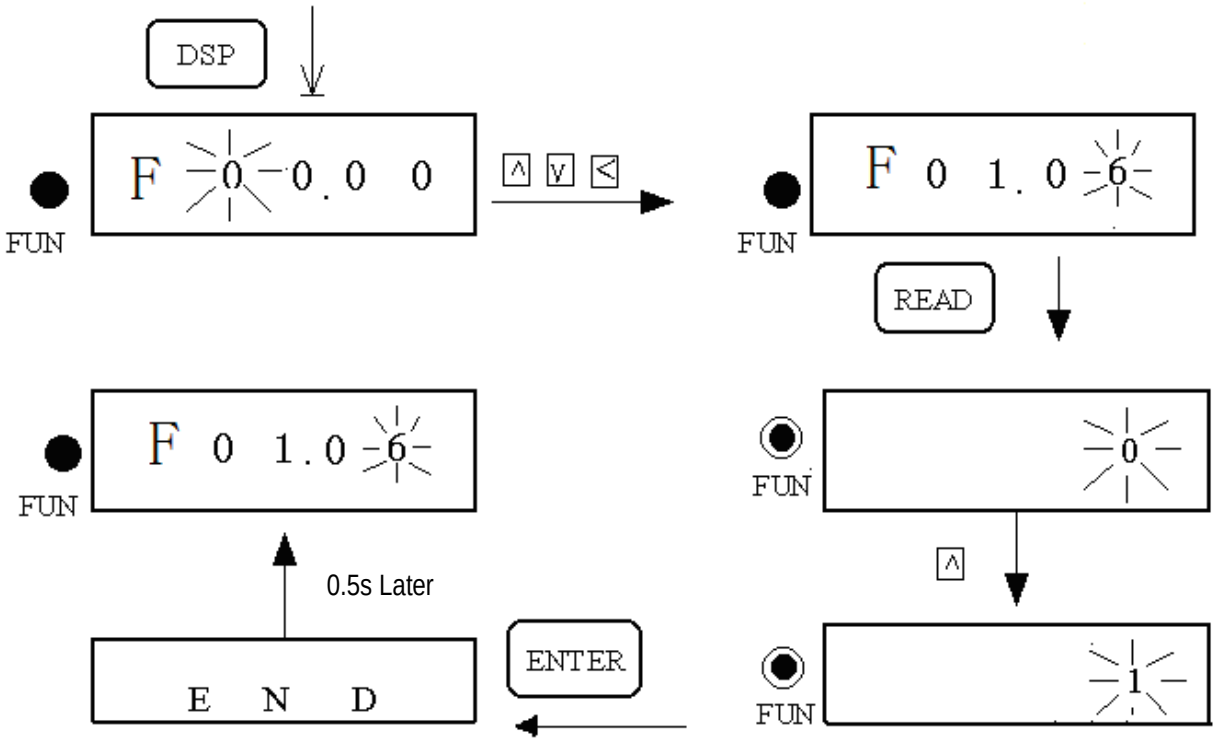




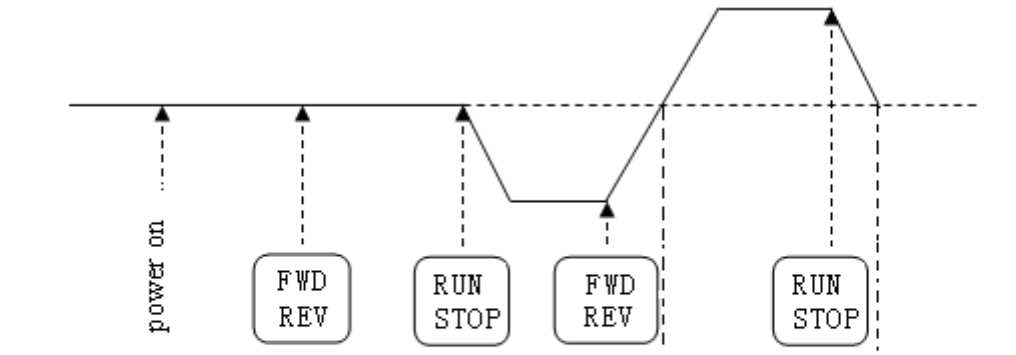
Note;XX.XX shows the present output frequency. The value ranges from 4.98 to 0 Hz, depending on the length og time the key ▼ pressed.



Example4：Modifying the Value of Parameter



Example 5：Operation Control



FWD LED	⊙	○	○	●	⊙
REV LED	○	⊙	●	○	○

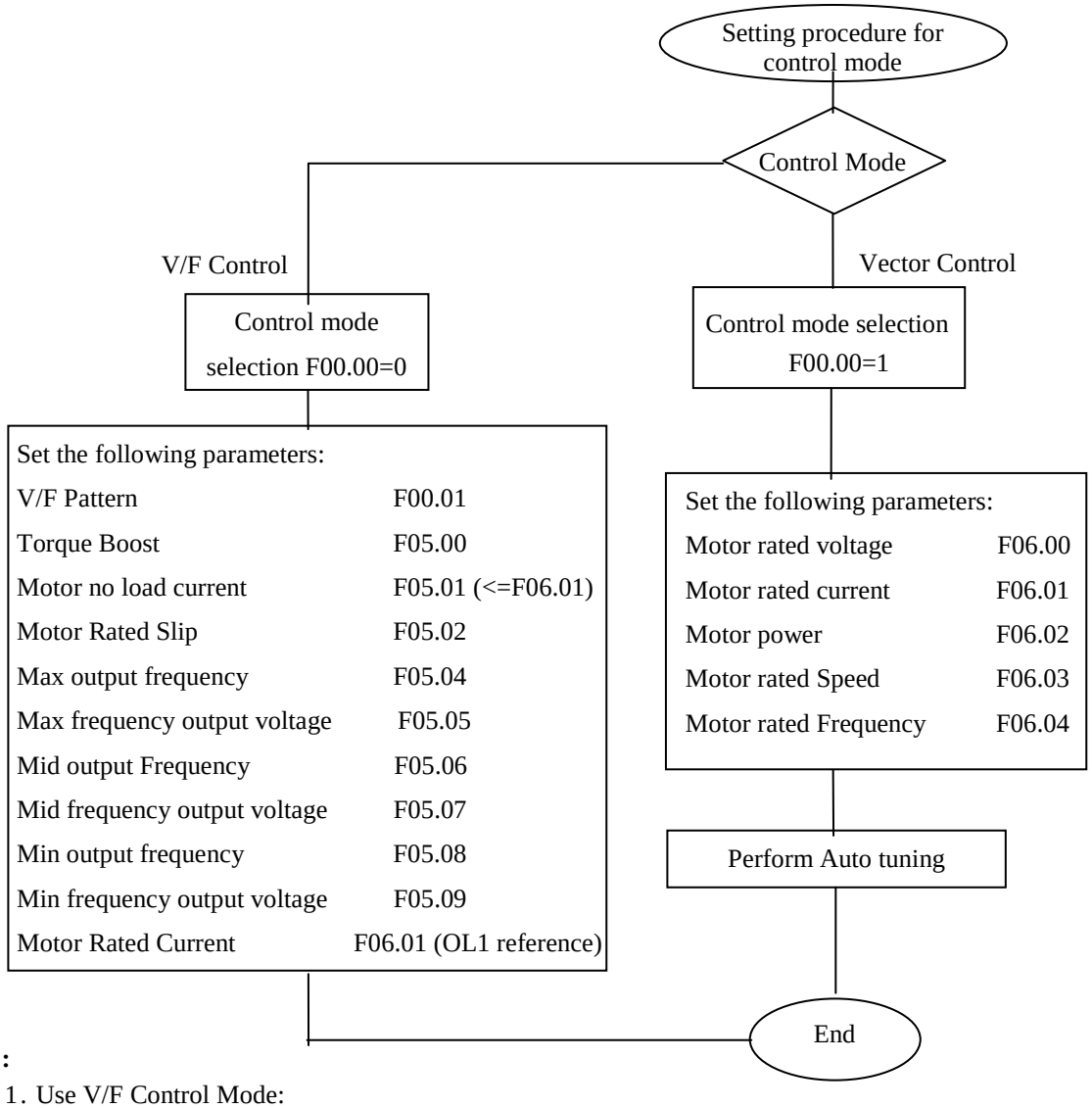
●. LED Lit
⊙. LED Flashing
○. LED Off

4.2 Control Mode Selection

The NTA5000 series inverter has two control modes:

1. **V/F Control Mode**
2. **Vector Control Mode**

The user can choose these modes with the digital keypad according to the application requirement. The factory setting is V/F Control Mode. Before operation, please set the control mode and the related motor parameters in accordance with the following flow chart. (The Vector control mode is suitable for the motors with the same power rating as the inverter, or one size bigger or smaller if necessary).



Note:

1. Use V/F Control Mode:
   (1) Use one inverter to drive several motors simultaneously.
   (2) Motor's nameplate is unknown or motor's specifications are too special, it will cause Auto-tuning fault.
   (3) Specification of inverter and motor differs by more than 1 size.
2. One inverter drives several motors (Only in V/F mode), set the motor parameters according to the following rules:
   (1) Sum the rated current of all motors for total inverter current (F06.01).
   (2) Input correct VF Pattern parameter (F05.04~F05.09).
3. When the nameplate of the motor is unknown, the inverter will be set by default to parameters according to the standard motor.
4. When parameter F00.00=0, the keypad will display 'Err2' when performing Auto tuning.
5. In Vector Mode, the max. & min. value of F06.01~F06.05 will be limited by one size higher or lower than standard motor specification. In VF Mode control, there is no limitation.

4.3 Programmable Functions List

Parameter Group No.	Description
F00.xx	The basic parameters group
F01.xx	External terminal digital signal input function group
F02.xx	External terminal analog signal input function group
F03.xx	Preset Frequency function group
F04.xx	Start/Stop command group
F05.xx	V/F command group
F06.xx	Motor parameter group
F07.xx	Protection function group
F08.xx	Communication function group
F09.xx	PID function group
F10.xx	Assistant function group
F11.xx	Keypad display group
F12.xx	User parameter group
F13.xx	Auto Run (Auto Sequencer) function group

F00.xx The Basic Parameters Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F00.00	Control Mode	0: Volts/Hz 1: Vector (General Purpose)	0	
F00.01	Volts/Hz Patterns (V/F)	0 ~ 18	0/9	*5
F00.02	-----	-----	----	Reserved
F00.03	Main Run Command Source Selection	0: Keypad 1: External Run/Stop Control 2: Communication 3: Expansion Card (Reserved Function)	0	
F00.04	Subsidiary Run Command Source Selection		0	
F00.05	Main Frequency Command Source Selection	0: Keypad 1: Potentiometer on Keypad 2: External AI1 Analog Signal Input 3: External Up/Down Frequency Control 4: Communication setting Frequency	0	
F00.06	Control Mode		0	
F00.07	Frequency Upper Limit (Hz)	0.01 ~ 400.00	50.00/ 60.00	
F00.08	Frequency Lower Limit (Hz)	0.00 ~ 399.99	0.00	
F00.09	Acceleration Time 1(Seconds)	0.1 ~ 3600.0	10.0	*1
F00.10	Deceleration Time 1(Seconds)	0.1 ~ 3600.0	10.0	*1
F00.11	Operation modes for external terminals	0: Forward/Stop-Reverse/Stop 1: Run/Stop-Forward/Reverse 2: 3-Wire Control Mode-Run/Stop	0	
F00.12	Jog Frequency (Hz)	1.00 ~ 25.00	2.00	*1
F00.13	Jog Acceleration Time (MFIT) (Seconds)	0.1 ~ 25.5	0.5	*1
F00.14	Jog Deceleration Time (MFIT) (Seconds)	0.1 ~ 25.5	0.5	*1

F01.xx External Terminal Digital Signal Input Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F01.00	Multifunction Input Term. S1	0: Forward/Stop Command 1: Reverse/Stop Command 2: Preset Speed unit 0 (F3.02) 3: Preset Speed unit 1 (F3.03) 4: Preset Speed unit 2 (F3.05) 5: Preset Speed unit 3 (F3.09) 6: Jog Forward Command 7: Jog Reverse Command 8: Acc/Dec 2 9: Emergency Stop 10: Base Block 11: Speed Search 12: Energy Saving (V/F) 13:Main/Alt run Command select 14: Acc/Dec Disabled 15: Up Frequency Command 16: Down Frequency Command 17: Main/Alt Frequency Command select 18: PID Function Disabled 19: Integration Value Resets to Zero 20: Reset 21: KEB function 22: Auto - Run Mode 23: PID Characteristics select (reverse with F09.00) 24: Reserved 25: Traverse run control 26: Up traverse run 27: Down traverse run 28: Counter trigger signal input (only for S6) 29: Clear counter	0	
F01.01	Multifunction Input Term. S2		1	
F01.02	Multifunction Input Term. S3		2	
F01.03	Multifunction Input Term. S4		3	
F01.04	Multifunction Input Term. S5		4	
F01.05	Multifunction Input Term. S6		20	
F01.06	Multifunction terminal S1~S6 confirm the scan times	1 ~ 200 (mSec X 2)	10	
F01.07	Up/Down set frequency width (Hz)	0.00 ~ 5.00	0.00	
F01.08	Up/Down keep Frequency mode	0: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down function is disabled. 1: When Up/Down is used, the preset frequency is reset to 0 Hz as the inverter stops. 2: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down is available.	0	

F01.09	Relay RY1	0: Running 1: Fault 2: Frequency Reached 3: Set Frequency 4: Frequency Threshold Level (> F01.11) - Frequency Reached 5: Frequency Threshold Level (<F01.11) - Frequency Reached 6: Auto Restart 7: Momentary AC Power Loss 8: Emergency Stop Mode 9: Base Block Stop Mode 10: Motor Overload Protection (OL1) 11: Drive Overload Protection (OL2) 12: Over torque Threshold Level (OL3) 13: PID Feedback Signal Loss 14: Output Current Reached 15: Counter Setting Value Reached	1	
F01.10	Output TR1 Operation Mode		0	
F01.11	Frequency Output Setting (Hz)	0.00 ~ 400.00	0.00	*1
F01.12	Frequency Detection Range	0.00 ~ 30.00	2.00	*1
F01.13	S1~ S5 switch type select	xxxx0: S1 NO. xxxx1: S1 NC. xxx0x: S2 NO. xxx1x: S2 NC. xx0xx: S3 NO. xx1xx: S3 NC. x0xxx: S4 NO. x1xxx: S4 NC. 0xxxx: S5 NO. 1xxxx: S5 NC.	00000	
F01.14	S7~ S9 switch type select	xxxx0: S6 NO. xxxx1: S6 NC. xxx0x: S7 NO. xxx1x: S7 NC, Reserved xx0xx: S8 NO. xx1xx: S8 NC, Reserved x0xxx: S9 NO. x1xxx: S9 NC, Reserved	00000	*6
F01.15	Output current Reached Level(A)	0.1 ~ 500.0	0.1	
F01.16	Output current detection time(s)	0.1 ~ 10.0	0.1	
F01.17	Traverse run control center frequency (%)	5.00 ~ 100.00	20.00	
F01.18	Traverse run amplitude (%)	0.1 ~ 20.0	10.0	
F01.19	Traverse run value variation (%)	0.0 ~ 50.0	0.0	
F01.20	Traverse run up time (Sec)	0.5 ~ 60.0	10.0	
F01.21	Traverse run down time (Sec)	0.5 ~ 60.0	10.0	
F01.22	Traverse run (upper) deviation (%)	0.0 ~ 20.0	10.0	
F01.23	Traverse run (lower) deviation (%)	0.0 ~ 20.0	10.0	

F02.xx External Terminal Analog Signal Input Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F02.00	AI1/AI2 analog Input signal type select	Setting / AI1 / AI2 0 / 0~10V Or (0~20mA) / 0~10V Or (0~20mA) 1 / 0~10V Or (0~20mA) / 2~10V or (4~20mA) 2 / 2~10V Or (4~20mA) / 0~10V Or (0~20mA) 3 / 2~10V Or (4~20mA) / 2~10V or (4~20mA)	0	
F02.01	AI1 Signal Verification Scan	1 ~ 200 (mSec x 2)	50	
F02.02	AI1 Gain (%)	0 ~ 1000	100	*1
F02.03	AI1 Bias (%)	0.0 ~ 100.0	0	*1
F02.04	AI1 Bias Selection	0: Positive 1: Negative	0	*1
F02.05	AI1 Signal direction selection	0: Positive 1: Negative	0	*1
F02.06	AI1 Gain (%)	0: PID feedback signal 1: AI2 Bias signal input	0	
F02.07	AI1 Bias (%)	1 ~ 200 (mSec x 2)	50	
F02.08	AI1 Bias Selection	0 ~ 1000	100	*1
F02.09	AI1 Slope	0.0 ~ 100.0	0.0	*1
F02.10	AI2 function Select	0: Positive 1: Negative	0	*1
F02.11	AI2 Signal Verification Scan	0: Positive 1: Negative	0	*1
F02.12	Analog Output Mode(FM+)	0: Output Frequency 1: Frequency Setting 2: Output Voltage 3: DC Bus Voltage 4: Output Current	0	*1
F02.13	Analog Output FM+ Gain (%)	0 ~ 1000	100	*1
F02.14	Analog Output FM+ Bias (%)	0.0 ~ 100.0	0.0	*1
F02.15	FM+ Bias Selection	0: Positive 1: Negative	0	*1
F02.16	FM+ Slope	0: Positive 1: Negative	0	*1
F02.17	Set analog input resolution (mV)	1 ~ 200	5	
F02.18	Analog temperature drift compensation	0: Invaild 1: Vaild	0	

F03.xx Preset Frequency Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F03.00	Preset Speed Control mode Selection	0: uniform time setted by F00.09 / F00.10, F10.05 / F10.06 1: single time	0	
F03.01	Preset Speed 0 (Hz)	0.00 ~ 400.00	5.00	Keypad Frequency
F03.02	Preset Speed 1 (Hz)		5.00	*1
F03.03	Preset Speed 2 (Hz)		10.00	*1
F03.04	Preset Speed 3 (Hz)		15.00	*1
F03.05	Preset Speed 4 (Hz)		20.00	*1
F03.06	Preset Speed 5 (Hz)		25.00	*1
F03.07	Preset Speed 6 (Hz)		30.00	*1
F03.08	Preset Speed 7 (Hz)		35.00	*1
F03.09	Preset Speed 8 (Hz)		40.00	*1
F03.10	Preset Speed 9 (Hz)		45.00	*1
F03.11	Preset Speed 10 (Hz)		50.00	*1
F03.12	Preset Speed 11 (Hz)		0.00	*1
F03.13	Preset Speed 12 (Hz)		0.00	*1
F03.14	Preset Speed 13 (Hz)		0.00	*1
F03.15	Preset Speed 14 (Hz)		0.00	*1
F03.16	Preset Speed 15 (Hz)		0.00	*1
F03.17	Preset Speed 0 Acctime (Secs)	0.1 ~ 3600.0	10.0	*1
F03.18	Preset Speed 0 Dectime (Secs)		10.0	*1
F03.19	Preset Speed 1 Acctime (Secs)		10.0	*1
F03.20	Preset Speed 1 Dectime (Secs)		10.0	*1
F03.21	Preset Speed 2 Acctime (Secs)		10.0	*1
F03.22	Preset Speed 2 Dectime (Secs)		10.0	*1
F03.23	Preset Speed 3 Acctime (Secs)		10.0	*1
F03.24	Preset Speed 3 Dectime (Secs)		10.0	*1
F03.25	Preset Speed 4 Acctime (Secs)		10.0	*1
F03.26	Preset Speed 4 Dectime (Secs)		10.0	*1
F03.27	Preset Speed 5 Acctime (Secs)		10.0	*1
F03.28	Preset Speed 5 Dectime (Secs)		10.0	*1

F03.29	Preset Speed 6 Acctime (Secs)	0.1 ~ 3600.0	10.0	*1
F03.30	Preset Speed 6 Dectime（Secs）		10.0	*1
F03.31	Preset Speed 7 Acctime (Secs)		10.0	*1
F03.32	Preset Speed 7 Dectime (Secs)		10.0	*1
F03.33	Preset Speed 8 Acctime (Secs)		10.0	*1
F03.34	Preset Speed 8 Dectime (Secs)		10.0	*1
F03.35	Preset Speed 9 Acctime (Secs)		10.0	*1
F03.36	Preset Speed 9 Dectime (Secs)		10.0	*1
F03.37	Preset Speed 10 Acctime (Secs)		10.0	*1
F03.38	Preset Speed 10 Dectime (Secs)		10.0	*1
F03.39	Preset Speed 11 Acctime (Secs)		10.0	*1
F03.40	Preset Speed 11 Dectime (Secs)		10.0	*1
F03.41	Preset Speed 12 Acctime (Secs)		10.0	*1
F03.42	Preset Speed 12 Dectime（Secs）		10.0	*1
F03.43	Preset Speed 13 Acctime (Secs)		10.0	*1
F03.44	Preset Speed 13 Dectime (Secs)		10.0	*1
F03.45	Preset Speed 14 Acctime (Secs)		10.0	*1
F03.46	Preset Speed 14 Dectime (Secs)		10.0	*1
F03.47	Preset Speed 15 Acctime (Secs)		10.0	*1
F03.48	Preset Speed 15 Dectime (Secs)		10.0	*1

F04.xx Start/Stop Command Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F04.00	Starting Method Selection	0: Normal Start 1: Enable Speed Search	0	
F04.01	Stopping Method Selection	0: Enhanced braking capacity 1: Coast to stop 2: standard braking capacity	2	
F04.02	Keypad Stop Button	0: Stop Button Enabled 1: Stop Button Disabled	0	
F04.03	Momentary Power Loss and Restart	0: Momentary Power Loss and Restart disable 1: Momentary power loss and restart enable 2: Momentary power loss and restart enable while CPU is operating. (According to the capacity of DC power)	0	
F04.04	Momentary Power Loss Ride-Thru Time (Seconds)	0.0 ~ 2.0	0.5	

F04.05	Auto Restart Method	0: Enable Speed Search 1: Normal Start	0	
F04.06	Auto Restart Delay Time (secs)	0 ~ 800.0	0.0	
F04.07	Number of Auto Restart Attempts	0 ~ 10	0	
F04.08	Reset Mode Setting	0: Enable Reset Only when Run Command is Off 1: Enable Reset when Run Command is On or Off	0	
F04.09	Direct Running After Power Up	0: Enable Direct running after power up 1: Disable Direct running after power up	1	
F04.10	Delay-ON Timer (secs)	1.8 ~ 300.0	1.8	*7
F04.11	Kinetic Energy Back-up Deceleration Time	0.0: Disable 0.1~25.0: KEB Deceleration Time	0.0	
F04.12	Lower Limit of Power Voltage Detect	150.0 ~ 210.0 (220V class) 300.0 ~ 420.0 (380V class)	190.0/ 380.0	
F04.13	DC Injection Brake Level (%) @start	0.0 ~ 150.0	0.0	
F04.14	DC Injection Brake Time (secs) @start	0.0 ~ 25.5	0.0	
F04.15	DC Injection Brake Start Frequency (Hz) @stopped	0.10 ~ 10.00	1.50	
F04.16	DC Injection Brake Level (%) @Stopped	0.0 ~ 150.0	50.0	
F04.17	DC Injection Brake Time (secs) @stopped	0.0 ~ 25.5	0.5	
F04.18	Over excitation Deceleration Gain	0.00 ~ 0.25	0.00	
F04.19	AVR Function	0: AVR function enable 1: AVR function Disable 2: AVR function disable for stop 3: AVR function disable for Deceleration. 4: AVR function disable for stop and Deceleration. 5: when VDC>360/740V, AVR function disable for stop and Deceleration.	5	
F04.20	DC Injection Brake Mode Selection (secs) @stopped	0: Current braking mode (F04.16 can be set to 0.0~150.0%) 1: Voltage braking mode (F04.16 can be set to 0.0~20.0%) 2: Crawling braking mode (F04.16 can be set to 0.0~200.0%, F04.15 can be set to 0~6.00)	0	

F05.xx V/F Command Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F05.00	Volts/Hz Curve Modification (V/F Torque Boost) (%)	0 ~ 10.0	0.0	*5
F05.01	Motor No Load Current (Amps AC)	-----		*5
F05.02	Motor rated Slip Compensation (%)	0.0 ~200.0	0.0	*5
F05.03	V/F max voltage	170.0 ~ 264.0 (220V class) 323.0 ~ 528.0 (380V class)		*5
F05.04	Maximum Frequency (Hz)	0.20 ~ 400.00	50.00/ 60.00	*5
F05.05	Maximum Frequency Voltage Ratio (%)	0.0 ~ 100.0	100.0	*5
F05.06	Medium Frequency (Hz)	0.10 ~ 400.00	25.00/ 30.00	*5
F05.07	Medium Frequency Voltage Ratio (%)	0.0 ~ 100.0	50.0	*5
F05.08	Minimum Frequency (Hz)	0.10 ~ 400.00	0.50/ 0.60	*5
F05.09	Minimum Frequency Voltage Ratio (%)	0.0 ~ 100.0	1.0	*5
F05.10	V/F Energy Saving Mode	0: Disabled 1: Controlled by MFIT at Energy Saving	0	*5
F05.11	V/F Energy Saving Gain (%)	0 ~ 100	80	*5
F05.12	V/F start Frequency	0.00 ~ 10.00	0.00	*5
F05.13	Slip Compensation Low pass filter time	0.05 ~ 10.00	0.10	
F05.14	Oscillation suppression gain	0.0 ~ 200.0	0.0	*1*5

F06.xx Motor Parameter Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F06.00	Motor Rated Voltage (VAC)	-----		*4
F06.01	Motor Rated Current (Amp AC)	-----		*4
F06.02	Motor Rated Power (kW)	-----		*4
F06.03	Motor Rated Speed (RPM)	-----		*4
F06.04	Motor Rated Frequency (Hz)	-----		*4
F06.05	Motor Parameter Auto Tuning	0:Invalid 1:Valid	0	
F06.06	Stator Resistance (Ohms)	-----		*3*4

F06.07	Rotor Resistance (Ohms)	-----		*3*4
F06.08	Equivalent Inductance (mH)	-----		*3*4
F06.09	Magnetizing Current (AmpsAC)	-----		*3*4
F06.10	Ferrite Loss Conductance (gm)	-----		*3*4
F06.11	Low-frequency compensation Gain	0 ~ 100	30	

F07.xx Protection Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F07.00	Trip Prevention Selection	xxxx0: Enable Trip Prevention During Acceleration xxxx1: Disable Trip Prevention During Acceleration xxx0x: Enable Trip Prevention During Deceleration xxx1x: Disable Trip Prevention During Deceleration xx0xx: Enable Trip Prevention in Run Mode xx1xx: Disable Trip Prevention in Run Mode x0xxx: Enable over voltage Prevention in Run Mode x1xxx: Disable over voltage Prevention in Run Mode	00000	
F07.01	Trip Prevention Level During Acceleration (%)	50 ~ 300	200	*7
F07.02	Trip Prevention Level During Deceleration (%)	50 ~ 300	200	*7
F07.03	Trip Prevention Level In Run Mode (%)	50 ~ 300	200	*7
F07.04	Electronic Motor Overload Protection Operation Mode	350VDC ~ 390VDC (220V Class) 700VDC ~ 780VDC (380V Class)	380/ 760	*7
F07.05	Motor type Selection	0: Enable Electronic Motor Overload Protection 1: Disable Electronic Motor Overload Protection	1	
F07.06	Motor Overload Protection Curve Selection	0: Electronic Motor Overload Protection Set for Non-Inverter Duty Motor 1: Electronic Motor Overload Protection Set for Inverter Duty Motor	0	
F07.07	Operation After Overload Protection is Activated	0: Constant Torque (OL =103 %) (150 % for 1 Minute) 1: Variable Torque (OL = 113 %) (123 % for 1 Minute)	0	
F07.08	Over torque Detection Selection (OL3)	0: Coast-to-Stop After Overload Protection is Activated 1: Drive Will Not Trip when Overload Protection is Activated (OL1)	0	

F07.09	Operation After Over torque Detection is Activated	0: Disable Over torque Operation 1: Enable Over torque Operation Only if at Set Frequency 2: Enable Over torque Operation while the Drive is in Run Mode	0	
F07.10	Over torque Threshold Level (%)	0: Coast-to-Stop After Over torque is Activated 1: Drive will Continue to Operate After Over torque is Activated (OL3)	1	
F07.11	Over torque Activation Delay Time (Seconds)	30 ~ 300	160	
F07.12	OH over heat Protection (cooling fan control)	0.0 ~ 25.0	0.1	
F07.13	Input Phase Loss Protection	0: Auto (Depends on temp.) 1: Operate while in RUN mode 2: Always Run 3: Disabled	1	
F07.14	Current limiting protection	0:disable 1:enable	0	
F07.15	Output Phase Loss Protection	0:disable 1:enable	0	
F07.16	(OL1) Overload Protection (150%) time	0:disable 1:enable	0	
F07.17	Electronic Motor Overload Protection Operation Mode	0.1 ~ 5min	1	

F08.xx Communication Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F08.00	Assigned Communication Station Number	0 ~ 64	1	*2*4
F08.01	RTU /ASCII mode select	0: RTU mode 1: ASCII mode	0	*2*3
F08.02	Baud Rate Setting (bps)	0: 4800 1: 9600 2: 19200 3: 38400	2	*2*3
F08.03	Stop Bit Selection	0: 1 Stop Bit 1: 2 Stop Bit	0	*2*3
F08.04	Parity Selection	0: NO Parity 1: Even Parity 2: Odd Parity	0	*2*3
F08.05	Data Format Selection	0: 8 Bits Data 1: 7 Bits Data	0	*2*3
F08.06	Communication time-out detection time	0.0 ~ 25.5	0.0	
F08.07	Communication time-out operation selection	0: Deceleration to stop (F00.10: Deceleration time 1) 1:Coast to stop 2: Deceleration to stop (F10.06: Deceleration time 2) 3: continue operating	0	
F08.08	Err6 fault tolerance times	1 ~ 20	3	
F08.09	Drive Transmit Wait Time(ms)	5 ~ 65	5	

F09.xx PID Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F09.00	PID Mode Selection	0: Disabled 1: Bias D Control (Fwd/Rev, positive Characteristics) 2: Feedback D Control (Fwd/Rev, positive Characteristics) 3: Bias D Control (Fwd/Rev, Reversed Characteristics) 4: Feedback D Control (Fwd/Rev, Reversed Characteristics) 5: Frequency Command + Bias D Control (Fwd/Rev, positive Characteristics) 6: Frequency Command + Feedback D Control (Fwd/Rev, positive Characteristics) 7: Frequency Command + Bias D Control (Fwd/Rev ,Reversed Characteristics) 8: Frequency Command + Feedback D Control (Fwd/Rev, Reversed Characteristics) 9: Bias D Control (Fwd -- positive Characteristics, Rev -- Reversed Characteristics) 10: Feedback D Control (Fwd -- positive Characteristics, Rev -- Reversed Characteristics) 11: Bias D Control (Fwd -- Reversed Characteristics, Rev-- positive Characteristics) 12: Feedback D Control (Fwd -- Reversed Characteristics, Rev-- positive Characteristics) 13: Frequency Command + Bias D Control (Fwd -- positive Characteristics, Rev -- Reversed Characteristics) 14: Frequency Command + Feedback D Control (Fwd-- positive Characteristics, Rev-- Reversed Characteristics) 15: Frequency Command + Bias D Control (Fwd -- Reversed Characteristics, Rev -- positive Characteristics) 16: Frequency Command + Feedback D Control (Fwd -- Reversed Characteristics, Rev -- positive Characteristics)	0	
F09.01	Feedback Gain coefficient	0.00 ~ 10.00	1.00	*1
F09.02	Proportional Gain (%)	0.0 ~ 10.0	1.0	*1
F09.03	Integration Time (Secs)	0.0 ~ 100.0	10.0	*1

F09.04	Differentiation Time (Secs)	0.00 ~ 10.00	0.00	*1
F09.05	PID Offset	0: Positive 1: Negative	0	*1
F09.06	PID Offset Adjust (%)	0 ~ 109	0	*1
F09.07	PID Output Lag Filter Time (Secs)	0.0 ~ 2.5	0.0	*1
F09.08	Feedback Loss Detection Mode	0: Disabled 1: Enabled - Drive Continues to Operate After Feedback Loss 2: Enabled - Drive 'STOPS' After Feedback Loss	0	
F09.09	Feedback Loss Detection Level (%)	0 ~ 100	0	
F09.10	Feedback Loss Detection Delay Time (Secs)	0.0 ~ 25.5	1.0	
F09.11	Integration Limit Value (%)	0 ~ 109	100	*1
F09.12	Integration Value Resets to Zero when Feedback Signal Equals the Intended Value	0 ~ 30 0: Disabled 1: 1 Second 30: 30 Seconds	0	
F09.13	Allowable Integration Error Margin (Units) (1 Unit = 1/8192)	0 ~ 100	0	
F09.14	Sleep Frequency Level	0.00 ~ 400.00	0.00	
F09.15	Sleep Function Delay Time	0.0 ~ 25.5	0.0	
F09.16	Wake up frequency Level	0.00 ~ 400.00	0.00	
F09.17	Wake up function Delay Time	0.0 ~ 25.5	0.0	

F10.xx Assistant Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F10.00	Expansion card type	0: none 1: IO-card (Reserved function)	0	
F10.01	Reverse operation control	0: Reverse command is enabled 1: Reverse command is disabled	0	
F10.02	Keypad Operation with Up/Down Keys in Run Mode	0: 'Enter' must be pressed after Frequency change with Up/Down Keys on keypad. 1: Frequency will be changed directly when Up/Down Keys are Pressed	0	
F10.03	Carrier Frequency (kHz)	1 ~ 15	5	*7

F10.04	Carrier mode Selection	0: Carrier mode0 3-phase PWM modulation 1: Carrier mode1 2-phase PWM modulation 2: Carrier mode2 2-phase randomized PWM modulation 3: Carrier mode3 randomized PWM modulation 4: Carrier mode4 dual randomized PWM modulation	1	
F10.05	Acceleration Time 2 (MFIT) (Secs)	0.1 ~ 3600.0	10.0	*1
F10.06	Deceleration Time 2 (MFIT) (Secs)	0.1 ~ 3600.0	10.0	*1
F10.07	S-Curve Acc/Dec 1 (Secs)	0.0 ~ 4.0	0.1	
F10.08	S-Curve Acc/Dec 2 (Secs)	0.0 ~ 4.0	0.1	
F10.09	S-Curve Acc/Dec 3 (Secs)	0.0 ~ 4.0	0.1	
F10.10	S-Curve Acc/Dec 4 (Secs)	0.0 ~ 4.0	0.1	
F10.11	Skip Frequency 1 (Hz)	0.00 ~ 400.00	0.00	*1
F10.12	Skip Frequency 2 (Hz)	0.00 ~ 400.00	0.00	*1
F10.13	Skip Frequency 3 (Hz)	0.00 ~ 400.00	0.00	*1
F10.14	Skip Frequency Bandwidth (±Hz)	0.00 ~ 30.00	0.00	*1
F10.15	Carrier Frequency Reduction byTemperature Raising	0: disabled 1: enabled	0	

F11.xx Keypad Display Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F11.00	Display Mode	xxxx0: Disable Motor Current Display xxxx1: Enable Motor Current Display xxx0x: Disable Motor Voltage Display xxx1x: Enable Motor Voltage Display xx0xx: Disable Bus Voltage Display xx1xx: Enable Bus Voltage Display x0xxx: Disable temperature Display x1xxx: Enable temperature Display 0xxxx: Disable PID feedback Display 1xxxx: Enable PID feedback Display	00000	*1
F11.01	Custom Units (Line Speed) Value	0 ~ 65535	1500/ 1800	*1

F11.02	Custom Units (Line Speed) Display Mode	0: Drive Output Frequency is Displayed 1: Line Speed is Displayed in Integer (xxxxx) 2: Line Speed is Displayed with One Decimal Place (xxxx.x) 3: Line Speed is Displayed with Two Decimal Places (xxx.xx) 4: Line Speed is Displayed with Three Decimal Places (xx.xxx)	0	*1
F11.03	Max PID Feedback Setting	0 ~ 999	100	*1
F11.04	Min PID Feedback Setting	0 ~ 999	0	*1
F11.05	PID Feedback Display Mode	0:Displayed in Integer (xxx) 1:Displayed with One Decimal Place (xx.x) 2:Displayed with Two Decimal Places (x.xx)	0	*1
F11.06	PID Feedback Display Unit Setting	0: xxx-- (no unit) 1: xxxpb (pressure) 2: xxxfl (flow)	0	*1
F11.07	Display count value	0: Not display 1: Display	0	
F11.08	Count value reached	0 ~ 9999	0	
F11.09	Current count value	0 ~ 9999	0	

F12.xx User Parameter Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F12.00	Drive Horsepower Code		----	*3
F12.01	Software Version	----	----	*3
F12.02	Fault Log (Last 3 Faults)		----	*3
F12.03	Accumulated Operation Time1 (Hours)	0 ~ 23	----	*3
F12.04	Accumulated Operation Time2 (Days)	0 ~ 65535	----	*3
F12.05	Accumulated Operation Time Mode	0: Time Under Power 1: Run Mode Time Only	0	*3
F12.06	Reset Drive to Factory Settings	1150: Reset to the 50Hz factory setting 1160: Reset to the 60Hz factory setting	----	
F12.07	Parameter Lock	0: Enable all Functions 1: F03.01~F03.16 cannot be changed 2: All Functions cannot be changed Except F03.01~ F03.16 3: Disable All Function	0	
F12.08	Parameter password	00000 ~ 65535	00000	

F13.xx Auto Run Function Group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
F13.00	Auto Run (sequencer) mode selection	0: Disabled. 1: Single cycle. (Continues to run from the Unfinished step if restarted). 2: Periodic cycle. (Continues to run from the unfinished step if restarted). 3: Single cycle, then holds the speed Of final step to run. (Continues to run from the unfinished step if restarted). 4: Single cycle. (Starts a new cycle if restarted). 5: Periodic cycle. (Starts a new cycle if restarted). 6: Single cycle, then hold the speed of final step to run. (Starts a new cycle if restarted).	0	
F13.01	Auto-Run Mode Frequency Command 1	0.00 ~ 400.00	0.00	*1
F13.02	Auto-Run Mode Frequency Command 2			
F13.03	Auto-Run Mode Frequency Command 3			
F13.04	Auto-Run Mode Frequency Command 4			
F13.05	Auto-Run Mode Frequency Command 5			
F13.06	Auto-Run Mode Frequency Command 6			
F13.07	Auto-Run Mode Frequency Command 7			
F13.08	Auto-Run Mode Frequency Command 8			
F13.09	Auto-Run Mode Frequency Command 9			
F13.10	Auto-Run Mode Frequency Command 10			
F13.11	Auto-Run Mode Frequency Command 11			
F13.12	Auto-Run Mode Frequency Command 12			
F13.13	Auto-Run Mode Frequency Command 13			
F13.14	Auto-Run Mode Frequency Command 14			
F13.15	Auto-Run Mode Frequency Command 15			
F13.16	Auto-Run Mode Running Time Setting 0	0.0 ~ 3600.0	0.0	
F13.17	Auto-Run Mode Running Time Setting 1			
F13.18	Auto-Run Mode Running Time Setting 2			
F13.19	Auto-Run Mode Running Time Setting 3			
F13.20	Auto-Run Mode Running Time Setting 4			
F13.21	Auto-Run Mode Running Time Setting 5			
F13.22	Auto-Run Mode Running Time Setting 6			

F13.23	Auto-Run Mode Running Time Setting 7	0.0 ~ 3600.0	0.0	
F13.24	Auto-Run Mode Running Time Setting 8			
F13.25	Auto-Run Mode Running Time Setting 9			
F13.26	Auto-Run Mode Running Time Setting 10			
F13.27	Auto-Run Mode Running Time Setting 11			
F13.28	Auto-Run Mode Running Time Setting 12			
F13.29	Auto-Run Mode Running Time Setting 13			
F13.30	Auto-Run Mode Running Time Setting 14			
F13.31	Auto-Run Mode Running Time Setting 15			
F13.32	Auto-Run Mode Running Direction 0	0: stop 1: forward 2: reverse	0	
F13.33	Auto-Run Mode Running Direction 1			
F13.34	Auto-Run Mode Running Direction 2			
F13.35	Auto-Run Mode Running Direction 3			
F13.36	Auto-Run Mode Running Direction 4			
F13.37	Auto-Run Mode Running Direction 5			
F13.38	Auto-Run Mode Running Direction 6			
F13.39	Auto-Run Mode Running Direction 7			
F13.40	Auto-Run Mode Running Direction 8			
F13.41	Auto-Run Mode Running Direction 9			
F13.42	Auto-Run Mode Running Direction 10			
F13.43	Auto-Run Mode Running Direction 11			
F13.44	Auto-Run Mode Running Direction 12			
F13.45	Auto-Run Mode Running Direction 13			
F13.46	Auto-Run Mode Running Direction 14			
F13.47	Auto-Run Mode Running Direction 15			

Note: *1 Can be modified during run.
*2 Cannot be modified while communication is active.
*3 Do not change while making factory setting.
*4 The parameter will be changed by replacing model.
*5 Only available in V/F mode.
*6 Function S7~S9 in parameter F01.04 is only for IO card being used (Reserved function).
*7 22K~55K models:

	Parameter	**Factory Setting**
①	F04.10	5secs
②	F07.01 ~F07.03	130 (inverter rated current 200%).
③	F07.04	740
	Parameter	**Range/Code**
④	F10.03	1~10

4.4 Parameter Function Description

Group F00.xx The Basic Parameters Group

F00.00 Control Mode
=0: V/F mode
=1: Vector mode(General Purpose)

To select the appropriate vector control mode or V/F mode, according to the load characteristics.
1. If V/F mode is selected, please set parameters, group F05.xx to comply with the load features.
2. Vector is best suited to control the general load or rapidly-changed torque load.

F00.01 Volts/Hz Patterns (V/F)
= 0 ~ 18

1. F00.01= 0~17, V / F Pattern. (Refer to groupF05.xx)
2. F00.01=18, Flexiable V/F pattern, programmable according to parameters F05.04~F05.09.

F00.03 Main Run Command Source Select
F00.04 Alternative Run Command Source Select
= 0: Keypad
= 1: External Run/Stop Control
= 2: Communication
= 3: Expansion Card (Reserved function)

1. F00.03/F00.04=0, the inverter is controlled by the keypad.
2. F00.03/F00.04=1, the inverter is controlled by the external terminals, and the Stop key for emergency stop is operational. (Refer to F04.02 description)

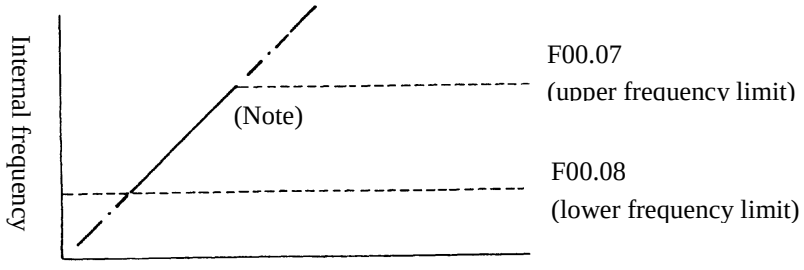
Note: F00.03/F00.04=1, please refer to parameter F04.03, F04.04, F04.06 and F04.07 for detailed descriptions to ensure safety of operators and machines.

3. F00.03/F00.04=2, the inverter is controlled by Communication. (RS485 ModBus RTU)
4. F00.03/F00.04=3, the inverter is controlled by expansion card. (Reserved function, setting is invalid).
5. When F01.00~F01.05 is set13 (Main/Alt Control Signal Select), if the terminal is ON, the inverter is controlled by parameter F00.03 if the terminal is Off, the inverter is controlled by parameter F00.04.

F00.05 Main Frequency Command Source Select
F00.06 Alternative Frequency Command Source Select
=0: UP/DOWN of Keypad
=1: Potentiometer on Keypad
=2: External AI1 Analog Signal Input
=3: External Up/Down Frequency Control
=4: Communication setting Frequency

1. Please refer to description of parameter group F01.00~F01.05(multifunction input terminals) for the function Up/Down terminal.
2. The priority in reading frequency is Jog> preset speed>▲▼ on keypad or Up / Down or communication control.
3. WhenF01.00~F01.05is set 17 (Main/Alt Frequency Command Select), if the terminal is ON, the inverter frequency command is set by parameter F00.05, if the terminal is Off, the inverter frequency command is set by parameter F00.06.

F00.07 Frequency Upper limit (Hz) **= 0.01 ~ 400.00**
F00.08 Frequency Lower limit (Hz) **= 0.00 ~ 399.99**



Note:

When F00.08 = 0Hz and frequency command is 0Hz, the inverter will stop at 0 speed.
When F00.08 > 0Hz and frequency command is≤F00.08, the inverter will output the F00.08 preset value.

F00.09 Acceleration time **1 (S)**	**= 0.1 ~ 3600.0**
F00.10 Deceleration time **1 (S)**	**= 0.1 ~ 3600.0**

1. Formula for calculating acceleration and deceleration time: The denominator is base on the rated frequency of motor:
   Acceleration time = F00.09 (or F10.05) * preset frequency / F06.04
   Deceleration time = F00.10 (or F10.06) * preset frequency / F06.04
2. When F01.00~F01.05 is set 08 (the second acceleration and deceleration time), the first acceleration/ deceleration or the second acceleration/ deceleration/ will be set by OFF or ON the external input terminal.
3. When F01.00~F01.05 is set 06/07 (jog), Jog run is controlled by external terminals. The acceleration and deceleration action will be at Jog acceleration and deceleration time.

The list setting:

Function / Preset Value	Acc/ Dec time 1 (F00.09/F00.10)	Acc/ Dec time 2 (F10.05/F10.06)	Jog Acc/ Dec time (F00.13/F00.14)
	F00.05/F00.06 determines the output frequency	F00.05/F00.06 determines the output frequency	Run at F00.12 Jog frequency
F01.00~F01.05=06/07 Jog command	off	off	on
F01.00~F01.05=08 Toggle Acc/Dec time	off	on	off

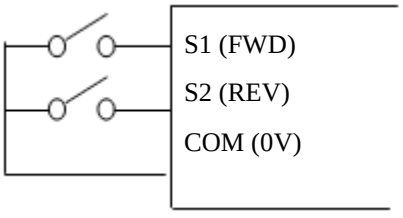
F00.11 : Operation modes for external terminals
0: Forward/stop-reverse/stop
1: Run/stop-forward/reverse
2: 3-wire control mode -run/stop

1. When operation command F00.03/F00.04=1 (external terminal control), F00.11 is valid.
2. When operation command F00.03/F00.04=1 (external terminal control), the stop button for emergency is available. (Refer to F04.02 for detail description).
3. That both forward and reverse commands are ON will be treated as STOP.
4. While F00.11 is set to 0, in external terminals function code, 0 stand for fwd/stop, 1 stand for rev/stop.
5. While F00.11 is set to 1, in external terminals function code, 0 stand for run/stop, 1 stand for fwd/rev.

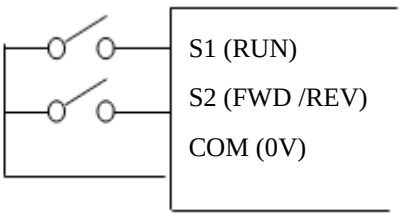
Note: 1.While setting 3-wire control mode -run/stop, terminals S1/S2/S3 will not be comtrolled by F01.00/F01.01/F01.02.
2. While F10.01is set to 1, reversal command is invalid.

External terminals control connection mode is described below with s1, s2 and s3, set parameters

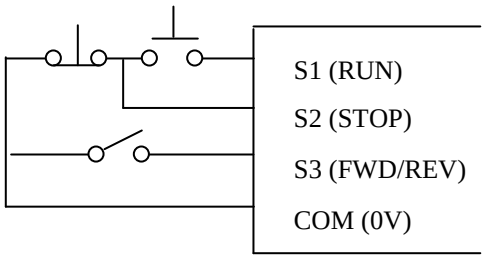
1. F00.11=0, control mode is as below:



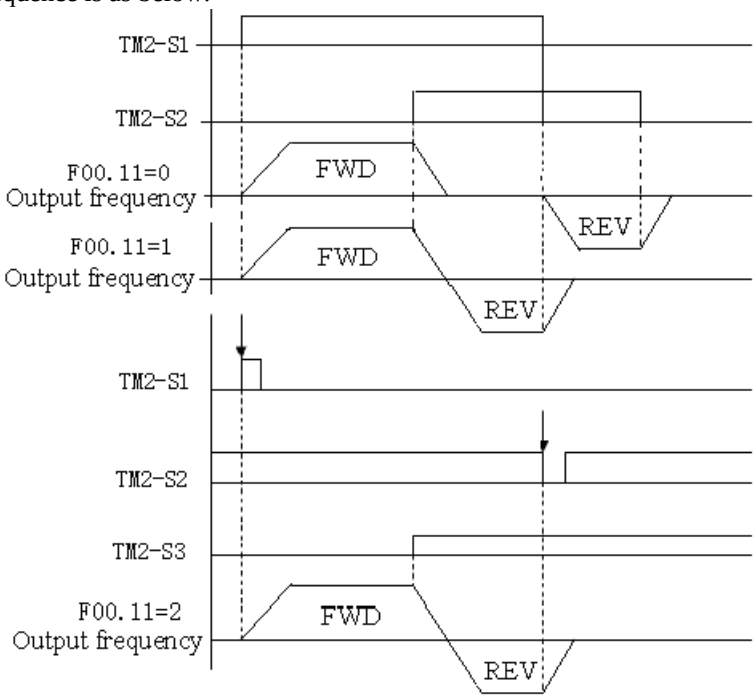
2. F00.11=1, control mode is as below:



3. F00.11=2, control mode is as below:



Wiring control sequence is as below:



F00.12 Jog Frequency (Hz)	**= 1.00 ~ 25.00**
F00.13 Jog Acceleration Time (MFIT) (S)	**= 0.1 ~ 25.5**
F00.14 Jog Deceleration Time (MFIT) (S)	**= 0.1 ~ 25.5**

Jog run is controlled by external terminals, S1 on is Jog-forward, S2 on is Jog-reverse.
Example: F01.00(S1)=6, F01.01(S2)=7

Group F01.xx- External Terminal Digital Signal Input function Group

Multifunction input terminals (TM2 S1-S6) controlling:

F01.00 ~ F01.05

=0: Forward/Stop Command
=1: Reverse/Stop Command
=2: Preset Speed unit 0 (F3.02)
=3: Preset Speed unit 1 (F3.03)
=4: Preset Speed unit 2 (F3.05)
=5: Preset Speed unit 3 (F3.09)
=6: JOG Forward Command
=7: JOG Reverse Command
=8: Acc/Dec time 2
=9: Emergency Stop
=10: Base Block
=11: Speed Search
=12: Energy Saving(V/F)
=13: Main/sub Control Signal Select
=14: Acc/Dec Disabled
=15: Up Command
=16: Down Command
=17: Main/sub Frequency Command Select
=18: PID Function Disabled
=19: Integration Value Resets to Zero
=20: Reset
=21: KEB function
=22: Auto _ Run Mode
=23: PID Characteristics select (reverse with F09.00)
=24: Reserved
=25: Traverse run control
=26: Up traverse run
=27: Down traverse run
=28: Counter trigger signal input (only for S6)
=29: Clear counter

1. The terminals S1- S6 on terminal block (TM2) are multifunction input terminals. The 30 functions shown above can be set for these terminals.

2. Descriptions of functions for F01.00~F01.05:

A. **F01.00~F01.05=0/1: Forward/Reverse/Stop**

As forward command is ON, the inverter runs and stops when the command is OFF. The F01.00 factory setting is forward.
As reverse command is ON, the inverter runs and stops when the command is OFF. The F01.01 factory setting is reverse.

B. **F01.00~F01.05=2/3/4/5: (Frequency Command 1/2/4/8 at F03.02/F03.03/F03.05/F03.08)**

When External multifunction input terminals are ON, the inverter is operates at the preset speed and the duration is determined by the time the input is ON. The corresponding preset frequency will be according to preset value of parameters F03.01 to F03.16 and in relation to the operation of input terminals 1 to 4. As shown in the table below:

Output frequency preset value	Multifunction terminal 4 Preset value =5	Multifunction terminal 3 Preset value =4	Multifunction terminal 2 Preset value =3	Multifunction terminal 1 Preset value =2
F03.01	0	0	0	0
F03.02	0	0	0	1
F03.03	0	0	1	0
F03.04	0	0	1	1
F03.05	0	1	0	0
F03.06	0	1	0	1
F03.07	0	1	1	0
F03.08	0	1	1	1
F03.09	1	0	0	0
F03.10	1	0	0	1
F03.11	1	0	1	0
F03.12	1	0	1	1
F03.13	1	1	0	0
F03.14	1	1	0	1
F03.15	1	1	1	0
F03.16	1	1	1	1

C. **F01.00~F01.05=6/7: (Forward/ Reverse JOG)**

When Jog operation, is selected, the inverter operates at the Jog acceleration and deceleration times. The corresponding jog frequency parameter is shown below:
The priority order of frequency: Jog Speed → Preset Speed → Keypad frequency or external frequency signal

D. **F01.00~F01.05=8: (Acc/Dec time selection)**

This input selects the acceleration 1/ deceleration 1 or acceleration 2/ deceleration 2.

E. **F01.00~F01.05=9:External Emergency Stop.**

The inverter will decelerate to stop by F10.06 setting and Flash E.S as the emergency stop signal is received regardless of F04.01 setting. After the emergency stop signal is removed, turn the RUN switch OFF and then ON again, or press the run key in keypad mode, the inverter will restart again up and ramps up to the command frequency.
If the emergency signal is released before the inverter stops completely, the inverter still carries out the emergency stop.
The F01.09/F01.10 determines the action of the error terminal. If F01.09/F01.10=0: the fault is not enabled when the external emergency signal input. If F01.09/F01.10=9, the fault is actuated when the emergency signal input.

F. **F01.00~F01.05=10: Base Block (Free operation stop)**

The inverter immediately stops output, and the motor does a Coast with flashing B.B.

G. **F01.00~F01.05=11: Speed Search Stop**

When starting, the inverter it detects the present speed of the motor, then accelerates from that present speed to preset speed.

H. **F01.00~F01.05=12: Energy-saving operation**

FAN, PUMP or other high inertia loads need greater starting torque, but once the operational speed is reached they need much less torque. In this mode the output voltage to is reduced to match the required torque demand, hence providing a saving in energy.
The output voltage gradually declines as the input is ON. It will gradually increase (to the original voltage) as the input is OFF.

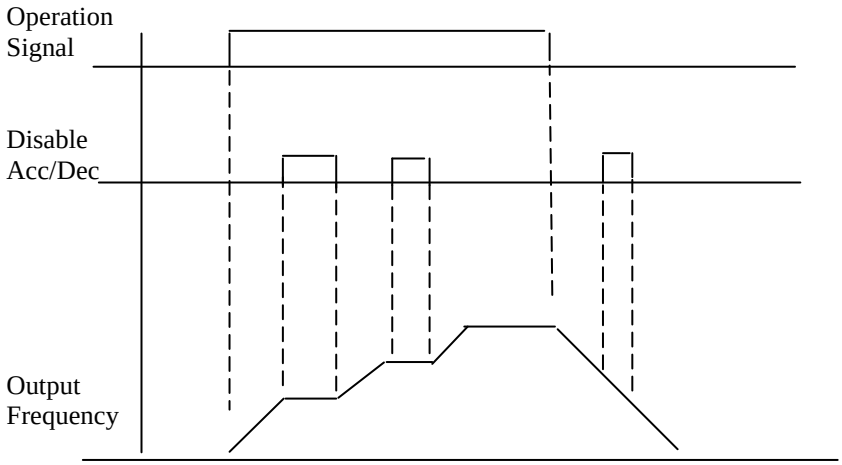
Note: The acceleration and deceleration speed of energy saving operation is the same as the speed of speed search.

I. **F01.00~F01.05=13: Main/sub Control Signal Selection**

When External multifunction input terminals are off, the inverter is operated by F00.03.
When External multifunction input terminals are on, the inverter is operated by F00.04.

J. **F01.00~F01.05=14: Disable acceleration and deceleration**

The acceleration and deceleration action is unavailable until the disable signals are released. The action is illustrated in the graph below



Note: Operation Switch is OFF, the command of disable.

K. **F01.00~F01.05=15/16: UP(Actual ACC/DEC time is based on the setting):**

1. F00.05/F00.06=3 to use the UP/DOWN Function. The other frequency signals are ignored.
2. Set F01.07=0 and F01.08=0, the inverter accelerates to the preset value of F03.01 when in RUN, and then it maintains a constant speed. As the inverter receives either the UP/DOWN command, it will accelerate / decelerate until the command is released. The inverter runs at the speed setting at the time of release. The inverter will ramp stop or Free-Fun stop which is determined by the F04.01 as long as the inverter receives the STOP command. The frequency at Stop time will be stored in F03.01. The UP/DOWN KEY is invalid when the inverter is stopped. It is necessary to use the Keypad to modify the preset parameters.
3. Set F01.08=1, the inverter will operate from 0Hz when the operation terminal is ON. The action of UP/DOWN is the same as above. The inverter will ramp stop or free-run stop as determined by F04.01, setting when it receives the Stop Command. The next operation will start at 0 Hz.
4. UP/Down Signals simultaneously pressed are invalid.
5. F01.07≠0, the inverter accelerates to the setting of F03.01 and maintains speed. When the UP/Down terminal is on, setting frequency is the value F03.01±F01.07, and the inverter will accelerate/ decelerate to frequency F03.01. The upper frequency limit and lower frequency limit also restrict the operation. If the signal of UP/ DOWN is maintained over 2 seconds, the inverter will begin to accelerate/ decelerate. the operation is the same, until the UP/ DOWN signal is released. Please refer to the time diagram of F01.07.

L. **F01.00~F01.05=17: Main/sub Frequency Command Selection**

When External multifunction input terminals are off, the inverter Frequency Command is operated by F00.05.

When External multifunction input terminals are on, the inverter Frequency Command is operated by F00.06.

M. **F01.00~F01.05=18: PID Function Disable**

When the PID Function Disable is ON, PID is not controlled by F09.00.

N. **F01.00~F01.05=19: Integration Value PID Resets to Zero**

When the multifunction terminal F01.00~F01.05=19 is set at 19 and the input terminal is on, the Integration Value of PID Resets to Zero.

O. **F01.00~F01.05=20: Reset Command**

The Reset command is same as the Reset Key on the panel. When the command is OFF, the inverter does not respond.

P. **F01.00~F01.05=21: Power Source Detect for KEB**

Refer to F04.11.

Q. **F01.00~F01.05=22: Auto-Run Mode**

Refer to group F13.xx.

R. **F01.00~F01.05=23: PID Characteristics select**

When the PID function enabled (F9.00 ≠ 0), anyone of the external terminals is setting as 23, and the terminal is conducting, the actual role of the PID control is contrary to the setting function feature.
For example: F9.00= 1"Bias D Control (Fwd/Rev, positive Characteristic", F01.00 = 23 (S1 = 23), when S1 switches on, the actual role of the PID control for"Bias D Control (Fwd/Rev, Reversed Characteristics)".

S. **F01.00~F01.05=24: Reserved**

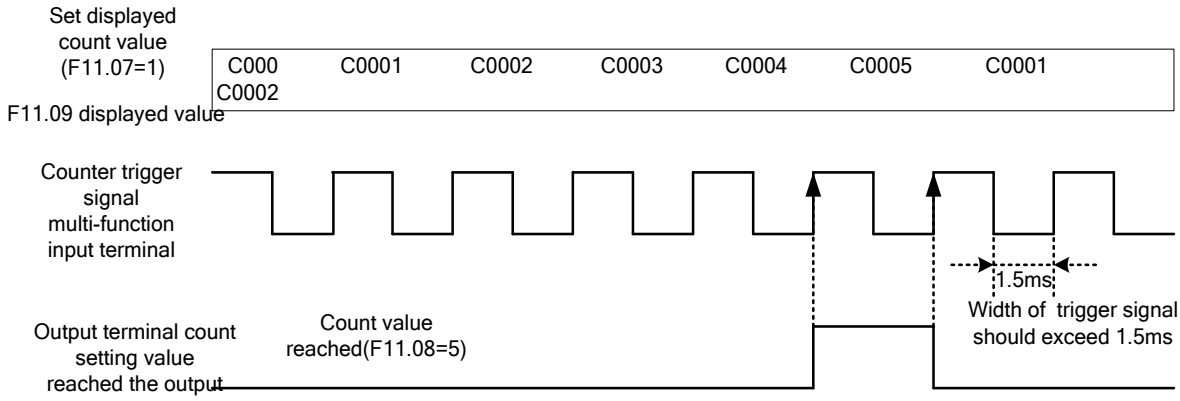
T. **F01.00~F01.05=25: Traverse run control, refer to P4-35/P4-36 parameters of F0.17~F01.23.**

U. **F01.00~F01.05=26: Up traverse run, refer to P4-35/P4-346 parameters of F0.17~F01.23.**

V. **F01.00~F01.05=27: Down traverse run, refer to P4-35/P4-36 parameters of F0.17~F01.23.**

W. **F01.00~F01.05=28: Counter trigger signal input(only for S6)**

When set S6=28, every time the terminal ON->OFF, then F11.09 count value will plus one.



X. **F01.00~F01.05=29: Clear the counter**

When one of S1~S6 is set to 29, this terminal is ON will clear the current displayed value of counter, and display "C0000", if the terminal is OFF, the inverter will trigger the counter to count again.

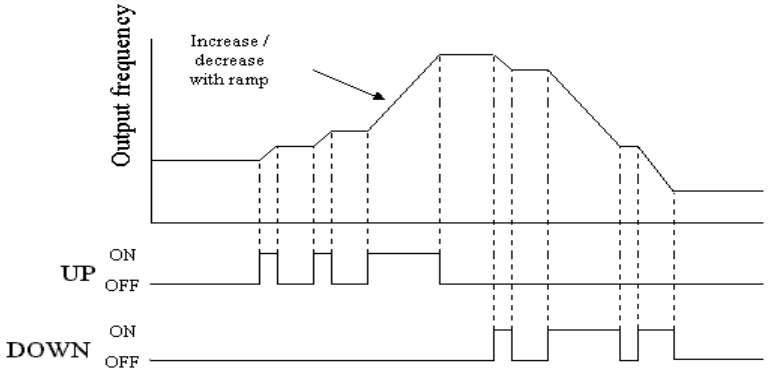
Digital /Analog input signal scan times:
F01.06 S1~S6: Multifunction terminal S1~S6 confirm the scan times (mSec X 2), 1~200 times

1. TM2 terminal is used for scanning. If there are the same signals continuously input for N times, the inverter will treat the signal as normal. During the signal evaluation, if the scan times are less than N, the signal will be treated as noise.
2. Each scan period is 2ms.
3. The user can specify the scan times interval duration according to the noise environment. If the noise is serious, increase the value of F01.06, however the response will be slower.

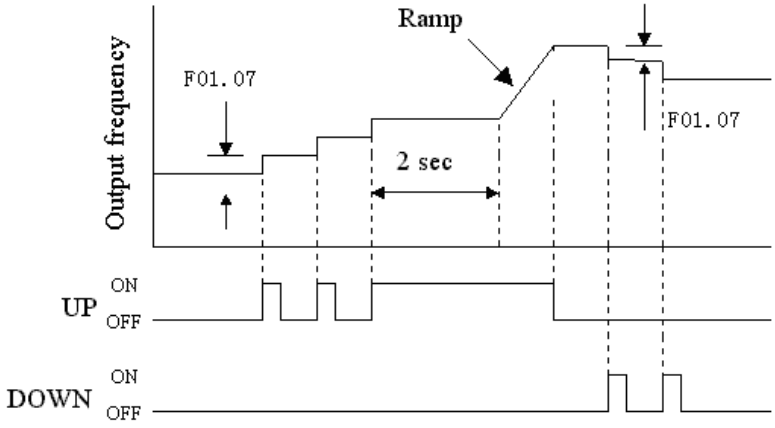
Step of F01.07 UP/DOWN Function (Hz):
0.00~5.00

There are two modes covered below:

1. F01.07=0.00, the operation is just as the original one. When the UP terminal is ON, the frequency will increase; while the DOWN terminal is ON, the frequency will decrease. (Refer to the following graph).



2. F01.07=0.01~5.00, and UP/ DOWN terminal ON, is equivalent to a step increase/ decrease at the increment frequency in F01.07. If UP/DOWN is pressed over 2 seconds, the original UP/DOWN mode is restored (Please refer to the following diagram)



Stop Mode Using Up/Down:

F01.08: Up/Down keep Frequency mode

0: When Up/Down is used, the preset frequency is held as the inverter stops, the UP/Down function is disabled.

1: When Up/Down is used, the preset frequency is reset to 0 Hz as the inverter stops.

2: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down is available.

1. F01.08=0, the inverter will accelerate to the speed set in parameter F03.01 as receiving the Run command and run at such certain speed. The inverter begins to accelerate (decelerate) as the UP (Down) terminal is energized. The inverter will hold the speed as the UP/DOWN command released. When the Run Signal releases, the inverter will ramp stop or stop which determined by the F04.01. It will store the frequency when the run signal is removed. UP/DOWN keys are idle when the inverter is stopped. The keypad is available to modify the preset frequency (F03.01). If F01-08=2, the UP/Down is available as the inverter stops.
2. F01.08=1， as the Run terminal is energized, the inverter operates from 0 Hz, the Function of UP/DOWN is same as the above description. When the Run signal is released, the inverter will ramp stop or stop output (determined by F04.01) to 0 Hz. The next run command will always begin from 0 Hz.

Multifunction output terminals control:

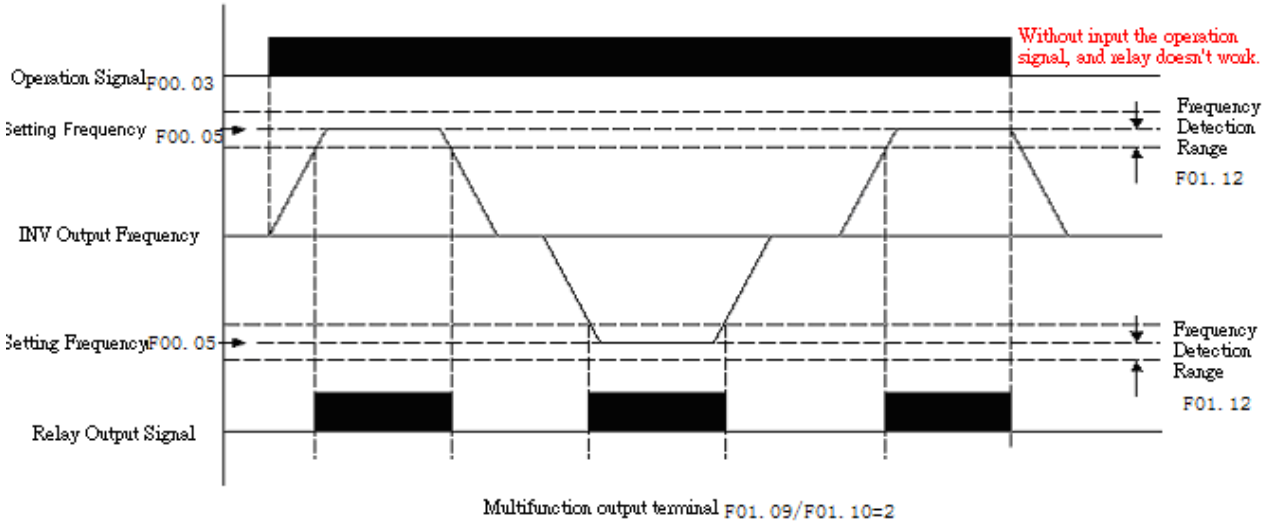
F01.09 Output Relay RY1 Operation Mode (R1C,R1B,R1A terminal)

F01.10 Output Relay TR1 Operation Mode (SYN+, SYN- terminal)

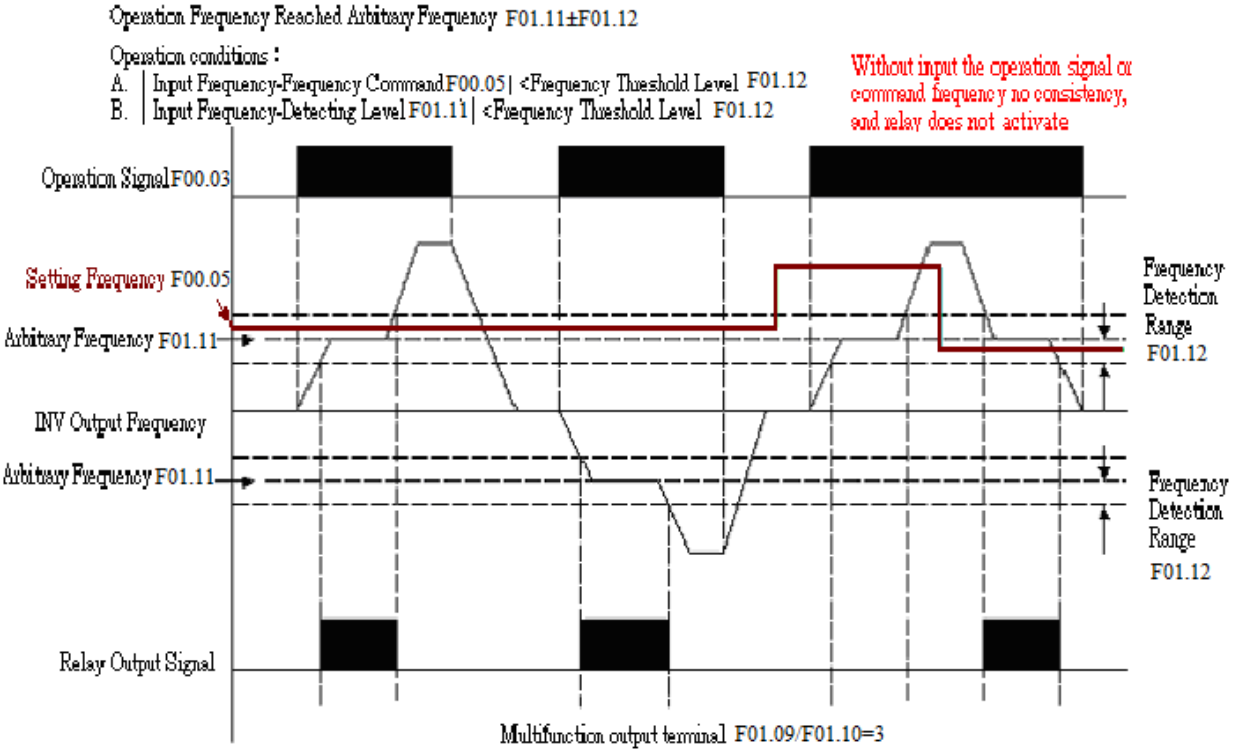
=0: Run
=1: Fault
=2: Frequency Reached
=3: Set Frequency (F01.11 ± F01.12)
=4: Frequency Threshold Level (> F01.11) - Frequency Reached
=5: Frequency Threshold Level (< F01.11) - Frequency Reached
=6: Auto-restart
=7: Momentary AC Power Loss
=8: Emergency Stop Mode
=9: Base Block Stop Mode
=10: Motor Overload Protection
=11: Drive Overload Protection
=12: Over-torque Threshold Level
=13: PID Feedback Signal Loss
=14: Current Reached
=15: Counter Setting Value Reached

F01.11 Frequency Reached Output Setting
= 0.00~400.00Hz
F01.12 Frequency Detection Range(Hz)
= 0.00~30.00Hz

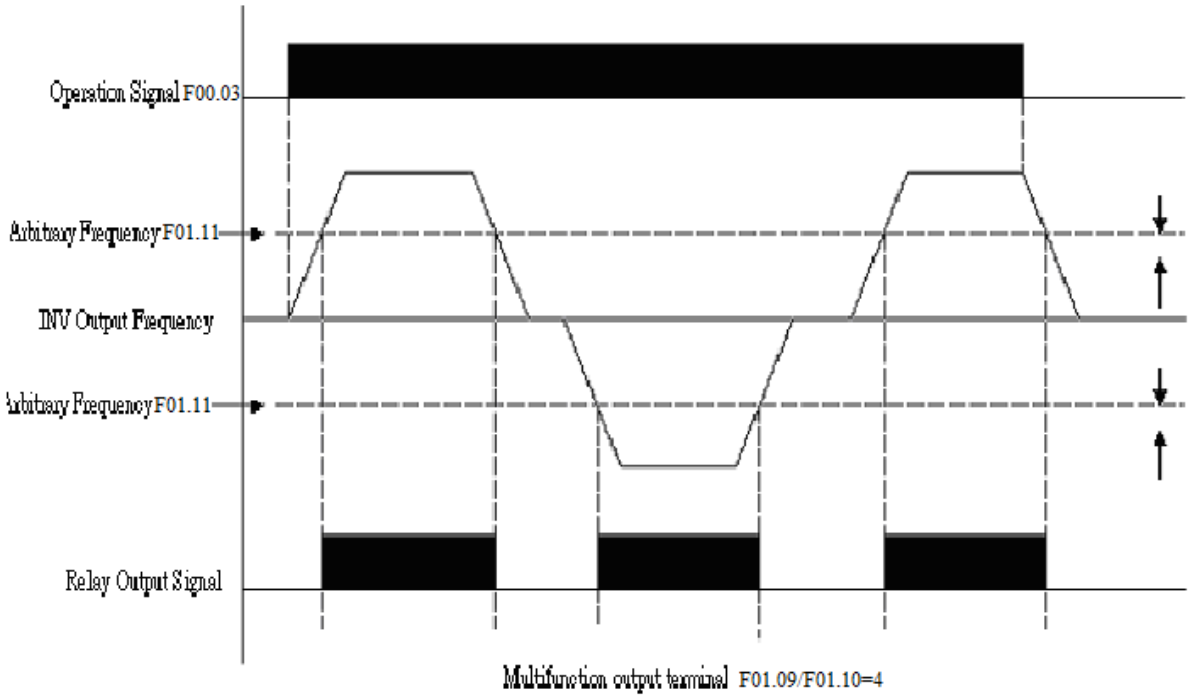
A. F01.09/F01.10=0, when the inverter is running, Output Relay operates.
B. F01.09/F01.10=1, when the inverter breaks down, Output Relay operates.
C. F01.09/F01.10=2, the preset frequency is reached (±F01.12)



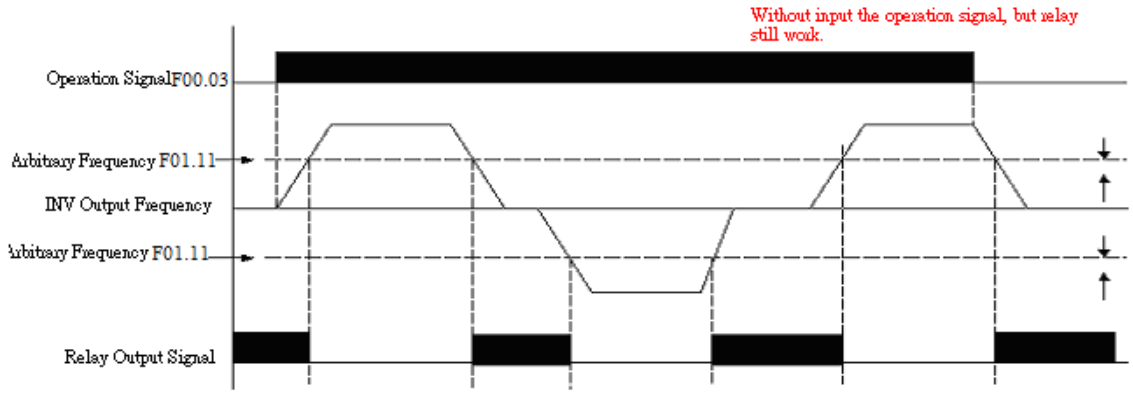
D. F01.09/F01.10=3, Arbitrary frequency consistency Fout=F01.11±F01.12



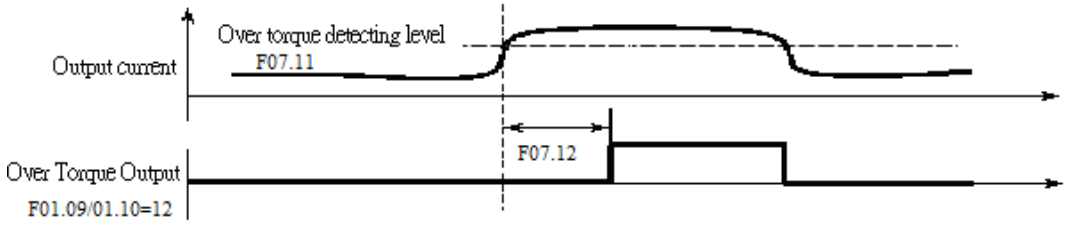
E. F01.09/F01.10=4: Frequency detection Fout>F01.11



F. F01.09/F01.10=5: Frequency detection Fout<F01.11



G. F01.09/F01.10=12: over torque detection



F01.13 S1~S5 switch type select

xxxx0: S1 Normal Open	**xxxx1: S1 Normal Close**
xxx0x: S2 Normal Open	**xxx1x: S2 Normal Close**
xx0xx: S3 Normal Open	**xx1xx: S3 Normal Close**
x0xxx: S4 Normal Open	**x1xxx: S4 Normal Close**
0xxxx: S5 Normal Open	**1xxxx: S5 Normal Close**

F01.14 S6~S9 switch type select

xxxx0: S6 Normal Open	**xxxx1: S6 Normal close**
xxx0x: S7 Normal Open	**xxx1x: S7 Normal close, reserved function**
xx0xx: S8 Normal Open	**xx1xx: S8 Normal close, reserved function**
x0xxx: S9 Normal Open	**x1xxx: S9 Normal close, reserved function**

When the external terminal is being used, should be connected with switch.The types of switch includes normal open and normal close. Please pay attention to these two different conditions while using switch to avoid the unnecessary damages.This parameter decides the input of normal open or normal close.

F01.13 means:

F01.13 = 0 0 0 0 0

S5 S4 S3 S2 S1

0: connect normal open 1: connect normal close

Because of different types of switches, select switches type is necessary.

Example: If need S1, S2 to connect normal close, F01.13 is set to 00011.

Note: Don't set F00.03/00.04=1, before you set F01.13, F01.14 (external terminal controlled)

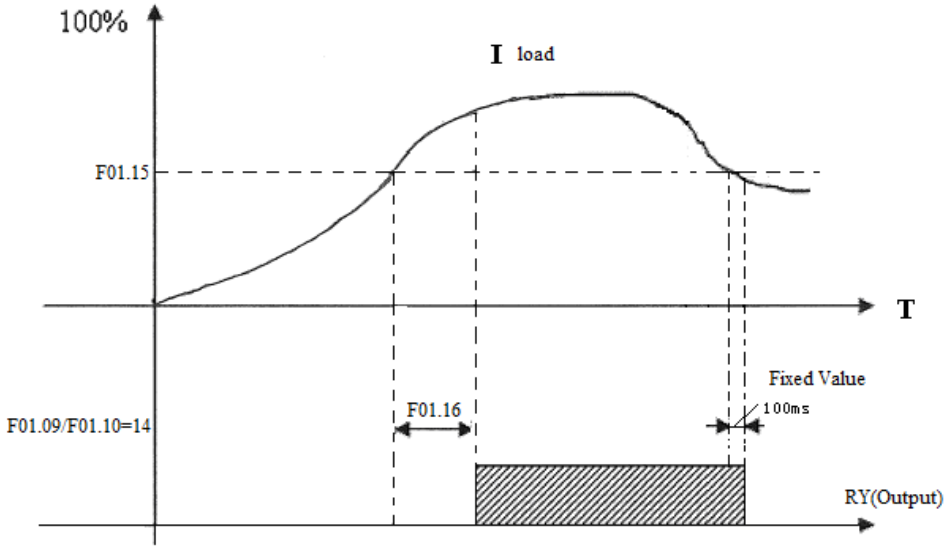
F01.15 Output current Reached Level (A)

= 0.1~500.0

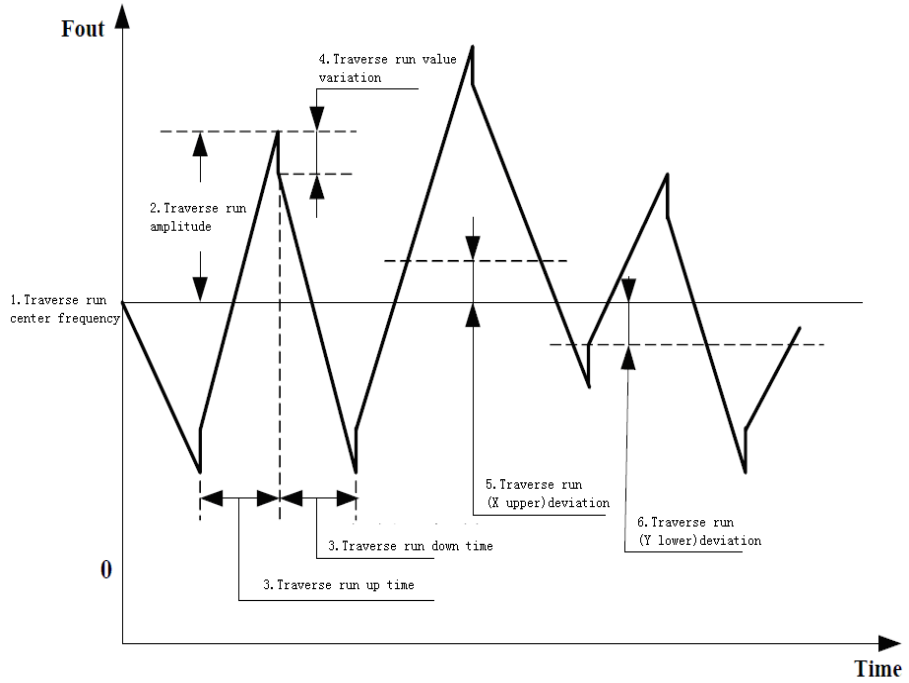
F01.16 Output current detection time (S)

= 0.1~10.0

1. F01.09/F01.10=14: Output current detection value > F01.15, RY(output).
2. F01.15: Setting value (0.1~500.0) by motor rated current (F06.01).
3. F01.16: Setting value (0.1~10.0) unit: sec. The delay time of relay signal from ON to OFF is 100ms (fixed).



F01.17 Traverse run control center frequency(%)	**= 5.00~100.0**
F01.18 Traverse run amplitude(%)	**= 0.1~20.0**
F01.19 Traverse run value variation(%)	**= 0.0~50.0**
F01.20 Traverse run up time(s)	**= 0.5~60.0**
F01.21 Traverse run down time(s)	**= 0.5~60.0**
F01.22 Traverse run (upper)deviation(%)	**= 0.0~20.0**
F01.23 Traverse run (lower)deviation(%)	**= 0.0~20.0**



1, Traverse run center frequency =set by the frequency source (F00.05/F00.06)
2, Traverse run amplitude =F01.18* upper frequency limit (F00.07)
3, Traverse run up/down time =F01.20/F01.21
4, Traverse run value variation =F01.19* Traverse run amplitude
5, Traverse run (upper) deviation =F01.22* Traverse run center frequency
6, Traverse run (lower) deviation =F01.23* Traverse run center frequency

Illustration of center frequency: when selection of main/subcarrier frequency source (F00.05/F00.06) is different, center frequency will change with it.
F00.05/F00.06=0, center frequency=the frequency set by keypad ▲▼
F00.05/F00.06=1, center frequency= the frequency set by keypad rotary knob
F00.05/F00.06=2, center frequency=the frequency set by external AI1 analog input
F00.05/F00.06=3, center frequency=F00.17* upper frequency limit (F00.07)
F00.05/F00.06=4, center frequency=the frequency set by communication

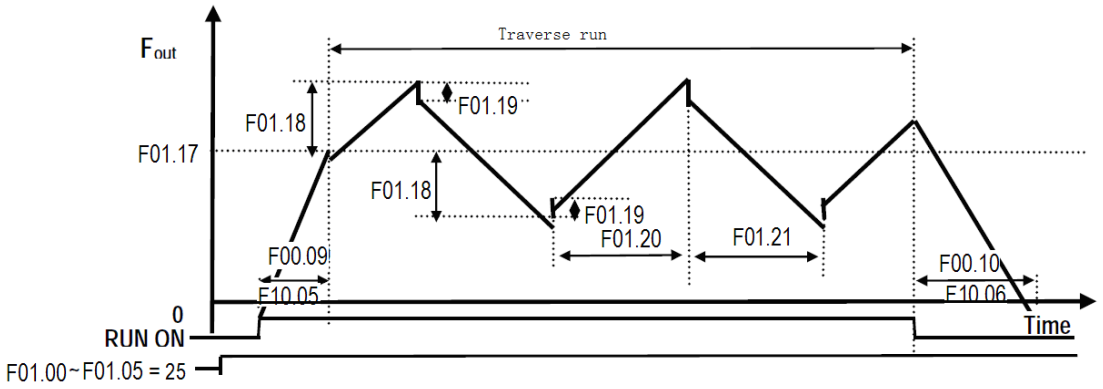
Note: the illustrations of parameters in the diagram are as below:

1, A. Traverse run control must be acted while the inverter command is turned **ON,** and traverse run control should be valid (F01.00~F01.05=25 and breakover).After the inverter is running and the output frequency reaches the center frequency (F01.17), the traverse run will start.

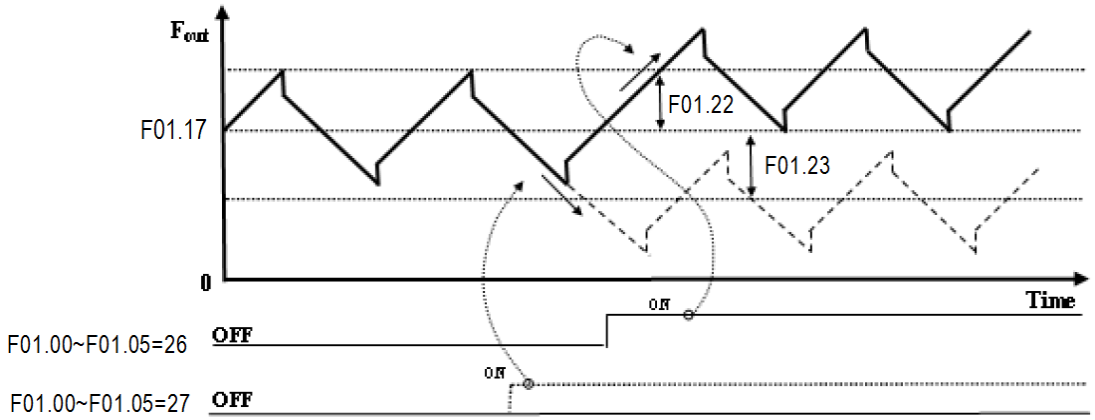
B. In the process of reaching the center frequency, the value of acceleration time is setted (F00.09/F10.05).

C. When the traverse run control is void or command is turned off, the value of deceleration time is setted (F00.09/F10.05).

D. When the traverse run within the range of running, the acc/dec time is based on the setted value of traverse run rising (F01.20) and declining time (F01.21), please see the diagram as below:



2. When traverse running, only the multi-function terminals can change upper deviation of the center frequency (F01.05=26 and breakover) or lower deviation of the center frequency (F01.00~F01.05=27 and breakover).But the commands of upper and lower deviation of the center frequency can't be used at the same time, and if they were used in the meantime, the frequency will maintain the original center frequency, please see the diagram as below:



Group F02.xx External Terminal Analog Signal Input Function Group

F02.00 analog Input signal type select

= 0: AI1 0~10V(0~20mA), AI2 0~10V(0~20mA)

= 1: AI1 0~10V(0~20mA), AI2 2~10V(4~20mA)

= 2: AI1 2~10V(4~20mA), AI2 0~10V(0~20mA)

= 3: AI1 2~10V(4~20mA), AI2 2~10V(4~20mA)

F02.00: AI1/AI2 analog Input signal type select (SW1/ SW2 determines V or I signal)

1. 0~10V (0~20mA)

$$F(hz)=\frac{I(mA)}{20(mA)}\times(\text{F00.07}),SW1=I,\ \text{Input current}$$

$$F(hz)=\frac{V(v)}{10(v)}\times(\text{F00.07}),\ SW1=\text{V},\ \text{Input voltage}$$

2. 2~10V (4~20mA)

$$F(hz)=\frac{I-4(mA)}{20-4(mA)}\times(\text{F00.07}),I>=4;SW2=I,\text{Input current, or}F=0,\ I<4$$

$$F(hz)=\frac{V-2(v)}{10-2(v)}\times(\text{F00.07}),V>=4;SW2=V,\text{Input voltage, or}F=0,\ V<2$$

F02.01 AI1 signal verification Scan Time	**= 1~200 (× 2mSec)**
F02.02 AI1 Gain(%)	**= 0 1000**
F02.03 AI1 Bias(%)	**= 0 ~100**
F02.04 AI1 Bias Selection:	**= 0: positive = 1: Negative**
F02.05 AI1 Slope:	**= 0: positive = 1: Negative**

Note: Please refer to AI1 and AI2 description of signal operation mode.

F02.06 AI2 function Select

= 0: PID feedback signal (terminal AI2)

= 1: AI2 Bias signal input (terminal AI2)

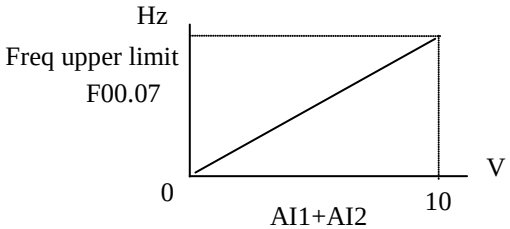
1. F02.06=0 (PID feedback input)

When AI2 is set to 0 means the PID feedback input terminal is controlled by the setting of F09.00, it can receive the signal of 0~10V (0~20mA) or 2~10V(4~20mA).

2. F02.06=1(Bias Input)

To regulate the Offset of the Keypad VR or AI1 analog input, only the signal of 0~10V (0~20 mA) or 2~10V (4~20mA) can be received.

F02.06=1 function



F02.07 AI2 signal verification Scan Time	**= 1~200(× 2mSec)**
F02.08 AI2 Gain(%)	**= 0~1000**
F02.09 AI2 Bias(%)	**= 0~100**
F02.10 AI2 Bias Selection	**= 0:Positive = 1:Negative**
F02.11 AI2 Slope	**= 0:Positive = 1:Negative**

Note: Except F02.08, only when F02.06 is set to1, settings of F02.07~F02.11 will be effective, setting parameters according to diagram as below:

Signal operation mode descriptions for AI1 and AI2 (PID feedback signal)
Parameter Description:
1. Bias value

When the given signal is '0', the corresponding frequency called the bias frequency with denotation fBI:

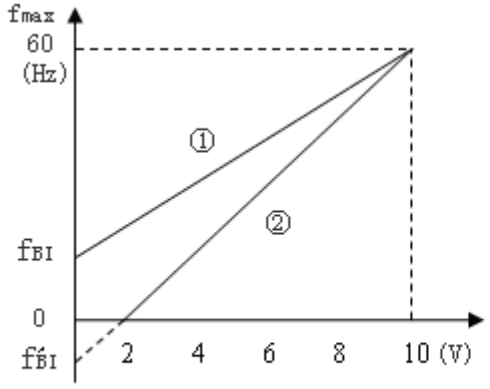


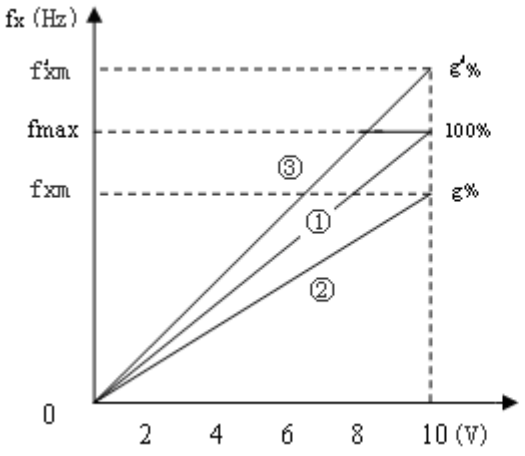
图 1 偏置频率图

$$f_{BI}\% = \frac{f_{BI}}{f_{max}} \times 100\% \qquad (1)$$

fBI%-—Percentage of Bias Frequency
fBI—Bias Frequency
fmax—Max frequency of Inverter output

2. Frequency Gain

When the given signal is maximum value 'xmax', the percentage about ratio of the maximum 'fxm' for corresponding given frequency and the maximum output frequency 'fmax' of inverter presetting, with denotation g%.



$$g\% = \frac{f_{xm}}{f_{max}} \times 100\% \qquad (2)$$

g%-—Percentage of Frequency Gain
fmax—The preset maximum frequency of inverter
fxm—Dummy maximum frequency

Here, the maximum for a given frequency 'fxm' of inverter not necessarily equal to the maximum frequency fmax.

1. g %<100%, the maximum frequency for actual output of inverter equal to fxm, like the curve ② show in Figure 2 (curve ① as given line for the fundamental frequency)
2. g %>100%, the maximum frequency for actual output of inverter equal to fmax , like the curve ③ show in Figure 2.

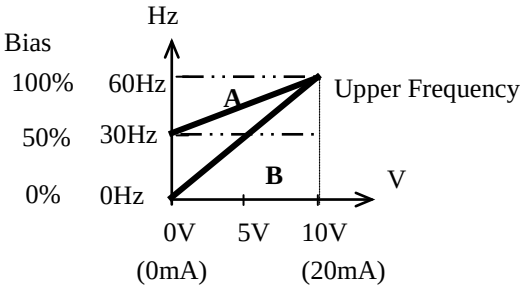
Example:

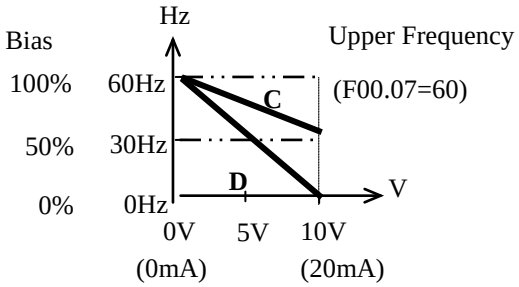
1. The setting of figure a:

	F02.02 Or F02.08	F02.03 Or F02.09	F02.04 Or F02.10	F02.05 Or F02.11	F02.09
A	100%	50%	0	0	100%
B	100%	0%	0	00	100%

2. The setting of figure b:

	F02.02 Or F02.08	F02.03 Or F02.09	F02.04 Or F02.10	F02.05 Or F02.11	F02.09
C	100%	50%	0	1	100%
D	100%	0%	0	1	100%



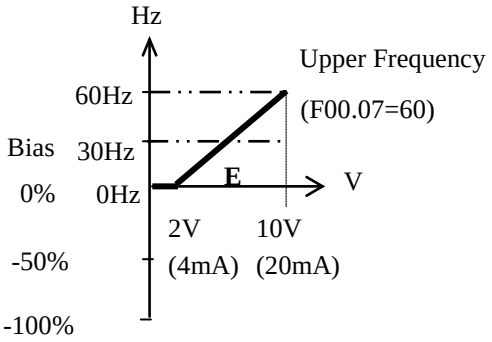


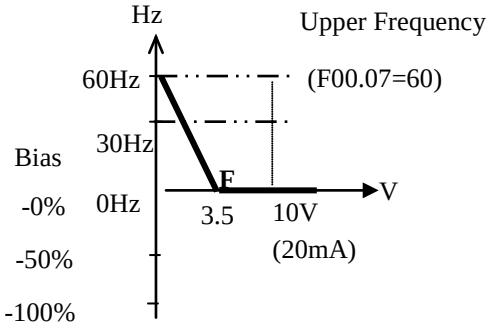
3. The setting of figure c:

	F02.02 Or F02.08	F02.03 Or F02.09	F02.04 Or F02.10	F02.05 Or F02.11	F02.09
E	100%	20%	1	0	100%

4. The setting of figure d:

	F02.02 Or F02.08	F02.03 Or F02.09	F02.04 Or F02.10	F02.05 Or F02.11	F02.09
F	100%	50%	1	1	100%





The inverter reads the average value of A/D signals once per (F02.01/F02.07 x 2mS).Users can set scan intervals according to possible noise interference in the environment.When the noise is serious, increasing the F02.01/F02.07,but the response time will increase accordingly.

F02.12 Analog Output Mode selection FM+:
= 0: Output frequency = 1: Frequency Setting
= 2: Output voltage = 3: DC Bus Voltage
= 4: Output current

F02.13 FM+Gain(%): = 0~1000

F02.14 FM+Bias(%): = 0~100

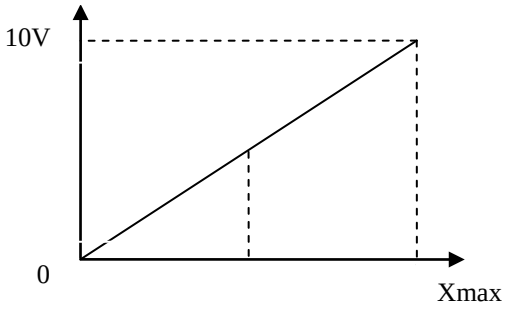
F02.15 FM+Bias Selection: = 0: Positive = 1: Negative

F02.16 FM+Slope: = 0: Positive = 1: Negative

The multifunction analog output terminal of the terminal block (TM2), is 0~10Vdc analog output. The output type is determined by the F02.12. The output voltage level can be scaled by parameter F02.13 to suit external meters and peripherals.

Note:The max output voltage is 10V due to hardware of the circuit. Use only devices that require a maximum of 10V signal.

1. FM+ Function Description



F2.12=0 Output Frequency	Xmax= Upper Frequency Limit
=1 Frequency Setting	Upper Frequency Limit
=2 Output Voltage	Motor Rated Voltage (VAC)
=3 DC Bus Voltage	220V: 0~400V
	440V: 0~800V
=4 Motor Current	2 times rated current of inverter

2. F02.13~F02.16 refer to Analog scaling examples.

F02.17 Set analog input resolution(mV)	**= 1~200mV**	
F02.18 Analog temperature drift compensation:	**= 0:Invalid**	**= 1~Valid**

Group F03.xx Preset Frequency Function Group

F03.00 Preset Speed Control mode Selection Acc/Dec (preset speed1~15) **= 0: common (is uniform time Acc1/Dec1or Acc2/Dec2)** **= 1: Special (is single time Acc0/Dec0~ Acc15/Dec15)**
Setting frequency **F03.01~F03.16 Preset Speed 0 ~ Preset Speed 15(Hz):** **= 0.00 ~ 400.00**
Setting time **F03.17~F03.48 Preset Speed 0~15 Acceleration time(second):** **Preset Speed 0~15 Deceleration time(second):** **= 0.1 ~ 3600.0**

1) When F03.00=0, Acc-time (Dec-time) is determined by the F00.09/F00.10 (F10.05/F10.06).
2) When F03.00=1, Acc-time(Dec-time) is determined by the F03.17~F03.48 rather than F00.09/F00.10 (F10.05/F10.06).

Function Description:
1. Formula for calculating acceleration and deceleration time: The denominator is base on the rated frequency of motor (F06.04).

Actual Acctime= F00.xx Acctime parameter*preset frequency/(F06.04)
Actual Dectime= F00.xx Dectime parameter* preset frequency/(F06.04)

Example: F06.04=50Hz(motor Rated frequency), F13.02=10Hz(preset speed), F03.19=5s(Acc time), F03.20=20s(Dec time),

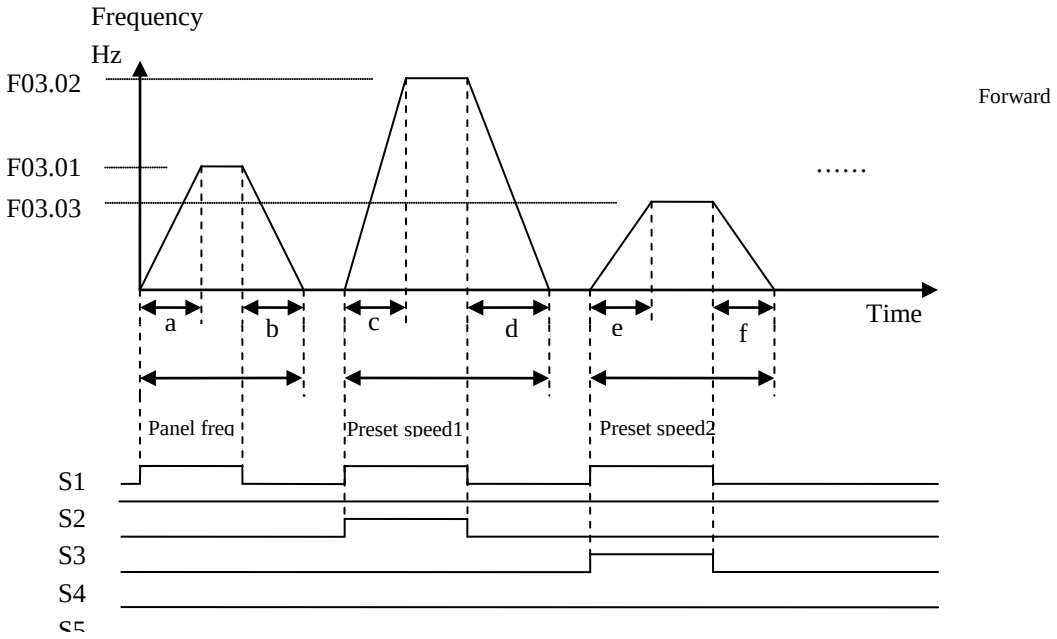
Preset speed 1 Actual Acc time= F03.19*10(Hz)/F06.04 = 1(s)

Preset speed 1 Actual Dec time= F03.20*10(Hz)/F06.04 = 4(s)

2. When F03.00=1, the time has two modes to be set
Example: F00.03=1(External terminal run), F01.00=0(S1=RUN/STOP), F01.01=1(S2= Forward/Reserve), F01.02=2(S3= preset speed 1), F01.03=3(S4= preset speed 2), F01.03=4(S5= preset speed 4).

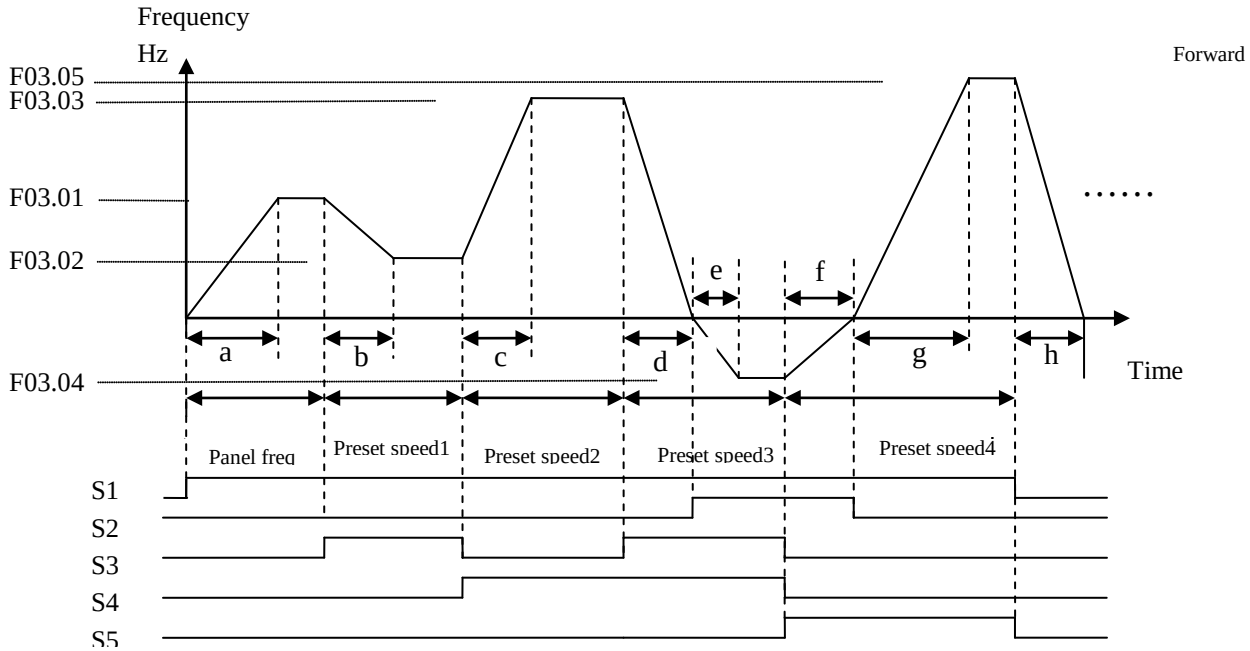
Mode 1: When the run command is uncontinuous, please calculate acceleration and deceleration time of each segment like this.

Example: a=(F03.17)*(F03.01)/F06.04, b=(F03.18)*(F03.01)/F06.04, c=(F03.19)*(F03.02)/F06.04, d=(F03.20)*(F03.02)/F06.04……unit(s)



Mode 2: When the run command is continuous, calculate acceleration and deceleration time of each segment like this

Example: a=(F03.17)*(F03.01)/F06.04, b=(F03.20)*[(F03.01)-(F03.02)]/F06.04, c=(F03.21)*[(F03.03)-(F03.02)]/F06.04, d=(F03.24)*(F03.03)/F06.04, e=(F03.23)*(F03.04)/F06.04, f=(F03.26)*(F03.04)/F06.04, g=(F03.25)*(F03.05)/F06.04, h=(F03.26)*(F03.05)/F06.04……(s)



Group F04.xx Start/Stop Command Group

F04.00 Starting Method Selection

= 0: Normal Start

= 1: Enable Speed Search

1. F04.00=0: On starting, the inverter accelerates from 0 to target frequency in the set time.
2. F04.00=1: On starting, the inverter accelerates to target frequency from the present detected speed of motor.

F04.01 Stop Method Selection

= 0: Enhanced breaking capacity

= 1: Coast to stop

= 2: Standard breaking capacity

1. F04.01=0: The inverter will decelerate to 0Hz in preset deceleration time after receiving the stop command. (Improved stop)
2. F04.01=1: The inverter will stop output as receiving the stop command. The motor will inertia Coast to stop.
3. F04.01=2: The inverter will decelerate to 0Hz in preset deceleration time after receiving the stop command. (Normal stop)

F04.02 Stop Key on Keypad

= 0: Stop Button Enable

= 1: Stop Button Disabled

F04.02=0, The STOP key is available for controlling the inverter to stop.

F04.03 Momentary power loss and restart

= 0: Momentary Power Loss and Restart disable

= 1: Momentary power loss and restart enable

= 2: Momentary power loss and restart enable while CPU is operating.

(According to the capacity of DC power)

F04.04 Momentary Power Loss Ride-Thru Time (Seconds)

= 0.0 ~ 2.0 seconds

1. If the input power supply due to sudden increase in supply demand by other equipment results in voltage drops below the under voltage level, the inverter will stop output at once. If the power supply voltage level recovers in the F04.04 preset time, it will spin start tracing from the trip frequency, or otherwise the inverter will trip with 'LV-C' fault displayed.
2. The allowable power loss time differs with the models. The range is from 1second to 2 seconds.
3. F04.03=0: As power lost, the inverter will not start.
4. F04.03=1: If the loss time is less than the value of F04.04, the inverter will Spin Start in 0.5 second as the power is resumed and restart times are infinite.
5. F04.03=2: If the power lost for long time, the inverter will stop operating.When the power is available, the inverter will restart according to the F00.03 and F04.05 setting and status of external switch as the resumed.

Note:When F00.03=1 and F04.05=0, F04.03=1 or 2, after a power loss for a long time, please turn OFF the power and power switches to avoid any possible injury to operators and machines when the power is resumed unexpectedly.

F04.05 Auto Restart Method

= 0: Enable Speed Search

= 1: Normal Start

1. F04.05=0: When auto-restarting the inverter will detect the rotating speed of the motor. The Motor will be controlled to accelerate from the present speed to the target speed.
2. F04.05=1: When auto-restarting the inverter will detect the rotating speed of the motor. The Motor will be controlled to accelerate from the present speed to the target speed.

F04.06 Auto Restart Delay Time (Seconds) **= 0 ~ 800.0 seconds**

F04.07 Number of Auto Restart Attempts **= 0 ~ 10 times**

1. F04.07=0: The inverter will not auto restart after trips due to fault.
2. F04.07>0, F04.06=0:
   The inverter will conduct SPIN START in 0.5 second after trips due to fault. The motor will coast to stop while the output is switched OFF, once the rotating speed is determined then it will accelerate or decelerate from this speed to the running speed before the fault.
3. F04.07>0, F04.06>0:
   The output will be stopped for a period which is determined by the F04.06 after a fault trip. Then, spin start to set target frequency.
4. Auto restart after a fault will not function while DC injection braking or decelerating to stop.

F04.08 Reset Mode Setting

= 0: Enable Reset Only when Run Command is Off

= 1: Enable Reset when Run Command is On or Off

F04.08=0 Once the inverter is detected a fault, please turn Run switch Off and then On again to perform reset, otherwise restarting will not be possible.

F04.09 Direct Running After Power Up

= 0: Enable Direct running after power up

= 1: Disable Direct running after power up

Danger:

1. F04.09=0 and the inverter is set external terminal controlled (F00.03/F00.04=1), if the run switch is ON as power is supplied, the inverter will auto start. It is recommend that the power is turned off and the run s witch is also off to avoid possibility of injury to operators and machines as the power is reapplied.
   Note: IF this mode is required all safety measures must be considered including warning labels.
2. F04.09=1 and the inverter is set external terminal controlled(F00.03/F00.04=1), if the run switch is ON as power is supplied, the inverter will not auto start and the display will flash with STP1.
   It is necessary to turn OFF the run switch and then ON to start normally.

F04.10 Delay-ON Timer (Seconds)

= 1.8 ~ 300.0 seconds

As power on and F04.09=0, the inverter will perform auto restart in the setting time for delay.

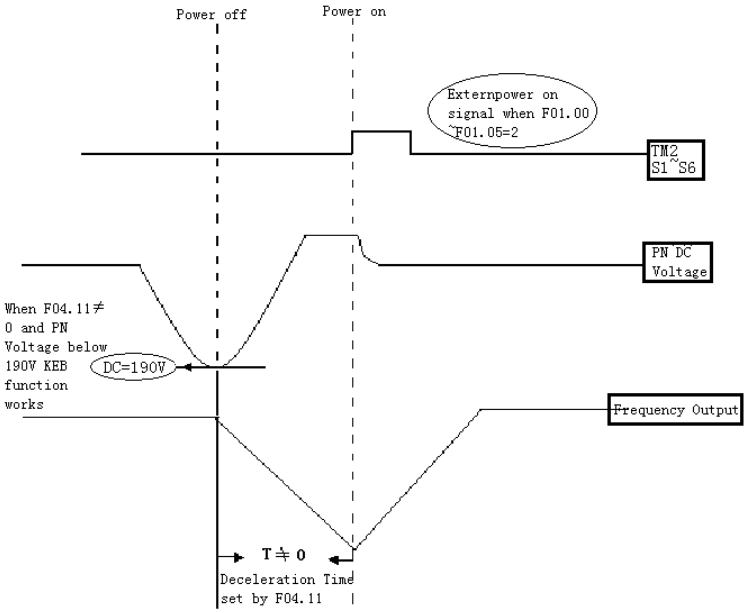
F04.11 Kinetic Energy Back-up Deceleration Time(S)

= 0.0: Disable KEB Deceleration Time

= 0.1~25.0: Enable KEB Deceleration Time

F04.11= 0, the function of KEB Deceleration Time is disabled.
F04.11 ≠ 0, the function of KEB Deceleration Time is enabled.

Example: 220V Class

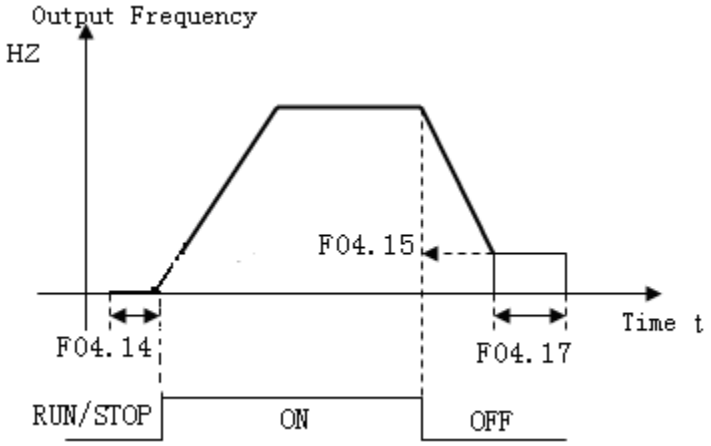


Note:

1. When F04.11≠0, the momentary power loss and Restart is disabled, the inverter will do KEB Function.
2. When input power is turned off, CPU detects the DC bus Voltage and as soon as DC bus Voltage becomes lower than190V (220V Class) or 380V (440V Class), then the KEB function is activated.
3. When KEB function is enabled, the inverter will decelerate to zero by F04.11, and the inverter stop.
4. If the power on signal enabled during the KEB function, the inverter accelerate to original frequency.

F04.12 Lower Limit of Power Voltage Detect **= 150.0 ~ 210.0 (220V Class)** **= 300.0 ~ 420.0 (380V Class)**	
F04.13 DC Injection Brake Level(%) @start (%)	**= 0.0 ~150.0**
F04.14 DC Injection Brake Time (Seconds) @start (S)	**= 0.0 ~ 25.5**
F04.15 DC Injection Brake Start Frequency (Hz) @Stopped	**= 0.1 ~ 10.0**
F04.16 DC Injection Brake Level (%)@Stopped	**= 0.0 ~150.0**
F04.17 DC Injection Brake Time (Seconds)@stopped	**= 0.0 ~ 25.5**

F04.17/F04.15 is the action time and start frequency of DC braking, as graph below:



F04.18 Over excitation Deceleration Gain

= 0.00~0.25

This function can be used to shorten deceleration time and when it is working the motor is in over excitation state. The optimum setting for F04.17 depends on the motor flux saturation characteristics.

F04.19 AVR Function

= 0: AVR function enabled

= 1: AVR function disabled

= 2: AVR function disabled for stop

= 3: AVR function disabled for Deceleration

= 4: AVR function disabled for stop and Deceleration

= 5: when VDC>360/740V, AVR function disabled for stop and Deceleration

Automatic voltage regulator function is mainly to solve the problem that is the output voltage instability caused from the input voltage instability.

1. F04.19=0, When the input voltage has fluctuating, the output voltage will not fluctuate with the input voltage changing.
2. F04.19=1, When the input voltage fluctuates, the output voltage will vary with input voltage fluctuations.
3. F04.19=2, AVR is invalid while “stop” of inverter at work only, to increase the speed of braking at this time.
4. F04.19=3, AVR is invalid when the inverter slows down, from high speed to low speed only, it can be shortened the time of deceleration at this time.
5. F04.19=4, AVR function disable for stop and deceleration.
6. F04.19=5, When VDC>360V(220V class) /740V(380V class), AVR function is disabled for stop and deceleration.

F04.20 DC Injection Brake Mode Selection (Seconds) @stopped

0= Current braking mode (F04.16 can be set to 0.0~150.0%)

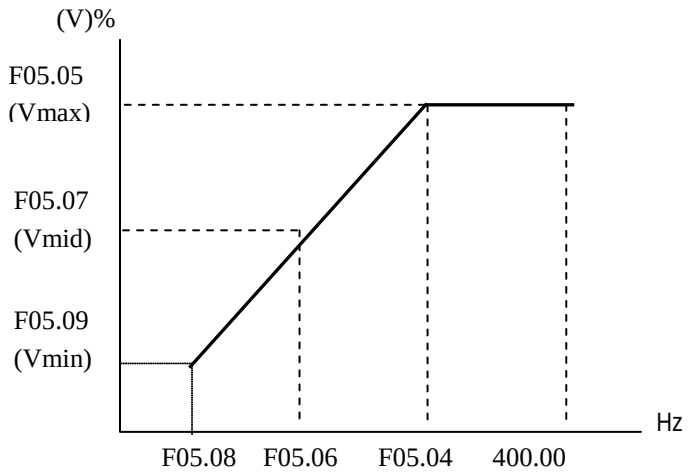
1= Voltage braking mode (F04.16 can be set to 0.0~20.0%)

2= Crawling braking mode (F04.16 can be set to 0.0~200.0%, F04.15 can be set to 0~6.00)

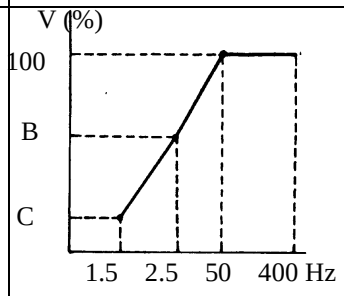
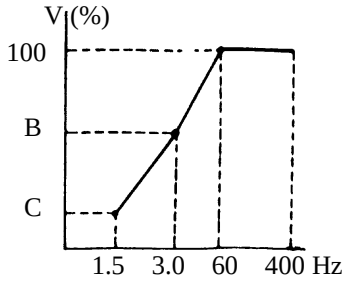
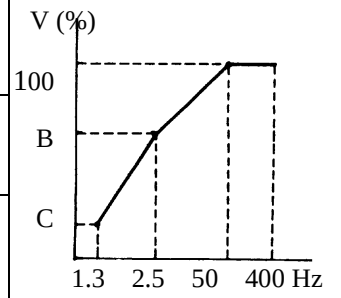
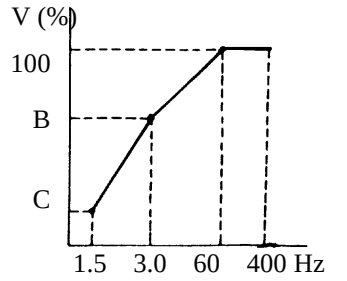
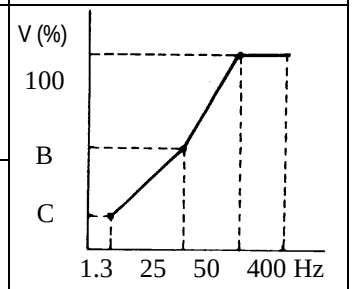
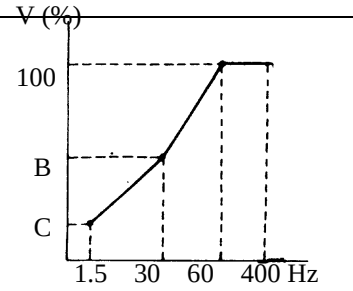
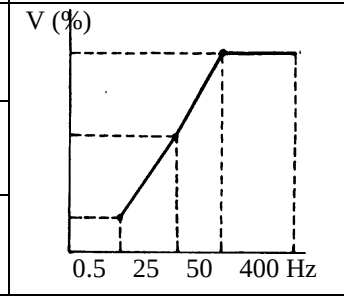
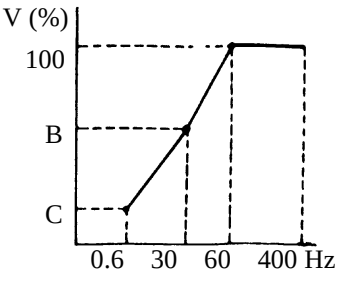
Group F05.xx V/F Command Group

V/F PATTERN Selection	
F05.00 Volts/Hz Curve Modification (Torque Boost) (%)	**= 0.0 ~ 10.0**
F05.01 Motor no load current (Amps AC)	**----------**
F05.02 Motor rated Slip Compensation(%)	**= 0.0 ~ 200.0**
F05.03 V/F Maximum voltage(Vac)	**220V: 170.0~264.0**
	380V: 323.0~528.0
F05.04 Maximum Frequency(HZ)	**= 0.20 ~ 400.00**
F05.05 Maximum Frequency Voltage Ratio (%)	**= 0.0 ~ 100.0**
F05.06 Medium Frequency(HZ)	**= 0.10 ~ 400.00**
F05.07 Medium Frequency Voltage Ratio (%)	**= 0.0 ~ 100.0**
F05.08 Minimum Frequency(HZ)	**= 0.10 ~ 400.00**
F05.09 Minimum Frequency Voltage Ratio (%)	**= 0.0 ~ 100.0**
F05.10 V/F Energy Saving Mode	**= 0: Disabled**
	= 1: Controlled by MFIT at Energy Saving
F05.11 V/F Energy Saving Gain (%)	**= 0 ~ 100**
F05.12 V/F start Frequency	**= 0.00~10.00**
F05.13 Slip Compensation Low pass filter time	**= 0.05~10.00**
F05.14 Oscillation suppression gain	**= 0.0~200.00**

1. F00.01=18, set the V/F pattern freely complying with F05.04~F05.09 (Refer to following diagram)

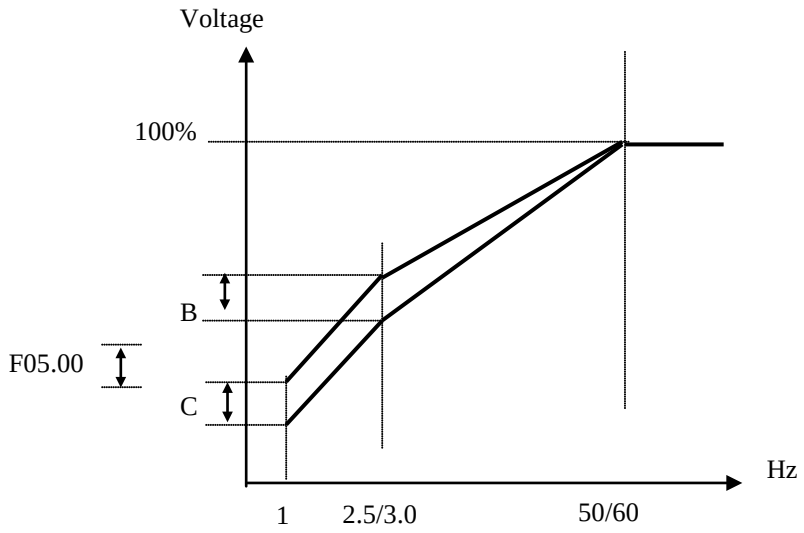


2. F00.01=0~17, fixed V / F Pattern (Refer to following list):

Type	Function	F00.01	V/F Pattern	Type	Function	F00.01	V/F Pattern
50 Hz	General Use	0		60 Hz	General Use	9	
	High Start Torque	1 2 3			High Start Torque	10 11 12	
	Decreasing Torque	4 5			Decreasing Torque	13 14	
	Constant Torque	6 7 8			Constant Torque	15 16 17	

F00.01	B	C
0 / 9	7.5%	4.5%
1 / 10	10.0%	7.0%
2	11.0%	8.5%
3	12.0%	9.5%
4	17.5%	4.0%
5	25.0%	5.0%
11	11.0%	8.0%
12	12.0%	9.0%
13	20.5%	7.0%
14	28.5%	8.0%
6 / 15	45.0%	1.0%
7 / 16	55.0%	1.0%
8 / 17	65.0%	1.0%

3. The inverter will output the value of B, C voltage (refer to F00.01) with the F05.00 V/F pattern setting. The starting torque will be raised as shown.



Note: F05.00=0, Torque boost function is invalid

4. When the induction motor is in running, there must be slip due to the load. It is necessary to boost voltage to improve the precision of the speed.

Slip frequency boost = [Output Current-(F05.01)]÷[(F06.01-F05.01)]×(F05.02)

Note: F05.01= Motor no load current

F06.01=Motor rated current

F05.02 approximate value =((Motor synchronization speed-Rated speed)÷Motor synchronization speed

Motor synchronization speed is marked on the motor nameplate

Motor synchronization speed(RPM)= 120÷Motor Poles×Motor rated frequency (50Hz or 60Hz)

Example: 4 Poles, 60Hz Hzinduction motor synchronization speed=120÷4×60=1800(PRM)

Note: Motor no load current (F05.01) differs with the inverter capacities (F12.00) (refer to F06.01 note). It should be regulated according to actual conditions.

Group F06.xx Motor Parameter Group

F06.00 Motor Rated Voltage(Vac)

F06.01 Motor Rated Current(A)

F06.02 Motor Rated Power(kW)

F06.03 Motor Rated Speed(RPM)

F06.04 Motor Rated Frequency(Hz)

F06.05 Motor Parameter Auto Tuning

= 0: Invalid

= 1: Valid

F06.06 Stator Resistance Gain(Rs)

F06.07 Rotor Resistance Gain(Rr)

F06.08 Equivalent Inductance Gain(lKg)

F06.09 Magnetizing Current Gain(imag)

F06.10 Ferrite Loss Conductance Gain(gm)

F06.11 Low-frequency compensation Gain **0~100**

1. If F00.00=1(vector mode) is selected, as power ON, set F06.05=1, the motor will not run as the inverter performs auto tuning. Once the auto tuning is complete, the inverter will write the internal parameter of the motor to F06.06~ F06.10, and auto reset the F06.05 as 0.
2. Auto tuning must be carried out as long as the motor changed. If the internal parameters is known already, they can be input to F06.06~F06.10 directly.
3. This parameter group only affects the vector mode.

⚠ Precaution

1. The motor parameter auto tuning is the stationary auto tuning.
   During motor auto tuning, the motor does not rotate, and the keypad display -AT-.
2. During motor parameter auto tuning, the input signal in control circuit is invalid.
3. Before motor parameter auto tuning, please confirm the stop state of the motor.
4. The motor parameter auto tuning is only available for vector control mode (F00.00=1).

Group F07.xx Protection Function Group

F07.00 Trip Prevention Selection

= xxxx0: Enable Trip Prevention During Acceleration
=xxxx1: Disable Trip Prevention During Acceleration
=xxx0x: Enable Trip Prevention During Deceleration
=xxx1x: Disable Trip Prevention During Deceleration
=xx0xx: Enable Trip Prevention in Run Mode
=xx1xx: Disable Trip Prevention in Run Mode
=x0xxx: Enable over voltage Prevention in Run Mode
=x1xxx: Disable over voltage Prevention in Run Mode

F07.01 Trip Prevention Level During Acceleration(%)	**= 50 ~ 300**
F07.02 Trip Prevention Level During Deceleration(%)	**= 50 ~ 300**
F07.03 Trip Prevention Level In Run Mode(%)	**= 50 ~ 300**
F07.04 Over voltage Prevention Level in Run Mode	**= 350VDC ~ 390VDC(220V class)**
	= 700VDC ~ 780VDC(380V class)

Note:
1. In acceleration, the inverter will delay the acceleration time if the time is too short resulting in the over current in order to prevent the inverter trips.
2. In deceleration, the inverter will delay the acceleration time if the time is too short resulting in the over voltage of DC VUS, in order to prevent the inverter trips with 'OV' displayed.
3. Some mechanical characteristics (such as press) or unusual breakdown (seize due to insufficient lubrication, uneven operation, impurities of processed materials, etc.) will cause the inverter to trip, thus inconvenience users. When the operating torque of the inverter exceeds the setting of F07.03, the inverter will lower the output frequency following the deceleration time, and return to the normal operation frequency after the torque get steady.

F07.05 Electronic Motor Overload Protection Operation Mode (OL1):

= 0: Enable Electronic Motor Overload Protection
= 1: Disable Electronic Motor Overload Protection

F07.06 Motor type selection:

= 0: Electronic Motor Overload Protection Set for Non-Inverter Duty Motor
= 1: Electronic Motor Overload Protection Set for Inverter Duty Motor

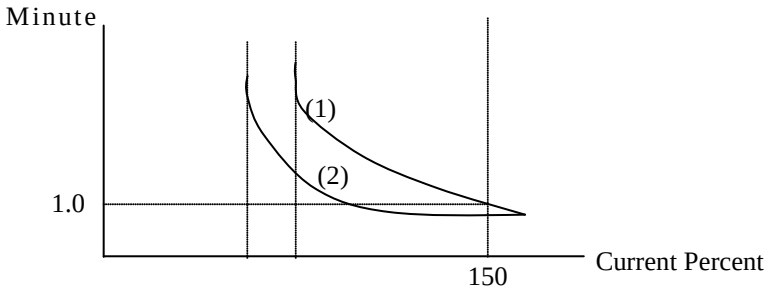
F07.07 Motor Overload Protection Curve Selection:

= 0: Constant Torque (OL =103 %) (150 % for 1 Minute)
= 1: Variable Torque (OL = 113 %)(123 % for 1 Minute)

F07.08 Operation After Overload Protection is Activated (OL1)

= 0: Coast-to-Stop After Overload Protection is Activated
= 1: Drive Will Not Trip when Overload Protection is Activated (OL1)

Description of the thermal relay function:
1. F07.07=0: To protect the general mechanical load, as long as the load is less than 103% rated current, the motor continue to run. The load is larger than 150% rated current, the motor will run for 1 minute. (Refer to following curve (1)).
   F07.07=1: To protect HVAC load(FAN, PUMP…so on), as long as the load is less than 113% rated current, the motor continue to run. The load is larger than 123% rated current, the motor will run for 1 minute.
2. The heat sinking function will not be as effective when the motor run at low speed. So the thermal relay action level will decline at the same time. (The curve 1 will change to curve 2).
3. F07.06=0: Set F06.04 as the rated frequency of the serve motor.
4. F07.08=0: The inverter coasts to stop, as the thermal relay acts and flash OL1. Press the 'Reset' or the external reset terminal to continue to run.
   F07.08=1: The inverter continues to run as the thermal relay acts and flash OL1. Until the current decline to 103% or 113 %(determined by F07.07), OL1 will disappear.



F07.09 Over torque Detection Selection (OL3)

= 0: Disable Over torque Operation

= 1: Enable Over torque Operation Only if at Set Frequency

= 2: Enable Over torque Operation while the Drive is in Run Mode

F07.10 Operation After Over torque Detection is Activated

= 0: Coast-to-Stop After Over torque is Activated

= 1: Drive will Continue to Operate After Over torque is Activated

F07.11 Over torque Threshold Level(%): 30~300

F07.12 Over torque Activation Delay Time (Seconds): 0.0~25.0

1. Over Torque is detected when the output torque level exceeds the level set in parameter F07.11 (inverter rated torque is 100%) and if it is detected for a duration of time which is set in parameter F07.12.
2. F07.10=0: If there is over torque, the inverter coasts to stop and flashes OL3. It is necessary to press 'RESET' or external terminal to continue to run.
   F07.10=1: If there is over torque, the inverter can continue to run and flashes OL3 until the output torque is less than the F07.11 set value.
3. Parameter F01.09/F01.10 (Multifunction output terminal) = 12, the output terminal signal will be set for over torque condition.

Note: Over torque detection will be enabled only when parameter F07.09 is set to options 1or2.

F07.13 OH over heat Protection (cooling fan control)

= 0: Auto (Depends on temp.) **= 1: Operate while in RUN mode**

= 2: Always Run **= 3: Disabled**

1. F07.13=0: The fan runs as the inverter senses temperature rises. Thusly, extend the service period.
2. F07.13=1: The fan runs while the inverter is running.
3. F07.13=2: The fan is continuously running regardless of the action of the inverter.
4. F07.13=3: The fan is disabled.

F07.14 Input Phase Loss Protection	**= 0:Disabled**	**=1: Enabled**
F07.15 Current limiting protection	**= 0:Enabled**	**=1: Disabled**
F07.16 Output Phase Loss Protection	**= 0:Disabled**	**=1: Enabled**
F07.17(OL1)Overload Protection(150%) time	**0.1~5min**	

The Current limiting protection is a drive protection function that prevents inverter high current.
When F07.15=1, the drive may trip on an oC fault if the load is too heavy or the acceleration is too short. For proper drive protection and operation leave the Current limiting protection function enabled.

Group F08.xx Communication Function Group

F08.00 Assigned Communication Station Number:	**0 ~ 64**
F08.01 RTU code /ASCII code Selection	**= 0: RTU code = 1: ASCII code**
F08.02 Baud Rate Setting (bps)	**= 0: 4800 = 1: 9600** **= 2: 19200 = 3: 38400**
F08.03 Stop Bit Selection	**= 0: 1 stop bit = 1: 2 stop bit**
F08.04 Parity Selection	**= 0: no parity** **= 1: odd parity = 2: even parity**
F08.05 Data Format Selection	**= 0: 8 bit data = 1: 7 bit data**

F08.00 to set the communication station codes which are suitable for driving more than one inverter situations.

RS-485 Communication:
1. One to one communication: A controller, PC or PLC, controls one inverter. (set F08.00 = 1~64)
2. One to many communication: A controller, PC or PLC, controls multiple inverters (Up to 32 inverters as max. Set F08.00 = 1~64). When any inverter receive the communication station number 0, from the PC or PLC (Broadcast mode) then all these inverters will be controlled in communication mode regardless of the setting of parameter F08.00.

Note:
a. Communication data parameters (F08.02/F08.03/F08.04/F08.05) for controller, PC or PLC and inverters should all be set the same.
b. The inverter will confirm the validity of new parameters set by PC.
c. Please refer to the Appendix 'NTA5000 ModBus Communication protocol'.
d. When F08.01=0 is input RTU, F08.05=0, can not set F08.05=1.

F08.06 Communication time-out detection time(s)	**= 0.0 ~ 25.5**
F08.07 Communication time-out operation selection	

1. Time-out detection time: 00.0~25.5sec;
   set 00.0 sec: disable time-out function.
2. Time-out operation selection:
   0: Deceleration to stop (F00.10: Deceleration time 1).
   1: Free run to stop.
   2: Deceleration to stop (F10.06: Deceleration time 2).
   3: Continue operating.

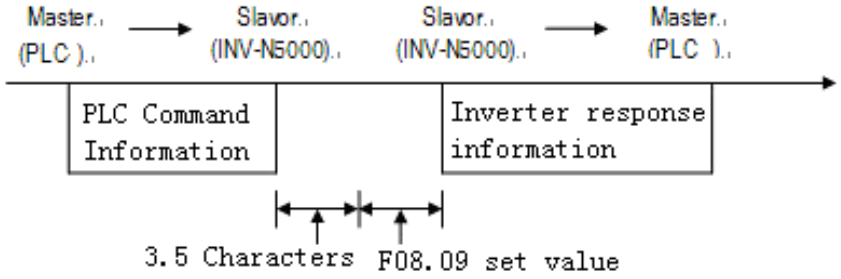
Note: This value cannot be modified during communication.

F08.08 Err6 fault tolerance times	**=1~20**

When communication error times ≥ F08.08 setting, display ERR6 on the keypad.

F08.09 Drive Transmit Wait Time (ms)	**=5~25**

This parameter is used to set the converter to receive data from the sending date to the beginning of the time.



Group F09.xx PID Function Group

F09.00: PID operation selection

=0: Disabled
=1: Bias D Control (Fwd/Rev, positive Characteristics)
=2: Feedback D Control (Fwd/Rev, positive Characteristics)
=3: Bias D Control (Fwd/Rev, Reversed Characteristics)
=4: Feedback D Control (Fwd/Rev, Reversed Characteristics)
=5: Frequency Command + Bias D Control (Fwd/Rev, positive Characteristics)
=6: Frequency Command + Feedback D Control (Fwd/Rev, positive Characteristics)
=7: Frequency Command + Bias D Control (Fwd/Rev, Reversed Characteristics)
=8: Frequency Command + Feedback D Control (Fwd/Rev, Reversed Characteristics)
=9: Bias D Control (Fwd - positive Characteristics, Rev - Reversed Characteristics)
=10: Feedback D Control (Fwd - positive Characteristics, Rev - Reversed Characteristics)
=11: Bias D Control (Fwd - Reversed Characteristics, Rev- positive Characteristics)
=12: Feedback D Control (Fwd - Reversed Characteristics, Rev- positive Characteristics)
=13: Frequency Command + Bias D Control
(Fwd - positive Characteristics, Rev - Reversed Characteristics)
=14:Frequency Command + Feedback D Control
(Fwd- positive Characteristics, Rev- Reversed Characteristics)
=15: Frequency Command + Bias D Control
(Fwd - Reversed Characteristics, Rev - positive Characteristics)
=16: Frequency Command + Feedback D Control
(Fwd - Reversed Characteristics, Rev - positive Characteristics)

Bias D: D is the deviation of (target value –detected value) in the unit time F09.04.
Feedback D: D is the deviation of the detected values in unit time F09.04.
Positive Characteristics: If the deviation is positive, the output frequency raises, vice versa.
Reversed Characteristics: If the deviation is positive, the output frequency decreases, vice versa.

F09.01 Feedback Gain coefficient (%) = 0.00 ~ 10.00

F09.01 is the calibration gain. Deviation = set point – (feedback signal×F09.01)

F09.02 Proportional Gain (%) = 0.00 ~ 10.00

F09.02 Proportion gain for P control.

F09.03 Integration Time (s) = 0.0 ~ 100.0

F09.03 Integrate time for I control.

F09.04 Differentiation Time (s) = 0.00 ~ 10.00

F09.04 Differential time for D control.

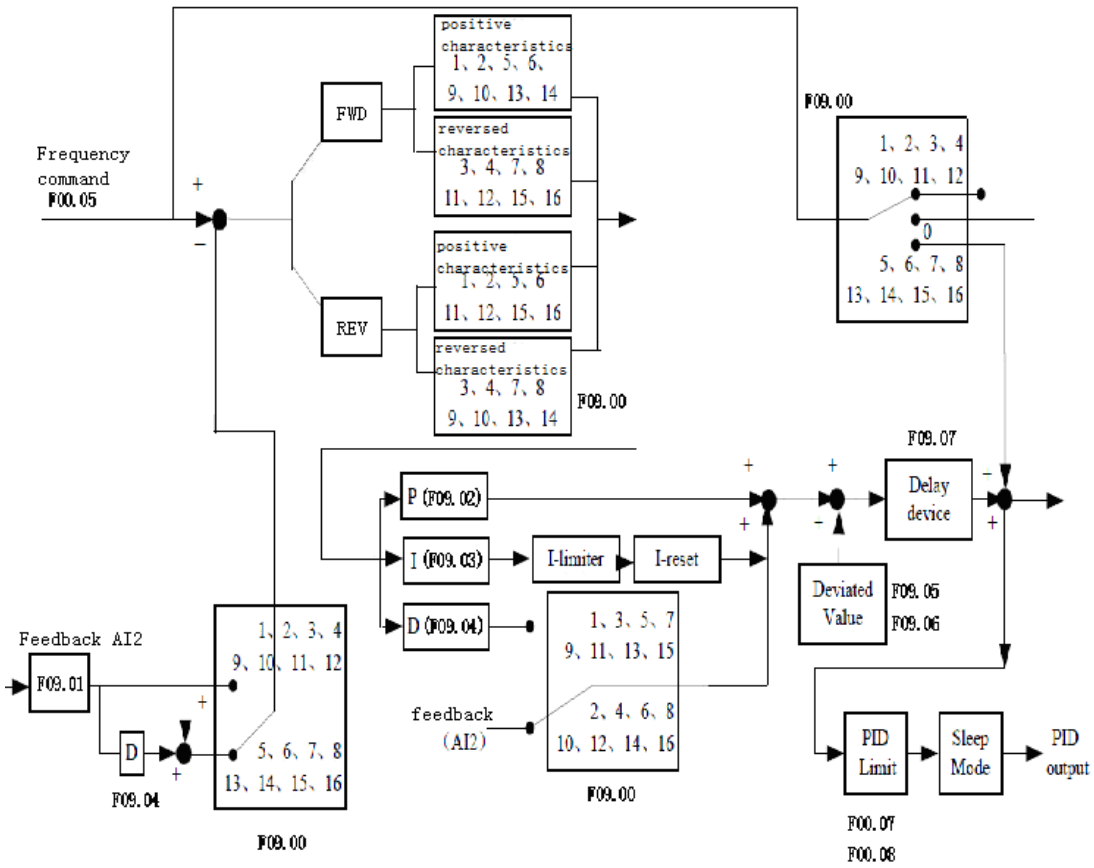
F09.05 PID Offset = 0: Positive Direction = 1: Negative Direction
F09.06 PID Offset Adjust(%) = 0 ~ 109

F09.05/F09.06: Calculated PID output is offset by F09.06 (the polarity of offset is according to F09.05).

F09.07 PID Update time(s) = 0.0 ~ 2.5

F09.07: Update time for output frequency.

Note: PID Function is available for controlling the output flow, external fan flow and temperature. The PID block diagram is as follows:



1. To enable PID control, set F02.06=0, AI2 on TM2 is defined as the PID feedback signal.
2. The set point in the above diagram is the F00.05/F00.06 input frequency.

F09.08 Feedback Loss Detection Mode

= 0: Disable

= 1: Enable – Drive Continues to Operate After Feedback Loss

= 2: Enable – Drive "STOPS" After Feedback Loss

F09.08=0: disable.
F09.08=1: detect, continue running, and display 'PDER'.
F09.08=2: detect, stop, and display 'PDER'.

F09.09 Feedback Loss Detection Level (%) = 0 ~ 100

F09.09: is the level for signal loss. Error = (Set point – Feedback value). When the error is larger than the loss level setting, the feedback signal is considered lost.

F09.10 Feedback Loss Detection Delay Time(s) = 0.0 ~ 25.5

F09.10: the minimum time to consider the feedback signal lost.

F09.11 Integration Limit Value (%) = 0 ~ 109

F09.11: the Limiter to prevent the PID from saturating.

F09.12 Integration Value Resets to Zero when Feedback Signal Equals the Intended Value

0~30

= 0: Disable

= 1: 1 second

= 30: 30 seconds

F09.12=0: As PID feedback value reaches the set point, the integrator will not be reset to 0.
F09.12=1~30: As PID feedback value reaches the set point, reset to 0 in 1~30 seconds and inverter stops. The inverter will run again when the feedback value differs from the set point value.

F09.13 Allowable Integration Error Margin (Unit value)(1Unit = 1/8192): = 0 ~ 100

F09.13=0~100% unit value: Restart the tolerance after the integrator reset to 0.

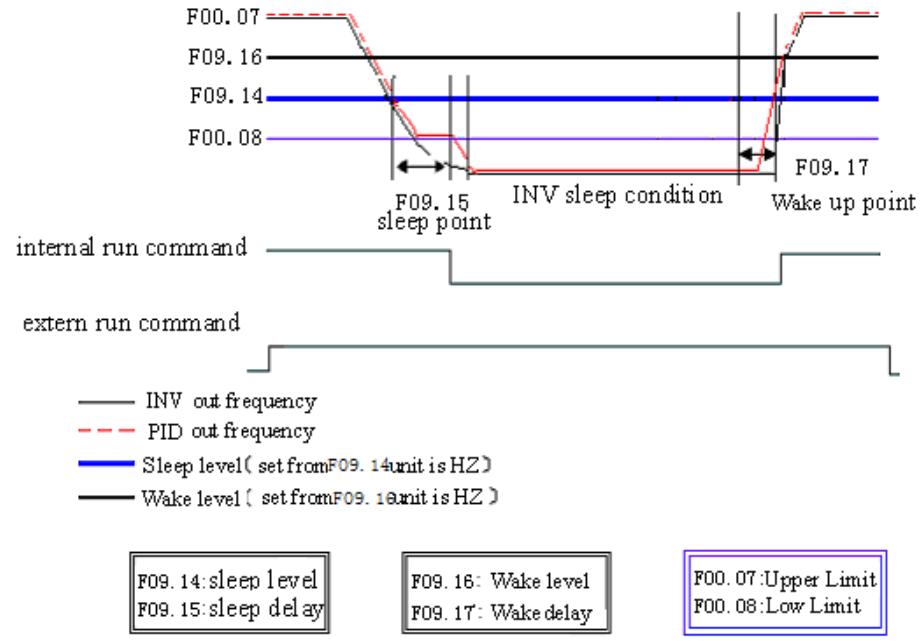
F09.14 PID Sleep Frequency Level (Hz)	**= 0.00 ~ 400.00**
F09.15 PID Sleep Function Delay Time (S)	**= 0.0 ~ 25.5**
F09.16 PID Wake up frequency Level (Hz)	**= 0.00 ~ 400.00**
F09.17 PID Wake up function Delay Time (S)	**= 0.0 ~ 25.5**

PID SLEEP MODE:

F09.00=1 (PID Enable)
F02.06=0 (PID FEEDBACK Enable)
F00.05=PID setting frequency source (Target Value)
F03.01=PID setting frequency
F09.14=PID set the sleep threshold frequency, Unit: Hz
F09.15=PID set the time for sleep delay, Unit: Sec
F09.16=PID set the wake threshold frequency, Unit: Hz
F09.17=PID set the time for wake delay, Unit: Sec

When PID output frequency is less than the sleep threshold frequency and exceeds the time of sleep delay, the inverter will decelerate to 0 and enter PID sleep mode.
When PID output frequency is larger than the Wake threshold frequency for Wake start the inverter will reactivate and enter PID wake mode.

The time diagram is as follow:



Group F10.xx Assistant Function Group

F10.00 Expansion card type select **= 0: None**
= 1: IO-card (Reserved function)

F10.01 Prevention of Reverse operation
= 0: Reverse command is enabled
= 1: Reverse command is disabled

F10.01=1, the reverse command is disabled.

F10.02 Keypad Operation with Up/Down Keys in Run Mode
= 0: 'Enter' must be pressed after frequency change with Up/Down Keys on keypad.
= 1: Frequency will be changed directly when Up/Down Keys are Pressed

F10.03 Carrier Frequency(KHz) 1~15

F10.03	Carrier Frequency	F10.03	Carrier Frequency	F10.03	Carrier Frequency	F10.03	Carrier Frequency
1	1KHz	5	5KHz	9	9KHz	13	13KHz
2	2KHz	6	6KHz	10	10KHz	14	14KHz
3	3KHz	7	7KHz	11	11KHz	15	15KHz
4	4KHz	8	8KHz	12	12KHz		

Note:

1. In applications where there is excessive audible noise from the motor or it is required to reduce electrical interference (RFI) from the inverter caused by use of long cable then the carrier frequency can be adjusted. To reduce electromagnetic interference due to long cable etc, decrease carrier frequency. To reduce motor audible noise, increase carrier frequency.
2. The carrier frequency as minimum should be set higher than ten times the max running frequency.
Example: If the Max running frequency=400Hz, then set the carrier Frequency higher than 4 KHz.
If the Max running frequency =300Hz, then set the carrier frequency higher than 3 KHz.

F10.04 Carrier mode selection

=0: Carrier mode0 3-phase PW M modulation
=1: Carrier mode1 2-phase PW M modulation
=2: Carrier mode2 2-phase randomized PW M modulation
=3: Carrier mode3 randomized PW M modulation
=4: Carrier mode4 dual randomized PW M modulation

1. F10.04=0: Carrier mode0 is recommended in environments where low noise is required. Correct ambient temperature and cooling is necessary.
2. F10.04=1: Carrier mode1 is recommended in locations where fan or pumps is required.
3. F10.04=2: Carrier mode2 Help to slow down the temperature raise, prolong life-span of IGBT and control electromagnetism noise.
4. F10.04=3: Carrier mode3 Suit to the application that using lower carrier wave in order to get low temperature or high torque, and hopes to shun shrill electromagnetism noise .This function mostly produce white noise.
5. F10.04=4: Carrier mode4 Reduce 1/3 on-off switch timers, prolong life-span of IGBT, and will not increase electromagnetism noise, even lower.

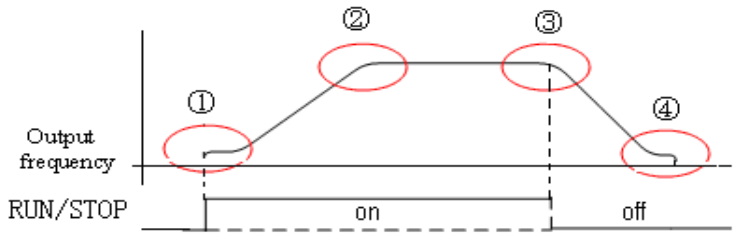
Note: When the inverter is running at high speed and high carrier frequency is selected then, please set F10.04=1 this can reduce the IGBT switching losses (heat loss).

F10.05 Acceleration Time 2 (MFIT) (Seconds)	**= 0.1 ~ 3600.0**
F10.06 Deceleration Time 2 (MFIT) (Seconds)	**= 0.1 ~ 3600.0**

Refer to Acc/Dec time 1(F00.09/F00.10).

F10.07 S-Curve Acc/Dec 1 (Seconds)	**= 0.0 ~ 4.0**
F10.08 S-Curve Acc/Dec 2 (Seconds)	**= 0.0 ~ 4.0**
F10.09 S-Curve Acc/Dec 3 (Seconds)	**= 0.0 ~ 4.0**
F10.10 S-Curve Acc/Dec 4 (Seconds)	**= 0.0 ~ 4.0**

Use S Curve parameters where a smooth acceleration or deceleration action is required, this will prevent possible damage caused to machines by sudden acceleration/deceleration.
Four parameters can be selected as shown on the diagram below:



Note:

a. Regardless of the stall prevention period, actual acceleration and deceleration time =preset acceleration / deceleration time + S curve time.

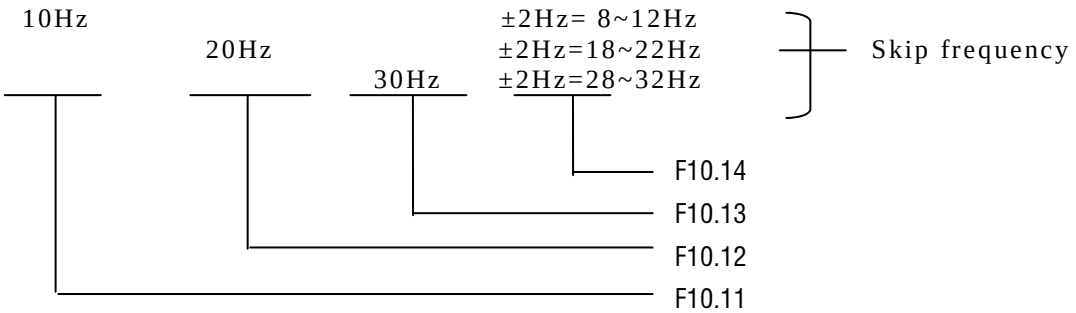
b. Please set the S curve time separately in the parameter (F10.07~F10.10)

c. When S curve time (F10.07~F10.10) is set as 0, the S curve function is disabled.

Note: The calculating of S curve time is based on the rated frequency of motor (F06.04), Please refer to the parameter (F00.09/F00.10).

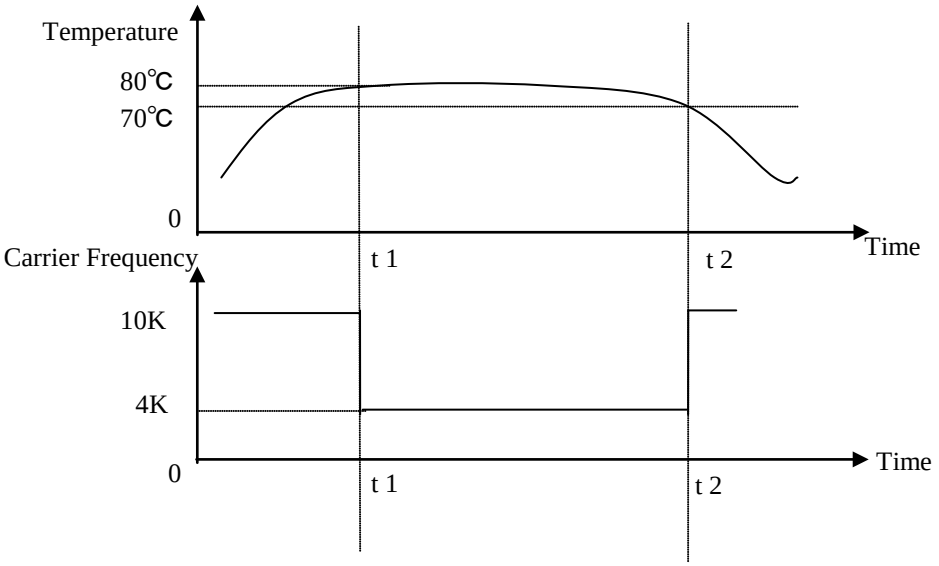
F10.11 Skip frequency 1 (Hz)	**= 0.00 ~ 400.00**
F10.12 Skip frequency 2 (Hz)	**= 0.00 ~ 400.00**
F10.13 Skip frequency 3 (Hz)	**= 0.00 ~ 400.00**
F10.14 Skip frequency range (±Hz)	**= 0.00 ~ 30.00**

Skip frequency parameters can be used to avoid mechanical resonance in certain applications.
Example, F10.11=10.0Hz, F10.12=20.0Hz, F10.13=30.0Hz, F10.14=2.0Hz.



F10.15 Carrier Frequency reduced by temperature raising
=0: Disabled
=1: Enabled

When inverter is temperature overrun 80°C on keypad display(F11.00=01000), Carrier Frequency reduced 4K.when inverter is temperature reduced less than 70°C, Carrier Frequency resume.



Group F11.xx Keypad Display Group

F11.00 A Display Mode

= xxxx0: Disable Motor Current Display
= xxxx1: Enable Motor Current Display
= xxx0x: Disable Motor Voltage Display
= xxx1x: Enable Motor Voltage Display
= xx0xx: Disable Bus Voltage Display
= xx1xx: Enable Bus Voltage Display
= x0xxx: Disable temperature Display
= x1xxx: Enable temperature Display
= 0xxxx: Disable PID feedback Display
= 1xxxx: Enable PID feedback Display

F11.01 Custom Units (Line Speed) Value: = 0~65535

The max preset line value of F11.01 is equal to the rated frequency (F06.04) of the motor. For instance, given line speed 1800 is equal to display 900 when output is 30Hz while the operation frequency is 60Hz.

F11.02 Custom Units (Line Speed) Display Mode

0: Drive Output Frequency is Displayed
1: Line Speed is Displayed in Integer (xxxxx)
2: Line Speed is Displayed with One Decimal Place (xxxx.x)
3: Line Speed is Displayed with Two Decimal Places (xxx.xx)
4: Line Speed is Displayed with Three Decimal Places (xx.xxx)

F11.02=1/2/3/4, line speed is displayed while the inverter is running or stopped.

F11.03 PID Max PID Feedback Setting: = 0 ~ 999

F11.04 PID Min PID Feedback Setting: = 0 ~ 999

Example: F11.03=100, F11.04=50, F11.00=10000, when the feedback changes from minimum to maximum, the feedback is displayed from 50 to 100 on the panel.

F11.05 PID Feedback Display Mode

= 0: Displayed in Integer (xxx)
= 1: Displayed with One Decimal Place (xx.x)
= 2: Displayed with Two Decimal Places (x.xx)

F11.06 PID Feedback Display Unit Setting

= 0: xxx--
= 1: xxxpb (pressure)
= 2: xxxfl (flow)

F11.07 Display Count Value:

=0: Not display
=1: Display

When F11.07=1, the keypad display C0000 and increases upward, eg. Increasing to C0008, it means count value is 8.

F11.08 Count value reached:
=0 ~ 9999

This parameter is used for setting the value of internal counter, any one of the multi-function terminals in the control circuit can as the trigger terminal for this counter.When the conunt value reached the setting valuation,can control the Replay to act output.

F11.09 Current count value:
=0 ~ 9999

As the same as the display count value, this parameter will display the value and will maintain it when power off.

Group F12.xx User Parameter Group

F12.00 Drive Horsepower Code

F12.00	Inverter Model	
20P5	NTA5200	0.4K
2001		0.75 K
2002		1.5K
2003		2.2K
-		-
-		-
-		-

F12.00	Inverter Model	
4001	NTA5000	0.75K
4002		1.5K
4003		2.2K
4005		3.7K
4008		5.5K
4010		7.5K
4015		11K

F12.00	Inverter Model	
4020	NTA5000	15K
4025		18.5K
4030		22K
4040		30K
4050		37K
4060		45K
4075		55K

F12.01 Software Version

Note: read only.

F12.02 Fault Log (Latest 3 times)

1. When the inverter trips on a fault, the previous fault log stored in2.xxx will be transferred to 3.xxx, the one in 1.xxx to 2.xxx. The present fault will be stored in the empty register 1.xxx. The fault stored in 3.xxx is the last one of the most recent three, while the one 1.xxx is the latest.
2. When pressing 'ENTER' at F12.02, the fault 1.xxx will be displayed first. Press▲, to read 2.xxx→3.xxx→1.xxx press▼ and the order is 3.xxx→2.xxx→1.xxx→3.xxx.
3. When pressing 'Reset' at F12.02, the three fault log will be cleared when the reset key is pressed. The log content will change to 1. ---, 2. ---, 3. ---.
4. E.g. the fault log content is '1.OC-C'; this indicates the latest fault is OC-C, etc.

F12.03 Accumulated Operation Time 1 (Hours) = 0 ~ 23
F12.04 Accumulated Operation Time 2 (Days) = 0 ~ 63335
F12.05 Accumulated Operation Time Mode = 0: Power on time = 1: Operation time

1. When the operation time is to 23 as the elapsed time 1 is set. The next hour will be carried to operation F12.04. Meanwhile, the recorded value will be cleared to 0000, and the record value of operation duration 2 will be 01.
2. Description of operation time selection:

Preset value	Description
0	Power on, count the accumulated time.
1	Inverter operation, count the accumulated operation time

F12.06 Reset Drive to Factory Settings	**= 1150: Reset to the 50Hz factory setting**
	= 1160: Reset to the 60Hz factory setting
F12.07 Parameter lock	**= 0: Enable all Functions**
	= 1: F03.01~F03.16 cannot be changed
	= 2: All Functions cannot be changed except F03.01~F03.16
	= 3: Disable All Function
F12.08 Parameter password	**00000~65535**

This function is used to prevent parameter from being modified by disrelated personnels, keep parameter safety. When a password has been set, parameters cannot be modified, and it is forbidden to reset to factory set.

(1) Setting password:
① open F12.08, '00000' is shown on keypad, input password, press 'enter', display 'End'.
② When open F12.08 again, display '00001', input password again, press 'enter', display 'LOC' display. If setting is different from the first time, display 'Err2', setting failed.

(2) Cancel password:
open F12.08, display '00002', input the correct password, press 'enter' key, display 'End', Disable the password is successes. If typing a wrong password, display 'LOC' (password is still holded).

Note: set F12.08=00000 means no password.

Group F13.xx Auto Sequencer Function Group

F13.00 Auto Run(sequencer) mode selection:

0: Disabled.
1: Single cycle. (Continues to run from the unfinished step if restarted).
2: Periodic cycle. (Continues to run from the unfinished step if restarted).
3: Single cycle, then holds the speed of final step to run. (Continues to run from the unfinished step if restarted).
4: Single cycle. (Starts a new cycle if restarted).
5: Periodic cycle. (Starts a new cycle if restarted).
6: Single cycle, then hold the speed of final step to run. (Starts a new cycle if restarted).

F13.01 Auto-Run Mode Frequency Command 1 (Hz) =	**(0~400 Hz)**
F13.02 Auto-Run Mode Frequency Command 2 (Hz) =	**(0~400 Hz)**
F13.03 Auto-Run Mode Frequency Command 3 (Hz) =	**(0~400 Hz)**
F13.04 Auto-Run Mode Frequency Command 4 (Hz) =	**(0~400 Hz)**
F13.05 Auto-Run Mode Frequency Command 5 (Hz) =	**(0~400 Hz)**
F13.06 Auto-Run Mode Frequency Command 6 (Hz) =	**(0~400 Hz)**
F13.07 Auto-Run Mode Frequency Command 7 (Hz) =	**(0~400 Hz)**
F13.08 Auto-Run Mode Frequency Command 8 (Hz) =	**(0~400 Hz)**
F13.09 Auto-Run Mode Frequency Command 9 (Hz) =	**(0~400 Hz)**
F13.10 Auto-Run Mode Frequency Command 10 (Hz) =	**(0~400 Hz)**
F13.11 Auto-Run Mode Frequency Command 11 (Hz) =	**(0~400 Hz)**
F13.12 Auto-Run Mode Frequency Command 12 (Hz) =	**(0~400 Hz)**
F13.13 Auto-Run Mode Frequency Command 13 (Hz) =	**(0~400 Hz)**
F13.14 Auto-Run Mode Frequency Command 14 (Hz) =	**(0~400 Hz)**
F13.15 Auto-Run Mode Frequency Command 15 (Hz) =	**(0~400 Hz)**

F13.16 Auto-Run Mode Running Time Setting 0 (seconds) =	**0.0~ 3600.0**
F13.17 Auto-Run Mode Running Time Setting 1 (seconds) =	**0.0~ 3600.0**
F13.18 Auto-Run Mode Running Time Setting 2 (seconds) =	**0.0~ 3600.0**
F13.19 Auto-Run Mode Running Time Setting 3 (seconds) =	**0.0~ 3600.0**
F13.20 Auto-Run Mode Running Time Setting 4 (seconds) =	**0.0~ 3600.0**
F13.21 Auto-Run Mode Running Time Setting 5 (seconds) =	**0.0~ 3600.0**
F13.22 Auto-Run Mode Running Time Setting 6 (seconds) =	**0.0~ 3600.0**
F13.23 Auto-Run Mode Running Time Setting 7 (seconds) =	**0.0~ 3600.0**
F13.24 Auto-Run Mode Running Time Setting 8 (seconds) =	**0.0~ 3600.0**
F13.25 Auto-Run Mode Running Time Setting 9 (seconds) =	**0.0~ 3600.0**
F13.26 Auto-Run Mode Running Time Setting 10 (seconds) =	**0.0~ 3600.0**
F13.27 Auto-Run Mode Running Time Setting 11 (seconds) =	**0.0~ 3600.0**
F13.28 Auto-Run Mode Running Time Setting 12 (seconds) =	**0.0~ 3600.0**
F13.29 Auto-Run Mode Running Time Setting 13 (seconds) =	**0.0~ 3600.0**
F13.30 Auto-Run Mode Running Time Setting 14 (seconds) =	**0.0~ 3600.0**
F13.31 Auto-Run Mode Running Time Setting 15 (seconds) =	**0.0~ 3600.0**

F13.32 Auto-Run Mode Running Direction	**0**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.33 Auto-Run Mode Running Direction	**1**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.34 Auto-Run Mode Running Direction	**2**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.35 Auto-Run Mode Running Direction	**3**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.36 Auto-Run Mode Running Direction	**4**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.37 Auto-Run Mode Running Direction	**5**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.38 Auto-Run Mode Running Direction	**6**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.39 Auto-Run Mode Running Direction	**7**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.40 Auto-Run Mode Running Direction	**8**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.41 Auto-Run Mode Running Direction	**9**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.42 Auto-Run Mode Running Direction	**10**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.43 Auto-Run Mode Running Direction	**11**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.44 Auto-Run Mode Running Direction	**12**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.45 Auto-Run Mode Running Direction	**13**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.46 Auto-Run Mode Running Direction	**14**	**(0: STOP**	**1:forward**	**2:reverse)**
F13.47 Auto-Run Mode Running Direction	**15**	**(0: STOP**	**1:forward**	**2:reverse)**

Note:

In order to selection Auto Run function, you must set to one of F01.00~F1.05=22, and then close the terminals.

1. Auto Run (sequencer) various modes cab is selected by parameter F13.00.

2. Auto Run (sequencer) mode set up parameters are parameters (F13.01~F13.47).

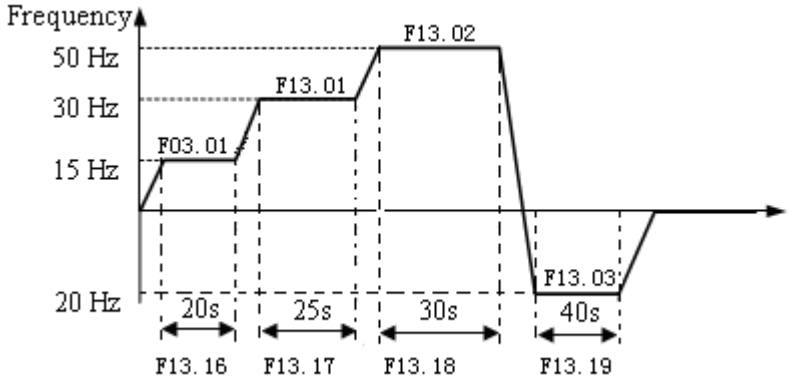
3. Auto run mode (sequencer) operation as selected by parameter F13.00 can be set up as follows:
   a. Setting multi-step frequency commands, by using the available multi-step frequency commands 1~15 as required can be set by parameters (F13.01~F13.15).
   b. Setting multi-step run time, by parameters (F13.16~F13.31) for each required step.
   c. FWD/REV direction can be selected by setting of parameters (F13.32~F13.47).

Some examples in auto_run mode as follows:

(A) Single Cycle Running (F13.00=1, 4)

The inverter will run for a single full cycle based upon the specified setting mode. Then, it will stop.

For example: F13.00=1 (or 4)
Panel Frequency (F03.01)=15Hz F13.01=30Hz F13.02=50Hz F13.03=20Hz
F13.16=20s F13.17=25s F13.18=30s F13.19=40s
F13.32=1 F13.33=1 F13.34=1(FWD) F13.35=2(REV)
F13.04~F13.15=0Hz, F13.20~F13.31=0s, F13.36~F13.47=0

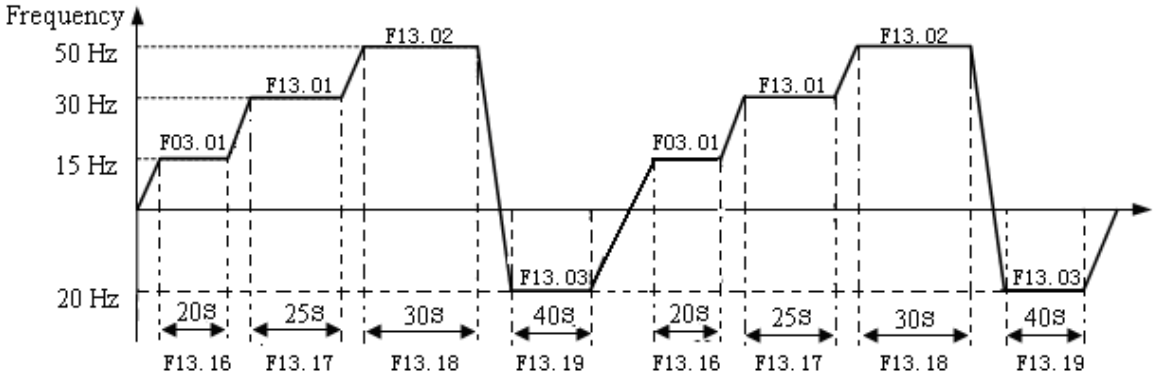


(B) Periodic cycle Running (F13.00=2, 5)

The inverter will repeat the same cycle periodically.

For example: F13.00=2 (or 5)

F13.01~F13.15, F13.16~F13.31, F13.32~F13.47, Same setting as the example (A)



(C) Auto-Run Mode for Single Cycle (F13.00=3, 6)

The speed of final step will be held to run.

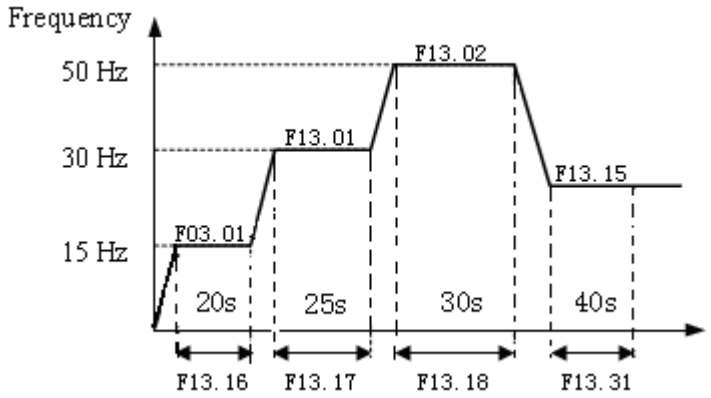
For example: F13.00=3 (or 6)

Panel Frequency (F03.01)=15Hz F13.01=30Hz F13.02=50Hz F13.15=20Hz

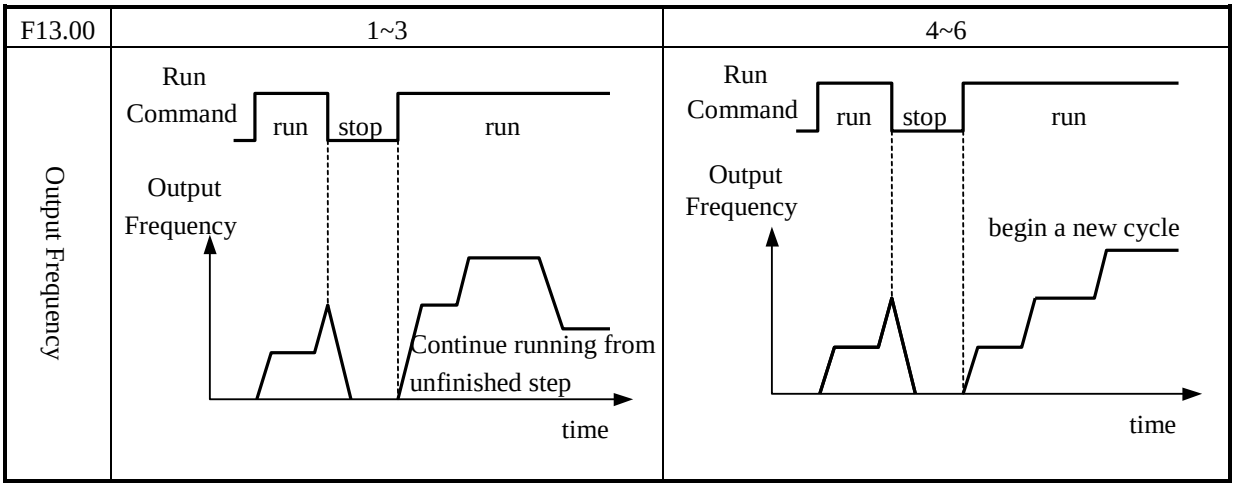
F13.16=20s F13.17=25s F13.18=30s F13.31=40s

F13.32=1 F13.33=1 F13.34=1 F13.47=1(FWD)

F13.04~F13.15=0Hz, F13.20~F13.30=0s, F13.35~F13.46=0



- F13.00 = 1~3: If the inverter stops and re-starts, it will continue running from the unfinished step, according to the setting of F13.00.
- F13.00 = 4~6: If the inverter stops and re-starts, it will begin a new cycle and continue running according to the setting of F13.00.



●ACC/DEC time follow the setting of F00.09/F00.10 or F10.05/F10.06.
Note: F13.16 and F13.32 need cooperate with panel frequency (F03.01) to as the auto-run mode running speed setting 0

Auto-run mode Description

1. The inverter is controlled by the keypad, to use Auto-run function, please set as below:

Example: ① F00.03=0 or F00.04=0, refer to P4-24/ P4-27
② F01.00 (S2) =22 (Auto-run)
③ Set parameter as (A)(B)(C), Auto_run function come true.
④ When S1 close, Auto-run function is enable, press RUN/STOP key on keypad offer Run or stop instruction.

2. The inverter is controlled by the external terminals, to use Auto-run function, please set as below:

Example: ① F00.03/F00.04=1 (external terminals)
② F00.11=0 (Operation modes of external terminals: FWD/STOP-REV/STOP)
Note: this section F00.11 do not set 1 or 2.
③ F01.00 (S1) =0 (FWD/STOP)
④ F01.01 (S2) =22(Auto_run)
⑤ Set parameter as (A)(B)(C) to make Auto-run function come true
⑥ When S2 close, Auto_run function is enabled, turn S1 ON/OFF offer Run or stop instruction.

3. The inverter is controlled by communication, to use Auto-run function, please set is as below:

Example: ① F01.00 (S1) =22(Auto-run Mode)
② Set parameter as (A)(B)(C) to make Auto-run function come true
When S1 close, Auto_run function enable, communication offer Run or stop instruction.

Chapter 5 Troubleshooting and maintenance

5.1 Error display and corrective action

5.1.1 General Conditions

1. Faults which cannot be recovered manually and automatically

Display	Fault	Cause	Corrective action
-OV-	Voltage too high when stopped	Detection circuit malfunction	Return the inverter to fix
-LV-	Voltage too low when stopped	1. Power voltage too low 2. Pre-charge resistor or fuse burnt out. 3. Detection circuit malfunction	1. Check if the power voltage is correct 2. Replace the pre-charge resistor or the fuse 3. Return the inverter to fix
-OH-	The inverter is overheated when stopped	1. Detection circuit malfunction 2. Ambient temperature too high or bad ventilation	1. Return the inverter to fix 2. Improve ventilation conditions
CTER	Current Sensor detection error	Current sensor error or circuit malfunction	Return the inverter to fix
EPR	EEPROM problem	Faulty EEPROM	Replace EEPROM
COt	Communication error	Communication error detect	Inspect the wiring

2. Faults which can be recovered manually and automatically

Display	Fault	Cause	Corrective Action
OC-S	Over current at start	1. Short circuit between the motor coil and the case 2. Short circuit between motor coil and ground 3. IGBT module damaged	1. Inspect the motor 2. Inspect the wiring 3. Replace the transistor module
OC-D	Over-current at deceleration	The preset deceleration time is too short.	Set a longer deceleration time
OC-A	Over-current at acceleration	1. Acceleration time too short 2. The capacity of the motor exceeds the capacity of the inverter 3. Short circuit between the motor coil and the case 4. Short circuit between motor wiring and ground 5. IGBT module damaged	1. Set a longer acceleration time 2. Replace inverter with one that has the same rating as that of the motor 3. Check the motor 4. Check the wiring 5. Replace the IGBT module

OC-C	Over-current at fixed speed	1. Transient load change 2. Transient power change	1. Increase the capacity of the inverter 2.Repeat parameter auto tuning (F06.05= 1) 3.Reduce stator resistance (F06.06) if the above actions are ineffective
OV-C	Excessive Voltage during operation/ deceleration	1. Deceleration time setting too short or excessive load inertia 2. Power voltage varies widely (fluctuates)	1. Set a longer deceleration time 2. Add a brake resistor or brake module 3. Add a reactor at the power input side 4. Increase inverter capacity
Err4	Unacceptable CPU interrupt	External noise interference	Please contact us if this happens regularly

3. Faults which can be recovered manually but not automatically

Display	Fault	Cause	Corrective Action
OC	Over-current during stop	1. Detection circuit malfunction 2. Bad connection for CT signal cable	1. Check the noise between Power line and motor line 2. Return the inverter for repair
OL1	Motor overload	1. Excessive load 2. Incorrect settings for F06.01, F07.05~F08	1. Increase the motor capacity 2. Set F06.01,F07.05~F08 correctly
OL2	Inverter overload	Excessive Load	Increase the inverter capacity
OL3	Over torque	1. Excessive Load 2. Incorrect settings for F07.11, F07.12	1. Increase the inverter capacity 2. set F07.11, F07.12 correctly
LV-C	Voltage too low during operation	1. Power voltage too low 2. Power voltage varies widely (fluctuates)	1. Improve power quality or increase the value of F04.04 2. Set a longer acceleration time 3. Add a reactor at the power input side 4. Increase the motor capacity

Note: After OC breakdown, you cannot reset until the delay time is over, and it is as follows:

NTA5000-0.4K~18.5K: 3Sec

NTA5000-22K~55K: 5Sec

5.1.2 Special Conditions

Display	Fault	Description
STP0	Zero speed at stop	Occurs when preset frequency <0.1Hz
STP1	Fail to start directly On power up.	1. If the inverter is set for external terminal control mode (F00.03/F00.04=1) and direct start is disabled (F04.09=1) The inverter cannot be started and will flash STP1. The run input is active at power-up, refer to descriptions of (F04.09). 2. Direct start is possible when F04.09=0.
STP2	Keypad Stop Operated when inverter in external Control mode.	1. With the function of Stop key enabled by (F04.02=0) And if the Stop key is pressed while the inverter is set to external control mode (F00.03/F00.04=1) then, the inverter will stop according to the setting of F04.01 and the error message, 'STP2'flashes after stop. Release and re-activate the run contact to restart the inverter. 2. If the inverter is in communication mode and the Stop key is enabled (F04.02=0), the inverter will stop in the way set by F04.01 when Stop key is pressed during operation and then flashes STP2. The Host controller has to send a Stop command then a Run command to the inverter for it to be restarted. 3. Stop key will be disabled when F04.02=1
E.S.	External Rapid stop	The inverter will decelerate to stop and then flash E.S., when input external Rapid stop signal via the multifunctional input terminal activates (refer to descriptions of F01.00~F01.05).
b.b.	External base block	The inverter stops immediately and then flashes b.b., when external base block is input by the multifunctional input terminals. (Refer to descriptions of F01.00~F01.05).
ATER	Auto-tuning faults	1. Motor data error resulting in auto-tuning failure 2. Stopping the inverter during Auto-tuning before completion
PDER	PID feedback loss	PID feedback loss detect

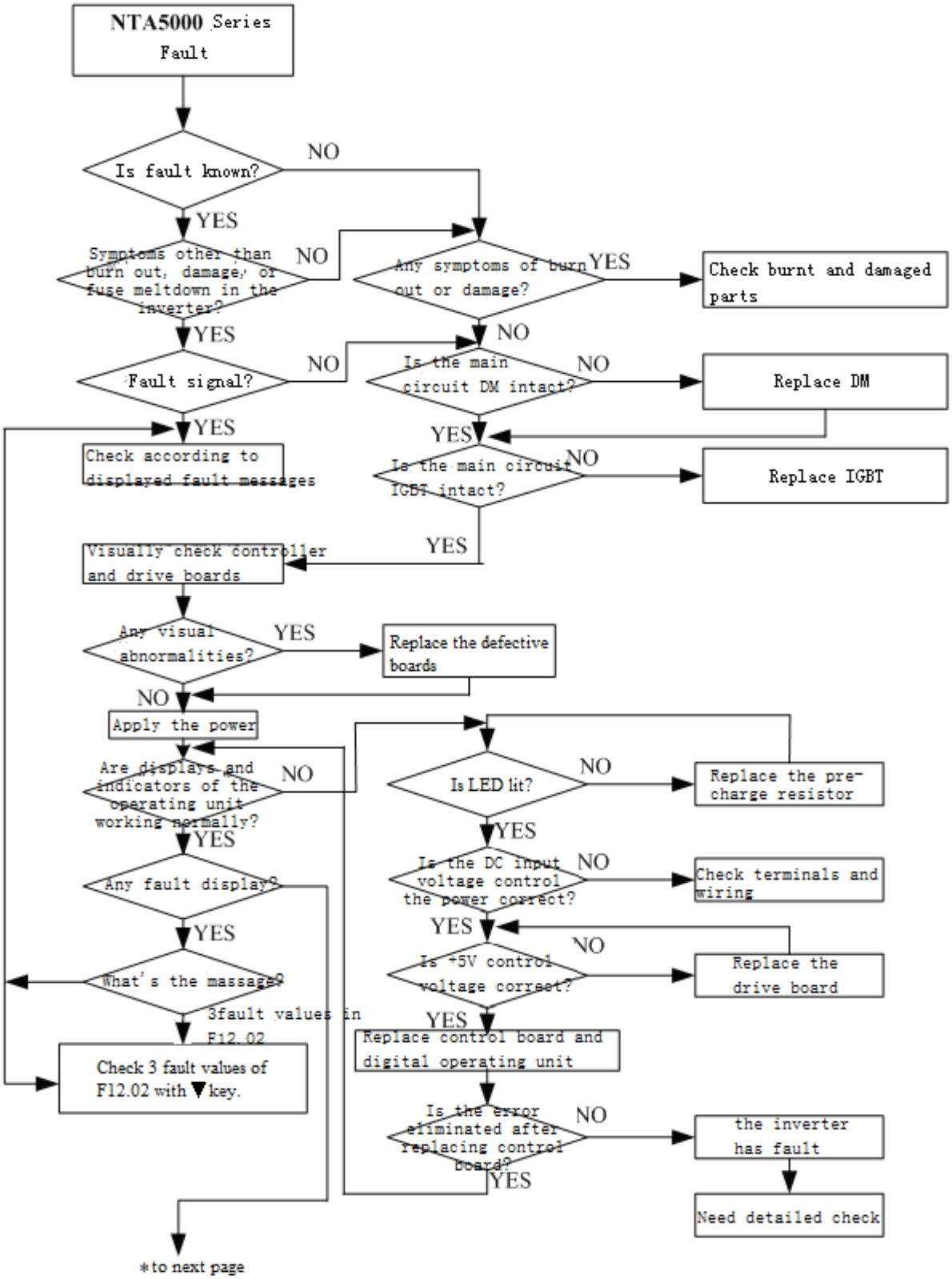
5.1.3 Operation errors

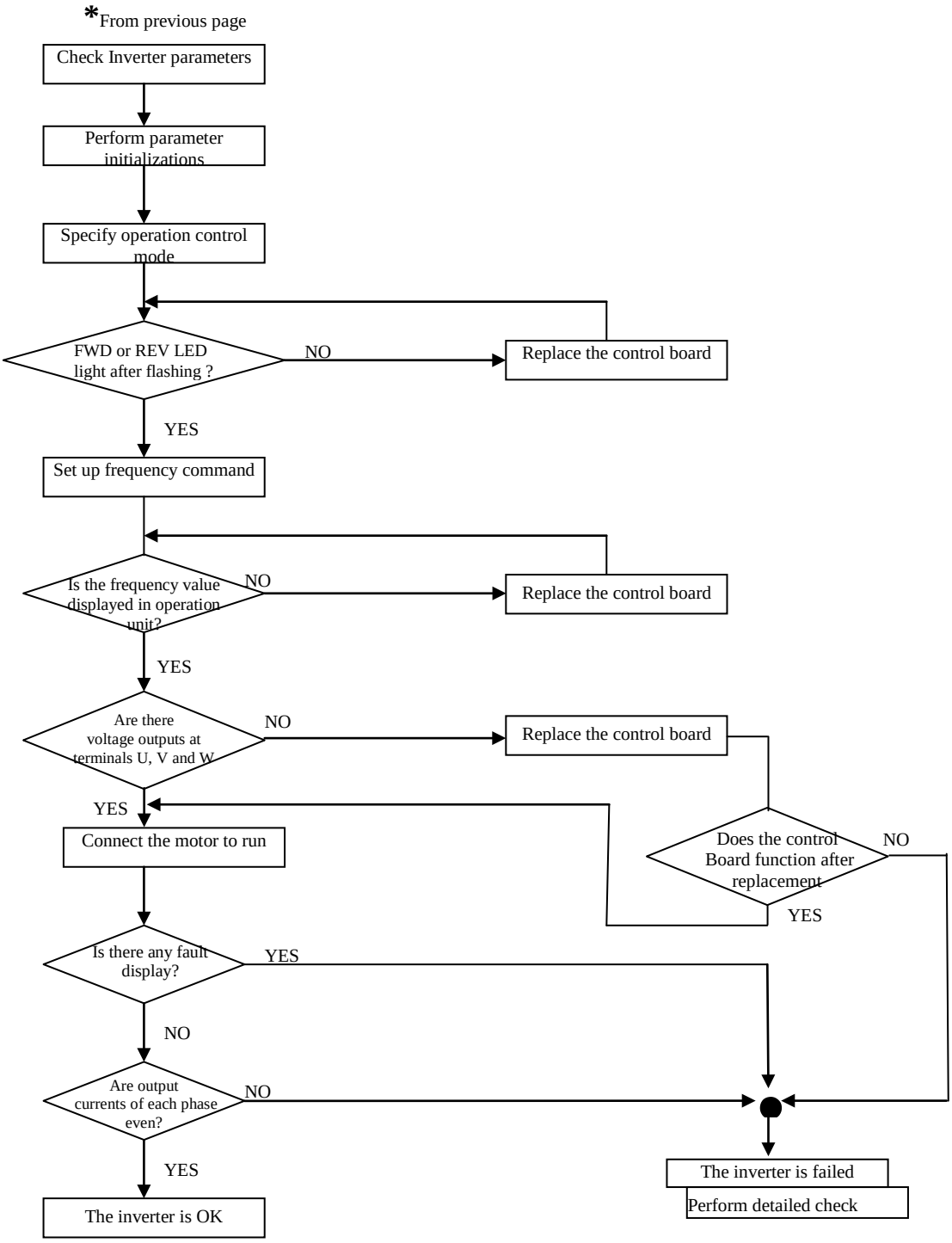
Display	Error	Cause	Corrective Action
LOC	Parameter and frequency reverse already locked	1.Attempt to modify frequency parameter while F12.07>0 2.Attempt to reverse while F10.01=1	1. Set F12.07=0 2. Set F10.01=0
Err1	Keypad operation error	1.Press ▲ or ▼while F00.05/F00.06>0 or running at preset speed. 2. Attempt to modify the Parameter. Can not be modified during operation (refer to the parameter list).	1. The ▲ or▼ is available for modifying the parameter only when F00.05/F00.06=0 2. Modify the parameter in STOP mode.
Err2	Parameter setting error	1. F00.08 is within the range of F10.11±F10.14 or F10.12±F10.14 or F10.13±F10.14 2. F00.07≤F00.08 3. Setting error while Performing Auto tuning. (eg.F00.03/F00.04≠0, F00.05/F00.06≠ 0)	1. Modify F10.11~F10.13 or F10.14 2. Set F00.07>F00.08 3. Set F00.03/F00.04=0 and F00.05/F00.06=0, during Auto tuning
Err5	Modification of parameter is not available in communication	1. Control command sent during communication. 2. Attempt to modify the function F08.02 ~ F08.05 during communication	1. Issue enable command before communication 2. Set parameters F08.02~F08.05 function before communication
Err6	Communication failed	1. Wiring error 2. Communication parameter setting error. 3. Check-Sum error 4. Incorrect communication protocol	1.Check hardware and wiring 2.Check Functions F08.02 ~ F08.05
Err7	Parameter conflict	1. Attempt to modify the function F12.00/12.06. 2. Voltage and current detection circuit is abnormal	If Reset is not possible, please Return the inverter for repair

5.2 General troubleshooting

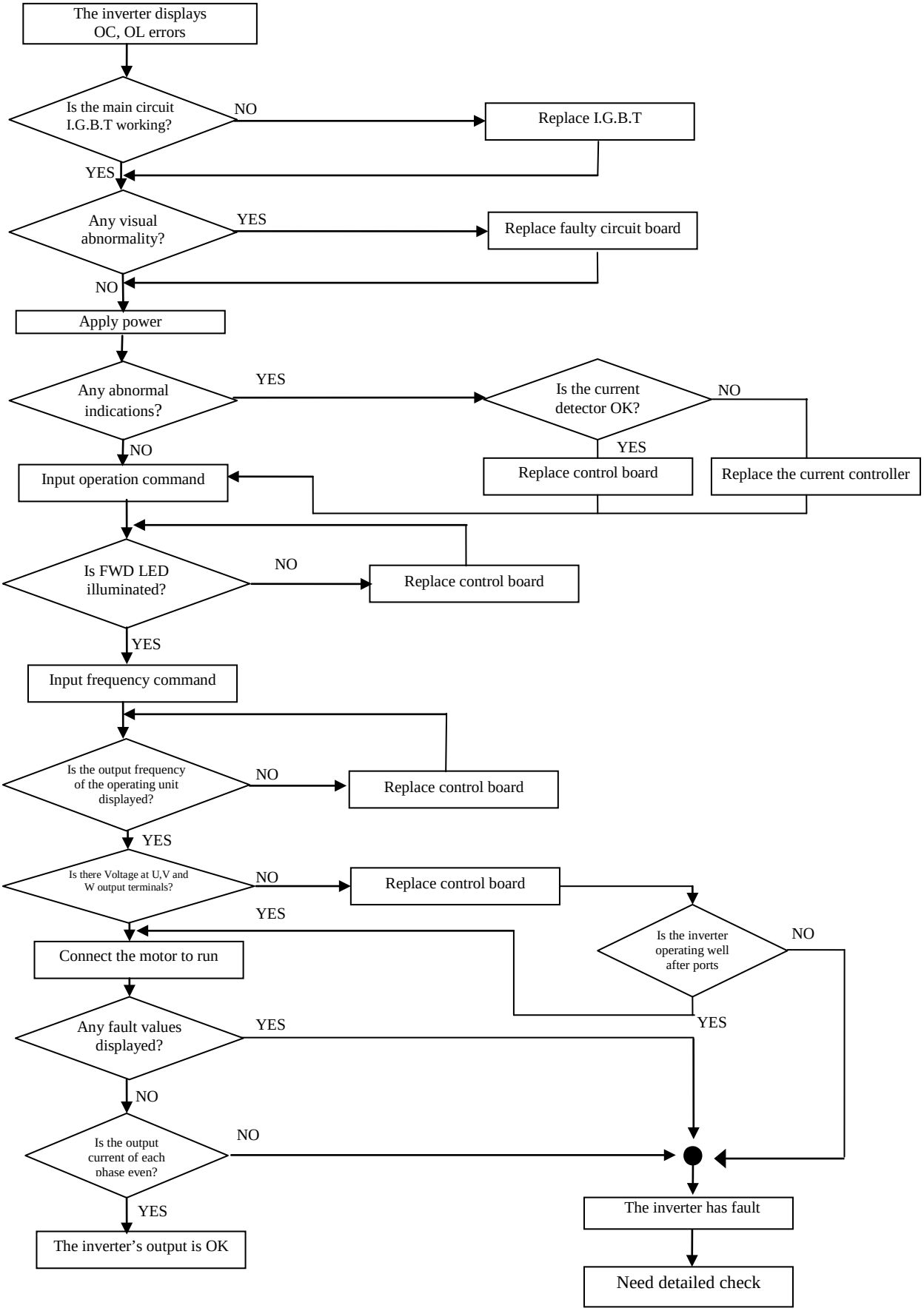
Status	Checking point	Remedy
Motor can not run	Is power applied to L1(R), L2(S) and L3(T) terminals (is the charging indicator lit)?	Is the power applied? Turn the power OFF and then ON again. Make sure the power voltage is correct. Make sure screws are secured firmly.
	Is there voltage across the output terminals U(T1),V(T2) and W(T3)?	Turn the power OFF and then ON again.
	Is overload causing the motor to stall?	Reduce the load so the motor will run.
	Are there any abnormalities in the inverter?	See error descriptions to check wiring and correct if necessary.
	Is forward or reverse run command issued?	
	Has the analog frequency signal been input?	Is analog frequency input signal wiring correct? Is voltage of frequency input correct?
	Is the operation mode setting correct?	Operate through the digital keypad.
Motor runs in wrong direction	Are wiring for output terminals U(T1), V(T2) and W(T3) correct?	Wiring must match U, V, and W terminals of the motor.
	Are wiring for forward and reverse signals correct?	Check for correct wiring.
The motor speed can not be regulated.	Is the wiring for the analog frequency inputs correct?	Check for correct wiring.
	Is the setting of operation mode correct?	Check the operation mode of the operator.
	Is the load too excessive?	Reduce the load.
Motor running speed too high or too low	Are the motor specifications (poles, voltage…) correct?	Confirm the motor specifications.
	Is the gear ratio correct?	Confirm the gear ratio.
	Is the setting of the highest output frequency correct?	Confirm the highest output frequency.
Motor speed varies unusually	Is the load too excessive?	Reduce the load.
	Does the load vary excessively?	Minimize the variation of the load. Increase capacities of the inverter and the motor.
	Is the input power erratic or is a phase loss occurring?	Add an AC reactor at the power input side if using single-phase power. Check wiring if using three-phase power.

5.3 Quick troubleshooting of NTA5000

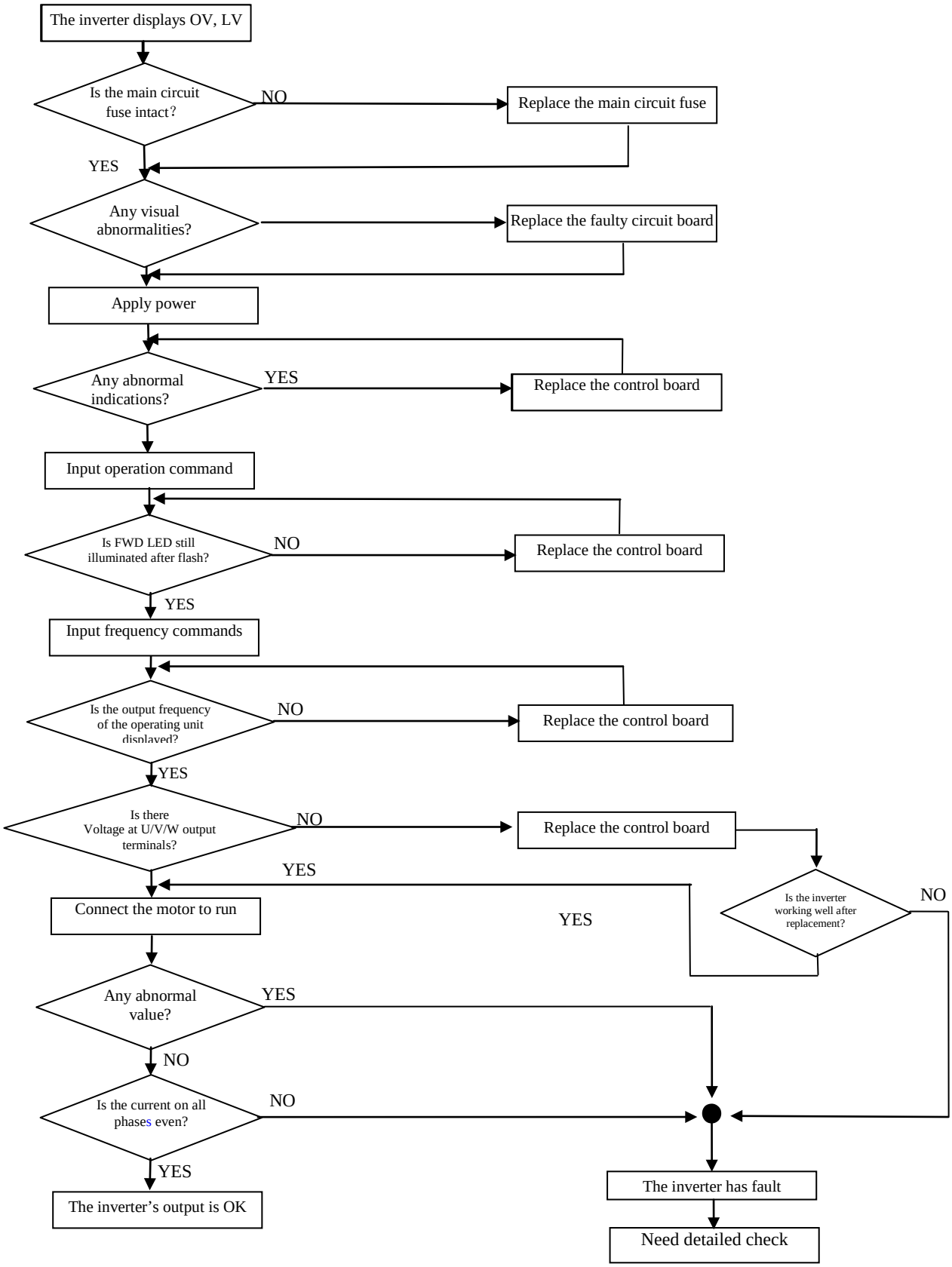



*From previous page
Check Inverter parameters
Perform parameter initializations
Specify operation control mode
FWD or REV LED light after flashing ?
NO
Replace the control board
YES
Set up frequency command
Is the frequency value displayed in operation unit?
NO
Replace the control board
YES
Are there voltage outputs at terminals U, V and W
NO
Replace the control board
YES
Connect the motor to run
Does the control Board function after replacement
NO
YES
Is there any fault display?
YES
NO
Are output currents of each phase even?
NO
YES
The inverter is OK
The inverter is failed
Perform detailed check

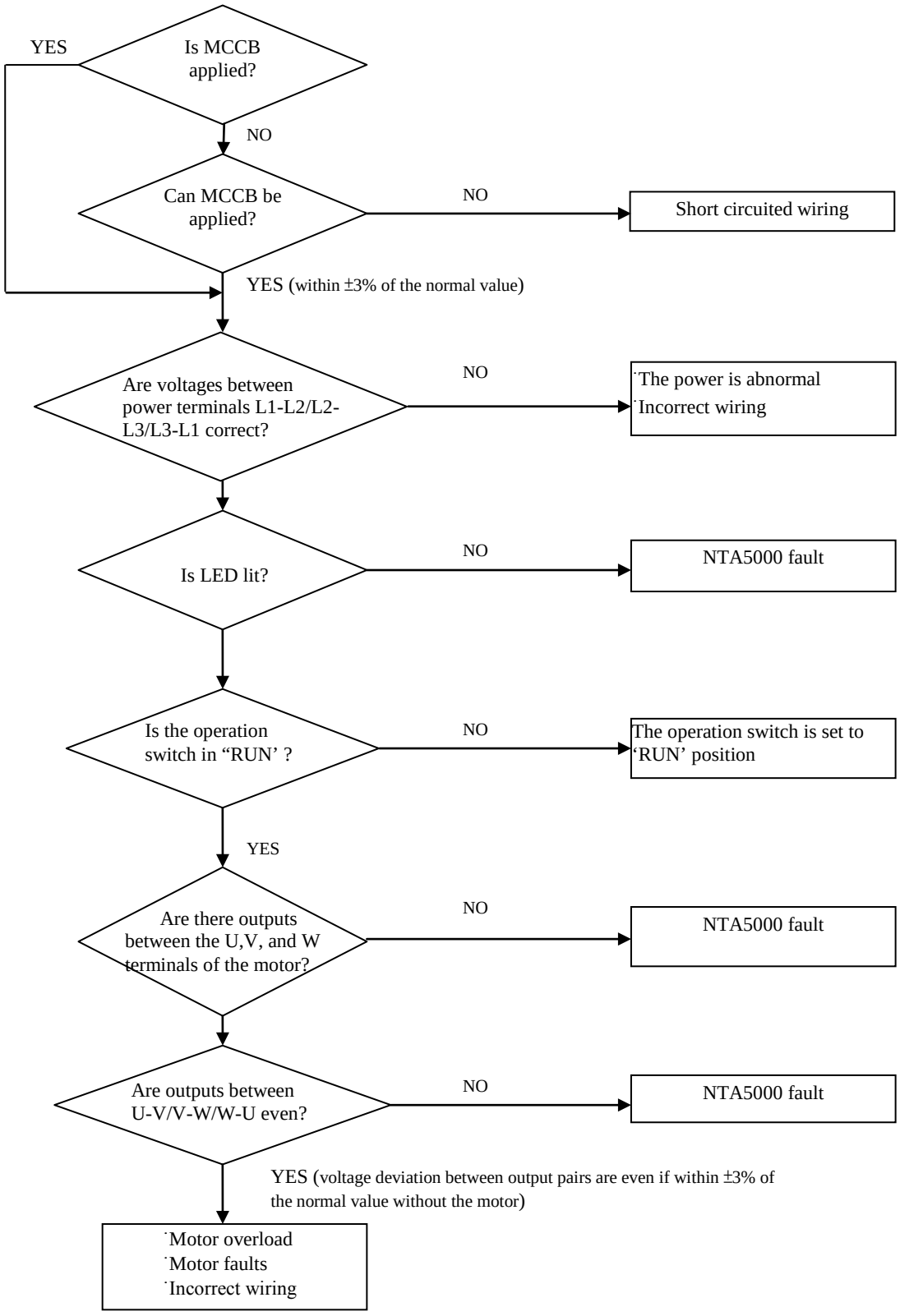
Troubleshooting for OC, OL error displays



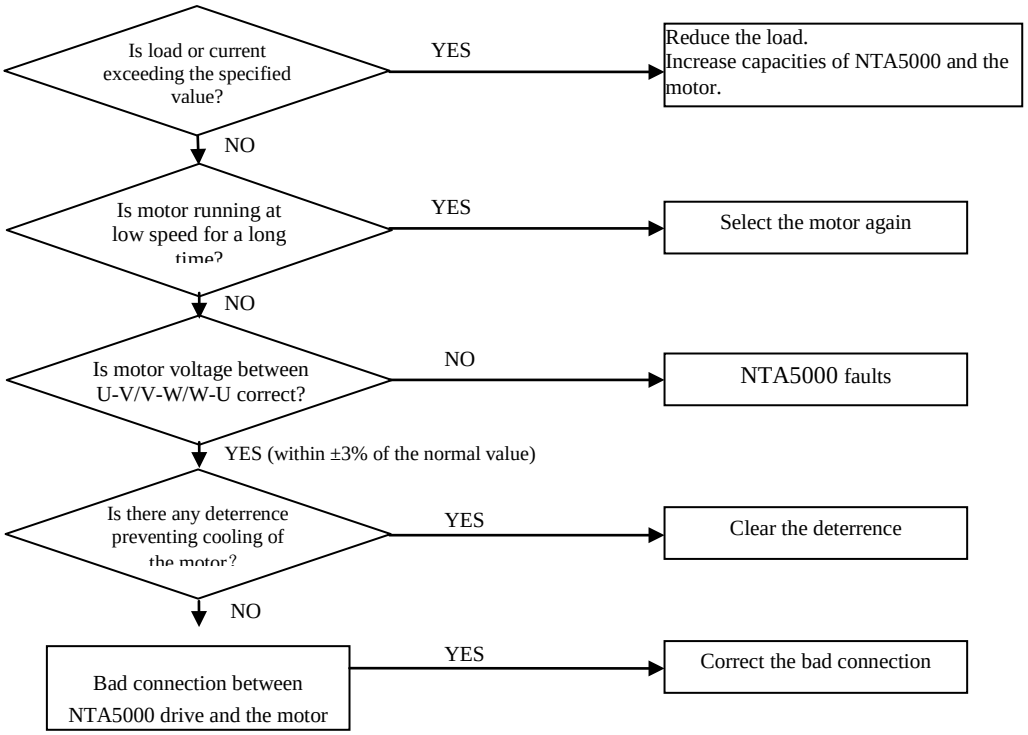
Troubleshooting for OV, LV error



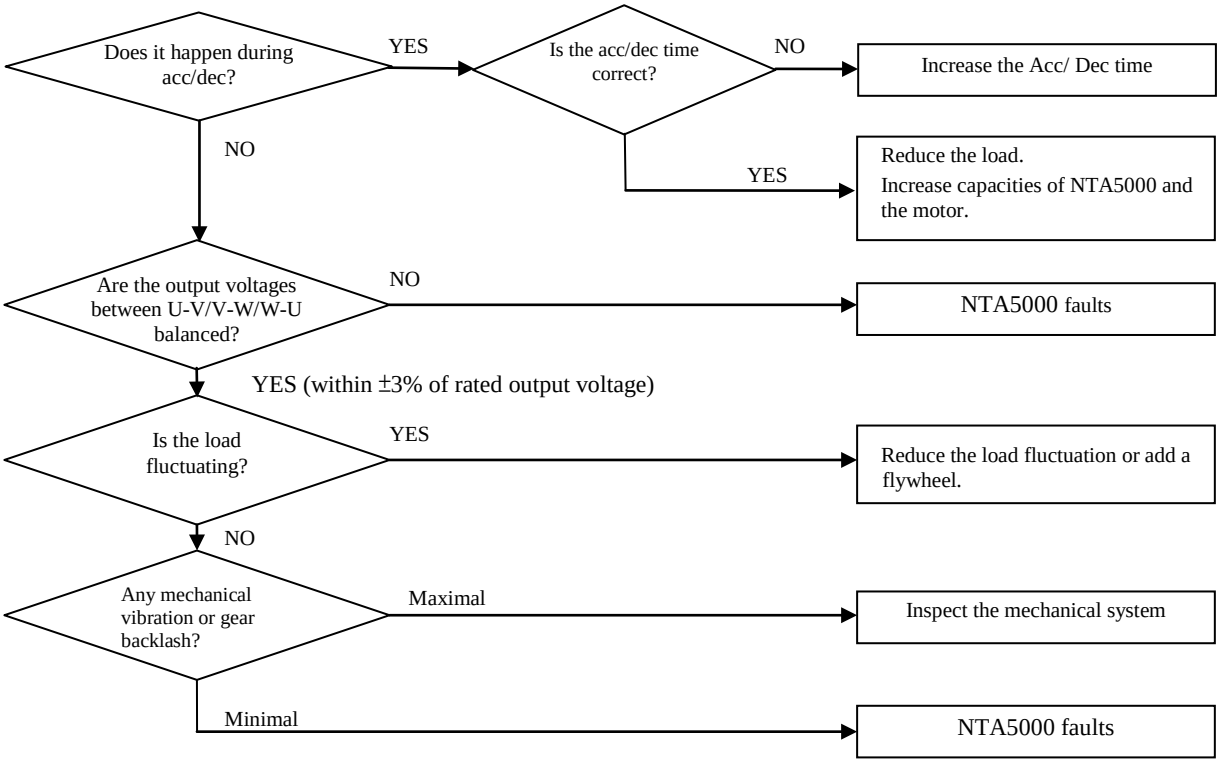
The motor can not run



Motor Overheating



Motor runs unevenly



5.4 Routine and periodic inspection

To ensure stable and safe operations, check and maintain the inverter at regular intervals.
The table below lists the items to be checked to ensure stable and safe operations.
Check these items 5 minutes after the 'Charge' indicator goes out to prevent injury to personnel by residual electric power.

Items	Details	Checking period		Methods	Criteria	Remedies
		Daily	1Year			
Ambient conditions around the machine	Confirm the temperature and humidity at the machine	○		Measure with thermometer and hygrometer according to installation notices.	Temperature: -10 – 40°C (14-120°F) Humidity: Below 95% RH	Improve the ambient or relocate the drive to a better area.
	Are there inflammable materials in the vicinity?	○		Visual check	Keep area clear	
Installation and grounding of the inverter	Any unusual vibration from the machine	○		Visual, hearing check	No vibration	Secure screws
	Is the grounding resistance correct?		○	Measure the resistance with a multi-tester	200Vclass: <100Ω 400V class:<10Ω	Improve the grounding
Input power voltage	Is the voltage of the main circuit correct?	○		Measure the voltage with a multi-tester	Voltage must conform with the specifications	Improve input voltage
External terminals and internal mounting screws of the inverter	Are secure parts loose?		○	Visual check Check with a screwdriver	Secure terminals and no rust	Secure or send back for repair
	Is the terminal base damaged?		○			
	Visual rust stains present?		○			
Internal wiring of the inverter	Any unusual bends or breaks?		○	Visual check	No abnormalities	Replace or send back for repair
	Any damage of the wire insulation?		○			
Heat sink	Excessive dust or debris	○		Visual check	No abnormalities	Clean up debris or dust
Printed circuit board	Excessive conductive metal shavings or oil sludge		○	Visual check	No abnormalities	Clean or replace the circuit board
	Discolored, overheated, or burned parts		○			
Cooling fan	Unusual vibration and noise		○	Visual or hearing check	No abnormalities	Replace the cooling fan
	Excessive dust or debris	○		Visual check		Clean fan
Power component	Excessive dust or debris		○	Visual check	No abnormalities	Clean component
	Check resistance between each terminals		○	Measure with a multi-tester	No short circuit or broken circuit in three-phase output	Replace power component or inverter
Capacitor	Any unusual odor or leakage	○		Visual check	No abnormalities	Replace capacitor or inverter
	Any deformity or protrusion	○				

5.5 Maintenance and Inspection

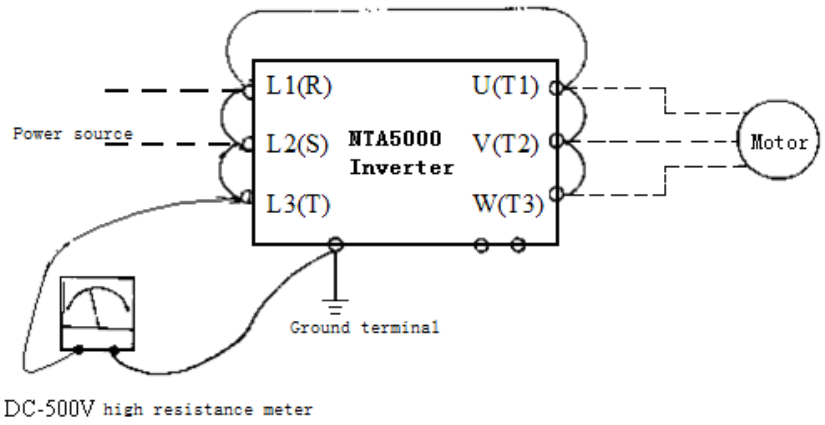
Inverter doesn't need daily inspection and maintenance.

To ensure long-term reliability, follow the instructions below to perform regular inspection. Turn the power off and wait for the charge indicator (LED) to go out before inspection to avoid potential shock hazard from the charge stored in high-capacity capacitors.

(1) Clean up the accumulation of any dust inside the inverter.
(2) Check if there are any loose terminal screws and tighten them.
(3) Insulation tests
  (a) Disconnect all leads connecting the INVERTER with external circuits when performing insulation tests on external circuits.
  (b) Internal insulation test should be performed against the main circuit of the inverter body only. Use a high resistance DC 500V meter with insulating resistance higher than 5MΩ.

Caution: Do not perform this test against the control circuit.

Insulation Test Diagram



Chapter 6 Peripherals Components

6.1 AC Reactor Specification at Input Side

Model	AC inductance at input side		Model	AC inductance at input side	
	Current (A)	Inductance (mH)		Current (A)	Inductance (mH)
NTA5200-0.4K	2.5	4.2	NTA5000-7.5K	20.0	1.06
NTA5200-0.75K	5.0	2.1	NTA5000-11K	30.0	0.7
NTA5200-1.5K	10.0	1.1	NTA5000-15K	40.0	0.53
NTA5200-2.2K	15.0	0.71	NTA5000-18.5K	50.0	0.45
NTA5000-0.75K	2.5	8.4	NTA5000-22K	60.0	0.36
NTA5000-1.5K	5.0	4.2	NTA5000-30K	80.0	0.26
NTA5000-2.2K	7.5	3.6	NTA5000-37K	90.0	0.24
NTA5000-3.7K	10.0	2.2	NTA5000-45K	120.0	0.18
NTA5000-5.5K	16.0	1.42	NTA5000-55K	150.0	0.15

6.2 DC Reactor Specification at Input Side

Model	DC inductance at input side	
	Current (A)	Inductance (mH)
NTA5200-0.4K	3.1	5.65
NTA5200-0.75K	4.5	3.89
NTA5200-1.5K	7.5	2.33
NTA5200-2.2K	10.5	1.67
NTA5000-0.75K	2.3	15.22
NTA5000-1.5K	3.8	9.21
NTA5000-2.2K	5.2	6.73
NTA5000-3.7K	8.8	3.98
NTA5000-5.5K	13	2.69
NTA5000-7.5K	17.5	2.00
NTA5000-11K	25	1.40

6.3 Braking Unit and Braking Resistor (Optional)

Model	Suitable Motor Horsepower (HP)	Suitable Motor Capacity (KW)	Braking Unit		Braking Resistor Specification			Braking Resistor ED(%)	Braking torque (%)
			Model	Number used	(W)	(Ω)	Number parallel		
NTA5200-0.4K	0.5	0.4	--	--	60	200	--	8	218
NTA5200-0.75K	1	0.75	--	--	60	200	--	8	119
NTA5200-1.5K	2	1.5	--	--	150	100	--	10	119
NTA5200-2.2K	3	2.2	--	--	200	70	--	9	116
NTA5000-0.75K	1	0.75	--	--	60	750	--	8	125
NTA5000-1.5K	2	1.5	--	--	150	400	--	10	119
NTA5000-2.2K	3	2.2	--	--	200	250	--	8	128
NTA5000-3.7K	5	3.7	--	--	300	150	--	8	127
NTA5000-5.5K	8	5.5	--	--	500	100	--	8	125
NTA5000-7.5K	10	7.5	--	--	600	80	--	8	119
NTA5000-11K	15	11	--	--	1200	50	--	8	125
NTA5000-15K	20	15	--	--	1600	50	--	10	100
NTA5000-18.5K	25	18.5	--	--	2000	50	--	10	100
NTA5000-22K	30	22	TBU-430	1	4800	27.2	1	10	120
NTA5000-30K	40	30	TBU-430	1	6000	20	1	10	120
NTA5000-37K	50	37	TBU-430	2	4800	16	2	10	120
NTA5000-45K	60	45	TBU-430	2	9600	13.6	2	10	120
NTA5000-55K	75	55	TBU-430	2	6000	20	2	10	120

Note: Formula for brake resistor: W= (Vpnb * Vpnb) * ED% / Rmin

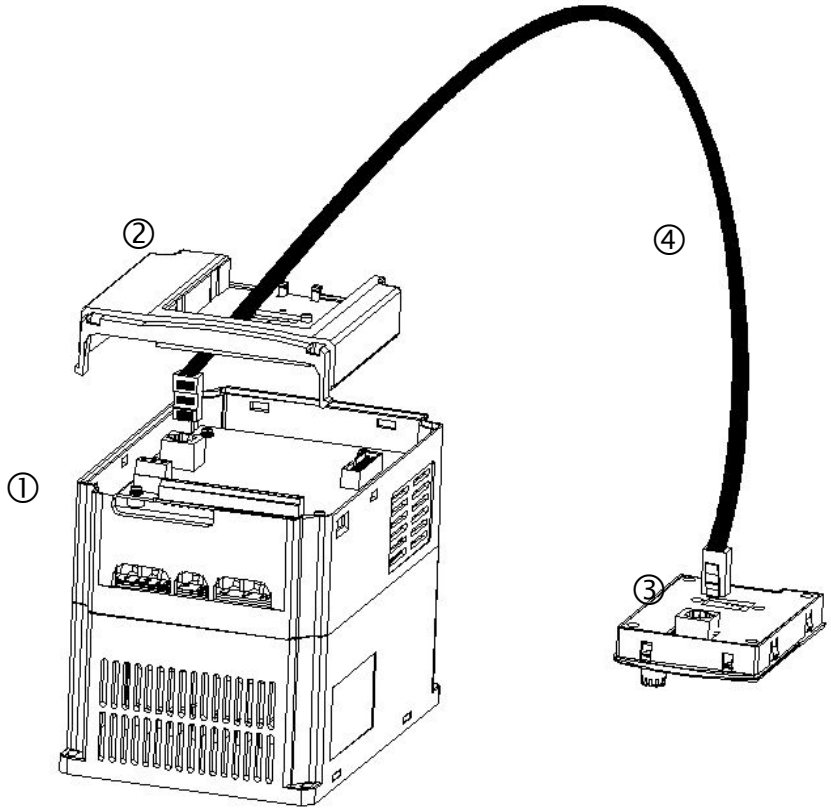
1. W: braking resistor power (Watts)
2. Vpnb: braking voltage (220V class =380VDC, 380V class =760VDC)
3. ED%: braking effective duty cycle
4. Rmin: braking resistor rated ohms

Note: above 18.7KW, please add the braking resistor: 380V TBU-430

6.4 Digital operator and extension cable

LED Keypad NTA-NDOP can be used by connecting extension cable (less than 3m), there are two ways to fix:

1. Keypad can be fixed by card slot directly and then used with control cabinet.
2. Installing the fixed-box (NTA-NBOX) on the control cabinet, and then put the keypad into the fixed-box.



A. Content

① Inverter body

② Inverter cover (can fix LED Keypad)

③ LED Keypad NTA-NDOP

④ Remote Cable for Keypad

Note: ④ Using standard network cable connection which must be sixth class or above, both ends are RJ45 crystal joints, the wire in the middle of attachment is straight-through.

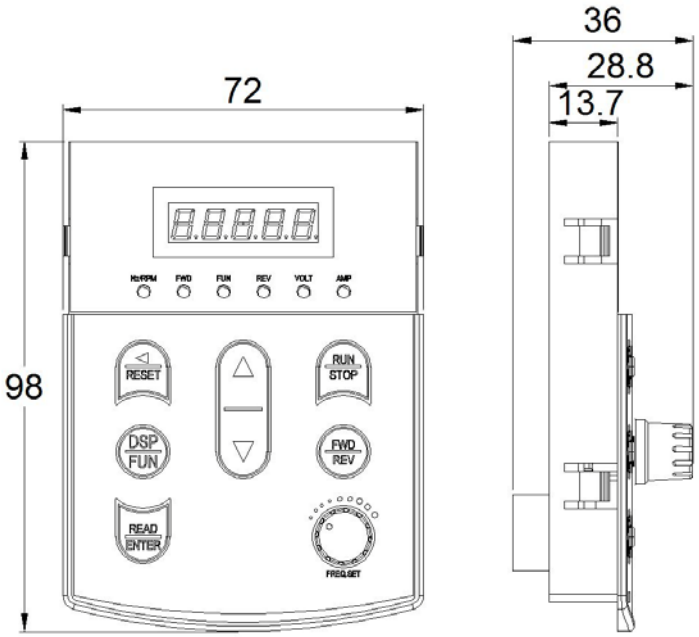
B. Operation procedure

1. Turn off the power supply, the following procedures should be performed after there is no display on the keypad.
2. Remove the keypad.
3. Remove lower half wire cover and upper half cover.
4. Connect the inverter and the keypad with remote cable in accordance with the diagram below.
5. Fasten the cable which connected with the inverter and keypad.
6. After checking the connection, installing the covers and then apply the power.

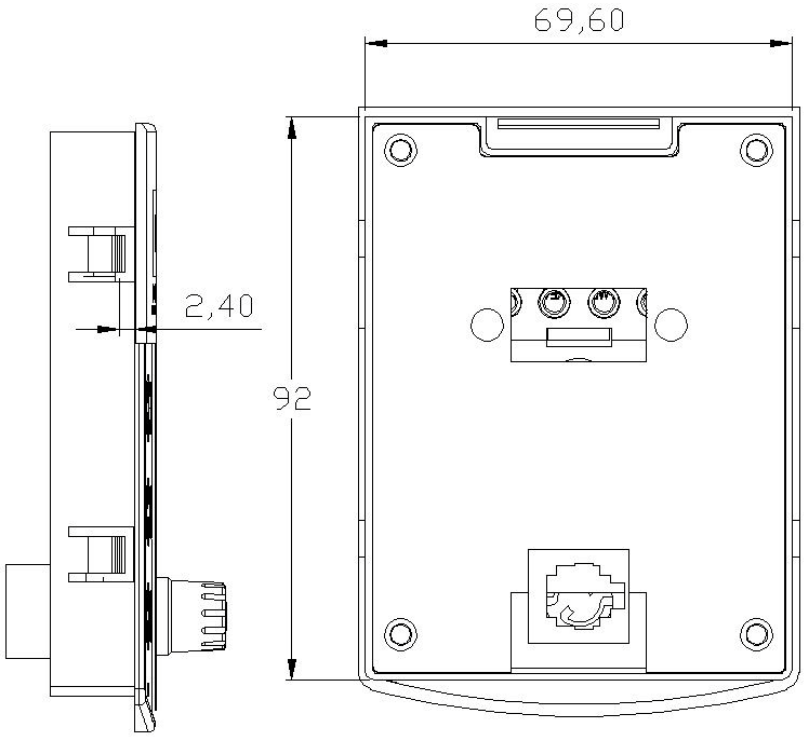
Note: While removing the covers and installing wires, please don't touch any components of the circuit board to avoid damages.

Extension KEYPAD (NTA-NDOP) Installation:

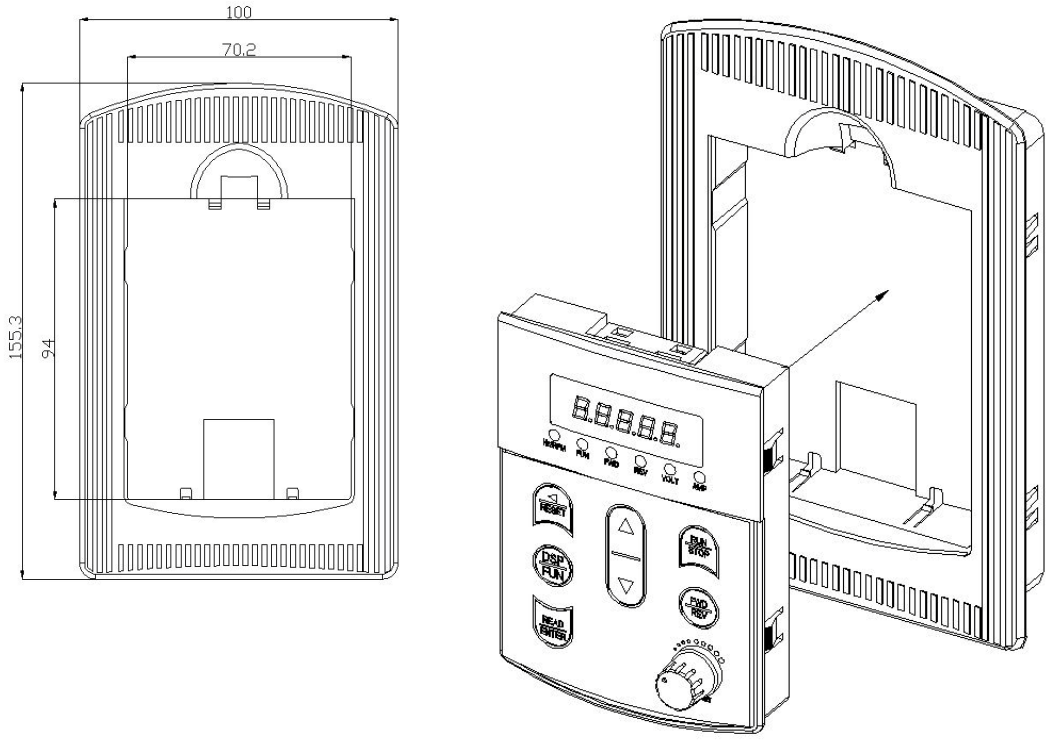
(1) KEYPAD (NTA-NDOP) Dimensions (unit: mm)



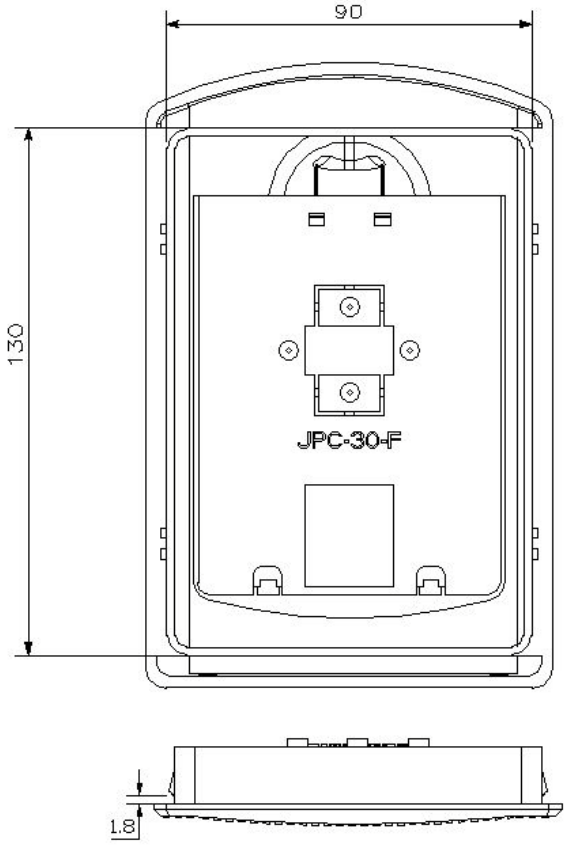
(2) KEYPAD (NTA-NDOP) Installation Dimensions (69.6*92mm)



(3) KEYPAD Fixed-box (NTA-NBOX) Dimensions (unit: mm)



(4) KEYPAD Fixed-box (NTA-NBOX) Installation Dimensions (90*130mm)

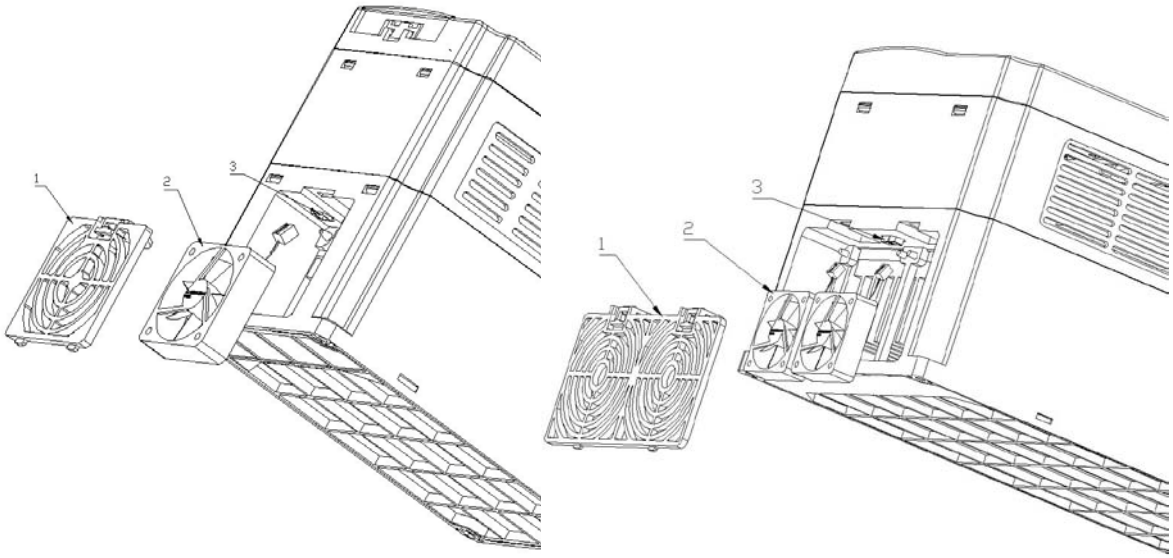


6.5 Replace Fans

The lifetime of cooling fan which operates under the rated temperature and rated load is about 60,000 hours. The temperature decreases every 10℃, the lifetime will double.

The forerunners of the cooling fan damaged are: the noise of fan's bearing is increasing or the temperature of heat sink is becoming higher although the heat sink has been cleaned. If these situations occur and the fan which is applied to the important occasions, please replace the cooling fan immediately.

Our company can supply the spare fans. In order to avoid the damage of control panel, please don't use the spares which are not appointed.



1. Fan cover
2. Cooling fan
3. Power connection

Steps of replacing fan:

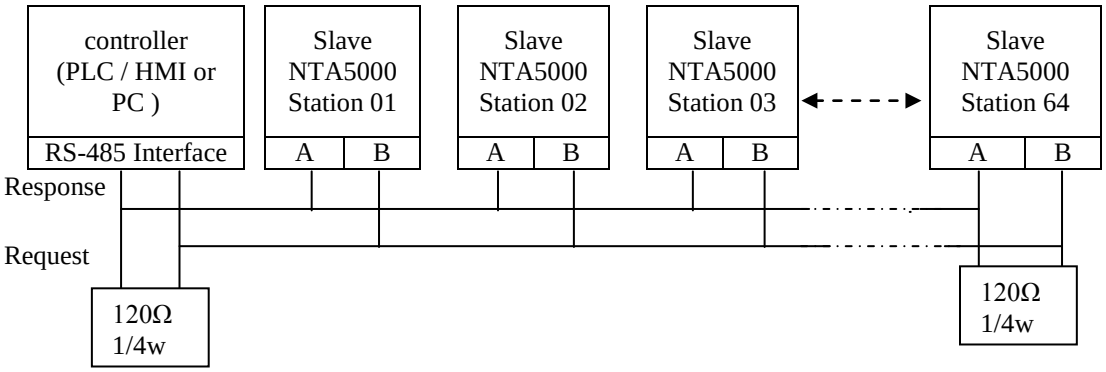
1. Turn off the power of the inverter.
2. Remove the cover of the fan.
3. Remove the power wire of the fan.
4. Install the cooling fan.
5. Install the fan cover.
6. Apply power.

Appendix A NTA5000 ModBus Communication

A.1 Communication Data Frame

NTA5000 series inverter can be Communication controlled by the PC or other controller with the Communication protocol, Modbus ASCII Mode & Mode RTU, RS485.
Frame length maximum 80 bytes.
As to communication format setting, please refer to the descriptions of group F08.xx.

A.1.1 Hardware installation



The network is terminated at each end with an external terminating resistor (120Ω, 1/4w)

A.1.2 Data format frame: ASCII mode

STX(3AH)	Start bit = 3AH
Address High byte	Communication Address(Station): 2-digit ASCII Code
Address Low byte	
Function High byte	Function Code (command): 2-digit ASCII Code
Function Low byte	
Command Start Address	command Start byte: 4-digit ASCII Code
Command Start Address	
Command Start Address	
Command Start Address	
Data length	The length of the command: 4-digit ASCII Code
Data length	
Data length	
Data length	
LRC Check High byte	LRC Check Code: 2-digit ASCII Code
LRC Check Low byte	
END High byte	End Byte : END Hi=CR(0DH) END Li = LF(0AH)
END Low byte	

A.1.3 Data format frame: RTU mode

MASTER (PLC etc.) send request to SLAVE, whereas SLAVE response to MASTER.
The signal receiving is illustrated here.
The data length is varied with the command (Function).

SLAVE Address
Function Code
DATA
CRC CHECK
Signal Interval

**The interval should be maintained at 10ms between command signal and request.

A.1.4 SLAVE Address

00H: Broadcast to all the drivers
01H: to the No.01 Drivers
0FH: to the No.15 Drivers
10H: to the No.16 Drivers
and so on ……, Max to 64(40H)

A.1.5 Function Code

03H: Read the registers contents
06H: write a WORD to register
08H: Loop test
10H: write several data to registers (complex number registers write)

A.2 CMS (Checksum and time-out definition)

A.2.1 LRC

ex. ADDRESS 01H
FUNCTION 03H
COMMAND 01H
00H
DATA LENGTH 0AH

Checksum 0FH
= F1H ----------true complement
CS(H) = 46H (ASCII)
CS(L) = 31H (ASCII)

A.2.2 CRC CHECK

CRC Check Code is calculated from SLAVE Address to end of the data. The calculation method is illustrated as follow:

(1)Load a 16-bit register with FFFF hex (all's1).Call this the CRC register.

(2)Exclusive OR the first 8-bit byte of the message with the low-order byte of the 16-bit CRC register, putting the result in the CRC register.

(3)Shift the CRC register one bit to the right (toward the LSB), Zero-filling the MSB, Extract and examines the LSB.

(4)(If the LSB was 0): Repeat Steps(3)(another shift). (If the LSB was 1): Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001), putting the result in the CRC register.

(5) Repeat Steps (3) and (4) until 8 shifts been performed. When this is done, a complete 8-bit byteWill be processed .

(6) Repeat Steps (2) through (5) for next 8-bit byte of the message, Continue doing this until all bytes have been processed. The final content of the CRC register is the CRC value. Placing the CRC into the message: When the 16-bit CRC (2 8-bit bytes) is transmitted in the message, the Low-order byte will be transmitted first, followed by the high-order byte, For example, if the CRC value is 1241 hex, the CRC-16 Upper put the 41h, the CRC-16 Lower put the 12h.

- **CRC calculation application program**

```
UWORD ch_sum ( UBYTE long , UBYTE *rxdbuff ) {
        BYTE i = 0;
        UWORD wkg = 0xFFFF;
        while ( long-- ) {
                wkg ^= rxdbuff++;
        for ( i = 0 ; i < 8; i++ ) {
                if ( wkg & 0x0001 ) wkg = ( wkg >> 1 ) ^ 0xa001;
                else wkg = wkg >> 1;
        }
    }
        return( wkg );
  }
```

A.3 Error Code

ASCII Mode

STX	':'
Address	'0'
	'1'
Function	'8'
	'6'
Exception code	'5'
	'1'
LRC Check	'2'
	'8'
END	'CR'
	'LF'

RTU Mode

SLAVE Address		02H
Function		83H
Exception code		52H
CRC-16	High	30H
	Low	CDH

Under communication linking, the driver responses the Exception Code and send Function Code AND 80H to main system if there is error happened.

Error Code	Description
51	Function Code Error
52	Address Error
53	Data Amount Error
54	DATA Over Range
55	Writing Mode Error

A.4 Function Code

A.4.1 Read the data in the holding register [03H]

Master unit reads the contents of the holding register with the continuous number for the specified quantity.

Note: 1. Limit number of read data, RTU mode 37words, ASCII mode 17words.

2. Can only Continuous read the address of the same Group.

3. Read data Quantity≥1.

(Example) Read the SLAVE station No.01, NTA5000 drive's frequency command.

ASCII Mode

Instruction Message

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	33H
Start Address	32H
	35H
	32H
	33H
Quantity	30H
	30H
	30H
	31H
LRC CHECK	42H
	33H
END	0DH
	0AH

Response Message (Normal)

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	33H
DATA number	30H
	32H
First holding register	31H
	37H
	37H
	30H
LRC CHECK	37H
	33H
END	0DH
	0AH

Response (Fault)

STX	3AH
SLAVE Address	30H
	31H
Function Code	38H
	33H
Error Code	35H
	32H
LRC CHECK	32H
	41H
END	0DH
	0AH

RTU Mode

Instruction Message

SLAVE Address		01H
Function Code		03H
Start Address	High	A0H
	Low	23H
Quantity	High	00H
	Low	01H
CRC-16	High	57H
	Low	C0H

Response Message (Normal)

SLAVE Address		01H
Function Code		03H
DATA number		02H
First holding register	High	07H
	Low	D0H
CRC-16	High	BBH
	Low	E8H

Response (Fault)

SLAVE Address		01H
Function Code		83H
Error Code		52H
CRC-16	High	C0H
	Low	CDH

A.4.2 LOOP BACK testing [08H]

The function code checks communication between MASTER and SLAVE, the Instruction message is returned as a response message without being changed, Any values can be used for test codes or data.

ASCII Mode

Instruction Message

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	38H
Test Code	30H
	30H
	30H
	30H
DATA	41H
	35H
	33H
	37H
LRC CHECK	31H
	42H
END	0DH
	0AH

Response Message (Normal)

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	38H
Test Code	30H
	30H
	30H
	30H
DATA	41H
	35H
	33H
	37H
LRC CHECK	31H
	42H
END	0DH
	0AH

Response (Fault)

STX	3AH
SLAVE Address	30H
	31H
Function Code	38H
	38H
Error Code	32H
	30H
LRC CHEC	37H
	35H
END	0DH
	0AH

RTU Mode

Instruction Message

SLAVE Address		01H
Function Code		08H
Test Code	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Response Message (Normal)

SLAVE Address		01H
Function Code		08H
Test Code	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Response (Fault)

SLAVE Address		01H
Function Code		88H
Error Code		20H
CRC-16	High	47H
	Low	D8H

A.4.3 Write holding register [06H]

Specified data are written into the several specified holding registers from the Specified number, respectively.

(Example)Set SLAVE station No.01, write NTA5000 drive frequency reference 60.0HZ.

ASCII Mode

Instruction Message

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	36H
Start Address	32H
	35H
	30H
	32H
DATA	31H
	37H
	37H
	30H
LRC CHECK	34H
	42H
END	0DH
	0AH

Response Message (Normal)

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	36H
Start Address	32H
	35H
	30H
	32H
DATA	31H
	37H
	37H
	30H
LRC CHECK	34H
	42H
END	0DH
	0AH

Response (Fault)

STX	3AH
SLAVE Address	30H
	31H
Function Code	38H
	36H
Error Code	35H
	32H
LRC CHECK	32H
	37H
END	0DH
	0AH

RTU Mode

Instruction Message

SLAVE Address		01H
Function Code		06H
Start Address	High	25H
	Low	02H
DATA	High	17H
	Low	70H
CRC-16	High	2DH
	Low	12H

Response Message (Normal)

SLAVE Address		01H
Function Code		06H
Start Address	High	25H
	Low	02H
DATA	High	17H
	Low	70H
CRC-16	High	2DH
	Low	12H

Response (Fault)

SLAVE Address		01H
Function Code		86H
Error Code		52H
CRC-16	High	C3H
	Low	9DH

A.4.4 Write in several holding registers [10H]

Specified data are written into the several specified holding registers from the Specified number, respectively.

Note: 1. Limit number of read data, RTU mode 35words, ASCII mode 15words.
2. Can only Continuous read the address of the same Group
3. Read data Quantity≥1.

(Example)Set SLAVE station No.01, NTA5000 drive as forward run at frequency reference 60.0HZ.

ASCII Mode

Instruction Message

STX	3AH
SLAVE Address	30H
	31H
Function Code	31H
	30H
Start Address	32H
	35H
	30H
	31H
Quantity	30H
	30H
	30H
	32H
DATA Number*	30H
	34H
First DATA	30H
	30H
	30H
	31H
Next DATA	31H
	37H
	37H
	30H
LRC CHECK	33H
	42H
END	0DH
	0AH

Response Message (Normal)

STX	3AH
SLAVE Address	30H
	31H
Function Code	31H
	30H
Start Address	32H
	35H
	30H
	31H
Quantity	30H
	30H
	30H
	32H
LRC CHECK	43H
	37H
END	0DH
	0AH

Response (Fault)

STX	3AH
SLAVE Address	30H
	31H
Function Code	39H
	30H
Error Code	35H
	32H
LRC CHECK	31H
	44H
END	0DH
	0AH

RTU Mode

Instruction Message

SLAVE Address		01H
Function Code		10H
Start Address	High	25H
	Low	01H
Quantity	High	00H
	Low	02H
DATA Number *		04H
First DATA	High	00H
	Low	01H
Next DATA	High	17H
	Low	70H
CRC-16	High	CBH
	Low	26H

Response Message (Normal)

SLAVE Address		01H
Function Code		10H
Start Address	High	25H
	Low	01H
Quantity	High	00H
	Low	02H
CRC-16	High	1BH
	Low	04H

Response (Fault)

SLAVE Address		01H
Function Code		90H
Error Code		52H
CRC-16	High	CDH
	Low	FDH

* DATA Numbers are the actual number timers 2

A.5 Inverter Control

A.5.1 Command Data (Readable and Writable)

<table>
<tr><th>Register No.</th><th>Content</th></tr>
<tr><td>2500H</td><td>Reserved</td></tr>
<tr><td>2501H</td><td>Operation Signal
<table>
<tr><th>Bit</th><th>Description</th><th>1</th><th>0</th></tr>
<tr><td>0</td><td>Operation Command</td><td>Run</td><td>Stop</td></tr>
<tr><td>1</td><td>Reverse Command</td><td>Reverse</td><td>Forward</td></tr>
<tr><td>2</td><td>Abnormal</td><td>EFO</td><td></td></tr>
<tr><td>3</td><td>Fault Reset</td><td>Reset</td><td></td></tr>
<tr><td>4</td><td>Jog Forward Command</td><td>Jog Forward</td><td></td></tr>
<tr><td>5</td><td>Jog Reverse Command</td><td>Jog Reverse</td><td></td></tr>
<tr><td>6</td><td>Multi-function Command S1</td><td>ON</td><td>OFF</td></tr>
<tr><td>7</td><td>Multi-function Command S2</td><td>ON</td><td>OFF</td></tr>
<tr><td>8</td><td>Multi-function Command S3</td><td>ON</td><td>OFF</td></tr>
<tr><td>9</td><td>Multi-function Command S4</td><td>ON</td><td>OFF</td></tr>
<tr><td>A</td><td>Multi-function Command S5</td><td>ON</td><td>OFF</td></tr>
<tr><td>B</td><td>Multi-function Command S6</td><td>ON</td><td>OFF</td></tr>
<tr><td>C</td><td>Multi-function Command R1</td><td>ON</td><td>OFF</td></tr>
<tr><td>D</td><td>Multi-function Command T1</td><td>ON</td><td>OFF</td></tr>
<tr><td>E</td><td>Reserved</td><td></td><td></td></tr>
<tr><td>F</td><td>Reserved</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>2502H</td><td>Frequency Command</td></tr>
<tr><td>2503H</td><td>Reserved</td></tr>
<tr><td>2504H</td><td>Reserved</td></tr>
<tr><td>2505H</td><td>Reserved</td></tr>
<tr><td>2506H</td><td>Reserved</td></tr>
<tr><td>2507H</td><td>Reserved</td></tr>
<tr><td>2508H</td><td>Reserved</td></tr>
<tr><td>2509H</td><td>Reserved</td></tr>
</table>

Note: Write in zero for Not used BIT, do not write in data for the reserved register.

A.5.2Monitor Data (Only for reading)

<table>
<tr><td>Register No.</td><td>Content</td></tr>
<tr><td>2520H</td><td>
<table>
<tr><td>Bit</td><td>Description</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>Operation state</td><td>Run</td><td>Stop</td></tr>
<tr><td>1</td><td>Direction state</td><td>Reverse</td><td>Forward</td></tr>
<tr><td>2</td><td>Inverter operation prepare state</td><td>ready</td><td>unready</td></tr>
<tr><td>3</td><td>Abnormal</td><td>Abnormal</td><td></td></tr>
<tr><td>4</td><td>DATA setting error</td><td>Error</td><td></td></tr>
</table>
5~F Reserved
</td></tr>
<tr><td>2521H</td><td>
Abnormity
<table>
<tr><td>Code</td><td>Description</td><td>Code</td><td>Description</td></tr>
<tr><td>00</td><td>The inverter is normal</td><td>01</td><td>OH (Inverter over heat)</td></tr>
<tr><td>02</td><td>OC (Over current at stop)</td><td>03</td><td>LV (Under voltage)</td></tr>
<tr><td>04</td><td>OV (Over voltage)</td><td>05</td><td>Reserved</td></tr>
<tr><td>06</td><td>B.B. (External bb)</td><td>07</td><td>CTER</td></tr>
<tr><td>08</td><td>Reserved</td><td>09</td><td>EPR (EEPROM error)</td></tr>
<tr><td>10</td><td>Reserved</td><td>11</td><td>Reserved</td></tr>
<tr><td>12</td><td>OL2 (Inverter over load)</td><td>13</td><td>OL1 (Motor over load)</td></tr>
<tr><td>14</td><td>EFO</td><td>15</td><td>E.S. (Emergency stop)</td></tr>
<tr><td>16</td><td>LOC</td><td>17</td><td>Reserved</td></tr>
<tr><td>18</td><td>OC-C
(Over current at constant speed)</td><td>19</td><td>OC-A
(Over current during accelerating)</td></tr>
<tr><td>20</td><td>OC-D
(Over current during decelerating)</td><td>21</td><td>OC-S</td></tr>
<tr><td>22</td><td>Reserved</td><td>23</td><td>LV-C
(Under voltage during running)</td></tr>
<tr><td>24</td><td>OV-C
(Over voltage at constant speed)</td><td>25</td><td>OH-C
(Inverter over heat during running)</td></tr>
<tr><td>26</td><td>STP0 (stop at 0 Hz)</td><td>27</td><td>STP1 (Direct start disable)</td></tr>
<tr><td>28</td><td>STP2(Control panel emergency stop)</td><td>29</td><td>ERR1 (Keypad operation error)</td></tr>
<tr><td>30</td><td>ERR2(Parameter setting error)</td><td>31</td><td>ERR4</td></tr>
<tr><td>32</td><td>ERR5 (Communication failure)</td><td>33</td><td>ERR6 Communication failure</td></tr>
<tr><td>34</td><td>ERR7</td><td>35</td><td>ERR8</td></tr>
<tr><td>36</td><td>LOC (parameter Locked) Reserved</td><td>37</td><td>EPR1 Reserved</td></tr>
<tr><td>38</td><td>EPR1</td><td>39</td><td>EPR2</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Register No.</th><th>Content</th></tr>
<tr><td>2522H</td><td>
<table>
<tr><th colspan="2">Bit</th><th>Description</th><th>1</th><th>0</th></tr>
<tr><td rowspan="6">Sequence input status</td><td>0</td><td>Terminal S1</td><td>On</td><td>OFF</td></tr>
<tr><td>1</td><td>Terminal S2</td><td>On</td><td>OFF</td></tr>
<tr><td>2</td><td>Terminal S3</td><td>On</td><td>OFF</td></tr>
<tr><td>3</td><td>Terminal S4</td><td>On</td><td>OFF</td></tr>
<tr><td>4</td><td>Terminal S5</td><td>On</td><td>OFF</td></tr>
<tr><td>5</td><td>Terminal S6</td><td>On</td><td>OFF</td></tr>
<tr><td rowspan="6">Contact output</td><td>6</td><td>Multi-function Output1 (RELAY1)</td><td>On</td><td>OFF</td></tr>
<tr><td>7</td><td>Multi-function Output1 (T1)</td><td>On</td><td>OFF</td></tr>
<tr><td>C</td><td>Reserved</td><td></td><td></td></tr>
<tr><td>D</td><td>Reserved</td><td></td><td></td></tr>
<tr><td>E</td><td>Reserved</td><td></td><td></td></tr>
<tr><td>F</td><td>Reserved</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>2523H</td><td>Frequency command (100/1Hz)</td></tr>
<tr><td>2524H</td><td>Output frequency (100/1Hz)</td></tr>
<tr><td>2525H</td><td>Output voltage command (10/1V)</td></tr>
<tr><td>2526H</td><td>DC voltage command (1/1V)</td></tr>
<tr><td>2527H</td><td>Output current (10/1A)</td></tr>
<tr><td>2528H</td><td>Reserved</td></tr>
<tr><td>2529H</td><td>Reserved</td></tr>
<tr><td>252AH</td><td>PID feedback (100% / fmax , 10/1%)</td></tr>
<tr><td>252BH</td><td>PID input (100% / fmax, 10/1%)</td></tr>
<tr><td>252CH</td><td>TM2 AI1 input value (100% / 10V) *1</td></tr>
<tr><td>252DH</td><td>TM2 AI2 input value (100% / 10V) *1</td></tr>
<tr><td>252EH</td><td>Reserved</td></tr>
<tr><td>252FH</td><td>Reserved</td></tr>
<tr><td>2530H</td><td>Reserved</td></tr>
</table>

(Note) Do not write in data for the reserved register.

A.5.3 Comparison list between parameter and register

Note:

Parameter register No.: GGnnH, ‘GG’ means Group number, ‘nn’ means Parameter number.

For example:

the address of Pr F08.03 is 0803H.

the address of Pr F10.11 is 0A0BH

Group00		Group01		Group02	
Register No.	Function	Register No.	Function	Register No.	Function
0000H	F00.00	0100H	F01.00	0200H	F02.00
0001H	F00.01	0101H	F01.01	0201H	F02.01
0002H	F00.02	0102H	F01.02	0202H	F02.02
0003H	F00.03	0103H	F01.03	0203H	F02.03
0004H	F00.04	0104H	F01.04	0204H	F02.04
0005H	F00.05	0105H	F01.05	0205H	F02.05
0006H	F00.06	0106H	F01.06	0206H	F02.06
0007H	F00.07	0107H	F01.07	0207H	F02.07
0008H	F00.08	0108H	F01.08	0208H	F02.08
0009H	F00.09	0109H	F01.09	0209H	F02.09
000AH	F00.10	010AH	F01.10	020AH	F02.10
000BH	F00.11	010BH	F01.11	020BH	F02.11
000CH	F00.12	010CH	F01.12	020CH	F02.12
000DH	F00.13	010DH	F01.13	020DH	F02.13
000EH	F00.14	010EH	F01.14	020EH	F02.14
		010FH	F01.15	020FH	F02.15
		0110H	F01.16	0210H	F02.16
		0111H	F01.17	0211H	F02.17
		0112H	F01.18	0212H	F02.18
		0113H	F01.19		
		0114H	F01.20		
		0115H	F01.21		
		0116H	F01.22		
		0117H	F01.23		

Group03		Group04		Group05	
Register No.	Function	Register No.	Function	Register No.	Function
0300H	F03.00	0400H	F04.00	0500H	F05.00
0301H	F03.01	0401H	F04.01	0501H	F05.01
0302H	F03.02	0402H	F04.02	0502H	F05.02
0303H	F03.03	0403H	F04.03	0503H	F05.03
0304H	F03.04	0404H	F04.04	0504H	F05.04
0305H	F03.05	0405H	F04.05	0505H	F05.05
0306H	F03.06	0406H	F04.06	0506H	F05.06
0307H	F03.07	0407H	F04.07	0507H	F05.07
0308H	F03.08	0408H	F04.08	0508H	F05.08
0309H	F03.09	0409H	F04.09	0509H	F05.09
030AH	F03.10	040AH	F04.10	050AH	F05.10
030BH	F03.11	040BH	F04.11	050BH	F05.11
030CH	F03.12	040CH	F04.12	050CH	F05.12
030DH	F03.13	040DH	F04.13	050DH	F05.13
030EH	F03.14	040EH	F04.14	050EH	F05.14
030FH	F03.15	040FH	F04.15		
0310H	F03.16	0410H	F04.16		
0311H	F03.17	0411H	F04.17		
0312H	F03.18	0412H	F04.18		
0313H	F03.19	0413H	F04.19		
0314H	F03.20	0414H	F04.20		
0315H	F03.21				

0316H	F03.22	Group06		Group07	
0317H	F03.23	Register No.	Function	Register No.	Function
0318H	F03.24	0600H	F06.00	0700H	F07.00
0319H	F03.25	0601H	F06.01	0701H	F07.01
031AH	F03.26	0602H	F06.02	0702H	F07.02
031BH	F03.27	0603H	F06.03	0703H	F07.03
031CH	F03.28	0604H	F06.04	0704H	F07.04
031DH	F03.29	0605H	F06.05	0705H	F07.05
031EH	F03.30	0606H	F06.06	0706H	F07.06
031FH	F03.31	0607H	F06.07	0707H	F07.07
0320H	F03.32	0608H	F06.08	0708H	F07.08
0321H	F03.33	0609H	F06.09	0709H	F07.09
0322H	F03.34	060AH	F06.10	070AH	F07.10
0323H	F03.35	060BH	F06.11	070BH	F07.11
0324H	F03.36			070CH	F07.12
0325H	F03.37	Group08		070DH	F07.13
0326H	F03.38	Register No.	Function	070EH	F07.14
0327H	F03.39	0800H	F08.00	070FH	F07.15
0328H	F03.40	0801H	F08.01	0710H	F07.16
0329H	F03.41	0802H	F08.02	0711H	F07.17
032AH	F03.42	0803H	F08.03		
032BH	F03.43	0804H	F08.04		
032CH	F03.44	0805H	F08.05		
032DH	F03.45	0806H	F08.06		
032EH	F03.46	0807H	F08.07		
032FH	F03.47	0808H	F08.08		
0330H	F03.48	0809H	F08.09		

Group09		Group10		Group11	
Register No.	Function	Register No.	Function	Register No.	Function
0900H	F09.00	0A00H	F10.00	0B00H	F11.00
0901H	F09.01	0A01H	F10.01	0B01H	F11.01
0902H	F09.02	0A02H	F10.02	0B02H	F11.02
0903H	F09.03	0A03H	F10.03	0B03H	F11.03
0904H	F09.04	0A04H	F10.04	0B04H	F11.04
0905H	F09.05	0A05H	F10.05	0B05H	F11.05
0906H	F09.06	0A06H	F10.06	0B06H	F11.06
0907H	F09.07	0A07H	F10.07	0B07H	F11.07
0908H	F09.08	0A08H	F10.08	0B08H	F11.08
0909H	F09.09	0A09H	F10.09	0809H	F11.09
090AH	F09.10	0A0AH	F10.10		
090BH	F09.11	0A0BH	F10.11		
090CH	F09.12	0A0CH	F10.12		
090DH	F09.13	0A0DH	F10.13		
090EH	F09.14	0A0EH	F10.14		
090FH	F09.15	0A0FH	F10.15		
0910H	F09.16				
0911H	F09.17				

Group12		Group13			
Register No.	Function	Register No.	Function	Register No.	Function
0C00H	F12.00	0D00H	F13.00	0D18H	F13.24
0C01H	F12.01	0D01H	F13.01	0D19H	F13.25
0C02H	F12.02	0D02H	F13.02	0D1AH	F13.26
0C03H	F12.03	0D03H	F13.03	0D1BH	F13.27
0C04H	F12.04	0D04H	F13.04	0D1CH	F13.28
0C05H	F12.05	0D05H	F13.05	0D1DH	F13.29
0C06H	F12.06	0D06H	F13.06	0D1EH	F13.30
0C07H	F12.07	0D07H	F13.07	0D1FH	F13.31
0C08H	F12.08	0D08H	F13.08	0D20H	F13.32
0C09H	F12.09	0D09H	F13.09	0D21H	F13.33
		0D0AH	F13.10	0D22H	F13.34
		0D0BH	F13.11	0D23H	F13.35
		0D0CH	F13.12	0D24H	F13.36
		0D0DH	F13.13	0D25H	F13.37
		0D0EH	F13.14	0D26H	F13.38
		0D0FH	F13.15	0D27H	F13.39
		0D10H	F13.16	0D28H	F13.40
		0D11H	F13.17	0D29H	F13.41
		0D12H	F13.18	0D2AH	F13.42
		0D13H	F13.19	0D2BH	F13.43
		0D14H	F13.20	0D2CH	F13.44
		0D15H	F13.21	0D2DH	F13.45
		0D16H	F13.22	0D2EH	F13.46
		0D17H	F13.23	0D2FH	F13.47

Appendix B NTA5000 parameter setting list

Client				Inverter model			
Usage occasion				Contact Phone			
Address							
Parameter code	Setting content	Parameter code	Setting content	Parameter code	Setting content	Parameter code	Setting content
F00.00		F02.00		F03.21		F04.12	
F00.01		F02.01		F03.22		F04.13	
F00.02		F02.02		F03.23		F04.14	
F00.03		F02.03		F03.24		F04.15	
F00.04		F02.04		F03.25		F04.16	
F00.05		F02.05		F03.26		F04.17	
F00.06		F02.06		F03.27		F04.18	
F00.07		F02.07		F03.28		F04.19	
F00.08		F02.08		F03.29		F04.20	
F00.09		F02.09		F03.30			
F00.10		F02.10		F03.31		F05.00	
F00.11		F02.11		F03.32		F05.01	
F00.12		F02.12		F03.33		F05.02	
F00.13		F02.13		F03.34		F05.03	
F00.14		F02.14		F03.35		F05.04	
		F02.15		F03.36		F05.05	
F01.00		F02.16		F03.37		F05.06	
F01.01		F02.17		F03.38		F05.07	
F01.02		F02.18		F03.39		F05.08	
F01.03				F03.40		F05.09	
F01.04		F03.00		F03.41		F05.10	
F01.05		F03.01		F03.42		F05.11	
F01.06		F03.02		F03.43		F05.12	
F01.07		F03.03		F03.44		F05.13	
F01.08		F03.04		F03.45		F05.14	
F01.09		F03.05		F03.46			
F01.10		F03.06		F03.47		F06.00	
F01.11		F03.07		F03.48		F06.01	
F01.12		F03.08				F06.02	
F01.13		F03.09		F04.00		F06.03	
F01.14		F03.10		F04.01		F06.04	
F01.15		F03.11		F04.02		F06.05	
F01.16		F03.12		F04.03		F06.06	
F01.17		F03.13		F04.04		F06.07	
F01.18		F03.14		F04.05		F06.08	
F01.19		F03.15		F04.06		F06.09	
F01.20		F03.16		F04.07		F06.10	
F01.21		F03.17		F04.08		F06.11	
F01.22		F03.18		F04.09			
F01.23		F03.19		F04.10			
		F03.20		F04.11			

Parameter code	Setting content	Parameter code	Setting content	Parameter code	Setting content	Parameter code	Setting content
F07.00		F09.00		F11.00		F13.13	
F07.01		F09.01		F11.01		F13.14	
F07.02		F09.02		F11.02		F13.15	
F07.03		F09.03		F11.03		F13.16	
F07.04		F09.04		F11.04		F13.17	
F07.05		F09.05		F11.05		F13.18	
F07.06		F09.06		F11.06		F13.19	
F07.07		F09.07		F11.07		F13.20	
F07.08		F09.08		F11.08		F13.21	
F07.09		F09.09		F11.09		F13.22	
F07.10		F09.10				F13.23	
F07.11		F09.11		F12.00		F13.24	
F07.12		F09.12		F12.01		F13.25	
F07.13		F09.13		F12.02		F13.26	
F07.14		F09.14		F12.03		F13.27	
F07.15		F09.15		F12.04		F13.28	
F07.16		F09.16		F12.05		F13.29	
F07.17		F09.17		F12.06		F13.30	
				F12.07		F13.31	
F08.00		F10.00		F12.08		F13.32	
F08.01		F10.01		F12.09		F13.33	
F08.02		F10.02				F13.34	
F08.03		F10.03		F13.00		F13.35	
F08.04		F10.04		F13.01		F13.36	
F08.05		F10.05		F13.02		F13.37	
F08.06		F10.06		F13.03		F13.38	
F08.07		F10.07		F13.04		F13.39	
F08.08		F10.08		F13.05		F13.40	
F08.09		F10.09		F13.06		F13.41	
		F10.10		F13.07		F13.42	
		F10.11		F13.08		F13.43	
		F10.12		F13.09		F13.44	
		F10.13		F13.10		F13.45	
		F10.14		F13.11		F13.46	
		F10.15		F13.12		F13.47	

2015.05 V02

雷翎电子・品质保证

上海雷翎电子科技有限公司
SHANGHAI REOR ELECTRIC CO., LTD.

Address：No.635, Huocheng Road, National High-tech Industrial Park, Jiading District, Shanghai
Tel：0086 021 39108222 **E-mail**：reor@reor-electron.com
Fax：0086 021 69522024 **Website**：www.reor-electron.com