INSTRUCTION MANUAL

TECO

230V Class 1Ø 0.5~3HP
0.4~2.2KW

230V Class 3Ø 0.5~40HP
0.4~30 KW

460V Class 3Ø 1~75HP
0.75~55 KW

N3 TECO AC Drive

TECO INVERTER
7300 N3

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 N3 Instruction Manual supplied with your inverter.

Step 1 Before Starting the Inverter

Please review Preface and Safety Precautions (page 0-1 through 1-4) of the N3 Instruction Manual. Verify that the drive was installed in accordance with the procedures as described in N3 Ambient Environment and Installation on pages 3-1 through 3-8. If you feel this was improper in any way, do not start the drive until qualified personnel have verified proper installation. (Failure to do so could result in serious injury.)

● **Check inverter and motor nameplates to determine that they have matched 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, L2, and L3 (pages 3-12).**
> **b. Verify that Motor leads are connected to T1, T2, and T3 (pages 3-12).**
> **(The two leads may need to be reversed if motor rotation is not correct.**
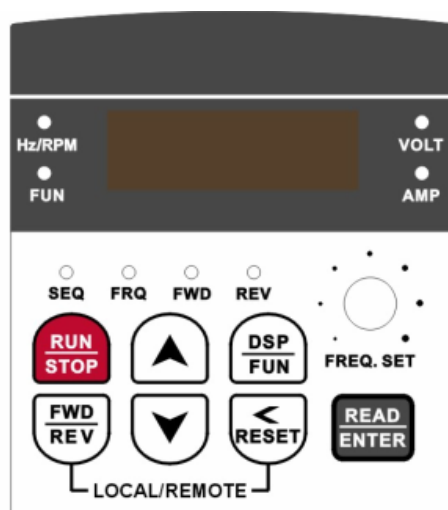
1. **SEQ LED :** 1_00 =1, LED Lit.
2. **FRQ LED :** 1_01 = 1/2/3/4, LED Lit
3. **FWD LED:** Forward Direction, LED action(Flash in stop, solid in Run).
4. **REV LED :** Reverse Direction, LED action(Flash in stop, solid in Run).
5. **Four actions of FUN、Hz/RPM、VOLT、AMP** LED and display of four 7-segment display. (Refer to operation description of the keypad.)
6. **LCD keypad without** FUN, Hz/RPM, VOLT, AMP LED.

Step 2 Apply Power to the Drive

- **Apply AC power to the Drive and observe keypad. Four 7-segments Display should read Power Voltage for 3~5 seconds and then read Frequency/Speed, 05.00. Four 7-segment Display and FWD LED should be flashing all the time.**

Step 3 Check Motor Rotation Without Load

- **Press RUN key (FWD LED should light); Four 7-segment Display should run from 00.00 to 05.00.**
- **Check motor rotation.**
  If it is not correct:
  Press STOP key. Remove AC power. Wait for LED "charge" lamp to extinguish.
  Reverse motor leads T1 and T2.Restart the drive and check new rotation.
- **Press STOP key to stop rotation.**

Step 4 Check Full Speed 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 SHIFT / RESET key. Press the READ / ENTER key to set the speed.**
- **Set frequency up to 50Hz/60Hz in accordance with the default base frequency.**
- **Press RUN key. Check drive acceleration up to full speed.**
- **Press STOP key to stop drive and check deceleration.**

Step 5 Other Operations

For information, see N3 Instruction Manual.
Please refer to the following pages:

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Preface

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 Teco's distributor 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 could cause death or serious personal injury if misused.
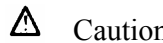
⚠ Caution	Indicates that the inverter or the mechanical system might be damaged if misused.

⚠ Danger
● Do not touch any circuit boards or components while the charging indicator is still lit after turned the power off. (The light will fade) ● Do not wire when the inverter is electrified. Do not check parts and signals on circuit boards during the inverter operation. ● Do not disassemble the inverter not and modify any internal wires, circuits, or parts. Ground the ground terminal of the inverter properly. For 200V class ground to 100 Ω or below. For 400v class ground to 10Ω or below.

⚠ Caution
● Do not perform a voltage test on parts inside the inverter. High voltage can destroy these semiconductor parts. ● Do not connect T1 (U), T2 (V), and T3 (W) 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

Product Inspection

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

● The model and capacity 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, and contact a TWMC sales representative 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 (L), L2 and L3 (N) are power-input terminals and must not be mistaken for T1, T2 and T3. Otherwise, inverter damage can result.

⚠ 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 removal means to keep the temperature below 40°C to avoid overheat or fire.

● When removing or installing the operator, turn OFF the power first, and manipulate the operator following the instruction of the diagram to avoid operator error or no display caused by bad contact.

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.

1.1.2 During Power Up

⚠ Danger

- Do not insert or remove input line connectors on the inverter when powered up to avoid the control panel damage resulting from possible voltage surge from 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 power is regenerated, the operation of the inverter is based on the setup of B000 / A015 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 regenerated, the inverter will automatically restart depending on the setup of A013/A014.

- When restarting the inverter, the operation of the inverter is based on the setup of B000 and A015 and the condition of external switch (FWD/REV button). Attention: the start operation is irrelevant with A013/A014/A018/A019.

  1. When B000=0000, the inverter will not automatically run after restart.

  2. When B000=0001 and the external switch (FWD/REV button) is OFF, the inverter will not run after restart.

  3. When B000=0001, the external switch (FWD/REV button) is ON, and A015=0000, the inverter will run automatically after restart. Attention: In the sake of safety, please turn off the external switch (FWD/REV button) after power loss to avoid damage to the machine and injury to personnel after sudden regeneration of power.

- To ensure the safety of people and machine, please refer to the description and warnings for A015.

1.1.3 Before Operation

⚠ Danger

Make sure the model and inverter capacity match the A175 setting.

⚠ Caution

The inverter will flash display the power voltage set by A007 for 5 seconds when applying power.

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.   • Note: The stop switch function is different from the emergency stop switch, which must be set first to be effective.

⚠ **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 capacities range of the motor and the associated machinery.   • Note the settings related to the braking reactor.   • 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 should be used in a non-condensing environment with temperature range of 14-104°F (-10-40°C) and a relative humidity of 95% non-condensing.

⚠ **Caution**
When the inverter top cover has removed, it can be used in a non-condensing environment with temperature from 14-122°F (–10°C to +50°C) and relative humidity of 95%, but the environment should be free from water and metal dust.

Chapter 2   Definition of model

Inverter model → 　MODEL：N3-2P5-SCF

Input voltage → 　I/P：AC 1 PH

200~240V 50/60Hz

Output specifications→ 　O/P：AC 3PH 0~264V

1.2 KVA 3.1 A

TECO ELECTRIC & MACHINERY CO., LTD.

N3　-　2　　P5　-　C　　S　　F

Series:

2:230V　P5:0.5 HP

4:460V　01:1.0 HP

Horsepower:

02:2.0 HP

03:3.0 HP

05:5.0 HP

07:7.5 HP

10:10 HP

15:15 HP

20:20 HP

25:25 HP

30:30 HP

40:40 HP

50:50 HP

60:60 HP

75:75 HP

C: IP20

N1: NEMA1

F: Filter Built-in

Blank: No filter

Built-in

Power supply:

S: Single phase

Blank: Three phase

Figure 2-1 Inverter Nameplate

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 install the inverter in an environment complying with the following conditions:

- Ambient temperature: 14-104℉ (-10℃ - +40℃); without cover:14-122℉ (-10℃ - +50℃)
- 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℃.
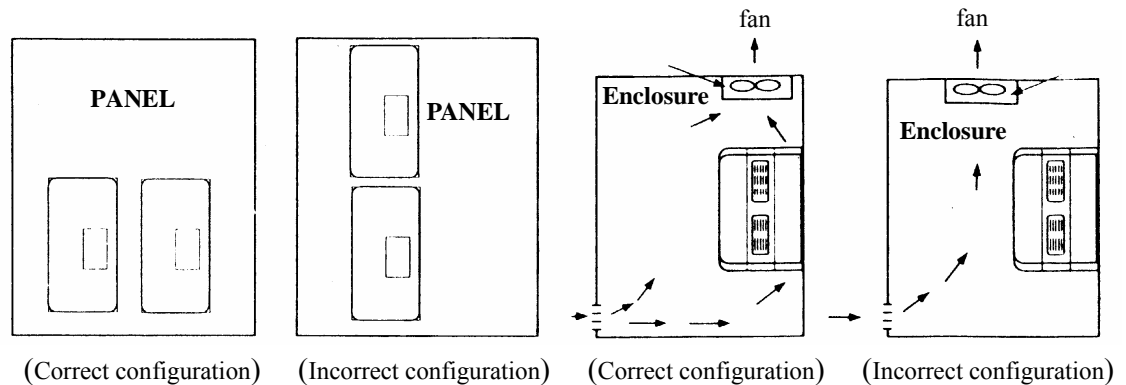
Figure 3-1 Panel and enclosure arrangement for N3 inverters

- Place the front side of the inverter onward and top upward to in favor of heat sink.

  - Install the inverter according to the following figures: (take the dustproof cover off in favor of heat sinking if it is installed in a box or the environment allows to do so)
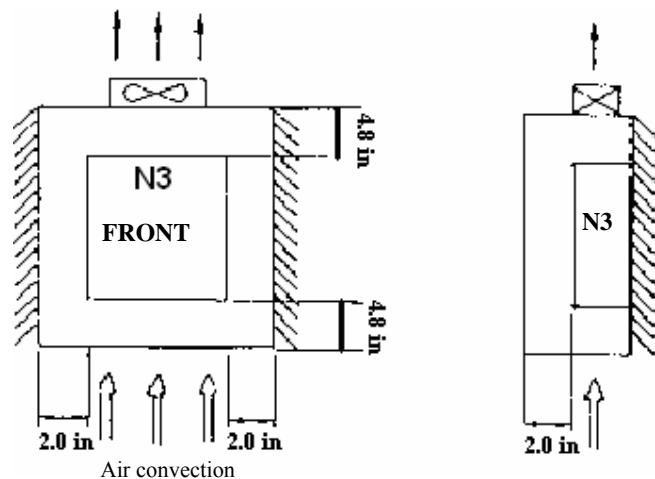
Figure 3-2 DIN RAIL MOUNTING OF THE N3 INVERTER

Air convection

14℉-104℉ (-10℃ - +40℃)

(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 (Near an electric welding machine)	Radioactive materials	Inflammable materials
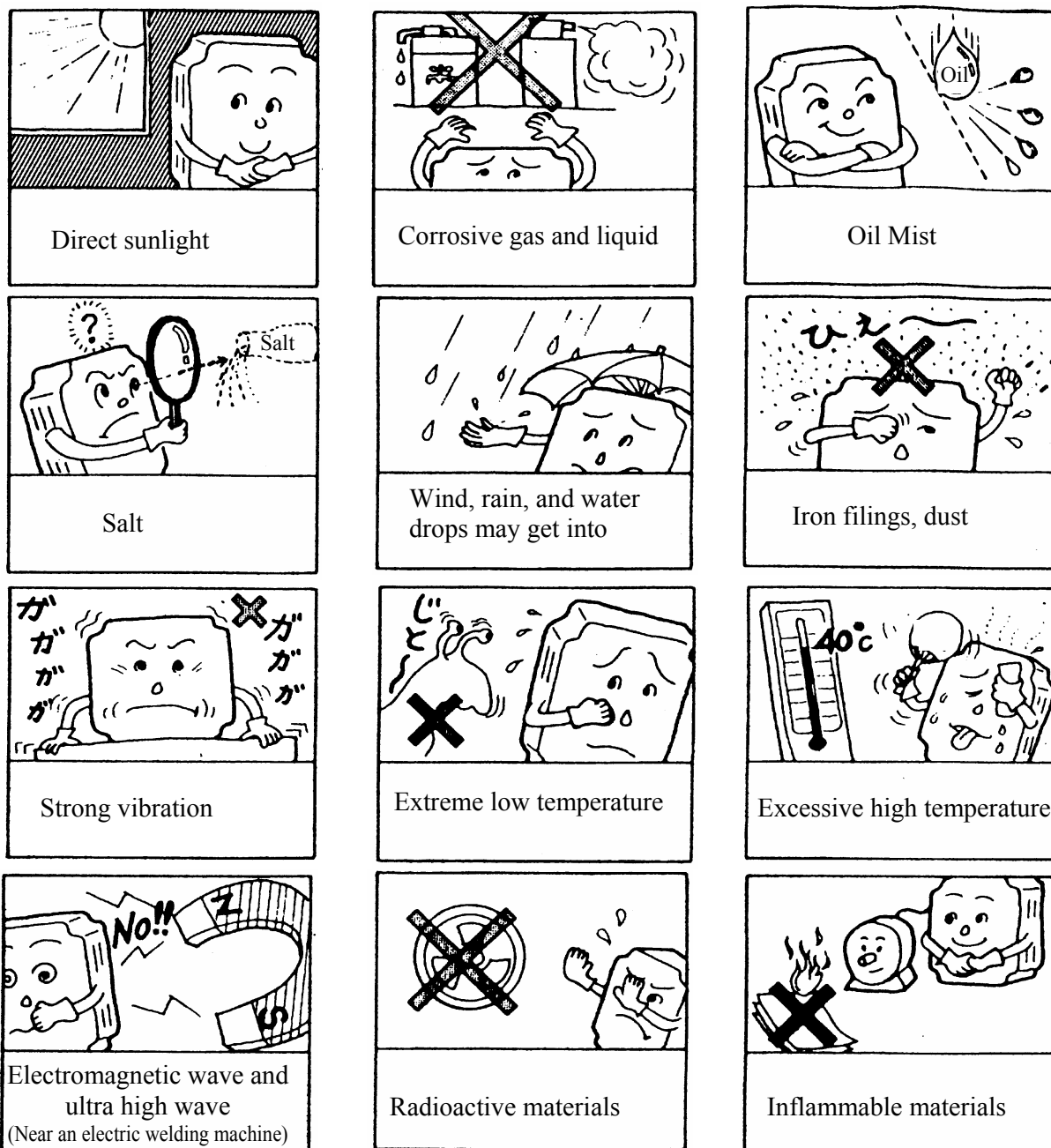
3.3 Inflammable materials

3.3.1 Notice for wiring

A. Tightening torque:

Wine with a screwdriver or other tools per the tightening the torques listed below:

Tightening torque			
Horsepower	Power source	Nominal torque for TM1 terminal	
0.5/1/2(3φ)	200-240V	0.59/0.08	7.10/8.20
1/ 2	380-480V	(LBS-FT / KG-M)	(LBS-IN/KG-CM)
2(1φ)/3/5/7.5/10	200-240V	1.5/0.21	18.00/20.28
3/ 5/ 7.5/ 10/15	380-480V	(LBS-FT/KG-M)	(LBS-IN/KG-CM)
15/20/25	200-240V	1.84/0.3	22.1/30
20/25/30	380-480V	(LBS-FT / KG-M)	(LBS-IN/KG-CM)
30/40	200-240V	4.42/0.66	53.1/66
40/50/60/75	380-480V	(LBS-FT/KG-M)	(LBS-IN/KG-CM)

B. Power wires:

Power wires are connecting to L1, L2, L3, T1, T2, T3, P, BR and P1. Select power wire in accordance with the following criteria:
   (1) Use copper wires only. Proper diameters of wires should be based on ratings at 105°C.
   (2) For rating voltage of wires, the minimum voltage of 230VAC type is 300V, and 460VAC type is 600V.
   (3) For safety reasons, the power wires should be fixed by terminal type.

C. Control wires:

Control wires are wires connecting to TM2 control terminal. Choose the wire in accordance with the following criteria:
   (1) Use copper wires only. Proper diameters of wires should be based on ratings at 105°C.
   (2) To avoid noise interference, do not route control wiring in the same conduit with power wires and motor wiring.

D. Nominal electrical specifications of the terminals Block:
The following list is nominal values of TM1:

Horsepower	Power source	Volts	Amps
0.5/1/ 2(3φ)	200-240V		15A
1/ 2	380-480V		
5/ 7.5/ 10	200-240V		40A
2(1φ)/3/ 5/ 7.5/ 10/15	380-480V		
15/20/25	200-240V	600	80A
20/25/30	380-480V		60A
30	200-240V		100A
40/50	380-480V		
40	200-240V		150A
60/75	380-480V		

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

E. Fuse types

Drive input fuses are provided to disconnect the drive from power in the event that a component fails in the drive's power circuitry. The drive's electronic protection circuitry is designed to clear drive output short circuits and ground faults without blowing the drive input fuses. Below table shows the N3 input fuse ratings.

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

RK5, CC/T TYPE FUSE FOR N3

220V class (1φ)

N3-2	HP	KW	KVA	100% CONT Output AMPS (A)	Max.RK5 FUSE Rating(A)	Max.CC or T FUSE Rating(A)
P5-S	0.5	0.4	1.2	3.1	10	20
01-S	1	0.75	1.7	4.5	15	30
02-S	2	1.5	2.9	7.5	20	40
03-S	3	2.2	4.0	10.5	25	50

220V class (3φ)

N3-2	HP	KW	KVA	100% CONT Output AMPS (A)	Max.RK5 FUSE Rating(A)	Max.CC or T FUSE Rating(A)
P5	0.5	0.4	1.2	3.1	8	10
01	1	0.75	1.7	4.5	12	15
02	2	1.5	2.9	7.5	15	20
03	3	2.2	4.0	10.5	20	30
05	5	3.7	6.7	17.5	30	50
07	7.5	5.5	9.9	26	50	60
10	10	7.5	13.3	35	60	70
15	15	11.0	20.6	48	80	100
20	20	15.0	27.4	64	100	125
25	25	18.5	34.0	80	125	150
30	30	22.0	41.0	96	160	200
40	40	30.0	54.0	130	200	250

440V class (3φ)

N3-4	HP	KW	KVA	100% CONT Output AMPS (A)	Max.RK5 FUSE Rating(A)	Max.CC or T FUSE Rating(A)
01	1	0.75	1.7	2.3	6	10
02	2	1.5	2.9	3.8	10	15
03	3	2.2	4.0	5.2	10	20
05	5	3.7	6.7	8.8	20	30
07	7.5	5.5	9.9	13	25	35
10	10	7.5	13.3	17.5	30	50
15	15	11.0	20.6	25	50	60
20	20	15.0	27.4	32	60	70
25	25	18.5	34.0	40	70	80
30	30	22.0	41.0	48	80	100
40	40	30.0	54.0	64	100	125
50	50	37.0	68.0	80	125	150
60	60	45.0	82.0	96	150	200
75	75	55.0	110.0	128	200	250

*Fuse ratings are based upon 250V fuses for 230V inverter, and 600V for 460V inverters

※Notice

- To avoid shock hazards, do not touch any electrical component when the power is applied or with in five minutes after the power is disconnected. The other action should be performed after the charge indicator goes off.
- Do not perform wiring on the inverter while it is still connected. Disregarding this notice of this notice could cause serious insure or death to personnel.

※This product is designed to use in Pollution Degree 2 environment or equivalent environments.

3.3.2 Applicable specification of magnetic contactor and wires

Molded-case circuit breaker/magnetic contactor

- Teco 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.

N3 model	N3-2□□											
	P5	01	02	03	05	07	10	15	20	25	30	40
Molded-case circuit breaker made by Teco	TO-50E 10A	TO-50E 20A	TO-50E 30A	TO-50E 30A	TO-50E 30A	TO-50E 50A	TO-100S 60A	TO-100S 100A	TO-100S 100A	TO-225S 150A	TO-225S 175A	TO-225S 175A
Magnetic contactor (MC) made by Teco	CN-11					CN-16	CN-18	CN-25	CN-50	CN-65	CN-80	CN-100	CN-125
Main circuit terminals (TM1)	Wire gauge 2.0 mm^2				Wire gauge 3.5 mm^2		Wire gauge 5.5 mm^2		Wire gauge 22 mm^2			Wire gauge 30mm^2	Wire gauge 50mm^2
Signal terminals (TM2)	Wire gauge 0.75mm^2 (# 18 AWG)											

N3 model	N3-4□□											
	01/ 02/ 03/ 05	07	10	15	20	25	30	40	50	60	75
Molded-case circuit breaker made by Teco	TO-50E 15A	TO-50E 20A	TO-50E 30A	TO-50E 50A	TO-100S 50A	TO-100S 75A	TO-100S 100A	TO-100S 100A	TO-125S 125A	TO-225S 175A	TO-225S 175A
Magnetic contactor (MC) made by Teco	CN-11	CN-16	CN-18	CN-25	CN-35	CN-50	CN-50	CN-65	CN-80	CN-100	CN-125
Main circuit terminals (TM1)	Wire gauge 2.0mm^2	Wire gauge 3.5mm^2		Wire gauge 5.5mm^2	Wire gauge 14mm^2			Wire gauge 30mm^2		Wire gauge 50mm^2	Wire gauge 50mm^2
Signal terminals (TM2)	Wire gauge 0.75mm^2 (# 18 AWG), 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 overload 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:
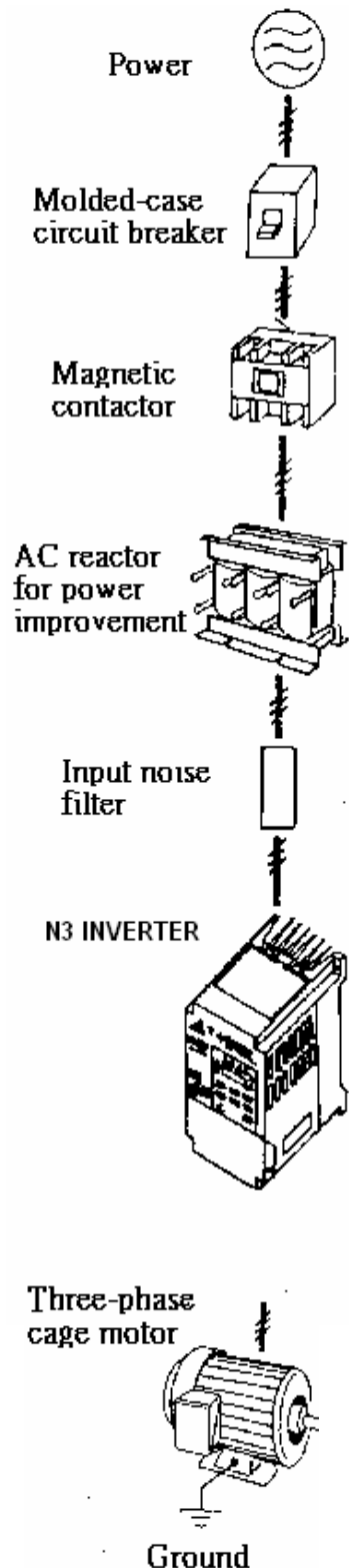
Power supply:
- Make sure the correct voltage is applied to avoid damaging the inverter.
- A molded-case circuit breaker or fused disconnect must be installed between the AC source and the inverter

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 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 Line reactor for power quality improvement:
- When inverters below 200V/400V 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, L2, and L3 can be used in any sequence regardless of phase.
- Output terminals T1, T2, and 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 T1, T2, and T3.
- To avoid damaging the inverter, do not connect the input terminals T1, T2, and T3 to AC input power.
- Connect the ground terminal properly. 230 V series: class 3 grounding, <100Ω; 460 V series : <10Ω.

Figure 3-3 Typical Installation Schematic

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

Figure 3-4a Installation Examples

● The inverter uses dedicated power line   A general noise filter may not provide correct results

CORRECT
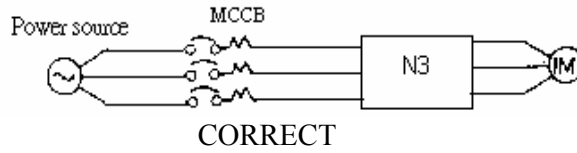
● Add a noise filter or separation transformer when shaning the power line with other machines.
● the inverter shares the power line with other machines.
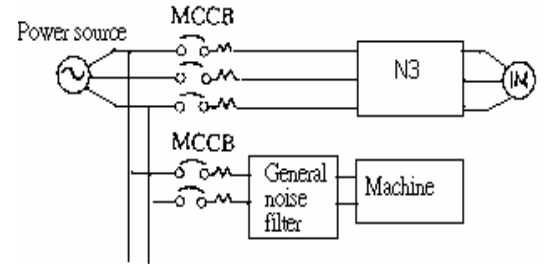
Figure 3-4b Installation Examples using a filter

Incorrect

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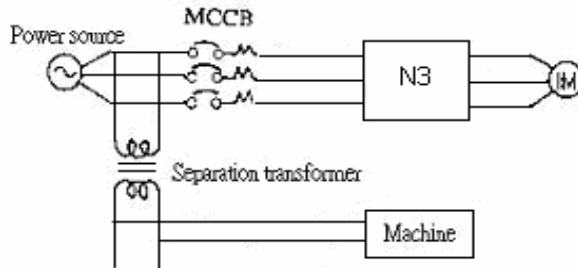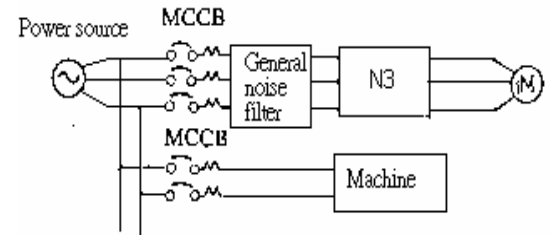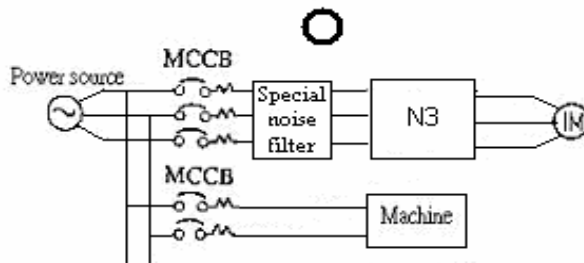
(A) Main circuit's wiring must separate from other high voltage or high current power line to avoid noise interference. Refer to the figures below:

● A noise filter in the output of the main circuit can suppress conductive noise. To prevent radiative noise, the wires should be put in a ferromagnetic metal pipe and sepoorated from all other signal lines by at least 1ft..
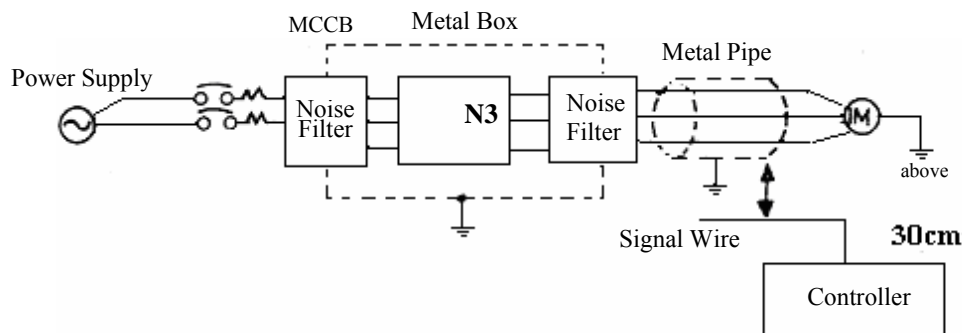
Figure 3-4c Installation Examples with Adjacent Signal Conductors

3-7

- When the connection between the inverter and the motor appears long, factor in 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}. The number of carriers must be adjusted based on the line length.

Cable length between the inverter and the motor	Below 75ft	Below 150ft	Below 300ft	Above 300ft
Recommended carrier frequency allowed	Below 16KHz	Below 12KHz	Below 8KHz	Below 5KHz
Setting of parameter 3-22	16	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 150ft.

Armor
Shielding sheath
To ground terminal
Do not connect this end
Wrapped with insulating tape
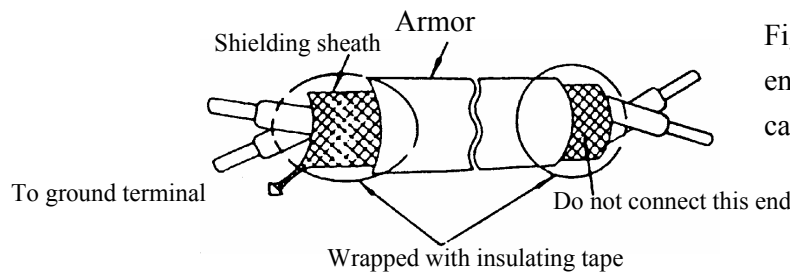
Figure 3-5 Processing he ends of twisted pair cables

(C) Ground the ground terminal of the inverter properly. For 230V class ground 100Ω or less; for 460V class ground 10Ω or less.

- Ground wiring AWG is sized per the electrical equipment specifications. Minimize wire length is recommended.

- 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.

Figure 3-6 Grounding Examples

(a) **Good**   (b) **Good**   (c) **Bad**
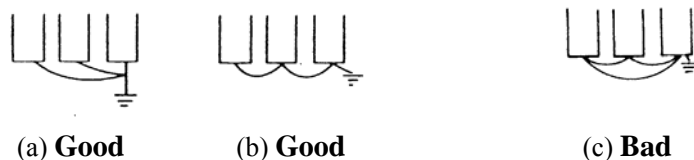
(D) To ensure maximum safety, use proper wire gauges (AWG) for the main power circuit and control circuit. (See table in section 3.2.2)

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

3.4 Specifications

3.4.1 Product Specifications

Single phase, 200-240V model

N3-2□□-SC/SCF	P5	01	02	03
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 Phase: 200~240V +10% -15% ，50/60H$_Z$ ± 5%			
Max. Output Voltage	Three Phase: 200~240V			
Input Current(A)	8.5	12	16	23.9
Net Weight Lb(KG)	2.87(1.3)	2.87(1.3)	3.31(1.8)	5.07(2.3)
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0

Three phase, 200 – 240V model

N3-2□□-C/N1	P5	01	02	03	05	07	10	15	20	25	30	40
Horsepower(HP)	0.5	1	2	3	5	7.5	10	15	20	25	30	40
Max Applicable Motor Output (KW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30
Rated Output Current(A)	3.1	4.5	7.5	10.5	17.5	26	35	48	64	80	96	130
Rated Capacity(KVA)	1.2	1.7	2.9	4.0	6.7	9.9	13.3	20.6	27.4	34	41	54
Max. Input Voltage	Three Voltage: 200~240V +10% -15% ，50/60H$_Z$ ± 5%											
Max. Output Voltage	Three Voltage: 200~240V											
Input Current(A)	4.5	6.5	11	12.5	20.5	33	42	57	70	85	108	138
Net Weight Lb(KG)	2.65 (1.2)	2.65 (1.2)	2.65 (1.2)	3.85 (1.75)	4.19 (1.9)	12.3 (5.6)	12.3 (5.6)	33.1(15)	33.1 (15)	33.1 (15)	72.8 (33)	75.0 (34)
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Three phase, 380 – 480V model

N3-4□□-C/CF/N1	01	02	03	05	07	10	15	20	25	30	40	50	60	75
Horsepower(HP)	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75
Max Applicable Motor Output (KW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
Rated Output Current(A)	2.3	3.8	5.2	8.8	13.0	17.5	25	32	40	48	64	80	96	128
Rated Capacity(KVA)	1.7	2.9	4.0	6.7	9.9	13.3	19.1	27.4	34	41	54	68	82	110
Max. Input Voltage	Three Voltage:380~480V +10% -15% ， 50/60H$_Z$ ± 5%													
Max. Output Voltage	Three Voltage: 380~480V													
Input Current(A)	4.2	5.6	7.3	11.6	17	23	31	38	48	56	75	92	112	142
Net Weight Lb(KG)	2.87 (1.3)	2.87 (1.3)	3.31 (2.2)	3.31 (2.2)	12.3 (6.6)	12.3 (6.6)	12.3 (6.6)	33.1 (15)	33.1 (15)	33.1 (15)	72.8 (33)	72.8 (33)	110 (50)	110 (50)
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

3.4.2 General Specifications

Item	N3 TYPE
Control Mode	V/F or Current Vector Control
Frequency Control	

	Item	N3 TYPE
Frequency Control	Range	0.1~650.0 Hz
	Start control torque	150%/1Hz (Current Vector)
	Speed control range	50:1 (Current Vector)
	Speed Control Precision	±0.5% (Current Vector)
	Setting resolution	Digital：0.01Hz(Note *1)；Analog: 0.06Hz/ 60Hz(10bits)
	Keypad setting	Set directly with▲▼ keys or the VR on the keypad
	Display Function	Four digital LED (or 2×16 LCD) and status indicator; display frequency/ speed/ line speed/ DC voltage/ Output voltage/ Current/ Rotation direction/ Inverter parameter/ Trouble Log/ Program Version
	External signal setting	1. External potentiometer/ 0-10V/ 0-20mA/ 10-0V/ 20-0mA 2. Performs up/down controls, speed control or automatic procedure control with multifunctional contacts on the terminal block (TM2)
	Frequency Limit Function	Upper/lower frequency limits and three skip frequencies
	Carrier frequency	2 ~ 16 kHz
	V/F pattern	18 pre-configured patterns, 1programable curve
	Acc/Dec control	Two-stage Acc/Dec time (0.1 – 3,600 seconds) and two-stage S curves (refer to descriptions on 3-05)
	Multifunction analog output	6 functions (refer to description on A103/A104)
	Multifunction input	30 functions (refer to description on A050~A056)
	Multifunction output	16 functions (refer to description on A105~A106)
	Digital Input Signal	NPN (SINK) / PNP (SOURCE) toggle
	Other Functions	Momentary Power Loss Restart, Speed Search, Overload Detection, 8 preset speeds. Acc/Dec Switch (2 Stages), S Curves, 3-wire Control, PID control, torque boost, Slip Compensation, Frequency Upper/ Lower Limit, Auto energy saving, Modbus slave and PC/PDA Link, Auto Restart.

Item	N3 TYPE
Communication Control	1. Control by RS232 or RS485 2. One to one or one to more (RS485 ONLY) control. 3. BAUD RATE/STOP BIT/PARITY/bit can be set
Braking Torque	About 20% , the model built-in braking transistor and connected braking resistor is 100%
Operation temperature	14-120°F(-10 ~ 50℃)(note 2)
Storage temperature	4-140°F(-20 ~ 60℃)
Humidity	0 – 95% Relative Humidity(Non-condense)
Vibration	1G (9.8m/s^2)
EMC	Complies with requirement EN 61800-3 (with optional Filter).
LVD	Complies with requirement EN 50178
Enclosure	IP20 (NEMA 1 by external box attached)
Safety Level	UL 508C

Protective Functions	Overload protection	The relays to protect the motor (the curve can be set) and the inverter (150 % / 1min)
	Over Voltage	230V class：DC Voltage＞410V 460V class：DC Voltage＞820V
	Under Voltage	230V class：DC Voltage＜190V 460V class：DC Voltage＜380V
	Momentary Power Loss Restart	Stop for more than 15ms-power-loss can be restarted with spin start after momentary power loss in Max 2 sec.15ms
	Stall Prevention	Stall prevention for Acceleration/ Deceleration/ Operation.
	Short-circuit output terminal	Electronic Circuit Protection
	Grounding Fault	Electronic Circuit Protection
	Other Function	Protection for overheating of heat sink, over torque detection, error contact control, reverse prohibit, prohibit for direct start after power up and error recovery, parameter lock out.

(• 220V, 15HP and above capacity are not CE complied)

※Note 1：The setting resolution of above 100Hz is 0.1Hz when controlled by the keypad, and 0.01 Hz when controlled using computer (PC) or programmable controller (PLC).

※Note 2：14-120℉(–10 ~ 50℃) in distributor (without dustproof cover),

14-104℉ (–10 ~ 40℃) outside distributor (with dustproof cover).

3.5 Wiring diagram N3 series inverter
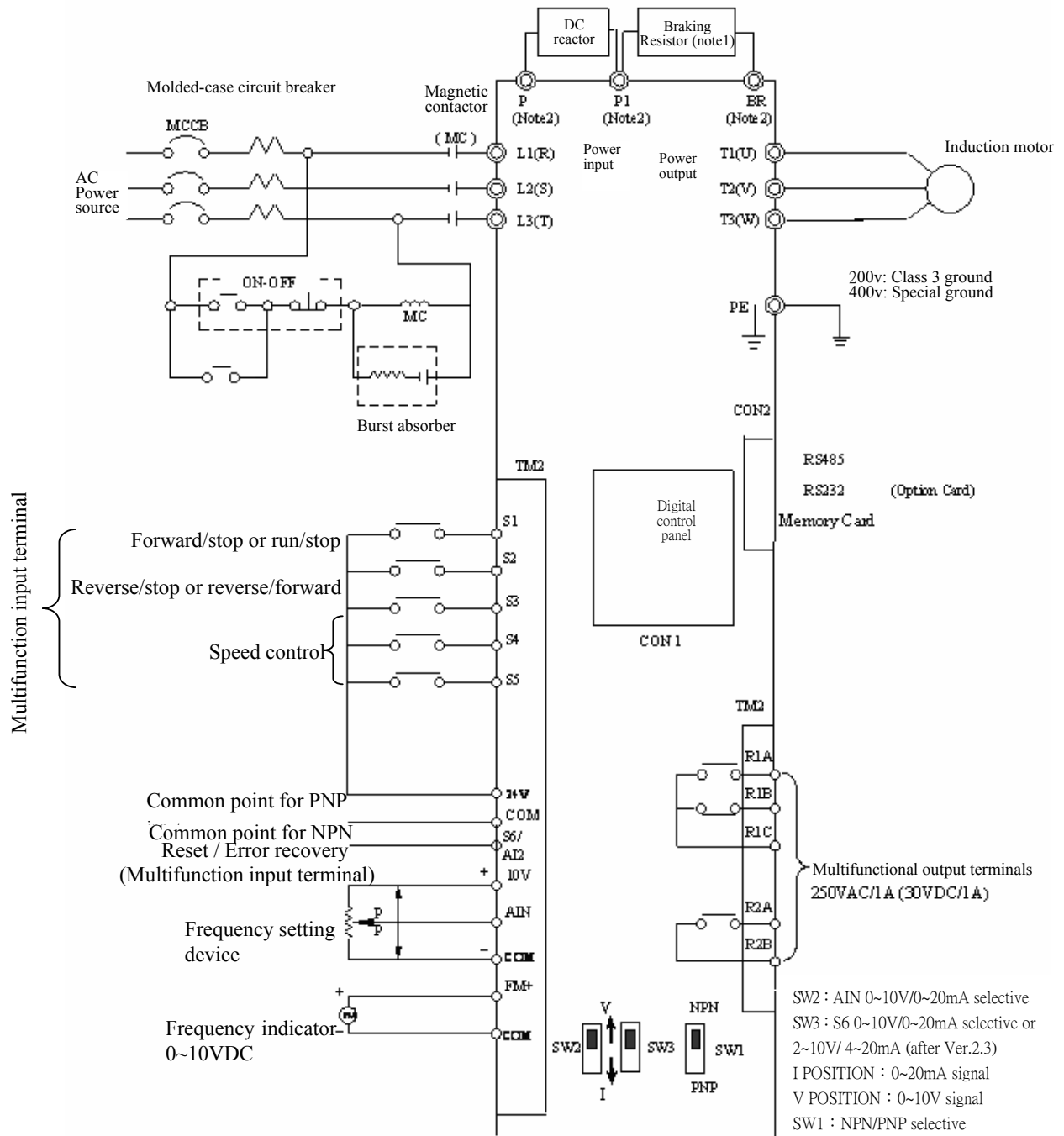
Figure 3-7 Wiring Diagram

※Note 1：Please refer to description of main circuit terminals (P1, BR) and specification of braking resistor for value selection.

※Note 2：Above scheme applies for models 230V:0.5~10HP and 460V:1~15HP only.

‧   230V: 25HP 440V: 25~30HP

‧   230V: 30~40HP 440: 40~75HP

3.6 Description of terminals of troubleshooting inverter

Descriptions of main circuit terminals

Symbol	Description		
R / L1 (L)	Main power input Single-phase: L/N		
S / L2	Three-phase: L1/L2/L3		
T / L3 (N)			
P1	Braking resistor connection terminal: Used in cases where the inverter regenerates due to large load inertias or short deceleration time (refer to specifications of the braking resistor)		For 230V:0.5~10HP, 460V:1~15HP
BR			
P1、P	DC reactor connecting terminals		
B1/P	● B1/P-Θ：DC power supply input B1/P-B2：External braking resistor (For 230V：15~20HP and 460V：20HP)	-	
B2			
Θ		● ⊕-Θ：DC power supply input or External braking unit. See Chapter 6.3 For 230V：25~40HP and 460V：25~75HP	
⊕	-		
U / T1	Inverter outputs		
V / T2			
W / T3			

Descriptions of N3 control circuit terminals

Symbol	Description		
R2A	Multifunctional terminal – Normal open		Contact rated capacity: (250VAC/1A or 30VDC/1A) Contact using description:(refer to parameters 8-02, 8-03)
R2B			
R1C	Common contact	Multifunctional output terminals	
R1B	Normal close contact		
R1A	Normal open contact		
10V	Frequency knob (VR) power source terminal (pin 3)		
AIN	Analog frequency signal input terminal or multifunction input terminals S7 (H level:>8V, L level:<2V, PNP only) (refer to parameter A056 description)		
24V	Common for S1~S5 (S6, S7) in PNP (Source) input. Connect pin 2 and pin 3 (refer to N3 wiring diagram) of SW1 when using PNP input		
COM	Common for analog input /output signal for S1~S5in NPN (Sink) input. Connect pin 2 and pin 3 (refer to N3 wiring diagram) of SW1 when used NPN input		
FM+	The positive multifunction analog output signal for multifunction (refer to parameter A103 description), the signal for output terminal is 0-10VDC (below 2mA).		

・230V：15 ~ 20 HP 460V：20HP
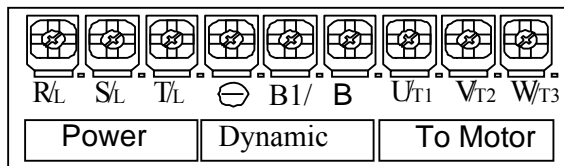
・230V 25 ~ 40HP 460V 25~75HP
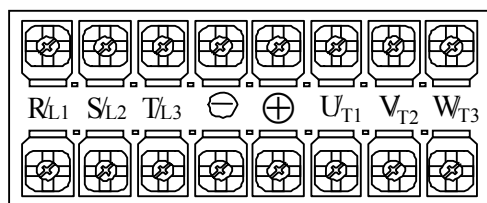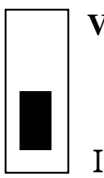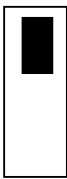
Figure 3-8 Power input locations

Symbol	Function Description
S1	Multifunction input terminals(refer to parameters A050 ~ A054 description) (S5 = Encoder input terminal. Encoder voltage range: 19.2V~24.7V)
S2	
S3	
S4	
S5	
S6	Multifunction input terminals (Digital terminal high level:>8V, Low level:<2V, PNP only) or analog input terminal AI2(0~10Vdc/4~20mA)(refer to A055 description)

Descriptions of SW function

SW2/SW3	Type of external signal	Remarks
	0~10VDC analog signal	Effective when External control is used as (B004=0002)
	0~20mA analog signal	

SW1	Type of external signal	Remarks
	NPN (SINK) input	
	PNP (SOURCE) input	Factory default

3.7 Outline Dimensions

(1) Frame1：Single phase N3-2__-S: P5, 01

Three phase N3-2/4__：P5, 01, 02

(2) Frame2：Single phase N3-2__-S: 02, 03

Three phase N3-2/4__：03, 05
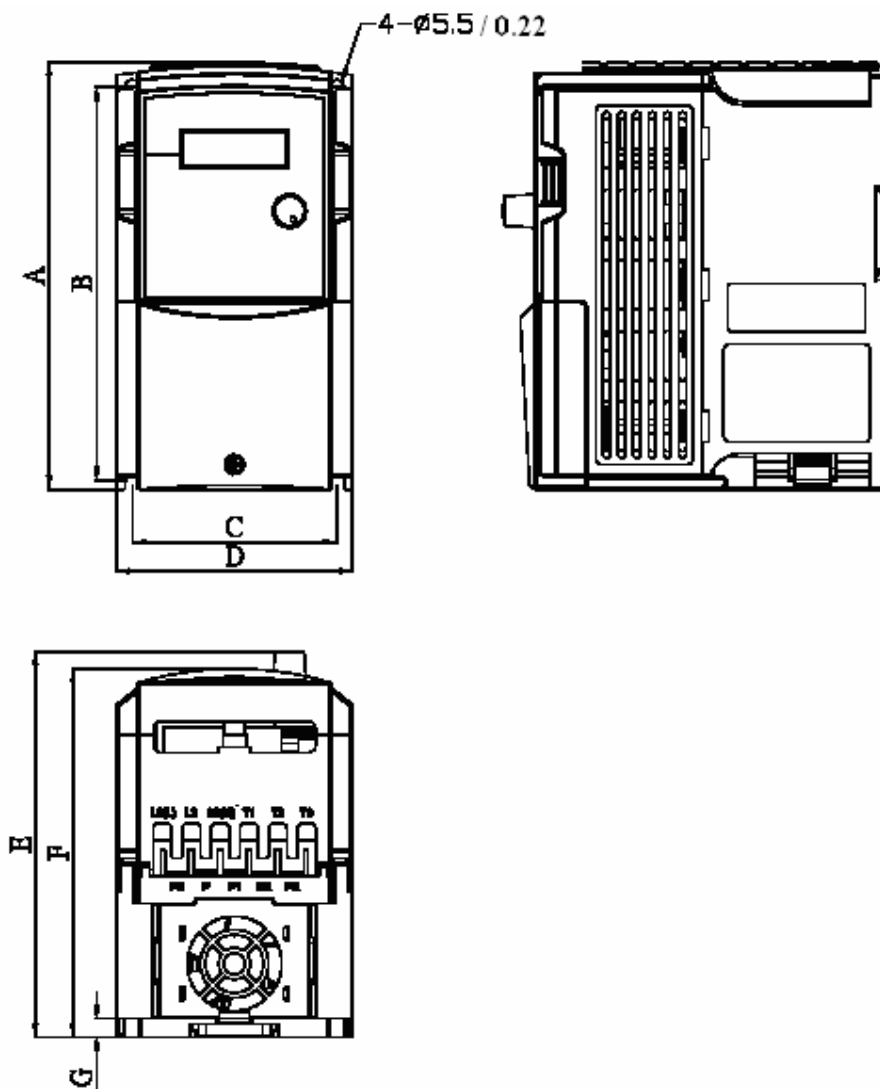
Figure 3-9 Frames1, 2 Dimensions

Unit : mm/inch

LENGTH / MODEL	A	B	C	D
Frame 1	163/6.42	150/5.9	78/3.07	90/3.54
Frame 2	187.1/7.36	170.5/6.71	114.6/4.51	128/5.04

LENGTH / MODEL	E	F	G	
Frame 1	147/5.79	141/5.55	7/0.28	
Frame 2	148/5.83	142.1/5.59	7/0.28	

(3) Frame3：Three phase N3-2__: 07, 10

N3-4__: 07, 10, 15
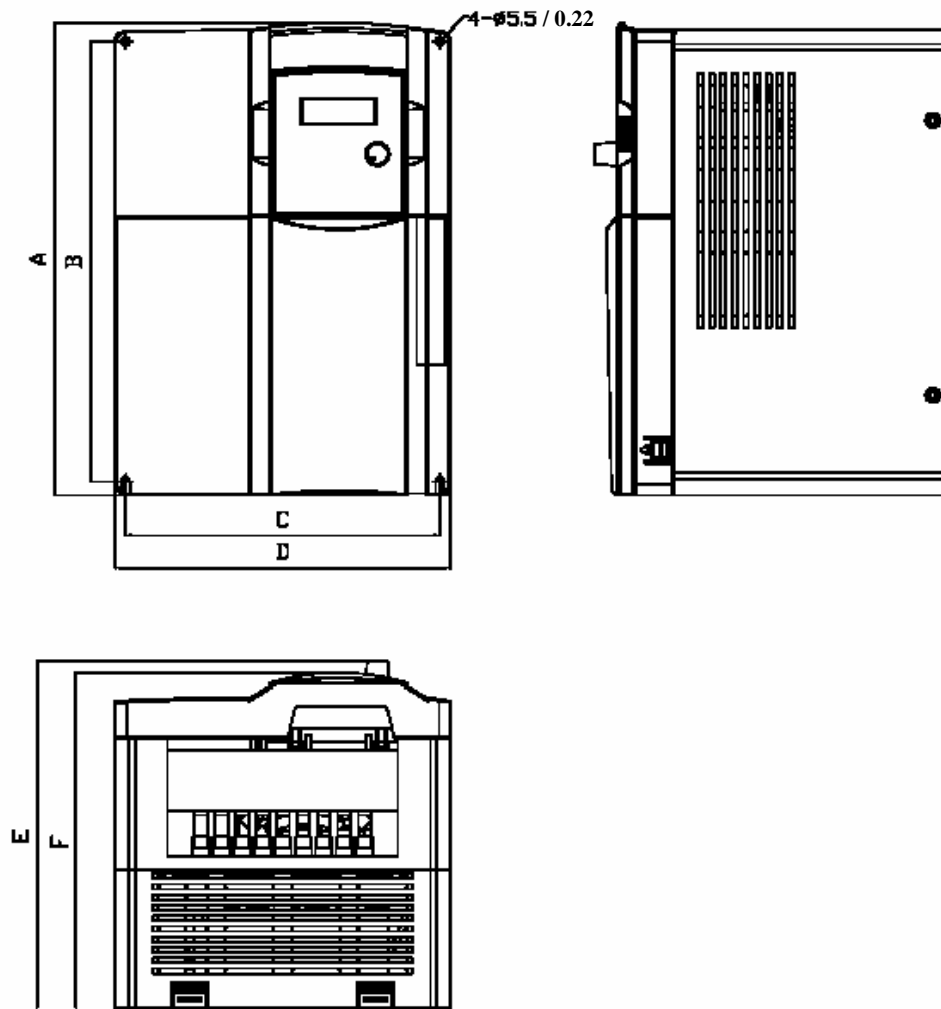
Unit : mm/inch

LENGTH MODEL	A	B	C	D	E	F
Frame 3	260/10.24	244/9.61	173/6.81	186/7.32	195/7.68	188/7.4

Figure 3-10 Frames 3 Dimensions

(4) Frame4：Three phase N3-2__ : 15, 20, 25

N3-4__ : 20, 25, 30
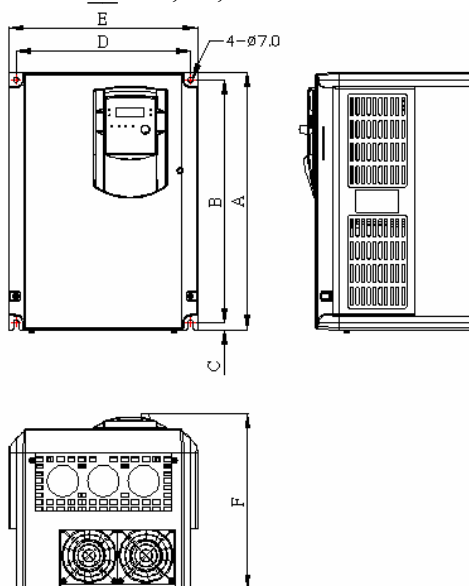
(5) Frame5：Three phase N3-2__ : 30, 40

N3-4__ : 40, 50

(6) Frame6：Three phase N3-4 __ : 60, 75
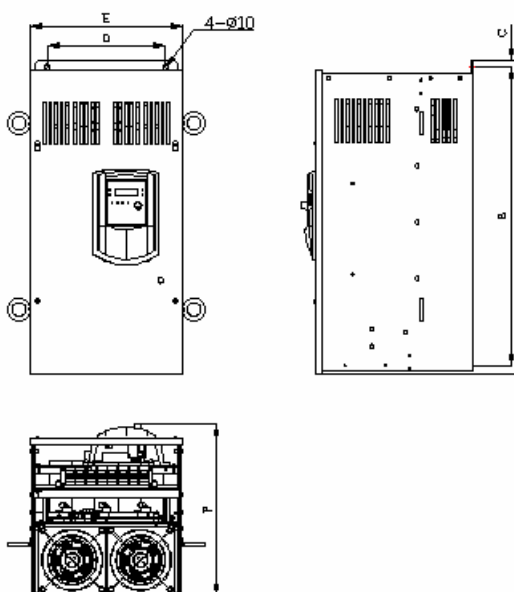
（Open Chassis Type－IP00）

Unit : mm/inch

LENGTH MODEL	A	B	C	D	E	F
Frame4	360/14.2	340/13.4	10/0.4	245/9.6	265/10.4	247.5/9.7
Frame5	553/21.8	530/20.9	10/0.4	210/8.3	269/10.6	303.6/12
Frame6	653/25.7	630/24.8	10/0.4	250/9.8	308/12.1	308.6/15.2

Figure 3-11 FRAMES SIZE 4, 5, 6 DIMENSIONS

Chapter 4   Software Index

4.1 Keypad Description

4.1.1Keypad Display and Operation Instruction
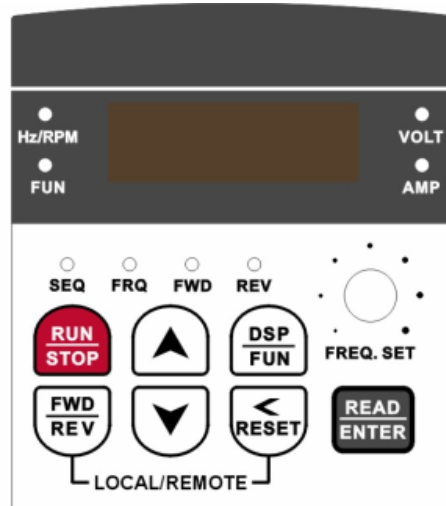
Figure 4-1 Keypad Layout

1. SEQ LED: Parameter B000 =1/2/3, LED Lit.

2. FRQ LED: Parameter B004 = 1/2/3/4, LED Lit

3. FWD LED: Forward Direction, LED action (Flash while stopped, solid during Lit operation).

4. REV LED: Reverse Direction, LED action (Flash while stopped, solid during Lit operation).

5. Four actions of FUN mode: Hz/RPM, VOLT, AMP LED, and display of four 7-segment display.

   (Refer to operation description of the keypad).

6. LCD keypad in display mode: Hz/RPM, VOLT, AMP, LED and FREQ.SET pot.

⚠ **Caution**

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

Remote/Local Mode

 • Local mode – Operation Command via RUN/STOP key on keypad

        – Frequency Command by ▲▼ key on keypad

 • Remote mode – Operating Command via B000

        – Frequency Command via B004

To Change the Remote/Local mode, you must push FWD/REV and 《/RESET key at the same time.

The Remote /Local mode of change can be used in STOP mode, but is not allowed in Run mode.

4.1.2 Operation Instruction of the keypad

Power On

● LED Light Lit

⊙ :LED Light Flash

Power Voltage (*1)

5 seconds later or after Enter operation signal, Press DSP to modify frequency.

● HZ/RPM — Frequency/Speed/Line Speed

RUN/STOP

● HZ/RPM — Frequency/Speed/Line Speed

∧ ∨ < — ● HZ/RPM — Frequency/Speed/Line Speed (*3)

READ/ENTER (*2)

DSP

● FUN — Selecting the parameter group

∧ ∨

● FUN — Selecting the parameter group

READ/ENTER — ⊙ FUN — Parameter Setting

DSP

READ/ENTER — END

DSP

DSP

Output Voltage ● VOLT

DSP — DC Voltage ● VOLT

DSP

DSP — Output Current ● AMP

(*4)

Figure 4-2 Keypad Operations Sequence

*1: The inverter will flash the current setting of A007 (power supply voltage) after power up.

*2: A045, A046 determines the displaying of frequency, speed or line speed.

*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 not is determined by B013 ~ B015 respectively.

4.1.3 Operation Instruction of the LED keypad

Power On

● : LED Light Lit
⊙ : LED Light Flash

$$220\,\text{u}$$

5 seconds later or after Enter operation signal, Press DSP to modify the display

● HZ/RPM 60.00

RUN/STOP

● HZ/RPM 60.00

∧ ∨ < ● HZ/RPM 60.00

READ/ENTER

DSP

● FUN $A000$

READ/ENTER

⊙ FUN 0000

∧ ∨

● FUN $b000$

DSP

⊙ FUN 0001

∧ ∨

End

READ/ENTER

DSP

$220\,\text{u}$ ● VOLT

DSP

$310\,\text{u}$ ● VOLT

DSP

DSP

$03.1A$ ● AMP
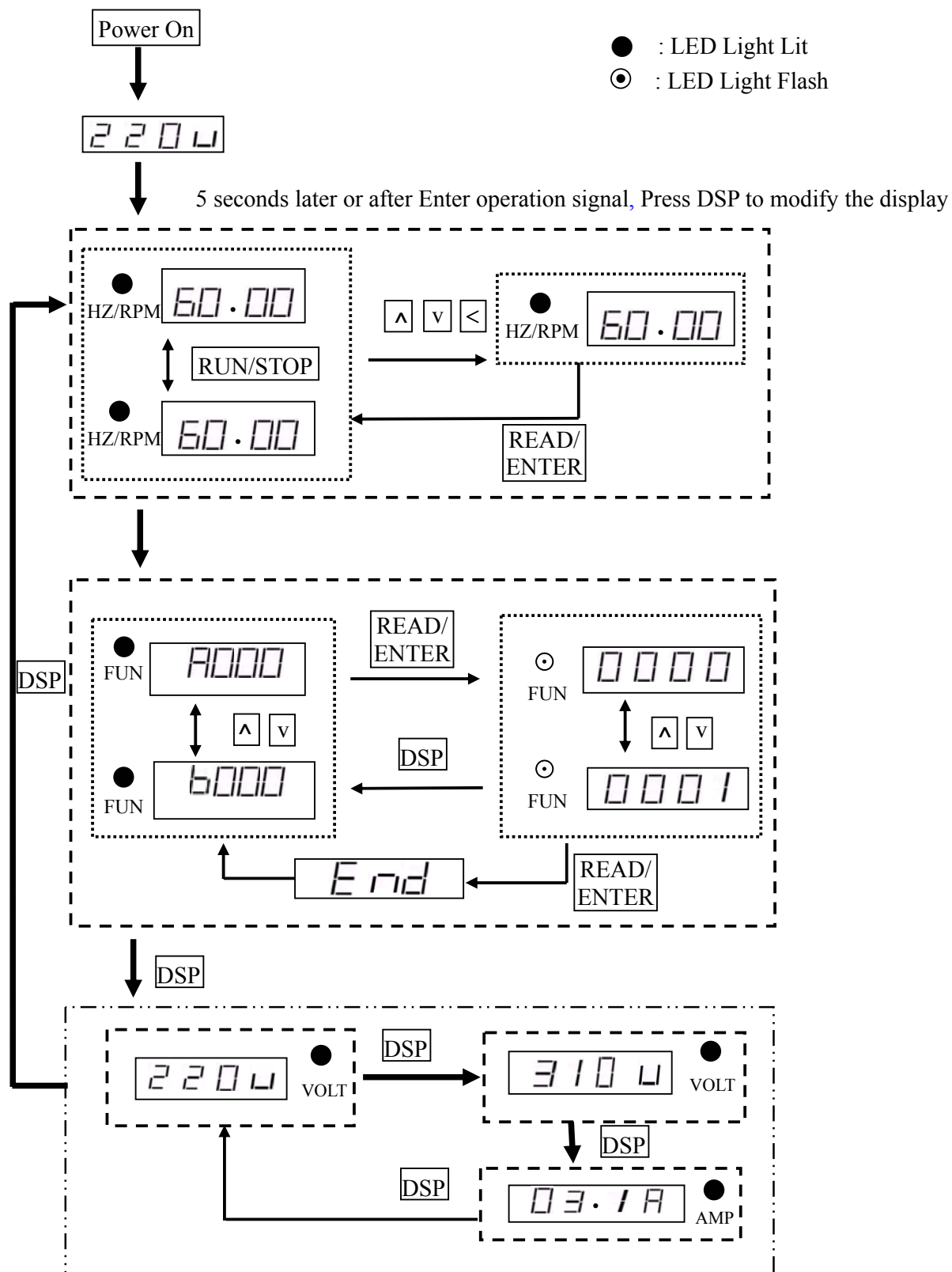
Figure 4-3 LED Operations Instruction Keypad

4-3

4.1.4 Operation Instruction of the LCD keypad

Power On

NOTE: x = Blinking Character

Power Source
220 V

5 seconds later or after Enter operation signal or Press DSP to modify frequency

Master Freq.
60.00 Hz

∧ v <

Setting Freq.
060.00Hz

RUN/STOP

Output Freq.
50.99 Hz

READ/
ENTER

DSP

A000=Vector(CT)
Control Mode

READ/
ENTER

A006=   0
Disabled

∧ v

A006=Disabled
Auto Tuning

DSP

A006=   1
Enabled

END

READ/
ENTER

DSP

DSP

Output Voltage
220V

DSP

DC Bus Voltage
311V

DSP

DSP

Output Current
3.1 Amp

Figure 4-4 LCD Operations Instruction Keypad

4.1.5 Keypad Operating Example

Example 1. Modify frequency while stopped
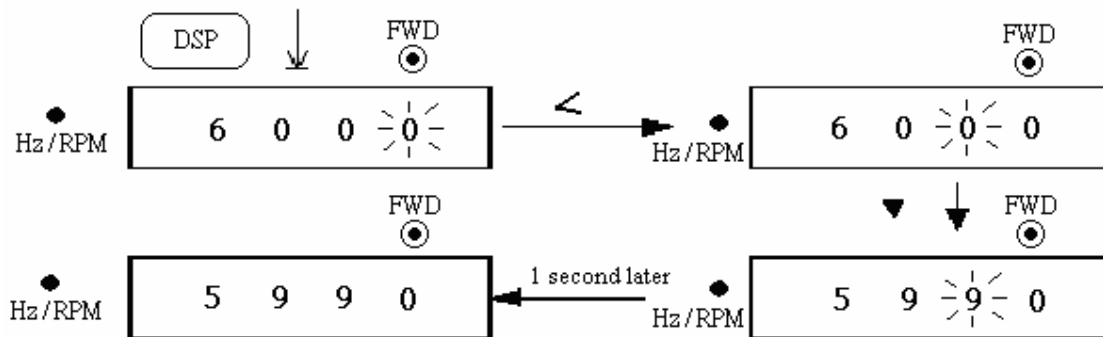
Example 2. Modify frequency during Run
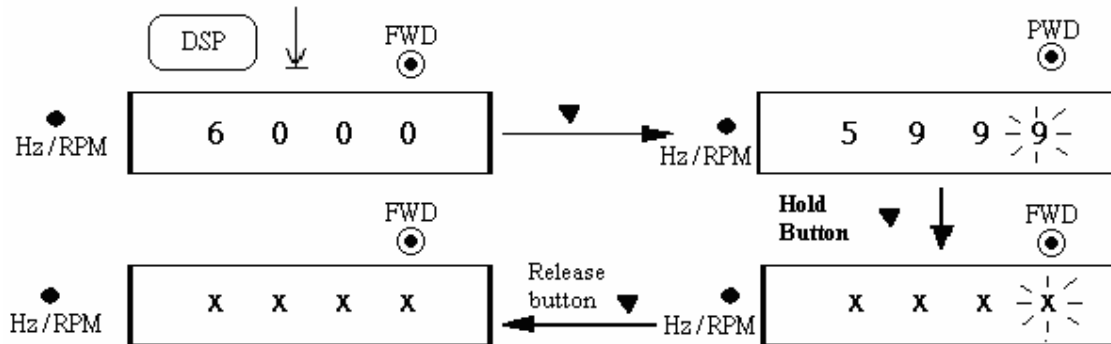
Note ： XX.XX shows the present output frequency. The value ranges from 59.98 to 0 Hz, depending on the length of time the key ▼ pressed.

Example 3. Modify frequency in running
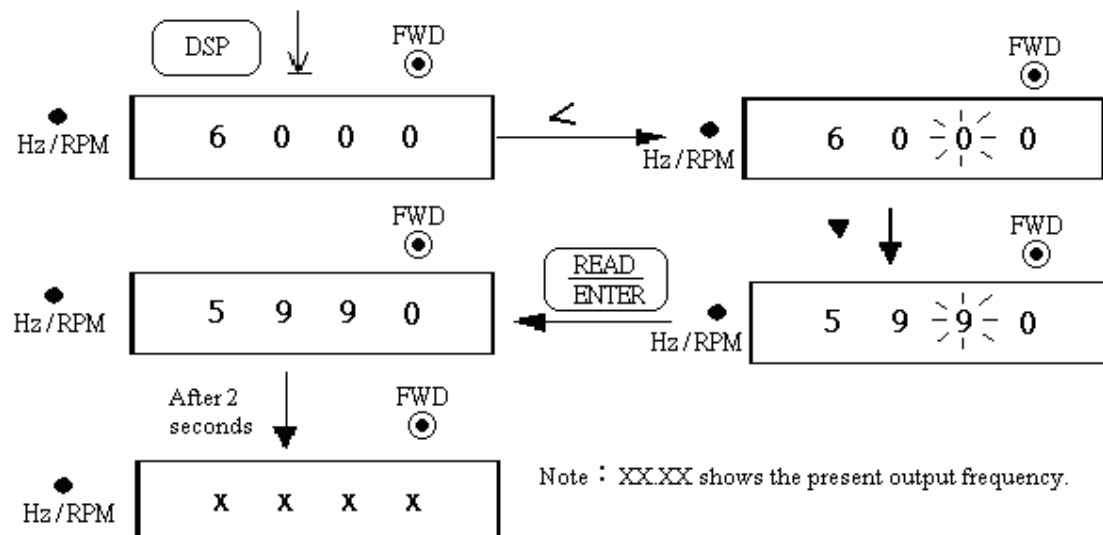
Note ： XX.XX shows the present output frequency.

Example4. Modify the Value of Parameter
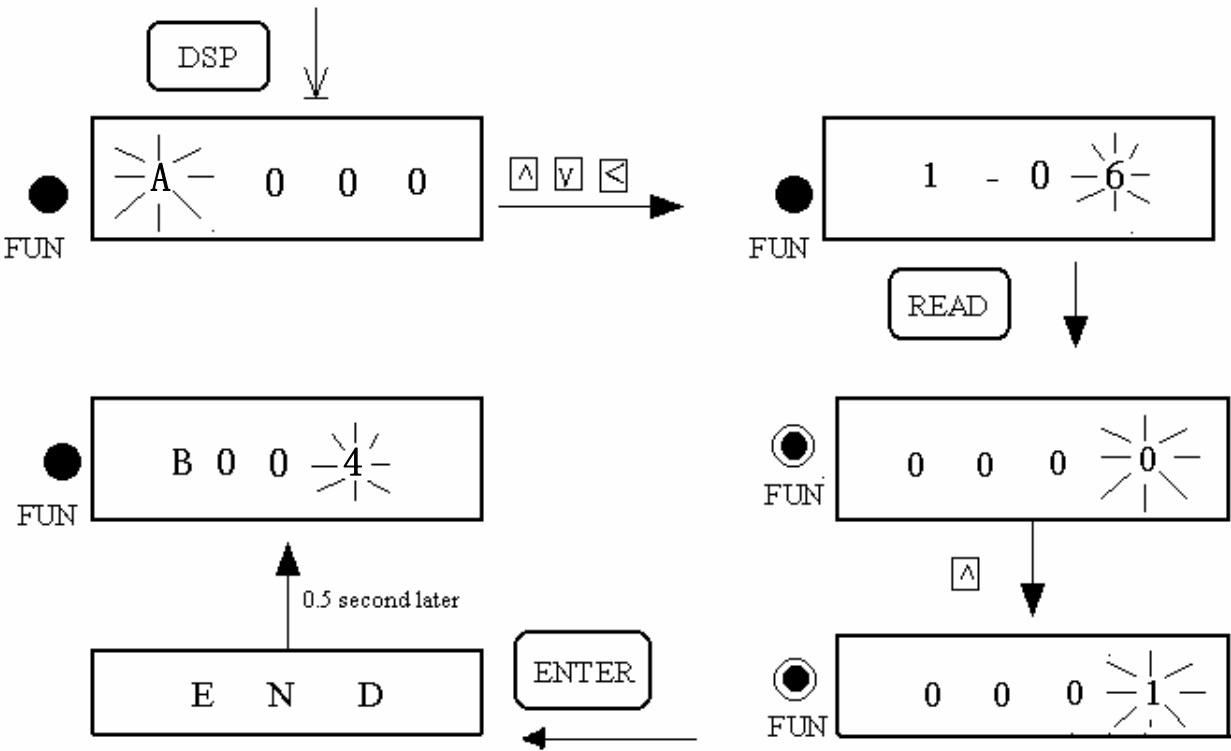
Example 5. Operation Control
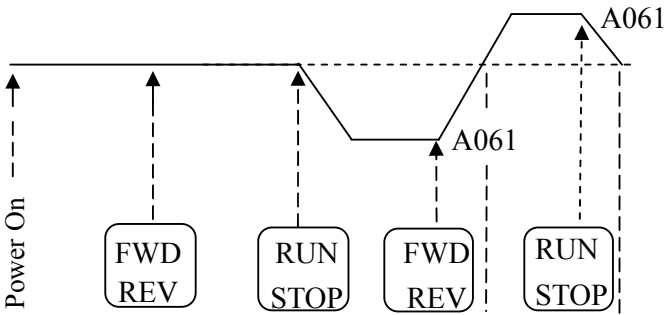
Figure 4-5 Keypad RUN Sequence

FWD LED	⊙	○	○	●	⊙
REV LED	○	⊙	●	○	○

●: LED Lit   ⊙: LED Flashing   ○: LED Off

4.2 Control Mode Selection

The N3 Series inverter has three control modes:

    1. General Vector Control Mode
    2. VT Vector Control Mode (Special for Fans, Blowers, Pumps).
    3. V/F Control Mode。

The user can choose these modes with the digital keypad according to the application characteristics. The factory setting is general vector control mode. Before operation, please set the control mode and the relative parameters of the motor in accordance with the following flow chart. (The Vector control mode only applies when the inverter is power matched to the motor, or varies by 1HP rating).

Figure 4-6 Control Mode Selection Chart

```
                                            Setting procedure for
                                               control mode
                                                                    Vector Control
                                              Control mode

         V/F Control
      Control mode selection A000=2              Control mode selection
                                                      A000=0
    Set the following parameters:                     A000=1
    V/F Pattern              B009
    Torque Boost             A129             Set the following parameters:
    Motor no load current    A130 (<=A002)    Motor rated voltage    A001
    Motor Rated Slip         A131             Motor rated current    A002
    Max output frequency     A132             Motor power            A003
    Max output voltage       A133             Motor rated Speed      A004
    Medium output Frequency  A134             Motor rated Frequency  A005
    Medium output voltage    A135             Power Voltage          A007
    Min output frequency     A136
    Min output voltage       A137             Perform Auto tuning (A006=1)
    Suitable motor capacity A002 (OL1 reference)
                                                          End
```

※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 differ more than 1 class.
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.
    (2). Input correct VF Pattern parameter (A132~A137).
3. When the nameplate of the motor is unknown, the inverter will set the internal parameters according to the standard TWMC motor.
4. When parameter A000 is set to 2, the keypad will display 'Err2' when performing Auto tuning.
5. In VF control, A001~A005 max. & min. values are determined by the TWMC standard motor specification limit.

The N3 inverter has a wide variety of programmable functions. They are organized into two categories: 1) Advanced or "A" parameters and 2) Basic or "B" parameters.

Basic parameters are intended for applications that are straightforward. They include the set of parameters that almost all users need to consider. Examples of basic settings are acceleration and deceleration rates (B007 and B008), Run command and frequency sources (B000 and B004), and optional current and voltage displays (B013 - B015). The user can also select whether to allow access to the advanced parameters. (B011). In order to see and change "A" parameters, B011 must be set to enable.

Advanced parameters are intended for specific and more focused applications. They provide the means to set up the N3 inverter to operate in specialized ways, such as applying a PID control mode, Auto-run mode, RS485 communication set-up, Vector control mode plus more. In addition, all analog and digital input and output configurations plus motor parameters are entered in the Advanced Parameters.

The table below summarizes all parameters. They are individually discussed in detail below the table.

4.3 N3 Programmable Functions List

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A000	(Control Mode)	Control Mode	0000: Vector (General Purpose) 0001: Vector (Variable Torque) 0002: Volts/Hz	0002	*3
A001	(Motor Rated Volt)	Motor Rated Voltage (Vac)	-----		*3*5
A002	(Motor Rated Amps)	Motor Rated Current (Amp)	-----		*3*5
A003	(Motor Rated HP)	Motor Rated Power (HP)	-----		*3*5
A004	(Motor Rated RPM)	Motor Rated Speed (RPM)X100	-----		*3*5
A005	(Motor Rated Hz)	Motor Rated Frequency (Hz)	-----		*3*5
A006	(Auto Tuning)	Motor Parameter Auto Tuning	0000: Disabled 0001: Enabled	0000	
A007	(AC Input Volt)	AC Line Input Voltage (Vac)	230V SERIES:170.0~264.0 460V SERIES:323.0~528.0		*3
A008 A009	(Reserved)	Reserved			
A010	(Keypad Stop)	Keypad Stop Button (In External Run/Stop Mode)	0000: Stop Button Enabled 0001: Stop Button Disabled	0000	
A011	(Keypad Up/Down)	Keypad Frequency Setting with Up/Down Keys in Run Mode	0000: 'Enter' must be pressed after frequency change with Up/Down Keys on keypad. 0001: Frequency will be changed directly when Up/Down Keys are Pressed	0000	
A012	(Starting Method)	Starting Method Selection	0000: Normal Start 0001: Enable Speed Search	0000	
A013	(PwrL Selection)	Momentary Power Loss and Restart	0000: Momentary power loss and restart disable 0001: Momentary power loss and restart enable 0002: Momentary power loss and restart enable while CPU is still powered up.	0000	
A014	(PwrL Ridethru T)	Momentary Power Loss Ride-Thru Time (Seconds)	0.0 - 2.0	0.5	
A015	(Dir Start Sel)	Direct Run After Power-Up	0000: Enable Direct run after power-up 0001: Disable Direct run after power-up	0001	
A016	(Dir Start Delay)	Delay-ON Timer (Seconds)	0.0-300.0	0.0	
A017	(Auto Restart)	Auto Restart Method	0000: Enable Speed Search 0001: Normal Start	0000	
A018	(Auto Restart Sel)	Number of Auto Restart Attempts	0 - 10	0	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A019	(Auto Restart Delay)	Auto Restart Delay Time (Seconds)	0.0 - 800.0	0.0	
A020	(Reset Mode Sel)	Reset Mode Setting	0000: Enable Reset Only when Run Command is Off 0001: Enable Reset when Run Command is On or Off	0000	
A021 A022	(Reserved)	Reserved			
A023	(S-Curve 1)	S-Curve Acc/Dec # 1 (Seconds)	0.0 - 4.0	0.2	
A024	(S-Curve 2)	S-Curve Acc/Dec # 2(Seconds)	0.0 - 4.0	0.2	
A025	(Accel Time 2)	Acceleration Time # 2 (MFIT)$^{\neq}$ (Seconds)	0.1 – 3600.0	10.0	*1
A026	(Decel Time 2)	Deceleration Time # 2 (MFIT)$^{\neq}$ (Seconds)	0.1 – 3600.0	10.0	*1
A027	(Jog Acc Time)	Jog Acceleration Time (MFIT)$^{\neq}$ (Seconds)	0.1 - 25.5	0.5	*1
A028	(Jog Dec Time)	Jog Deceleration Time (MFIT)$^{\neq}$ (Seconds)	0.1 - 25.5	0.5	*1
A029	(DC Inj Freq)	DC Injection Braking Start Frequency (Hz)	0.1 - 10.0	1.5	
A030	(DC Inj Level)	DC Injection Braking Level (%)	0.0 20% (Level 100% by based on Motor Rate Voltage A001)	5.0	
A031	(DC Inj Time)	DC Injection Braking Time (Seconds)	0.0 - 25.5	0.5	
A032	(Skip Freq 1)	Skip Frequency # 1 (Hz)	0.00 - 400.00	0.0	*1
A033	(Skip Freq 2)	Skip Frequency # 2 (Hz)	0.00 - 400.00	0.0	*1
A034	(Skip Freq 3)	Skip Frequency # 3 (Hz)	0.00 - 400.00	0.0	*1
A035	(Skip Bandwidth)	Skip Frequency Bandwidth(± Hz)	0.00 - 30.00	0.0	*1
A036 A037 A038	(Reserved)	Reserved			
A039	(Parameter Lock)	Parameter Lock	0000: Enable all Functions 0001: A059 – A068 cannot be changed 0002: All Functions Except A059 – A068 cannot be changed 0003: Disable All Functions	0000	
A040	(Parameter Copy)	Copy Unit	0000: Disable 0001: Inverter to Copy Unit 0002: Copy Unit to Inverter 0003: Verify Copy Operation	0000	
A041	(Fan Control)	Fan Control	0000: Auto (Depend on temp.) 0001: Operate while in RUN mode 0002: Always Running 0003: Always Stopped	0000	
A042	(Energy Save Mode)	Energy Saving Mode *1	0000: Disabled 0001: Controlled by MFIT$^{\neq}$ at Set Frequency	0000	*6

$\neq$: MFIT =Multi-function input terminal.

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A043	(Energy Save Gain)	Energy Saving Gain (%)	0 - 100	80	*6
A044	(Carrier Freq)	Carrier Frequency (kHz)	4 - 16	10	
A045	(Display Units)	Custom Units (Line Speed) Display Mode	0000: Drive Output Frequency is Displayed 0001: Line Speed is Displayed as an Integer (xxxx) 0002: Line Speed is Displayed with One Decimal Place (xxx.x) 0003: Line Speed is Displayed with Two Decimal Places (xx.xx) 0004: Line Speed is Displayed with Three Decimal Places (x.xxx)	0000	*1
A046	(Display Scaling)	Custom Units (Line Speed) Value	0 - 9999	1800	*1
A047 A048 A049	(Reserved)	Reserved			

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A050	(S1 Terminal Sel)	Multifunction Input Term. S1	0000: Forward/Stop Command 0001: Reverse/Stop Command 0002: Frequency Command 2 (A062) 0003: Frequency Command 3 (A063)	0000	
A051	(S2 Terminal Sel)	Multifunction Input Term. S2	0004: Frequency Command 4 (A065) 0005: Jog 0006: Acc/Dec # 2 0007: Emergency Stop A Contact 0008: Base Block	0001	
A052	(S3 Terminal Sel)	Multifunction Input Term. S3	0009: Speed Search 0010: Energy Saving 0011: Control Signal Selection 0012: Communication Selection	0002	
A053	(S4 Terminal Sel)	Multifunction Input Term. S4	0013: Acc/Dec Disabled 0014: Up Command 0015: Down Command	0003	
A054	(S5 Terminal Sel)	Multifunction Input Term. S5	0016: Master/Auxiliary Speed 0017: PID Function Disabled 0018: Reset	0004	
A055	(S6 Terminal Sel)	Multifunction Input Term. S6	0019: Pulse Input terminal (terminal S5) 0020: PID feedback signal AI2 (terminal S6)	0018	
A056	(AIN Term Sel)	Multifunction Input Term. AIN	0021: AI2 Bias signal 1 input （terminal S6） 0022: AI2 Bias signal 2 input （terminal S6） 0023: Analog input（terminal AIN） 0024: Multi-Sequence Control	0023	
A057	(Term Scan Time)	Multifunction Input Term. S1 -S6 Signal Verification Scan Time (mSec X 4)	1 – 100 (4-400msec)	5(20ms)	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A058	(Up/Dn Stop Mod)	Stop Mode Using Up/Down	0000: When the terminals are Programmed for Up/Down Frequency Control, the Set Frequency will remain when the Drive stops. When the Drive stops, Up/Down Function Disabled. 0001: Up/Down is used. The preset frequency is reset to 0 Hz as the inverter stops. 0002: When the terminals are Programmed for Up/Down Frequency Control, the Set Frequency will remain when the Drive stops. When the Drive stops, Up/Down Function is Enabled.	0000	
A059	(Jog Freq)	Jog Frequency (Hz)	0.00 - 400.00	2.00	*1
A060	(Up/Down Step Fnct)	Up/Down Step Function (Hz)	0.00 – 5.00	0.00	
A061	(Freq command 1)	Frequency Command 1 (Hz)	0.00 - 400.00	5.00	*1
A062	(Freq command 2)	Frequency Command 2 (Hz)	0.00 - 400.00	5.00	*1
A063	(Freq command 3)	Frequency Command 3 (Hz)	0.00 - 400.00	10.00	*1
A064	(Freq command 4)	Frequency Command 4 (Hz)	0.00 - 400.00	20.00	*1
A065	(Freq command 5)	Frequency Command 5 (Hz)	0.00 - 400.00	30.00	*1
A066	(Freq command 6)	Frequency Command 6 (Hz)	0.00 - 400.00	40.00	*1
A067	(Freq command 7)	Frequency Command 7 (Hz)	0.00 - 400.00	50.00	*1
A068	(Freq command 8)	Frequency Command 8 (Hz)	0.00 - 400.00	60.00	
A069 A070	(Reserved)	Reserved			
A071	(Auto_ Run Sel 1)	Auto_ Run Mode Operation Selection 1	(0-3600 sec)	0000	
A072	(Auto_ Run Sel 2)	Auto_Run Mode Operation Selection 2			
A073	(Auto_ Run Sel 3)	Auto_Run Mode Operation Selection 3			

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A074	(Auto_ Run Sel 4)	Auto_Run Mode Operation Selection 4	(0-3600 sec)	0000	
A075	(Auto_ Run Sel 5)	Auto_Run Mode Operation Selection 5			
A076	(Auto_ Run Sel 6)	Auto_Run Mode Operation Selection 6			
A077	(Auto_ Run Sel 7)	Auto_Run Mode Operation Selection 7			
A078	(Auto_ Run Sel 8)	Auto_Run Mode Operation Selection 8			
A079 A080	(Reserved)	Reserved			
A081	(Auto _ Run Stop 1)	Auto_ Run Stop 1	0000: STOP 0001: Forward 0002: Reverse	0000	
A082	(Auto _ Run Stop 2)	Auto_ Run Stop 2		0000	
A083	(Auto _ Run Stop 3)	Auto_ Run Stop 3		0000	
A084	(Auto _ Run Stop 4)	Auto_ Run Stop 4		0000	
A085	(Auto _ Run Stop 5)	Auto_ Run Stop 5		0000	
A086	(Auto _ Run Stop 6)	Auto_ Run Stop 6		0000	
A087	(Auto _ Run Stop 7)	Auto_ Run Stop 7		0000	
A088	(Auto _ Run Stop 8)	Auto_ Run Stop 8		0000	
A089 A090	(Reserved)	Reserved			

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A091	(Auto Run Invalid)	Operation Mode Selection During Auto Run	0000: Auto Run mode not effective 0001: Auto Run mode for cycle. (continue running from the unfinished step if restarting) 0002: Auto Run mode performed periodically (continue running from the unfinished step if restarting) 0003: Auto Run mode for cycle, then hold the speed of final step to run. (continue running from the unfinished step if restarting) 0004: Auto Run mode for cycle. (starting a new cycle if restarting) 0005: Auto Run mode be performed periodically (starting a new cycle if restarting) 0006: Auto Run mode for one single cycle, then hold the speed of final step to run. (starting a new cycle if restarting)	0000	
A092	(AIN Gain)	AIN Gain (%)	0 - 200	100	*1
A093	(AIN Offset)	AIN Bias (%)	0 - 100	0	*1
A094	(AIN Bias)	AIN Bias Selection	0000: Positive 0001: Negative	0000	*1
A095	(AIN Slope)	AIN Slope	0000: Positive 0001: Negative	0000	*1
A096	(AIN Scan Time)	AIN Signal Verification Scan Time (AIN, AI2) (mSec x 2)	1 - 100	50	
A097	(AI2 Gain)	AI2 Gain (%)(S6)	0 - 200	100	*1
A098	Pulse Inp. Mult.	Encoder Impulse Ratio	0.001 - 9.999	1.000	
A099	Ref. Source2	Select the source of auxiliary frequency command	0 - 4	0	
A100 | A102	(Reserved)	Reserved			

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A103	(AO Mode Sel)	Analog Output Voltage Mode (0 - 10 VDC, Term. FM+)	0000: Output Run Frequency 0001: Input Frequency Setting 0002: Output Voltage 0003: DC Voltage 0004: Output Current 0005: PID Feedback	0000	*1
A104	(AO Gain)	Analog Output Gain (%)	0 - 200	100	*1
A105	(Relay R1 Sel)	Output Relay R1 Operation Mode	0000: Run 0001: Frequency Reached (Frequency Command) (Set Frequency ± 8-05) 0002: Set Frequency (8-04 ± 8-05) 0003: Frequency Threshold Level (> 8-04) - Frequency Reached 0004: Frequency Threshold Level (< 8-04) - Frequency Reached 0005: Over torque Threshold Level	0006	
A106	(Relay R2 Sel)	Output Relay R2 Operation Mode	0006: Fault 0007: Auto Restart 0008: Momentary AC Power Loss 0009: Rapid Stop Mode 0010: Coast-to-Stop Mode 0011: Motor Overload Protection 0012: Drive Overload Protection 0013: PID Feedback Signal Loss 0014: PLC Operation 0015: Under torque Threshold Level	0	
A107	(Freq Agree)	Frequency Reached (Hz) (Refer to A105: 0001)	0.00 - 400.00	0.00	*1
A108	(Freq Agree width)	Frequency Reached Bandwidth (± Hz)	0.00 - 30.00	2.00	*1
A109 A110	(Reserved)	Reserved			
A111	(Trip Prevent –ACC)	Trip Prevention Selection During Acceleration	0000: Enable Trip Prevention During Acceleration 0001: Disable Trip Prevention During Acceleration	0000	
A112	(Trip ACC Level)	Trip Prevention Level During Acceleration (%)	50 - 300(Level 100% based on Motor HP setting A003)	150	
A113	(Trip Prevent -DEC)	Trip Prevention Selection During Deceleration	0000: Enable Trip Prevention During Deceleration 0001: Disable Trip Prevention During Deceleration	0000	
A114	(Trip DEC Level)	Trip Prevention Level During Deceleration (%)	50 - 300(Level 100% based on Motor HP setting A003)	150	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A115	(Trip Prevent -RUN)	Trip Prevention Selection in Run Mode	0000: Enable Trip Prevention in Run Mode 0001: Disable Trip Prevention in Run Mode	0000	
A116	(Trip Run Level)	Trip Prevention Level In Run Mode (%)	50 - 300 (Level 100% based on Motor HP setting A003)	150	
A117	(Dec Trip Time)	Trip Prevention Deceleration Time Selection in Run Mode	0000: Trip Prevention Deceleration Time Set by B008 0001: Trip Prevention Deceleration Time Set by A118	0000	
A118	(Dec Trip Time)	Deceleration Time In Trip Prevention Mode (Seconds)	0.1 – 3600.0	3.0	
A119	(Motor OL1 Sel)	Electronic Motor Overload Protection Operation Mode	0000: Enable Electronic Motor Overload Protection 0001: Disable Electronic Motor Overload Protection	0000	
A120	(Motor Type)	Motor type Selection	0000: Electronic Motor Overload Protection Set for Non-Inverter Duty Motors 0001: Electronic Motor Overload Protection Set for Inverter Duty Motors	0000	
A121	(Motor OL1 Curve)	Motor Overload Protection Curve Selection	0000: Curve 1 (OL =103 %) (150 % for 1 Minute) 0001: Curve 1 (OL = 113 %) (123 % for 1 Minute)	0000	
A122	(Motor OL1 Operat)	Operation After Overload Protection is Activated	0000: Coast-to-Stop After Overload Protection is Activated 0001: Drive Will Not Trip when Overload Protection is Activated (OL1)	0000	
A123	(Torq Det Sel)	Over/Under torque Detection Selection	0000: Disable Over/Under torque Operation 0001: Enable Over/Under torque Operation Only if at Set Frequency 0002: Enable Over/Under torque Operation while the Drive is in Run Mode	0000	
A124	(Torq Det Res)	Operation After Over/Under torque Detection is Activated	0000: Drive will Continue to Operate After Over-torque is Activated 0001: Coast-to-Stop After Over-torque is Activated	0000	
A125	(Torq Hi Level)	Over-torque Threshold Level (%)	30 – 200 (Level 100% based by Motor HP A003)	150	
A126	(Torq Hi Delay)	Over-torque Activation Delay Time (Seconds)	0.0 - 25.0	0.1	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A127	(Torq Low Level)	Under-torque Threshold Level (%)	30-200 (Level 100% based by Motor HP A003)	0	
A128	(Torque Reserved Time)	Under-torque Activation Delay Time (Seconds)	0.0 – 25.0	0.1	
A129	(Torque Boost)	Volts/Hz Curve Modification (Torque Boost) (%)	0 – 30.0	0.0	*1*6
A130	(Motor noLoad Amp)	Motor No Load Current (Amps AC)	-----		*5*6
A131	(Motor rated Slip)	Motor Slip Compensation (%)	0.0 – 100.0	0.0	*1*6
A132	(Max frequency)	Maximum Frequency (Hz)	0.20 - 400.00	50.00/ 60.00	*4*6
A133	(Max Voltage)	Maximum Frequency Voltage Ratio (%)	0.0 - 100.0 (l 100% based on AC Input Volt A007)	100.0	*6
A134	(Mid frequency)	Mid Frequency (Hz)	0.10 - 400.00	25.00/ 30.00	*4*6
A135	(Mid Voltage)	Mid Frequency Voltage Ratio (%)	0.0 - 100.0 (100% based on AC Input Volt A007)	50.0	*6
A136	(Min frequency)	Minimum Frequency (Hz)	0.10 - 400.00	0.50/ 0.60	*6
A137	(Min Voltage)	Minimum Frequency Voltage Ratio (%)	0.0 - 100.0 (100% based on AC Input Volt A007)	1.0	*6
A138 A139	Reserved	Reserved			
A140	(PID Mode Sel)	Mode Selection	0000: Disabled 0001: Bias D Control 0002: Feedback D Control 0003: Bias D Reversed Characteristics Control 0004: Feedback D Reversed Characteristics Control 0005: Frequency Command + Bias D Control 0006: Frequency Command + Feedback D Control 0007: Frequency Command + Bias D Reversed Characteristics Control 0008: Frequency Command + Feedback D Reversed Characteristics Control	0000	
A141	(Feedback Gain)	Feedback Gain (%)	0.00 - 10.00	1.00	*1
A142	(PID Gain)	Proportional Gain (%)	0.0 - 10.0	1.0	*1
A143	(PID I Time)	Integration Time (Seconds)	0.0 - 100.0	10.0	*1
A144	(PID D Time)	Differentiation Time (Seconds)	0.00 - 10.00	0.00	*1
A145	(PID Offset)	PID Offset	0000: Positive 0001: Negative	0000	*1
A146	(PID Offset Adj)	PID Offset Adjust (%)	0 - 109	0	*1
A147	(Output Filter T)	Output Lag Filter Time (Seconds)	0.0 - 2.5	0.0	*1

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A148	(Fdbk Sel)	Feedback Loss Detection Mode	0000: Disabled 0001: Enabled - Drive Continues to Operate After Feedback Loss 0002: Enabled - Drive "STOPS" After Feedback Loss	0000	
A149	(Fdbk Lvl)	Feedback Loss Detection Level (%)	0 - 100	0	
A150	(Fdbk Los Time)	Feedback Loss Detection Delay Time (Seconds)	0.0 -25.5	1.0	
A151	(PID I Limit)	Integration Limit Value (%)	0 - 109	100	*1
A152	(I Time value Sel)	Integration Value Resets to Zero when Feedback Signal Equals the set point	0000: Disabled 0001: 1 Second 0030: 30 Seconds	0000	
A153	(I Error Margin)	Allowable Integration Error Margin (Units) (1 Unit = 1/8192)	0 - 100	0	
A154	(PID Comm. Source)	PID Feedback signal	0000: 0~10V or 0~20mA 0001: 2~10V or 4~20mA	0000	
A155	(Sleep Level)	Sleep Function Operation Level	0.00-400.00	0.0	
A156	(Sleep Delay Time)	Sleep Function Delay Time	0.0-25.5	0.0	
A157	(Unit : NONE)	Engineering Unit (only for PID feedback used for LCD type)	0000 : NONE 0001 : FPM (feet per minute) 0002 : CFM (cubic feet per minute) 0003 : PSI (pounds per square inch) 0004 : GPH (gallons per hour) 0005 : GPM (gallons per minute) 0006 : in 0007 : ft 0008 : /s (units per second) 0009 : /m (units per minute) 0010 : /h (units per hour) 0011 :Deg F 0012 : inW (inches in water column) 0013 : HP 0014 : m/s (meters per second) 0015 : MPM (meters per minute) 0016 : CMM (cubic meters per minute) 0017 : W 0018 : kW 0019 : m 0020 : Deg C 0021 : % 0022 : rpm	0000	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
A158	(PID Fdbk Dsp Max)	PID Feedback Display Unit Max	0-9999	1000	Only for LCD keypad
A159	(PID Fdbk Dsp Min)	PID Feedback Display Unit Min	0-9999	0	Only for LCD keypad
A160 | A162	(Reserved)	Reserved			
A163	(Se Comm Adr)	Assigned Communication Station Number	1 - 254	1	*2*3
A164	(Se Baud Rate)	Baud Rate Setting (bps)	0000: 4800 0001: 9600 0002: 19200 0003: 38400	0003	*2*3
A165	(Comm Stop Bit)	Stop Bit Selection	0000: 1 Stop Bit 0001: 2 Stop Bits	0000	*2*3
A166	(Comm Parity Sel)	Parity Selection	0000: Without Parity 0001: With Even Parity 0002: With Odd Parity	0000	*2*3
A167	(Comm Data Format)	Data Format Selection	0000: 8-Bits Data 0001: 7-Bits Data	0000	*2*3
A168	(Stator Resistor)	Stator Resistance (Ohms)	-----		*3*5
A169	(Rotor Resistor)	Rotor Resistance (Ohms)	-----		*3*5
A170	(Equi Inductance)	Equivalent Inductance (mH)	-----		*3*5
A171	(Magnet Current)	Magnetizing Current (Amps AC)	-----		*3*5
A172	(Ferrite Loss)	Ferrite Loss Conductance (gm)	-----		*3*5
A173 A174	Reserved	Reserved			
A175	(Drive Model)	Drive Horsepower Code	-----		*3
A176	(Software Version)	Software Version	-----	-----	*3
A177	(Fault Log)	Fault Jog (Last 3 Faults)	-----	-----	*3
A178	(Elapsed Hours)	Accumulated Operation Time (Hours)	0 - 9999	-----	*3
A179	(Elapsed Hr*10000)	Accumulated Operation Time (Hours X 10000)	0 - 27	-----	*3
A180	(Elapsed Time Sel)	Accumulated Operation Time Mode	0000: Time Under Power 0001: Run Time	0000	*3
A181	(Reset Parameter)	Reset Drive to Factory Settings	1110: Reset for 50 Hz Motor Operation 1111: Reset for 60 Hz Motor Operation	0000	*4

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
B000	(Run Source)	Run Command Source Selection	0000: Keypad 0001: External Run/Stop Control 0002: Communication	0000	
B001	(MFIT Run Mode)	Run/Stop-Forward/Reverse Operation Mode with External Terminals	0000: Forward/Stop-Reverse/Stop 0001: Run/Stop-Forward/Reverse 0002: 3-Wire Control Mode- Run/Stop	0000	
B002	(Reverse Oper)	Reverse Prohibit operation	0000: Enable Reverse Command 0001: Disable Reverse Command	0000	
B003	(Stopping Method)	Stopping Method Selection	0000: Deceleration-to- Stop with DC Injection Braking (Rapid Stop) 0001: Coast to a Stop		
B004	(Frequency Source)	Frequency Command Source Selection	0000: Keypad 0001: Potentiometer on Keypad 0002: External Analog Signal Input or Remote Potentiometer 0003: Up/Down Frequency Control Using MFIT (S1 - S6) 0004: Communication setting frequency 0005: Pulse Follower	0000	
B005	(Freq Upper Limit)	Frequency Upper Limit (Hz)	0.01 - 400.00	50.00／60.00	*4
B006	(Freq Lower Limit)	Frequency Lower Limit (Hz)	0.00 - 400.00	0.00	
B007	(Accel Time 1)	Acceleration Time # 1 (Seconds)	0.1 – 3600.0	10.0	*1
B008	(Decel Time 1)	Deceleration Time # 1 (Seconds)	0.1 – 3600.0	10.0	*1

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
B009	(V/F Selection)	Volts/Hz Patterns(Password protected	0 - 18	9	*4*6
B010	(Password)	Parameter Lock(except B010)	0000：Disable 0001：Enable	0000	
B011	(Advanced Display)	Advanced Display	0000：Disable 0001：Enable	0000	
B012	(Select Language)	Language Selection	0000: English 0001: German 0002: French 0003: Italian 0004: Spanish	0000	Only for LCD keypad
B013	(Mtr Current)	Motor Current Display Selection	0000：Disable Motor Current Display 0001：Enable Motor Current Display	0000	*1
B014	(Mtr Voltage)	Motor Voltage Display Selection	0000：Disable Motor Voltage Display 0001：Enable Motor Voltage Display	0000	*1
B015	(Bus Voltage)	DC Bus Voltage Display Selection	0000：Disable Bus Voltage Display 0001：Enable Bus Voltage Display	0000	*1
B016	(PID Fdbk(S6)Disp)	PID Feedback Display Selection	0000：Disable PID Feedback Display 0001：Enable PID Feedback Display	0000	*1

※Notes: *1 can be modified during run

*2 cannot be modified while communication is active

*3 do not change while performing auto tuning or serial settings

*4 related to factory setting in North America or overseas

*5 the parameter will be changed by replacing motor (see descriptions of the POSTSCRIPT 1)

*6 only available in V/F mode

4.4 Parameter Function Description

A000:Control Mode
   0000:Vector mode (General Mode)
   0001:Vector mode (VT Mode)
   0002:V/F mode

Select the appropriate vector control mode or V/F mode according to the load characteristics.
   1. Vector (general mode) is best suited to control the general load or rapidly-changed torque load.
   2. Vector (VT mode) is suitable for Blower/ Pump and HVAC loads. The magnetic current of motor will vary with the torque, which will reduce the current and save energy.
   3. If V/F mode is selected, please set parameters, B000 & A129~A137 to comply with the load features.

A001:Motor Rated Voltage(Vac)
A002:Motor Rated Current (A)
A003:Motor Rated Power (kW)
A004:Motor Rated Speed (RPM)
A005:Motor Rated Frequency (Hz)
A006:Motor Parameter Auto Tuning
   0000: Disabled   0001: Enabled

It is necessary to input data on the motor nameplate and auto tune whenever vector mode is selected.

Auto tuning: Input the data to A001~A005 according to the nameplate after power off, then set A006=0001and perform auto tuning; the detected internal data will automatically be written to parameter group 14 when display shows "End".

Ex. If the motor rated speed is 1700 rpm, set A004 to 17.0

⚠ Precaution

1. The motor parameter auto tuning is stationary auto tuning.   During motor auto tuning, the motor does not rotate, and the keypad displays "-AT-".
2. During motor parameter auto tuning, the input signal in the control circuit is invalid.
3. Before motor parameter auto tuning, please confirm the motor is stopped.
4. The motor parameter auto tuning is only available for vector control modes (A000=0000or A000=0001).

A007 AC Line Input Voltage (Volts AC)
   230V series:**170.0~264.0**
   460V series:323.0~528.0

To accurately represent the voltage level of inverter, please input the actual on-site line voltage.

A010 : Keypad Stop Button   0000: Stop Button Enable
                            0001: Stop Button Disable

A010=0000, The STOP key is available for commanding the inverter to stop.

A011:Keypad Operation with Up/Down Keys in Run Mode
   0000: 'Enter' must be pressed after frequency changes with the Up/Down Keys on keypad.
   0001: Frequency will be changed directly when Up/Down Keys are Pressed

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A012 : Starting Method Selection	**0000: Normal Start**
	0001: Enable Speed Search

1.) A012=0000**:** At start, the inverter accelerates from 0 to target frequency in the set time.

2.) A012=0001**:** At start, the inverter accelerates to target frequency from the detected speed of motor.

A013: Momentary Power Loss and Restart

> **0000: Momentary Power Loss and Restart Disable**
>
> **0001: Momentary Power Loss and Restart is Enable**
>
> **0002: Momentary Power Loss and Restart Enable while CPU is Operating.**

A014 : Momentary Power Loss Ride-Thru Time(sec):   0.0 - 2.0 second

1.) Changing power supply often results in lowering the voltage below the under voltage threshold level and the inverter will stop at once. If the power supply recovers within the A014 preset time, it will spin start from the trip frequency, or the inverter will trip with 'LV-C' displayed.

2.) The allowable power loss time differs with the models ratings. The range is from 1 to 2 seconds.

3.) A013=0000: if power is lost, the inverter will not start.

4.) A013=0001: if the loss time is less than the value of A014, the inverter will Spin Start in 0.5 second as the power is re-supplied, and restart times are unlimited.

5.) A013=0002: the power is lost for on extended time, before the inverter loses control power for the CPU, the inverter will restart according to the B000 and A017 settings and status of external switch as the power re-applied.

※Note: B000=0001, A017=0000, A013=0001 or 0002 after power is lost for an extended time, please disconnect the power and power switches to avoid injury to personnel and equipment by the re-applied power.

A015 :Direct run after power up:

> **0000: Enable Direct Run After Power Up**
>
> **0001: Disable Direct Run After Power Up**

⚠Danger:

1.) A015=0000 and the inverter is set external terminal control (B000=0001). If the run switch is ON as power is supplied, the inverter will auto-start. It is recommend to disconnect the power switch and run switch to avoid injury to personnel or equipment as power is re-applied.

2.) A015=0001and the inverter is set external terminal control (B000=0001). If the run switch is ON as power is supplied, the inverter will not auto start and flash STP1. It is necessary to disconnect the run switch and then restart.

A016 : Delay-ON Timer (seconds): 0 ~ 300.0 second

On power up with A015=0000, the inverter will perform auto restart after the time for the selected delay.

A017 : Auto restart method**:**

0000: Enable Speed Search

0001: Normal Start

1.) A017=0000: the inverter will detect motor speed and accelerate to the set frequency.

2.) A017=0001: the inverter will be accelerated from stop (zero speed) to set frequency.

A018: Number of Auto restart   Attempts :0 ~ 10 times

A019: Auto restart Delay Time :0 ~ 800.0 second

1.) A018=0**:** the inverter will not auto restart after fault trip.

2.) A018>0, A019= 0:

The inverter will conduct SPIN START 0.5 seconds after fault trip. The motor will inertia run to frequency at the trip stop, then according to acceleration or deceleration time to set frequency.

3.) A018>0, A019>0:

The output will be stopped for a period which is determined by parameters A019 after fault trip. Then, the inverter spin starts to present set frequency.

4.) If the inverter is set in braking deceleration or DC braking, it will not perform restart after fault trip.

A020: Error reset mode setting   0000: Enable Reset Only when Run Command is Off

0001: Enable Reset when Run Command is On or Off

A020=0000 if the inverter trips on fault, remove the Run switch to perform reset, or restarting is not possible unless power is cycled.

B007 : Acceleration Time #1   (second): 0.1 – 3600.0

B008 : Deceleration Time #1   (second): 0.1 – 3600.0

A023 : S Curve of First Acceleration Stage (second): 0.0 – 4.0

A024 : S Curve of Second Acceleration Stage (second): 0.0 – 4.0

A025 : Acceleration Time #2 (second): 0.1 – 3600.0

A026 : Deceleration Time #2 (second): 0.1 – 3600.0

A027 : Jog Acceleration Time (second): 0.1 –25.5

A028 : Jog Deceleration Time (second): 0.1 – 25.5

1.) Formula for calculating acceleration and deceleration time: The denominator is based on the rated frequency of the motor.

$$\text{Acceleration time} = \text{B007 (or A025)} \times \frac{\text{Preset frequency}}{\text{A005}}, \text{Deceleration time} = \text{B008 (or A026)} \times \frac{\text{Preset frequency}}{\text{A005}}$$

2.)When A050 – A056 is set as 06 (the second acceleration and deceleration time), the first acceleration/ deceleration/ S curve or the second acceleration/ deceleration/ S curve will be set by the external input terminal.

3.) When A050 – A056 is set as 05 (Jog), Jog run is controlled by external terminals. The acceleration and deceleration action will be at Jog acceleration and deceleration times.

4.) When A050 – A056 is set as 05(Jog) and 06(acceleration and deceleration time 1/2 toggle), to change the acceleration and deceleration times by the external terminals, and the settings as shown:

Function\n\npreset value	Acc/ Dec time 1(B007/B008)	Acc/ Dec time 2 (A025/A026)	JOG Acc/Dec time (A027/A028)
	B004 determines the output frequency	B004 determines the output frequency	Run at A059Jog frequency
A050~A056=05 Jog command	Off	Off	On
A050~A056=04 Toggle Acc/Dec time.	Off	On	Off

5.) When S curve time (A023/A024) is set as 0, the S curve is ignored. Acceleration and deceleration ramps are linear.

6.) When S curve time (A023/A024) is greater than 0, the acceleration and deceleration action is as shown in figure 4-7.

7.) Regardless of the stall prevention period, actual acceleration and deceleration time =preset acceleration / deceleration time + S curve time. For example: acceleration time = B008+ A023.

8.) During acceleration and deceleration process, there might be residual error in acceleration and deceleration toggling. Please set the S curve time as 0 (A023/A024), if you need to toggle acceleration and deceleration time in acceleration / deceleration process.
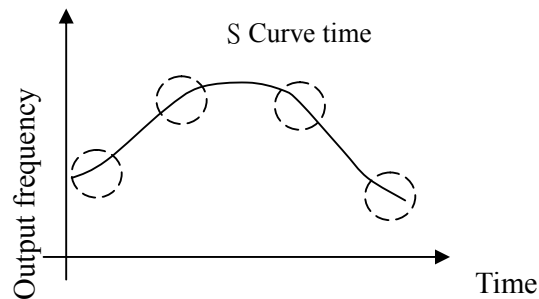
Figure 4-7 S-Curve characteristics

A029 : DC Injection Brake Start Frequency (Hz) : 0.1 – 10.0
A030 : DC Injection Brake Level (%) : 0.0 – 20.0
A031 : DC Injection Brake Time(second) : 0.0 – 25.5

A031 / A029 is the active time and start frequency of DC braking, as shown below:
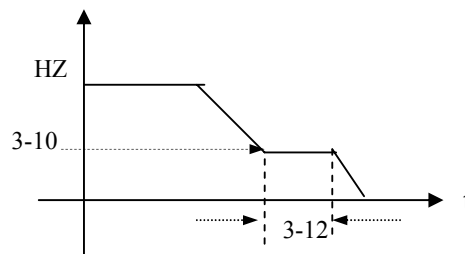
Figure 4-8 DC Injection Braking Example

A032 : Skip Frequency #1 (Hz) : 0.00 –400.00

A033 : Skip Frequency #2 (Hz) : 0.00 –400.00

A034 : Skip Frequency #3 (Hz) : 0.00 –400.00

A035 : Skip Frequency Bandwidth (± Hz) : 0.00 –30.00

Example: A032is set to 10.0Hz / A033 to 20.0 Hz / A034 to 30.0 Hz / A035 to 2.0Hz
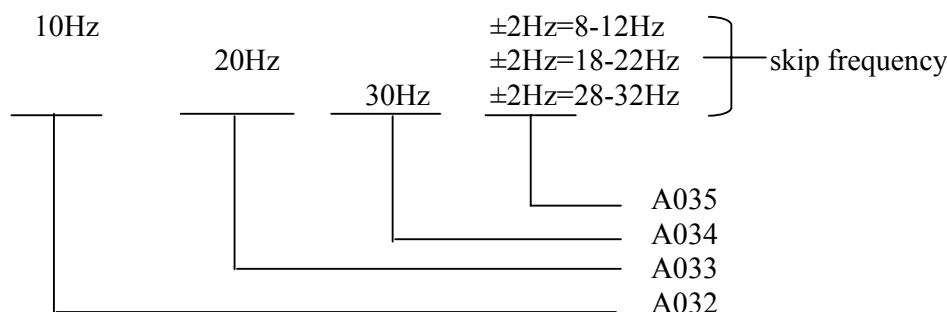
A039: Parameter lock function

    0000: Enable all Functions

    0001: A059 - A068 cannot be changed

    0002: All Functions Except A059 - A068 cannot be changed

    0003: Disable All Functions

A040: Parameter Copy

    0000: Disable

    0001: Inverter to Copy Unit

    0002: Copy Unit to Inverter

    0003: Verify

1.) A040=0000**:** Inverter copy operation not in copy mode.

2.) A040=0001**:** Copy the inverter parameters to keypad module.

3.) A040=0002**:** Copy the keypad module parameters to inverter.

4.) A040=0003**:** Copy the parameters to inverter or keypad module to mutually verify the parameters.

※Note: The copy function is only available for the models with same ratings.

A041: Fan Run Control

    0000: Auto (Depend on temp.)

    0001: Operate while in RUN Mode

    0002: Always Running

    0003: Always Stopped

1.) A041=0000**:** The fan runs as the inverter senses temperature, extending the service period.

2.) A041=0001**:** The fan runs while the inverter is running.

3.) A041=0002**:** The fan is continuously running regardless of the action of the inverter.

4.) A041=0003**:** The fan is always stopped regardless of the action of the inverter.

※Note: Depending on the hardware; the function is disabled at and above 15HP for 230V class and
       above 20HP for 460V class. The fan is running after the inverter power on.

A042: Energy Saving Mode Operation   0000: Disabled
0001: Controlled by MFIT at Set Frequency
A043: Energy saving operation gain (%): 0-100 (see Note 1)

1.) With FANS, PUMPS or other heavy inertia loads, starting torques are typically high, while at speed torque demand is less. Consequently, the output voltage can be lowered to save energy by setting A042.

2.) A050 ~A056 (Multifunction input terminal) set to 10 to enable energy saving.

3.) A042=0001, If the multifunction terminal is set as 10(energy saving control terminal), the output voltage will gradually decline to 'original voltage'×'A043' preset value as the terminal' is ON. The output voltage will rise to original voltage if the input is low.

※Note:1. The declining and rising speeds of voltage for energy saving are the same as those for SPEED SEARCH.

2. Energy saving mode is only available in V/F mode. (A000 = 0002).

A044: Carrier Frequency (KHz) : 2-16

A044	Carrier Frequency	A044	Carrier Frequency	A044	Carrier Frequency	A044	Carrier Frequency
2	2KHz	6	6KHz	10	10KHz	14	14KHz
3	3KHz	7	7KHz	11	11KHz	15	15KHz
4	4KHz	8	8KHz	12	12KHz	16	16KHz
5	5KHz	9	9KHz	13	13KHz		

※ Note**:** Increasing the carrier frequency will generally result in quieter operation of the motor. However, increased carrier frequencies can potentially cause electrical interference on other equipment operating in proximity to the N3 inverter.

A045 : Custom Units (Line Speed) Display Mode
0000:Drive Output Frequency is Displayed
0001:Line Speed is Displayed as an Integer (xxxx)
0002:Line Speed is Displayed with One Decimal Place (xxx.x)
0003:Line Speed is Displayed with Two Decimal Places (xx.xx)
0004:Line Speed is Displayed with Three Decimal Places (x.xxx)

The preset frequency is displayed when the inverter is stopped while the operation line speed is displayed while the inverter is running.

A046:Custom Units (Line Speed) Value :   0-9999

The max preset line value of A046 is equal to the rated frequency (A005) of the motor. For instance, line speed at 1800 RPM is equal to 900 RPM when output is 30Hz while the base frequency is 60Hz.

Multifunction input terminals (TM2 S1-S6/AIN) controlling:

A050~A056   **0000: Forward/Stop Command**

                   0001: Reverse/Stop Command

                   0002: Frequency Command 2 (A062)

                   0003: Frequency Command 3 (A063)

                   0004: Frequency Command 4 (A065)

                   0005: Jog

                   0006: Acc/Dec time # 2

                   0007: Emergency Stop Contact A

                   0008: Base Block

                   0009: Speed Search Stop

                   0010: Energy Saving

                   0011: Control Signal Selection

                   0012: Communication Control Signal Selection

                   0013: Acc/Dec Disabled

                   0014: Up Command

                   0015: Down Command

                   0016: Master/Auxiliary Speed

                   0017: PID Function Disabled

                   0018: Reset

                   0019: Pulse Input Terminal（Terminal S5）

                   0020: PID Feedback Signal AI2 （Terminal S6）

                   0021: AI2 Bias Signal 1 Input（Terminal S6）

                   0022: AI2 Bias Signal 2 Input（Terminal S6）

                   0023: Analog Input（Terminal AIN）

                   0024: Multi-Sequence Control

A. The terminals S1-AIN on terminal block (TM2) are multifunction input terminals. The 30 functions shown above can be set in these terminals.

B. Function Description for A050~A056:

1. A050~A056=0/1(Forward/Reverse/Stop)

If forward command is ON, the inverter runs and stops when the command is OFF. The A050 factory setting is forward.

As reverse command is ON, the inverter runs stops when the command is OFF. The A051 factory setting is reverse.

2. A050~A056=2-4 (Frequency Command 2/3/4 at A062/A063/A065)

When External multifunction input terminals are ON, the inverter operates at the preset speed, and the duration is determined by the time the input is ON. The corresponding frequency parameter match to the terminal input states is shown in the table on the next page.

3. A050~A056=5(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

Multifunction terminal3 Preset value=04	Multifunction terminal 2 Preset value =03	Multifunction terminal 1 Preset value =02	Jog Command terminal Preset value =05	Output frequency preset value
0	0	0	0	6-00
X	X	X	1	A059
0	0	1	0	A061
0	1	0	0	A062
0	1	1	0	A063
1	0	0	0	A064
1	0	1	0	A065
1	1	0	0	A066
1	1	1	0	A067

4. A050~A056=6 (toggle acceleration and deceleration time)

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

5. A050~A056=7: External Emergency Stop Contact A.

The inverter will decelerate to stop and Flash E.S as the emergency stop signal is received regardless of B003 setting. After the signal is released, toggle the run input or press the run key in keypad mode and the inverter will restart from the start frequency. If the emergency signal is released before the inverter stops completely, the inverter still carries out the emergency stop. The A105/A106 determines the action of the error terminal. If A105/A106=0: the fault is not enabled when the external emergency signal is input. If A105/A106=9, the fault is actuated when the emergency signal is input.

6. A050~A056=8: Base Block

The inverter immediately stops sending output voltage, and the motor does a Coast stop.

7. A050~A056=9: Speed Search Stop

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

8. A050~A056=10: Energy-saving operation

With FANS, PUMPS, or other heavy inertia loads, starting torques are typically higher while at speed, torque demand is less. Consequently the output voltage is reduced to save 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.

9. A050~A056=11: Switch of the control signal

OFF: B000/B001 determines the operation signal and frequency signal.

ON: Keypad controls the operation signal and frequency signal.

※ **NOTE: Switch of control signal via A050~A056=11 is allowed while the drive is running (on the fly). Please exercise caution around operating equipment when operating in this mode.**

10. A050~A056=12: Switch of the inverter control (RS485) communication

OFF: in communication, the master (PC or PLC) can control the inverter operation and frequency signal and allow modification or the parameters. The operation signals from Keypad and TM2 are idle. Furthermore, the keypad can only display the voltage, current and frequency; the parameters are read-only, while Emergency Stop is valid.

ON: in communication, the inverter is controlled by the keypad regardless of the settings of B000/B004 and master. Under such circumstance, the RS485 master still can read and write the inverter parameters.

11. A050~A056=13: 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:
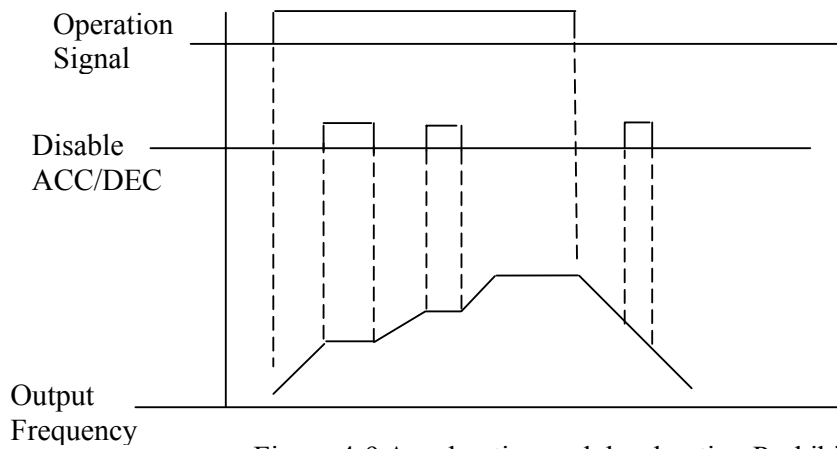
Figure 4-9 Acceleration and deceleration Prohibit

12. A050~A056=14,15: UP / DOWN Function (Actual ACC/DEC time is based on the setting):

(1) B004 = 3 to use the UP/DOWN Function. The other frequency signals are useless.

(2) Set A058 = 0 and A060 = 0. The inverter accelerates to the preset value of A061 when in RUN, 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 B003 as long as the inverter receives the STOP command. The frequency at Stop time will be stored in A061. 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 A058 = 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 B003 setting when it receives the Stop Command. The next operation will start at 0 Hz.

(4) UP/Down Signals simultaneously pressed are invalid

(5) A060≠ 0, the inverter accelerates to the setting of A061 and maintains speed. When the UP/Down terminal is ON, setting frequency is the value A061±A060, and the inverter will accelerate/ decelerate to frequency A061. 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. If A060=0, the operation is the same, until the UP/ DOWN signal is released. Please refer to the time diagram of A060.
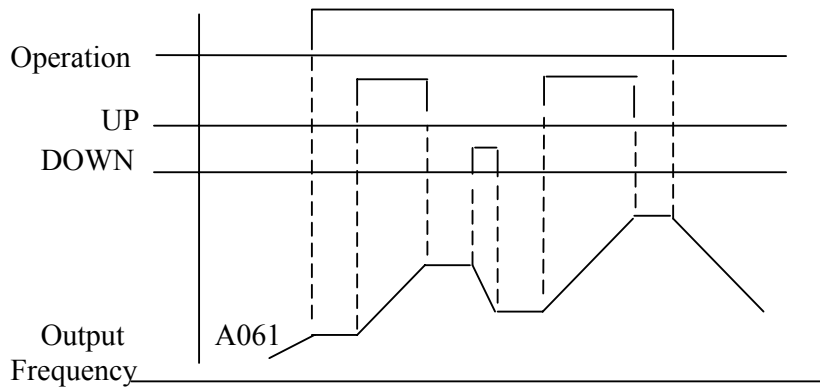
Figure 4-10 UP/DOWN key sequencing

13. A050~A056=16 Principal/Auxiliary speed toggle

OFF: the frequency is set by the potentiometer (Master Speed) on the Keypad. ON: the frequency is set by the analog signal terminal (Auxiliary Speed) on TM2.

14. A050~A056=17(PID Function Disable)

When the PID Function Disable is ON, PID is not controlled by A140.

15. A050~A056=18(Reset Command)

The Reset command is same as the Reset Key on the panel. When the command is OFF, the inverter does not respond. The factory default of A055 is Reset command.

16. A054=19 (Pulse Input Terminal)

The multifunction terminal S5 is set at 19 and becomes the input terminal for encoder signals.

17. A055=20 (PID feedback input terminal)

The multifunction terminal S6=20 becomes the PID feedback input terminal and 0~10V (0~ 20 mA) or 2~10V (4~20mA) is available by the setting of A140.

18. A055=21 /22(Bias signal 1/2 input)

To regulate the Offset of the Keypad Potentiometer or AIN analog input (only 0~10V (0~ 20 mA) or 2~10V (4~20mA) is available).

A055=21 Function

A055=22Function   * The value is 0 when AIN+ (S6-5V)＜0
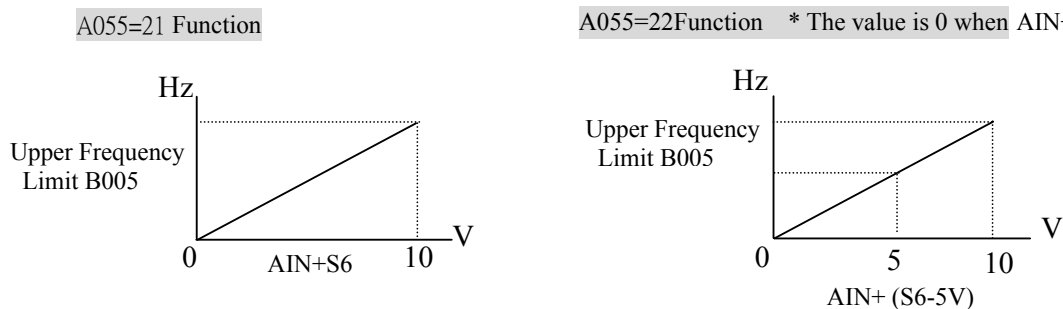
Figure 4-11 Bias signal characteristics

19. A056=23 (Analog input AIN)

The multifunction terminal AIN = 23. This is provided for setting the frequency.

20. A050~A056=24 (Multi-Sequence Control)

The Multi-Sequence control is set at 24 to become the input terminal for the Auto_Run Mode.

Digital /Analog input signal scan times:

A057: Multifunction terminal S1～S6 and AIN signal confirm the scan times (mSec X 4),1~100 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 4ms.

3. The user can specify the scan times interval duration according to the noise environment. If the noise is serious, increase the value of A057, however the response will be slower.

4. Note: If the S6 and AIN is digital, the voltage level for digital signal above 8V is treated as ON, below 2V is OFF.

Stop Mode Using Up/Down:

A058:

0000: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down is idle.

0001: When Up/Down is used, the preset frequency is reset to 0 Hz as the inverter stops.

0002: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down is available.

(1) 0: the inverter will accelerate to the speed set in parameter 6-00 upon receiving the Run command and run at commanded 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 as determined by the B003. 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 (6-00). If A058=0002, the UP/Down is available as the inverter stops.

(2) 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 B003) to 0 Hz. The next run command will always begin from 0 Hz.

Jog and Preset (MFIT) Speed Setting on Keypad:

A059 & A061~A068: Set Jog and preset speed by Keypad

A. A050~056=2-4(preset speed 1~3)

ON: the inverter operates at preset speed. The operation time of the 8 stages is based on the bit pattern of the three available inputs. Please refer to the corresponding parameters list:

B. A050~056=5(Jog terminal)

ON: the inverter operates in Jog acceleration time/ Jog decelerate time/ON

Function Code No.	LCD Display	Description	Range/Code
A059	(Jog Freq)	Jog Frequency (Hz)	0.00 - 400.00
A061	(Freq Command 1)	Frequency Command 1 (Hz)	0.00 - 400.00
A062	(Freq Command 2)	Frequency Command 2 (Hz)	0.00 - 400.00
A063	(Freq Command 3)	Frequency Command 3 (Hz)	0.00 - 400.00
A064	(Freq Command 4)	Frequency Command 4 (Hz)	0.00 - 400.00
A065	(Freq Command 5)	Frequency Command 5 (Hz)	0.00 - 400.00
A066	(Freq Command 6)	Frequency Command 6 (Hz)	0.00 - 400.00
A067	(Freq Command 7)	Frequency Command 7 (Hz)	0.00 - 400.00
A068	(Freq Command 8)	Frequency Command 8 (Hz)	0.00 - 400.00

Priority in reading the frequency: Jog > Preset speed > Keypad frequency or external frequency signal

Multifunction terminal3 Preset value=04	Multifunction terminal 2 Preset value =03	Multifunction terminal 1 Preset value =02	Jog Command terminal Preset value =05	Output frequency preset value
0	0	0	0	A061
X	X	X	1	A059
0	0	1	0	A062
0	1	0	0	A063
0	1	1	0	A064
1	0	0	0	A065
1	0	1	0	A066
1	1	0	0	A067
1	1	1	0	A068

Step of Up/Down Function (Hz):
A060: Up/Down (Hz) 0.00 – 5.00

There are two modes covered below:

(1) A060 = 0.00, The operation is just as the original one. When the UP terminal is ON, the frequency increases; while the DOWN terminal is ON, the frequency decreases. (Refer to the following graph).
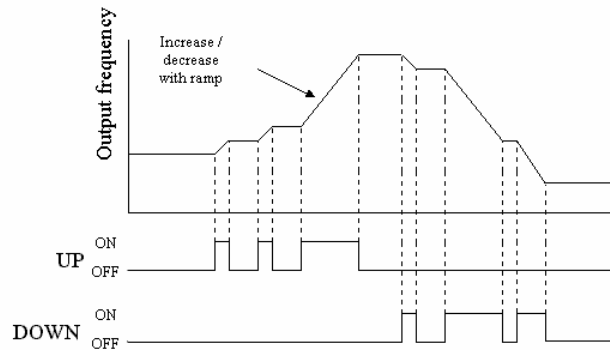
Figure 4-12 UP/DOWN profile example

(2) A060 = 0.01 to 5.00, and UP/ DOWN terminal ON, is equivalent to a step increase/ decrease at the increment frequency in A060. If UP/DOWN is pressed over 2 seconds, the original UP/DOWN mode is restored (Please refer to the following diagram)
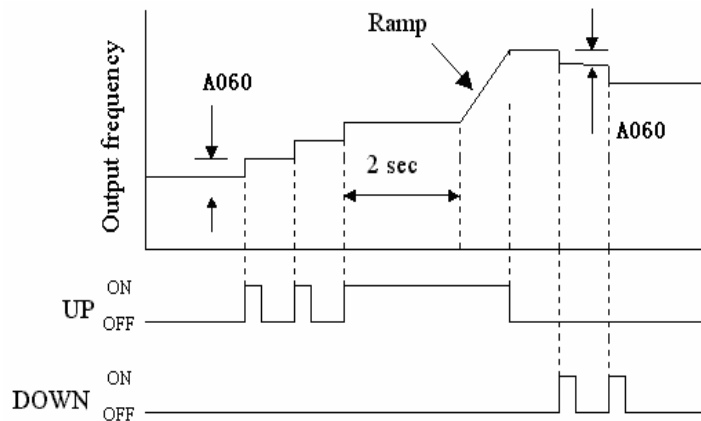
Figure 4-13 UP/DOWN with incremental steps

A061 : Auto _ Run Mode Frequency Command 1 (0-400Hz)

A062 : Auto _ Run Mode Frequency Command 2 (0-400Hz)

A063 : Auto _ Run Mode Frequency Command 3 (0-400Hz)

A064 : Auto _ Run Mode Frequency Command 4 (0-400Hz)

A065 : Auto _ Run Mode Frequency Command 5 (0-400Hz)

A066 : Auto _ Run Mode Frequency Command 6 (0-400Hz)

A067 : Auto _ Run Mode Frequency Command 7 (0-400Hz)

A068 : Auto _ Run Mode Frequency Command 8 (0-400Hz)

A071 : Auto _ Run Mode Operation Selection 1 (0-3600sec)

A072 : Auto _ Run Mode Operation Selection 2 (0-3600sec)

A073 : Auto _ Run Mode Operation Selection 3 (0-3600sec)

A074 : Auto _ Run Mode Operation Selection 4 (0-3600sec)

A075 : Auto _ Run Mode Operation Selection 5 (0-3600sec)

A076 : Auto _ Run Mode Operation Selection 6 (0-3600sec)

A077 : Auto _ Run Mode Operation Selection 7 (0-3600sec)

A078 : Auto _ Run Mode Operation Selection 8 (0-3600sec)

A081: Auto _ Run Stop 1 (0000 : STOP、0001:forward、0002:reverse)

A082: Auto _ Run Stop 2 (0000 : STOP、0001:forward、0002:reverse)

A083: Auto _ Run Stop 3 (0000 : STOP、0001:forward、0002:reverse)

A084: Auto _ Run Stop 4 (0000 : STOP、0001:forward、0002:reverse)

A085: Auto _ Run Stop 5 (0000 : STOP、0001:forward、0002:reverse)

A086: Auto _ Run Stop 6 (0000 : STOP、0001:forward、0002:reverse)

A087: Auto _ Run Stop 7 (0000 : STOP、0001:forward、0002:reverse)

A088: Auto _ Run Stop 8 (0000 : STOP、0001:forward、0002:reverse)

Operation Mode Selection During Auto Run

A091: 0000: Auto Run mode not effective.

0001: Auto Run mode for one cycle. (continuing running from the unfinished step if restarting)

0002: Auto Run mode be performed periodically (continuing running from the unfinished step if restarting)

0003: Auto Run mode for one cycle, then hold the speed of final step to run. (continuing running from the unfinished step if restarting)

0004: Auto Run mode for one cycle. (starting a new cycle if restarting)

0005: Auto Run mode be performed periodically (starting a new cycle if restarting)

0006: Auto Run mode for one single cycle, then hold the speed of final step to run. (starting a new cycle if restarting)

(1) Auto_Run Mode Selection (A091)

(2) Auto_Run Mode Setting Selection (A061~A068、A071~A078、A081~A088)

‧ A PLC operation mode is ready to use with the following settings of the multi-step frequency command 1~8 (A061~A068), Auto_Run mode time setting (A071~A078) under the Auto_Run mode selection (A091). The FWD/REV direction can be set with the setting of (A081~A088).

‧ In the Auto_Run mode, the multi-step frequency commands 2~4 are ineffective.

‧ Some examples in auto_run mode follow：

(A) Single Cycle Running (A091= 1, 4)

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

For example:

A091＝1	A081~83=1(FWD)	A084=2(REV)	A085~88＝0
A061＝15Hz	A062＝30Hz	A063＝50Hz	A064＝20Hz
A071＝20s	A072＝25s	A073＝30s	A074＝40s
A065~68＝0Hz	A075~78＝0s		
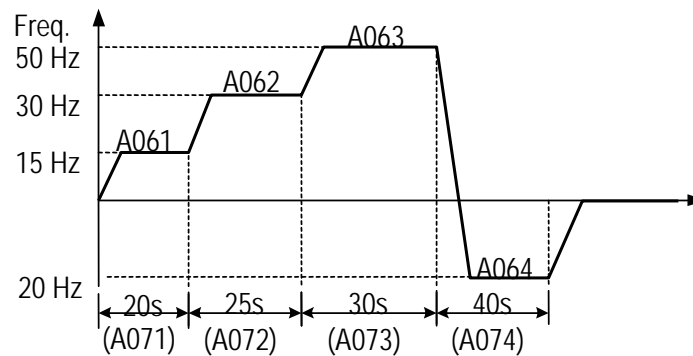
Figure 4-14 Single cycle auto run

(B) Periodic Running (A091＝2, 5)

The inverter will repeat the same cycle periodically.

For example:

A091 ＝ 2

A061～68, A071～78, A081-88 ： same setting as the example (A)
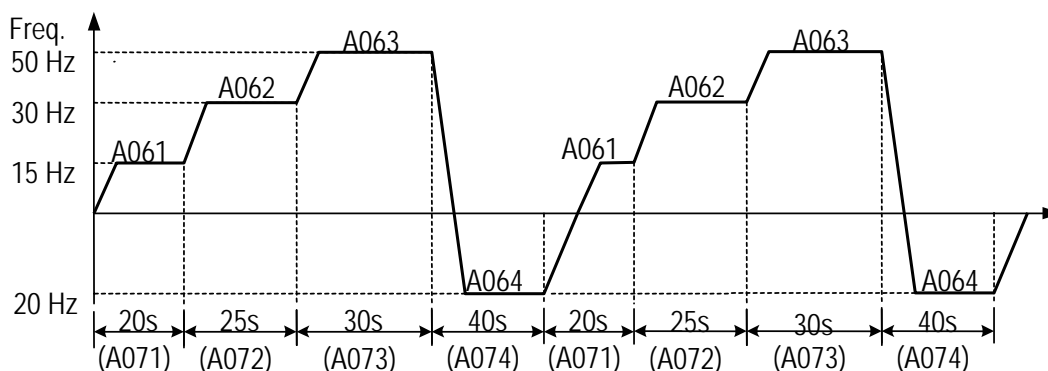
Figure 4-15 Periodic cycle auto run

(C) Auto_Run Mode for Single Cycle (A091 = 3, 6)

   The speed of final step will be held to run.

   For example:

   A091 = 3

   A081~84 = 1 (FWD) A085~88 = 0

   A061~68, A071~78   : same setting as the example (A)
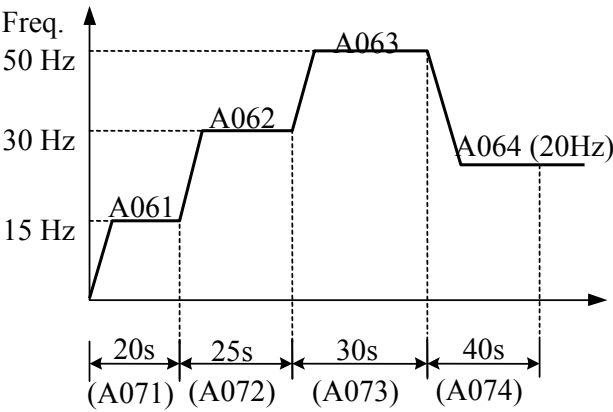
Figure 4-16 Single cycle auto run: final step hold

• A091 = 1~3 : If the inverter stops and re-starts, it will continue running from the unfinished step, according to the setting of A091.

   = 4~6 : If the inverter stops and re-starts, it will begin a new cycle and continue running according to the setting of A091.
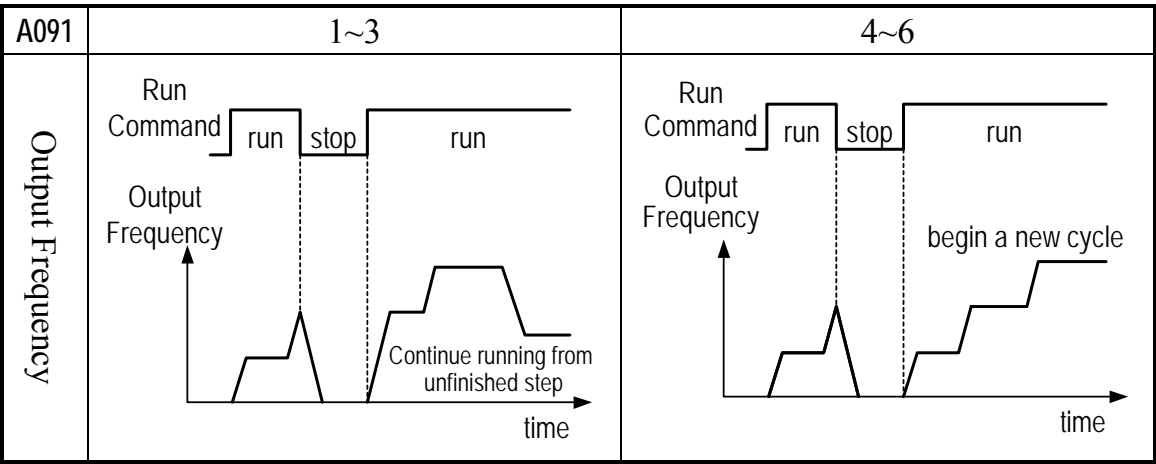
Figure 4-17 AUTO_RUN cycle with interrupt

• ACC/DEC time follow the setting of B007, B008 in Auto_Run Mode.

Analog Input Signal Operation Mode:
A092:AIN Gain(%) 0 - 200
A093:AIN Bias(%) 0 - 100
A094:AIN Bias Selection: 0000:positive   0001:Negative
A095:AIN Slope: 0000:positive   0001:Negative
A096: AIN signal verification Scan Time (AIN, AI2)   1–100 (× 4mSec)
A097: AI2 Gain (%)(S6) 0 - 200

1. A094 = 0: 0V (0mA) corresponding to Lower Frequency Limit., 10V (20mA) corresponding to Upper Frequency Limit.

2. A094 = 1: 10V (20mA) corresponding to Lower Frequency Limit, 0V (0mA) corresponding to Upper Frequency Limit.

3.A154 = 0: 0~10V (0~20mA)

$$F= I*(B005)/20 \quad I>=0 ; SW2= I \quad or \quad F=V*(B005)/10 \quad V>=0 ; SW2=V$$

= 1: 2~10V (4~20mA) (PID FEEDBACK)

$$F= (I-4)*(B005)/16 \quad I>=4 ; SW2= I$$
$$F=0 \qquad\qquad\qquad I<4$$
$$F= (V-2)*(B005)/8 \quad V>=2 ; SW2=V \ or$$
$$F=0 \qquad\qquad\qquad V<2$$

Figure 4-18 Analog scaling examples

The setting of figure 4-18A:

	A092	A093	A094	A095	A097
A	100%	50%	0	0	100%
B	100%	0%	0	0	100%
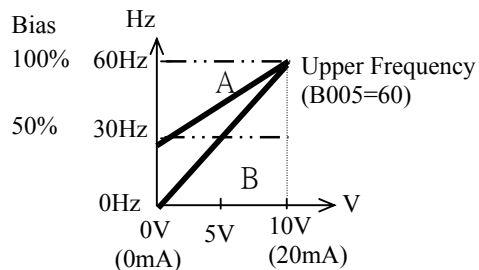
The setting of figure 4-18B:

	A092	A093	A094	A095	A097
C	100%	50%	0	1	100%
D	100%	0%	0	1	100%
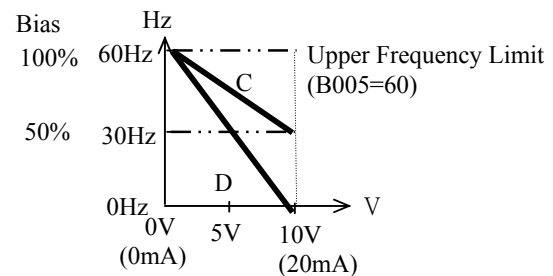
The setting of figure 4-18C:

	A092	A093	A094	A095	A097
E	100%	20%	1	0	100%
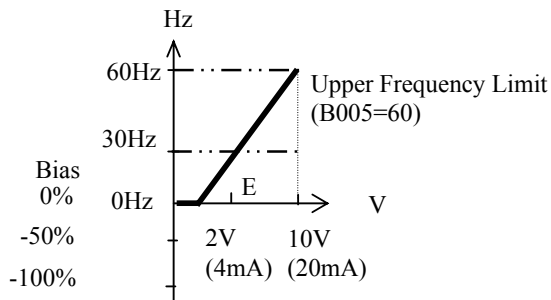
The setting of figure 4-18D:

	A092	A093	A094	A095	A097
F	100%	50%	1	1	100%
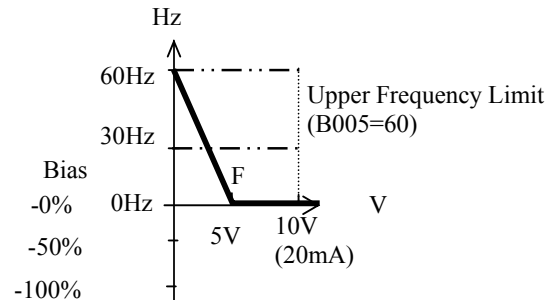
3. The inverter reads the average value of A/D signals once per (A096×4ms). Set scan intervals according to noise in the environment. Increase A096 in a noisy environment, but the response time will increase accordingly.

Multifunction analog output control:

A103: Analog Output Voltage Mode:

      0000: Output frequency

      0001: Frequency Setting

      0002: Output voltage

      0003: DC Voltage

      0004: Output current
      0005: PID Feedback

A104: Analog Output Gain = 0 ~ 200%

The multifunction analog output terminal of the terminal block (TM2), is 0~10Vdc analog output volts. The output type is determined by A104. A104 is to calibrate the external voltage meter and peripheral equipment, according to A103.

The FEEDBACK value of PID (the input voltage and current of S6) outputs analog value from FM+ terminal. (Set by parameter B016) The value corresponds to the input signal 0~10V (0 ~ 20 mA) or 2~10V (4~20mA).

※Note: The max output voltage is 10V

Multifunction output terminals control:

A105: RELAY1(R1C,R1B,R1A terminal on TM2)

A106: RELAY2(R2C,R2A terminal on TM2)

      0000:   Run

      0001:   Frequency Reached (Target Frequency) (Set Frequency ± A108)

      0002:   Set Frequency (A107 ± A108)

      0003:   Frequency Threshold Level (> A107) - Frequency Reached

      0004:   Frequency Threshold Level (< A107) - Frequency Reached

      0005:   Over-torque Threshold Level

      0006:   Fault

      0007:   Auto-restart

      0008:   Momentary AC Power Loss

      0009:   Rapid Stop Mode

      0010:   Coast-to-Stop Mode

      0011:   Motor Overload Protection

      0012:   Drive Overload Protection

      0013:   PID Feedback Signal Break

      0014:   Power On :

      0015:   Under-torque Threshold Level

A107: Frequency Reached Output Setting =0 ~ 400Hz

A108: Frequency Reached Bandwidth =0 ~ 30Hz

A105/A106= 01:
The preset frequency is reached (± A108)
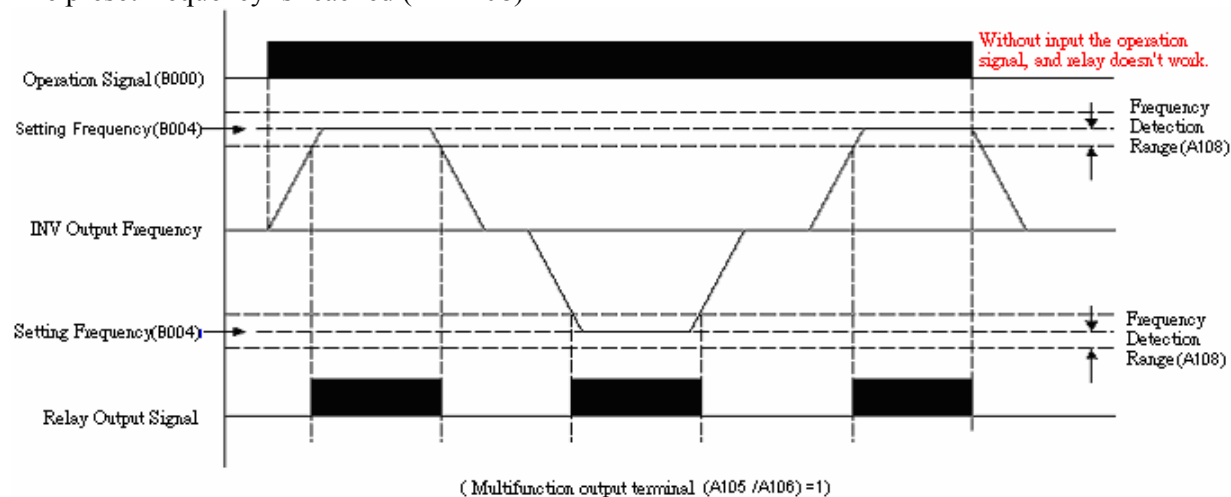
Figure 4-19 Frequency reached example

A105/A106= 02:
Arbitrary frequency consistency Fout = A107 ± A108
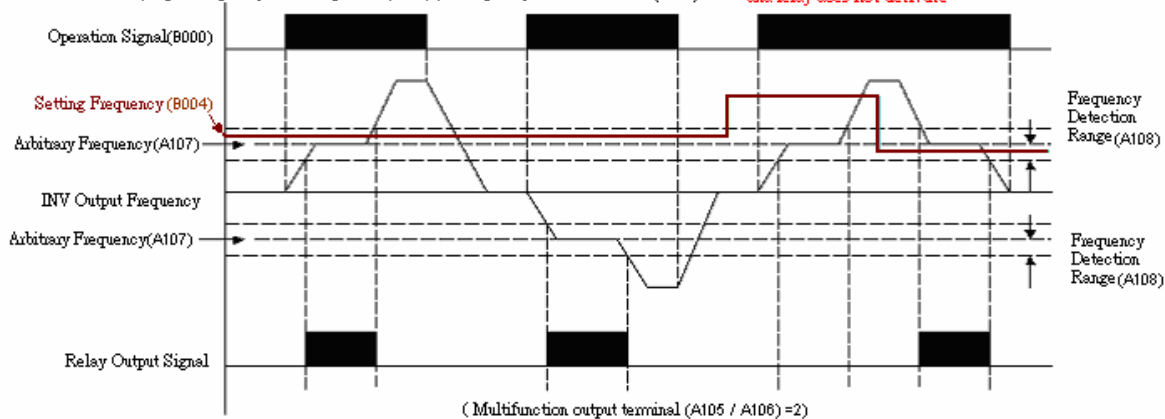
Figure 4-20 Frequency within specified range example

A105/A106 = 03: frequent detection Fout > A107
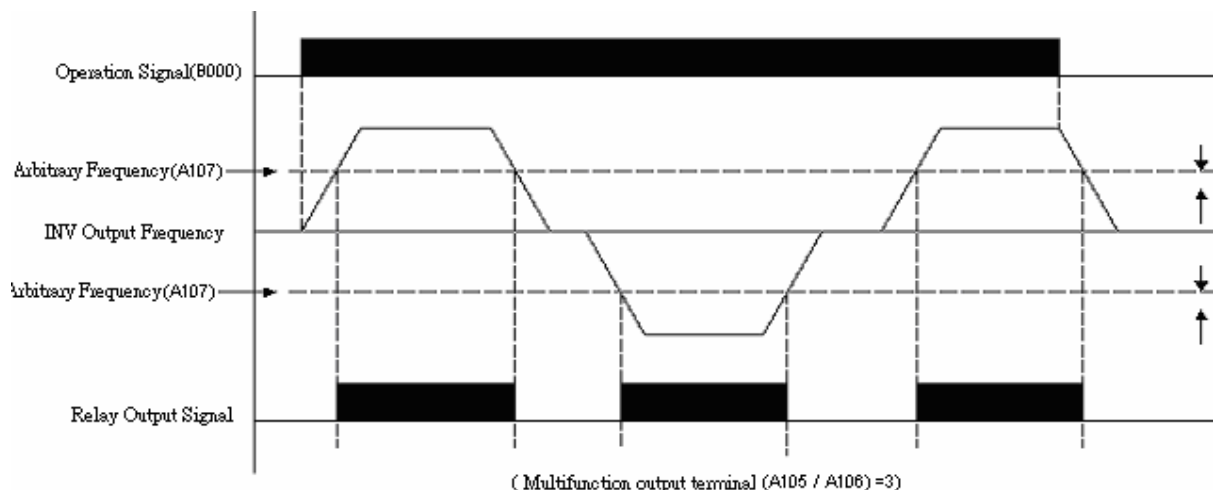
Figure 4-21 Frequency outside of range example

A105/A106 = 04: frequent detection Fout < A107
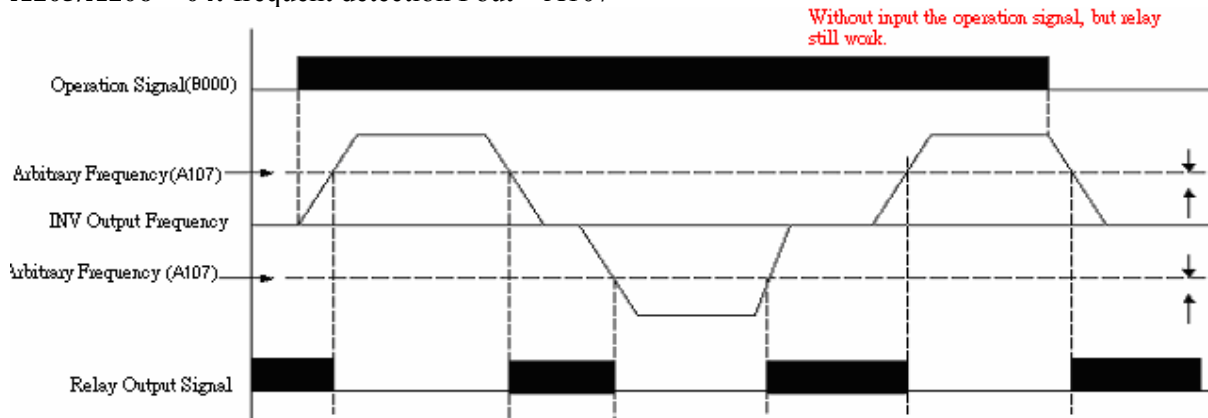
Figure 4-22 Frequency at or below specified range example

A105/A106= 05: over torque detection
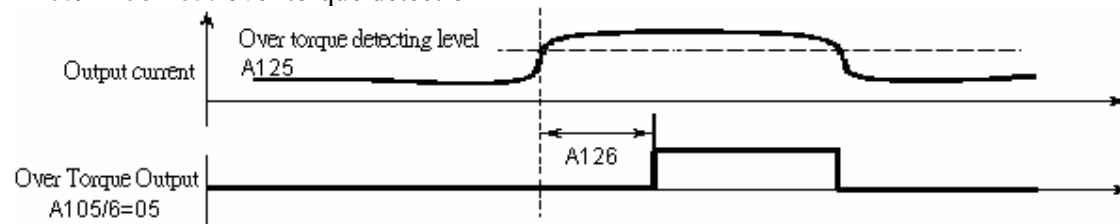
Figure 4-23 Over torque detection example

A111: Trip Prevention Selection During Acceleration:
    0000: Enable Trip Prevention During Acceleration
    0001: Disable Trip Prevention During Acceleration
A112: Trip Prevention Level During Acceleration: 50% ~ 300%(based by Motor HP A003)
A113: Trip Prevention Selection During Deceleration:
    0000: Enable Trip Prevention During Deceleration
    0001: Disable Trip Prevention During Deceleration
A114: Trip Prevention Level During Deceleration: 50% ~ 300%(based by Motor HP A003)
A115: Trip Prevention Selection in Run Mode:
    0000: Enable Trip Prevention in Run Mode
    0001: Disable Trip Prevention in Run Mode
A116: Trip Prevention Level in Run Mode: 50% ~ 300%(based by Motor HP A003)
A117: Trip Prevention Deceleration Time Selection in Run Mode:
    0000: Trip Prevention Deceleration Time Set by B008
    0001: Trip Prevention Deceleration Time Set by A118
A118: Deceleration Time in Trip Prevention Mode (sec): 0.1 ~ 3600.0

---

1. During acceleration, the inverter will delay the acceleration time if the acceleration time is too short, and otherwise resulting in the over current trip.

2. During deceleration, the inverter will delay the deceleration time if the deceleration time is too short, otherwise resulting in the over voltage of DC BUS trips with 'OV' displayed.

3. Some mechanical equipment (such as a press) or unusual breakdown (seizing due to insufficient lubrication, uneven operation, impurities of processed materials, etc.) will cause the inverter to trip. When the operating torque of the inverter exceeds the setting of A116, the inverter will lower the output frequency following the deceleration time set by A117, and return to the normal operation frequency after the torque level stabilizes.

A119: Electronic Motor Overload Protection Operation Mode:
   0000: Enable Electronic Motor Overload Protection
   0001: Disable Electronic Motor Overload Protection
A120: Motor Type Selection:
   0000: Electronic Motor Overload Protection Set for Non-Inverter Duty Motor
   0001: Electronic Motor Overload Protection Set for Inverter Duty Motor
A121: Motor Overload Protection Curve Selection:
   0000: Constant Torque (OL=103%)(150%,1 minute)
   0001: Variable Torque (OL=113%)(123%,1 minute)
A122: Operation After Overload Protection is Activated:
   0000: Coast-to-Stop After Overload Protection is Activated
   0001: Drive Will not Trip when Overload Protection is Activated (OL1)

Description of the thermal relay function:
1. A121 = 0000: protect the general mechanical load. If the load is less than 103% rated current, the motor continues to run. If the load is larger than 150% rated current, the motor will run for 1 minute. (Refer to curve (1).
    = 0001: protect HVAC load (FAN、PUMP…so on): If the load is less than 113% rated current, the motor continues to run. If the load is larger than 123% rated current, the motor will run for 1 minute.
2. The heat sink function will diminish when the motor runs at low speed. The thermal relay action level will diminish at the same time. (The curve 1 will change to curve 2).
3. A120 = 0000: set A005 as the rated frequency of the motor.
    A122 = 0000: 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
    = 0001: the inverter continues to run as the thermal relay acts and the display flashes OL1. Until the current declines to 103% or 113 %(determined by A121), then OL1 disappears.
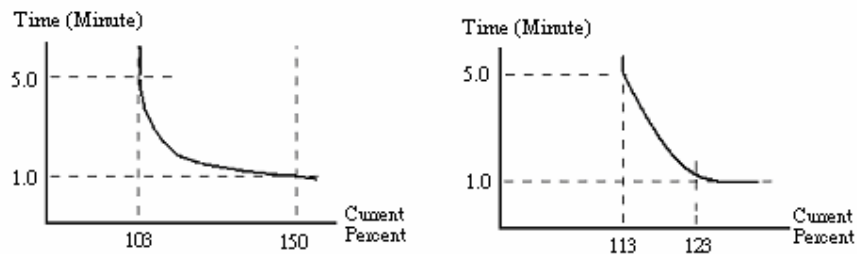
Figure 4-24 Thermal Overload Curves

Electronic Motor Overload OL1 protection current and frequency

Inverter Duty Motor OL1 Protection Curve
OL=103% Start, 150%/1 Min.

Non-Inverter Duty Motor OL1 Protection Curve
OL=113% Start, 123%/1 Min.

Inverter Duty Motor OL1 Protection Curve
OL=103% Start, 150%/1 Min.

Inverter Duty Motor OL1 Protection Curve
OL=113% Start, 123%/1 Min.
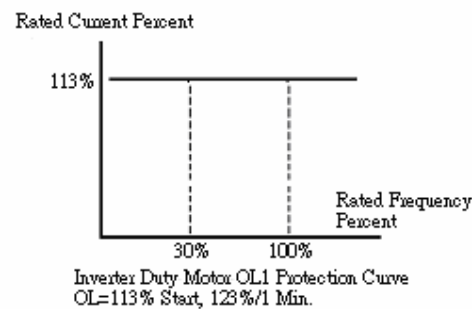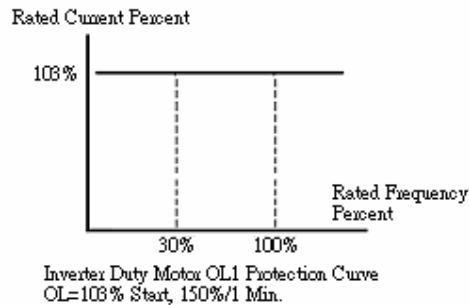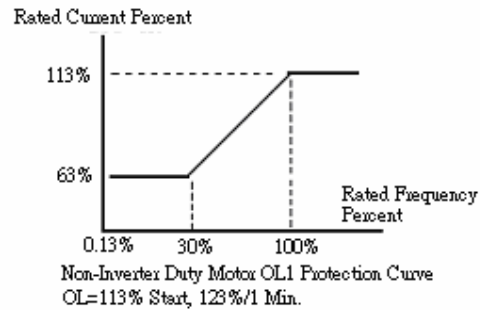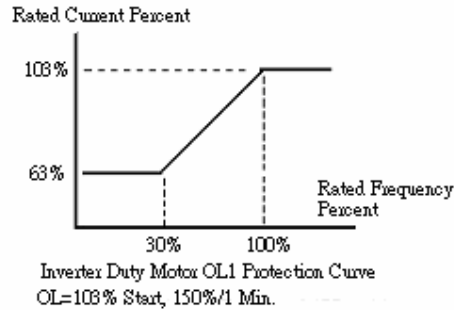
A123: Over/Under Torque Detection Selection:00
   = 0000: Disable Over/Under Torque Operation
   = 0001: Enable Over/Under Torque Operation Only if at Set Frequency
   = 0002: Enable Over/Under Torque Operation while the Drive is in Run Mode
A124: Operation After Over/Under Torque Detection is Activated:
   = 0000: Drive will Continue to Operate After Over/Under Torque is Activated
   = 0001: Coast-to-Stop After Over/Under Torque is Activated
A125: Over Torque Threshold Level (%): 100-200%
A126: Over Torque Activation Delay Time (s): 0.0-25.0
A127: Under torque Threshold Level (%): 0-100%
A128: Under torque activation Delay Time (Seconds): 0.0-25.0

The over torque is defined as the output torque is active for longer than parameter A126 and, the voltage level (the inverter rated torque is 100%) exceeds over A125 parameter.

   Over Torque:
      A124 = 0000: If there is over torque, the inverter can continue to run and flashes OL3 until the
                     output torque is less than the A125 setting value.
            = 0001: If there is over torque, the inverter coasts to stop and flashes OL3. It is required to
                     press 'RESET' or external terminal to continue running.
            Parameter A105, A106 (Multifunction output terminal) = 05, the output terminal is output
            over torque signal.

The Under torque is defined as the output torque is active for longer than parameter A126 and the voltage level (the inverter rated torque is 100%) is less than A125 parameter.

   Under Torque:
      A124 = 0000: If there is under torque, the inverter can continue to run and flashes OL4 until the
                     output torque is over than the A125 setting value.
            = 0001: If there is under torque, the inverter coasts to stop and flashes OL4. It is required to
                     press 'RESET' or external terminal to continue running.
            Parameter A105, A106 (Multifunction output terminal) = 15, the output terminal is output
            under torque signal.

※ Note: Over torque output signal will be output as the parameter A123=0001or 0002 when the set level and time are over the range.

V/F PATTERN Selection

B009: V/F PATTERN Selection   = 0 – 18

A129: Torque boost gain(V/F pattern modulation)% = 0.0 – 30.0%

A130: Motor no load current(Amps AC)   -------------

A131: Motor rated slip compensation(%)   = 0.0 – 100.0%

A132: Max output frequency(HZ)   = 0.20 – 400.0Hz

A133: Max output frequency voltage ratio(%)   = 0.0 – 100.0%

A134: Medium frequency(HZ)   = 0.10 –400.0Hz

A135: Medium output frequency voltage ratio (%)   = 0.0 – 100.0%

A136: Min output frequency(HZ)   = 0.10 –400.0Hz

A137: Min output frequency voltage ratio (%)   = 0.0 – 100.0%

---

1. B009=18, set the V/F pattern freely complying with A132~A137 (Refer to following diagram)
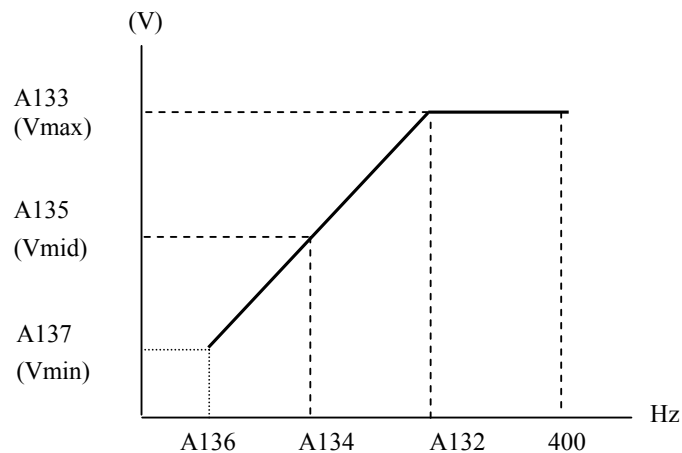
Figure 4-25 Custom V/F Settings

2. B009 = 0 – 17 V / F Pattern (Refer to following list) 。

type	Function	B009	V/F pattern	type	Function	B009	V/F pattern
50 Hz	General Use	0		60 Hz	General Use	9	
	High start torque	1			High start torque	10	
		2				11	
		3				12	
	Decreasing torque	4			Decreasing torque	13	
		5				14	
	Constant torque	6			Constant torque	15	
		7				16	
		8				17	

Figure 4-26 Custom V/F Patterns

B009	B	C
0 / 9	50.0%	1.0%
1 / 10	60.0%	1.0%
2 / 11	65.0%	1.0%
3 / 12	70.0%	1.0%
4 / 13	40.0%	1.0%
5 / 14	35.0%	1.0%
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 B009) points according the A129 V/F pattern setting. The starting torque will be raised as shown.

Figure 4-27 V/F curve with torque boost
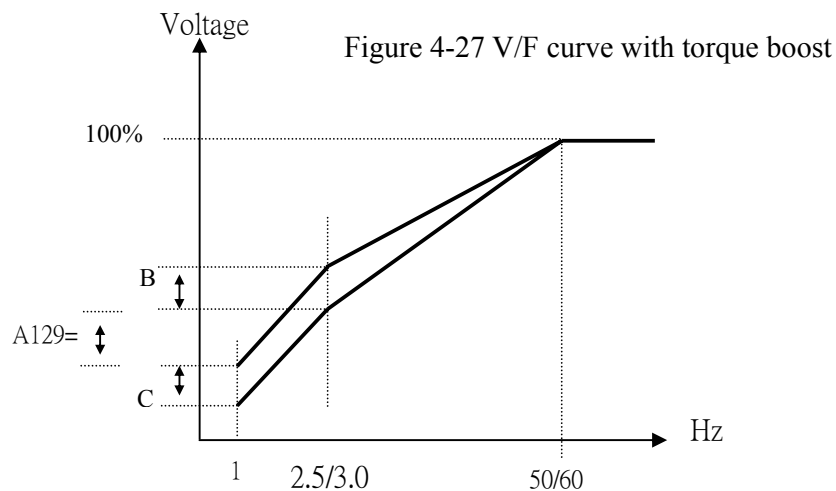
※Note: A129=0, Torque boost function is invalid

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.

$$\text{Slip frequency boost} = \frac{\text{Output Current-(A130)}}{\text{(A002)-(A130)}} \times \text{(A131)} \qquad \begin{array}{l}\text{Note : A002=motor rated current} \\ \text{A130=motor no load current}\end{array}$$

A131 approximate value= (Motor synchronization speed– Rated speed) / Motor synchronization speed

Marked on the motor nameplate

$$\text{Motor synchronization speed (RPM)} = \frac{120}{\text{Motor Poles}} \times \text{Motor rated frequency (50Hz or 60Hz)}$$

$$\text{Example: 4 Poles,60Hz induction motor synchronization speed} = \frac{120}{4} \times 60 = 1800 \text{ RPM}$$

※Note: Motor no load current (A130) differs with the inverter capacities (A175) (Refer to A002 note). It should be regulated according to actual conditions.

A140: PID Operation Selection

   0000: PID disable

   0001: PID enable (Deviation is D-controlled)

   0002: PID Feedback D-controlled

   0003: PID D Reverse characteristic controlled

   0004: PID Feedback D characteristic controlled

   0005: PID, Frequency command + D controlled

   0006: PID, Frequency command + Feedback D controlled

   0007: PID, Frequency Command + D reverse Characteristic controlled.

   0008: PID, Frequency Command + Feedback D reverse Characteristic controlled.

See figure 4-28 for

A140 =1, D is the deviation of the process error signal in unit time (A144).

 =2, D is the deviation of the feedback in unit time (A144).

 =3, D is the deviation of the process error signal in the unit time (A144). If the deviation is positive, the output frequency decreases and vice versa.

 =4, D is the deviation of feedback in unit time (A144). When the deviation is positive, the frequency decreases, and vice versa.

 =5, D is equal to the deviation of the process error signal in unit time (A144) +Frequency command.

 =6, D is equal to the deviation of feedback in unit time + Frequency command.

 =7, D is equal to the deviation of the process error signal in unit time +Frequency command. If the deviation is positive, the output frequency decreases, and vice versa.

 =8, D is equal to the deviation of feedback in unit time + Frequency command. When the deviation is positive, the frequency decreases, vice versa.

A141: Feedback Calibration Gain(%) : 0.00 - 10.00

A141 is the calibration gain. Deviation = (set point –feedback signal) × A141

A142: Proportion Gain(%) : 0.00 - 10.00

A142: Proportion gain for P control.

A143: Integrate Time（s）: 0.0 - 100.0

A143: Integrate time for I control

A144: Differential Time（s）: 0.00 - 10.00

A144: Differential time for D control

A145: PID Offset : 0000 : Positive Direction

      0001 :Negative Direction

A146: PID Offset Adjust (%) : -109% ~ +109%

A145/A146: PID the calculated result pluses A146 (the sign of A146 is determined by A145).

A147: Output Lag Filter Time（s）: 0.0 - 2.5

A147: 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:
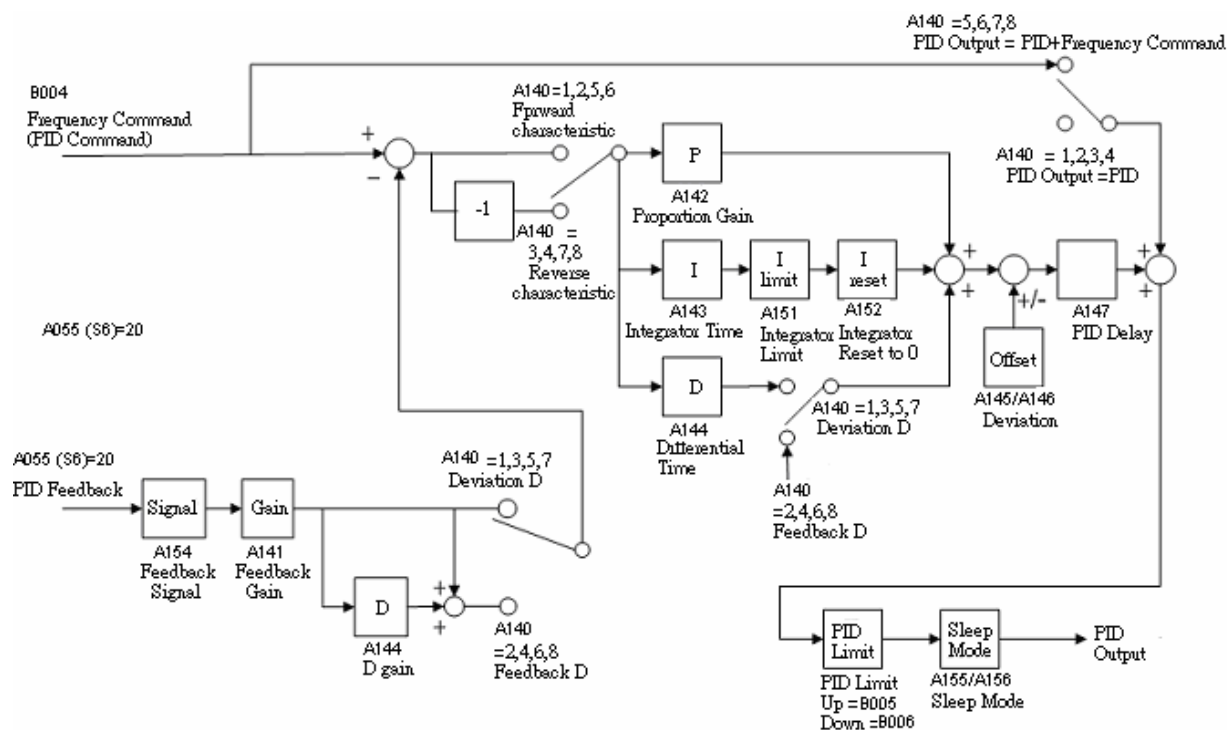
Figure 4-28 PID BLOCK DIAGRAM

1. To enable PID control, set A055=20, AI2 (S6) on TM2 is defined as the PID feedback signal.
2. The set point in the above diagram is the B004 input frequency.
3. There are two ways to view the PID feedback signal: one is using the Keypad switch display
(B016 must be set to 1), the other is using analog output FM+ (A103 must be set to 5).

> **A148: Feedback Loss Detection Mode: 0000:Disable**
>
> **0001:Enable – Drive Continues to Operate After Feedback Loss**
>
> **0002:Enable – Drive "STOPS" After Feedback Loss**

A148= 0: Disable；A148= 1: detect, continue running, and display 'PDER'；A148= 2: detect, stop, and display 'PDER'。

> **A149: Feedback Loss Detection Mode (%): 0 - 100**

A149 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.

> **A150: Feedback Loss Detection Delay Time (s): 0.0 -25.5**

A150: the minimum time window to consider the feedback signal lost.

> **A151: Integrate Limit Value (%): 0 - 109**

A151: the Limiter to prevent the PID from saturating.

> **A152: Integrator Reset to 0 when Feedback Signal Equals the set point:**
>
> **0000:Disable**
>
> **0001:1 second**
>
> **0030: 30 seconds**

A152=0: As PID feedback value reaches the set point, the integrator will not be reset to 0.
A152=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.

> **A153: Allowable Integration Error Margin (Unit Value) (1 Unit = 1/8192): 0 - 100**

A153=0 ~ 100% unit value: Restart the tolerance after the integrator reset to 0.

> **A154: PID   Feedback Signal: 0000: 0~10V or 0~20mA**
>
> **0001: 2~10V or 4~20mA**

A154: Feedback signal selection, A154=0: 0~10V or 0~20mA (signal V or I set by SW3)

A154=1: 2~10V or 4~20mA (signal V or I set by SW3)

> **A155, A156: PID Sleep Mode**

PID SLEEP MODE:
A140=1(PID Enable)
A055=20(PID FEEDBACK Enable)
B004=PID setting frequency source (Target Value)
A155: set the sleep threshold frequency, Unit: HZ
A156: set the time for sleep 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 sleep threshold frequency for sleep start the inverter will reactivate and enter PID wake mode. The time diagram is as follow:
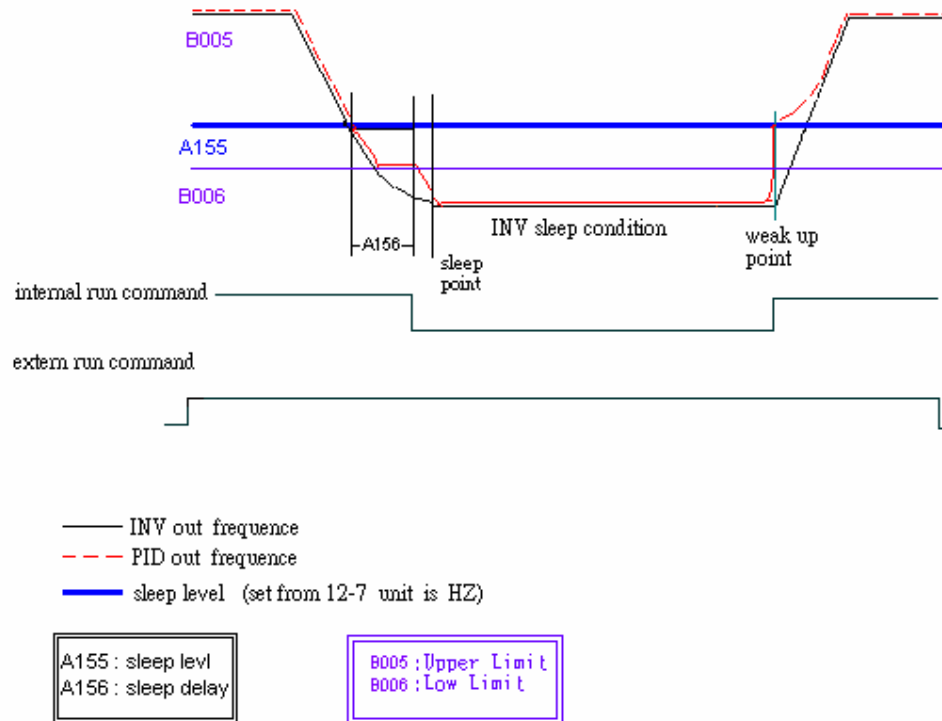
Figure 4-29 PID sleep wake mode diagram

A157: Engineering Units(only for PID feedback used on LCD display)

0000 : NONE	0012 : inW (inches in water column)
0001 : FPM (feet per minute)	0013 : HP
0002 : CFM (cubic feet per minute)	0014 : m/s (meters per second)
0003 : PSI (pounds per square inch)	0015 : MPM (meters per minute)
0004 : GPH (gallons per hour)	0016 : CMM (cubic meters per minute)
0005 : GPM (gallons per minute)	0017 : W
0006 : in	0018 : kW
0007 : ft	0019 : m
0008 : /s (units per second)	0020 : °C
0009 : /m (units per minute)	0021 : %
0010 : /h (units per hour)	0022 : rpm
0011 : °F	

A158: PID Feedback Display Unit Max : 0-9999**(only for PID feedback used on LCD type display)**

A159: PID Feedback Display Unit Min : 0-9999**(only for PID feedback used on LCD type display)**

A157: PID Feedback Engineering Unit.

A158:PID Feedback Display Maximum
A159:PID Feedback Display Minimum

Figure 4-30 PID Display Scaling
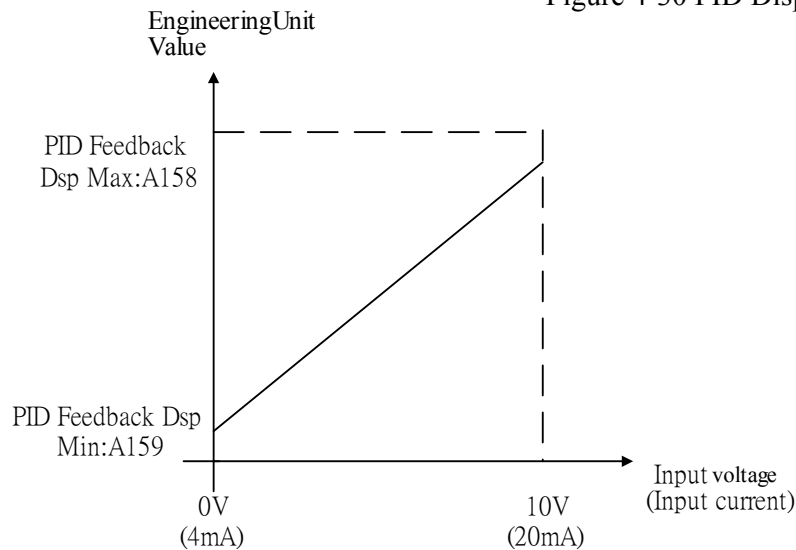
A163: RS485 Communication Station Drop Number: 1 - 254

A163: to set the RS485 communication station codes which are suitable for driving multi drop situations on inverter networks.

A164: Baud Rate setting (bps):   **0000: 4800**
0001: 9600
0002: 19200
0003: 38400
A165: Stop Bit Selection: 0000: 1 stop bit
0001: 2 stop bit
A166: Parity Selection : 0000 : no parity
0001 : even parity
0002 : odd parity
A167: Data Format Selection: 0000 : 8 bit data
0001 : 7 bit data

1. RS-485 Communication:
   (1)1 vs. 1 Control: to control one inverter by a PC or PLC or controller. (set A163 = 1~254)
   (2)1 vs. Multiple Drop Control: to control more than one inverter by PC, PLC, or Host Controller (The max number of inverter drops is 254. Set A163 = 1~254). When the inverter receives the host communication (station code = 0), the communication command is followed regardless the setting value of A163.
2. RS-232communication: (RS232 interface is required)
   1vs1 control only: to control one inverter by a PC, PLC, or controller. (Set A163 = 1~254)
   ※Note:
   a. The BAUD RATE (A164) of PC (or PLC or Controller) has to match the inverter baud rate setting. Communication format (A165/A166/A167) should also be set as the same.
   b. The inverter will confirm and acknowledge commands as PC modifies the parameters of the inverter.
   c. Please refer to the N3 Communication PROTOCOL.

A168: Stator Resistance(Ohms) Gain

A169: Rotator Resistance(Ohms) Gain

A170: Equivalent Inductance(mH) Gain

A171: Magnetized Current(Amps AC) Gain

A172: Ferrite Loss Conduction (gm) Gain

1. If A000=0 or 1(vector control mode), when powered up, set A006=1. The motor will run while the inverter performs auto tuning. Once the motor stops, auto tuning is finished. The inverter will write the internal parameters of the motor to A168~ A172, and auto reset the A006 to 0.
2. Auto tuning must be carried out whenever the motor is changed. If the internal parameters are known already, they can be input to A168~A172 directly.
3. Set A006=1 to perform auto tuning. When finished, A006 auto resets to 0. The Keypad displays END.
4. The parameter group is only effective in current vector mode.
5. Never perform the auto tune when the inverter and motor are not connected.

A175: Drive Horsepower Code

A175	Inverter Model		A175	Inverter Model	
2P5		2P5-SC/SCF/C	401		401-C/CF
201		201-SC/SCF/C	402		402-C/CF
202		202-SC/SCF/C	403		403-C/CF
203		203-SC/SCF/C	405		405-C/CF
205		205-C	407		407-C/CF
207		207-C	410		410-C/CF
210	N3-	210-C	415		415-C/CF
215		215-N1	420	N3-	420-N1
220		220-N1	425		425-N1
225		225-N1	430		430-N1
230		230-N1	440		440-N1
240		240-N1	450		450-N1
			460		460-N1
			475		475-N1

A176: Software Version

A177: Fault Jog（Latest 3 times）

1. When the inverter trips on a fault, the former fault log stored in2.xxxx will be transferred to 3.xxxx, the one in 1.xxxx to 2.xxxx. The present fault will be stored in the blank 1.xxxx. The fault stored in 3.xxxx is the earliest one of the most recent three, while the one 1.xxxx is the latest.
2. When pressing 'ENTER' at A177, the fault 1.xxxx 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 'ENTER' at A177, 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.OCC', this indicates the latest fault is OC-C, etc.

A178: Accumulated Operation Time 1 (Hours): 0 – 9999

A179: Accumulated Operation Time 2 (Hours X 10000): 0 - 27

A180: Accumulated Operation Time Mode: 0000: Power on time

0001: Operation time

---

1. When the operation time is to 9999 as the elapsed time 1 is set. The next hour will be carried to operation A179. 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

A181: Reset to the factory setting: 1110: Reset to the 50Hz factory setting

1111: Reset to the 60Hz factory setting

When A181 is set to 1111, the parameter will be reset to the factory setting. The max output voltage will comply with the voltage and frequency (A001/A005) on the nameplate of the motor. The output frequency is 60Hz if the upper frequency limit is not set.

※**Note:**

Motor parameters (A168~A172) will be modified under V/F control mode when reset factory setting is performed.

Motor parameters (A168~A172) will not be modified under vector control mode when reset factory setting is performed.

B000 : Run Command Source Selection

0000:Keypad

0001:External terminal control

0002:Communication control

1.) B000=0000 the inverter is controlled by the keypad.

2.) B000=0001 the inverter is controlled by the external terminals. The Stop key for emergency will function. (Refer to A010 description).

Note: B000=0001, please refer to parameter group A013, A014, A019 and A018 for detail description for safety of persons and machines.

3.) B000=0002 the inverter is Rs485 communication controlled.

B001 : Operation modes for external terminals
    0000:Forward/stop-reverse/stop
    0001:Run/stop-forward/reverse
    0002:3-wire control mode -run/stop

1.) When operation command B000 = 0001 (external terminal), B001 is valid.

2.) When operation command B000 = 0001 (external terminal control), the stop button for emergency is available. (Refer to A010 for detail description).

3.) When both forward and reverse commands are ON will be treated as STOP.

B001 = 0000, Control mode is as below:

(1).Input signal is NPN:
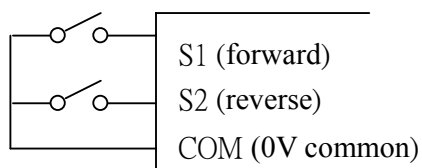
(2). Input signal is PNP:
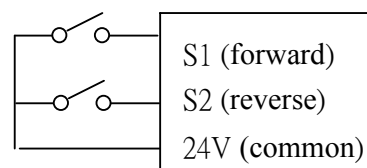
B001 = 0001, Control mode is as below:

(1). Input signal is NPN:
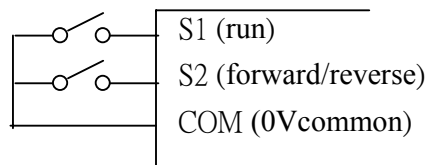
(2). Input signal is PNP:
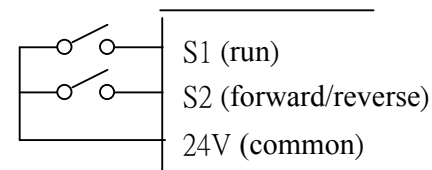
Figure 4-31 Terminal Board Drive Operation Modes

B001 = 0002, Control mode is as below:

(1). Input signal is NPN:
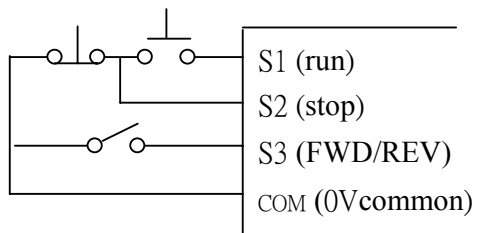
(2). Input signal is PNP:
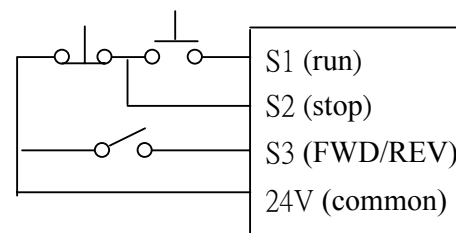
Figure 4-32 3-Wire start/stop wiring

Note: As 3 wire control mode is selected, the terminal S3 is not controlled by A052.
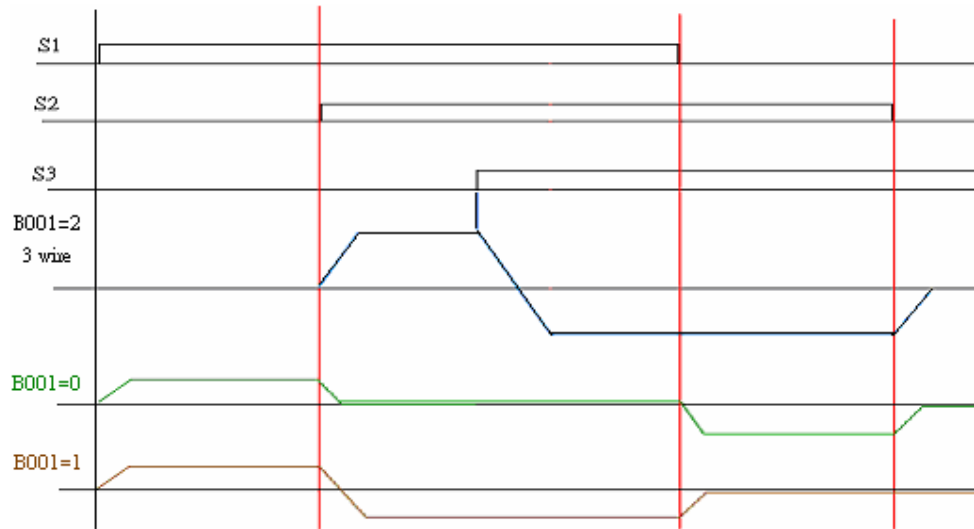
Figure 4-33 Drive start/stop operation sequences

Note: B002=0001, the reverse command is unavailable.

B002 : Prohibition of Reverse Operation	0000: Enable Reverse Command
	0001: Disable Reverse Command

B002=0001, the reverse command is invalid.

B003 : Stopping Method	0000: Controlled Deceleration-to- Stop with DC Injection Braking (Rapid Stop)
	0001: Free run stop (Coast stop)

1.) B003=0000: the inverter will decelerate to 0Hz within configured deceleration time after receiving the stop command.

2.) B003=0001: the inverter will stop after receiving the stop command. The motor will coast to stop.

B004 : Frequency Command Source Selection

    0000: Set the Frequency with Keypad

    0001: Potentiometer on Keypad

    0002: External Analog Signal Input or Remote Potentiometer

    0003: Up/Down Frequency Control Using MFIT (S1 - S6)

    0004: Communication Setting Frequency

    0005: Impulse frequency (S5) setting frequency (ver2.3)

1.) B004=0001: if one of the parameters in group A050~ A056is set to 16 and the multifunction terminal is OFF, the frequency is set by the potentiometer (VR for principal speed) on keypad. While the multifunction is ON, the frequency is set by analog signal (auxiliary speed) on terminal block (TM2).

2.) B004=0002: if one of the parameters in group A050~ A056 is set to 16 and the multifunction terminal is OFF, the frequency is set by the analog signal (principal speed) on terminal block (TM2), While the input is ON, the frequency is set by the potentiometer (VR for auxiliary speed) on the keypad.

3.) Please refer to the description of parameter group A050~ A056 (multifunction input terminals) for the function Up/Down terminal.

4.) The priority in reading frequency is Jog> preset speed>▲ ▼ on keypad or Up / Down or communication control.

B005: Frequency Upper limit(Hz) : 0.01 - 400.00
B006: Frequency Lower limit(Hz) : 0.01 - 400.00
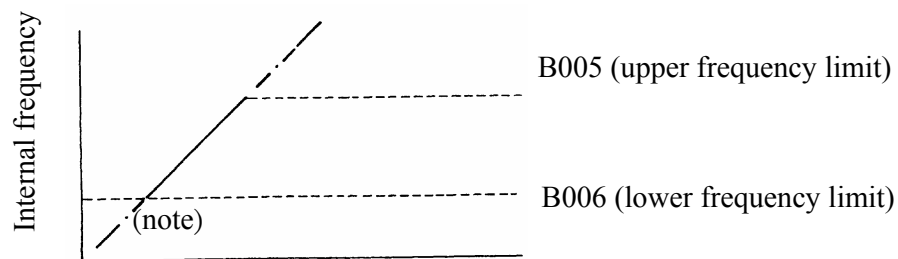
Figure 4-34 Frequency reference limits

※Note: When B006 = 0 Hz and frequency command is 0 Hz, the inverter will stop at 0 speed.
    When B006 > 0 Hz and frequency command ≦B006, the inverter will output the B006 preset value.

B010 : Parameter Lock(except B010) : 0000: Disable
                                                                    0001: Enable

---

0000: Disable parameter lock.
0001: Enable parameter lock.

> **B011 : Advanced Display : 0000: Disable**
> **0001: Enable**

0000: Disable advanced display.
0001: Enable access to advanced functions (A000~A181).

> **B012 Language Selection**
> **0000: English**
> **0001: German**
> **0002: French**
> **0003: Italian**
> **0004: Spanish**

The function is only available for the products with LCD operation keypad. The operation is not valid with the LED keypad.

> **B013:Motor Current Display Selection: 0000: Disable Motor Current Display**
> **0001: Enable Motor Current Display**

> **B014:Motor Voltage Display Selection: 0000: Disable Motor Voltage Display**
> **0001: Enable Motor Voltage Display**

> **B015:DC Bus Voltage Display Selection: 0000: Disable Bus Voltage Display**
> **0001: Enable Bus Voltage Display**

> **B016:PID Feedback Display   0000:Disabled**
> **0001:Enable**

Keypad displays PID feedback value:

Parameter A055=20 (When S6 is set as the PID feedback analog terminal, refer to PID),

A140=1(PID is enabled), and B016=1 (Displays S6 as PID analog feedback value 0~100, the formula is as follows:

If feedback signal is 0~10V, (A154=0000), the keypad display value = (S6/10V)*100

If feedback Signal is 4~20mA, (A154=0001), the keypad display value = (S6/20mA)*100

※Note: Please press DSP Key to switch between the output frequency and PID feedback value.

※Note: The inverter displays XXXF when in Run mode, while XXXr when stopped.

Chapter 5   Troubleshooting and maintenance

5.1. Error display and corrective action
5.1.1. Faults which can not be recovered manually

	Display	Fault	Cause	Corrective action
	CPF	Program problem	External noise interference	Connect a parallel RC suppressor across the magnetizing coil of the magnetic contactor that causes the interference
	EPR	EEPROM problem	Faulty EEPROM	Replace EEPROM
@	**-OV-**	Voltage too high when stopped	Detection circuit malfunction	Return the inverter
@	**-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
@	**-OH-**	The inverter is overheated when stopped	1. Detection circuit malfunction 2. Ambient temperature too high or bad ventilation	1. Return the inverter 2. Improve ventilation conditions
	CTER	Current Sensor detection error	Current sensor error or circuit malfunction	Return the inverter

※ Note： 〝@〞 the Failure contact does not function.

5.1.2. Faults which can be recovered manually and automatically

Display	Fault	Cause	Corrective Action
OC-S	Over current at start	1. the motor winding short circuit 2. motor contacts and ground short circuit 3. the 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 (A006 = 1) 3. Reduce stator resistance (A168) 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	Illegal interrupt of CPU	Outside noise interference	Return unit if this happens regularly
OVSP	Over speed during operating	1. Motor load too big or Inverter capacity too small 2. Motor parameter error (vector mode) 3. The gain is excessive in vector mode 4. Current detection circuit fault	1. Increase acceleration / deceleration time (B007/B008) 2. Input correct motor Parameter 3. Change stator Resistance gain and Rotor resistance gain (A168/A169), (suggest incremental Decrease of 50~100) 4. (Return unit)

5.1.3 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. Inappropriate settings on A002, A119~A122	1. Increase the motor capacity 2. set A002, A119~A122 properly
OL2	Inverter overload	Excessive Load	Increase the inverter capacity
OL3	Over torque	1. Excessive Load 2. Improper settings on A125, A126	1. Increase the inverter capacity 2. set A125, A126 properly
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 A014 2. Set a longer acceleration time 3. Add a reactor at the power input side
OH-C	Heat-sink temperature too High during operation	1. Excessive load 2. Ambient temperature too high or bad ventilation	1. Check if there are any problems with the load 2. Increase inverter capacity 3. Improve ventilation conditions

5.1.4 Special conditions

Display	Fault	Description
STP0	Zero speed stop	Occurs when preset frequency <0.1Hz
STP1	Fail to start directly	1. If the inverter is set for external terminal control mode (B000=1) and direct start is disabled (A017=0001) The inverter cannot be started and will flash STP1. The run input is active at power-up (refer to descriptions of A017). 2. Direct start is possible when A017=0001.
STP2	Keypad emergency stop	1. If the inverter is set in external control mode (B000=0001) and the Stop key is enabled (A010=0000), the inverter will stop according to the setting on B003. When the Stop key is pressed, 'STP2' flashes after stop. Release and re-assert the run contact to restart the inverter. 2. If the inverter is in communication mode and the Stop key is enabled (A010=0000), the inverter will stop in the way set by B003 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 cannot perform an emergency stop when A010=0001
E.S.	External emergency stop	The inverter will ramp stop and then flash E.S., when input external emergency stop signal via the multifunctional input terminal activates (refer to descriptions of A050~A056).
b.b.	External base block	The inverter stops immediately and then flashes b.b., when external base block is input through the multifunctional input terminal activates (refer to descriptions of A050~A056).
ATER	Auto-tuning faults	1. Motor data error resulting in for auto-tuning failure 2. Stopping the inverter during Auto-tuning before completion
PDER	PID feedback loss	PID feedback loss detect

5.1.5 Operation errors

Display	Error	Cause	Corrective Action
LOC	Parameter and frequency reverse already locked	1.Attempt to modify frequency parameter while A039>0000 2.Attempt to reverse while B002=0001	1. Set A039=0000 2. Set B002=0000
Err1	Keypad operation error	1. Press ▲ or ▼ while B004>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 B004=0 2.Modify the parameter while STOP
Err2	Parameter setting error	1. B006 is within the range of A032 ± A035 or A033 ± A035or A034 ± A035 2. B005≤B006 3. Setting error while performing Auto tuning(e.g. B000 ≠ 0，B004 ≠ 0)	1.Modify A032~A034 or A035 2. B005>B006 Set B000=0, B004=0 during Auto tuning
Err5	Modification of parameter is not available in RS485 communication	1.Issue a control command during RS485 communication disallowed 2.Modify the function A164 ~ A167 during RS485 communication	1.Issue enable command before communication 2.Set parameters 164-167 function before RS485 communication
Err6	Communication failed	1.Wiring error 2.Communication parameter setting error. 3.Sum-check error 4.Incorrect communication protocol	1.Check hardware and wiring 2.Check Functions A161 ~ A164
Err7	Parameter conflict	1.Attempt to modify the function A175. 2.Voltage and current detection circuit is abnormal	If Reset is not available, please contact TWMC
EPr1	Parameter setting error copy unit failed	1. Set A040=1/2 to without connecting copy unit. 2. Copy unit failed.	1.Modify A040 2.Replace copy unit
EPr2	Parameter mis-match	Problem during copying of the parameter to inverter to	1.Retry copy command 2.Replace copy unit

5.2 General troubleshooting

Status	Checking point	Remedy
Motor can not run	Is power applied to L1 (L), L2, and L3 (N) 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 T1, T2, and 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	Is the wiring for output terminals T1, T2, and T3 correct?	· Wiring must match U, V, and W terminals of the motor.
	Is the wiring for forward and reverse signals correct?	· Check wiring are correct if necessary.
The motor speed can not be regulated.	Is the wiring for the analog frequency inputs correct?	· Check wiring are correct if necessary.
	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 specifications for the motor (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 N3

DM = Diode Module
I.G.B.T = Inverter Gate Bipolar Transistor

```
┌─────────────────┐
│  N3 INV Fault   │
└────────┬────────┘
         │
   ◇ Is fault known? ◇ ──NO──────────────────┐
         │ YES                                │
   ◇ Symptoms other than burn                 ▼
     out, damage, or fuse ◇ ──NO──→  ◇ Any symptoms of burn ◇ ──YES──→ ┌──────────────────────┐
     meltdown in the inverter?          out and damage?                │ Check burnt and      │
         │ YES                          │ NO                           │ damaged parts        │
   ◇ Fault signal? ◇ ──NO──┘            ▼                              └──────────────────────┘
         │ YES                   ◇ Is the main circuit ◇ ──NO──→ ┌──────────────┐
   ┌──────────────────┐            DM intact?                    │ Replace DM   │
   │ Check according  │            │ YES                         └──────────────┘
   │ to displayed     │            ▼
   │ fault messages   │     ◇ Is the fuse intact? ◇ ──NO──→ ┌──────────────┐
   └──────────────────┘            │ YES                    │ Replace fuse │
                                   ▼                        └──────────────┘
                            ◇ Is the main circuit ◇ ──NO──→ ┌────────────────┐
                              I.G.B.T intact?               │ Replace I.G.B.T│
                                   │ YES                    └────────────────┘
   ┌────────────────────┐          │
   │ Visually check     │←─────────┘
   │ controller and     │
   │ driver boards      │
   └─────────┬──────────┘
   ◇ Any visual abnormalities? ◇ ──YES──→ ┌──────────────────────────┐
             │ NO                         │ Replace the defective    │
             ▼                            │ boards                   │
   ┌──────────────────┐                   └──────────────────────────┘
   │ Apply the power  │←──────────────────────────┐
   └────────┬─────────┘                           │
   ◇ Are displays and indicators of the           │
     operating unit working normally? ◇ ──NO──────┼──┐
             │ YES                                 │  │
   ◇ Any fault display? ◇ ──NO──┐        ◇ Is LED lit? ◇ ──NO──→ ┌──────────────────────────┐
             │                  │                               │ Replace the precharge    │
   ◇ What's the message? ◇      │                  │ YES         │ resistor                 │
             │                  │        ◇ Is the DC input       └──────────────────────────┘
   Any fault display?           │          voltage controlling
             │                  │          the power correct? ◇ ──NO──→ ┌──────────────────────────┐
   3 fault values in A177       │                  │ YES                 │ Check terminals and wiring│
             │                  │        ◇ Is +5V control         └──────────────────────────┘
   ┌──────────────────────┐     │          voltage correct? ◇ ──NO──→ ┌──────────────────────────┐
   │ Check 3 fault values │     │                  │ YES                 │ Replace the driver board │
   │ of 15-2 with ▼key.   │     │        ┌─────────────────────┐   └──────────────────────────┘
   └──────────────────────┘     │        │ Replace control board│
                                │        │ and digital operating │
                                │        │ unit                  │
                                │        └──────────┬────────────┘
                                │        ◇ Is the error eliminated
                                │          after replacing control ◇ ──NO──→ ┌──────────────────────┐
                                │          board?                            │ The inverter has     │
                                │                  │ YES                     │ faulted              │
                                └──────────────────┘                        │ Perform detailed check│
                                                                             └──────────────────────┘
```

*to next page

Figure 5-1 N3 fault display troubleshooting flow chart

*to previous page

```
┌─────────────────────────┐
│  Check Inverter parameters │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Perform parameter       │
│  initializations         │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Specify operation control│
│  mode                    │
└─────────────────────────┘
```

FWD or REV LED light after flashes? —— 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 faulted

Perform detailed check

Figure 5-1 N3 fault display troubleshooting flow chart

Troubleshooting for OC, OL error displays

```
┌─────────────────────┐
│ The inverter displays OC, OL │
│         errors        │
└─────────────────────┘
            │
            ▼
     ◇ Is the main circuit ◇ ──NO──▶ ┌──────────────────┐
     ◇  I.G.B.T working?  ◇          │   Replace I.G.B.T  │
            │ YES                     └──────────────────┘
            ▼
     ◇ Any visual abnormalities? ◇ ──────▶ ┌────────────────────────┐
            │                               │ Replace faulty circuit board │
            ▼                               └────────────────────────┘
     ┌──────────────┐
     │  Apply power  │
     └──────────────┘
            │
            ▼
     ◇ Any abnormal ◇ ──YES──▶ ◇ Is the current detector ◇ ──NO──▶ ┌────────────────────────┐
     ◇ indications? ◇           ◇           OK?            ◇         │ Replace the current controller │
            │                          │ YES                         └────────────────────────┘
            │                          ▼
            │                   ┌────────────────────┐
            │                   │ Replace control board │
            │                   └────────────────────┘
            ▼
     ┌─────────────────────────┐
     │  Input operation command │
     └─────────────────────────┘
            │
            ▼
     ◇ Is FWD LED ◇ ──NO──▶ ┌────────────────────┐
     ◇ illuminated? ◇        │ Replace control board │
            │ YES            └────────────────────┘
            ▼
     ┌─────────────────────────┐
     │  Input frequency command │
     └─────────────────────────┘
            │
            ▼
     ◇ Is the output frequency of the ◇ ──NO──▶ ┌────────────────────┐
     ◇  operating unit displayed?     ◇         │ Replace control board │
            │ YES                                └────────────────────┘
            ▼
     ◇ Is there            ◇ ──NO──▶ ┌────────────────────┐
     ◇ voltage at U, V and W output ◇ │ Replace control board │
     ◇       terminals?    ◇          └────────────────────┘
            │ YES                                │
            ▼                                     ▼
     ┌────────────────────────┐          ◇ Is the inverter ◇ ──NO──┐
     │ Connect the motor to run │          ◇ operating well after ◇       │
     └────────────────────────┘          ◇ ports replacement? ◇         │
            │                                   │ YES                   │
            ▼                                     ▼                       │
     ◇ Any fault values displayed? ◇ ──YES──────────▶●◀──────────────┘
            │ NO                                     │
            ▼                                         ▼
     ◇ Is the output current of ◇ ──NO──────▶ ┌────────────────────┐
     ◇  each phase even?        ◇             │ The inverter is faulted │
            │ YES                              ├────────────────────┤
            ▼                                   │ Perform detailed check │
     ┌────────────────────────┐               └────────────────────┘
     │ The inverter's output is OK │
     └────────────────────────┘
```

Figure 5-2 OC, OL Fault Flow Chart

Troubleshooting for OV, LV error

```
┌─────────────────────────────┐
│ The inverter displays OV, LV │
└─────────────────────────────┘
                │
                ▼
        ◇ Is the main circuit fuse    ──NO──►  ┌──────────────────────────────┐
          intact ?                              │ Replace the main circuit fuse │
                │                                └──────────────────────────────┘
              YES
                │
                ▼
        ◇ Any visual abnormalities?   ──YES──► ┌──────────────────────────────┐
                │                               │ Replace the bad circuit board │
               NO                               └──────────────────────────────┘
                │
                ▼
        ┌──────────────┐
        │  Apply power │
        └──────────────┘
                │
                ▼
        ◇ Any abnormal              ◄──YES── ┌───────────────────────────┐
          indications?                        │ Replace the control board │
                │                             └───────────────────────────┘
               NO
                │
                ▼
        ┌────────────────────────┐
        │ Input operation command │
        └────────────────────────┘
                │
                ▼
        ◇ Is FWD LED still          ──NO──► ┌───────────────────────────┐
          illuminated after flash?           │ Replace the control board │
                │                             └───────────────────────────┘
              YES
                │
                ▼
        ┌──────────────────────────┐
        │ Input frequency commands │
        └──────────────────────────┘
                │
                ▼
        ◇ Is the output frequency of   ──NO──► ┌───────────────────────────┐
          the operating unit displayed?          │ Replace the control board │
                │                                 └───────────────────────────┘
              YES
                │
                ▼
        ◇ Is there                     ──NO──► ┌───────────────────────────┐
          voltage at T1, T2, T3 output          │ Replace the control board │
          terminals?                            └───────────────────────────┘
                │                                          │
              YES                                          ▼
                │                              ◇ Is the inverter        ──NO──┐
                ◄─────────────────────────────  working well after           │
                │                                 replacement?                │
        ┌────────────────────────┐                       │                   │
        │ Connect the motor to run │                    YES                   │
        └────────────────────────┘                       │                   │
                │                                                             │
                ▼                                                             │
        ◇ Any abnormal value?   ──YES──────────────────────────────────┐     │
                │                                                       │     │
               NO                                                       │     │
                │                                                       ▼     ▼
                ▼                                                       ●─────┘
        ◇ Is the current on all  ──NO──────────────────────────────────┘
          phases even?                                                  │
                │                                                       ▼
              YES                                    ┌───────────────────────────┐
                │                                    │ The inverter is faulted     │
                ▼                                    ├───────────────────────────┤
        ┌──────────────────────────┐                │ Perform detailed check      │
        │ The inverter's output is OK │              └───────────────────────────┘
        └──────────────────────────┘
```
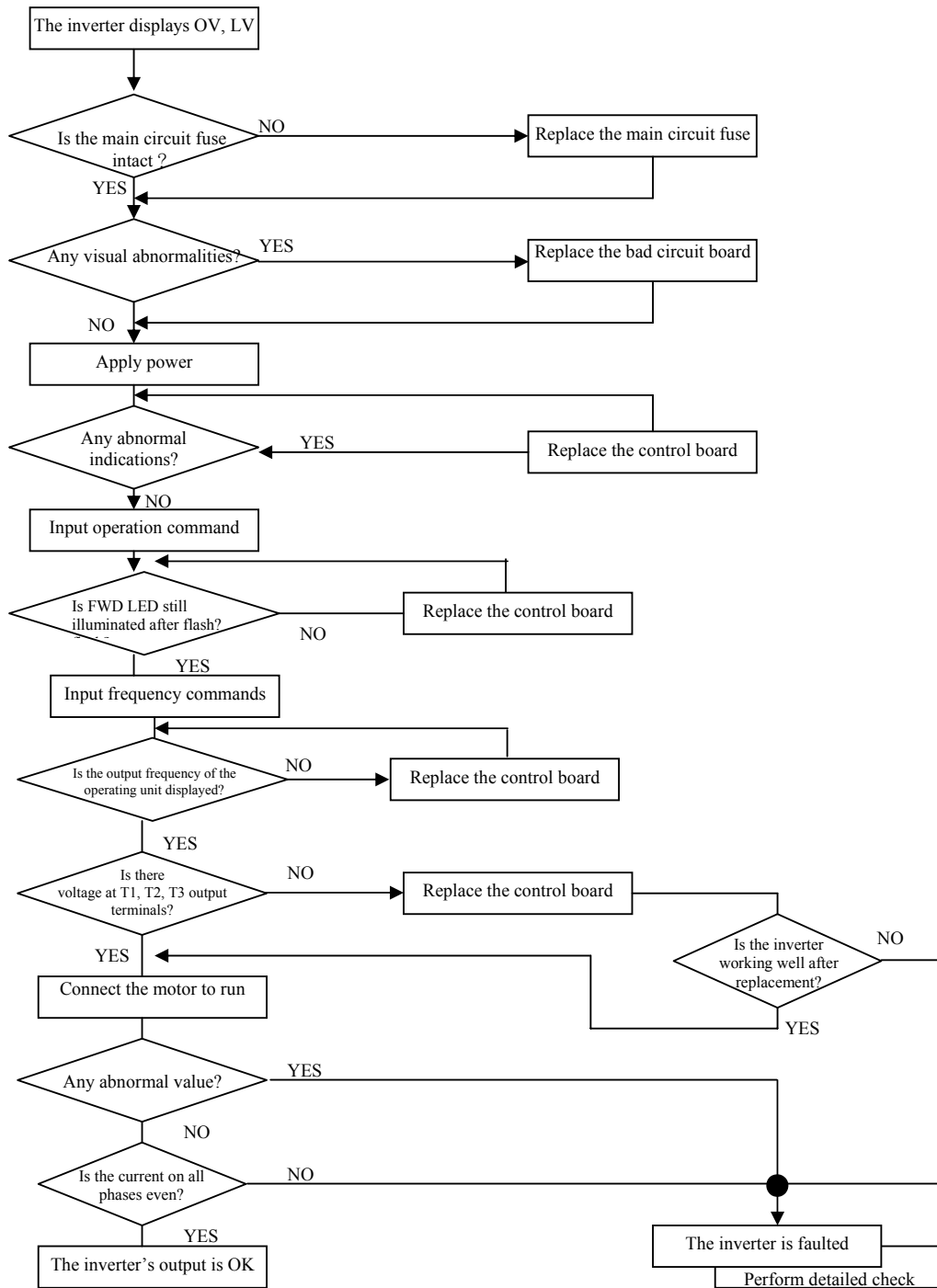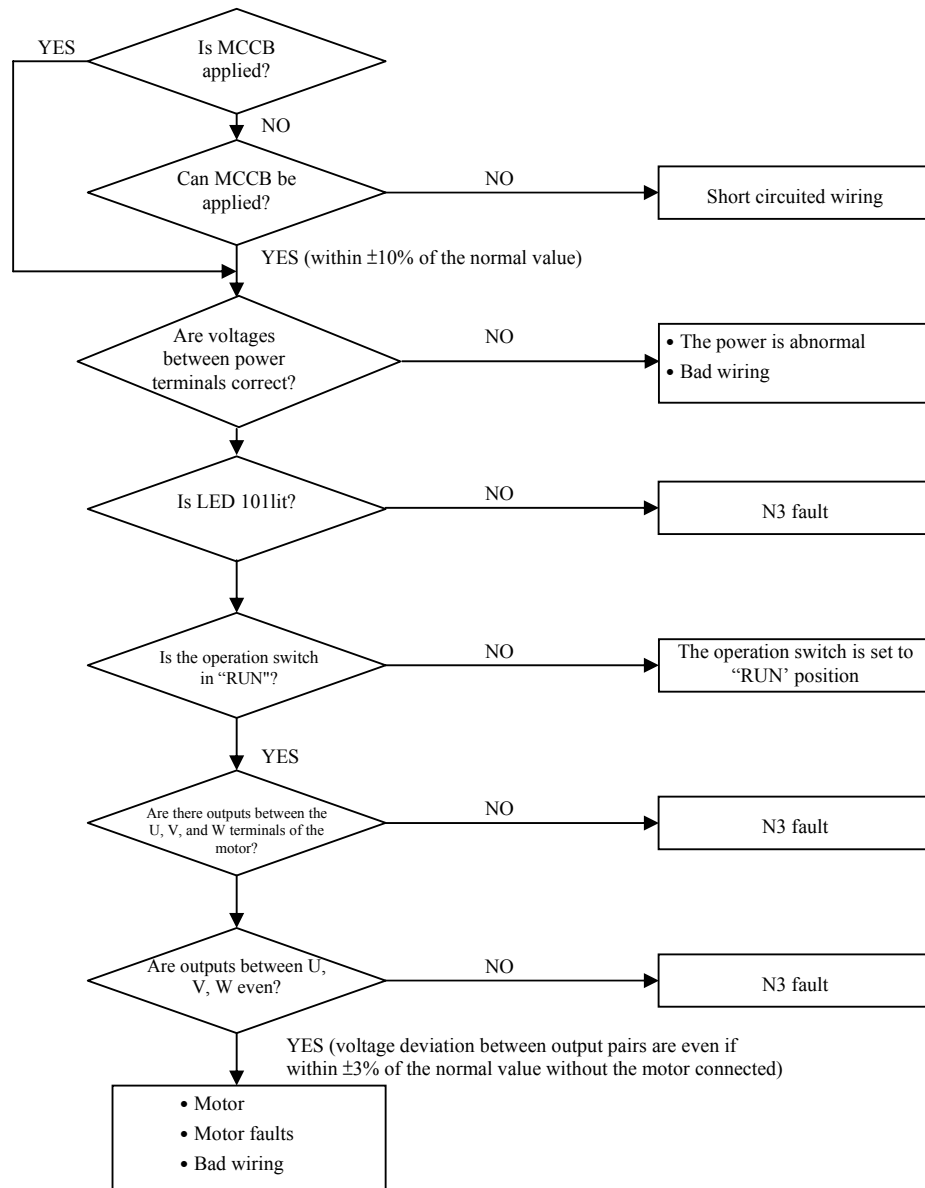
Figure 5-3 OC, LV Fault Flow Chart

The motor can not run

Figure 5-4 RUN MODE TROUBLESHOOTING Flow Chart
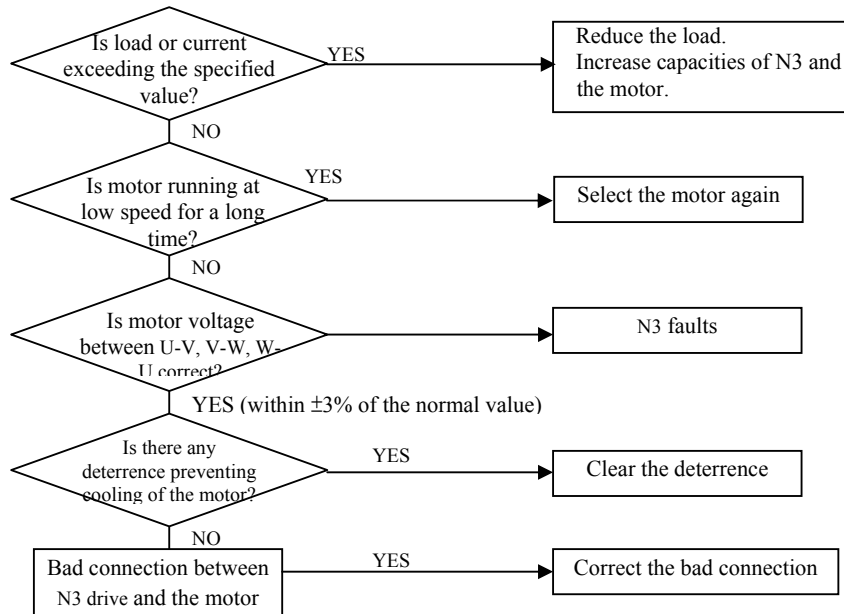
The motor is overheated

Figure 5-5 Motor Overheat Troubleshooting Flow Chart
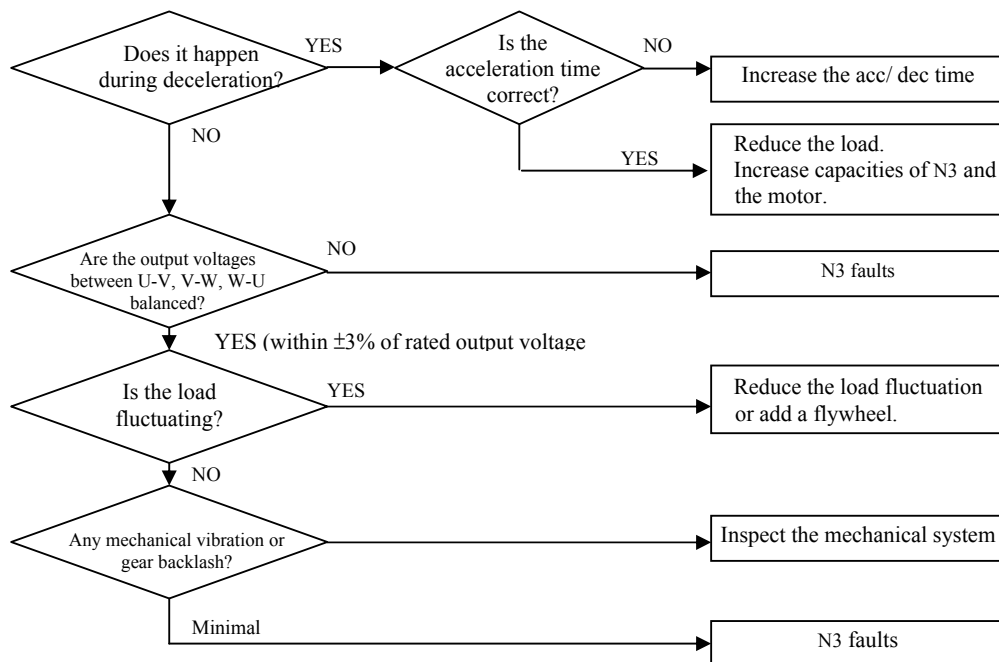
Motor runs unevenly

Figure 5-6 Motor Instability Troubleshooting Flow Chart

5.4 Routine inspection and period 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 Daily	Checking period 1Year	Methods	Criteria	Remedies
Ambient conditions around the machine	Confirm the temperature and humidity at the machine	○		Measure with thermometer and hygrometer according to installation notices.	Temperature: -10 – 40ºC (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	200V series: below 100Ω 400V series: below 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	○				

Chapter 6   Peripherals Components

6.1 Reactor specification at Input side

Model		AC inductance at input side	
		Current (A)	Inductance (mH)
N3-	2P5	5.0	2.1
	201	5.0	2.1
	202	10.0	1.1
	203	15.0	0.71
	205	20.0	0.53
	207	30.0	0.35
	210	40.0	0.265
	215	60.0	0.18
	220	80.0	0.13
	225	90.0	0.12
	230	120.0	0.09
	240	160.0	0.07

Model		AC inductance at input side	
		Current (A)	Inductance (mH)
N3-	401	2.5	8.4
	402	5.0	4.2
	403	7.5	3.6
	405	10.0	2.2
	407	15.0	1.42
	410	20.0	1.06
	415	30.0	0.7
	420	40.0	0.53
	425	50.0	0.42
	430	60.0	0.36
	440	80.0	0.26
	450	90.0	0.24
	460	120.0	0.18
	475	150.0	0.15

6.2 Reactor specification at DC side

Model		DC inductance at input side	
		Current (A)	Inductance (mH)
N3	2P5	3.1	5.65
	201	4.5	3.89
	202	7.5	2.33
	203	10.5	1.67
	205	17.5	1.00
	207	26	0.67
	210	35	0.50
	401	2.3	15.22
	402	3.8	9.21
	403	5.2	6.73
	405	8.8	3.98
	407	13	2.69
	410	17.5	2.00
	415	25	1.40

6.3 Braking unit and braking resistor

N3 series braking specifications

Inverter Model	Braking Unit		Braking Resistor per braking unit	Suitable Motor Capacity (HP)	Suitable Motor Capacity (KW)	Braking resistor Specification		Braking resistor Duty Cycle (%)	Braking torque (%)	Resistor dimension (L*W*H) mm (inches)
	Model	Number used	Type			(W)	(Ω)			
2P5	-	-	JNBR-150W200	0.5	0.4	150	200	10	238	251*28*60 (9.88*1.10*2.36)
201	-	-	JNBR-150W200	1	0.75	150	200	10	119	251*28*60 (9.88*1.10*2.36)
202	-	-	JNBR-150W100	2	1.5	150	100	10	119	251*28*60 (9.88*1.10*2.36)
203	-	-	JNBR-260W70	3	2.2	260	70	10	115	274*34*78 (10.79*1.34*3.07)
205	-	-	JNBR-390W40	5	3.7	390	40	10	119	395*34*78 (10.79*1.34*3.07)
207	-	-	JNBR-520W30	7.5	5.5	520	30	10	108	400*40*100 (15.7*1.57*3.94)
210	-	-	JNBR-780W20	10	7.5	780	20	10	119	400*40*100 (15.7*1.57*3.94)
215	-	-	JNBR-2R4KW13R6	15	11	2400	13.6	10	117	535*50*110 (*2 pcs) (21.1*1.96*4.33)
220	-	-	JNBR-3KW10	20	15	3000	10	10	119	615*50*110 (*2 pcs)
225	JNTBU-230	1	JNBR-4R8KW8	25	18.5	4800	8	10	119	535*50*110 (*4 pcs) (21.1*1.96*4.33)
230	JNTBU-230	1	JNBR-4R8KW6R8	30	22	4800	6.8	10	117	535*50*110 (*4 pcs) (21.1*1.96*4.33)
240	JNTBU-230	2	JNBR-3KW10	40	30	3000	10	10	119	615*50*110 (*2 pcs) (24.21*1.96*4.33)
401	-	-	JNBR-150W750	1	0.75	150	750	10	126	251*28*60 (9.88*1.10*2.36)
402	-	-	JNBR-150W400	2	1.5	150	400	10	119	251*28*60 (9.88*1.10*2.36)
403	-	-	JNBR-260W250-	3	2.2	260	250	10	126	274*34*78 (10.79*1.34*3.07)
405	-	-	JNBR-400W150-	5	3.7	400	150	10	126	395*34*78 (10.79*1.34*3.07)
407	-	-	JNBR-600W130-	7.5	5.5	600	130	10	102	470*50*100 (15.7*1.57*3.94)
410	-	-	JNBR-800W100	10	7.5	800	100	10	99	535*50*110 (24.21*1.96*4.33)
415	-	-	JNBR-1R6KW50	15	11	1600	50	10	126	615*50*110 (24.21*1.96*4.33)
420	-	-	JNBR-1R5KW40	20	15	1500	40	10	119	615*50*110 (24.21*1.96*4.33)
425	JNTBU-430	1	JNBR-4R8KW32	25	18.5	4800	32	10	119	535*50*110 (*4 pcs) (21.1*1.96*4.33)
430	JNTBU-430	1	JNBR-4R8KW27R2	30	22	4800	27.2	10	117	535*50*110 (*4 pcs) (21.1*1.96*4.33)
440	JNTBU-430	1	JNBR-6KW20	40	30	6000	20	10	119	615*50*110 (*4 pcs) (24.21*1.96*4.33)
450	JNVPHV-0060	1*5	JNBR-9R6KW16	50	37	9600	16	10	119	535*50*110 (*4 pcs) (21.1*1.96*4.33)
460	JNVPHV-0060	1*5	JNBR-9R6KW13R6	60	45	9600	13.6	10	117	535*50*110 (*4 pcs) (21.1*1.96*4.33)
475	JNTBU-430	2	JNBR-6KW20	75	55	6000	20	10	126	615*50*110 (*4 pcs) (24.21*1.96*4.33)

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

1. **W :** braking resistor power (Watts)
2. **Vpnb:** braking voltage (220V=380VDC, 440V=760VDC)
3. **ED%:** braking effective period
4. **R:** braking resistor rated ohms
5. **Alternative selection choice:**   450: (JNTBU-430 + JNBR-4R8KW32) × 2
    460: (JNTBU-430 + JNBR-4R8KW27R2) × 2

Above 25HP, please add Braking Transistor Units: 200V JNTBU-230
    400V JNTBU-430
    400V JUVPHV-0060

For more detailed information, please contact TWMC.

6.4 Digital operator and extension cable

A. Remote Cable Kit

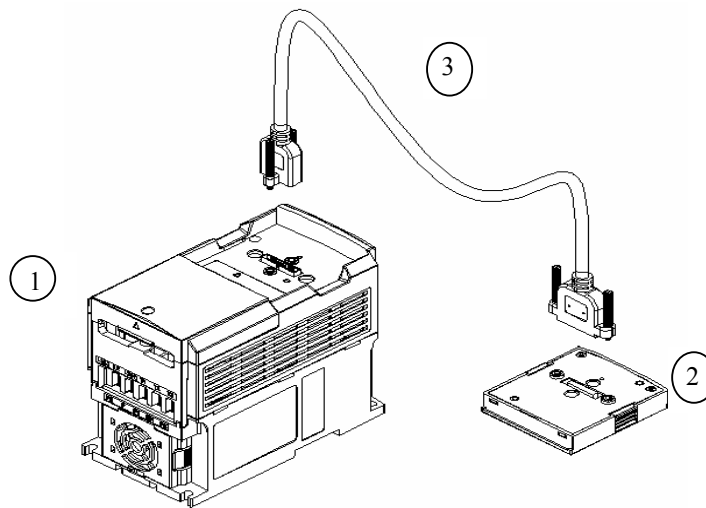| Inverter Model	Extension Cable Kit	Cable Length FT (Meter)
	JNSW-30P5	1.6 (0.5)
	JNSW-3001	3.3 (1.0)
All models	JNSW-3002	6.6 (2.0)
	JNSW-3003	9.8 (3.0)
	JNSW-3005	16.4 (5.0)

Figure 6-1 Digital Operator Extension Cable

B. Content
① Inverter
② LED (N3-LED) or LCD (N3-LCD) Keypad
③REMOTE Cable for Keypad

C. Operation procedure:

Warning: Disconnect the power supply. The following procedures should be performed after there is no display on the keypad.
1. Remove the keypad from the Inverter.
2. Please refer to Figure 6-1 before mounting the keypad to your machine or Panel.
3. Connect the inverter and the keypad with the remote cable in accordance with the Figure 6-1.
Supply power ONLY after all components are secured.

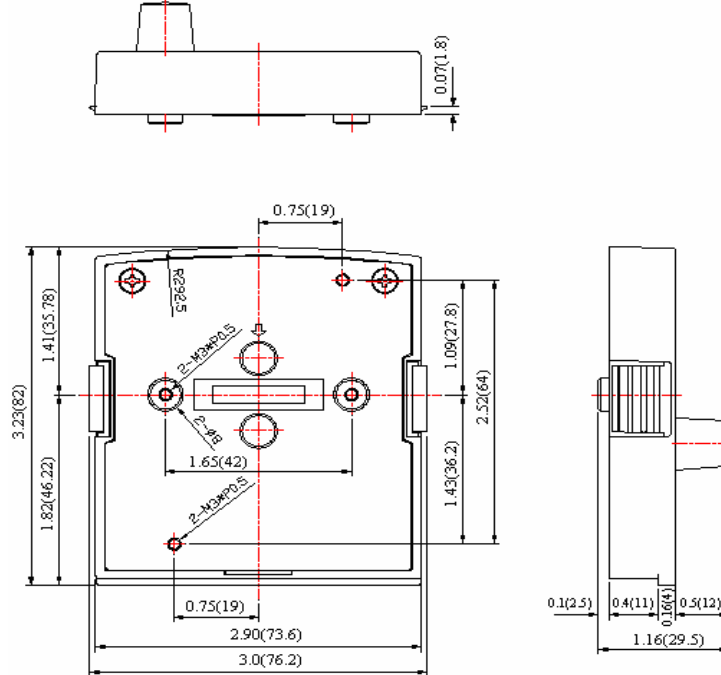**LED Keypad (N3-LED) Mounting Dimensions   Unit: in (mm)**

Figure 6-2 LED Keypad (N3-LED) Mounting Dimensions

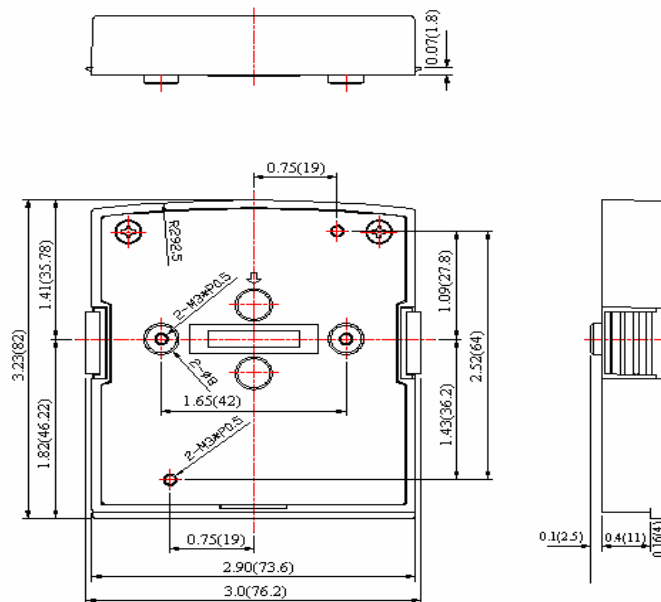**LCD Keypad (N3-LCD) Mounting Dimensions   Unit: in (mm)**

Figure 6-3 LCD Keypad (N3-LCD) Mounting Dimensions

6. 5 EMC Filter

The inverter adopts rapid switching components to improve the efficiency of the motor and to reduce the motor noise. Using the EMC Filter allows the EMI (Electromagnetic Interference) and RFI (Radio Frequency interference) to be controlled within ranges compliant with the directives as shown.

EMC Directives

The inverter with optional filter complies with the EMC directives 89/336/EEC, limiting the environmental EMI and RFI. Independent tests have demonstrated compliance to the following standards when the optional filters are used.

EMI radio standard、EMS immunity standard

EN 61800-3 1996/A11: 2000: First Environment Unrestricted Distribution (Class B).

EN 61800-3 1996/A11: 2000: First Environment Restricted Distribution

Filter Selection

Inverter Model		Rating (INPUT)	Filter Model	
			First Environment Restricted Distribution	First Environment Unrestricted Distribution
N3	2P5-SCF	1 φ 170 ~264V	Built in	FS 6146-11-07
	201-SCF	1 φ 170~264V	Built in	FS 6146-11-07
	202-SCF	1 φ 170~264V	Built in	FS 6146-27-07
	203-SCF	1 φ 170 ~264V	Built in	FS 6146-27-07
	2P5-SC	1 φ 170 ~264V	FS 6146-11-07	--
	201-SC	1 φ 170~264V	FS 6146-11-07	--
	202-SC	1 φ 170~264V	FS 6146-27-07	--
	203-SC	1 φ 170 ~264V	FS 6146-27-07	--
	2P5-C	3 φ 170 ~264V	FS 6147-8.9-07	--
	201-C	3 φ 170 ~264V	FS 6147-8.9-07	--
	202-C	3 φ 170 ~264V	FS 6147-8.9-07	--
	203-C	3 φ 170 ~264V	FS 6147-19-07	--
	205-C	3 φ 170 ~264V	FS 6147-19-07	--
	207-C	3 φ 170 ~264V	FS 6147-39-07	--
	210-C	3 φ 170 ~264V	FS 6147-39-07	--
	401-CF	3 φ 323~528 V	Built in	FS 6149-4.6-07
	402-CF	3 φ 323~528 V	Built in	FS 6149-4.6-07
	403-CF	3 φ 323~528 V	Built in	FS 6149-10-07
	405-CF	3 φ 323~528 V	Built in	FS 6149-10-07
	407-CF	3 φ 323~528 V	Built in	FS 6149-28-07
	410-CF	3 φ 323~528 V	Built in	FS 6149-28-07
	415-CF	3 φ 323~528 V	Built in	FS 6149-28-07
	401-C	3 φ 323~528 V	FS 6149-4.6-07	--
	402-C	3 φ 323~528 V	FS 6149-4.6-07	--
	403-C	3 φ 323~528 V	FS 6149-10-07	--
	405-C	3 φ 323~528 V	FS 6149-10-07	--
	407-C	3 φ 323~528 V	FS 6149-28-07	--
	410-C	3 φ 323~528 V	FS 6149-28-07	--
	415-C	3 φ 323~528 V	FS 6149-28-07	--
	420-N1	3 φ 323~528 V	JUNF34048S-MA	--
	425-N1	3 φ 323~528 V	KMF370A	--
	430-N1	3 φ 323~528 V	KMF370A	--
	440-N1	3 φ 323~528 V	KMF3100A	--
	450-N1	3 φ 323~528 V	KMF3100A	--
	460-N1	3 φ 323~528 V	KMF3150A	--
	475-N1	3 φ 323~528 V	KMF3180A	--

Figure 6-4 N3 External Filter Dimensions

MODEL \ SIZE	In (mm) Inverter Mounting Dimensions (C*B)	In (mm) External Filter Size (W*H*D)	In (mm) External Filter Mounting Dimensions(E*A)
FS 6146 - 11 - 07 FS 6147 - 8.9 - 07 FS 6149- 4.6 - 07	**3.07*5.91** **(78 * 150)**	**3.58*7.56*1.10** **(91 * 192 * 28)**	**2.91*7.13** **(74 * 181)**
FS 6146 - 27 – 07 FS 6147 - 19 –07 FS 6149 - 10 - 07	**4.51*6.71** **(114.6 * 170.5)**	**5.04*8.46*1.46** **(128 * 215 * 37)**	**4.37*8.03** **(111 * 204)**
FS 6147 - 39 – 07 FS 6149 - 28 - 07	**6.81*9.61** **(173 * 244)**	**7.40*11.34*1.65** **(188 * 289 * 42)**	**6.50*10.94** **(165 * 278)**
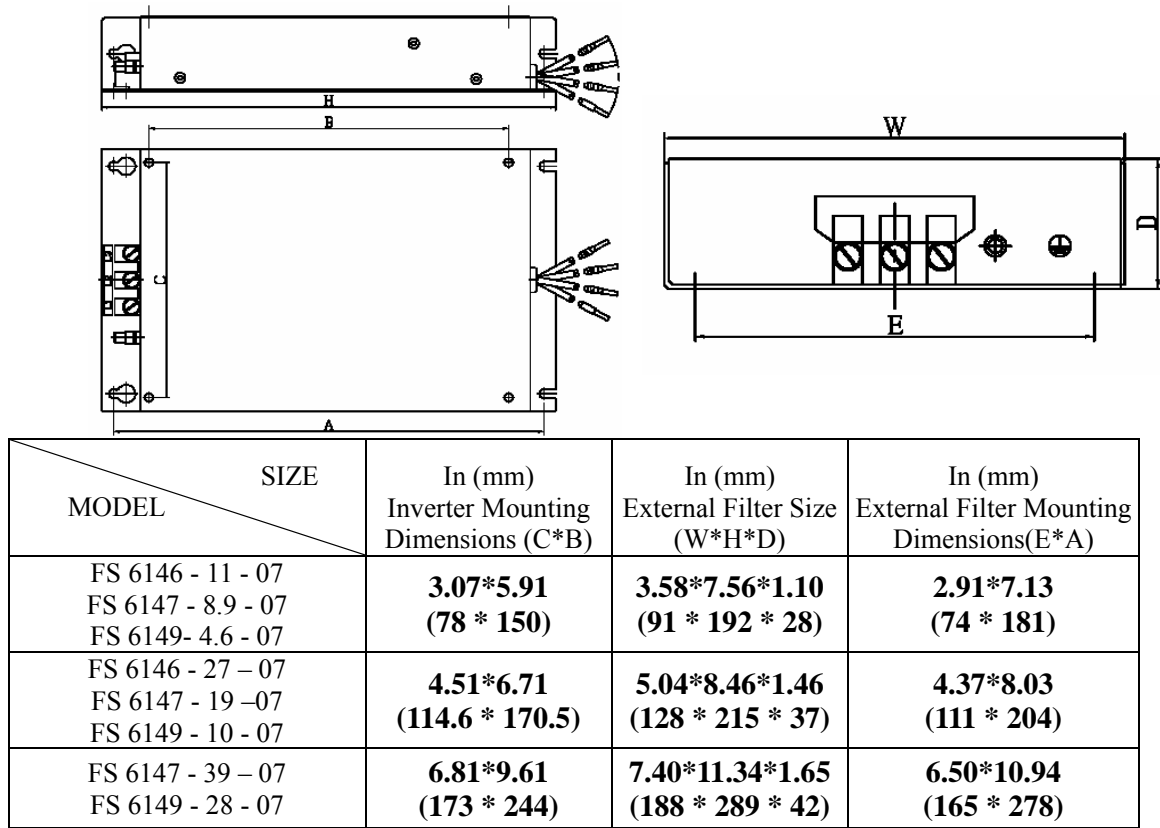
Model	Dimensions in(mm)						
	W	W1	H	H1	D	d	M
KMF370A	3.66(93)	3.11(79)	12.3(312)	11.7(298)	7.48(190)	0.28(7)	M6
KMF3100A	3.66(93)	3.11(79)	12.3(312)	11.7(298)	7.48(190)	0.28(7)	M6
KMF3150A	4.96(126)	4.41(112)	12.3(312)	11.7(298)	8.82(224)	0.28(7)	M6
KMF3180A	4.96(126)	4.41(112)	12.3(312)	11.7(298)	8.82(224)	0.28(7)	M6

Figure 6-5 JUNF34048S-MA:
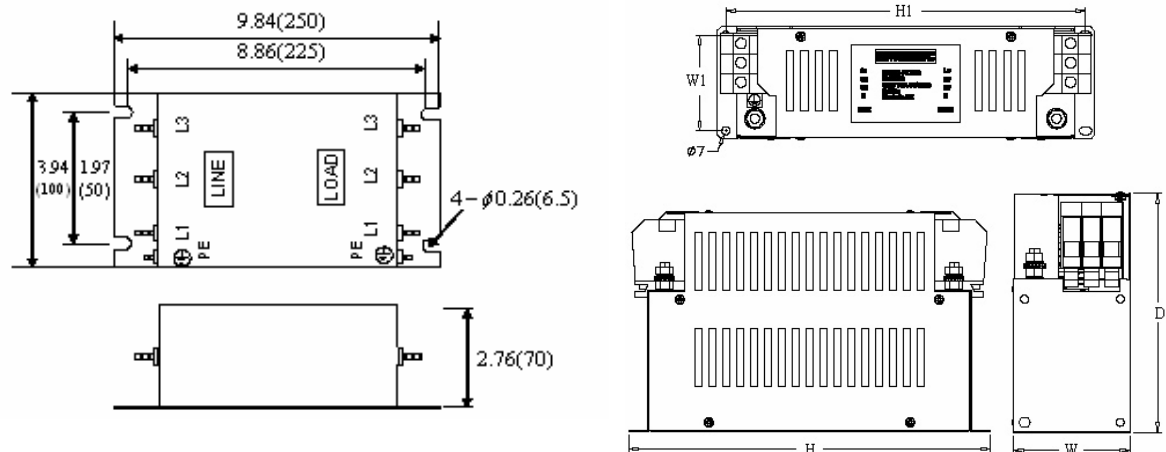
6.6 Interface Card

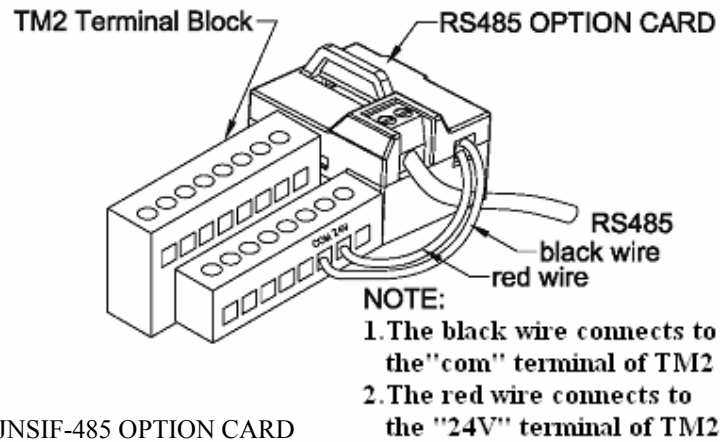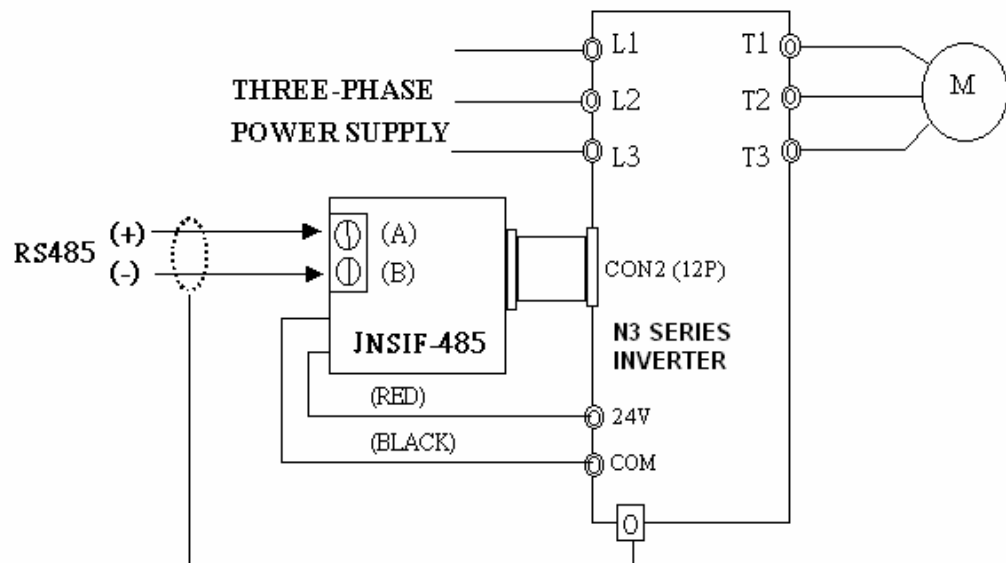### 6.6.1 RS-485 Interface Card (Model: JNSIF-485)

Figure 6-6 JNSIF-485 OPTION CARD

Figure 6-7 JNSIF-485 Wiring Diagram:

Note:

Please reinstall the cover of inverter to avoid electrical noise disturbances on the Interface Card.

Please use isolated RS232 / RS485 converter to link the PC and interface card to avoid equipment damage.

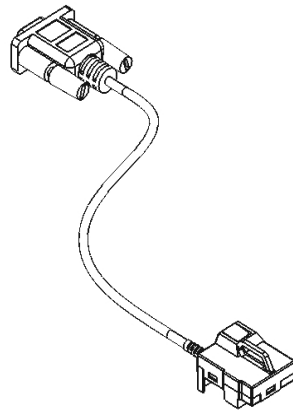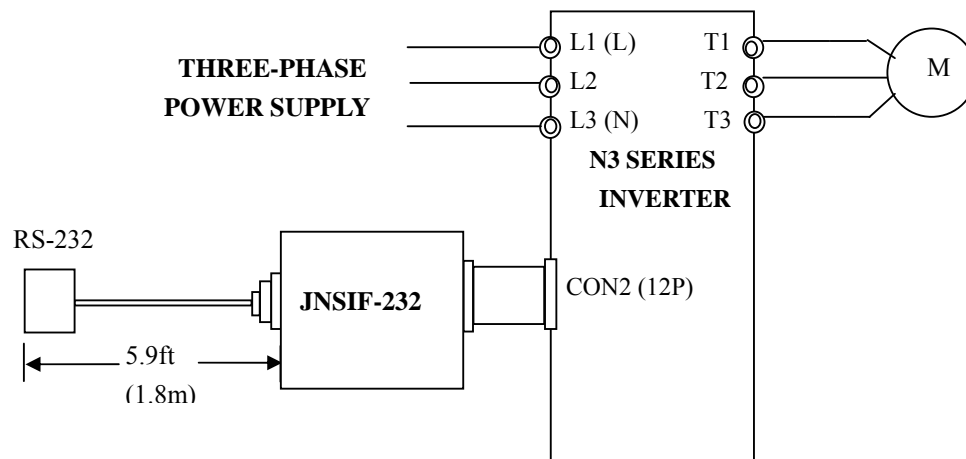## 6.6.2 RS-232 Interface Card (Model: JNSIF-232)

Figure 6-8 JNSIF-232 OPTION CARD

Figure 6-9 JNSIF-232Wiring Diagram:

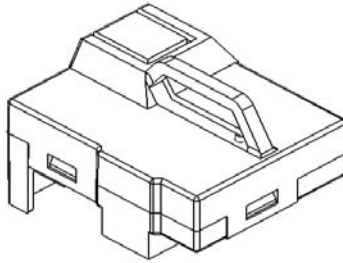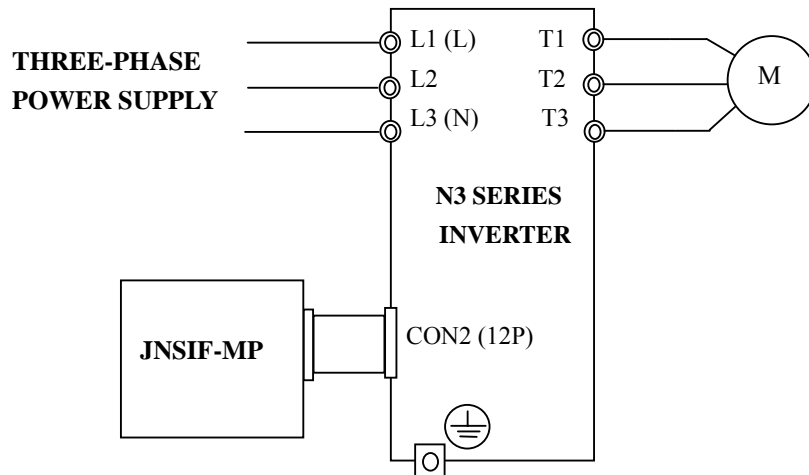## 6.6.3 Program Copy Unit (Model: JNSIF-MP)

Figure 6-10 Program Copy Unit

Figure 6-11 JNSIF-MP   Wiring Diagram

6.6.4 PDA Link

. HP iPAQ Pocket PC h2210. (PDA) / PC hx2190
. PDA wire (JNSWPDA).
. RS-232 Interface Card (JNSIF-232).
. Inverter

55m
(2.16in)
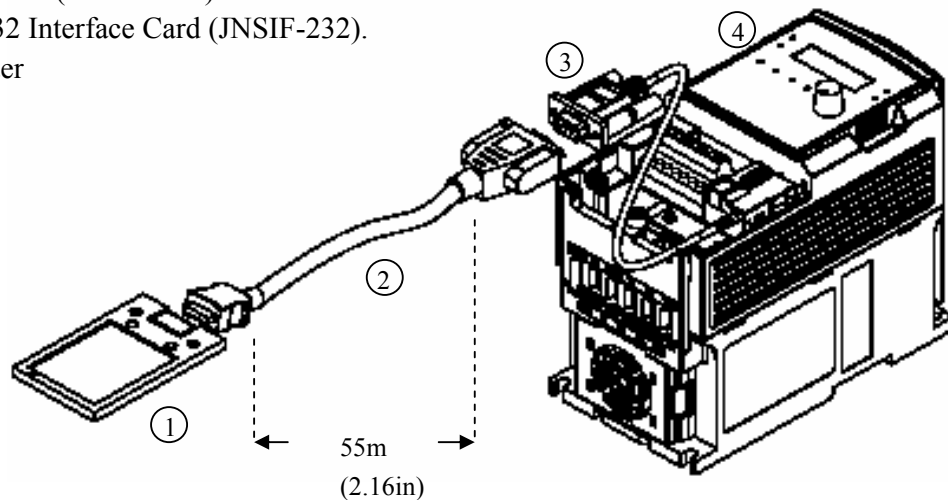
Figure 6-12 PDA Link Board Installation

Appendix 1: N3 Motor Internal Parameter List

Factory Setting of the Motor Internal Parameters：

Parameter / Model		A168 (Stator Resistance)	A169 (Rotor Resistance)	A170 (Equivalent Inductance)	A171 (Magnetization Current)	A172 (Iron Loss Conductance)
N3	2P5	200	200	800	7200	0
	201 / 401	380	300			
	202 / 402	300	280			
	203 / 403	280	240			
	205 / 405	260	200			
	207 / 407	240	160			
	210 / 410	220	150			
	215 / 415	200	140			
	220 / 420	180	130		4100	205
	225 / 425					
	230 / 430					
	240 / 440					
	450					
	460					
	475					

※Note：

1. The above motor internal parameters are not used in V/F Control Mode.
   These parameters are used for vector control mode only.

2. The motor parameters (A168~A172) are not be modified when factory setting
   under vector mode. The internal parameters will be maintained after auto
   tuning (refer to Auto Tuning and Description on motor Internal Parameter).

3. The motor parameters (A168~A172) will be modified to factory setting
   completely under any operation mode. When conducting factory setting,
   change the Drive Horsepower code (A175).

Appendix 2: N3 parameter setting list

Customer				Inverter Model				
Using Site				Contact Phone				
Address								
Parameter Code	Setting Content	Parameter Code	Setting Content	Parameter Code	Setting Content	Parameter Code	Setting Content	Parameter Code	Setting Content
---	---	---	---	---	---	---	---	---	---
A000		A040		A080		A120		A160	
A001		A041		A081		A121		A161	
A002		A042		A082		A122		A162	
A003		A043		A083		A123		A163	
A004		A044		A084		A124		A164	
A005		A045		A085		A125		A165	
A006		A046		A086		A126		A166	
A007		A047		A087		A127		A167	
A008		A048		A088		A128		A168	
A009		A049		A089		A129		A169	
A010		A050		A090		A130		A170	
A011		A051		A091		A131		A171	
A012		A052		A092		A132		A172	
A013		A053		A093		A133		A173	
A014		A054		A094		A134		A174	
A015		A055		A095		A135		A175	
A016		A056		A096		A136		A176	
A017		A057		A097		A137		A177	
A018		A058		A098		A138		A178	
A019		A059		A099		A139		A179	
A020		A060		A100		A140		A179	
A021		A061		A101		A141		A180	
A022		A062		A102		A142		A181	
A023		A063		A103		A143		B000	
A024		A064		A104		A144		B001	
A025		A065		A105		A145		B02	
A026		A066		A106		A146		B003	
A027		A067		A107		A147		B004	
A028		A068		A108		A148		B005	
A029		A069		A109		A149		B006	
A030		A070		A110		A150		B007	
A031		A071		A111		A151		B008	
A032		A072		A112		A152		B009	
A033		A073		A113		A153		B010	
A034		A074		A114		A154		B011	
A035		A075		A115		A155		B012	
A036		A076		A116		A156		B013	
A037		A077		A117		A157		B014	
A038		A078		A118		A158		B015	
A039		A079		A119		A159		B016	

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Distributor

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